National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science

Exotic Plant Management Team Program

2010 Annual Report

Natural Resource Report NPS/NRSS/NRR—2011/459

ON THE COVER
Top center – Olympic National Park, North Coast/Cascades Network EPMT; Center left –Badlands National Park, Northern Great Plains EPMT; Center center – Wrangell-St.Elias National Park and Preserve, Alaska EPMT; Center right – Point Reyes National Seashore, California EPMT; Bottom left – Black Canyon of the Gunnison, Lake Mead EPMT; Bottom center – Bighorn Canyon National Recreation Area, Northern Rocky Mountain EPMT; Bottom right – Rock Creek Park, National Capital Region EPMT.

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Exotic Plant Management Team Program

Figure 1: Scotts Bluff National Monument.

Introduction

Invasive species are recognized as one of the major factors contributing to ecosystem change and instability throughout the world. The National Park Service (NPS) protects some of the most iconic and ecologically important areas in the United States. Invasive species are altering the native and cultural landscapes invirtually every unit of the National Park Service.The Exotic Plant Management Team (EPMT)Program was created and serves as a critical resource to strategically manageinvasive plant populations that are threateningthese treasured landscapes.

The teams are recognized as technical experts and leaders in invasive plant management, both withinNational Park Service and by partners. The success of the programcan be attributed to several factors: an expert and highly trained workforce, designing teams to meet park needs, anda highly mobile workforce able to respond changing problems and conditions. The EPMT program provides a wide range of services to parks including inventory, monitoring, treatment, restoration of disturbed landscapes, training, facilitation and support of partnership development.Teams work with steering committees and individual parks to identify management needs and priorities.

Invasive species are introduced and spread in parks through visitors, roads, trails, waterways, maintenance activities, construction, wildlife, and from adjacent lands. Management of invasive species requires coordination across a variety of NPS programs and with land owners that surround parks. The teams facilitate partnerships with adjacent landowners, state and federal agencies and local organization to promote education, awareness and coordinated management of invasive species at a landscape scale.

The program was first established in 2000 with four teams serving 99 parks. The program reached its current size in 2003 with 16 teams that now serve more than 230 parks. The program continues to evolve in response to increasing threats from invasive plants and the ability of parks to respond to these threats. The EPMT program is undergoing a programmatic review that will be completedin 2011. The review is intended togauge the success of the programand suggest modifications to better serve the needs of the parks. An implementation plan that addresses the recommendations and findings from the report will be developed following approval of the review.

Figure 2: Blue Ridge Mountains.

Two new Exotic Plant Management Teams, the Southeast Coast EPMT based out of Congaree National Park and Heartland Network EPMT headquartered at Wilson's Creek National Battlefield, have been established. These teams are not formally part of the National EPMT network, but function in much the same way as the national teams. Accomplishments for the Southeast Coast team are reported in the following pages. The 2011 report will present accomplishments for both teams.

This report contains a summary of the 2010 accomplishmentsfor each team. Any questions regarding the EPMT Programcan be directed to Rita Beard, Program Coordinator, rita_beard@nps.gov.

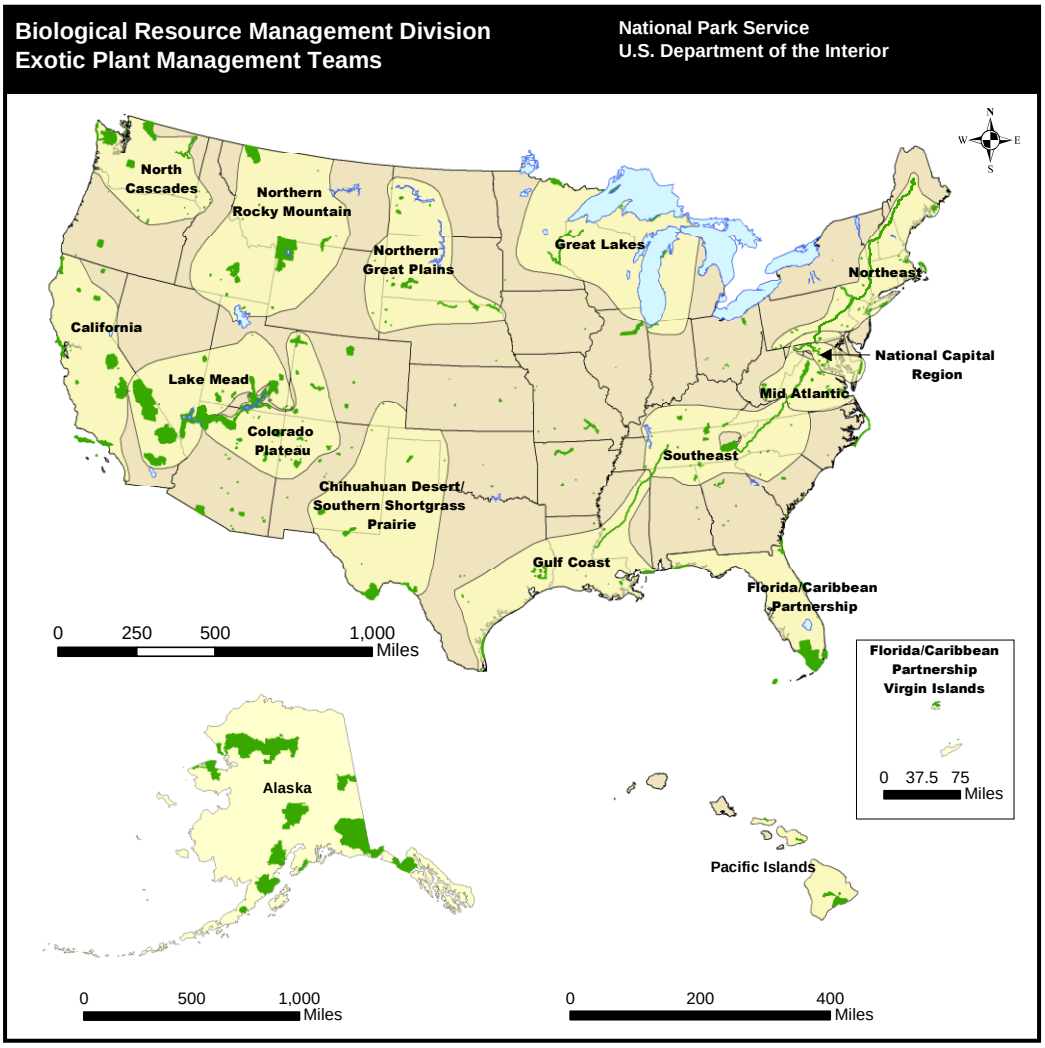


Figure 3.The Exotic Plant Management Teams.

Alaska Region

Alaska EPMT based in the Alaska Regional Office serving parks throughout Alaska.

Pacific Region

California EPMT based at Point Reyes National Seashore.

Lake Mead EPMT based at Lake Mead National Recreation Area.

North Cascades EPMT based at North Cascades National Park.

Pacific Islands EPMT based at Haleakala National Park.

Intermountain Region

Chihuahua Desert/Southern Shortgrass Prairie EPMT based at Carlsbad Caverns National Park.

Colorado Plateau EPMT based at Petrified Forest National Park.

Gulf Coast EPMT based at Big Thicket National Park.

Northern Rocky Mountain EPMTbased at Yellowstone National Park.

Midwest Region

Great Lakes EPMT based at the Great Lakes Inventory and Monitoring Network Office.

Northern Great Plains EPMT based at Theodore Roosevelt National Park.

Northeast Region

Mid Atlantic Cooperative EPMT based at Shenandoah National Park.

Northeast EPMT based at Delaware Water Gap National Recreation Area.

National Capital Region

National Capitol Region EPMT based at Rock Creek Park.

Southeast Region

Southeast EPMT based at Blue Ridge Parkway.

Florida Caribbean Partnership EPMT based in Palmetto Bay, Florida.

Accomplishments
The EPMT program provides critical assistance to parks in invasive plant management efforts. In the relatively short period since the implementation of the EPMT program, the teams have made significant strides in reducing the introduction and spread of invasive plants in and around parks.The teams spend more time on treatments than any other single aspect of invasive plant management. Since the creation of the EPMT program in 2000, the teams have inventoried 86,947,985 acres* and treated 107,835 acres. These numbers represent valuable accomplishments in achieving invasive plant management goals. In addition to quantifiable goals, many accomplishments achieved by the teams cannot be summarized with numerical statistics.

2010 Accomplishments	
Treated Acres	15,474
Inventoried Acres*	16,417,947
Monitored Acres	514,003
Gross Infested Acres	79,717
Infested Acres	30,971
Restored Acres	78

Figure 4.2010 Program accomplishments.
*Inventoried acres includes lands outside of national parks.

Management Strategies
In concert with NPS policy the teams use an integrated pest management (IPM) approach to controlling invasive plants; choosing methods which that are the most effective and have the least environmental impact. A variety of tools and techniques are considered including manual, mechanical, biological and chemical.

Treatment
The teams employ a variety of treatment methods including manual, mechanical, biological and chemical. Treatment methods can range from prescribed burns, requiring extensive planning and cooperation from local fire managers to hand pulling individual stems by volunteer groups. The teams spend more time on treatment and control than any other single aspect of invasive plant management. In 201015,474 acres were treated. Of these, 1,535 were retreated acres.

The California EPMT in cooperation with Point Reyes National Seashore is using a combination of prescribed burning and herbicide treatments to control expanding scotch broom populations. Fire is used to provide initial control and to encourage germination of scotch broom seeds in the soil. The following year areas are chemically treated leading to more than 90% control of scotch broom in treated areas.

Aerial spraying allows teams to access and treat large remote areas. The Northern Great Plains EPMT is using aerial spraying to treat thousands of acres of leafy spurge (*Euphorbia esula*), Canada thistle (*Cirsiumarvense*), and common mullein (*Verbascumthapsus*). Populations in these parks have declined by more than 70% since the program began. In Everglades National park, the Florida EPMT is using aerial spraying to treat remote infestations of Australian pine (*Casuarinaequistetifolia*). In Alaska, the Alaska EPMT is able to use manual removal of individual stems of dandelions (*Leontodonautumnalis*) and hawksbeard (*Crepistectorum*). The team's expertise enables using the best tool for on the ground needs.

Figure 5: Prescribed burn for Scotch broom at Point Reyes National Seashore.

Inventory
Inventoriesdescribe the location and abundance of invasive species allowing parks to prepare plans and set priorities for management. Several NPS programs contribute to inventories including the EPMTs, Inventory and Monitoring Program, and park resource managers. Invasive plant inventories are critical to understanding the threats facing park resources and provide a basis for developing and refining resource management plans. Approximately 5 – 10% of park lands have been inventoried for invasive species. Frequently inventories occur alongside treatment projects and allow

managers to employ an early detection and rapid response plan.

During the 2010 season, the teams inventoried nearly 16.5 million acres. Working with partners, the Florida-EPMT inventoried over 16 million acres using aerial sketch mapping, a techniqueperfected by the Forest Service for forest insect and disease detection. This method of inventory allows resource managers to map large and inaccessible areas. Cooperative mapping allows invasive species to be managed on a landscape scale facilitating management across ownerships.

Funding from the American Recovery and Reinvestment Act of 2009 (ARRA) allowed the Alaska team complete extensive surveys in Alaskan parks. Most of the Alaska parklands have yet to be surveyed. Inventories concentrated on priority areas with a high probability of invasion such as roads, trails and landing strips. The inventories yielded several new invasive species and new populations. These findings will inform management strategies and treatment plans in the upcoming years.

The inventories completed by all teams during the 2010 field season revealed that there were 79,717 gross infested acres and 30,971 infested acres. Gross infested acres represent the general perimeter of an area containing infestations. Infested acres represents the actual canopy or leaf cover estimated for identified infestations. For more information please see Appendix B.

Monitoring

Monitoringisused todetermine changes in invasive populations,treatment effectiveness, response of native plant communities to treatment, and the success of restoration activities. In 2010, the teams monitored more than514,003 acres. Monitoring allows teams toadjust management in response to observations, new information and changing conditions, adaptive management. At Cape Cod National Seashore, the Northeast EPMT is working with the park to refinemanagement techniques to control Oriental bittersweet (*Celastrusorbiculatus*) and Canada thistle (*Cirsiumarvense*). These invasive plants are threatening native dune morphology and habitat for the threatened plover (*Charadriusmelodrus*) and other native species.Treatment has resulted in significant declines in these invasive plants speciesbut has also createdan ecological opening for increasing invasive grass populations. The team and park are working toalter the timing of mowing and herbicide applications to control the entire spectrum of invasive species and favor recovery of native species.

The Lake Mead EPMT is monitoring riparian sites following removal of the invasive species tamarisk. Information is being gathered on abundance of native and invasive species following treatment including the rate of native shrub species recoveryand the presence of invasive species. Any invasive species present are documented and then treated including reinvading tamarisk. This information is being used to guide management throughout the area.

Figure 6: Monitoring stiltgrass treatment along the Appalachian Trail.

Restoration

The ultimate goal of the EPMT program is to facilitate the restoration of park ecosystems to native dominated communities. The actions taken by the teams and parks in managing invasive plants contribute to restoration through both passive and active restoration avenues. Treatment of infestations may reduce invasive populations to the point where native species

regain dominance. This allows for passive recovery, requiring no further action. Ecosystems that have been highly altered by invasive plants may requirerestoration actions to restore native dominance, such as planting of native species. In the 2010 season, the teams restored over 78 acres.

The North Coast Cascades Network EPMT is working on a restoration project at John Day Fossil Beds to restore native steelhead trout habitat. This project requires treatment of invasive Russian knapweed (*Rhaponticumrepens*) and perennial pepperweed (*Lepidiumlatifolium*), followed by planting of native willows and cottonwoods. Planting native species is critical to prevent reinvasion from invasive plants. Along the gulf coast, the Gulf Coast EPMT is working to restore the lowland forests damaged by hurricanes. The team is removing the invasive mimosa (*Albizia mimosa*) and paulownia (*Paulownia tormentosa*) trees, allowing the native tree species to regenerate naturally.Predicting the response of ecosystems to the removal of a particular invasive species, or suite of species, is often highly variable and requires field based expertise to achieve best results.

Figure 7: Dead tamarisk along Green River resulting from tamarisk leaf beetle.

Prevention

Prevention are actions that prevent or retard the introduction, establishment, and distribution of invasive plant species. Prevention is the most efficient management strategy for invasive species. Teams work with park staff to institute prevention practices into all aspects of park operations. Working with parks to incorporate invasive plant management into planned construction and maintenance activities is one of the ways the EPMTs build prevention activities into park operations. Prevention can include a wide variety of techniques include cleaning field equipment such as boots, tools, and vehicles, selecting routes in and out of an infestation to minimize potential dispersal, using certified weed seed free construction and restoration materials. Teams also work with weed management groups and adjacent communities to adopt prevention strategies on a landscape scale. The North Coast Cascades Network-EPMT has worked with partner parks to treat invasive plants along roadways and riparian corridors to prevent further distribution along this pathway.

Early Detection and Rapid Response

Early Detection and Rapid Response (EDRR) is part of the EPMT prevention program; identify a new infestation or invasive species and respond before the species has a chance to establish and spread. Treating an invasive species soon after introduction is the most cost effective time and greatly increases the possibility of control or eradication. The teams coordinate with local, regional and national information systems to share distribution information on invasive species, focusing on new species and new populations. locations. The National Capital Region EPMT is collaborating with the Wavyleaf Basket Grass Task Force and the Anacostia Watershed Society to implement EDRR protocols to prevent the spread of this highly invasive plant.

Cooperation and Collaboration

In addition to working within NPS, the teams facilitate collaborative efforts across park boundaries, fostering partnerships and cooperation with adjacent landowners, cooperative weed management areas (CWMAs), state offices, tribal governments, and federal agencies to more effectively manage invasive plants on a landscape scale. These partnerships provide more efficient invasive plant control over broader areas and protect parks from invasive population outside park boundaries. These partnerships also allow the teams to leverage funding with partners and cooperating entities.

The Southeast EPMT is working with the U.S. Fish and Wildlife Service and staff from Big South Fork National Park to remove the invasive mimosa tree from river scour prairies along miles of the Big

South Fork River in Tennessee. This collaboration is critical to preserve this rare ecosystem and keep mimosa from reinvading the park. The Southeast EPMT is also working with numerous organizations to create the Blue Ridge Parkway Cooperative Weed Management Area to manage invasive plants along the scenic byway. Roads and vehicles are well known pathways for invasive plants. Controlling invasive plants along the parkway not only preserves natural flora, this prevents the parkway from becoming a source of invasive plants for adjacent lands. The North Coast Cascades Network EPMT has begun a multiyear agreement with the Quinault Tribe, Olympic National Forest and Olympic National Park to treat knotweed populations throughout the Quinault River watershed.

Research

The teams work with parks, the U.S. Geological Service and universities to determine the efficacy of management strategiesin the field. In addition, the teams are involved in research to help refine management strategies to help determine when passive or active restoration activities may be needed. The Lake Mead EPMT is working with partners to research the response of ecosystems in the wake of removing tamarisk.

The Northern Rocky Mountainand Chihuahuan Desert Shortgrass Prairie EPMTs are working with researchers on test plots to assess the efficacy of new herbicide treatments in controlling cheatgrass and yellow toadflax. This research will provide information into future management activtiies. Asiatic sand sedge (*Carexkobomugi*) is increasingly infesting dunes along the coast of New Jersey. The Northeast EPMT is working with a local university on test plots to determine effective treatment methods for this poorly understood invasive plant.

Outreach and Education

Outreach and education are critical to successful management of invasive plants. Audiences range from visitors to park staff and park partners. Teams work with parks, cooperative weed management areas, friends groups, and many other groups to educate citizens, land managers, and resource users about the issues invasive species can introduce or exacerbate.

The Northern Great Plains EPMT holds herbicide applicator trainings for both EPMT and parks staff to ensure new staff are educated on the best practices in safely applying herbicides in the field. Pamphlets developed by the Alaska EPMT have helped the numerous concessionaires in Alaskan parks learn to identify and report infestations of invasive plants. Many non-native species play a role in historic and culturally important resources within national parks. The Great Lakes EPMT is working with partner parks to establish a balance between maintaining the culturally significant historic landscape while moving forward with restoringnative ecosystems. The Mid Atlantic EPMT is working with partner parks to establish sustainable volunteer programs to help educated the public about invasive plants and to assist with manual treatment methods within parks.

Figure 8: Volunteers assist with locating and removing invasive plants along the Appalachian Trail.

Future of the Program

Effective management of invasive species requires continued vigilance. Seeds can remain viable in the soil for more than 20 years. To maintain the accomplishments of the teams, parks and teams must be able to monitor and continue treatment. Teams have reduced the cover of invasive plants to less than 1% over thousands of acres, but if not monitored or treated the areas can quickly be re-infested by invasive plants.Invasive species have the ability to affect all aspects of park management and require a cohesive management approach that considers input from a multidisciplinary perspective.

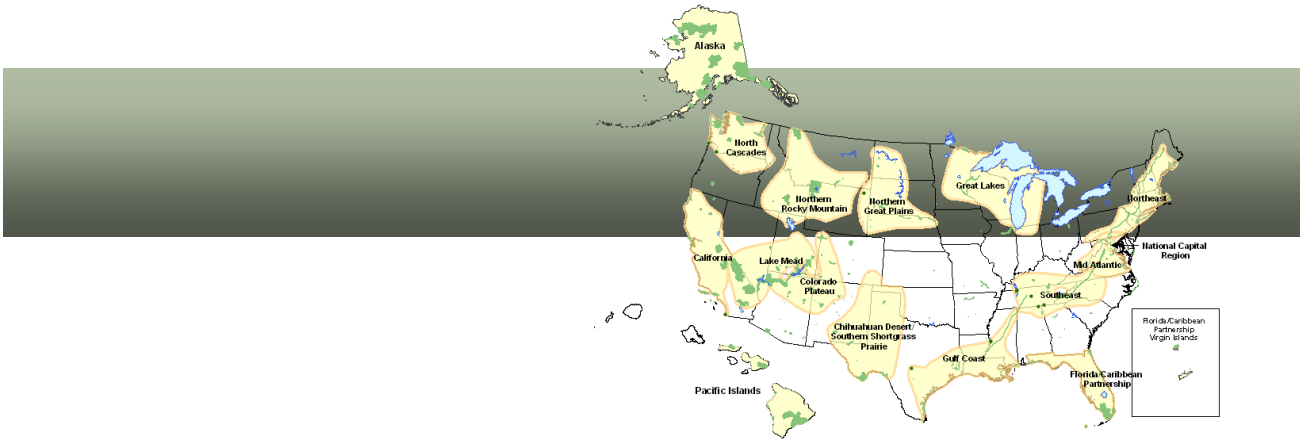
The EPMT program, like many others, is facing the challengeof maintaining services. Less than 10% of parklands have been inventoried for invasive species. Of the 395 national park units, the EPMT program currently assists only 229 parks with invasive plant management. Despite

the success of the EPMTs collaborations with partner parks, there are extensive areas infested with invasive plants that remain untreated. It is estimated that NPS treats less than 5% of known infestations each year. Climate change, introduction of new invasive species, changing fire regimes, habitat fragmentation are all processes that will increase invasive species pressure on native ecosystems.

Safety

The Exotic Plant Management Teams often work in demanding and hazardous conditions. Treatments may require the use of potentially hazardous equipment such as chainsaws, weed wrenches, ATVs, and helicopters. Crews must often hike for long distances, carrying heavy loads and navigate remote, steep, and uneven terrain. Pack stock and technical climbing equipment areused to reach remote invasive plant infestations.

To manage these hazardous working conditions the EPMT program emphasizes safety and caution in all operations. Each team prepares a job hazard analysis for every type of operation. These analyses are updated frequently to reflect current conditions. On the job safety meetings are held frequently, reinforcing good safety practices. The teams work with each park to ensure that the safety plans and hazardous analyses meet park standards and local environmental conditions. The teams have recorded 958,648 field hours over the last 10 years with very few lost time injuries, representing less than .02% percent of the field hours.Theadmirable safety record of EPMT program is a testament to dedication and expertise of the teams.



Team Reports

Alaska
Exotic Plant Management Team

Figure 1: Kenai Fjords National Park.

The Alaska Exotic Plant Management Team (EPMT) provides invasive plant management assistance to each of the 16 national parks in Alaska. These parks cover over 52 million acres of pristine natural areas and wilderness, including coastal fjords, glacial valleys, tundra, and boreal forests.

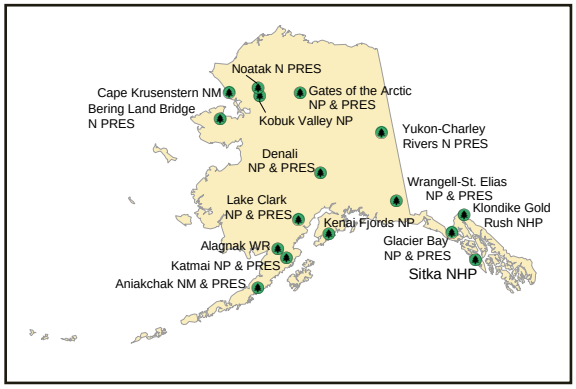


Figure 2: Alaska EPMT partner parks.

The geography of Alaska plays a leading role in the levels of invasive plant infestations and the strategies employed by the Alaska EPMT to manage these infestations. The majority of national parks in Alaska contain healthy, intact native ecosystems with very low levels of invasive plant infestations. Most parks have limited or minimal road access, multiple dispersed backcountry uses, such as concessionaires, subsistence, airstrips, or public use cabins, and require a significant investment of time and money to access. These factors directly shape the structure of the Alaska EPMT program. The Alaska EPMT allocates dedicated staff and resources to specific parks for entire seasons to improve the local knowledge base, reduce the amount of resources being directed towards travelling between parks, and more efficiently manage front country infestations.

The low level of infestation and grand scale of the landscape allows the Alaska EPMT to focus on two primary goals: 1) early detection and rapid response (EDRR) of new invasive plant populations, and 2) education and outreach.

The 2010 field season was especially productive for the Alaska EPMT, in large part due to two American Recovery and Reinvestment Act projects which funded additional seasonal hiring to assist with invasive plant management. These projects produced over 17,000 works hours, nearly two thirds of the total youth hours for the entire NPS in Alaska.

Figure 3: Alaska EPMT staff and an American Recovery and Reinvestment Act funded SAGA crew at Wonder Lake in Denali NP.

This increase in person hours, a 100% increase over 2009 efforts, allowed the Alaska EPMT to greatly increase the amount of EDRR activities performed on the ground. EDRR is particularly

important in Alaskan parks given the large scale of the landscapes being managed and the pristine nature of many of the ecosystems found within the parks. At Wrangell-St. Elias National Park, the 2010 Alaska EPMT crew was able to inventory or monitor over 1,400 acres – a 500% increase over 2009 efforts. The crew was able to access backcountry public use cabins, trails, and airstrips that had never been surveyed for invasive plants. Most areas were still in pristine condition; however several airstrips had small infestations that were immediately treated. These infestations could easily have been transported to more remote locations in the park had they not been discovered and controlled.

Figure 3: The Alaska-EPMT uses a wide variety of methods to inventory for invasive weeds.

The 2010 season was the first time Alaska EPMT staff was stationed at Katmai National Park and Preserve. These staff members focused on inventory and EDRR efforts around the popular Brooks Camp area of the park. During the course of the season the team discovered three invasive species that had never been documented within the park before: bird vetch (*Vicia cracca*), fall dandelion (*Leontodon autumnalis*), and narrowleaf hawksbeard (*Crepis tectorum*). These infestations were all still relatively small and were controlled immediately after detection.

The increased EDRR efforts at all parks this season will greatly increase the efficacy of next year's planned herbicide treatments by providing more detailed infestation data and better allowing park managers and Alaska EPMT staff to prioritize treatment areas based on species and infestation size.

Education and outreach activities play a critical role in the Alaska EPMT management strategies. Alaska EPMT staff are consistently working to increase the amount of outreach with neighboring land managers, park staff, and park visitors. Through collaboration with the Alaska Committee on Noxious and Invasive Plant Management, the Alaska EPMT was able to increase work across jurisdictional boundaries and share information on species discoveries across the state. The discovery of infestations of common tansy in the vicinity of Wrangell-St. Elias and bird vetch outside of Kenai Fjords National Park was shared between land managers, improving the potential for eradicating these infestations.

Alaska EPMT staff is also improving communication with parks by engaging park concessionaire staff through invasive plant identification pamphlets and classes. This outreach led to the discovery of several new infestations of narrowleaf hawksbeard in Denali National Park.

Figure 4: Alaska-EPMT perform the "Weed Blues" –at the Fireweed Festival in Copper Center, AK.

The Alaska EPMT will continue to focus on EDRR and education and outreach to prevent the establishment of invasive species in the pristine landscapes protected within NPS.

2010 Accomplishments	
Treated Acres	70
Inventoried Acres	1,365
Monitored Acres	1,800
Gross Infested Acres	1,290
Infested Acres	419
Restored Acres	0

California
Exotic Plant Management Team

Figure 1: Team members approach work site at Yosemite National Park.

The California Exotic Plant Management Program (EPMT), based out of Point Reyes National Seashore, serves 14 parks within the California Floristic Province. This is a zone of Mediterranean-type climate, having high levels of plant endemism, and has been designated by The Nature Conservancy as a "global biodiversity hotspot". The California EPMT works in a variety of ecosystems ranging from coastalscrub at Channel Islands National Park to montane forests in Sequoia and Kings Canyon National Parks.

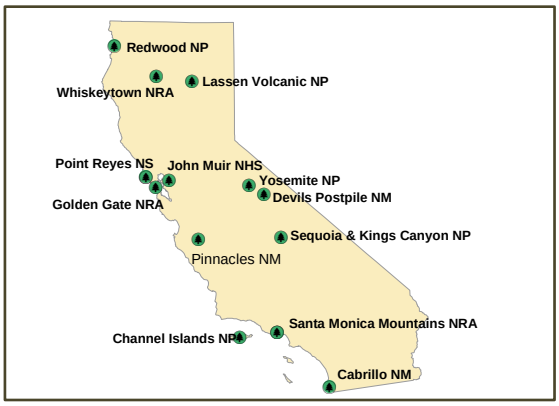


Figure 2: California-EPMT partner parks and work area.

The California EPMT uses a mixture of park staff, contractors, and volunteers to complete planned projects. California's diverse physical environment requires a variety of technical skills and extensive planning. Projects require a diversity of tactics including rappelling steep slopes in Yosemite

National Park and application of prescribed fire in Pinnacles National Monument. This year the California EPMT has emphasized sustaining the substantial gains that have been made in controlling invasive plant populations throughout the area. The majority of treatments were monitoring and retreatment on formerly treated sites. This strategy coupled with treating new and outlying populations is intended to reduce the overall impact of invasive species in native vegetation.

The California EPMT is working with parks to treat multiple invasive species over increasingly large project areas. This annual report for the Calfornia EPMT will focus on one of the team's largest projects, yellow starthistle (*Centaurea solstitialis*) treatment at Pinnacles National Monument. The park recently acquired a 2,000 acre parcel of rare valley-oak savannah, with more than 200 acres dominated by yellow starthistle. Restoring the site is a high priority for the park using integrated pest management techniques. This a cooperative project supported by an extensive network of partnerships. The California EPMT has helped the park leverage funds from NPS special project funding, the San Francisco Bay Network Fire Program, Bureau of Land Management, and San Benito County Weed Management Area.

The project was initiated in 2009 with a 130-acre burn to flush the seedbank. Herbicides were applied to favor recovery of native forbs and grasses. Outlying areas were treated with a combination of mowing, goat grazing, and digging. In 2010, over 180 acres of densely infested yellow starthistle were treated; 130 acres within the relatively flat bottomlands, and 50 acres in outlying areas. Treatment will continue into the 2012 season. Areas within the 130-acre prescribed burn site are expected to be controlled by the end of 2012.

Yellow starthistle is a major invasive species in much of California. Monitoring is a critical part of this project, so that outcomes could be applied to infestations throughout the area. Plant community response to treatments and restoration techniques were monitored. A grid-based mapping of invasive and native cover was used to quantify species diversity and composition in response to treatments (natives and non-natives).

Ten experimental test plots were set up in the bottomlands at the beginning of the project and plant community characteristics were sampled. Seedling plugs and seed-drill methods were compared and preliminary observations appear to show that the seed drill technique to be an effective way to reestablish a foundation of native perennial grasses within the bottomlands. These techniques will be adapted to restore the remainder of this site and other historically disturbed site within the ecosystem.

Figure 3: Infestation of yellow starthistle.

Information from this work will be compiled and presented to the scientific community. As the site is restored, the location and accessibility of this site make this area an ideal site to interpret invasive species and restoration for park visitors. This project demonstrates the integration of management, monitoring and research, establishing management techniques and protocols in this important California plant community.

The California EPMT program is becoming more efficient with a reduction in the time spent in the field and an increase in acres treated. In light of the magnitude of the issue, and the reality of shrinking budgets, we have been learning on an annual basis how to maximize our efforts by using tools that increase our efficiency. The combination of mechanical, physical and chemical tools to treat the sites, such as tractors, helicopters, and the application of fire to the landscape, has reduced treatment time and increased our ability to manage more acres. Almost 14 percent (or 290,436 acres) of the California EPMT partner parks 2.1 million acres are infested with invasive species Finding the most efficient, effective methods with the least environmental impact are an important consideration in protecting the parks native habitats.

Figure 4: Prescribed burn at PinnaclesNational Monument being used to treat yellow starthistle.

2010 Accomplishments	
Treated Acres	208
Inventoried Acres	1,285
Monitored Acres	2,196
Gross Infested Acres	1,868
Infested Acres	208
Restored Acres	0

Figure 1: Black Canyon, Lake Mead National Recreation Area.

The Lake Mead Exotic Plant Management Team (EPMT) works with 17 partner parks throughout the southwest United States. The Lake Mead EPMT goals focus on: 1) providing implementation expertise in the selective control of high priority weeds from priority areas to preserve, restore and maintain native plant communities 2) working to professionalize invasive plant management within the NPS and other partners by developing staff expertise 3) serving as a model for interagency cooperation by developing partnerships to effectively manage weeds on a landscape level. Partnerships are integral to the team's success.

Figure 2: Lake Mead-EPMT partner parks and work

In addition to working with partner parks, the team works with U.S. Fish and Wildlife Service, Bureau of Land Management, U.S. Forest Service, Bureau of Indian Affairs, Bureau of Reclamation, and other state and local entities throughout the southwest impacting millions of acres. The team has been successful in working with these partners to leverage each NPS base dollar with 2-3 additional dollars on an annual basis. These partnerships facilitate weed management across agency boundaries and increase our capacity to serve NPS units.

Figure 3: Lake Mead-EPMT and park crew at Canyon de Chelly Russian olive control site.

Some highlights of the team include:

- Responsible for elimination of virtually all tamarisk populations at Mojave NP, Zion NP, Joshua Tree National Park, Death Valley National Park, Colorado National Monument, Mesa Verde National Park, Hubbell Trading Post National Historic Site, and Bent's Old Fort National Historic Site.
- Russian Olive elimination at three NPS units.
- Protecting Historic Zion Lodge from potential wildfire by treating cheatgrass to reduce the surrounding hazard fuels.
- Completed treatment of smooth brome in East Creek Meadow at Bryce Canyon.
- Controlled ravenna grass in two remote drainages preventing it from spreading throughout the region at Glen Canyon.
- Controlled fountain grass at Joshua Tree, Lake Mead and in bordering BLM lands.
- Protected Kelso Dunes from Saharan mustard invasion and conducted control of six early detection species at Mojave NP.
- Completed tamarisk control along twelve miles of the Verde River in the Prescott NF.
- Led volunteers in two Cooperative Weed Management Areas.

The team partners with the research community to evaluate various treatment methods, post treatment effects, site recovery, and restoration strategies. Several of these research projects involve partnerships with the U.S. Geological Service addressing challenging restoration questions. Some of the restoration issues include tamarisk biological control and subsequent site restoration, post fire tamarisk and annual brome treatments, revegetation, and the evaluation of various treatments of Saharan mustard, Russian knapweed and camelthorn.

The tamarisk leaf beetle, a biological control agent, has the potential to control tamarisk on a watershed scale. The beetle is now present in several park units on the Colorado Plateau and is expanding throughout the region. The team is partnering with researchers to evaluate restoration methods following beetle defoliation of tamarisk. Our response to beetle establishment has been to shift control efforts to other priority species to prevent secondary weed invasion and to assist with revegetation.

In addition the team has been pivotal in the development of the Colorado River Exotic Plant Partnership led by Grand Canyon National Park, Glen Canyon National Recreation Area, and Lake Mead National Recreation Area. This partnership will facilitate these parks working together on early detection of species that may respond to the reduction of tamarisk from biological control.

Figure 4: Lake Mead-EPMT spot treating brome grass at Zion NP, UT after wildfire.

The team continues to conduct active revegetation following removal of dense tamarisk infestations in the Southern Nevada region. Native trees have been successfully established with the increase in soil moisture following tamarisk control. Many of the team's restoration sites, once dominated by monotypic tamarisk thickets, are now lush with native species in just a few short years. It is truly amazing and rewarding to see this transformation occur.

2010 Accomplishments	
Treated Acres	121
Inventoried Acres	5,407
Monitored Acres	1,229
Gross Infested Acres	6,492
Infested Acres	122
Restored Acres	2

Figure 1: Blue Basin at John Day Fossil Beds National Monument.

The North Coast Cascades Exotic Plant Management Team (EPMT) serves fourteen park units across Washington, Oregon and Idaho. The team works with a diverse range of ecosystems from the open range of the Palouse prairie to the high desert of eastern Oregon, along the streams and rivers fed by the glacial North Cascade and Olympic mountains, and in the rainforests of the northwest coast. The North Coast Cascades EPMT focuses on providing professional invasive plant management to its partner parks support projects that restore degraded park habitats, prevent the spread of non-native species into fragile wilderness areas, and expand ecosystem-level partnerships with adjacent landowners.

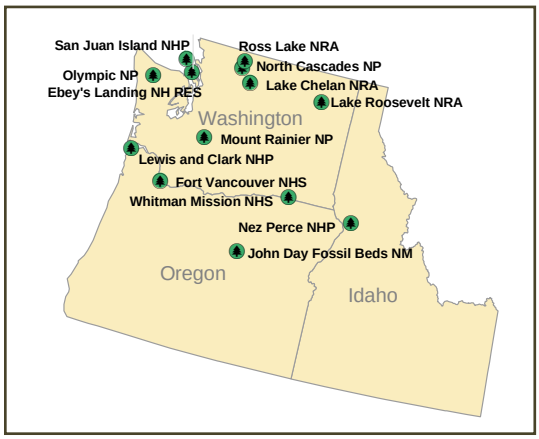


Figure 2: North Coast Cascades Network EPMT partner parks and work area.

The North Coast Cascades EPMT achieves these goals through providing on the ground assistance to 12 park units representing over 100 projects. Many of these projects focus on restoration and planning. In eastern Oregon, the team is working to control Russian knapweed (*Rhaponticum repens*) and perennial pepperweed (*Lepidium latifolium*) at John Day Fossil Beds National Monument (NM). This control work is being implemented in conjunction with the planting of hundreds of willow and cottonwood trees along threatened steelhead trout spawning habitat. Removal of these exotic species is crucial in reestablishing native vegetation that can provide shade to spawning habitat, as well as preventing erosion and sedimentation from seasonal flooding.

Figure 3: Treating blackberry at San Juan Island

The North Coast Cascades EPMT continues to work with a number of park units to rehabilitate sites damaged by wildfire. At Olympic National Park (NP), crews have begun surveys and control efforts to prevent the spread of Canada thistle (*Cirsium arvense*) and herb Robert (*Geranium robertianum*) into adjacent wilderness areas in the wake of the Heatwave fire complex. In the Lake Chelan National

Recreation Area, the team leant its expertise in planning 2011 control efforts to prevent the spread of cheatgrass after the Rainbow Bridge wildfire.

Preventing the spread of invasive plant species from transportation corridors into fragile park ecosystems remains a focus of the North Coast Cascades EPMT. Crews treated infestations along over 200 miles of road and 50 miles of riparian corridor in North Cascades, Olympic, Lewis and Clark, Crater Lake, and Mount Rainer National Parks. At Olympic NP, efforts continued to mitigate the spread of cheatgrass and several other species in conjunction with the improvement of Hurricane Ridge Road. Above the Glines Canyon Dam on the Elwah River, crews treated a variety of species, including Canada thistle, Japanese knotweed, everlasting peavine (*Lathyrus latifolius*), and herb Robert in anticipation of the ground disturbance that will occur in conjunction with the removal of the dam in 2012.

Facilitating partnerships that coordinate management of resources across ownerships is critical to the success of the North Coast Cascades EPMT. Ebey's Landing National Historic Reserve is one of the most unique units in the National Park System. A patchwork of National Park Service, Washington State Parks, Nature Conservancy, Island County, and private land ownerships fall within the boundaries of the reserve. The North Coast Cascades EPMT is participating in a multi-year effort to remove invasive plant species on the reserve, while working to restore native habitat.

Forging partnerships to control Japanese, giant, and Bohemian knotweed in Pacific Northwest watersheds has also been a long-term goal of the North Coast Cascades EPMT. In 2010, the program utilized new authority under the Consolidated Natural Resources Act of 2008 to begin a multi-year agreement with the Quinault Tribe and the Olympic National Forest, controlling knotweed populations throughout multiple ownerships along the Quinault River watershed. Further south along the Washington coast, the team began its second year treating Yellow-flag iris (*Iris pseudacorus*) in wetlands and along riparian corridors around Cape Disappointment, under a memorandum of understanding between Lewis and Clark National Park, and the Washington State Park system.

Figure 4: North Coast Cascades Network EPMT access a test plot for treating Medusahead at John

2010 Accomplishments	
Treated Acres	416
Inventoried Acres	5,896
Monitored Acres	960
Gross Infested Acres	3,729
Infested Acres	524
Restored Acres	0

Pacific Island Exotic Plant Management Team

Figure 1: Pampas grass (*Cortaderia jubata)* in East Maui, Hawai'i.

The Pacific Island Exotic Plant Management Team (EPMT) works with the six national parks located on the Hawaiian Islands to control invasive plants that threaten the islands unique biological resources. The team focuses on developing collaborative partnerships that support effective and efficient use of management resources.

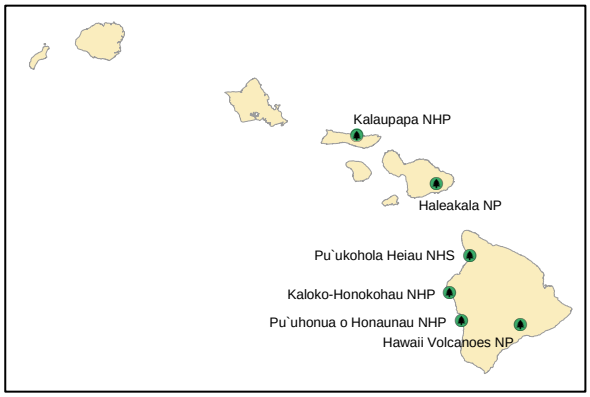


Figure 2: Partner parks and work area for Pacific Island EPMT.

Partnership efforts have significantly increased on-the-ground capacity of the Pacific Islands-EPMT to protect Hawaiian ecosystems on Maui and the Big Island. On the Big Island, the team leveraged its ability by combining efforts with Hawai'i Volcanoes National Park (NP) Resources Management crews. This partnership resulted in control of 27 invasive plant species.

Early detection leading to eradication is considered among the most cost effective management strategies. The Pacific Islands EPMT partnership with Hawai'i Volcanoes (NP) brings together specialized experience and leadership to detect and control incipient infestations. This partnership has led to the early detection and control of seedlings of Padang cassia (*Cinnamomum burmannii*), a highly disruptive tree previously unknown in the park. Pacific Island-EPMT crews also led the continued treatment of Koster's curse (*Clidemia hirta*), a noxious weed first detected in 2003. Control of Koster's curse is complicated by the species aggressive reproduction and occurence on steep slopes. The Pacific Islands EPMT and Hawai'i Volcanoes NP crews have jointly developed techniques to safely access and control these hard to reach plants.

Eradication of widespread invaders presents immense challenges. A highly effective approach developed in Hawai'i Volcanoes NP has been to exclude disruptive weeds from priority areas known as Special Ecological Areas (SEAs). Approximately 30 species have been systematically managed across 77,000 acres using this strategy. These species include Kahili ginger, banana poka, and three invasive species related to blackberry. The Pacific Islands EPMT offers critical support to existing park based crews to systematically remove weeds from existing SEA units. In 2010, these crews removed 62,786 individuals of 14 species. The Pacific Islands EPMT worked collaboratively with park personnel to remove invasive faya tree (*Morella faya*) in a new 827 acre SEA. Faya tree is one of the most damaging pests to Hawaiian ecosystems, considered among the world's top

100 alien species by the International Union for Conservation of Nature (IUCN). The Pacific Islands EPMT facilitated the removal of 13,325 faya tree in 2010.

Figure 3: Crew member removes a juvenile Pampass grass (*Cortaderia jubata*) plant from Haleakala National Park.

The Pacific Islands EPMT continues to lead projects to control disruptive, fire promoting species in key areas of the parks. These efforts protect parkland by directly managing the invasive plants and by augmenting efforts to control wildfire in Hawaiian ecosystems that are poorly adapted to tolerate the fire regimes that typically develop following weed invasion. Notable among these efforts are the knockdown of guinea grass (*Panicum maximum*), an African fire adapted species, over 1,368 acres of coastal lowlands, and the removal of 2,368 silk oak trees (*Grevillea robusta*) from the western boundary of Hawai'i Volcanoes NP.

The Pacific Islands EPMT has maintained its now ten-year commitment to serve as a coordinating entity for the interagency miconia control program on Maui. Miconia (*Miconia calvescens*) is an extremely aggressive invader of island ecosystems, commonly described as the one weed that could destroy Hawaiian rainforests in the period of a single human lifetime. The team benefits from a close working relationship with the Maui Invasive Species Committee (MISC). MISC utilizes funds and a range of expertise from many sources, including State and County agencies, private entities, community development organizations, watershed protection and restoration partnerships, and Federal agencies. The collaborative effort has delayed the miconia invasion and resulting inevitable decline of Hawaiian rainforests by inventorying at least 60,000 acres every year. Employing an aggressive early detection and control program, seven exotic species, including two close relatives of miconia, have been identified and eradicated while still in the incipient stages of invasion on the island of Maui.

As a result of significant collaborative efforts and sound weed management strategies, the Pacific Islands EPMT has achieved many successes. Maintaining existing momentum will be critical to continued successful management and future accomplishments.

2010 Accomplishments	
Treated Acres	1,258
Inventoried Acres	275,759
Monitored Acres	496,510
Gross Infested Acres	18,889
Infested Acres	14,880
Restored Acres	0

Figure 1: Guadalupe Mountains.

The Chihuahuan Desert/Southern Shortgrass Prairie Exotic Plant Management Team (EPMT) serves 14 National Parks ranging across 400 miles of southwestern arid lands in the states of New Mexico, Texas, Colorado and Oklahoma. This network of parks preserves and protects a wide range of unique natural and cultural settings, from Pecos National Historic Park which preserves thousands of years of human history, to Big Bend National Park, a United Nations designated Biosphere Preserve. Collectively, these parks manage more than one million acres.

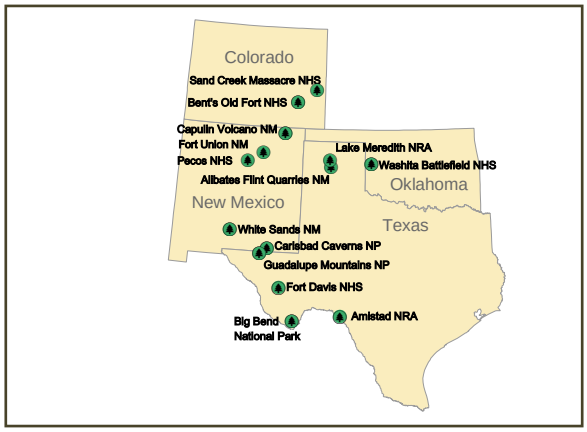


Figure 2: CDSP-EPMT partner parks and work area

The Chihuahuan Desert/Southern Shortgrass Prairie EPMTs primary goals are to conduct treatment operations to reduce invasive plant populations to a maintenance level, work with partner park staff and cooperators to improve early detection and rapid response capabilities (EDRR), and initiate restoration activities to stabilize treated areas.

Prior to establishment of the national parks much of the land in this region was extensively utilized for livestock grazing, minerals extraction, and irrigated row crop production. Today, shifting land use practices have resulted in thousands of acres of being transferred out of agricultural production. The transition of these lands out of intensive use has led to exponential increases in invasive plant infestations. Historically, the Chihuahuan Desert/Southern Shortgrass Prairie EPMT has focused a large portion of its efforts on the control of saltcedar (*Tamarix ramoissima*). This species is of great concern in the arid west due to its ability to rapidly establish monocultures that replace native vegetative communities, leading to impacts on wildlife habitat and an overall reduction in biodiversity. Dedicated treatments have successfully extirpated saltcedar from the majority of park lands in the network. In the wake of this success the team is now shifting its focus to the growing infestations of other invasive plants.

Of particular concern is the rapid increase in populations of invasive grass species, most notably Bufflegrass (*Pennisetum ciliare*), Cheatgrass (*Bromus tectorum*), and Lehmanns lovegrass (*Eragrostis lehmanianna*). These species drastically alter the ecosystems through alteration of fire regimes, decreasing forage utility by wildlife, and outcompeting native grasses for available moisture. The team is working with parks to establish site based treatments. At Bent's Old Fort National Historic Site and Capulin Volcano National Monument, test plots are in place for the second year of treatments assessing the effects of different herbicides and seasonal timing on cheatgrass.

Figure 3: Cheatgrass infestation.

As the threats to park resources are changing, so are the operational strategies of the Chihuahuan Desert/Southern Shortgrass Prairie EPMT. While control of Saltcedar will remain a priority, the team is increasing its utilization of additional tools to better accommodate a focus on multi species management. The team has responded to this challenge by expanding its use of cooperative youth crews such as Americorps, American Conservation Experience, and local Public Lands Corps teams in order to conduct operations on multiple parks simultaneously. The team is also increasing collaboration with regional and park based resources, such as working with fire programs and Inventory and Monitoring networks to improve training and EDRR capabilities.

Figure 4: Saltcedar treatment area at Lake Meredith NRA.

This year the Chihuahuan Desert/Southern Shortgrass Prairie EPMT conducted training sessions with participation of 29 staff members from seven parks. This training included invasive plant management and principles of vegetation management to promote a greater understanding of an integrated ecosystem approach.

The team is working to increase direct support of park restoration needs. At Carlsbad Caverns the Chihuahuan Desert/Southern Shortgrass Prairie EPMT program has assisted the park on a large scale post construction project by providing herbicide treatments, assisting in planting native grass, forbs, and shrubs, and providing technical advice on materials and methods for optimal site restoration.

The team is working with other partner parks restoration efforts through the development of agreements for native seed collection, provision of plant propagation supplies, acquisition of native seed, and technical advice.

2010 Accomplishments	
Treated	165
Inventoried Acres	3,244
Monitored Acres	0
Gross Infested Acres	1,655
Infested Acres	441
Restored Acres	0

Colorado Plateau
Exotic Plant Management Team

Figure 1: Transept Canyon, Grand Canyon National Park.

There are 23 parks within the Colorado Plateau region partnering with the Exotic Plant Management Team program. In 2010, the Colorado Plateau partner parks were served by the Lake Mead Exotic Plant Management Team (EPMT). The Lake Mead EPMT has continued to assist these partner parks to support ongoing invasive plant management efforts, respond to early detection and rapid response priority species, and maintain achievements from previous efforts.

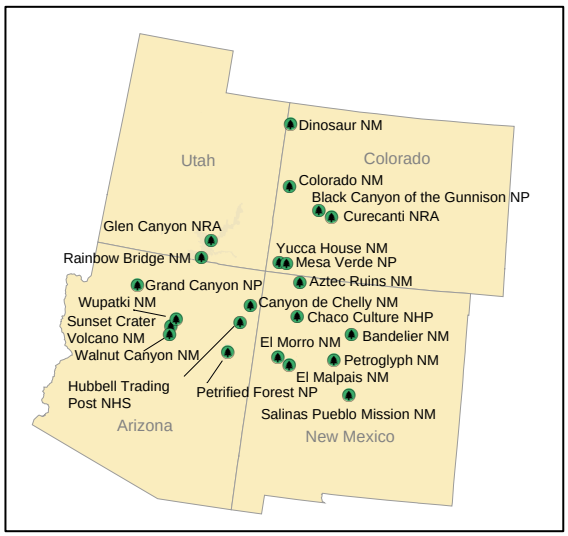


Figure 2: Colorado Plateau EPMT partner parks and work area.

The Lake Mead EPMT worked with staff from Canyon de Chelly National Park to treat 17 acres of Russian olive (*Eleagnus agustifolia*) and tamarisk (*Tamarix spp*.). Part of this project included removing the invasive trees from the Antelope House ruin site. The removal of these invasive trees has opened up the viewshed improving the visitor experience and maintenance of this cultural site. The partnership between the park staff and the Lake Mead EPMT provided improved site management through improved expertise.

Figure 3: Antelope House Ruins, Canyon de Chelly National Park.

The Lake Mead EPMT worked with the Student Conservation Association at Bandalier National Monument to implement an early detection and rapid response (EDRR) strategy. The crew worked to eradicate small infestations of ailanthus (*Ailanthus altisimus*), Russian olive, toadflax (*Linaria genistifolia*), and perennial pepperweed (*Lepidium latifolium*) from 627 acres in backcountry sites. In addition to the

EDRR work, time was allocated to controlling nuisance weeds such as Russian thistle, Kochia and others in the Juniper Campground area. These early detection rapid response projects are very valuable to protect all of the uninfested areas throughout the park.

The team continued work on eradicating Ravenna grass (*Saccharum ravennae)* from drainages of Lake Powell. This grass is currently restricted to approximately 500 acres of remote drainages around Lake Powell. Accessing these drainages requires a significant investment of time involving transportation and establishing backcountry workstations. However, eradicating these remote infestations is critical to preventing the spread throughout Colorado River drainage.

Figure 4: Ravenna grass in Cottonwood Gulch, Glen Canyon NRA.

The team worked with staff at Grand Canyon National Park as part of the parks systematic control of tamarisk in 67 tributaries throughout the Grand Canyon. The park has accomplished a tremendous amount of tamarisk control in these high priority drainages leaving only a few of these tributaries remaining to be treated. The team worked to retreat 30 acres in Transept Canyon. This remote canyon required the use of helicopters to bring in supplies to support the crew.

Controlling Russian olive along the Green River has been a successful longterm effort completed through a partnership with Dinosaur National Monument (NM). The EPMT returned to Dinosaur NM after many years of effort to eradicate the last Russian olive thickets left in the park along the Green River. The crew treated 281 acres. There now remains only a few individual Russian olive trees in the Yampa drainage of the park that will be controlled by local park staff. This is a huge accomplishment achieved through collaboration between the parks staff and the EPMT program.

2010 Accomplishments	
Treated Acres	20
Inventoried Acres	1,247
Monitored Acres	214
Gross Infested Acres	1,461
Infested Acres	21
Restored Acres	0

Figure 1: Neches River in Big Thicket National Preserve.

The Gulf Coast Exotic Plant Management Team (EPMT) spans the Gulf Coast region from Mexico to Florida and includes six partner parks. This is a region of warm year round temperatures, high precipitation, and high plant diversity, including a high diversity of exotic vegetation.

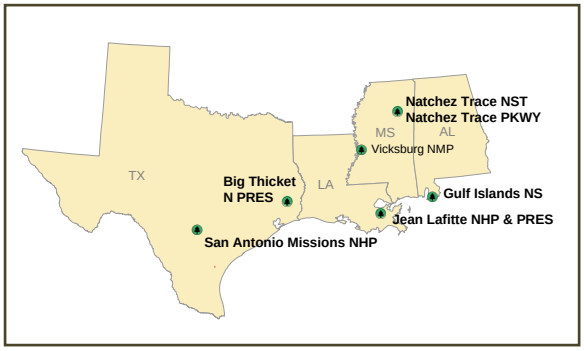


Figure 2: Gulf Coast partner parks and work area

New species of exotic vegetation are discovered annually in our parks and the Gulf Coast EPMT makes every effort to control those new exotic populations before they have a chance to spread to a larger area. The western riparian corridors are infested with Chinaberry tree (*Melia azedarach*), Japanese privet (*Ligustrum japonicum*), Japanese honeysuckle (*Lonicera japonica*), giant cane (*Arundinaria gigantean*), and golden bamboo. In the western upland parks, common invasives include musk thistle (*Carduus nutans*), old world bluestems, and Johnson grass (*Sorghum halepense*). Coastal parks are primarily concerned with invasive grasses such as cogon grass (*Imperata cylindrical*) and phragmites (*Phragmites australis*), which are adapted to low lying wet areas. The lowland forest sites face threats from Chinese tallow tree (*Triadeca sebifera*), royal paulownia (*Paulownia tormentosa)*, and mimosa tree (*Albizia mimosa)*, among many others.

The recent hurricane history in the region has provided ample opportunity for these species to gain a foothold in stressed native ecosystems. Most of the forested ecosystems within the parks have the potential to naturally revegetate after invasive species are removed. Disturbed grasslands within the parks require more active restoration efforts. These sites often need decades to naturally revegetate with native species unless reseeding and weed control are practiced. The focus of our team in the coming years will be to replace these exotic species with suitable, adapted native species, both in an effort to restore native habitats and to prevent re-infestation of exotic species from surrounding exotic plant populations and the remaining seed bank.

The Gulf Coast EPMT is working with San Antonio Missions National Historical Park (NHP) on projects that aim to control invasive plants, promote the use of native plants in landscaping, and develop education materials for the public. The Gulf Coast EPMT and San Antonio Missions NHP work in partnership with interns from the Student Conservation Association (SCA) to accomplish these projects. In addition to working to treat invasive plants the interns participated in the development of an educational outreach program initiated by a four way partnership with the SCA, National Park Service (NPS), Lady Bird Johnson Wildflower Center (LBJ) and the University of Texas (UT). Through this partnership, the SCA interns researched and recommended native plant alternatives to exotic vegetation used in the landscape around the San Antonio area. They developed an interpretive video of common

invasive exotic plants of the San Antonio Missions and surrounding urban areas of San Antonio. These materials will be linked to the LBJ and park websites. Onsite interpretive tours of common exotic species were also provided by the SCA Interns on the San Juan Mission nature trail.

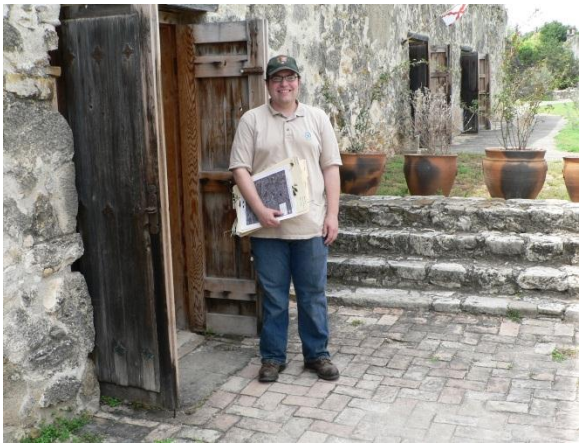


Figure 3: GC-EPMT member preparing an interpretive tour at San Antonio Mission National Historic Park.

Two of the Gulf Coast EPMT partner parks, San Antonio and Vicksburg National Battlefield (NB), have had exotic populations reduced to a maintenance level. San Antonio was plagued by a variety of exotic species that required persistent labor intensive efforts over a period of almost ten years to bring under control. Vicksburg NB was overrun by one primary species, Kudzu that was controlled through using large scale contract operations.

Management efforts in future years will shift from a focus on control to an emphasis on restoration. Initial restoration efforts will focus on grassland habitats. Prairie restoration plans will be in place at several network or proposed network parks including San Antonio Mission NHP, Lyndon Johnson NHP, and Palo Alto Battlefield NHP. Infrastructure required to facilitate the shift to restoration was purchased this year and will be followed by procurement plant materials, seed and supplies in the spring. This is an exciting new horizon for the Gulf Coast EPMT. The ultimate goal of the EPMT program is to restore native ecosystems. Given the extensive infestations and persistence of many invasive plants, site restoration is a great achievement; one that did not always seem feasible.

In addition to the services expected of our Exotic Plant Management Teams, many EPMT Liaisons served as Resource Advisors for the

Figure 4: Experimental treatment plot, team member treats a stump of golden bamboo .

Gulf Oil Spill incident. EPMTs served in all locations from Louisiana to Florida, answering the call when needed. Duties varied from development of Oil Spill Response Plans to directing the cleanup effort. Participation in the oil spill response came at no cost to the EPMTs and actually allowed for additional funding to be channeled into exotic plant control efforts. The Gulf Coast EPMT, will continue to provide important insight to the cleanup and restoration efforts.

2010 Accomplishments	
Treated Acres	657
Inventoried Acres	19,875
Monitored Acres	365
Gross Infested Acres	6,142
Infested Acres	734
Restored Acres	0

Northern Rocky Mountains
Exotic Plant Management Team

Figure 1: Yellowstone National Park.

The Northern Rocky Mountain Exotic Plant Management Team (EPMT) serves 15 partner parks consisting of more than four million acres. These parks are spread across four states (Idaho, Montana, Utah, and Wyoming) and encompass high desert, forests, sub-alpine meadows, sagebrush-steppe, wetland and riparian areas, as well as unique thermal features.

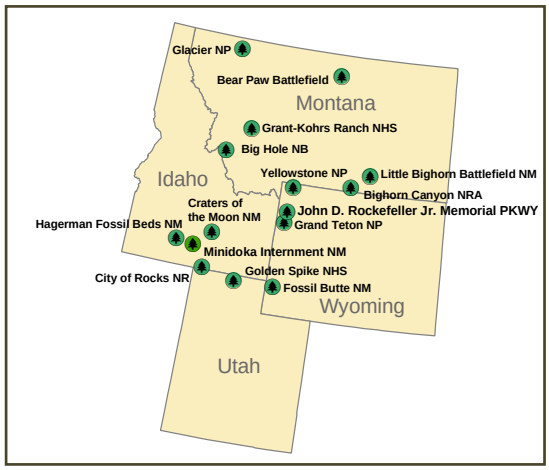


Figure 2: Northern Rocky Mountain-EPMT partner parks and work area.

To accommodate such a large geographic expanse, the team is separated into three crews based out of Glacier National Park, Yellowstone National Park, and Craters of the Moon National Monument and Reserve. The Northern Rocky Mountain EPMTs goals emphasize the systematic, long-term management and control of invasive plant species. Much of the effort is focused on controlling state listed noxious weeds, as well as providing rapid response to new invaders. The team employs a scientifically based Integrated Pest Management approach to ensure that management actions are effective, efficient, and safe for the public and the environment.

The Northern Rocky Mountain EPMT and partner parks work in cooperation with regional weed control organizations such as the Greater Yellowstone Coordinating Committee Weed Sub-committee, Northern Rockies Invasive Plant Council, Montana Weed Control Association, county weed commissions, Montana State University, and others to improve efficient management of infestations across jurisdictional boundaries. The team liaison also works to improve public outreach and prevention education by participating in presentations, workshops, and events with the Montana Weed Awareness Campaign, Society of Range Management, and Yellowstone National Park (NP). The Northern Rocky Mountain-EPMT works on several long-term successful projects with partners. At Grand Teton National Park (NP), the Northern Rocky Mountain-EPMT is working with adjacent land managers to treat populations of Canada thistle (*Cirsium arvense*) and spotted knapweed (*Centaurea stoebe*) in the Gros Ventre River drainage in Wyoming. This collaboration will help the park, the US Fish and Wildlife Service National Elk Refuge, and Teton County to control these two persistent

weeds more effectively than would be possible if each entity worked alone.

The Northern Rocky Mountain EPMT is also continuing to work on very successful projects at Dinosaur National Monument and Bighorn Canyon National Recreation Area to assist these parks in controlling Russian knapweed (*Rhaponticum repens*) and tamarisk (*Tamarix spp.*).

Beginning in 2011, the Northern Rocky Mountain EPMT and Yellowstone staff are planning a new cooperative project with HOLD THE LINE – an Idaho-based group dedicated to keeping leafy spurge and other invaders out of Yellowstone NP and Grand Teton NP.

In order to improve the effectiveness of field work, the Northern Rocky Mountain-EPMT is providing assistance with research into potential new controls for difficult species. In 2008, under the direction of Dr. Peter Rice from Montana State University, the Team established test plots using new herbicide on yellow toadflax (*Linaria vulgaris*) at Grant-Kohrs Ranch National Historic Park (NHP). These successful treatments have been implemented throughout the park. In 2010, the team started a round of tests of various treatments on cheatgrass. These test plots will contribute to future management plans for this ubiquitous species.

2010 has been a safe and productive season for the Northern Rocky Mountain EPMT. After several years of treatments, many targeted populations of invasive plants have been reduced from large monocultures to a few scattered plants. These results represent the hard work of previous seasons.

Figure 4: Yellow toadflax in test plot before (2008) and after (2010) successful treatment with herbicide, 2010.

2010 Accomplishments	
Treated Acres	172
Inventoried Acres	5,435
Monitored Acres	6,182
Gross Infested Acres	8,477
Infested Acres	179
Restored Acres	0

Figure 1: Sleeping Bear Dunes National Lakeshore, Michigan.

The Great Lakes Exotic Plant Management Team (EPMT) provides support to nine national parks located across four states in the western Great Lakes Region. This region includes diverse aquatic and terrestrial ecosystems from the boreal forests of northern Minnesota, to the dunes along the eastern shores of Lake Michigan, and west to the scenic riverways of Wisconsin and Minnesota.

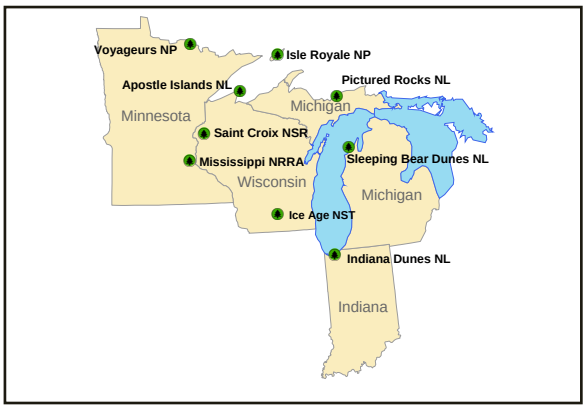


Figure 2: GL EPMT partner parks and work area.

Invasive plants in the Great Lakes EPMT partner parks have historically been those of cultural origin, such as buckthorn, black locust and purple loosestrife. However, visitor use as well as natural and human caused disturbance has more recently introduced a new suite of invasive species problems. The team balances its workload to meet two vastly different needs: (1) long-term, large-scale control and restoration and (2) early detection and eradication of nascent populations.

National parks in the western Great Lakes contain important natural resources, including wilderness areas, as well as cultural heritage resources. The parks and the Great Lakes EPMT work to protect this integrated landscape through several management strategies.

Invasive species that hold historic value are replaced with similar non-invasive species or are managed to prevent spread beyond the historic context. Species known to be invasive that are new to the area are managed with the ultimate goal of eradicating these species or controlling them to prevent additional spread. Part of the challenge in maintaining both the natural and cultural resources within the parks is understanding the interactions and impacts of one resource upon another.

Plants such as forget-me-nots (*Myosotis scorpioides*) and periwinkle (*Vinca minor*) that once graced the gardens and window boxes of early European settlers at Pictured Rocks National Lakeshore are now invading and replacing understories of forest communities. Nonnative trees such as black locust (*Robinia pseudoacacia*), planted to provide firewood and building timber at Sleeping Bear Dunes National Lakeshore, now dominate some forest areas. When these areas became National Parks, these introduced species were slow to move across the landscape. However, these species and others, such as buckthorn along the Mississippi National River and Recreation Area and Tatarian honeysuckle (*Lonicera tatarica*) at Indiana Dunes National Lakeshore, are now rapidly replacing the native plant understory and threatening habitat for other species.

Figure 3: Removal of black locust at Beverly Beach, Indiana Dunes National Lakeshore.

Many parks have been reluctant to view cultural species as problematic due to their role in the park's heritage and their initially slow progression across the landscape. However, current plant inventories indicate that many cultural/ornamental species populations have exploded. These species have begun to significantly impact native habitat.

The parks are also facing challenges from the introduction of new invasive species. Changing land use from private ownership to publically accessible recreation areas has increased the number of introduction pathways providing opportunities for the establishment of "new" invasive species such as wild parsnip, garlic mustard and spotted knapweed. New species appear every year in high visitor use areas and have the potential to spread like wildfire across the landscape. Prevention and early detection are critical to keep many of these species from becoming established. Spotted knapweed seeds carried in kayaks from one of the Apostle Islands to the next will impact sand spit vegetation and nesting areas for the endangered piping plover. Fill contaminated with wild parsnip used in parking lot construction at Pictured Rocks National Lakeshore produces new populations that spread from area to area as visitors travel by car throughout the park.

The Great Lakes EPMT is working with NPS interpreters to create public programs that reduce visitor mediated spread of invasive species through education and prevention activities. The Great Lakes EPMT has assisted the parks with development of large-scale restoration management plans and it continues to update existing recommendations for monitoring and early detection and control of new invaders. Cooperative efforts with the public and gateway communities have helped develop support for larger landscape management efforts both within and outside of park boundaries.

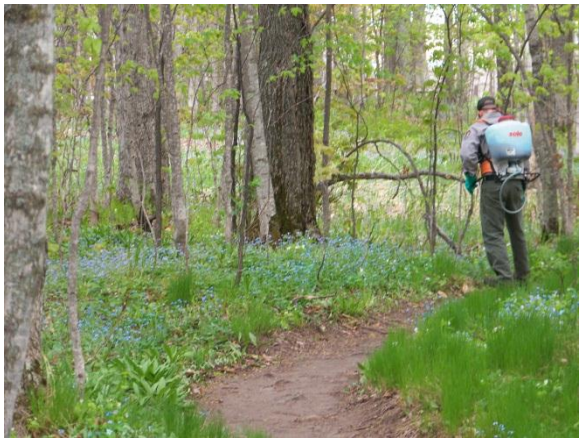


Figure 4: Treatment of Forget-me-nots at Miners Castle, Pictured Rocks National Lakeshore.

2010 Accomplishments	
Treated Acres	75
Inventoried Acres	1273
Monitored Acres	147
Gross Infested Acres	1275
Infested Acres	106
Restored Acres	0

Northern Great Plains
Exotic Plant Management Team

Figure 1: Sunrise at Agate Fossil Beds National Monument.

The Northern Great Plains Exotic Plant Management Team (NGP-EPMT) works with fourteen partner parks in four states and two regions, consisting of more than 452,000 acres. These parks share the characteristics of prairie grasslands but vary in rugged badlands, steep tree covered hills and river valleys. The team goals focus on controlling the spread of invasive species and restoring areas to native plant communities. Emphasis is placed on Integrated Pest Management techniques including chemical control and restoration using manual control, prescribed burning and reseeding. Providing training to park staff and partners on identification, early detection and rapid response, and control techniques is a team priority.

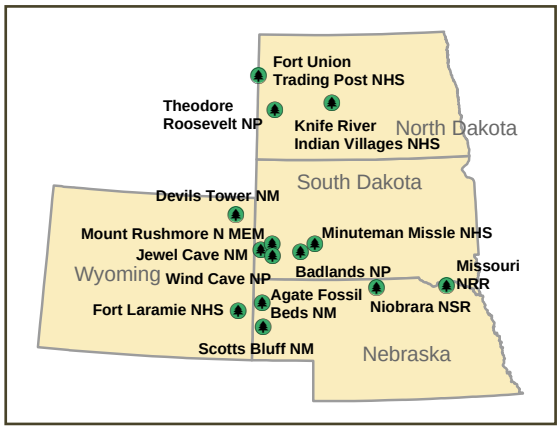


Figure 2: Northern Great Plains EPMT partner parks and work area.

For the past several years, the team has held herbicide applicator training in the spring to teach new staff the field tested techniques of invasive plant management. The training is provided for EPMT seasonal staff as well as staff from the 14 partner parks. This year the training was held at Badlands National Park (NP) in South Dakota. Staff from Badlands NP, Devils Tower National Monument, Wind Cave National Park, and the newly formed Heartland EPMT, attended the training in addition to the EPMT staff. Northern Great Plains EPMT crew members were taught the basics of chemical application as well as global positioning systems (GPS) operation and data collection techniques. Trainees were broken into smaller groups where they worked on various scenarios representing situations they may face while in the field. One day was spent in the field treating exotic vegetation, where crews went through the steps of spraying and mapping infestations as they would be doing the rest of the season.

Figure 3: Northern Great Plains EPMT liaison, Chad Prosser, speaks at the annual herbicide applicator training at Badlands National Park, South Dakota.

The team concentrates the majority of its efforts towards on the ground treatment of invasive plants using herbicides. Working in diverse environments ranging from roadways and campgrounds to wilderness areas, the Northern

Great Plains EPMT employs multiple treatment tools that best fit the location and infestation. Ground crews, comprised of EPMT, park staff and Youth Conservation Crews, work in areas that receive heavy public use such as along roadways, trails, campgrounds and the park boundary, applying herbicides with backpack and ATV mounted sprayers. In the larger parks, ground crews are supported by helicopter contractors that concentrate on spraying in Wilderness and backcountry areas. Aerial application is used to treat thousands of acres of leafy spurge (*Euphorbia esula*), Canada thistle (*Cirsium arvense*) and common mullein (*Verbascum Thapsus*) in Theodore Roosevelt and Badlands National Parks.

Figure 4: Crossing the Little Missouri River in Theodore Roosevelt NP to treat infestations of Russian knapweed.

Vast improvements to the infestation size and densities of exotic vegetation can be seen at all parks. These treatments often require multiple years to achieve desired results. One of the team's greatest accomplishments has been at Agate Fossil Beds NM, where Canada thistle infestations have gone from 105 acres to just over 9 acres in three years.

Restoration of disturbed areas is also an objective of the team. Prairie landscapes at many parks have become dominated by invasive grass species. Although restoration projects require an investment of time and money and are often very slow in showing positive results, they are also very rewarding. Fort Union Trading Post and Knife River Indian Villages in North Dakota have seen some exciting results this past year, after years of restoration work. Fields of exotic smooth brome and crested wheatgrass have been replaced with native grasses so tall, crew members could not see over the plants when walking through the area. A combination of herbicide applications, prescribed fire, haying and reseeding were used to achieve these results.

The team continues to emphasize the early detection and rapid response to new invasive plants at partner parks. Crew members receive training on over 30 species of invasive plants and carry identification materials with them in the field. Additionally, other park staff are also educated on different weed species they may potentially encounter in the field. Maintenance crews have been especially helpful in locating new infestations and informing the team so that the plants can be removed. This year, common mullein was discovered for the first time at Theodore Roosevelt National Park and was promptly treated. A new infestation of houndstongue (*Cynoglossum officinale*) was also discovered and treated at Fort Laramie NHS.

The Northern Great Plains EPMT will continue to focus its efforts on chemical control application methods and restoration projects. Focus will remain on high visitor use areas, park boundaries, avenues of invasion such as rivers, streams, railroads and canals and hard to reach Wilderness areas. Areas that have been treated in the past will continue to be a priority for the team, but when time and funding allow, treatments into new areas will occur whenever possible.

2010 Accomplishments	
Treated Acres	10,786
Inventoried Acres	81,209
Monitored Acres	0
Gross Infested Acres	12, 976
Infested Acres	10,802
Restored Acres	76

Figure 1: Bluestone National Scenic River.

The Mid-Atlantic Exotic Plant Management Team (EPMT) is part of an 18-park cooperative in Virginia, West Virginia, Maryland, and Pennsylvania. These parks lie within a diverse landscape ranging from the coastal plateau through the Piedmont and up to the Appalachian mountains. The goals of the Mid Atlantic EPMT are to 1) effectively control targeted invasive plants, and 2) increase public participation through developing sustainable volunteer service and education programs.

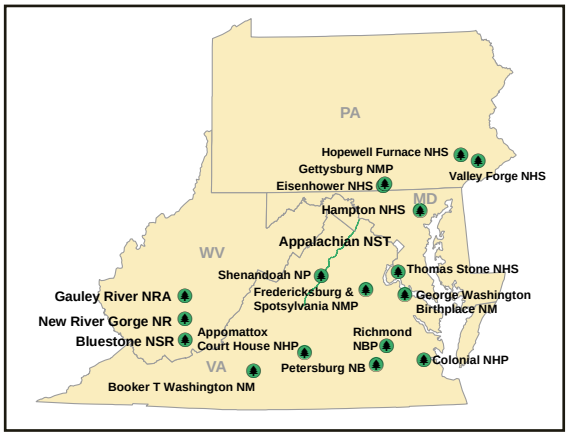


Figure 2: Mid-Atlantic-EPMT partner parks and work area.

The Mid Atlantic EPMT is continuously working to increase management accomplishments through refining field techniques and incorporating tools that address the changing complexion of invasive plants. In its eight year history, the Mid Atlantic EPMT and partner parks have brought over 1,200 acres into controlled status. These areas now thrive and function in a natural condition without invasive plant domination, offering benefits to plant communities and wildlife habitat.

The Mid Atlantic EPMT has assisted three parks in planning and implementing large management projects using private contractors. Colonial National Historic Park (NHP) is working to control Phragmites reed (*Phragmites australis*) along the tidal marsh of the James River. Removal of this highly invasive reed is part of a larger effort to restore the water quality of the Chesapeake Bay. Petersburg National Battlefield controlled Japanese stiltgrass (*Microstegium vimineum*) to maintain the historic landscape of this important battlefield. Richmond National Battlefield Park controlled several invasives including Japanese honeysuckle (*Lonicera japonica*) and Oriental bittersweet (Celastrus orbiculatus) on a newly acquired parcel.

In addition to working with partner parks, the Mid Atlantic EPMT assisted with the development of a rapid response guide for addressing invasive insects, diseases, and abiotic factors. This guide will be used by four regional offices in management planning.

Although volunteering has a long history in parks, involving the public in invasive plant management is a relatively new concept for many park units. The Mid Atlantic EPMT has assisted several parks to establish volunteer programs, including Shenandoah National Park

(NP), Appalachian National Scenic Trail (NST), and Hopewell Furnace National Historic Site (NHS). Hopewell Furnace initiated its first volunteer project in 2010 with Mid Atlantic EPMT assistance. Today there are five park based volunteer programs in Mid Atlantic EPMT partner parks: Shenandoah NP, Appalachian NST, Hopewell Furnace NHS, Colonial NHP, Valley Forge NHP. Over 1,000 volunteers have donated 5,087 hours to on the ground management of invasive plants in these volunteer programs. Volunteers assist with manual removal of invasive plants and shrubs.

Figure 3: A team member treats autumn olive at Bluestone NSR.

Volunteer efforts have contributed to impressive progress toward the recovery of natural areas, native species protection, and cultural landscape preservation.

The Mid Atlantic EPMT works to incorporate public outreach and education into the suite of management strategies. To accomplish this task the team works with local media outlets, professional organizations, schools, church groups, and the internet to access new audiences. Improving the quality and delivery of information on invasive plants is critical to strengthening the public understanding of the threat these invasive species pose to park resources. These outlets notify the public of existing invasive plant issues, opportunities to learn more about these threats, and opportunities to participate in managing invasive plants. Once a park visitor or community member understands the impacts of invasive plants and the processes of invasion, they are able to actively participate in preventing further introductions and distribution. This education can also improve a visitor's connection to a park, increasing the level personal investment an individual has. Reaching the public is a critical component to reducing future public-caused infestations.

They also enhanced program impacts through media outreach to increase public awareness of invasive threats and encourage public participation in service projects. The Mid Atlantic EPMT and parks conducted treatments with volunteers, contractors, and staff. Four other parks increased their collaboration with volunteers and sponsoring non-governmental organizations. Through on the ground treatments, public outreach and education, and technical assistance the Mid Atlantic EPMT strives to preserve and protect America's unique natural and cultural resources.

Figure 4: College students receive a briefing prior to controlling invasives at Hopewell Furnace NHS, August.

2010 Accomplishments	
Treated Acres	500
Inventoried Acres	5,761
Monitored Acres	1,031
Gross Infested Acres	6,649
Infested Acres	623

Northeast
Exotic Plant Management Team

Figure 1: *Euonymus alatus* infestation along River Road in Delaware Water Gap National Recreation Area.

The Northeast Exotic Plant Management Team (EPMT) works with 23 partner parks distributed across eight states in the Northeast United States. The parks, ranging from Pennsylvania to Maine, encompass over 335,000 acres.

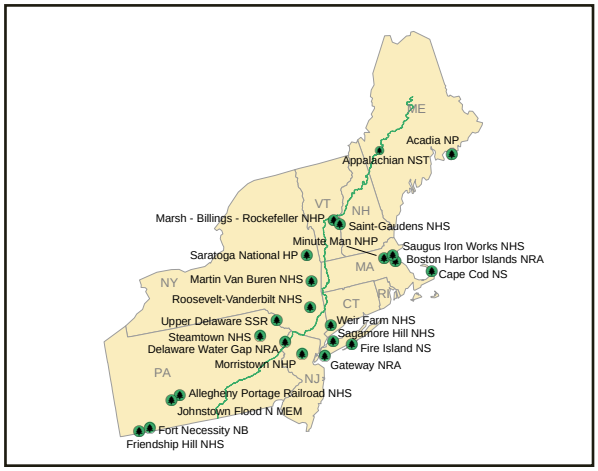


Figure 2: Northeast EPMT partner parks and work area.

The overarching goals of the Northeast EPMT are focused on assisting the parks with the restoration and maintenance of healthy, invasive-free landscapes. The team employs a suite of strategies using adaptive management to implement best management practices for each situation. Many of the parks that partner with the Northeast EPMT contain significant historic cultural resources. Balancing the desired management goals of cultural and natural resources within these parks can be a challenge. Non-native plants are often a documented part of the historical landscape. Although known invasive plants are sometimes viewed as necessary components of the cultural integrity of a historic site, these same plants can escape into the site's natural areas. Where possible, Northeast EPMT works with park resource managers to limit the inclusion of invasive non-native plants into cultural landscape preservation, replacing invasive cultural plantings with similar native alternatives.

The Northeast EPMT's control work is guided by the principles of Integrated Vegetation Management. Management decisions and techniques reflect the target species, site conditions and overall goals of the park. To accomplish its goals, Northeast EPMT utilizes a variety of techniques that include chemical, mechanical (e.g., mowing), manual control methods, limited use of biological controls, as well as partnering with parks using prescribed burns.

At Cape Cod National Seashore, the team is working with park staff to restore patches of grasslands and shrublands, to improve wildlife habitat and restore the cultural landscape. Historically, the park has employed mechanical treatment methods, using prescribed burns and mowing to remove invasive plants. The Northeast EPMT has added herbicide applications to the prescribed burn and mowing regimes the park was already using. Herbicides have helped reduce persistent invasives like Oriental bittersweet (*Celastrus orbiculatus*) and Canada thistle (*Cirsium arvense*), which were not being controlled by fire and mowing. Monitoring of these same sites over the past several years is now showing an increase of an invasive grass. To address this, the team is working with park resource managers to alter the timing of mowing and herbicide treatments, and to incorporate more active restoration

efforts, such as reseeding portions of the site. The Northeast EPMT has been able to work with the park to adapt management strategies as the landscape continues to respond to treatment methods.

Figure 3: Completing herbicide treatments at Cape Cod National Seashore.

Monitoring the response of ecosystems to treatment regimens is critical to achieving long-term success in controlling invasive plants. The Northeast EPMT has established multiple sites within partner parks to monitor the response of specific species to treatment methods. The team is monitoring the effects of herbicide treatments on brown and spotted knapweed at Saratoga National Historic Park and on shrub honeysuckles at Fort Necessity National Historic Site.

The Northeast EPMT is working to incorporate early detection and rapid response (EDRR) into management planning for the parks. In support of building EDRR capabilities, the Northeast EPMT assisted the Inventory and Monitoring program in developing an early detection database to track invasive plants and insect species. Identification cards of species in this database are distributed to the parks in the region, and to EPMT staff. The Northeast EPMT periodically updates park species lists. While in the field, the team keeps watch for new species and new infestations, treating new infestations before they can proliferate. Expansion of the EDRR network is a goal of the Northeast EPMT.

Collaboration with the parks and their partners is key to leveraging resources and pulling in expertise the Northeast EPMT and individual parks may not have. The Northeast EPMT and the Sandy Hook Unit of Gateway National Recreation Area (NRA) are working with a researcher to develop management strategies for Asiatic sand sedge (*Carex kobomugi*). Currently, there is very little information on this species, especially on management strategies. The sedge is infesting the dunes at Sandy Hook and elsewhere along the coast. Drawing upon this research the team has been able to learn about the life history of this invasive plant and how it impacts the structure of this dune system.

The team has set up test plots to run treatment trials on the sedge. Initial results of the trials, which began in 2008, will be presented by the Northeast EPMT Team Leader at the 2011 annual meeting of the Northeast Weed Science Society.

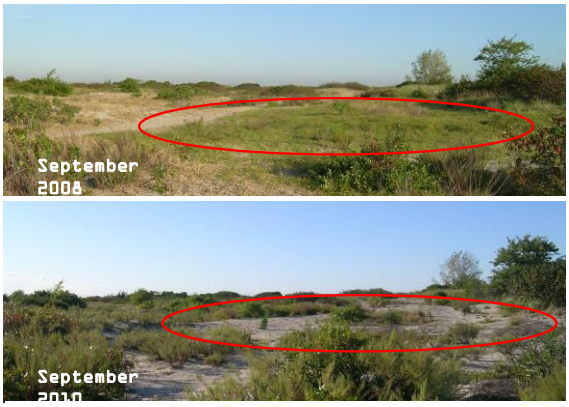


Figure 4: Gateway NRA, test plots for Asiatic sand sedge before and after treatment.

Control of invasive species is a long-term investment, requiring expertise, planning, and infrastructure to monitor and respond to evolving conditions. The Northeast EPMT is working to assist parks in carrying out this long-term management goal.

2010 Accomplishments	
Treated Acres	151
Inventoried Acres	6,061
Monitored Acres	1,072
Gross Infested Acres	3,424
Infested Acres	1,159
Restored Acres	0

Figure 1: View of National Capital Region from Potomac Gorge.

The National Capital Region Exotic Plant Management Team (EPMT) assists partner parks in the management of exotic invasive plants species to protect and restore valuable native ecosystems. From the barrier island of Assateague Island National Seashore, to Rock Creek Park located in the center of Washington DC, to Catoctin Mountain Park in the foothills of the Appalachian Mountains, the National Capital Region parks encompass a wide variety of ecosystems.

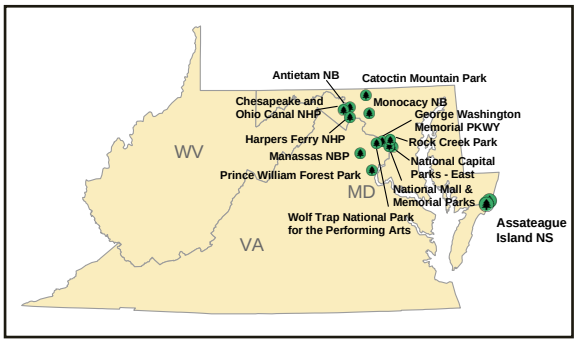


Figure 2: NCR-EPMT partner parks and work area

The team works closely with 13 partner parks, nearby sections of the Appalachian Trail, and cooperative partners to develop annual work plans, inventory and monitor exotic plant infestations, train park employees and partners in best treatment practices, coordinate treatment and restoration efforts, and share resources and information.

The goals of the National Capital Region EPMT are; (1) Preserve healthy habitats using early detection and rapid response (EDRR) to prevent exotic plants species populations from establishing. (2) Removing the exotic invasive plants currently infesting ecologically sensitive areas such as riparian areas, rare habitats and forest interiors. (2) Restore two to three acres annually by removing exotic plants, reseeding, and re-planting native species.

EDRR efforts to prevent the establishment of Wavyleaf basket Grass (*Oplismenus hirtellus* ssp. *undulatifolius*) and Black Swallow Wort (*Cynanchum louiseae*) in the National Capital Region have been quite successful, but will require many years of vigilance, and the continued aid of our partners. The team works with The Anacostia Watershed Society and other members of the Wavyleaf Basket Grass Task Force to identify and eradicate Wavyleaf Basket Grass from Greenbelt Park, part of National Capital Parks East. These efforts have been part of the larger ongoing work by the Task Force and have been very successful in locating and removing Wavyleaf Basket Grass throughout the region. The goal is to eradicate Wavyleaf Basket Grass from Greenbelt Park within the next two years.

Aided by Appalachian Trail staff, members of the Cumberland Valley Appalachian Trail Club, and local volunteers, the National Capital Region-EPMT has been treating Black Swallow Wort on the Appalachian Trail in south-central Pennsylvania during the past two years. The partnership located two sites that were treated in 2009 and revisited in 2010. Both infestation sites have been reduced to less than a third of the original population size.

The National Capital Region EPMT continues its efforts to remove highly invasive Kudzu (*Pueraria montana* var. lobata) from the

Potomac George. The Gorge is one of the most biologically significant natural areas in the eastern United States supporting more than 400 occurrences of 200 rare species and vegetation communities. Located in a densely populated urban landscape of more than four million people, the Gorge extends for 15 miles along the Potomac River from Great Falls to Theodore Roosevelt Island. Kudzu is an extremely harmful species that smothers and eventually kills trees and other native species, forming dense monocultures and creating gaps in the canopy. This facilitates the movement of exotic invasive species from the forest edge into the forest interior. The team worked closely with the natural resource management staff from the George Washington Memorial Parkway to develop a comprehensive treatment and restoration plan. The National Capital Region-EPMT treated over 13 acres on both sides of the Gorge this season and will aid in the replanting of thousands of native trees as well the reseeding of understory species in coming years.

With the aid of park personnel from Wolf Trap National Park for the Performing Arts and Rock Creek Park, the National Capital Region EPMT began four restoration projects that totaled a little over one and a half acres. These projects were carried out in forest edge communities that had previously been heavily infested with a wide variety of exotic plant species. Although small in size, these projects took place in areas of high visibility that helped bring to the public's attention the seriousness of exotic plant invasions, and the efforts the Park Service is making to address these problems.

One project at Wolf Trap reseeded 5,000 square feet of riparian area along Wolf Trap Stream with a native riparian buffer seed mix. The National Capital Region EPMT has treated exotic plants in this area for several years with great success, and park personnel have been planting native tree seedlings along the stream for several years now. These projects, in addition to brochures on local exotic plant species, and native alternatives that can be used in landscaping have been a great source of public outreach.

Figure 1. The Military Road restoration site in Rock Creek Park. Series shows site infested with multiflora rose and mile-a-minute vine and site following treatment.

2010 Accomplishments	
Treated Acres	158
Inventoried Acres	493
Monitored Acres	1,112
Gross Infested Acres	491
Infested Acres	196
Restored Acres	0

Figure 1: Big South Fork National River and Recreation Area river scour prairie ecosystem, Tennessee and Kentucky.

The Southeast Exotic Plant Management Team (EPMT) provides support to 18 national parks located across seven states in the Southeast Region. Stationed on the Blue Ridge Parkway in Asheville, North Carolina the team provides technical and on the ground assistance in habitat restoration and the maintenance of cultural landscapes to partner parks. The Southeast Region contains unique natural and cultural resources that are representative of the ecosystems and historic cultural events of the Cumberland Plateau, the Appalachian Highlands and the Piedmont physiographic provinces. These resources include remnant cedar glades, earthworks, battlefields, sandstone rock shelter communities, scenic byways, and river scoured prairies.

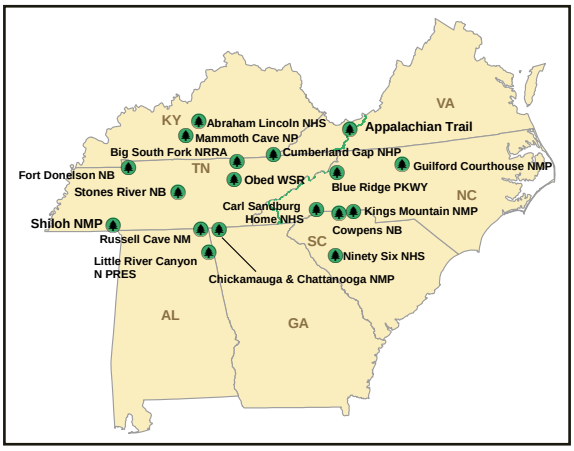


Figure 2: Southeast EPMT partner parks and work area.

Many of the Southeast EPMT partner parks contain rare, threatened, and endangered native plant and animal species and significant cultural resources that are threatened by invasive plants. The Southeast EPMT works with the partner parks to protect these unique resources by integrating adaptive management tools that complement the sensitive ecosystems.

The Big South Fork National River and Recreation Area (NRA) in Tennessee and Kentucky, is home to numerous rare and endemic plants and animals, including globally rare biological communities. The river scour prairie is a unique riparian vegetation type endemic to the Cumberland Plateau of Tennessee and Kentucky. These communities occur on open, flood-scoured exposures of bedrock, cobble, and gravel along large rivers in the Cumberland River watershed. Fewer than 500 acres (200 ha) of this habitat type remain in existence; the best examples in the world are found at Big South Fork NRA and Obed Wild and Scenic River. Several rare plants, many found nowhere else, flourish in these riparian prairies. Two federally listed endangered species, Cumberland rosemary (*Conradina verticillata*) and Virginia spirea (*Spiraea virginiana*), and several dozen globally or regionally rare plants thrive here. One of the primary threats to this unique community is the invasive tree, Mimosa (*Albizia mimosa*) which alters this ecosystem by producing heavy summer shade and dominating water and nutrient resources. In 2010 the Southeast-EPMT, in cooperation with the U.S. Fish and Wildlife Service and Big South Fork NRA, removed more than 4000 stems of mimosa from two river scour prairies covering over 12 acres.

A second example is the Blue Ridge Parkway whose mission is to provide a scenic byway experience for the public, whether by car, motorcycle, bicycle, or foot. Increasing development adjacent to the parkway and within the view shed presents growing challenges to maintaining the native forest ecosystems. One area heavily used by the public is a 17 mile section winding through the Asheville, NC metropolitan area. Lined almost continuously with mature hardwoods, this section is highly prized for its scenery and urban wilderness qualities. A serious threat to the integrity of this hardwood corridor is the aggressive exotic vine Oriental bittersweet (*Celastrus orbiculatus*).

Figure 3: Treating privet at Cowpens National Battlefield, South Carolina.

This proficient climber moves into the forest canopy where it shades native hardwoods and frequently topples mature trees. In 2009, the American Recovery and Reinvestment Act funded a temporary EPMT crew dedicated to Oriental bittersweet eradication along this section of the parkway. More than 37 acres were controlled along the length of the corridor. These efforts have spurred the involvement of the local community to continue this work through volunteer efforts. This highly utilized and visible landscape provides a unique opportunity to demonstrate the essential work achieved by the Southeast EPMT and partner parks to a broad audience.

The Southeast EPMT also works with partner parks to control large areas infested with aggressive invasives such as privet (*Ligustrum sinense*) and multiflora rose (*Rosa multiflora*). These two species have been the focus of management efforts at Chickamauga and Chattanooga National Battlefield, Ninety Six National Military Park, and Cowpens National Battlefield. These cultural sites with forested landscapes recently infested by these two invasive plant species are slowly returning to the native plant communities and associated wildlife found in historic times.

Figure 4: Controlling multiflora rose at Chickamauga and Chattanooga National Battlefields, Georgia.

Building upon experience and incorporation of new management strategies, the Southeast EPMT strives to meet its management goals and the goals of its partners. The Southeast EPMT readily seeks new opportunities to develop the long lasting partnerships that are necessary to ensure our natural and cultural resources remain healthy and intact for generations to come.

2010 Accomplishments	
Treated Acres	201
Inventoried Acres	1296
Monitored Acres	0
Gross Infested Acres	1291
Infested Acres	232
Restored Acres	0

Florida and Caribbean
Exotic Plant Management Team

Figure 1: Virgin Islands National Park.

The Florida and Caribbean Exotic Plant Management Team (EPMT) provides assistance to all 15 NPS units located in Florida and the U.S. Virgin Islands. The Florida and Caribbean EPMT manages invasive plants through an efficient combination of cost-effective private contractors and i NPS crews and volunteers. The team works in close cooperation with our 15 partner parks as well as many federal agencies, state offices, local governments, non-governmental organizations, Cooperative Weed Management Areas (CWMA), and Universities.

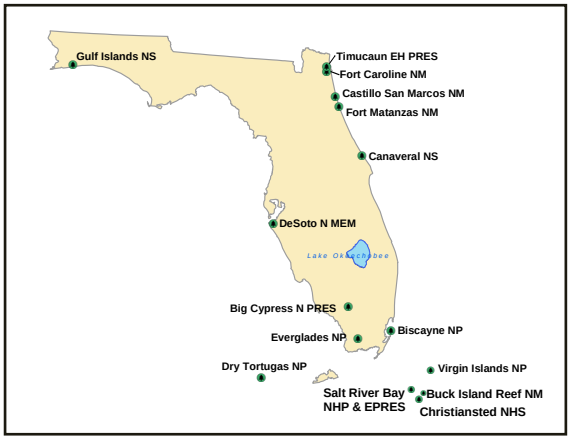


Figure 2: Florida and Caribbean EPMT partner parks and work area.

The goal of the Florida and Caribbean EPMT is to achieve maintenance control on targeted invasive plants. The goal is accomplished through the prevention of new invasive plants, the early detection and rapid response (EDRR) to new invasive plant species, and through the prioritization and treatment of existing populations. As a result of the teams efforts, invasive plants within 9 of the teams 15 partner parks are now considered under maintenance control. Due to successful initial treatment strategies, these parks require only yearly site visits maintain the plants at low levels.

The success of the Florida and Caribbean EPMT can be directly attributed to its unique structure. The Florida and Caribbean EPMT uses private contractors to effectively tackle large mono-cultures of established invasive plants, distributed across both the mainland of Florida, the Florida Keys, and the U.S. Virgin Islands. Through the use of contracts the team is able to access and utilize equipment and resources that would otherwise be unavailable. This strategy greatly increases the acreage that can be inventoried, treated, and managed in the long term. The Florida and Caribbean EPMT is able to complement the large scale contracting through the use EPMT program staff and National Park Service crews for early detection and rapid response (EDRR) activities and for parks requiring maintenance control. The combination of contracts and ground crews has proven to be a highly effective strategy for the Florida and Caribbean EPMT.

Figure 3: Brazilian Pepper Control, Big Cypress NP.

Big Cypress National Preserve (NPre) contains over 720,000 acres of tropical and temperate plant communities. These ecosystems support diversity wildlife, including the endangered Florida panther. Invasive plant species, such as melaleuca (*Melaleuca quinquenervia*), Brazilian pepper (*Schinus terebinthifolius*), cogon grass (*Imperata cylindrica*) and Old World climbing fern (*Lygodium microphyllum*) are disrupting natural processes and threatening native plant and animal communities.

In 2010, the Florida and Caribbean EPMT began a focused effort to manage a concentrated infestation of Brazilian pepper in the southern end of Big Cypress NP that was displacing native hardwood stands. The team also collaborated with the State of Florida on an Early Detection and Rapid Response project to treat Old World Climbing fern along the northern boundary of the Big Cypress NPre.

Biscayne National Park's islands contain unique sub-tropical vegetation that is home to many state and federally listed plant and animal species. Invasive plants threaten the survival of these species. This year the team completed two projects targeting Australian pine (*Casuarina equisetifolia*), Latherleaf (*Colubrina asiatica*), Brazilian pepper and Seaside Mahoe (*Thespesia populnea*). The project area included Porgy Key. Porgy Key, home of early settler Lancelot Jones, was recently highlighted in Ken Burns film "Americas Best Idea".

Since 1984, Everglades National Park has been working on reducing over 100,000 acres of melaleuca along its eastern boundary (East Everglades). Today, melaeuca occupies less than 6,000 acres. Everglades NP contains over 30,000 acres of Brazilian pepper as well as hundreds of acres of old World Climbing fern. These areas continue to be the focus of numerous control projects by the park as well as the Florida and Caribbean EPMT.

Australian pine once covered thousands of acres of the Everglades. The last remaining stand of Australian pine occurs in a remote wilderness area in the southeast corner of the park known as the saline glades. The removal of these plants has been especially challenging. Everglades NP and the Florida and Caribbean EPMT are working together, utilizing aerial spot spraying technology to effectively target and treat these remote trees.

Figure 4: Aerial spot spray of Australian pine, Everglades NP.

2010 Accomplishments	
Treated Acres	535
Inventoried Acres	16,003,588
Monitored Acres	1,399
Gross Infested Acres	3,588
Infested Acres	346
Restored Acres	0

Regional Exotic Plant Management Teams

The following section describes the activities of regionally-funded Exotic Plant Management Team (EPMT) programs. While these teams are not funded by the national program, they share a common design and mission – controlling invasive plants within a geographic area. There are currently two regional teams: Heartland EPMT, based at Effigy Mounds National Monument, and Southeast Coast EPMT, headquartered at Congaree National Park. Activities from the Southeast Coast team are reported here. In 2011, both regional teams will be included in the annual report.

Southeast Coast Exotic Plant Management Team

Figure 1: Wild horses at Cumberland Island National Seashore.

The Southeast Coast Exotic Plant Management Team (EPMT) is a newly established team based at Congaree National Park (NP). Initiated as a pilot project in 2005, the team acquired permanent funding in 2009 through park based initiatives. Although this team is funded separately from the national Exotic Plant Management Team program, the goal is for both programs to work in partnership. This new partnership will increase cooperation, reduce duplication, and improve invasive plant management efforts at the local and national level.

This team will serve 15 units of the National Park Service in the Southeast Coastal Network. The current list of partner parks includes Cape Hatteras National Seashore (NS)/Fort Raleigh National Historic Site (NHS)/Wright Brothers National Monument (NM), Cape Lookout National Seashore, Chattahoochee River National Recreation Area (NRA), Congaree NP, Cumberland Island National Seashore (NS), Fort Frederica National Monument, Fort Pulaski National Monument, Fort Sumter National Monument/Charles Pinckney National Monument, Horseshoe Bend National Military Park, Kennesaw Mountain National Battlefield Park, Moores Creek National Battlefield, and Ocmulgee National Monument.

The Southeast Coast EPMT is working to develop and refine short term and long term goals with its partner parks. Current goals identified for this team include: 1) on the ground

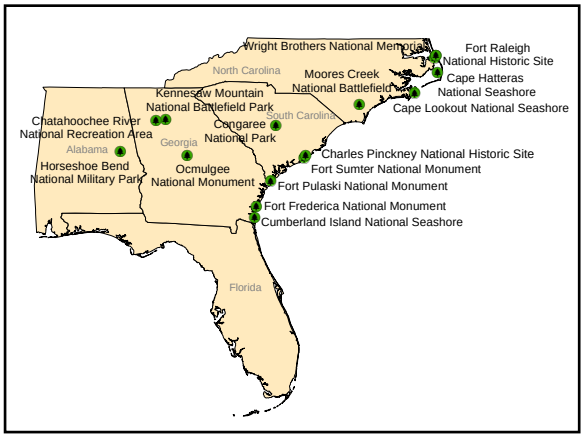


Figure 2. Southeast Coast Exotic Plant Management Team Partner National Park Units

control of invasive plants that threaten both natural and cultural resources of partner parks, 2) post-disturbance restoration, including restoration after treatment of invasive plants, 3) education of park staff and visitors on issues associated with invasive plants, including the threat that invasive plants post to native plant and animal communities (education efforts will be conducted in cooperation with the Old Growth Bottomland Forest Research and Education Center that is based at Congaree NP), and 4) partner park staff training on prevention, early detection rapid response, and management of invasive plants.

Organizational development of the Southeast Coast EPMT will continue through 2011. The team has been working primarily with volunteers

from the Student Conservation Association Native Plant Corps Teams. Using a model employed by the Southeast EPMT, the Southeast Coast EPMT will begin to restructure itself using a mixture of permanent and term employees, improving the quality and consistency of work. In addition, partner parks are working together to determine management needs and to develop a list of invasive plant species to target. The team will also establish a steering committee composed of superintendents and resource managers from at least five of the partner parks. Other objectives include gathering, editing, and finalizing safety documents; determining equipment and supply needs; and developing a method to prioritize parks and species for future treatment.

Figure 3. SCA interns cut invasive Chinese tallow at Cumberland Island National Seashore (October 2010).

Accomplishments: 2010

In the fall of 2010, a five member Native Plant Corps Team worked through the Southeast Coast EPMT at Congaree NP for three months. A six-month team will begin in February 2011. In the fall of 2010, the Southeast Coast-EPMT treated invasive plants at Chattahoochee River NRA, Congaree NP, Cumberland Island NS, and Fort Raleigh NHS.

Chattahoochee River NRA has identified the southern-most portion of the park, which includes Cochran Shoals, Palisades, and Paces Mill, as a focal area for invasive plant control and restoration. Park staff is working with the Atlanta Botanical Garden and the the Souteast Coast EPMT to restore this section of the park. The Atlanta Botanical Garden is collecting native plant propagules from the park and growing them out for planting into areas identified for restoration. The Southeast Coast EPMT is supporting this effort by treating invasive plants within these units with a focus on specific areas slated for restoration.

At Congaree NP and Cumberland Island NS, the team's goals are to assist with the management of cultural resources by removing invasive plants, treat new occurrences of invasive plant species before they become major problems within the parks, and retreat areas to eradicate occurrences of invasive plants.

At Fort Raleigh NHS, the Southeast Coast EPMT's goal is to assist the park in treatment of invasive plants that occur adjacent to private in holdings where invasive plant management is being conducted. This effort strengthens existing partnerships between park management and the local community. Cape Hatteras NS is also responsible for the management of Fort Raleigh NHS and Wright Brothers NM. Cape Hatteras staff has asked the Southeast Coast EPMT to help develop a long-term management plan for *Phragmites australis.* To gather initial information for plan development, the team revisited *Phragmites australis* treatment sites to determine effectiveness of past treatments.

2010 Accomplishments	
Treated Acres	13.5
Inventoried Acres	38
Monitored Acres	---
Gross Infested Acres	---
Infested Acres	---
Restored Acres	---

Appendix A 2010 EPMT Program Participants

The Exotic Plant Management Teams (EPMTs) do not function in isolation. The achievements of the teams are due in large part to the time, resources and contributions of many. The EPMT program and the EPMT Team is a coordinated effort made up of park leadership, park staff, seasonal and permanent Team members, the Student Conservation Association, Americorps and hundreds of volunteers. Following is a partial list of people who contributed to the 2010 achievements described in the report.

Alaska EPMT

Administration: Bonnie Million (Liaison), James Sowerwine (ARRA AmeriCorps Crew Lead)
Crew:
Denali National Park - Wendy Mahovlic
Glacier Bay National Park and Preserve - Dave Decker
Kenai Fjords National Park - Deborah Kurtz
Klondike Gold Rush National Historic Park - Jessica Wilbarger
Wrangell - St.Elias National Park and Preserve - Nicole Liette
Fieldwork Assistance:
Katmai National Park and Preserve - Whitney Rapp
Kenai Fjords National Park - Christina Kriedeman
Kondike Gold Rush National Historic Park - Dave Schirokauer
Sitka National Historic Park - Geof Smith
Wrangell-St.Elias National Park and Preserve - Annie Lain, Miranda Terwilliger
Yukon-Charley Rivers National Preserve - Jobe Chakuchin
Crew Interns:
Denali National Park SCA - Canyon Evans, Patricia Knapick,
Glacier Bay National Park and Preserve SCA - Rachel Workin
Katmai National Park and Preserve SCA - Devin Bartley, Crystal Shepherd
Kenai Fjords National Park SCA - Greg Kolenda
Klondike Gold Rush National Historic Park SCA- Jenny Busam, Kassie Hauser
Sitka National Historic Park SCA - Katie Auer, Megan Fredrich
Wrangell-St. Elias National Park and Preserve SCA - Melissa Booher, Jack Cebe, Chelsea Gordon, Tim Federal
Yukon-Charley Rivers National Preserve SCA - Chelsy Passmore, Susan Sherman
Fieldwork Assistance Interns: 1 YCC intern at Kenai Fjords National Park, 4 YCC interns at Wrangell-St. Elias National Park and Preserve
Volunteers: Southeast Alaska Guidance Association; Need for Seed and Denali Discovery Camp at Denali National Park; Alaska Association of Conservation Districts, Resurrection Bay Conservation Alliance, and Alaska Sea Life Center at Kenai Fjords National Park; Skagway Public Library and Taiya Inlet Watershed Council at Klondike Gold Rush National Historic Park; Boy Scout Troop 92 (YUCH)
Park and regional contacts:
Alaska Regional Office - Joel Cusick, Russ Kucinski, Bud Rice
Denali National Park - Guy Adema, Pat Owen, Carl Roland
Glacier Bay National Park and Preserve - Lewis Sharman, Craig Smith
Katmai National Park and Preserve - Whitney Rapp, Troy Hamon, Roy Wood
Kenai Fjords National Park - Fritz Klasner, Christina Kriedeman
Klondike Gold Rush National Historic Park - Dave Schirokauer
Lake Clark National Park and Preserve - Page Spencer
Sitka National Historic Park - Ana Dittmar
Western Arctic National Parklands - Peter Neitlich
Wrangell-St. Elias National Park and Preserve - Miranda Terwilliger, Eric Veach
Yukon-Charley Rivers National Preserve and Gates of the Arctic National Park and Preserve - Jobe Chakuchin, Tom Liebscher
Alaska EPMT Steering Committee:
Alaska Regional Office - Jennifer Allen (Fire Ecologist), Sara Wesser (I&M Coordinator), Tim Hudson (Assoc. Regional Director),
Alaska Department of Transportation - Larry Johnson
Bureau of Land Management - Jeanne Standley
Denali National Park - Carl Roland
Klondike Gold Rush National Historic Park - Susan Boudreau
Lake Clark National Park and Preserve - Page Spencer

Southwest Alaska Network Inventory and Monitoring Coordinator - Michael Shephard
Wrangell - St.Elias National Park and Preserve - Eric Veach

California EPMT
Administration: Bobbi Simpson (Liaison), Patrick Kelly (Data manager)
Contractors: American Conservation Experience, Americorps, California Department of Parks and Recreation, Cameron Colson, Courage for Change, Great Tree Tenders, Native Range (John Knapp)
Park and Regional Contacts:
Pacific West Region - Jay Goldsmith (Natural Resources Specialist)
Steering Committee:
Mediterranean Inventory and Monitoring Network - Christy Brigham
Klamath Inventory and Monitoring Network - Stassia Samuels
Pacific West Regional Office - Jay Goldsmith
Sierra Inventory and Monitoring Network - Athena Demetry
San Francisco Bay Area Inventory and Monitoring Network - Sue Fritzke

Chihuahuan Desert / Shortgrass Prairie EPMT
Administration: Patrick Wharton (Team Leader)
Cooperators:
Texas Environmental Corps, American Conservation Experience, Service Organization for Youth, World Wildlife Fund
Collaborative Partners:
Chihuahuan Desert Inventory and Monitoring Network - Kirsten Gallo
Southern Colorado Plateau Inventory and Monitoring Network - Rob Bennetts
New Mexico Range Improvement Task Force
Park and Regional Contacts:
Intermountain Region Integrated Pest Management Coordinator - Myron Chase, Linda Kerr (Fire Ecologist), Pam Benjamin (Vegetation Ecologist), Sarah Wynn (Restoration Ecologist)
Steering Committee:
Amistad National Recreation Area - Greg Garetz
Bents Old Fort National Historic Site - Fran Pannebaker
Big Bend National Park - Phil Wilson, Joe Sirotnak
Capulin Volcano National Monument - Kim Struthers
Carlsbad Caverns National Park - Renee West
Fort Davis National Historic Site - John Heiner
Fort Union National Monument - Marie Frias
Guadalupe Mountain National Park - Fred Armstrong
Lake Meredith National Recreation Area - Arlene Wimer
Pecos National Historic Site - Cheri Dorshak
Sand Creek Massacre National Historic Site - Karl Zimmermann
Washita Battlefield National Historic Site - Dick Zahm
White Sands National Monument - David Bustos

Florida / Caribbean Partnership EPMT
Administration: Tony Pernas (Liaison)
Crew Leader - Alan Shane McKinley
Park and regional contacts, fieldwork assistance, and various types of technical assistance:
Biscayne National Park - Shelby Moneysmith
Everglades National Park - Jonathan Taylor
Institute for Regional Conservation - Keith Bradley
Fairchild Tropical Garden - Jennifer Possley
Florida International University - Aaron Parns
Miami-Dade County - Dallas Hazelton
South Florida and Caribbean Network - Brooke Shamblin, Kevin Whelan
The Nature Conservancy - Kris Serbesoff-King
University of Florida - Ken Langeland
Steering Committee:
Big Cypress National Park - Jim Burch
Biscayne National Park - Vanessa McDonough
Canaveral National Seashore - John Stiner
De Soto National Memorial - Scott Pardue

Everglades National Park - Hillary Cooley
Florida Wildlife Conservation Commision - Dennis Giardina
Fort Matanzas National Monument - Andrew Rich
Gulf Islands National Seashore - Riley Hoggard
South Florida Water Management District - Leroy Rodgers
Timucuan Ecological and Historic Preserve - Richard Bryant
US Army Corp of Engineers - Jon Lane
US Fish and Wildlife Service - Bill Thomas

Great Lakes EPMT
Administration: Carmen Chapin (Liaison),
Crew Leader: Isaiah Messerly
Crew: Ben Axt, Daniel Bishop, Cari Manson
Data Manager: Rebecca Key
Park and Regional Contacts: Chris Holbeck
Student Conservation Corp Interns: Katy Cummings, Denise Cupp, Jana Calibe
Steering Committee:
Apostle Islands National Lakeshore - Julie Van Stappen
Ice Age National Scenic Trail - Dean Gettinger
Indiana Dunes National Lakeshore - John Kwilosz
Isle Royal National Park - Paul Brown
Midwest Regional Office - Julie Stumpf
Mississippi National River and Recreation Area - Nancy Duncan
Pictured Rocks National Lakeshore - Bruce Leutscher
Saint Croix National Scenic River - Robin Maercklein
Sleeping Bear Dunes National Lakeshore - Steve Yancho
Voyagers National Park - John Snyder

Gulf Coast EPMT
Administration: Eric Worsham (Liaison).
Partners/Contractors: Arrowhead Star Company, Colorado State University, Ladybird Johnson Wildflower Center, Rice University, Union Forestry, University of Texas, US Army Corps of Engineers.
Volunteers: AmeriCorps, Student Conservation Association.
Park and Regional Contacts:
Big Thicket National Preserve - Dave Roemer and Brian Lockwood
Gulf Islands National Seashore - Riley Hoggard and Gary Hopkins
Jean Lafitte National Historic Park and Preserve - Dusty Pate, and David Muth
Intermountain Region Integrated Pest Management Coordinator - Myron Chase
Southeast Region Integrated Pest Management Coordinator - Chris Furqueron
San Antonio Missions National Historic Park - Greg Mitchell and Greg Smith
Natchez Trace Parkway - Lisa McInnis
Palo Alto Battlefield National Historic Park - Rolando Garza
Vicksburg National Military Park - Virginia Dubowy

Lake Mead EPMT
Administration: Curt Deuser (Liaison)
Crew Leader: Tarl Norman
Admin Assistant: Sue Knowles (shared position with LAME RM)
Data Manager: Ryan Tietjen
Squad Leaders: Dwayne Coleman, Beth Points, and Joe Castello
Crew Members: Lauren Alnwick-Pfund, Amorita Brackett, Tamberlain Jacobs, Ed Kloehn, Kelly Mathis, Anna O'Brien, Jacob Rigby, Sam Smyrk, Frank Szajko, Adam Throckmorton, Hannah Wigginton (SCA) and William Lide (SCA)
Park and Regional Contacts:
Lake Mead National Recreation Area – Kent Turner
Pacific West Region - Jay Goldsmith
Steering Committee:
United States Geological Service - Matt Brooks (Research Botanist), Todd Esque (Research Ecologist), Ron Hiebert (NAU/CPSU),
Intermountain Region - Pam Benjamin (Plant Ecologist)
Bureau of Land Management - Gayle Marrs-Smith (Plant Ecologist)

Mid Atlantic EPMT & Cooperative
Administration: James Åkerson (Liaison), Craig Bentley (Crew Leader).
Crew: Nathan Wender, Robert Jennings (portion of year), Coleman Minney, and Brandon White.
Student Conservation Association Interns: Eugene Kobayashi and Dustin Baxter.
Regional Contacts:
Northeast Region - David W. Reynolds (Chief Natural Resources and Science Division), Wayne Millington (Integrated Pest Management Specialist).
Inventory & Monitoring:
Eastern Rivers and Mountains and Mojave Desert Inventory and Monitoring Networks - Jennifer Stingelin Keefer
Appalachian Trail Inventory and Monitoring Network - Fred Dieffenbach
Steering Committee:
Appomatox Court House National Historic Park - Brian Eick
Appalachian National Scenic Trail - C. Casey Reese
Booker T Washington National Monument - Timothy Sims
Colonial National Historic Park - Dorothy Geyer
Fredericksburg and Spotsylvania National Military Park - Gregg Kneipp
Gettysburg National Military Park - Sara Koenig and Randy Krichten
George Washington Birthplace National Monument - Rijk Moräwe
Hampton National Historic Site - Paul Bitzel
Hopewell Furnace National Historic Site - Steven Ambrose
New River Gorge/Blue Ridge Parkway/Gauley River National Recreation Area - Scott Stonum and John Perez
Petersburg National Battlefield - Dave Shockley and Tim Blumenschine
Richmond National Battlefield Park - Kristen Allen
Shenandoah National Park - Gordon Olson
Valley Forge National Historic Park - Kristina Heister
Volunteers: 664 individuals contributed 2,352 hours. Participating volunteer organizations included Alvernia University, Classical Cottage School, Mountain Laurel Montessori, Oberle School, Sherando High School, Virginia Governor's School, Defenders of Wildlife, Friends of the National Zoo, and National Audubon Society.
Sponsoring Organizations: National Audubon Society of Virginia, Defenders of Wildlife, National Environmental Education Foundation, Shenandoah National Park Association, The Student Conservation Association, Appalachian Trail Conservancy, Potomac Appalachian Trail Club, and Leave No Trace.
Park contacts & participants for fieldwork and technical assistance:
Appomattox Court House National Historic Site - B. Eick, R. Tillotson, J. Spangler
Appalachian National Scenic Trail - C. Reese, M. Miller, L. Parriott, M. Gray, T. Sowers, M. Elfner, D. Bryon, T. Pryor, R. Williams, W. Ebersberger, S. Mayes, S. Schaffer, and P. Dennison
Booker T Washington National Monument - T. Sims and C. Mays
Colonial National Historic Park - D. Geyer
Fredericksburg and Spotsylvania National Military Park - G. Kneipp, M. Soper, W. Albridge, K. Mullholland
Gettysburg National Military Park/Eisenhower National Historic Site - J. Johnson, S. Koenig, R. Krichten, C. Brown, G. Thomas, A. Roach, B. Robinson
George Washington Birthplace/Thomas Stone National Historic Site - R. Moräwe
Hampton National Historic Site - P. Bitzel, M. Lynch, A. Klopka, J. Hicks
Hopewell Furnace national Historic Site - E. Shean-Hammond, S. Ambrose, G. Martin, and F. Delmar; New River Gorge National River/Blue Ridge Parkway/Gauley River National recreation Area - J. Perez, C. Bishop, J. Childress, D. DeFillips, S. Demaio
Petersburg National Battlefield - D. Shockley, T. Blumenschine
Richmond National Battlefield Park - K. Allen, M. Prowatzke
Shenandoah National Park - G. Olson, W. Cass, J. Hughes, A. Webb, T. Pryor
Valley Forge national Historic Park - K. Heister, K. Jensen, A. Ruhe, H. Martin, C. Hedges, four YCC crew members, and one Conestoga High School student.

National Capital Region EPMT
Administration: Frank Archuleta (Team Leader), Geoff Clark (Data Manager)
Crew: Ana Chuquin, Tory Grayson, Andrew Petit de Mange, Josh Rodgers, Natasha Garcia Andersen, Ari Giller Leinwohl, Josh Lowman, Dan Malooly,
Park and Regional Contacts:
National Capital Region - Dan Sealy (Deputy Chief of Natural Resources and Sciences)
Volunteers: Gary Sikora, Mark Imlay, Virginia Weston, Friends of Rock Creek, Anacostia Watershed Society
The Nature Conservancy Volunteer Coordinators: Mary Travaligni, Jamie Weaver

Other Federal Agencies:
United States Fish and Wildlife Service - Phil Pannill (NCTC Grounds Manager), Karin Christensen
Animal and Plant Health Inspection Service - Alan Tasker
Steering Committee:
National Capital Region - Jim Sherald (Chief of Natural Resources and Sciences), Diane Pavek (Botanist and Research Coordinator), Jil Swearingen (Integrated Pest Management Specialist)
Antitiam National Battlefield - Ed Wenschof
Catocin Mountain Park - Sean Denniston
Chesapeake and Ohio Canal National Historic Park - Scott Bell
George Washington Memorial Parkway - Brent Steury
Harpers Ferry National Historic Park - Bill Hebb
Manassas National Battlefield Park - Bryan Gorsira
Monocacy National Battlefield - tAndrew Banasik
National Capital Parks East - Steve Syphax
National Mall - Mary Willeford Bair
Prince William Forest Park - Paul Petersen
Rock Creek Park - Ken Ferebee
Wolf Trap National Park for the Performing Arts - Duane Erwin
Park Contacts, technical and field assistance:
Antietam National Battlefield - Joe Calzarette
Appalachian National Scenic Trail - Kent Schwarzkpof
Assateague Island National Seashore - Jonathan Chase
Catocin Mountain Park - Matt Gilford, Becky Loncosky
Chesapeake and Ohio Canal National Historic Park - P. Scott Bell, Michele Carter
George Washington Memorial Parkway - Erik Oberg
Harpers Ferry National Historical Park - Dale Nisbet
Monocacy National Battlefield - Eric Kelley
National Capital Parks East - Mikaila Milton
Rock Creek Park - Joe Kish
Wolf Trap National Park for the Performing Arts - Betsy Chittenden, Phil Goetkin

North Cascades EPMT
Administration: Todd Neel (Liaison), Dan Campbell (Data Manager / OLYM Lead), Eric Walker (LARO Field Crew Lead)
Crew:
Olympic National Park - Daniel Lucero, Cory Nelson, Gus Johnson
Lake Roosevelt National Park - Alex Heeren, Matt Pierce, Sam Halvorsen, James VanGeystel
Steering Committee / NCCN Park Contacts:
Crater Lake National Park - Greg Holm, Kathryn Williams
Ebeys Landing National Historic Reserve - Craig Holmquist
John Day Fossil Beds National Monument - Shirley Hoh
Lake Roosevelt National Recreation Area - Nate Krohn, Ken Hyde
Lewis and Clark National Historic Park - Carla Cole, Zachary Bolitho
Mount Rainer National Park - Lou Whiteaker, Will Arnesen
Nez Perce National Historic Park - Jason Lyon
North Cascades National Park - Mignonne Bivin, Jack Oelfke
North Coast Cascades Network - Regina Rochefort
Olympic National Park - Steve Acker
Pacific West Region Integrated Pest Management Coordinator - Erv Gasser
San Juan Island National Historic Park - Jerald Weaver
Whitman Mission National Historic Site - Roger Trick

Northeast EPMT
Administration: Betsy Lyman (Liaison), Brian McDonnell (Team Leader)
Crew: Matthew Gorentz (Student Conservation Association Intern), P.J. Koehler & Jason Zarnowski, Biotech Seasonals
Regional Contacts:
Northeast Region - Wayne Millington (IPM Coordinator), David W. Reynolds (Division Chief, Natural Resources & Science)
Park contacts, fieldwork assistance, and various types of technical assistance (alpha by organization):
Allegheny Portage Railroad National Historic Site - Kathy Penrod

Appalachian National Scenic Trail - Casey Reese
Appalachian Trail Conservancy - Adam Brown
Boston Harbor Islands National Recreation Site/Saugus Iron Works National Historic Site - Marc Albert, Valerie Wilcox
Boston Harbor Islands National Recreation Site Partner: Trustees of Reservations - Ed Pitcavage
Cape Cod National Seashore - Stephen M. Smith
Central Jersey Invasive Species Strike Team interns: Michelle Slosberg, Alexander McManus, Shannon Zaret, Nathan Teich;
Delaware Water Gap National Recreation Area - Brad Boynton, Jon Bugan, Larry Hilaire, Jeff Shreiner, Tom Witter
Eleanor Roosevelt National Historic Site/Vanderbilt Mansion National Historic Site - Dave Hayes
Fire Island National Seashore - Jordan Raphael
Fort Necessity National Battlefield - Connie Ranson
Gateway National Recreation Area - Doug Adamo, Mike Byer, George Frame, Jeanne McArthur-Heuser, Bill Parker, Jessica Browning, Kasen Whitehouse,
Georgian Court University - Dr. Louise Wootton (researcher and partner GATE-SHU),
Marine Academy of Science & Technology - Alexander Kloo (working with Dr. Wootton at GATE-SHU)
Morristown National Historic Park - Robert Masson
Northeast Regional Office – Dave Reynolds
Saratoga National Historic Park - Chris Martin, Linda White, Cindy VanDerwerker
Upper Delaware Scenic and Recreational River - Jamie Myers
University of Massachusetts – Russ Bowles
Webb State Park - Roger Meine

Northern Great Plains EPMT
Administration: Chad Prosser (Liaison), Taryn Preston (Biologist/Data Manager), Mark Slovek (Crew Leader), Jared Burian (Crew Leader)
Crew: Jaden Honeyman, Trenton Hieb, Jacob Friesenhahn, Justin Fjellanger, Christine Sommerfeld, John Shoup, Lee Vaughn, Daniel Yonkee, Maria Herber, Wayne Strebe
Park contacts:
Agate Fossil Beds National Monument - James Hill
Badlands National Park - Milt Haar
Devils Tower National Monument - Mark Biel
Fort Laramie National Historic Site - Dean Reasoner
Fort Union Trading Post National Historic Site - Andy Banta
Jewel Cave National Monument - Rene Ohms
Knife River Indian Villages National Historic Site - John Moeykens
Niobrara National Scenic River - Pamela Sprenkle
Missouri National Recreation River - Gia Wagner
Minuteman Missile National Historic Site - John Black
Mount Rushmore National Memorial - Bruce Weisman
Scotts Bluff National Monument - Bob Manasek
Theodore Roosevelt National Park - Bill Whitworth
Wind Cave National Park - Beth Burkhart
Steering Committee:
Badlands National Park - Brian Kenner
Midwest Regional Office - Chris Holbeck
Northern Great Plains Network – Kara Painter, Dan Swanson
Theodore Roosevelt National Park - Bill Whitworth
Wind Cave National Park - Greg Schroeder

Northern Rocky Mountain EPMT
Administration: Sue Salmons (Liaison), Gary Ludwig (Team Leader), David Bates (Crew Leader), Timothy Marsh (Crew Leader)
Crew: Arley Cantwell, Daniel Esposito, Rebecca Huncilman, Rebecca Panko, Jacob Rigby, Benjamin Wallace
Park and Regional Contacts:
Bear Paw and Big Hole National Battlefield - Jannis Jocius, Jimmer Stevenson
Bighorn Canyon National Recreation Area - Bill Pickett and Ryan Felkins
City of Rocks National Reserve - Trenton Durfee and Steven Murray
Craters of the Moon National Monument and Preserve - Steven Bekedam
Fossil Butte National Monument - Clay Kyte and Phil Knecht

Glacier National Park - Dawn LaFleur
Grant-Kohrs Ranch National Historic Site - Jason Smith
Hagerman Fossil Beds National Monument - Mike Wadsworth
Intermountain Region - Myron Chase (Integrated Pest Management Coordinator)
Yellowstone National Park - Daniel Reinhart
Yellowstone National Park - Chris Overbaugh and Troy Nedved
Steering Committee:
Bear Paw and Big Hole National BattlefieldJason Lyon
Bighorn Canyon National Recreation Area - Cassity Bromley
City of Rocks National Reserve - Kristen Bastis
Craters of the Moom National Monument and Preserve - John Apel and Steve Bekedem
Fossil Butte National Monument - Arvid Aase
Glacier National Park - Dawn LaFleur
Golden Spike National Historic Site - Tammy Bensen
Grant-Kohrs Ranch National Historic Site - Chris Ford and Jason Smith
Grand Teton National Park - Kelly McCloskey and Jason Brengle
Hagerman Fossil Beds National Monument - Ray Vader
Little Big Horn Battlefield National Monument - Melana Stichman
Yellowstone National Park - Dan Reinhart
Cooperators: Montana Conservation Corps crews, US Fish & Wildlife Staff from Elk Refuge, WY, Teton County Weed Control, seasonal staff from CIRO, CRMO, GLAC, GRTE, YELL.

Pacific Islands EPMT
Administration: Jeremy Gooding (Liaison)
Crew Leaders:
MISC Operations Manager - Adam Radford
Hawaii Volcanoes National Park - Jon Makaike, David Benitez (HAVO, PUHO, PUHE, KAHO)
Imi Nelson (Interagency Miconia Management Crew – Leader, MISC Hana Crew), Michael Ade (MISC Piiholo Crew),
Data Managers:
Hawaii Volcanoes National Park, PUHO, PUHE, KAHO - David Benitez
Interagency Miconia Management Program Maui Crew, HALE - Sean Birney
Maui Invasive Species Council - Brooke Mahnken
Maui Invasive Species Council Field Technicians: Brooke Mahnken
Steering Committee:
East Maui Watershed Partnership - Randy Bartlett
Haleakala National Park - Steve Anderson
Hawaii Division of Forestry and Wildlife - Fern Duvall
Hawaii Volcanoes National Park - Dr. Rhonda Loh
Maui Invasive Species Council - Teya Penniman, Elizabeth Anderson
The Nature Conservancy Hawaii, Maui Program - Pat Bily
United States Geologival Service - Lloyd Loope

Southeast EPMT
Administration: Nancy Fraley (Liaison), Toby Obenauer (Team Leader)
Crew: Will Pittman, Cory Barnes, Danny Stewart, Aaron Vail, Sara McInnis, Marc Weller, Brent Stoltz
Regional Contacts:
Chris Furqueron (Chief - IPM, Invasives, and EPMT Program)
Volunteers: Jane Hargreaves, Arthur Miller, Diane Riggs, Western NC Alliance, Green Asheville, Warren Wilson College, Friend of the Blue Ridge Parkway, NC Native Plant Society.
Steering Committee, Park Contacts, technical and field assistance:
Abraham Lincoln Birthplace National Historic Park - Jenny Jones
Andrew Johnson National Historic Site - Jim Small
Big South Fork National River and Recreation Area - Marie Kerr
Blue Ridge Parkway - Chris Ulrey
Carl Sandburg Home National Historic Site - Irene Van Horn
Chickamauga and Chattanooga National Military Park - Jim Scyjkowski
Cowpens National Battlefield - Kathy McKay
Cumberland Gap National Historic Park - Jenny Beeler
Fort Donelson National Battlefield - Michael Manning

Guilford Courthouse National Military park - Vicki Boyce
Kings Mountain National Military Park - Chris Revels
Little River Canyon National Preserve and Russell Cave National Monument- Mary Shew
Mammoth Cave National Park - Bob Ward
Ninety Six National Historic Site - Gray Wood
Obed Wild and Scenic River - Rebecca Schapansky
Shiloh National Military Park - Marcus Johnson
Stones River National Battlefield - Terri Hogan
Great Smokey Mountains National Park - Kris Johnson

Natural Resource Program Center, Biological Resource Management Division
Jerry Mitchell (Division Chief)
Rita Beard (Invasive Species Coordinator)
Louisa Gibson (Program Assistant)
Rick App (Data Manager)
Debi Reep (Administrative Assistant)
Don Kammerer (Administrative Assistant)

Appendix B Glossary

Exotic, Invasive, Noxious, and Weed
The terms exotic, invasive, noxious weed, and weed are used in this report and the literature. These are related terms with variations in meaning. *Exotic* refers to organisms including plants that are not native to an ecosystem. Not all exotic organisms are invasive. For this report, *invasive species* are exotic organisms that can reproduce, persist, and even dominate ecosystems. The National Park Service, along with others use the term Invasive species as defined by Executive Order 13112; Plants that are: 1) non-native (or alien) to the ecosystem under consideration, and 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health (Executive Order 13112). Weeds are the most general term with the broad definition of any plant out of place. Finally, *noxious weed* is a legal term referring to any plant that has been designated as noxious by a federal, state, or county entity. There is often a legal obligation to control, contain, or not distribute plant species designated as noxious.

Gross Infested Area
Like *Infested Area,* it is the area of land occupied by a single weed species. Unlike Infested Area, the area is defined by drawing a line around the general perimeter of the invasive plant population not the canopy cover of the plants. The gross area may contain significant parcels of land that are not occupied by weeds.
Gross area is used in describing large infestations. Some infestations are very large or discontinuous and it is difficult or not useful to map these larger infestations based on the canopy cover of the plants (Infested Area). The increase in accuracy gained by plotting individual plants may not compensate for the increase in cost or manpower. The general location on the landscape and an estimate of land area may be sufficient to meet inventory, monitoring, and treatment requirements. For these larger infestations a line is drawn around the outer perimeter of general weeded area or the plant population, this is the *Gross Area.* When a value is entered for gross area, the assumption is that the area within the perimeter of the weed population (area perimeter) is an estimate or the product of calculating the area within a described perimeter. It is *not* a measured value. If an infestation is mapped using *Gross Area*, a value for *Infested Area* must still be recorded. The value for *Infested Area* is derived from estimating the actual or percentage of land occupied by weed plants.

Infested Area
This is the area of land containing a single weed species. An infested area of land is defined by drawing a line around the actual perimeter of the infestation as defined by the canopy cover of the plants, excluding areas not infested. Areas containing only occasional weed plants per acre do not equal one acre infested. There is no lower or upper limit to the size of an infestation. An infestation can be 1/10,000 of an acre to several thousand acres. 1/10,000 or .0001 acres is approximately a 3' x 4' area and is equivalent to approximately one plant.

Inventoried Area
An extensive point-in-time survey to determine the presence/absence, location, or condition of an invasive plant species. An area can be considered inventoried regardless of the whether an invasive plant is found or not. Inventoried Area is reported in acres.

Maintained Area
Maintaining an area in an invasive plant free state so that annual or periodic maintenance treatments represent 1% or less of the original infestation.

Monitored Area
Monitoring is the collection of information or repeated observations by measuring changes in an indicator or variable. Monitoring may include ecological factors such as soils and plant composition. Monitoring for the EPMT program often refers to measuring the changes in density, distribution abundance or location of an invasive species. Monitoring is reported in acres.

Retreated Area
This term refers to areas that have previously been treated. The retreated are may be a portion or a subset of the original treatment area, or the entire original treatment area.

Treated Area
Treated area is either the infested area or subset of an infested area that has received some form or treatment or control for invasive plants. Treatment area is calculated using the same standards as infested area and is reported in acres.

Restored Area
Acres restored to the condition specified in management plans. Returning an area, watershed or landscape to some previous condition, often some desirable baseline through efforts that include controlling invasive plants and animals.

Appendix C Common Acronyms

CWMA: Cooperative Weed Management Area
EDRR: Early detection and rapid response
EPMT: Exotic Plant Management Team
GIS: Geographic Information System
GPS: Geographic Positioning System
NHS: National Historic Site
NM: National Monument
NPS: National Park Service
NRA: National Recreation Area
USGS: United States Geological Service

The Department of the Interior protects and manages the nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its special responsibilities to American Indians, Alaska Natives, and affiliated Island Communities.

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