National Park Service
U.S. Department of the Interior

Natural Resource Stewardship and Science

Exotic Plant Management Team Program

2012 Annual Report

Natural Resource Report NPS/NRSS/BRMD/NRR—2013/674

ON THE COVER
Top: Outwash at Kenai Fjords National Park. **Middle row (fromleft):** Adjuvant trial plots at Gateway National Recreation Area, mapping tungoil trees at Cumberland Island National Seashore, herbicide application at Blue Ridge Parkway. **Bottom row (from left):** Herbicide application at Theodore Roosevelt National Park, chainsaw work at Hawaii Volcanoes National Park.

Exotic Plant Management Team Program

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June 2013

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science
Fort Collins, Colorado

The National Park Service, Natural Resource Stewardship and Science office in Fort Collins, Colorado, publishes a range of reports that address natural resource topics. These reports are of interest and applicability to a broad audience in the National Park Service and others in natural resource management, including scientists, conservation and environmental constituencies, and the public.

The Natural Resource Report Series is used to disseminate high-priority, current natural resource management information with managerial application. The series targets a general, diverse audience, and may contain NPS policy considerations or address sensitive issues of management applicability.

All manuscripts in the series receive the appropriate level of peer review to ensure that the information is scientifically credible, technically accurate, appropriately written for the intended audience, and designed and published in a professional manner. This report received informal peer review by subject-matter experts who were not directly involved in the collection, analysis, or reporting of the data.

Views, statements, findings, conclusions, recommendations, and data in this report do not necessarily reflect views and policies of the National Park Service, U.S. Department of the Interior. Mention of trade names or commercial products does not constitute endorsement or recommendation for use by the U.S. Government.

This report is available at the Biological Resource Management Division's Invasive Species website (http://www.nature.nps.gov/biology/invasivespecies/) and the Natural Resource Publications Management website (http://www.nature.nps.gov/publications/nrpm/). To receive this report in a format optimized for screen readers, please email irma@nps.gov.

Please cite this publication as:

Beard, R., and R. App. 2012. Exotic Plant Management Team Program: 2012 Annual Report. Natural Resource Report NPS/NRSS/BRMD/NRR—2013/674. National Park Service, Fort Collins, Colorado.

NPS 999/121328, June 2013

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Program Summary

The National Park System represents our cultural, historic, and natural heritage. Parks are mandated to "conserve unimpaired for the enjoyment of future generations" the forests, prairies, and the plants and animals they support. Invasive species have been recognized as one of the major factors contributing to ecosystem change and instability throughout the world. According to the United Nations Program for the Environment, invasive alien species are the second greatest threat to biodiversity. The introduction and proliferation of invasive plants is having a profound effect on the flora and native landscapes of North America.

Invasive plant species are able to transform ecosystems by a variety of mechanisms including: changing the composition of plant communities, contributing to soil erosion, changing soil chemistry, modifying the physical structure of ecosystems, and altering water availability. These ecosystem changes can in turn lead to a loss in biodiversity, threaten rare species, alter the visual landscape, and modify habitat for indigenous wildlife and other native organisms. The increasing movement of people and goods across ecosystem, state, national, and international boundaries coupled with global climate change will likely accelerate problems with invasive plants and other invasive organisms. The response to this threat has been a growing awareness and focus on scientific research and management of invasive species by federal, state, and international governments, as well as academic institutions and private organizations.

Our National Parks are not immune to this accelerating biological invasion. Invasive plants have been found on virtually all lands administered by the National Park Service (NPS). Current estimates are that more than 2.6 million acres (3-5 percent) of park lands are dominated by non-native, invasive plant species. It is policy of the NPS to manage invasive species that are interfering with natural processes, native species, and native habitats. The Exotic Plant Management Team Program was formed to help address this growing problem.

Exotic Plant Management Team Program

The Exotic Plant Management Team (EPMT) Program provides a framework for addressing expanding invasive plant control and management issues within the National Park System. Originally proposed and developed in 1996, the Program has expanded to 18 regionally located teams (i.e. EPMTs), each comprised of highly-trained individuals with expertise in plant identification, plant ecology, weed management, restoration, and pesticide use. Within the NPS, EPMTs provide assistance to parks, regions, fire programs, facilities, interpretive services, and NPS Inventory and Monitoring networks. Invasive species require coordinated management activities across landscapes, jurisdictions, and ownerships. To achieve these cooperative goals, the EPMTs are participants and leaders of local cooperative weed management areas, county weed boards, and professional societies.

This report contains a summary of 2012 activities and accomplishments for each EPMT. Any questions regarding the EPMT Program can be directed to Pete Budde, Branch Chief (peter_budde@nps.gov).

2012 Activities and Accomplishments

The Exotic Plant Management Team (EPMT) Program is a leading force for invasive plant management within the National Park System. The EPMTs incorporate principles of Integrated Pest Management through inventory, monitoring, prevention, treatment, restoration, Early Detection / Rapid Response, and collaboration with local and regional organizations. They tailor these strategies to meet local park needs and priorities.

Table 1: EPMT Program Accomplishments in 2012[1]

Measure	Acres
Treated/Retreated	8,041
Inventoried	2,117,650
Monitored	180,174
Gross Infested Area (GIA)	307,867
Infested Area (IA)	9,303

Treatment

The EPMTs were formed to be a first response to plant invasions in National Parks. Treatment and control remains the focus of the Program, accounting for approximately 60% of EPMT time and resources. EPMT activities in parks are assisted by park staff, local cooperative weed management groups, and volunteers. In 2012, more than 8,000 acres and more that 440 invasive plant species were treated. In the last seven years, EPMTs have treated almost 125,000 acres.

The EPMTs employ a variety of methods for invasive plant treatment including manual, mechanical, biological, and chemical. Treatment in remote and inaccessible sites may use helicopters and technical climbing equipment. Helicopter treatments in the Dakotas (as implemented by the Northern Great Plains EPMT) have reduced leafy spurge (*Euphorbia esula*) from the dominant plant in the prairie landscape to 10% of its former range and density. Treatments have been so successful that helicopter operations are being reduced to spot treatment and land-based control in many areas. The Pacific Islands EPMT plays a leadership role in the Maui Invasive Species Committee to control a highly-invasive tree, Miconia (*Miconia calvescens*). An escaped ornamental, it is now present on close to 19,000 acres, or about 9% of the potential habitat on the island. An interagency effort which combines ground and aerial applications has had great success containing the existing population and decreasing the density of the core population. The California EPMT is also combining management techniques, utilizing prescribed fire and herbicide treatments to control Scotch broom (*Cytisus scoparius*) at Point Reyes National Seashore. The prescribed burn facilitates herbicide use by making plants more accessible and increasing herbicide efficacy.

Controlling invasive species can benefit both natural and cultural resources. Since 2009, the Mid-Atlantic EPMT has been working with volunteers and park staff at Hopewell Furnace National Historic site to restore a significant dry-laid stone wall. Treatment of the invasive plants along the wall has been essential to maintain the wall's structural integrity, restore the visual landscape, and allow access for the

[1] Program accomplishments reflect the efforts of all EPMTs except Heartland Network and Southeast Coast, which are park base-funded teams.

restoration of the wall itself. Prior to treatment, invasive plants entirely obscured the wall and were causing structural damage. A treatment regime was implemented in 2009, and as of 2012, the most destructive invasive species – multiflora rose (*Rosa multiflora*) and Himalayan blackberry (*Rubus discolor*) – have been eliminated from the wall and are no longer present on the site. Treatments in 2012 focused on the remaining invasive species in the area.

Inventory

Inventories are a systematic process to locate and describe the abundance of invasive species. Inventories help the parks and EPMTs understand the extent of the invasive plants and then assist in setting management priorities, strategies, and plans. Parks, citizen scientists, volunteers, and the NPS Inventory and Monitoring Program contribute to completing park invasive plant inventories. Though park inventories are improving every year, a considerable portion of park lands have yet to be surveyed or inventoried.

In 2012, EPMTs inventoried park lands, and through cooperative agreements assisted states and counties with inventories across landscapes. EPMTs inventoried 2,117,650 acres in 2012, bringing the total acres inventoried by the EPMT Program since 1995 to almost 91,000,000 acres. Many of these inventoried acres represent a combination of public and private lands such as those recorded by aerial surveys in south Florida around Everglades National Park.

Monitoring

Monitoring is used to determine changes in invasive plant populations, treatment effectiveness, response of native plant communities, and success of restoration activities. Monitoring allows EPMTs to adjust or adapt management to provide the most effective, efficient, and least environmentally intrusive tools for treatment and eventual restoration of native plant communities. In 2012, EPMTs monitored more than 180,000 acres.

In September 2012, the Lake Mead EPMT treated 109 acres for Russian knapweed (*Acroptilon repens*) along the Mancos River in Mesa Verde National Park. The park staff provided logistical support for these challenging remote projects. The return to this project site allowed the EPMT to observe and monitor the success of previous tamarisk (*Tamarix ramosissima*) and Russian olive (*Elaeagnus angustifolia*) control projects conducted in 1999. The area remains largely free of tamarisk, with only a few isolated plants needing treatment.

Gulf Islands National Seashore has extensive disturbed areas associated with oil spill cleanup activities. These areas are being monitored for the presence of invasive species. The Gulf Coast EPMT has made significant progress in recent years ridding the offshore Mississippi islands of invasive species. Monitoring and any needed treatment will ensure these accomplishments will not be lost to oil spill activities.

Cooperation and Collaboration

The success of invasive plant control within NPS park units is dependent on the control and management of invasive plants across jurisdictions and property boundaries. The EPMTs participate with and lead local and regional invasive plant groups such as Cooperative Weed Management Areas, Invasive Plant Pest Councils, and Exotic Plant Councils.

Common reed (*Phragmites australis*) is a problem of wetland ecosystems within the National Capital Region, Assateague Island National Seashore, and areas around Washington, DC. Management of this

species provides an excellent opportunity to work with partner organizations and foster cooperative relationships across jurisdictions. Regional management efforts are emphasizing control along the Anacostia and Potomac River watersheds. Activities in 2012 expanded on the previous three years' efforts to control populations in key areas in both George Washington Memorial Parkway (GWMP) and Kenilworth Aquatic Gardens. In cooperation with the Arlington County AmeriCorps, Student Conservation Association, DC Summer Youth program, and GWMP staff, the EPMT treated several large populations within Roaches Run Waterfowl Sanctuary.

The EPMTs form strong partnerships with the parks and the regions they serve. In 2012, the EPMTs received more than $2.6 million in contributions from parks, regions, and other agencies toward cooperative and coordinated invasive plant efforts. The Gulf Coast EPMT, for instance, is working with both the Army Corps of Engineers and the United States Fish and Wildlife Service to manage invasive plants in Texas. These agencies are engaged in long-term discussions on how to best manage invasive plants cooperatively, possibly through an interagency-funded team.

Research

Though research is not a responsibility of the EPMT Program, teams and national staff work with universities, professional organizations, and the United States Geological Survey to expand the knowledge base for invasive species and managing invasive plants. EPMTs assist in testing new techniques and materials, identify information gaps, and share treatment and monitoring information.

In the fall of 2009, a new exotic plant, spurge flax (*Thymelea passerina*), was found in Badlands National Park. In 2010, and again in 2011, approximately 40 acres were found to be infested. Given there is little information on management of this species, EPMT, park resource managers, neighboring United States Forest Service personnel, and faculty at the University of South Dakota have coordinated to develop management strategies including herbicide tests and screenings.

Safety

The EPMTs work under hazardous and demanding work conditions. Crews must often hike for long distances navigating remote, rocky, steep, uneven terrain carrying heavy loads. Treatments may require the use of potentially hazardous substances such as pesticides and hazardous equipment such as chainsaws, weed wrenches, off road vehicles, and helicopters. Pack stock and technical climbing gear are used to reach remote invasive plant infestations.

The EPMT Program emphasizes safety and caution in all operations. Each EPMT prepares a job hazard analysis for each type of operation. These analyses are updated frequently to reflect current and changing conditions. Operations are coordinated with park safety officers to identify local conditions and hazards. This ensures that safety plans meet park standards and local environmental conditions. The EPMTs have logged more than a million field hours with field time injuries representing less than 0.01% of the field hours. This outstanding safety record is a testament to the dedication and expertise of the teams and team leaders.

The NPS Call to Action

2016 will mark the centennial of the National Park Service (NPS). As the NPS prepares for its second century of operation, it is renewing the commitment to the public to preserve and protect our natural and cultural heritage. In 2011, the NPS announced the Call to Action plan with the

purpose of continuing important programs and establishing a new commitment and action items to guide management into the next century. The EPMT Program responded to the challenge by exploring how the Program and invasive plant management efforts can contribute to the NPS mission now and into the future. The Call to Action is divided into the following themes: Connecting People to Parks, Advancing the NPS Education Mission, Preserving American's Special Places, and Enhancing Professional and Organizational Excellence. EPMTs working in concert with parks contribute to all four of the goals and 17 of the 36 specific action items in the plan.

Connecting People to Parks

The EPMTs contribute to this goal through creating a new generation of park users and managers, restoring waterways, restoring natural landscapes in urban areas, organizing volunteer activities, and contributing to local economies. The EPMTs organize and participate in youth employment programs, volunteer programs, and education and outreach efforts. They restore waterways and watersheds through control of aquatic invasive plants, which are known to degrade recreational facilities, prevent boat navigation, reduce fish populations, and permanently alter native aquatic ecosystems.

Advancing the NPS Education Mission

The EPMTs increase the understanding of park resources through working with local youth groups and schools, and by partnering with interpretive services. The Program provides employment and educational opportunities to students, youth groups, and volunteer organizations. The Program has created partnerships with professional organizations and agencies to increase opportunities for students and young people. The Program is responding to changing technologies by creating new tools for citizen scientists and park visitors of all ages.

Preserving America's Special Places

Preserving native landscapes and cultural resources is the central goal and mission of the EPMT Program. Managing invasive plants requires cooperation across broad landscapes and ownerships. EPMTs are part of, and play a leadership role in, community and regional coordination efforts. Cooperative Weed Management Areas unite federal, state, and local entities with private landowners to address invasive species across broad landscapes. At a larger scale, the Program works with regional and national efforts to address new and emerging species. For instance, the Program Coordinator provided leadership and subject matter expertise as acting Department of the Interior Invasive Species Coordinator through part of 2012. Among other responsibilities, she facilitated department-wide discussions concerning invasive species management strategies.

Enhancing Professional and Organizational Excellence

EPMTs are a center of excellence for invasive plant management, restoration, and pesticide use. They contribute to this goal by providing training and oversight to park staff, crews, and personnel. The emphasis on safety and safe procedures has led to an exemplary safety record exceeding national averages and standards. The Program provides a model for parks and other federal agencies.

There has been a strong association between the EPMT Program and recruitment into natural resource careers. The Program has worked with established youth programs and educational institutions such as the Student Conservation Association, Chicago Botanical Gardens, and universities. The EPMT Program has an impressive track

record reaching out to younger demographics through youth programs, providing training and career tracks into seasonal, and then permanent, employment in natural resources. Former interns are now in supervisory positions in invasive plant programs throughout the Park Service. More than half of our current EPMT term, permanent, and leadership positions are staffed by former youth program interns.

Moving Forward

While the 2012 annual report provides an occasion to highlight accomplishments of the overall Program and individual Teams, it also provides an opportunity to address future goals and vision. During 2012, an EPMT Advisory Group was established to articulate a strategic direction for the Program as requested in the 2011 EPMT review. As chartered, the Advisory Group will provide guidance for the development of program goals, policy, objectives, and planning. Faced with the compounded impacts of invasive plant species, EPMTs as part of the larger NPS effort are challenged to identify approaches that balance site-specific management goals with inextricable ecosystem-level priorities. Through a strategic approach of the combined inventory, treatment, and monitoring efforts, EPMT activities can contribute to the growing knowledge of best management practices and critical success towards restoration of park-managed waters and lands.

Exotic Plant Management Teams

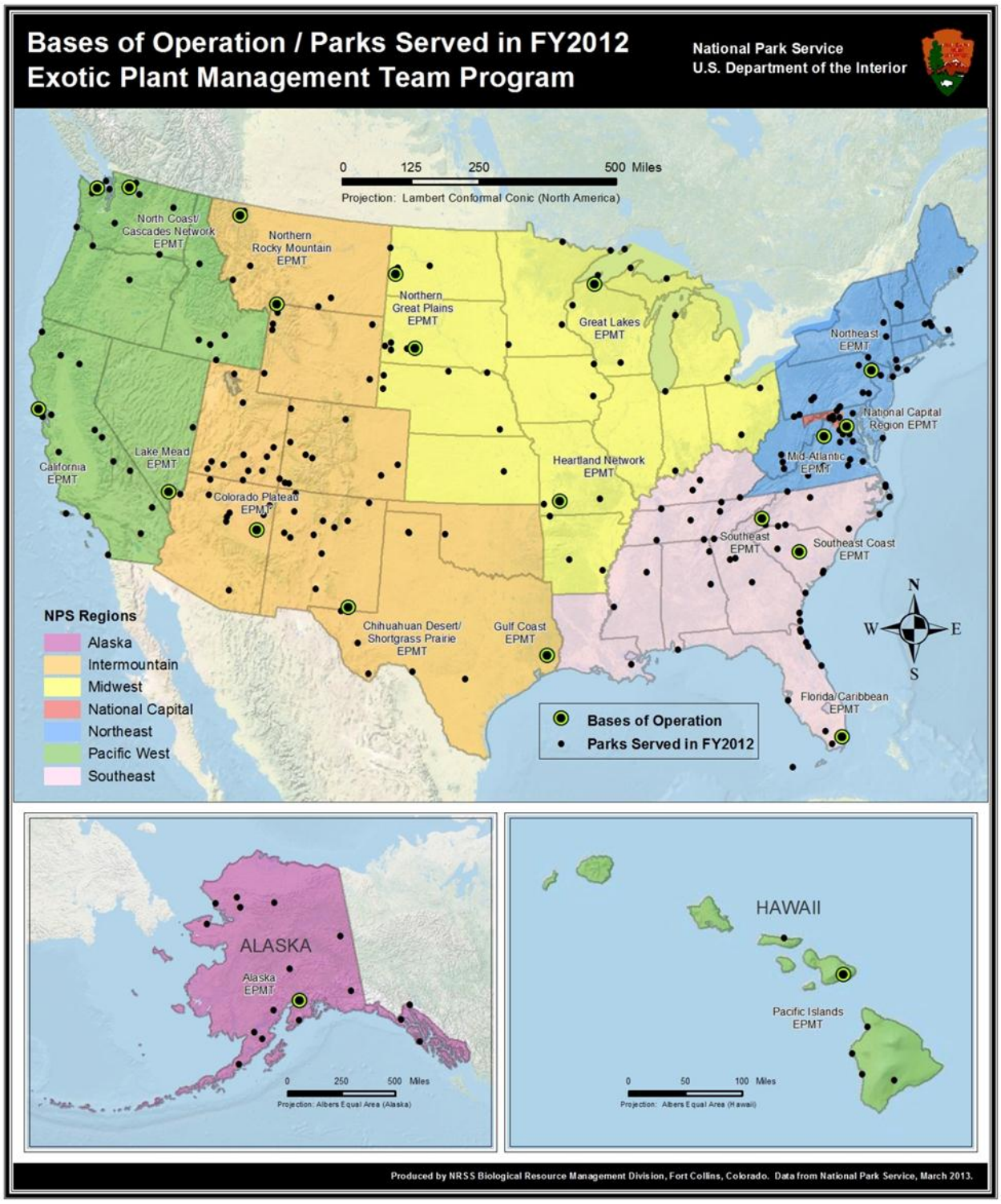
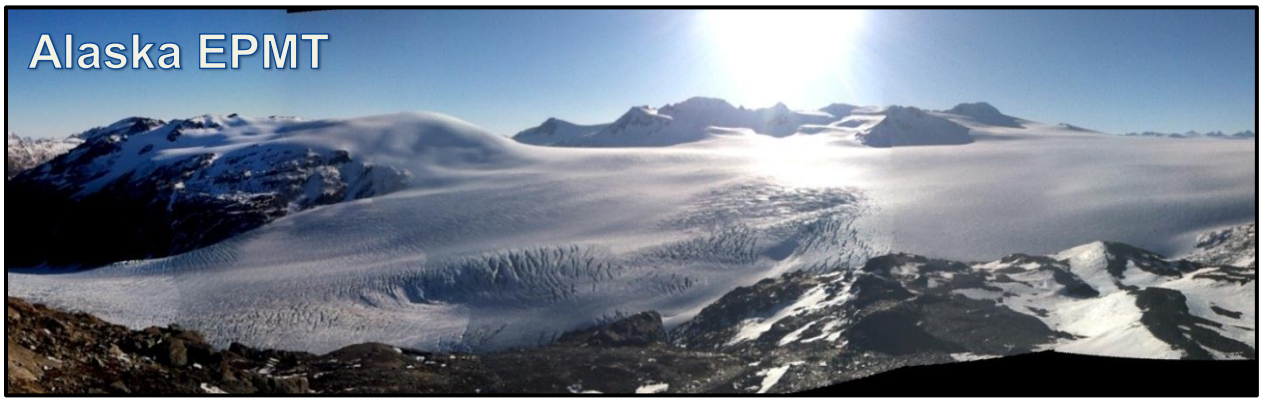


Figure 1. EPMTs provided invasive plant management expertise to parks in all seven NPS regions.



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. The majority of national parks in Alaska contain healthy, intact, native ecosystems with few infestations of invasive plants.

Figure 2. EPMT staff Travis Fulton and Christina Kreideman of Kenai Fjords NP participate in a community weed pull at the Seward Middle School.

The geography of Alaska makes invasive plant management strategies challenging, requiring backcountry or air travel to reach many park boundaries. Most parks have little or no road access. Recreation use is widely-dispersed with access only by boat, backpacking, or aircraft. Remote airstrips, cabins, and concessionaires can provide avenues for invasive species introduction in wilderness sites where they are difficult to detect, treat, and manage. The Alaska program relies heavily on knowledge and participation from parks.

2012 Program Highlights

2012 was a productive year for the Alaska EPMT. Nearly 500 acres were surveyed for non-native plants in seven parks, including Denali National Park and Preserve (NP & PRES), Glacier Bay NP & PRES, Katmai NP & PRES, Kenai Fjords National Park (NP), Klondike Gold Rush National Historical Park (NHP), Sitka NHP, and Wrangell-St. Elias NP & PRES. The EPMT coordinated over 5,000 hours of volunteer and park staff support, which resulted in the manual removal of over 10,000 pounds of invasive vegetation and treatment of 46 infested acres.

Figure 3. EPMT staff manually control an infestation in full bug gear on the Dinglestat cliffs in Kenai Fjords NP.

The relatively cool spring, heavy snowpack, and late snowmelt greatly delayed the phenology of the target species in some areas and inhibited access in others. Snow covered some sites late into May and early June. Some of the invasive

plants treated this season included common tansy (*Tanacetum vulgare*) at Wrangell-St. Elias NP & PRES, common dandelion (*Taraxacum officinale ssp. officinale*) at Katmai NP & PRES and Kenai Fjords NP, perennial sowthistle (*Sonchus arvensis*) and reed canarygrass (*Phalaris arundinacea)* at Glacier Bay NP & PRES. Herbicides were incorporated into the EPMT Program in 2011 and continued in 2012. Knowledge of effective herbicide treatment methods continues to grow in the state. In 2013, the team will continue to focus on increasing understanding and expertise in all control methods through training and creating partnerships with local weed control coalitions.

New Site Surveys

In addition to continuing control efforts throughout the parks, inventories were conducted in several areas either not previously inventoried or infrequently visited by EPMT staff. First-time surveys of areas within and around Noatak National Preserve (N PRES) and Kobuk Valley NP (in the western Arctic region of Alaska) were conducted. No invasive species were found on park lands, but some species were found at gateway sites adjacent to the park, such as airstrips and recreation staging facilities. These surveys show that these types of remote sites are vulnerable to infestation. Increased prevention measures and continual monitoring of these sites is needed to inhibit establishment of invasive species in Alaska's remote wilderness areas. For the first time, highly-invasive species were documented on both NPS and non-NPS lands in Kotzebue, the headquarters area for all western Arctic parklands. Increased monitoring and treatment will be needed in future years.

Restoration

Restoration efforts are increasing in many parks in Alaska, becoming a vital part of overall invasive plant management. In 2012, 1.95 acres were restored in Denali NP & PRES by planting native seeds collected via "Need for Seed" projects. Nearly 0.5 acres were revegetated with native seeds and native tundra mats in Wrangell-St. Elias NP & PRES this season. Revegetation efforts will continue in 2013 utilizing native plant beds created this year.

Outreach and Education

Parks continued efforts to provide outreach and education to local communities in 2012. In Denali NP & PRES, invasive plant presentations were conducted at the Wilderness Access Center that reached many visitors. Denali's Student Conservation Intern also posted updates regarding invasive plants and revegetation efforts in the weekly newsletter "Denali this Week." Glacier Bay NP & PRES staffed an invasive plants awareness booth at the Gustavus Fourth of July Festival, and made a presentation for staff and the public at the Glacier Bay Lodge. Kenai Fjords NP hosted their 9th annual Exit Glacier Road Community Weed Pull event that included several groups and volunteers, and resulted in the removal of over 170 pounds of invasive plants. Kenai Fjords and EPMT staff participated in the annual Seward Weed Smackdown, helped with manual removal of bird vetch (*Vicia cracca*) and other invasive plants from the area around the Seward Middle School, and took the opportunity to connect with citizens concerned with the issue of invasive plants in Alaska. The Skagway Community Weed Pull is the largest community event organized by the EPMT in Klondike Gold Rush NHP. The event has proven to be an effective tool for controlling invasive plants and increasing public awareness. White sweetclover (*Melilotus alba*) infestation size and density have been significantly reduced as a result of these efforts. EPMT staff from Katmai NP & PRES conducted community presentations at the United States Fish and Wildlife Service office and local schools this season. They co-manned a National Park Service booth at the Naknek Fishtival bazar and displayed live invasive plant samples and pamphlets, as well as activity books for children.

Table 2. Alaska EPMT Accomplishments

Measure	Acres
Treated/Retreated	46
Inventoried	229
Monitored	261
Gross Infested Area (GIA)	490
Infested Area (IA)	174

The Chihuahuan Desert/Shortgrass Prairie Exotic Plant Management Team (EPMT) serves 16 national park units ranging across more than 400 miles of arid lands in New Mexico, Oklahoma, Colorado, and Texas.

Figure 4. Cheatgrass on NPS boundary.

This park network preserves and protects a wide range of unique natural and cultural settings that collectively manage more than one million acres. Examples of the diverse nature of these parks include Pecos National Historic Park and Big Bend National Park, a United Nations designated Biosphere Preserve. The common thread linking these parks are native biological systems adapted to arid climate, frequent drought, and increasing populations of invasive plants.

Established in 2000, the EPMT focused primarily on the control of populations of invasive species such as saltcedar (*Tamarix ramosissima*) and Russian olive (*Elaeagnus angustifolia*) which significantly degrade riparian systems. The majority of these invasive populations have been eradicated or have been brought under control. The emphasis for the EPMT has now shifted to rangeland and agricultural weeds.

Figure 5. Mastication of kochia to be followed by Western wheatgrass seeding.

A number of factors are contributing to increasing populations of invasive plants in network parks. The majority of parks served by the EPMT are relatively small in size and bordered by private agricultural lands. Drought and other factors have resulted in an increase in agricultural weed populations such as Johnsongrass (*Sorghum halepense*), kochia (*Kochia scoparia*), and Russian thistle (*Salsola tragus*), which are threatening National Park units. Also, two years of wildfire activity in the Southwest have increased exotic grass populations of Lehmann's lovegrass (*Eragrostis*

lehmanniana), cheatgrass (*Bromus tectorum)*, and buffelgrass (*Pennisitum ciliare)* in parks. Along the Rio Grande River, a substantial increase of giant reed (*Arundo donax*) is occurring at Amistad National Recreation Area and Big Bend National Park. Finally, energy development may also be contributing to the distribution of many invasive species. Exotic species which were once considered contained, such as Malta starthistle (*Centaurea melitensis*) and African rue (*Peganum harmala*), are now reappearing in large numbers on public lands.

Figure 6. Kochia.

While the original model of a single, centrally-located crew of EPMT regulars was once adequate to serve the needs of its partner parks, declining budgets and the increasing number and scope of threats region-wide has taxed the resources of the Team. The EPMT has been meeting this challenge by adopting a comprehensive revision of operational models. Examples include:

- Use of Cooperative Agreement crews such as AmeriCorps in order to conduct operations on multiple parks simultaneously, while also training the next generation of natural resource management professionals.

- Increased utilization of assets from other agencies such as the Bureau of Land Management and United States Fish and Wildlife Service to optimize treatment timing, reduce travel costs, and enhance collaboration between agencies.

- Direct support to parks to increase in-house operations including: training sessions/workshops for park staff on strategic planning and identification of negative cultural practices, plant identification, treatment materials and methods, chainsaw certification, herbicide application methods, regulations, and safety.

Implementation of Adaptive Management strategies

The EPMT is working with outside agencies and the National Park Service Intermountain Region to implement and expand management practices including prescribed fire, prescribed grazing, restoration seeding, competition planting, and biological control.

Table 3. Chihuahuan Desert / Shortgrass Prairie EPMT Accomplishments.

Measure	Acres
Treated/Retreated	97
Inventoried	4,711
Monitored	50
Gross Infested Area (GIA)	2,740
Infested Area (IA)	252

There are 23 parks within the Colorado Plateau region partnering with the Exotic Plant Management Team (EPMT) Program. The Colorado Plateau partner parks were served by the Lake Mead EPMT for the third consecutive year during Southwest EPMT reorganization. The Lake Mead EPMT conducted priority exotic plant control projects in seven of the Colorado Plateau NPS units during 2011 and 2012. The parks have been very pleased with the level of service provided by the Lake Mead EPMT.

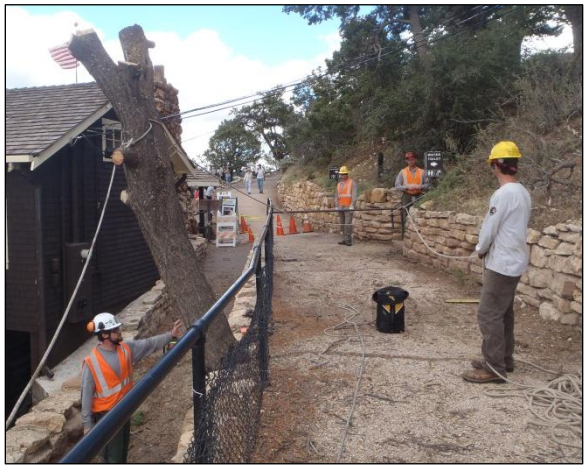


Figure 7. EPMT tree feller Matthew Duffy preparing to drop a hazard tree at Grand Canyon National Park.

The EPMT returned to Canyon De Chelly National Monument (NM) for the sixth time in eight years, continuing the Russian olive (*Elaeagnus angustifolia*) control project it initiated for the park in 2004. Over the years at Canyon De Chelly NM, the Lake Mead EPMT has logged 7,806 hours of field labor controlling tamarisk (*Tamarix ramosissima*) and Russian olive, training the local park crews in effective treatment methods, herbicide application, and safety operations. The EPMT Liaison participated on the Watershed Assessment Team in 2003 and developed treatment methods for the study design to evaluate geomorphic response of the various treatments. This year, the EPMT worked in Lower Canyon Del Muerto and provided 1,600 hours in the field conducting exotic tree control with an experienced saw crew.

The EPMT initiated an exotic plant inventory on newly-acquired lands along the Puerco River within Petrified Forest National Park. The Team detected and mapped 10 different priority weed species within 521acres. All of the species detected, with the exception of tamarisk, were small populations that can easily be controlled. Additional areas need inventories and a plan developed for management and control of the entire area. Like other areas in the Southwest, the tamarisk leaf beetle biological control agent is suppressing tamarisk populations. It is important to monitor and treat these areas for new invaders as the tamarisk recedes in dominance.

The EPMT assisted Grand Canyon National Park with multiple projects during the summer including exotic plant control, hazard tree removal, and native plant propagation. The EPMT assisted Chaco Culture National Historic Site for the second year in a row, controlling tamarisk along a trail within Chaco Wash and providing training and oversight to the Southwest Conservation Corp youth crew that was funded by the park.

Figure 8. Backpack spraying at Yucca House National Monument.

The EPMT has conducted eight project trips to Mesa Verde National Park since 1999. In September 2012, the EPMT treated 109 acres for Russian knapweed *(Acroptilon repens)* along the Mancos River. The park staff provided logistical support for these challenging remote projects. It was rewarding to return to this project site and observe the success of previous tamarisk and Russian olive control projects conducted in 1999.

Figure 9. Lake Mead EPMT members Kevin Reichling (with saw) and Timothy Marsh controlling Russian olive trees at Canyon De Chelly NM, Utah.

The EPMT also conducted multiple interagency exotic plant control projects on the Colorado Plateau. Cooperative agreements were developed with the United States Forest Service on the Coconino and Prescott National Forests (NF). Due to the EPMT's work on the adjacent Prescott NF, a new partnership was implemented with the Arizona Game and Fish Department to conduct invasive plant control on the Upper Verde River Wildlife Habitat Area. These partnerships provide supplemental funding for the EPMT, increase government efficiency, and ensure weeds are being managed on a cooperative basis across agency boundaries.

The Lake Mead EPMT has a long history of providing service to many of the Colorado Plateau NPS park units and looks forward to serving these parks in the future.

Table 4. Colorado Plateau EPMT Accomplishments.

Measure	Acres
Treated/Retreated	106
Inventoried	10,509
Monitored	917
Gross Infested Area (GIA)	8,898
Infested Area (IA)	235

The Gulf Coast Exotic Plant Management Team (EPMT) spans the Gulf Coast region from Mexico to Florida and includes six partner parks and two non-partner parks. This is a region of warm year-round temperatures, relatively high precipitation, and plant diversity, including a significant array of exotic species. 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 have been invaded by Chinaberry tree (*Melia azedarach*), Japanese privet (*Ligustrum japonicum*), Japanese honeysuckle (*Lonicera japonica*), giant cane (*Arundo donax*), and golden bamboo (*Phyllostachys aurea*). In the western upland parks, common invasives include musk thistle (*Carduus nutans*), Old World bluestems (Kleberg, Angleton, Australian, Silky, and Yellow varieties) and Johnsongrass (*Sorghum halepense*). Coastal parks are primarily concerned with invasive grasses such as cogongrass (*Imperata cylindrica*) and phragmites (*Phragmites australis*), which are adapted to low-lying wet areas. The lowland forest sites face threats from Chinese tallow tree (*Triadica sebifera*), royal paulownia (*Paulownia tomentosa)*, tung oil tree (*Aleurites fordii*), mimosa tree (*Albizia mimosa*), Japanese climbing fern (*Lygodium japonicum*), and kudzu (*Pueraria montana*), among many others. The recent hurricane history in the region has provided ample opportunity for these species to gain a foothold in stressed and disturbed native ecosystems.

Most of the forested ecosystems within the parks have the potential to naturally revegetate after invasive species are removed and once canopy closure has been achieved. 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 native species, both in an effort to restore native habitats and to help prevent re-infestation of exotic species from surrounding exotic plant populations and the remaining seed bank.

Figure 10. Tailgate safety briefing for American Youth Works crew prior to start of work at San Antonio Missions NHP.

A new initiative for 2012 was the formation of an Interagency Agreement between the National Park Service and United States Fish and Wildlife Service to establish an interagency EPMT strike team to serve Texas parks and wildlife refuges. The primary purpose of the new invasive species program in Texas is to coordinate and capitalize on the combined resources of the two agencies.

This partnership will contribute to the restoration and maintenance of native plant and wildlife communities of the National Parks, National Wildlife Refuge System, and neighboring landscapes by reducing impacts from invasive species through prevention, control, restoration, monitoring, and education. Invasive species control/eradication, with emphasis on Early Detection / Rapid Response (EDRR), is a priority of this program. An integral part of the invasive species program is the use of crews who can work in areas where it is not possible or practical to use heavy equipment or aerial application. This program offers opportunities for American and International volunteers/interns/employees (including youth-based conservation groups) from diverse backgrounds to take part in challenging outdoor projects, get hands-on training, skill development, and career exploration in the preservation, conservation, and restoration of natural resources. In addition to the conservation training activities, professional development will also be provided in life skills, job readiness skills, and leadership.

The EPMT is working with San Antonio Missions National Historical Park (NHP) and Palo Alto Battlefield National Historic Site (NHS) on projects designed to control invasive plants, promote the use of native plants in landscaping, and restoration of disturbed, invaded prairie lands. The EPMT and San Antonio Missions NHP work in partnership with the Austin, Texas based American Youth Works to accomplish these projects. Projects this year concentrated on treatment and removal of invasive species such as Chinaberry tree, Japanese privet, golden bamboo, giant cane, and Old World bluestems. This shall be followed by mechanical treatments and seeding with native perennial warm season grasses. Restoration areas have been selected, and associated planning documents are being prepared.

At Gulf Islands National Seashore, disturbed areas associated with oil spill cleanup activities are being monitored for the presence of invasive species. We have made significant progress in recent years ridding the offshore Mississippi islands of invasive species. Monitoring and any needed treatment will ensure these accomplishments will not be lost to oil spill activities.

Figure 11. Giant cane is cut and stacked in preparation for treatment at San Antonio Missions NHP.

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 soon be in place at several network (or proposed network) parks including San Antonio Mission NHP, and Palo Alto Battlefield NHS. Infrastructure required to facilitate the shift to restoration has been purchased and will be followed by procurement plant materials, seed, and supplies. This is an exciting new horizon for the 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 in concert with invasive species treatment may ultimately be required to achieve plant community stability.

Table 5. Gulf Coast EPMT Accomplishments.

Measure	Acres
Treated/Retreated	392
Inventoried	3,898
Monitored	611
Gross Infested Area (GIA)	3,091
Infested Area (IA)	701

The 15 partner parks served by the Northern Rocky Mountain Exotic Plant Management Team (EPMT) consist of more than four million acres spread across four states (Idaho, Montana, Utah, and Wyoming) and two NPS regions (Intermountain and Pacific West). Encompassing high desert, forests, sub-alpine meadows, sagebrush-steppe, wetland and riparian areas, as well as unique thermal features, the area is immense and diverse. Because of the vastness of this region, the EPMT is divided into small crews strategically based at parks throughout the network, so that all partner parks receive annual work. Since its inception in 2003, the EPMT has assisted partner parks with protecting and improving the health of native habitats in these diverse areas. The EPMT's 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 EPMT employs scientifically-based Integrated Pest Management, so that its actions on the ground are effective, efficient, and safe for the public and the environment.

Missing a Year in the Clark's Fork Riparian Corridor

Grant-Kohrs Ranch National Historic Site (NHS) includes a 100-acre riparian corridor of the Clark's Fork River. The EPMT started treating leafy spurge (*Euphorbia esula*) and yellow toadflax (*Linaria vulgaris*) at this site in 2006, under a restoration plan developed by Dr. Peter Rice of Montana State University. From 2007 through 2010, populations were reduced from 52.2 acres to 4.2 acres of leafy spurge and 43.0 acres to 4.0 acres of toadflax on the site. These results were confirmed by plot sampling that was conducted by Dr. Rice over that time period. Travel restrictions forced the EPMT to skip treatments in 2011. When the EPMT returned to treat in 2012, there were 7.9 acres of leafy spurge and 4.6 acres of yellow toadflax – nearly twice the amount of spurge and more of both species than were on site in 2009, setting the project back by 3 years. While these increases do not appear large, this illustrates the drawbacks of missing a season of treatments, although the impact can vary by species – some invasive plants rebound more quickly than others. And the reduced amounts of both target species allowed the EPMT to start targeting more invasive species, like Canada thistle (*Cirsium arvense*) and perennial pepperweed (*Lepidium latifolium*).

Figure 12. Reaching further into the canyons around Golden Spike NHS to treat Dyer's woad.

Successes

It has been gratifying to find over the past few years that the original target species in many parks have been significantly reduced – e.g. thistles (*Cirsium spp.*) and knapweeds

(*Centaurea spp.*) at City of Rocks National Reserve, the Dyer's woad (*Isatis tinctoria*) and rush skeletonweed (*Chondrilla juncea*) at Craters of the Moon National Monument and Preserve, Russian knapweed (*Acroptilon repens*) and tamarisk (*Tamarix ramosissima*) at Dinosaur National Monument (NM), musk thistle (*Carduus nutans*) at Three Rivers in Grand Teton National Park (NP), the successes at Grant-Kohrs Ranch NHS mentioned above, and others. This has allowed the crews to expand search areas and target additional species, like the Dyer's woad in the remote canyons at Golden Spike NHS. At other parks, we are successfully containing species (like the hawkweeds [*Hieracium spp.*] in Yellowstone NP) so that they do not expand their range and infest new areas.

Figure 13. EPMT treated Russian knapweed in Dinosaur NM, 2008 (above). No Russian knapweed was found at same spot in 2010 (below).

Working in New Parks

Since 2008, the EPMT has been traveling to Dinosaur NM, which was not one of the original partner parks in the Northern Rocky Mountain EPMT network. These trips have occurred in October, when work in the other parks has ended. In 2011, the EPMT added another Colorado park – Rocky Mountain National Park – to its October schedule. The large crew has been assisting park staff with late-season treatments of leafy spurge and cheatgrass (*Bromus tectorum*) along trails leading into the backcountry. These visits have been very successful and satisfying to the EPMT and the parks. In 2013, the EPMT will officially embrace these two parks as partners. We look forward to benefitting from their enthusiasm, knowledge, and experience in controlling invasive species.

Table 6. Northern Rocky Mountain EPMT Accomplishments.

Measure	Acres
Treated/Retreated	176
Inventoried	6,197
Monitored	14,612
Gross Infested Area (GIA)	17,254
Infested Area (IA)	183

The Great Lakes Exotic Plant Management Team (EPMT) provides support to 10 national parks across four states in the western Great Lakes Region. From the dunes along Lake Michigan, west to the scenic riverways of Wisconsin and Minnesota, and north to the boreal forests along the Canadian border, this region claims diverse aquatic and terrestrial ecosystems. Geographical and environmental conditions have limited the impact of many invasive species, but visitor use and necessary maintenance activities have introduced new invasive species. The team balances its activity to meet two vastly different needs: (1) long-term, large-scale control and restoration, and (2) early detection and eradication of nascent populations.

Figure 14. Crew member foliar spraying oriental bittersweet.

Oriental Bittersweet Control at Indiana Dunes National Lakeshore

In 2012, the focus of the management efforts at Indiana Dunes National Lakeshore was on oriental bittersweet (*Celastrus orbiculatus*). Bittersweet is found in multiple habitat types and has invaded the dunes and forests within the park. Taking the forms of ground cover and climbing vines, bittersweet can shade out and smother other species. Its sprawling tendencies also add weight to its host plants causing limb breakage, uprooting, increased susceptibility to damages from high winds, and ultimately mortality of the host plant. Due to its nature, it has been given the moniker of "the kudzu of the north."

Within the last few years, oriental bittersweet's presence within Indiana Dunes has exploded. The park is also home to the native American bittersweet (*Celastrus scandens*), which means the EPMT and park must use caution so that treatment regimens do not harm the native species. In seeing the oriental bittersweet take off, the park acknowledged the need to begin control work in earnest. Through EPMT and other funding sources, a concentrated effort was begun.

Continued Restoration in Mississippi National River and Recreation Area

The Coldwater Spring site of the Mississippi National River and Recreation Area was acquired by the park in 2010. Located in the metropolitan area of Minneapolis/St. Paul, Minnesota, the goal is to restore native prairie-oak savanna on the property. Throughout the last few years, park and EPMT staff, Youth Conservation Corp crews, and volunteers have made significant progress in eradicating the buckthorn (*Rhamnus cathartica*) that had invaded the site.

From 2010 to 2012, crews removed buckthorn, honeysuckle (*Lonicera sp.*), and garlic mustard (*Alliaria petiolata*) from the property. This season, with assistance from the Saint Croix National Scenic Riverway maintenance crew, hazard trees and other species were removed to open canopies and view sheds within the site. Additional work was completed on land adjacent to the northern boundary of the Coldwater Spring site, through an agreement with the landowner (the Veterans Association).

Figure 15. YCC members assisting in hauling buckthorn at Coldwater Spring.

In a few short years, the site has undergone a dramatic transformation from an urbanized industrial area to a glimpse of a historical native landscape. Even though some native plants are beginning to emerge, several years of work by the EPMT, the park, and dedicated volunteers will be needed to prevent the re-establishment of invasive plants. Reseeding native plants and careful monitoring for new invasives will be necessary throughout the restoration process. Follow-up treatment of garlic mustard and buckthorn will be required for several years given the established seed bank. Maintaining the restored site in an urban setting will be an ongoing effort even after the project has been completed.

Restoration Activities at Voyageurs National Park

Besides traversing the park and controlling invasive species found within its boundaries, a number of restoration activities are in progress. A greenhouse was established by the park in 2011, and EPMT staff has since assisted in nurturing seeds, cuttings, and rootstock collected by park employees. These plants will later be distributed to various locations throughout the park to aid in restoration efforts in areas previously overcome by invasive species.

The EPMT crew members also assisted park staff in monitoring tree survivorship and evaluating restoration of cabin sites. Trees were planted at these locations in 2008, and this season's assessment shows that tree survivorship was high at all the sites, though additional plantings are needed at some sites. Assessments like these are critical to ensuring restoration success and to lowering the chance for re-infestation.

Figure 16. Volunteers planting plugs at the Rainy Lake Visitors Center Ethnobotanical Garden.

The EPMT also assisted in maintaining the ethnobotanical garden located at the Rainy Lake Visitor Center. The half-acre garden was created in 2011, and during the 2012 season park staff and volunteers removed unwanted species and planted over 600 native plants of 20 species.

Table 7. Great Lakes EPMT Accomplishments.

Measure	Acres
Treated/Retreated	56
Inventoried	4,266
Monitored	147
Gross Infested Area (GIA)	4,266
Infested Area (IA)	144

The Heartland Network Exotic Plant Management Team (EPMT) is a collaborative partnership between 15 parks in the National Park Service's Midwest Region. The parks, located in eight states, support a range of plant communities. These plant communities include tallgrass prairie, consisting of unplowed prairie in the Flint Hills of Kansas and Sioux quartzite outcrops in Minnesota and numerous prairie restorations; Eastern deciduous forests, ranging from Northeastern Iowa to Northwestern Ohio; Midwestern riparian woodlands, such as cottonwood and bur oak-dominated forests; mixed shortleaf pine-oak-hickory forests in the Ozark and Ouachita Mountains; and a variety of wetlands from southeastern cypress-tupelo swamps to emergent wetlands along tributaries of Lake Erie. The majority of these parks commemorate important historical events, locations, people, and cultural practices, which requires integrating invasive plant management in cultural and natural landscapes. The diversity, complexity, and geographical extent of these park resources requires the commitment and shared expertise of all cooperating parks to sustain an invasive plant management program.

In 2012, the EPMT collaborated with park staff and landscape architects in the Midwest Regional Office to develop treatment recommendations for Arkansas Post National Memorial and Lincoln Boyhood National Memorial. In these memorial sites, landscaping goals may be more clearcut than ecological restoration goals. For example, Lincoln Boyhood National Memorial has a history of extensive clearing at the site, reducing the biological significance of the current forest vegetation. Frederick Law Olmsted, Jr., when designing the site that surrounds the gravesite of Nancy Hanks Lincoln, noted that the forest was the only landscape feature that could be re-created "without sham or falsehood". The current goal is to manage the site to represent a "pioneer forest" with an oak and hickory canopy. Management of the site is complicated by a much larger state park, which surrounds the site and which hosts numerous wide-spread invasive plants.

To establish the target forested community, a 10-person crew consisting of EPMT staff, American Conservation Experience interns, and Conservation Corps of Iowa interns spent seven days controlling 0.4 acres of autumn olive (*Elaeagnus umbellata*), Japanese stiltgrass (*Microstegium vimineum*), Chinese wisteria (*Wisteria sinensis*), privet (*Ligustrum sp.*), tree of heaven (*Ailanthus altissima*), and eight other species throughout the north section of the park.

Early detection projects take action now to prevent greater resource degradation and higher costs in the future. The EPMT uses an Early Detection / Rapid Response approach. At Hopewell Culture National Historical Park, an inventory in 2011 led to the discovery of small populations of Japanese knotweed (*Fallonia japonica*) and reed canarygrass (*Phalaris arundinacea*). The EPMT treated these plants in 2012. At Cuyahoga Valley National Park, the EPMT staff responded immediately to detection of giant hogweed (*Heracleum mantegazzianum*) – a species that has been the subject of USDA eradication efforts. Early detection projects that began in previous years, but still require annual

treatments, include Chinese bushclover (*Sericea lespedeza*) at Effigy Mounds National Monument and garlic mustard (*Alliaria petiolata*) at Homestead National Monument of America. Early detection projects depend on a on a high level of investment in proactive and, often, time-consuming monitoring in the field.

Figure 17. An EPMT member treats re-sprouting tree of heaven stems following eastern redcedar removal and prescribed fire undertaken as part of an Ozarks glade restoration project.

A key principle of ecosystem management is to manage not only plant community structure and composition (e.g., weed suppression), but also ecological processes. In the Ozark and Ouachita Mountains, the EPMT focuses its efforts in areas that are managed with fire. Fire effects nutrient cycling, canopy openness, litter removal, soil warming, and seed scarification – all of which can affect the structure, composition, and function of plant communities. Restoring fire even at historical frequencies and intensities, however, can have unintended consequences in modified landscapes. At Buffalo National River, following prescribed burning and tree felling, the EPMT controlled tree of heaven within glades, a small-patch plant community that supports state-rare endemic plants. In this way, invasive plant management functions as a critical component of the NPS restoration approach. In 2012, the EPMT also controlled scattered mimosa (*Albizia julibrissin*) and princess tree (*Paulownia tomentosa*) within burn units at Hot Springs National Park and two acres of autumn olive in a burn unit at Ozark National Scenic Riverways.

For some invasive plant species, the EPMT continues to work at "getting to no." Hopewell Culture National Historical Park, for example, supports over 200 species of non-native plants. We have identified 50 of these species as invasive. This situation is not unusual. The situation, in fact, is even more difficult on larger parks where the invasions may be spread over thousands of acres. Certainly at this scale, species-based and area-based prioritization approaches must also contend with project feasibility – a criterion specifically noted in the NPS management policies (2006). In Buffalo National River and Ozark Scenic Riverways, the two largest network parks, the EPMT decided not to control garlic mustard or Japanese stiltgrass. Our assessment is that the plants are too widespread and subject to frequent re-introduction during flooding events. In contrast, our attempts to control garlic mustard at Effigy Mounds, while ambitious, are premised on the observation that these populations are less dense presumably because they largely occur in drier sites outside of floodplains. Although we hope to develop more formalized risk assessment approaches to assist with such decisions, for the moment we can only be clear and intentional about saying "no" in some cases. These difficult decisions have challenged and shaped our strategic approach more forcefully than decisions to begin or continue a project.

Table 8. Heartland Network EPMT Accomplishments.

Measure	Acres
Treated/Retreated	78
Inventoried	4
Monitored	0
Gross Infested Area (GIA)	5,143
Infested Area (IA)	82

The Northern Great Plains Exotic Plant Management Team (EPMT) works with fourteen partner parks in four states and two National Park Service regions. The goal of the EPMT is to help parks preserve native plant communities and historic landscapes by managing the spread of exotic invasive species. Where sites have been disturbed by activities such as road construction, the EPMT will work with park personnel to restore vegetation to native or another desired condition. The area served by the EPMT is large – approximately 452,000 acres – and the ecology is diverse. Vast grasslands are found in some parks, others are part of the forested Black Hills, and others include parts of the Missouri, Niobrara, or Knife rivers. Integrated Pest Management strategies including chemical, biological, mechanical, and cultural methods are used to manage exotic and invasive plants. Education and training in Integrated Pest Management are also EPMT priorities. Almost every year, EPMT staff offer a week-long training session in the principles and practices of Integrated Pest Management for park staff, partners, and EPMT seasonal employees.

Personnel changed greatly this past year. The Liaison position, vacant since last year, was filled. The new Liaison is scheduled to begin work in December 2012. The Liaison position, previously housed at Theodore Roosevelt National Park, will share office space with the Northern Great Plains Inventory and Monitoring Network in Rapid City, South Dakota. Two long-time employees, the Data Manager and the field Crew Leader, also departed this year. The Midwest Regional Office and Badlands National Park staff led the Team during this time of leadership transition.

Seasonal employees of the EPMT are based at either Badlands National Park or Theodore Roosevelt National Park and travel to other parks in the network. Over the course of this year, EPMT members worked at each park in the network. Youth Conservation crews were employed more extensively this year than in the past years. The Montana Conservation Corps or the Minnesota Conservation Corps worked at 10 park units. Other contracted work included herbicide application by truck to an infestation of white horehound (*Marrubium vulgare*) at Wind Cave National Park, and herbicide application by helicopter to leafy spurge (*Euphorbia esula*) at Theodore Roosevelt National Park.

Figure 18. Herbicide application to leafy spurge at Theodore Roosevelt National Park.

White Horehound Management at Wind Cave National Park

Recently, the invasive exotic plant white horehound has become a significant problem at Wind Cave National Park. Approximately 1,500 acres are infested, almost all of them on prairie

dog towns. Habitat for the black-tailed prairie dog towns is impacted and, indirectly, the endangered black-footed ferret is impacted as well. Prairie dogs are the primary food for the black-footed ferret, which has recently been reintroduced to Wind Cave National Park. White horehound is not a common plant pest, so little information on management was available. Last year, personnel from the EPMT and Wind Cave National Park conducted field trials to determine the best herbicide and method of application. Park staff surveyed and mapped the infested areas and used fire engines and fire hoses to transport water to work sites. EPMT personal applied herbicide to 878 acres using ATV-mounted sprayers. Another 189 acres were treated by contract using a truck-mounted sprayer. The goal for the project is to keep the infestation from spreading, reduce the size of the infestation, monitor and treat any new infestations, and finally restore native plant communities.

Exotic Plant Management at Knife River Indian Villages National Historic Site

The EPMT used the Conservation Corps of Minnesota to work on invasive plant management at Knife River Indian Villages National Historic Site. Extensive, dense, and tall stands of Canada thistle (*Cirsium arvense*) were growing in areas that had been disturbed by flooding or opened by the removal of buckthorn (*Rhamnus cathartica*). Because the site is steep, wooded, and has a thick understory of fallen trees, herbicide application by backpack sprayer was the best option. Although conditions were often uncomfortable, personnel from EPMT, Knife River, and Conservation Corps of Minnesota worked together to spray 575 acres infested with exotic plants as part of a long-term effort to restore native plant communities.

Canada Thistle and Leafy Spurge Management

Canada thistle and leafy spurge were the most commonly treated exotic plants in the EPMT network. Both are pernicious, persistent, state-listed noxious weeds, and likely to generate complaints from neighboring land owners. Effective herbicides, biological control agents, and healthy invasive-resistant grasslands are important parts of the strategy that EPMT has for the long-term management of these exotic invasive plants.

Figure 19. Evaluation of herbicides for spurge flax management.

Spurge Flax at Badlands National Park

In the fall of 2009, a new exotic plant, spurge flax (*Thymelea passerina*), was found in Badlands National Park. In 2010, and again in 2011, approximately 40 acres were infested. Information on management of spurge flax was not available, so EPMT, park resource managers, neighboring United States Forest Service personnel, and faculty at the University of South Dakota began to develop a management strategy. An herbicide screen was initiated last year and it was planned to replicate the study this year. The site was monitored, but very few plants were found. It is thought that a dry spring inhibited germination.

Table 9. Northern Great Plains EPMT Accomplishments.

Measure	Acres
Treated/Retreated	4,226
Inventoried	4,231
Monitored	196
Gross Infested Area (GIA)	4,422
Infested Area (IA)	4,423

The National Capital Region Exotic Plant Management Team (EPMT) continues to perform its mission assisting parks in the management of invasive plant species. From Rock Creek Park located in the center of the District of Columbia (DC), to Catoctin Mountain Park in the foothills of the Appalachian Mountains, the National Capital Region parks protect a wide range of species and communities. The EPMT also assists Assateague Island National Seashore, the Appalachian National Scenic Trail, and the National Conservation Training Center (managed by the United States Fish and Wildlife Service).

The EPMT works closely with our 12 partner parks and cooperative partners to develop annual work plans, inventory and monitor invasive plant infestations, train park employees and partners in best practices, coordinate treatment and restoration efforts, and share resources and information. Our goals are to: preserve healthy habitats using Early Detection / Rapid Response to prevent invasive plant populations from establishing; control invasive plants currently infesting ecologically-sensitive areas such as riparian areas, rare habitats, and forest interiors; and restore native habitats by removing exotic pest plants, and re-establishing native plants and natural processes.

Common Reed in NCR Parks and Assateague Island National Seashore

Common reed (*Phragmites australis*) continues to plague wetland ecosystems within the National Capital Region and the wetlands of Assateague Island National Seashore (ASIS), presenting a difficult task to the EPMT. Although the task of treating common reed with a small 2012 Team presented many challenges, it also provided an excellent opportunity to work with partner organizations and continue to foster regional relationships.

Figure 20. EPMT and DDOE crew members transport 1,000 feet of hose and a ladder to a remote stand of common reed at Kenilworth Aquatic Gardens, District of Columbia.

Regional common reed treatments continued this year along the Anacostia and Potomac River watersheds in both George Washington Memorial Parkway (GWMP) and Kenilworth Aquatic Gardens, building upon the previous three years' efforts to control populations in key areas. Assisted by the Arlington County AmeriCorps, Student Conservation Association (SCA), DC Summer Youth program, and GWMP staff, the EPMT treated several large populations within Roaches Run Waterfowl Sanctuary. The labors of past treatments were evident in the large patches of dead standing

reeds and a much-reduced living population. Although the site presented significant logistical challenges in coordinating the three crews and navigating the hazards of an urban site, the project was completed ahead of schedule.

Figure 21. EPMT crew member Eric Prunchak mentors an SCA volunteer on cut stumping Wisteria at Manassas National Battlefield, Virginia.

Kenilworth Gardens, located in Northeast DC, provided similar logistical challenges. High tide waters and large, remote populations required a concentrated effort by the EPMT and the DC Department of Environment (DDOE). Unfortunately, a resurgence of common reed in one site treated in past years serves as a reminder that the EPMT and park management must continue to be active in planning, treating and monitoring infested areas. These high-visibility sites offer great potential for public education.

The common reed season drew to a close with a trip to ASIS, where the EPMT worked closely with ASIS staff dedicated exclusively to treating common reed. The ASIS team provided not only vital mosquito netting and coveralls, but also field assistance in treating two large populations. In addition to foliar spray treatments of over six acres, the EPMT participated in an ongoing study of the effectiveness of removing dead standing common reed on desirable species repopulation.

National Capital Region Education and Outreach

A strong focus of the 2012 season has been education and public outreach. Through formal training sessions at two locations, and informal fieldwork with volunteers and partners, the EPMT has shared its knowledge of exotic species management with NPS resource staff, NPS interpretive staff, NPS maintenance staff, partners, and volunteers.

In collaboration with the DC Cooperative Weed Management Area, the EPMT hosted two training sessions - one at Rock Creek Park in DC and the second at Catoctin Mountain Park in Maryland. The EPMT provided training on herbicide preparation, chemical spill response, personal protective equipment, truck organization, and herbicide labels. The audience was engaged in the topics presented, and discussions engendered a mutual sharing of knowledge and experiences beneficial to both the trainees and the EPMT.

Throughout the season, the EPMT has been assisted by local groups seeking training in invasive plant management techniques. Monocacy National Battlefield staff and SCA members from a DC high school, organized by the DDOE, participated in treating a large wisteria (*Wisteria sinensis*) infestation at Manassas National Battlefield. The EPMT provided mentoring in species identification, treatment techniques, and hands-on experience cut-stumping vines.

Table 10. National Capital Region EPMT Accomplishments.

Measure	Acres
Treated/Retreated	60
Inventoried	288
Monitored	524
Gross Infested Area (GIA)	738
Infested Area (IA)	75

The Mid-Atlantic Exotic Plant Management Team (EPMT), hosted at Shenandoah National Park, is part of an 18-park network in Maryland, Pennsylvania, Virginia, and West Virginia consisting of approximately 305,000 acres. The goals of the EPMT are to effectively monitor, survey, and control targeted invasive plants, develop volunteer and education programs to increase public participation and awareness about invasive plants, and to create a sustainable environment where native plants can thrive. Communication, the use of Volunteers In Parks (VIPs), and collaboration with outside agencies and neighbors are hallmarks of the program. The biological diversity of the region is one of the greatest in North America. Exotic vegetation, though, threatens to destroy native biodiversity and ecosystem health, replacing thousands of species with relatively few. Preserving, unimpaired, the natural and cultural resources and values of the region's NPS sites is essential to the National Park Service mission. The EPMT uses an Integrated Pest Management approach where prevention, early detection, and least-toxic methods are emphasized, and where controls include hand pulling, manual and power-assisted cutting, prescribed fire, and application of herbicides.

The EPMT continued to provide support to a variety of ongoing projects for our partner parks in 2012. Reaching long-term project goals, maintaining project continuity, training, and education are just a few of the reasons for these collaborative operations. 2012 had its share of difficulties including the absence of a Team Liaison for much of the year. This effectively reduced crew size and team effectiveness. The team was further challenged by the uncommonly mild temperatures of the 2011-2012 winter followed by the early arrival of a warm spring, both allowing invasive plants an unusual early surge of growth. In spite of these setbacks, the EPMT still managed to have a productive and successful year. All 18 parks were visited at least once throughout the year, with most receiving two visits.

Figure 22. Spraying common reed in tidal marshes, displaying the problematic nature of treating "phrag".

With successive treatment from 2009-2012 of common reed (*Phragmites australis*) at George Washington Birthplace National Monument (GEWA), the EPMT reduced infestation densities at 11 of 12 sites to manageable or eradicated status. The remaining site is vastly improved from previous years, but a recent flood event re-established common reed on a large portion of the site. The reduction of common reed at GEWA has allowed the EPMT to work on other priority species and monitoring programs for the park. These efforts led to the discovery of a new invasive species within

GEWA and the region – Louise's swallow-wort, or black swallow-wort (*Cynanchum louiseae*) – and highlighted the importance of Early Detection / Rapid Response (EDRR). Plants were treated, and later inspection of the site during the EPMT's following visit showed that the treatment was successful. Monitoring in 2013 will be necessary to confirm that this infestation has been controlled.

Colonial National Historic Park also saw similar improvements with common reed. Several sites are now at a maintenance level, and many show rapid re-establishment of the native plant communities. Annual inspections of these sites will be necessary in the future. Some sites have not been treated regularly due to difficult access across tidal marshes and creeks. Helicopter spraying and the expanded use of boats are planned for reaching these areas, and should help to reduce common reed to manageable levels.

Mile-a-minute (*Persicaria perfoliata*) treatment continued in a joint effort between the EPMT and the Shenandoah National Park (SHEN) Exotic Plant Management Crew. Treatment began in March, applying herbicide on a 20-acre area in the north district of the park, with subsequent treatment on an adjacent 10-acre area. Though treatment progress was made in 2012, a significant amount of work is needed to get this invader under control.

The EPMT also assisted SHEN staff in a fuels reduction project. Brush and trees were removed around radio towers and buildings vital to park operations and local law enforcement. Team members operated chainsaws, hauled and dispersed brush, and sprayed cut stumps. Similar projects are being coordinated to be completed in the future.

Figure 23. EPMT working with SHEN Fire Crew in fuel reduction tasks around vital communications infrastructure.

The EPMT collaborative efforts are highlighted at Hopewell Furnace National Historic Site (HOFU). Since 2009, the EPMT, HOFU staff, and volunteers have worked closely on restoring a historically-significant dry-laid stone wall. Treatment of the invasive plants along the wall has been essential to maintain the wall's structural integrity and allow for restoration efforts to be effective. When treatment began in 2009, invasive plants entirely obscured the wall. Past treatments were focused on multiflora rose (*Rosa multiflora*), common mullein (*Verbascum thapsus*), Himalayan blackberry (*Rubus discolor*), and mile-a-minute. Monitoring in 2012 revealed that multiflora rose and Himalayan blackberry are no longer present. The 2012 treatment focused on the remaining common mullein and mile-a-minute, and both were reduced to very low densities. The Team was able to treat the remaining infestation by hand-pulling.

Table 11. Mid-Atlantic EPMT Accomplishments.

Measure	Acres
Treated/Retreated	410
Inventoried	4,358
Monitored	370
Gross Infested Area (GIA)	4,729
Infested Area (IA)	484

The Northeast Exotic Plant Management Team (EPMT), stationed at Delaware Water Gap National Recreation Area, has been serving 23 parks in the northern portion of the National Park Service's Northeast Region (NER) since August 2003. The parks, in eight states from Pennsylvania north to Maine, encompass over 335,000 acres. The majority are found in the Appalachian Highlands geographic region, from the Appalachian Plateau in the west to the Piedmont in the east. The remaining parks are farther east in the Atlantic Coastal Plain. The number of parks visited by the EPMT each year depends on regional priorities and on-going projects. EPMT services include on-site control work, inventory and monitoring, revegetation, technical advice and training, planning and prevention, outreach, funding and contract assistance, and research.

The EPMT has set up monitoring plots in a number of its parks to more closely estimate the efficacy of its treatments. In a few parks, the EPMT established permanent plots to test the efficacy of different herbicides on specific invasive plant species. At the Sandy Hook Unit of Gateway National Recreation Area (GATE), on dunes along beaches at the north end of the park unit, plots were established to determine which herbicides best controlled Japanese sedge (*Carex kobomugi*). Management information for this dune invader is scarce, so these trials should produce useful data. All such trials have involved collaborations with park staff. In this instance, partners also included a researcher and her students from a local university, and students from a local public high school. Results have been mixed with major fluctuations in response. This caused the EPMT to rethink its treatment options, beginning a new trial this year focusing on adjuvants. It is important for the EPMT to utilize an adaptive management approach to all its work, modifying its actions when desired results don't materialize.

Figure 24. Cape Cod National Seashore, Herring Pond. Brian McDonnell foliar sprays common reed after Ryan Hodge has recorded the area on the GPS.

At the Staten Island Unit of GATE, the EPMT teamed up with several divisions of the park to remove a thick swath of invasive shrubs, vines, and trees in advance of creating a public bike path. A cooperative project with the city of New York, Maintenance and Fire Management staff cut tree of heaven (*Ailanthus altissima*) and Norway maples (*Acer platanoides*). The EPMT, in cooperation with GATE Natural Resource staff, followed with cut-stump herbicide applications and foliar-spraying of small trees, vines, shrubs, and herbaceous invasive plants. By the end of two and a half days, the beach and ocean were clearly visible—one of the

objectives of this "jungle" removal. Using appropriate native plant species, the park revegetated the area later in the year. Once established, these plants will help exclude further infestation by invasive species and maintain the open character of the area.

Figure 25. Promised Land State Park, PA. Ryan Hodge and Kim Oellerich test and compare accuracy of Trimble GPS units at a National Geodectic Survey marker.

At Saratoga National Historical Park (SARA), the EPMT continues its productive collaboration with the park and the NER Fire Monitoring Team. The objective is control of three invasive species infesting many of SARA's open fields: brown and spotted knapweed (*Centaurea jacea* and *Centaurea stoebe*, respectively) and Canada thistle (*Cirsium arvense*). Mowing and prescribed burns have not been effective in controlling these species. The EPMT has added herbicide treatment to the mix. Initial monitoring by the EPMT and park staff has indicated at least 90% control after 2-3 chemical treatments. Because the Fire Monitoring Team and park staff include all species in the monitoring plots, the data will not only indicate efficacy of the herbicide but show how the total assemblage of plants changes over time. Like many of the EPMT's parks, SARA's overall goals deal with historical as well as natural resources: maintaining the 18th century look of the park (i.e. open fields and farmland), and preserving and restoring these areas for disappearing grassland and shrubland bird species.

Because it is unusual to find areas that are relatively untouched by invasive plants in parks in the Northeast Region, such sites are often given high priority for invasive plant removal. At Cape Cod National Seashore, several freshwater ponds – glacial kettle holes – are dominated by native plant communities. Phragmites, or common reed (*Phragmites australis*), is beginning to appear in patches around the ponds. Using canoes to access some of these patches, all known infestations were treated, and a major reduction of the phragmites population is expected. This is an example of the Team's use of Early Detection / Rapid Response to manage infestations of invasive plants while they are still small and eradication is yet possible. The site will continue to be monitored and treated as needed in subsequent years. Early detection is critical in avoiding large infestations and resulting expensive control efforts, which rarely end in elimination of the invaders.

Table 12. Northeast EPMT Accomplishments.

Measure	Acres
Treated/Retreated	222
Inventoried	1,349
Monitored	1,267
Gross Infested Area (GIA)	2,347
Infested Area (IA)	224

The California Exotic Plant Management Team (EPMT) serves 14 parks that reside within the California Floristic Province. Regarded for its exceptionally high concentration of endemic plants, this region is one of 25 world biodiversity hotspots. Of 3,500 vascular plants found in California, over two-thirds of the species are found nowhere else in the world. In 2012, project sites were exceedingly diverse, ranging from the geothermal vents of Lassen Volcanic National Park and the coastal dunes of Point Reyes National Seashore, to the snow-capped Sierra Nevada Mountains in Yosemite National Park (NP). With over 290,000 acres of the California partner parks' 2.1 million acres infested with invasive plants, the EPMT dedicates significant energy to promoting partnerships that facilitate strategically robust treatment efforts.

In recent years, the EPMT's focus has shifted from annually treating a distinct array of small infestations to converging efforts on fewer, but larger, infestations. The EPMT annually treated an average of 61 different species between 2002 and 2009. Since 2009 we have treated an average of 29 species per year and, despite rising equipment and personnel costs, have nearly doubled the number of treated acres per year. Initially, bringing large infestations under control seems daunting, but with perseverance and strategic treatments we are achieving promising results. Our highlights this year cover a few of these impressive large-scale projects.

Redwood National and State Parks

Harding grass (*Phalaris aquatica*) is an aggressive perennial plant that is known for dominating valuable grasslands. The EPMT began assisting Redwood National Park (NP) with Harding grass treatments at the Bald Hills in 2005. The initial EPMT funding sponsored the pilot project that was instrumental in leveraging two years of state Weed Management Area funds and five years of NPS regional funds, providing a much greater treatment footprint. In 2006, park staff documented 57.4 infested acres across 500 acres, and by 2012 the infestation had declined to 12 infested acres across 84 acres. Inventory and monitoring records and clear signs of treatment effectiveness indicate that this highly-invasive population will reach controlled status within two years.

Figure 26. Contract crew treating Harding grass in Redwood NP's Bald Hills.

Though daunting in scope, this project has been recognized as a long-term project. The strategy of conducting pilot treatments, initially treating outliers, and critically reviewing treatment progress has proven successful. Park staff presented their results-to-date at the 2012 California Invasive Plant Council Symposium.

Point Reyes National Seashore

Point Reyes National Seashore (NS) just completed a three-year project to treat Scotch broom (*Cytisus scoparius*) over a 3,300-acre zone in the north district of the park. This zone received multiple treatments on 28 infested acres. The EPMT Program's initial treatments and funding support over the last three years helped the park leverage in-kind service commitments, as well as substantial financial commitments.

Figure 27. Using a chainsaw to cut an old, dense stand of Scotch broom at Point Reyes NS.

The San Francisco Bay Area Fire Management program conducted a 14-acre prescribed burn. The Fire Effects crew monitored treatment response, and volunteers and interns helped with follow-up treatments. Monitoring data has demonstrated that mechanical, chemical, and burn treatments significantly reduced Scotch broom cover and density. Analysis of the data revealed that chemical treatments, of all the treatment methods implemented, resulted in the most native species recolonizing the area.

The EPMT will address an additional 500-acre infestation in a three-year project beginning in 2013. Scotch broom has a long-lived seed bank, and will require follow-up actions for the next decade. Although this seems like a long time, considering the significant strides taken thus far, bringing Scotch broom to a control status is impressively within reach.

Yosemite and Pinnacles National Parks

Yellow starthistle (*Centaurea solstitialis*) is estimated to occupy 15 million acres in California, (15% of the entire state). Since 2008, yellow starthistle has constituted 46% of the EPMT's total treated acreage, and at times the prospect of restoring yellow starthistle-invaded landscapes has seemed dim. In 2012, however, after years of treatment, Pinnacles National Monument and Yosemite NP demonstrated that they are both on the verge of bringing California's worst invader under control within park boundaries, and their treatment efforts have expanded to neighboring lands. Considering the remarkable invasive characteristics of yellow starthistle, it is critical that effected treatment plans work with partners to address the potential for re-invasion from adjacent lands.

Partnerships and Leadership

A notable factor of the EPMT's success with long-term treatments is our ability to promote partnerships by providing timely funding. The EPMT equips park managers with the capital necessary to attract both internal and external partners. In some cases, this EPMT-provided "seed funding" has aided park managers in framing regional treatment priorities. In 2012 alone, parks used EPMT funding to leverage $220,000 from 14 different sources, allowing for more-comprehensive projects than would be possible with park and EPMT funding alone. This partnership approach expands the scope of what we are able to accomplish, incrementally moving us closer to restoration of our precious landscapes.

Table 13. California EPMT Accomplishments.

Measure	Acres
Treated/Retreated	156
Inventoried	275
Monitored	2,004
Gross Infested Area (GIA)	1,491
Infested Area (IA)	196

The Lake Mead Exotic Plant Management Team (EPMT) was established in 1996, serving as the prototype model for what eventually developed into the National Park Service (NPS) EPMT Program. The EPMT has conducted on-the-ground projects with field crews in 33 NPS park units, six United States Fish and Wildlife Service refuges, six Bureau of Land Management (BLM) districts, four National Forests, two Bureau of Indian Affairs units, one Bureau of Reclamation region, and several state and local entities throughout the Southwest. The EPMT has three primary goals: (1) provide expertise in the control of invasive plants in order to preserve, restore, and maintain native plant communities; (2) professionalize invasive plant management within the NPS and its partners by developing staff and regional expertise; and (3) improve efficiencies and effectiveness at a landscape scale through interagency cooperation and partnership development.

Partnerships are integral to the EPMT's success, leveraging each NPS base dollar with three additional dollars on an annual basis. These partnerships facilitate weed management across agency boundaries and increase our capacity to serve park units. For example, BLM funds are provided to the EPMT through an agreement to control weeds adjacent to park units within the Mojave Desert, and National Forest funds and agreements are in place to treat weeds adjacent to many park units in Arizona. All of these funds total more than one million dollars, supporting a 20-person crew in the field on a daily basis, forming the largest EPMT in the nation.

The favorable climate conditions of the Southwest allow the EPMT to conduct weed control projects throughout the year. A year-round operation maximizes the EPMT's ability to serve its various partners and control a diversity of weeds, thereby improving efficiency and flexibility in scheduling projects.

Figure 28. Matt Duffy, Casey Sandusky, and Joe Kelley (left to right) controlling tamarisk on the Upper Verde River Wildlife Area, AZ.

2012 Accomplishment Summary

The Lake Mead EPMT conducted projects at 18 NPS units and 13 interagency partner management units.

In November 2011, the Clark County Desert Conservation Program (Nevada) requested that the EPMT conduct a plant inventory and weed treatment on their 120-acre Muddy River Reserve with funds that had to be expended and the project completed by late January 2012. Thanks to Lake Mead National Recreation Area administrative staff support (host park), an agreement was finalized, and the field work and data were processed and completed within the

short time frame. This was a challenge and testament to our Team's flexibility and capacity to accomplish projects and to meet the needs of our partners. Due to our Team's production on this project, the EPMT and Clark County are entering into a new three-year term agreement for $108,000 to conduct habitat restoration for many sensitive, rare, and endangered wildlife species.

Figure 29. EPMT members Dawn Hulton and Matt Duffy collecting native plant seeds for restoration projects at Organ Pipe Cactus NM, AZ.

Another example of expanding partnerships includes invasive plant control on the Verde River in Arizona. The EPMT began a partnership with the Prescott National Forest in 2006 controlling tamarisk (*Tamarix ramosissima*) and other species in remote areas of the river. The effectiveness of the EPMT and the partnership gave hope to the downstream communities that something could be done about all the weeds. The result is a Friends of the Verde River collaborative partnership that is implementing an aggressive invasive plant control plan for the lower portions of the river, including Tuzigoot National Monument. This also resulted in a new partnership between the EPMT and the Arizona Game and Fish Department's Upper Verde River Wildlife Area to control weeds in the remote portions of the river.

Organ Pipe Cactus National Monument (NM) provided another unexpected partnership opportunity involving the parks with their border restoration project. The EPMT collected 70 bags of seed from five native species inside and outside the park with an eight-person crew over three separate trips. Seeds ripen during the summer months, increasing the challenges of ensuring worker safety in hot desert conditions. The park staff appreciated the ease and flexibility of working with our team.

The EPMT also treated 20 infested acres of Russian knapweed (*Acroptilon repens*) in Cordova Canyon at Arches National Park. The remote project required backcountry camping and transporting water for several miles daily to support workers and the herbicide applications. More work is being planned on the project in the future.

The EPMT returned to Manzanar National Historic Site to continue removal of some very large tamarisk trees that are threatening natural and cultural resources within the park. The park has developed a site-specific plan to control tamarisk in this culturally-significant area. Now that a plan is in place, the EPMT will continue working at the park until all the designated trees are removed. This will also be important since the Inyo County Water Department continues its long-term tamarisk control efforts outside the park throughout the Owens Valley of California.

Table 14. Lake Mead EPMT Accomplishments.

Measure	Acres
Treated/Retreated	144
Inventoried	26,612
Monitored	1,046
Gross Infested Area (GIA)	20,051
Infested Area (IA)	220

From the open range of the Palouse prairie in Idaho and Washington to the high desert of eastern Oregon, along the creeks and rivers fed by the glacial North Cascades and Olympic mountains, and in the rainforests and remnant prairies of the Northwest Coast, the North Coast / Cascades Network Exotic Plant Management Team (EPMT) provides professional invasive plant management services to its partner parks. The EPMT focuses on fostering projects that assist with the restoration of degraded park resources, preventing the spread of non-native species into fragile wilderness areas, and expanding ecosystem-level partnerships to combat invasive plant species with other stakeholders. The EPMT provides coverage for between 12 and 14 parks across Idaho, Oregon, and Washington during any given field season, across three National Park Service (NPS) Inventory and Monitoring networks, representing approximately 2.1 million acres of federal lands in the Pacific Northwest.

2012 was a year in which the EPMT was able to capitalize on investments made in developing projects and personnel over the last decade. Beginning in August, the EPMT initiated control work on one of the last and most significant untreated populations of Japanese knotweed (*Polygonum cuspidatum*) in the North Cascades. Left unchecked, Japanese knotweed has shown the ability to outcompete native streamside vegetation, reducing habitat available for the spawning of threatened and endangered salmon species. Surveys conducted by the EPMT along the lower seven miles of the Stehekin River, its tributaries, and the associated 500 acre floodplain in 2004 and 2005, and again in 2009, revealed an increase in the Japanese knotweed population of almost 100 percent over a five-year period. Data collected during these surveys was integral in completing the North Cascades National Park Service Complex Invasive Plant Management Plan and Environmental Assessment, allowing this project, and many others to finally be implemented.

Figure 30. Treatment of an isolated patch of Japanese knotweed in the floodplain of the Stehekin River.

As part of this project, the NPS entered into cooperative agreements with 10 adjacent private landowners along the river, utilizing authority granted under PL110-229 Title III, in order to ensure that treatments made by the team encompassed the entire drainage. Over a three week period in August, team members, as well as volunteers, carefully applied targeted herbicide applications to known knotweed populations. Prior experience gained by the EPMT in implementing extensive knotweed control projects in cooperation with neighboring landowners and in difficult-to-access locations, along with the detailed maps produced by

surveys during previous field seasons, contributed to the EPMT completing the initial phase of this project a full week ahead of schedule. EPMT staff anticipates that two more years of follow-up treatment will be required by the EPMT before this population can be declared controlled.

Figure 31. Broadcast treatment of Scotch broom (*Cytisus scoparius*) in recently-acquired coastal units of Lewis and Clark National and State Historical Park.

Over the last decade, cheatgrass (*Bromus tectorum*) (also known as downy brome) has become a significant management problem in the wake of wildfires in the inland Northwest. After the Flick Creek Fire in 2006, the North Cascades National Park Complex saw an explosion of cheatgrass in the forest understory over a three-year period. In an effort to prevent additional loss of habitat to cheatgrass invasion as well as an increase in fire danger to the rural community of Stehekin (located in the Lake Chelan National Recreation Area), the EPMT coordinated with the Park and NPS Fire Management staff to implement a program of Early Detection / Rapid Response (EDRR) for cheatgrass control after the Rainbow Bridge Fire in 2010. Utilizing data collected about cheatgrass distribution in the fire-fuel reduction areas on the hillsides above Stehekin, the EPMT initiated a focused survey in the spring of 2010. Despite challenges posed by the difficult terrain and remote project locations, the EPMT was subsequently able to initiate treatment of known cheatgrass populations in the spring and fall of 2011, significantly reducing rapidly-expanding populations in the first year after the fire.

Local land managers are already seeing the impact of cheatgrass control efforts, as native species have begun to establish in areas where cheatgrass would have dominated. The EPMT anticipates that at least one more year of control work will be necessary in order to declare this population controlled. Without the planning and rapid response provided by the EPMT, the park would have likely lost several thousand acres to cheatgrass over the next several years.

Figure 32. EPMT crews treat patches of cheatgrass on slopes above the Stehekin River in an effort to release native vegetation and restore areas affected by the Rainbow Bridge Fire.

Nearing the end of its 11th field season, the EPMT continues to provide a variety of invasive, non-native plant management services to its partner parks, while successfully collaborating with neighboring stakeholders to ensure that NPS lands continue unimpaired for future generations.

Table 15. North Coast / Cascades Network EPMT Accomplishments.

Measure	Acres
Treated/Retreated	160
Inventoried	1,988
Monitored	761
Gross Infested Area (GIA)	1,319
Infested Area (IA)	170

In 2012, the Pacific Islands Exotic Plant Management Team (EPMT) provided critical and necessary guidance, supporting six Pacific Island Network parks, including one that has not historically been serviced by the program. Particularly notable, the Hawaii Volcanoes National Park (HAVO) EPMT staff, treated 72,090 invasive plants, consisting of 58 species in a range of ecosystems including littoral strand, coastal lowland, dry woodland, and rainforest. Despite increasing fiscal challenges, the program continues to make remarkable progress in controlling invasive plant populations in the Pacific Islands.

Figure 33. Rappelling recertification and training (Maui 2012, North Shore, Peahi District) in preparation for fountain grass (*Pennisetum setaceum*) control.

One fundamental tenet of weed management is that maximum effectiveness is realized when early invasions are identified and aggressively targeted for eradication. The EPMT uses this principle in protecting parks from invasion. In HAVO, we searched for, and controlled, two individuals of gorse (*Ulex europaeus*) and 30 individuals of Singapore daisy (*Sphagneticola trilobata*) in the Kahuku area of the park. Gorse is considered by the International Union of Conservation of Nature (IUCN) to be one of the 100 worst invasives in the world. Singapore daisy is tenacious and problematic, displacing natural communities in an exceptionally wide range of environments.

Typically, tropical invasive plants exhibit rapid growth and high fecundity, and can have profound ecosystem-altering impacts such as intensified fire regimes. At Pu'uhonua o Honaunau National Park, the EPMT provided specialized assistance clearing alien fire-promoting grasses and woody weeds that were encroaching on a fuel break that protects a significant historical feature, further enhancing protection for an irreplaceable 2.5 acres of our national heritage from threat of wildfire. Crews also controlled invasive weeds in a high-visibility site, benefiting interpretive efforts and solidifying increased appropriate native ecosystem restoration.

In Kaloko-Honokohau National Historical Park, we lent specialized experience to remove woody vegetation from a restored cultural and biologically-significant site near an anchialine pool, removing invasive coastal invasive plants.

On the Island of Maui, Haleakala National Park (HALE) and the EPMT benefit from an invaluable partnership with the Maui Invasive Species Committee (MISC). The partner's efforts protect the park from ecological threats, before they irreplaceably impact our pristine ecosystems. One such problem, miconia (*Miconia calvescens*), has been described as the

only weed that can and will, if left unmanaged, destroy the remaining Hawaiian rainforests. We leveraged 300 hours of NPS effort into more than 5,200 hours for controlling miconia. Cooperative efforts have allowed for a dramatic leveraging of EPMT funds and maintaining pristine conditions at HALE. Over 65,000 target plants were identified and eliminated. In total, over 20,000 acres were engaged in surveillance and protection from this one threat.

Figure 34. Sweeping for incipient infestations of fountain grass in order to prevent spread to other islands and protected lands.

Other significant partnership efforts resulted in over 7,300 acres of monitoring and control of invasive pampas grass (*Cortaderia spp.*) on Maui, protecting HALE from an imminent invasion of this highly-problematic and destructive threat. Additionally, early detection and control of invasive Mexican feather grass (*Nassella sp.*) resulted in treating the only known nine mature and 16 immature individuals on Maui. We continued the cooperative monitoring for common mullein (*Verbascum thapsus*) and reduction of weed dispersal agents such as non-native parrots.

In the National Park of American Samoa (NPSA), the EPMT collaborated with on-site expertise to map invasive species, primarily along the coastal strand. These efforts will assist prioritization of management strategies in a vulnerable ecosystem, and refine long-term management approaches. As this was our inaugural venture to assist NPSA, future plans will be to continue developing refined strategic planning, and expand effectiveness of interdiction and early control efforts there.

Over the last twelve years, the Pacific Islands EPMT has become a model of success with active invasive weed management, long-term planning, and responsiveness to new invasive threats. Partnership and leveraging efforts have been critically influential to our success, not only from a funding perspective, but also from building capacity to rely on broad spectrums of expertise and willing assistance. The Team's success depends on funding sustainability and diversity of unique partners, from watershed restoration entities, to Island Invasive Species Committees, local government, state government, and private foundations to address weed issues proactively. Our efforts will continue to protect our most pristine national natural heritage in Hawaii.

Table 16. Pacific Islands EPMT Accomplishments.

Measure	Acres
Treated/Retreated	39
Inventoried	3,013
Monitored	157,408
Gross Infested Area (GIA)	190,308
Infested Area (IA)	45

Florida and the Caribbean have the dubious distinction of having one of the worst invasive species problems in the country with over 1.5 million acres of conservation areas infested with invasive plants. These invasive plants are having detrimental effects on native plant communities by reducing native plant diversity, altering ecological processes such as fire behavior, and impacts to surface water conveyance. In Florida and the Caribbean, over 400,000 acres of the approximately 2 million acres of National Park Service lands are infested with invasive plants. The Florida/Caribbean Exotic Plant Management Team (EPMT) supports 15 partner park units in Florida and the Caribbean by augmenting existing exotic plant control efforts such as inventory and monitoring, control, education, and research. Control is accomplished through regional private contractors using an Indefinite Delivery/Indefinite Quantities contract administered by the Denver Service Center (DSC). Smaller projects are carried out by seasonal NPS crews.

In 2012, the steering committee, which includes experts in invasive plant control from federal, state, and local governments, prioritized invasive plant treatment projects and selected four projects to be accomplished through private contractors. The five contract projects selected were targeted at dense stands of melaleuca (*Melaleuca quinquenervia*) in Everglades National Park and Brazilian pepper (*Schinus terebinthifolius*) at Big Cypress National Preserve and Canaveral National Seashore. These cost effective treatment contracts are administered by the DSC. In addition, seasonal NPS crews visited 12 of the EPMT's 15 partner parks, assuring that previously-treated invasive plant sites are monitored, retreated, and thereby maintained at the lowest feasible level. In this year's annual report we will be highlighting two restoration projects: (1) the Schaus swallow tail restoration project, and (2) the restoration of heavily-invaded disturbed lands at Salt River Historical Park and Ecological Reserve.

Figure 35. Crewmember Alex Heeren performing cut-stump treatments on the camphortree (*Cinnamomum camphora*) in Timucuan Ecological & Historic Preserve.

Schaus Swallowtail Butterfly Habitat Enhancement Project

In 2011, the Florida/Caribbean EPMT, the South Florida and Caribbean Inventory and Monitoring Network, and Biscayne National Park received a grant from the United States Fish and Wildlife Service Coastal Program to enhance habitat for the federally-listed Schaus swallowtail butterfly (*Heraclides aristodemus ponceanus*). The Schaus swallowtail butterfly is critically-

endangered; 2012 surveys have shown less than 10 confirmed individuals. The goal of the habitat enhancement project was to take areas highly infested with invasive plant species and convert them into highly-productive habitat by replanting native host plants of the swallowtail. The Team treated all invasive plants and prepared the sites for planting. Three highly-invasive plant species – latherleaf (*Colubrina asiatica*), seaside mahoe (*Thespesia populnea*), and Burma reed (*Neyraudia reynaudiana*) – infested the two project sites with nearly 100% canopy cover over 2.1 acres. The EPMT contributed 240 employee hours for the project and also assisted in the collection of native seeds, transportation of personnel and supplies, and planting of native host plants for the endangered butterfly. A total of 2,332 plants have been planted, and future efforts plan on planting another 2,000+ plants in open and disturbed areas.

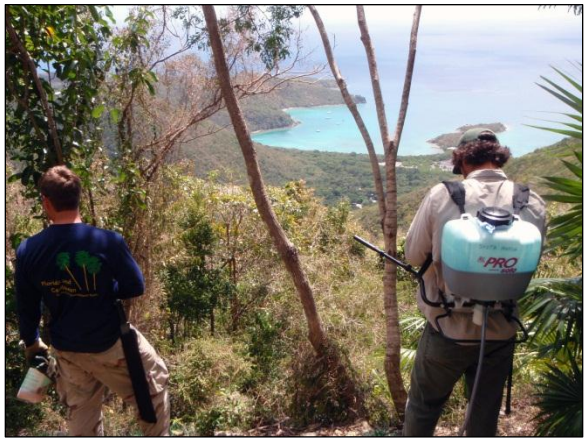


Figure 36. Crewmembers scanning for exotic species along Bordeaux Mountain Trail, Virgin Islands National Park.

Salt River Exotic Plant Control and Native Plant Restoration Project

Salt River Bay National Historic Park and Ecological Preserve (SARI) is a 1,015-acre coastal watershed. Much of the vegetation of this park unit (over 60%) is dominated by two invasive plant species: Guinea grass (*Panicum maximum*) and lead tree (*Leucaena leucocephala*). The EPMT partnered with SARI resource management staff to develop a plan to plant native plants on 30 acres of disturbed land. The site contains a 7.3-acre peninsula, with an abandoned hotel construction project and large stores of construction materials. The hotel and debris were removed by the United States Virgin Islands Army Reserves. In May, the EPMT treated six different invasive plant species and planted over 208 plants of 14 native species on the recently-cleared areas. In July, the Team revisited SARI and mowed, sprayed, and cleared an adjacent 7.7-acre prairie and coastal wetland consisting of over 95% invasive species. After removal, native planting occurred, this time planting out 778 individuals of 22 different species. Future plans will be focusing on removing invasive species from the ecologically-valuable coastal woodlands and semi-deciduous forests that neighbor these highly-disturbed areas.

Table 17. Florida / Caribbean EPMT Accomplishments.

Measure	Acres
Treated/Retreated	1,463
Inventoried	2,043,032
Monitored	0
Gross Infested Area (GIA)	43,032
Infested Area (IA)	1,503

The Southeast Exotic Plant Management Team (EPMT) has completed another successful year in providing services to our partner parks. Since establishment in 2003 the Team has steadily increased efficiency and ability to provide effective plant control techniques. Because we work in areas that differ greatly in elevation and climate within the Cumberland Plateau, Piedmont, and Appalachian Highland physiographic provinces of the southeastern United States, we have continued to provide field services year round. Our 18 partner parks, ranging in size from 200 acres to 50,000 acres, exist as islands of natural communities, or lands protected in a specific historical state, surrounded by a disturbed landscape. This disturbance, coupled with a temperate climate similar to that found in portions of China and Japan, contributes greatly to the often devastating success of plants introduced, intentionally and accidentally, from those Asian countries.

In 2012, the EPMT treated 33 invasive exotic plant species on 315 acres as documented in the Alien Plant Control and Management database. Treatment was conducted in 14 of our 18 partner parks as well the Great Smoky Mountains National Park. The most commonly treated species in 2012 were multiflora rose (*Rosa multiflora*), tree of heaven (*Ailanthus altissima*), Japanese privet (*Ligustrum sinense*) and Japanese honeysuckle (*Lonicera japonica*). Using an Integrated Pest Management strategy, control techniques range from hand pulling of invasive herbs like garlic mustard (*Alliaria petiolata*) to the use of power tools and herbicides on woody species such as Japanese spiraea (*Spiraea japonica*). By using a varied "toolbox" of control techniques and operating year around, the EPMT is able to adapt operations to fit a particular season and environmental situation. We are gratified to see significant success in treatment as evidenced by the natural re-establishment of native species in many treatment areas. Sites are monitored and, on occasion, re-treated for new plants arising from the existing seed bank.

Figure 37. One SCA intern uses chainsaw to cut privet, while partner follows up with herbicide treatment.

Opportunities to provide outreach to the general public and professional resource managers have continued to expand for the EPMT. During 2012, the EPMT provided classroom and hands on training to many groups, expanding this effort in order to provide training opportunities to our partner parks, and to organizations supporting work in those parks. Workshop topics in 2012 included wildland sawyer certification, safe ATV operations, Early

Detection / Rapid Response strategies, plant identification, safe and effective use of herbicides, treatment techniques, and planning and prioritizing strategies. The EPMT continues to provide electronic communications to partner parks regarding new exotic plant threats in an effort to solicit early detection and rapid response from all parks in the Southeast Region.

Figure 38. EPMT and NPS employees work together to pull a tangled privet tree out of the forest.

The EPMT has enjoyed several successes during 2012, but none more significant than the completion of the ninth year of scheduled work without any hours lost to accident or injury. Because the EPMT uses a variety of power equipment tools and numerous chemicals, as well as logs more than 15,000 miles on the road each year, safety is the primary focus. This success is not taken for granted as new and better ways to insure safe operational strategies are constantly sought, reviewed, and revised. Examples for 2012 include completion of Operational Leadership training, a review and revision of Job Hazard Analyses, implementation of post work activity safety briefings in addition to the standard pre-work briefing, maintaining advanced chainsaw operation and safety certification (C-feller) and Wilderness First Responder certification for the Team Leader, and continuing an ATV and trailer pre-trip safety check-list to enhance safe operations and transport.

Figure 39. SCA interns and NPS employee take an ATV safety certification course from Toby Obenauer.

Throughout 2012, the EPMT has continued to adapt to the needs of partner parks while stressing safe and efficient operations. As we persist in making headway in controlling the invasive exotic plants currently present in our partner parks, preventing new introductions and responding quickly to those that do occur is the most efficient and cost effective way to protect our resources from the damage caused by invasive exotic plants.

Table 18. Southeast EPMT Accomplishments.

Measure	Acres
Treated/Retreated	289
Inventoried	2,693
Monitored	0
Gross Infested Area (GIA)	2,692
Infested Area (IA)	274

The Southeast Coast Exotic Plant Management Team (EPMT) serves 15 park units across the Carolinas, Georgia, and Alabama. Network parks range from protected seashores and forested wilderness to urban recreational areas and preserved cultural landscapes, including forts and battlegrounds from the Revolutionary and Civil Wars. The EPMT is stationed at Congaree National Park that protects one of the last remaining remnants of an intact old growth bottomland floodplain forest. The EPMT was initiated as a pilot project in 2005 and was permanently funded through base increases to Congaree's operating budget in 2009 and 2010. Although the EPMT is funded separately from the national EPMT Program, the goal of both programs is to develop partnerships to improve invasive plant management efforts.

During 2012, Lauren Serra was hired as the Liaison, and organization of the Southeast Coast EPMT program continued, as team structure shifted from overlapping Student Conservation Association (SCA) Native Plant Corps teams of three and six-month youth interns to individual six-month teams comprised of three interns. This year a total of nine SCA interns rotated through the EPMT, led by Amorita Brackett, the permanent field Crew Leader. The EPMT served 11 parks**,** treated 23 exotic plant species, and visited most network parks twice. The team conducted exotic plant inventories and treatments, and participated in restoration and revegetation projects.

The EPMT conducted restoration activities at Ocmulgee National Monument, where team members harvested and planted native willow (*Salix spp.*) cuttings in a wetland of Walnut Creek along the western side of the River Trail boardwalk. Prior to planting, the team treated and removed a dense stand of Chinese tallow (*Triadica sebifera*) that had colonized the wetland following disturbance. The intent of this revegetation effort was to stabilize the soil and minimize colonization by exotic species. The EPMT plans to continue this restoration project in 2013. The EPMT also worked on a restoration project on Cumberland Island National Seashore in proximity to the Dungeness ruins, clearing out exotic and native vegetation in the historic garden area to improve the cultural landscape at Cumberland Island.

The EPMT treated invasive plants at all network parks this year, and completed a thorough inventory of Fort Frederica National Monument. Cut-stump treatments of exotic trees or bamboo (*Phyllostachys aurea*) were conducted at most network parks, including projects where additional time was required to either access the site, treat amongst dense surrounding vegetation, or pile slash in accordance with network park standards. Trees were cut and piled to maintain the aesthetic requirements of cultural landscape parks, while the logistics of removing invasive species in wilderness parks restricted work. The EPMT worked through extreme high temperatures and heat indices during the summer months, accomplishing foliar treatments on phragmites (*Phragmites australis*), Japanese climbing fern (*Lygodium japonicum*), Chinese privet (*Ligustrum sinense*), sericea lespedeza (*Lespedeza cuneata*), and kudzu (*Pueraria montana*). This included a retreatment of kudzu at Chattahoochee River National Recreation

Area, an important step towards getting this plant under control.

Figure 40. EPMT team leader Amorita Brackett (middle) provides herbicide training to youth interns at Moores Creek National Battlefield.

Congaree National Park contributed the majority of funding and support necessary for the EPMT to accomplish these treatments, as well as office space, administrative staff, maintenance staff, and dormitory space for youth intern crewmembers. In addition, most network parks were able to provide travel support for at least one of the team leader's trips this year. After working continuously through 2012 without a Data Manager, the EPMT will suspend youth interns until January 2013 to focus on data organization, GIS projects, reporting, and administrative planning. The 2012 field data was processed and work summaries sent to network parks in a timely matter as a result of assistance from youth interns and park volunteers.

The EPMT spent a significant amount of time working with park volunteers in 2012. The SCA interns had 5,714 volunteer hours on the EPMT, while a Volunteers-In-Parks volunteer from Congaree devoted 217 hours towards structuring and organizing the Team's GIS database. Congaree National Park coordinated an exotic hand-pulling project to remove beefsteak (*Perilla frutescens*) with the University of South Carolina MayMester course, educating students on invasive plants and manual removal techniques. Volunteers from partner parks, such as the Kennesaw Mountain Trail Club, worked with the Team on invasive species removal projects that involved intense physical labor. The EPMT Crew Leader provided herbicide applicator training to three SCA interns stationed at Moores Creek National Battlefield, instructing staff on mixing, use, cleanup, and storage of herbicides, along with the rules and regulations regarding herbicides.

The EPMT had many training and networking opportunities this fiscal year, including training in Occupational Leadership, First Aid/CPR, S-212 Chainsaw Certification, and GIS. Team members attended the South Carolina Exotic Pest Plant Council Annual Meeting, where Liaison Lauren Serra was invited to join the Board of Directors, and Amorita Brackett attended the South Carolina Aquatic Plant Management Society Annual Meeting.

Lastly, a survey of cogongrass (*Imperata cylindrica*), in partnership with Clemson University, was conducted by all Congaree National Park staff divisions. Following education on Early Detection / Rapid Response, staff collected and reported baseline absence data for 47 miles of Congaree National Park roadside and waterways for the state of South Carolina.

Table 19. Southeast Coast EPMT Accomplishments.

Measure	Acres
Treated/Retreated	27
Inventoried	694
Monitored	0
Gross Infested Area (GIA)	298
Infested Area (IA)	27

Appendix A – Program Participants

Alaska EPMT

Leadership
Bonnie Million (Liaison), Tim Federal (Acting Liaison / Seasonal Data Manager)

Crew
Travis Fulton, AnnMarie Lain, Wendy Mahovlic, Gina Bono, Henry Ring (SCA Intern), Stacey Torigoe (SCA Intern), Peter Frank (SCA Intern), Maria Vasquez (SCA Intern), Kevin Storey (SCA Intern), Shahed Dowlatshahi (SCA Intern), John Patrick Mershon (SCA Intern)

Region/Network Support
Alaska Region Office – Guy Adema, Joel Cusick, Bud Rice

Park Support
Denali National Park – Pat Owen, Carl Roland
Glacier Bay National Park and Preserve – Lewis Sharman
Katmai National Park and Preserve – Whitney Rapp, Troy Hamon
Kenai Fjords National Park – Fritz Klasner, Christina Kriedeman
Klondike Gold Rush National Historic Park – Jessica Wilbarger
Lake Clark National Park and Preserve - Jeff Shearer
Sitka National Historic Park – Craig Smith
Western Arctic National Parklands – Peter Neitlich, Marci Johnson
Wrangell-St. Elias National Park and Preserve – Miranda Terwilliger, Eric Veach
Yukon-Charley Rivers National Preserve – Tom Liebscher

Volunteers
Alaska Association of Conservation Districts, Alaska Sea Life Center, Need for Seed, Resurrection Bay Conservation Alliance, Skagway Public Library, Southeast Alaska Guidance Association, Taiya Inlet Watershed Council

Steering Committee
Alaska Region Office – Jennifer Allen (Fire Ecologist), Sara Wesser (I&M Coordinator), Tim Hudson (Associate 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
Southwest Alaska Network – Michael Shephard (I&M Coordinator)
Wrangell-St. Elias National Park and Preserve – Eric Veach

California EPMT

Leadership
Bobbi Simpson (Liaison), John Swenson (Data Manager)

Partners
American Conservation Experience
AmeriCorps
Back Country Horseman

California Department of Parks and Recreation
California Invasive Plant Council
Golden Gate National Parks Conservancy
Great Tree Tenders
Mariposa County
Native Range (John Knapp)
San Francisco Bay Inventory and Monitoring Group
United States Forest Service
Youth Conservation Corps

Region/Network Support
Pacific West Region Office – Jay Goldsmith (Natural Resources Specialist)

Steering Committee
Klamath Inventory and Monitoring Network – Stassia Samuels
Mediterranean Inventory and Monitoring Network – Irina Irvine
Pacific West Region Office – Jay Goldsmith
San Francisco Bay Area Inventory and Monitoring Network – Sue Fritzke
Sierra Inventory and Monitoring Network – Athena Demetry

Chihuahuan Desert / Shortgrass Prairie EPMT

Leadership
Patrick Wharton (Team Leader)

Region/Network Support
Chihuahuan Desert Inventory and Monitoring Network – Kirsten Gallo
Intermountain Region Office – Myron Chase (IPM Coordinator), Linda Kerr (Fire Ecologist), Pam Benjamin (Vegetation Ecologist), Sarah Wynn (Restoration Ecologist)
Southern Colorado Plateau Inventory and Monitoring Network – Rob Bennetts, Tomye Folts

Partners
San Andres National Wildlife Refuge
Texas A&M University
Texas Environmental Corps
World Wildlife Fund

Steering Committee
Amistad National Recreation Area – Kate Johnson
Bents Old Fort National Historic Site – Fran Pannebaker
Big Bend National Park – Joe Sirotnak
Capulin Volcano National Monument – Zach Cartmell
Carlsbad Caverns National Park – Renee West
Fort Davis National Historic Site – John Heiner
Fort Union National Monument – Marie Frias
Guadalupe Mountain National Park – Janet Coles
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

Leadership
Tony Pernas (Liaison), Alan Shane McKinley (Crew Leader), Aaron Parns (Data Manager)

Crew
Eric Walker, Dan Lucero, Alex Heeren

Region/Network Support
North Coast / Cascades Network EPMT – Todd Neel (Liaison)
South Florida and Caribbean Network – Brooke Shamblin, Brian Wicher, Judd Patterson

Park Support
Big Cypress National Preserve – William Snyder, Jim Burch
Biscayne National Park – Shelby Moneysmith , Vanessa McDonough
Buck Island Reef National Monument – Ian Lundgren, Zandy Hillis-Starr
Canaveral National Seashore – John Stiner
DeSoto National Memorial – Jorge Acevedo
Dry Tortugas National Park – Tracy Ziegler, Kayla Nimmo
Everglades National Park – Hillary Cooley, Jonathan Taylor, Sergio Martinez, Elise Morrison, Louie and Alice Toth, Wayne Strebe, Ashley Schnitker
Fort Matanzas National Monument – Kurt Foote
Gulf Islands National Seashore – Mark Nicholas
Timucuan Ecological and Historic Preserve – Shauna Allen, Ryan Williams
Virgin Islands National Park – Rafe Boulon, Thomas Kelly, Kelly Altenhofen

Partners
Florida Wildlife Conservation – Dennis Giardina
Miami-Dade County – Jane Dozier, Dallas Hazelton, Jeff Fobb
United States Department of Agriculture – Jonathan Lewis

Steering Committee
Big Cypress National Preserve – Jim Burch
Biscayne National Park – Vanessa McDonough
Buck Island Reef National Monument – Ian Lundgren
Canaveral National Seashore – John Stiner
Everglades National Park – Hillary Cooley
Florida Wildlife Conservation – Jackie Smith
Fort Matanzas National Monument – Kurt Foote
Gulf Islands National Seashore – Mark Nicholas
United States Army Corps of Engineers – John Lane
United States Fish and Wildlife Service – William Thomas
South Florida Water Management District – Leroy Rogers
Southeast Region – Chris Furqueron (IPM Coordinator)
Timucuan Ecological and Historic Preserve – Shauna Allen
Virgin Islands National Park – Kelly Altenhofen

Great Lakes EPMT

Leadership
Carmen Chapin (Liaison), Isaiah Messerly (Crew Leader), Rebecca Key (Data Manager), Tammy Keniry (Administrative Assistance)

Region/Network Support
Midwest Region Office – Carmen Thomson

Park Support
Mississippi National River and Recreation Area – Tamberlain Jacobs (Lead), Oliver Liu, Matt Jorgenson, Greg Anderson, Abigail Yang (YCC), Chinou Vang (YCC), Connie Xiong (YCC), Noushee Khang (YCC), multiple volunteers
Indiana Dunes National Lakeshore – Rachel Ianni (Lead), Andrew LaPlant (Lead), William Gehrling, Caleb Gielczyk, Megan Korte, Daniel Mockler, William Warner, Kirk Yoder, Mark Montgomery (Volunteer)
Voyageurs National Park – Jessica Sarauer
Saint Croix National Scenic River – Michelle Prosser (Lead), Kathy Kafura, Nathan Tillinghast

Steering Committee
Apostle Islands National Lakeshore – Peggy Burkman
Grand Portage National Monument – Brandon Seitz
Ice Age National Scenic Trail – Mark Holden
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 – Amanda Brushaber
Voyagers National Park – John Snyder

Gulf Coast EPMT

Leadership
Eric Worsham (Liaison)

Region/Network Support
Intermountain Region Office – Myron Chase (IPM Coordinator), Mark Sturm (Biological Resources Program Manager)
Southeast Region Office – Chris Furqueron (IPM Coordinator)

Park Support
Big Thicket National Preserve – Jalyn Cummings (Chief Resource Management)
Gulf Islands National Seashore – Gary Hopkins (Biologist)
Jean Lafitte National Historic Park and Preserve – Dusty Pate (Natural Resource Program Manager)
Natchez Trace Parkway – Lisa McInnis (Natural Resource Management)
Palo Alto Battlefield National Historic Park – Rolando Garza (Integrated Resource Manager)
San Antonio Missions National Historic Park – Greg Mitchell (Biologist), Greg Smith (Chief RM/VP)

Vicksburg National Military Park – Virginia Dubowy (Natural Resource Program Manager)

Partners
Arrowhead Star Company
Colorado State University
Cutting Edge Forestry
Ladybird Johnson Wildflower Center
Rice University
Summitt Forestry
Union Forestry
University of Texas
United States Army Corps of Engineers
United States Fish and Wildlife Service – Saul D. Petty (Invasive Species Coordinator for Texas & Oklahoma)

Volunteers
AmeriCorps, American Youth Works, Student Conservation Association

Heartland Network EPMT

Leadership
Mike DeBacker (Network Coordinator / Supervisory Ecologist), Craig Young (Invasive Plant Program Leader), Andrew Bishop (Field Leader), Adam Throckmorton (Field Leader), Chad Gross (Data Manager)

Crew
Jordan Bell (Biological Technician)

Region/Network Support
Midwest Region – Carmen Thomson (I&M Program Manager)

Partners
Conservation Corps of Iowa

Board of Directors
Cuyahoga Valley National Park – Stan Austin (Superintendent)
George Washington Carver National Monument – Jim Heaney (Superintendent)
Herbert Hoover National Historic Site – Pete Swisher (Chair / Superintendent)
Homestead National Monument of America – Mark Engler (Superintendent)
Pea Ridge National Military Park – John Scott (Superintendent)

Technical Committee
Arkansas Post National Memorial – Kirby McCallie
Buffalo National River – Caven Clark
Cuyahoga Valley National Park – Andrew Bishop
Effigy Mounds National Monument – Rodney Rovang
George Washington Carver National Monument – Lana Henry
Herbert Hoover National Historic Site – Mike Wilson
Homestead National Monument of America – Jesse Bolli
Hopewell Culture National Historical Park – Dafna Reiner
Hot Springs National Park – Steve Rudd

Lincoln Boyhood National Memorial – Mike Capps
Ozark National Scenic Riverways – Victoria Grant
Pea Ridge National Military Park – Kevin Eads
Pipestone National Monument – Seth Hendriks
Tallgrass National Preserve – Kristen Hase
Wilson's Creek National Battlefield – Gary Sullivan

Lake Mead EPMT

Leadership

Curt Deuser (Liaison), Tarl Norman (Crew Leader), Sue Knowles (Administrative Assistant; position shared with Lake Mead Resource Management), Scott Briggs (Budget Assistant; position shared with Lake Mead Resource Management), Vanessa Truitt (Data Manager; position shared with Lake Mead Resource Management), Dwayne Coleman (Squad Leader), Samuel Smyrk (Squad Leader), Joseph Castello (Squad Leader)

Crew

Anna O'Brien, Lauren-Alnwick Pfund, Dawn Hulton, Tamberlain Jacobs, William Lide, Timothy Marsh, Christopher Penny, Kevin Reichling, Casey Sandusky, Valerie Seeton, Rebecca Welytok, Bryon Lorenz, Mathhew Duffy, Joseph Kelley, Ari Giller-Leinwohl, Alexander Heeren

Region/Network Support

Intermountain Region – Mark Sturm
Pacific West Region – Jay Goldsmith

Park Support

Arches National Park – Clay Kark, Clay Allred, Mark Miller
Bandelier National Monument – Brian Jacobs
Bryce Canyon National Park – Laura Schrage
Canyon de Chelly National Monument – Mick Castillo
Capitol Reef National Park – Dave Worthington, Gary Lenhart
Chaco Culture National Historic Site – Jim Von Haden
Death Valley National Park – Kelly Fuhrmann, Jane Cipra, Kirtsen Lund
Glen Canyon National Recreation Area – Lonnie Pilkington, John Spence, Chris Hughes
Grand Canyon National Park – Melissa McMaster, Lori Makarick, Kristina Sorrell
Joshua Tree National Park – Josh Hoines, Katie Kain
Lake Mead National Recreation Area – Gordon Olson, Alice Newton, Carrie Norman, Dara Scherpenisse
Manzanar National Historic Site – Jeff Burton
Mesa Verde National Park / Yucca House National Monument – Bryan Wender, George San Miguel
Mojave National Park – Anne Kearns
Organ Pipe Cactus National Monument – Ryan Tietjen, Kate Conner
Parashant National Monument – Rosie Pepito, Kathleen Harcksen, Raymond Klein
Petrified Forest National Park – William Reitze, Patricia Thompson
Zion National Park / Cedar Breaks National Monument – Brian Black, Cheryl Decker

Partners
Arizona Game and Fish Department – Virginia Gouldsbury
Bureau of Land Management – Nora Caplette, Lauren Brown, Sean McEldery, Nancy Williams, Kathleen Harcksen, Whit Bunting
Bureau of Reclamation – Marc Maynard, Jason Kirby
California Fish and Game Department –Troy Kelly, Bruce Kenyon
Clark County, Nevada – Liz Bickmore
United States Fish and Wildlife Service – Mark Kaib (BAER/BAR Coordinator), Jack Allen, Allison Manwaring, Amy Lavoie, Kathleen Blair, Stan Cummings, Brenda Zaun (Arizona ISST Coordinator)
United States Forest Service – Marissa Anderson, Laura Moser

Volunteers
Pat Riley (Shop Master)

Mid-Atlantic EPMT

Leadership
Brian Lockwood (Liaison), Craig Bentley (Crew Leader)

Crew
Nathan Wender, Quintin Quigley, Blake Hocker, Coleman Minney

Region/Network Support
Northeast Region Office – Kristina Heister, David W. Reynolds (Chief Natural Resources and Science Division), Wayne Millington (IPM Coordinator)

Park Support
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, P. Dennison
Booker T Washington National Monument – T. Sims, C. Mays
Colonial National Historic Park – D. Geyer
Fredericksburg and Spotsylvania National Military Park – G. Kneipp, , W. Albridge, K. Mullholland
Gettysburg National Military Park / Eisenhower National Historic Site – S. Koenig, R. Krichten, C. Brown, G. Thomas, A. Roach, B. Robinson, Z. Bolitho
George Washington Birthplace / Thomas Stone National Historic Site – R. Moräwe, L. Lawliss
Hampton National Historic Site – P. Bitzel, M. Lynch, A. Klopka, J. Hicks
Hopewell Furnace national Historic Site – E. Shean-Hammond, S. Ambrose, G. Martin, F. Delmar, K. Jensen
New River Gorge National River / Bluestone National Scenic River / Gauley River National Recreation Area – J. Perez
Petersburg National Battlefield – D. Shockley, T. Blumenschine
Richmond National Battlefield Park – K. Allen, M. Prowatzke
Shenandoah National Park – J. Schaberl, W. Cass, J. Hughes, A. Webb, T. Pryor
Valley Forge National Historic Park – K. Heister, K. Jensen

Volunteers

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, National Audubon Society

Sponsors

National Audubon Society of Virginia, Defenders of Wildlife, National Environmental Education Foundation, Shenandoah National Park Association, Student Conservation Association, Appalachian Trail Conservancy, Potomac Appalachian Trail Club, Leave No Trace

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, Randy Krichten
George Washington Birthplace National Monument – Rijk Moräwe
Hampton National Historic Site – Paul Bitzel
Hopewell Furnace National Historic Site – Steven Ambrose, Kate Jensen
New River Gorge National River / Bluestone National Scenic River / Gauley River National Recreation Area – Scott Stonum, John Perez
Petersburg National Battlefield – Dave Shockley, Tim Blumenschine
Richmond National Battlefield Park – Kristen Allen
Shenandoah National Park – Jim Schaberl
Valley Forge National Historic Park – Kristina Heister, Kate Jensen

National Capital Region EPMT

Leadership

Mark Frey (Liaison), Frank Archuleta (Team Leader), Geoff Clark (Data Manager)

Crew

Natasha Garcia Andersen, Dan Malooly, Eric Prunchak, Colleen Corballis

Region/Network Support

National Capital Region Office – Carol Pollio (Chief of Natural Resources and Sciences)

Park Support

Antietam National Battlefield – Joe Calzarette
Appalachian National Scenic Trail – Casey Reese
Assateague Island National Seashore – Bill Hulslander, Helen Violi, Jonathan Chase, Steve Bailey
Catocin Mountain Park – P. Scott Bell, Becky Loncosky, Lindsey Donaldson
Chesapeake and Ohio Canal National Historic Park – Michele Carter
George Washington Memorial Parkway – Bretn Steury, Erik Oberg, Christina DeMariano
Harpers Ferry National Historical Park – Mia Parsons, Dale Nisbet
Manassas National Battlefield Park – Bryan Gorsira, Courtney Asher
Monocacy National Battlefield – Andrew Banasik

National Capital Parks East – Steve Syphax, Mikaila Milton
National Mall and Memorial Parks – Mary Williford Bair
Prince William Forest Park – Paul Petersen, Eric Kelley
Rock Creek Park – Ken Ferebee, Ana Chuquin
Wolf Trap National Park for the Performing Arts – Phil Goetkin

Partners
Animal and Plant Health Inspection Service – Alan Tasker
United States Fish and Wildlife Service – Phil Pannill (NCTC Land Manager)
The Maryland-National Capital Park and Planning Commission – Marc Imlay
Anacostia Watershed Society – Jorge Bogantes
DC Cooperative Weed Management Area – Damien Ossi, Laura Washington

Steering Committee
National Capital Region – Mark Frey (EPMT Liaison), Carol Pollio (Chief of Natural Resources and Science), Jil Swearingen (IPM Specialist), Diane Pavek (Research Coordinator), Pat Campbell (I&M Network Program Manager)
Antitiam National Battlefield – Joe Calzarette
Catocin Mountain Park – P. Scott Bell
Chesapeake and Ohio Canal National Historic Park – Michele Carter
George Washington Memorial Parkway – Brent Steury
Harpers Ferry National Historic Park – Dale Nisbet
Manassas National Battlefield Park – Bryan Gorsira
Monocacy National Battlefield – Andrew Banasik
National Capital Parks East – Mikaila Milton
National Mall and Memorial Parks – Mary Willeford Bair
Prince William Forest Park – Paul Petersen
Rock Creek Park – Ken Ferebee
Wolf Trap National Park for the Performing Arts – Phil Goetkin

North Coast / Cascades Network EPMT

Leadership
Todd Neel (Liaison), Dan Campbell (Data Manager / GIS / Exotic Plant Management Specialist)

Crew
Lake Roosevelt National Recreation Area – Eric Walker (Lead), Sam Halvorsen, James VanGeystel, Bradley Wigginton
Olympic National Park – Daniel Lucero (Lead), Kate Bradshaw, Gus Johnson, Cody Hagen

Region/Network Support
Pacific West Region Office – Erv Gasser (IPM Coordinator), Jay Goldsmith (Natural Resources and Research)
Regina Rochefort (Network Science Advisor)

Park Support
Ebey's Landing National Historical Reserve – Craig Holmquist
Fort Vancouver National Historic Site – Tracy Fortmann
John Day Fossil Beds National Monument – Shirley Hoh
Lake Chelan National Recreation Area – Vicki Gempko

Lake Roosevelt National Recreation Area – Ken Hyde, Nate Krohn
Lewis and Clark National Park – Carla Cole, Chris Clatterbuck
Mount Rainier National Park – Lou Whiteaker, Will Arnesen
Nez Perce National Historical Park – Jason Lyon, Jannis Jocious
North Cascades National Park / Ross Lake National Recreation Area – Jack Oelfke, Mignonne Bivin
Olympic National Park – Steve Acker
San Juan Island National Historic Park – Jerald Weaver
Whitman Mission National Historic Site – Roger Trick

Northeast EPMT

Leadership
Betsy Lyman (Liaison), Brian McDonnell (Team Leader)

Crew
Jason Zarnowski, Susan Robinson, Ryan Hodge, Kim Oellerich

Region/Network Support
Northeast Region Office – Wayne Millington (IPM Coordinator), Kristina Heister (Division Chief)

Park Support
Allegheny Portage Railroad National Historic Site – Kathy Penrod
Appalachian National Scenic Trail – Casey Reese, Adam Brown (Appalachian Trail Conservancy; partner)
Boston Harbor Islands National Recreation Area – Marc Albert, Valerie Wilcox, Andrew Petit de Mange, Russ Bowles (UMass boat operator)
Cape Cod National Seashore – Stephen M. Smith
Delaware Water Gap National Recreation Area – Brad Boynton (Mechanic), Larry Hilaire, Jeff Shreiner, Tom Witter (VIP), Jon Bugan (VIP), Doug Millard (VIP)
Fire Island National Seashore – Jordan Raphael
Gateway Natinoal Recreation Area – Doug Adamo, Mike Byer, George Frame, Jeanne McArthur-Heuser (Sandy Hook Unit), Bill Parker (Sandy Hook Unit), Chris Maila (Staten Island Unit), Gary Zbel (Staten Island Unit), Tomas Liogys (Fire), Fire staff, Maintenance staff, Natural Resource staff, SCA Interns, Dr. Louise Wootton (researcher, Georgian Court University; partner at Sandy Hook Unit)
Morristown National Historic Park – Robert Masson
Roosevelt-Vanderbilt Historic Sites – Dave Hayes
Saratoga National Historical Park – Chris Martin, Linda White, Cindy VanDerwerker
Upper Delaware Scenic and Recreational River – Jamie Myers

Northern Great Plains EPMT

Leadership
Taryn Preston (Acting Liaison / Biologist), Milt Haar (Acting Liaison), Jared Burian (Crew Leader), Mark Slovek (Crew Leader)

Crew
Matthew Svoboda, Irene Weber, Drew Zawacki, Joshua James, John Shoup, Maria Herber, Richard Bishop, Colin Davis, Adam Sedivy, Brett Kavanaugh

Park Support
Agate Fossil Beds National Monument – James Hill
Badlands National Park – Brian Kenner, Milt Haar, Mark Slovek, Lee Vaughn, Casey Sawvell, Laniece Sawvell
Devils Tower National Monument – Angela Wetz, Ed Eberhardy
Fort Laramie National Historic Site – Mitzi Frank, Gayle Jones
Fort Union Trading Post National Historic Site – Andy Banta
Jewel Cave National Monument – Rene Ohms
Knife River Indian Villages National Historic Site – John Moeykens
Minuteman Missile National Historic Site – John Black
Missouri National Recreational River – Gia Wagner
Mount Rushmore National Memorial – Bruce Weisman, Al Sage
Niobrara National Scenic River – Pam Sprenkle
Scottsbluff National Monument – Bob Manasek
Theodore Roosevelt National Park – Bill Whitworth, Laurie Richardson, Chad Sexton, Meg Schwartz
Wind Cave National Park – Greg Schroeder, Beth Burkhart, Kevin Kovacs

Steering Committee
Midwest Regional Office – Carmen Thomson
Agate Fossil Beds National Monument – James Hill
Badlands National Park – Brian Kenner
Northern Great Plains Network – Kara Painter (I&M), Dan Swanson (Fire)
Theodore Roosevelt National Park – Bill Whitworth
Wind Cave National Park – Greg Schroeder

Northern Rocky Mountain EPMT

Leadership
Sue Salmons (Liaison), Gary Ludwig (Team Leader), Michael E. "Mickey" Pierce (Crew Leader), Andrew Ringholz (Assistant Crew Leader)

Crew
Arley Cantwell, B. Pat Clark, Ashley Coletti, Ed Eberhardy, Heather Golden, R. Walter Householder

Region/Network Support
Intermountain Region Office – Myron Chase (IPM Specialist)

Park Support
Big Hole National Battlefield – Jimmer Stevenson
Bighorn Canyon National Recreation Area – Ryan Felkins, Bill Pickett, Melana Stichman
City of Rocks National Reserve – Trenton Durfee, Steven Murray
Craters of the Moon National Monument & Preserve – Steven Bekedam, seasonal staff
Fossil Butte National Monument – Arvid Aase, Clay Kyte, Phil Knecht
Glacier National Park (host park) – Dawn LaFleur, Matt Kennedy, seasonal staff

Golden Spike National Historic Site – Tammy Benson
Grand Teton National Park / John D. Rockefeller Memorial Parkway – Jason Brengle
Grant-Kohrs Ranch National Historic Site – Jason Smith
Hagerman Fossil Beds National Monument / Minidoka Internment National Monument – Ray Vader
Little Bighorn Battlefield National Monument – Melana Stichman
Nez Perce National Historic Park – Jannis Jocius
Rocky Mountain National Park – Jim Cheatham, Jim Bromberg, seasonal staff
Yellowstone National Park (host park) – Christopher Overbaugh, Troy Nedved, Eric Reinertson, seasonal staff

Partners
Dinosaur National Monument – Tamara Naumann
Rocky Mountain National Park – Jim Cheatham, Jim Bromberg, seasonal staff

Steering Committee
Yellowstone National Park (host park) – Dan Reinhart
Glacier National Park (host park) – Dawn LaFleur
Craters of the Moon National Monument & Preserve – John Apel, Steve Bekedem
Bighorn Canyon National Recreation Area – Cassity Bromley
City of Rocks National Reserve – Kristen Bastis
Fossil Butte National Monument – Arvid Aase
Golden Spike National Historic Site – Tammy Benson
Grand Teton National Park / John D. Rockefeller Memorial Parkway – Kelly McCloskey, Jason Brengle
Grant-Kohrs Ranch National Historic Site – Chris Ford, Jason Smith
Hagerman Fossil Beds National Monument / Minidoka Internment National Monument – JoAnn Blalack
Little Bighorn Battlefield National Monument – Melana Stichman
Nez Perce National Historic Park – Jannis Jocius, Jason Lyon

Pacific Islands EPMT

Leadership
Jeremy Gooding (Liaison)

Park Support
Hawaii Volcanoes National Park – Jon Makaike (Crew Leader), David Benitez (Ecologist / Data Manager)

Partners
Maui Invasive Species Committee – Adam Radford (Operations Manager), Brooke Mahnken (Data Manager), Michael Ade (Crew Leader)
Interagency Miconia Management Program – Sean Birney (Technical Support), Imi Nelson (Crew Leader)

Steering Committee
East Maui Watershed Partnership – Randy Bartlett (Coordinator)
Haleakala National Park – Steve Anderson (Natural Resource Program Manager), Matt Brown (Division Chief)

Leeward Haleakala Watershed Restoration Partnership – Andrea Buckman (Project Coordinator)
Hawaii Division of Forestry and Wildlife – Dr. Fern Duvall (Biologist)
Hawaii Volcanoes National Park – Dr. Rhonda Loh (Division Chief)
Maui Invasive Species Committee – Teya Penniman (Coordinator), Elizabeth Anderson (Facilitator), Dr. Lloyd Loope (Chair)
The Nature Conservancy Hawaii, Maui Program – Pat Bily (Project Manager)

Southeast EPMT

Leadership
Nancy Fraley (Liaison), Toby Obenauer (Team Leader)

Crew
Chelsea Bandau, Max Barbero, Andrew Spear, Joseph Kelley, Anthony Tocci, David Ward

Region/Network Support
Southeast Region Office – 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
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 – Bambi Teague
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 – Bill Barley
Great Smokey Mountains National Park – Kris Johnson
Guilford Courthouse National Military park – Rose Ownby
Kings Mountain National Military Park – Chris Revels
Little River Canyon National Preserve / Russell Cave National Monument – Mary Shew
Mammoth Cave National Park – Brice Leech
Ninety Six National Historic Site – Gray Wood
Shiloh National Military Park – Marcus Johnson
Stones River National Battlefield – Troy Morris

Southeast Coast EPMT

Leadership
Lauren Serra (Liaison), Terri Hogan (Acting Liaison), Amorita Brackett (Team Leader)

Crew
Emily Jablonski, Erin Redding, Margaret Wilder, Emily Chilton, Henry McGuire, David Solomon (SCA Intern), Ryan Terlep (SCA Intern), Kiri Ando (Congaree National Park Resource Management Intern), Eric Wilson (Congaree National Park Resource Management Intern)

Region/Network Support

Southeast Region Office – Chris Furqueron (Chief – IPM, Invasives, and EPMT Program), Christopher Barrow (GIS Specialist/GPS Coordinator)

Park Support

Cape Hatteras National Seashore / Fort Raleigh National Seashore / Wright Brothers National Monument – Sara Strickland
Chattahoochee River National Recreation Area – Allyson Read, Paula Capece
Congaree National Park – Theresa Yednock, Terri Hogan
Cumberland Island National Seashore – Doug Hoffman
Fort Frederica National Monument – Denise Spear, Chad Thomas
Fort Pulaski National Monument – Laura Rich-Acosta
Fort Sumter National Monument / Charles Pinckney National Historic Site – Rick Dorrance
Horseshoe Bend National Military Park – Jim Cahill, Roy Appulguise
Kennesaw Mountain National Battlefield Park – Thomas Sparks
Moores Creek National Battlefield – James Sutton
Ocmulgee National Monument – Guy LaChine

Volunteers

Miriam Oudejans (Congaree National Park VIP); Harry Carpenter and Doug Tasse (Kennesaw Mountain Trail Club); Gwendelyn Geidel (University of South Carolina); Kelsie Engelhard, Saffie Jallow, and Kimberly Abramowski (Moores Creek National Battlefield SCA Interns)

Appendix B – Acronyms

CWMA – Cooperative Weed Management Area

EDRR – Early Detection / Rapid Response

EPMT – Exotic Plant Management Team

GIS – Geographic Information System

GPS – Global Positioning System

I&M – Inventory and Monitoring

IPM – Integrated Pest Management

NPS – National Park Service

RM – Resource Manager/Management

SCA – Student Conservation Association

USDA – United States Department of Agriculture

USFS – United States Forest Service

USFWS – United States Fish and Wildlife Service

USGS – United States Geological Survey

VIPs – Volunteers-In-Parks

YCC – Youth Conservation Corps

Appendix C – Plant Species Index (by scientific name)

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.

NPS 999/121328, June 2013

National Park Service
U.S. Department of the Interior

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