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Natural Resource Program Center
Biological Resource Management Division



Exotic Plant Management Team Annual Report



2007

Cover Photos:

1. Top: Fall at Theodore Roosevelt National Park, contributed by Chad Prosser of Northern Great Plains EPMT.
2. Lower left: Treatment at Mount Rushmore National Memorial, contributed by Chad Prosser of Northern Great Plains EPMT.
3. Lower right: Treatment at the Presidio in Golden Gate National Recreation Area, contributed by Bobbi Simpson of California EPMT.

Table of Contents

Introduction	1
EPMT Location Map	2
Alaska Region	
Alaska EPMT	11
Pacific West Region	
California EPMT	13
Lake Mead EPMT	15
North Cascades EPMT	17
Pacific Islands EPMT	19
Intermountain Region	
Chihuahuan Desert / Shortgrass Prairie EPMT	21
Colorado Plateau EPMT	23
Gulf Coast EPMT	25
Northern Rocky Mountain EPMT	27
Midwest Region	
Great Lakes EPMT	29
Northern Great Plains EPMT	31
Northeast Region	
Mid Atlantic EPMT	33
Northeast EPMT	35
National Capital Region	
National Capital Region EPMT	37
Southeast Region	
Florida Caribbean Partnership EPMT	39
Southeast EPMT	41
Appendix A: 2007 EPMT Participants	43
Appendix B: Glossary	48
Appendix C: Common Acronyms	49

Introduction

The spread of invasive species is recognized as one of the major factors contributing to ecosystem change and instability throughout the world. The proliferation of invasive plants is changing the native landscape across 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; academic institutions and private organizations.

Our National Park units 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 or between 3-5 percent of park lands are dominated by non-native, invasive plant species.



Figure 1. Leafy Spurge at Grant-Kohrs Ranch National Historic Site.

The National Park Service is responding to this growing threat of invasive species by expanding programs and directing increasing resources toward the problem. It is the goal of invasive plant programs within the National Park Service to manage the sources of new infestations, reduce

the effects of existing infestations, and to restore native plant communities and ecosystem functions.

Exotic Plant Management Teams

The Exotic Plant Management Team (EPMT or Team) program is part of the NPS response to the growing invasive plant problem. The Teams were established to provide a framework and a first response to exotic plant invasions within NPS. The teams are staffed by highly trained individuals with expertise in plant identification, plant ecology, weed management, and pesticide use. The Teams are funded through the National Resource Challenge, within the Biological Resource Management Division of the Washington Office. The teams are headquartered in a region or park unit and then operate over a wide geographic area, serving as many as 22 parks. The activities of each EPMT are coordinated through a steering committee, which consists of representatives for each of the parks they serve. There are now 16 teams operating across the country, serving more than 200 parks.



Figure 2. Mapping invasive plants in Alaska.

Within the National Park Service, invasive plant management is a partnership among many programs including: park resource management programs, maintenance, interpretation, the Inventory and Monitoring Networks, and the Exotic Plant Management Teams (Teams).

Managing invasive plants requires a combination of inventory, monitoring, prevention, restoration, control, and research. The Teams contribute to all these components of invasive species management.

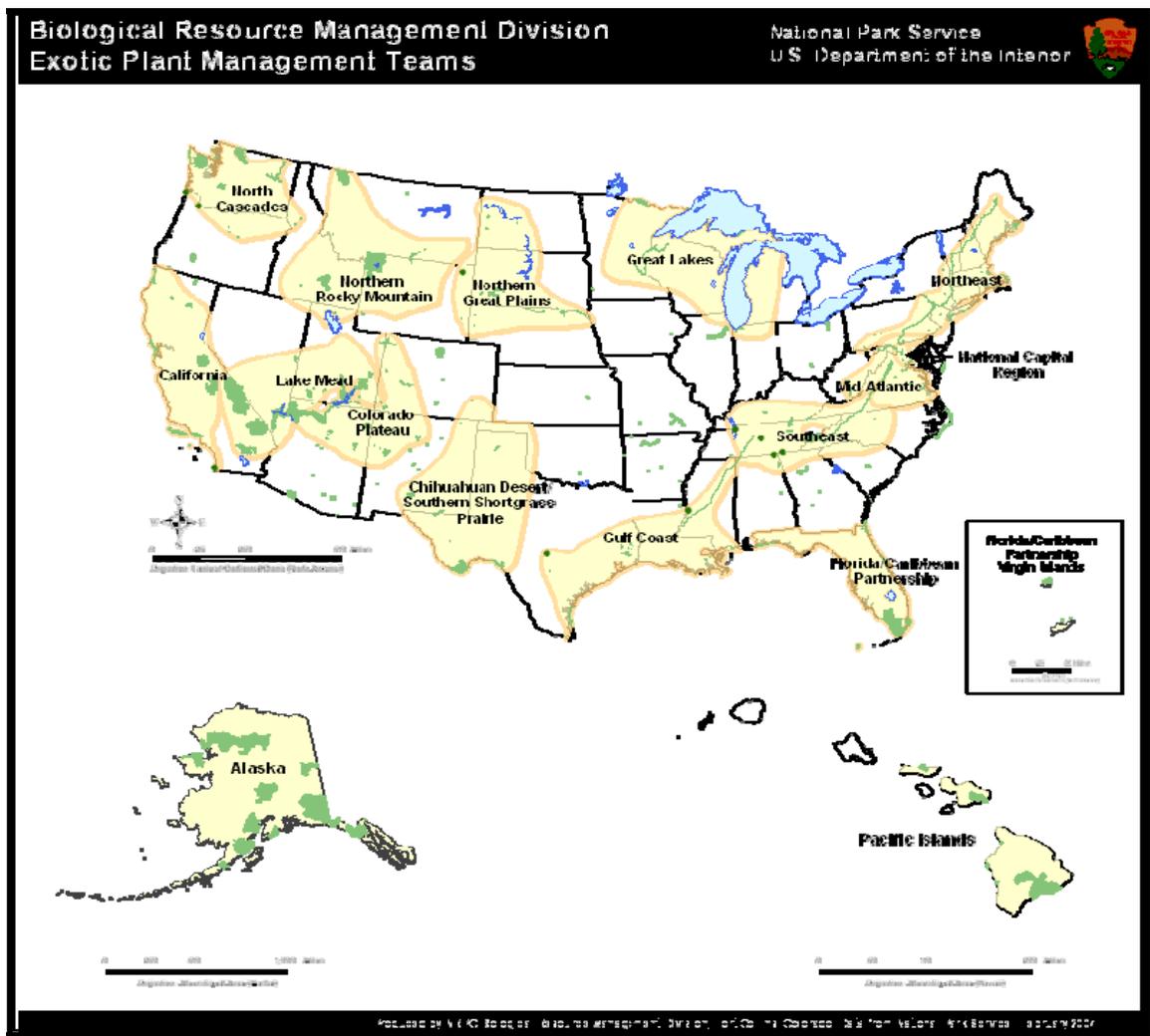


Figure 3. The Exotic Plant Management Teams.

Alaska Region

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

Pacific Region

California EPMT based at Point Reyes National Seashore.

Lake Mead EPMT based at Lake Mead National Recreation Area.

North Cascades EPMT based at North Cascades National Park.

Pacific Islands EPMT based at Haleakala National Park.

Intermountain Region

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

Colorado Plateau EPMT based at Petrified Forest National Park.

Gulf Coast EPMT based at Big Thicket National Park.

Northern Rocky Mountain EPMT based at Yellowstone National Park.

Midwest Region

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

Northern Great Plains EPMT based at Theodore Roosevelt National Park.

Northeast Region

Mid Atlantic Cooperative EPMT based at Shenandoah National Park.

Northeast EPMT based at Delaware Water Gap National Recreation Area.

National Capital Region

National Capitol Region EPMT based at Rock Creek Park.

Southeast Region

Southeast EPMT based at Blue Ridge Parkway.

Florida Caribbean Partnership EPMT based in Palmetto Bay, Florida.

The Teams accomplish this goal by working closely with other NPS programs and through cooperation and collaboration with other agencies, adjacent landowners, groups and academic institutions. This annual report documents the activities and achievements of the Exotic Plant Management Teams in 2007.

2007 Accomplishments

The Teams contribute in all facets of invasive plant management for the National Park Service. In 2007, the Teams demonstrated this through accomplishments in prevention, inventory, monitoring, participation in research efforts, and through treatment of invasive plants on more than 160 parks. In addition to this project work, Teams provided technical assistance to parks, regions, and the Inventory and Monitoring networks. Teams are playing an increasing role as regional experts in vegetation and invasive species management. The Teams provide invasive species training to park resource managers, maintenance staffs, as well as, other federal and non-federal partners. Teams also assist parks with general management plans, vegetation management plans, and environmental compliance.

2007 Accomplishments	
Inventoried Acres	221,692
Monitored Acres	17,752
Treated & Retreated Acres	14,272
Restored Acres	213
Gross Infested Acres	72,330
Infested Acres	15,710

Figure 4. 2007 Accomplishments.

Special Funding

In 2007, the Exotic Plant Management Team program received an additional \$750,000. The purpose of the funding was to supplement invasive plant programs in three critical areas: South Florida, the Northern Great Plains, and the Rio Grande watershed. The Teams used these funds to hire additional crews, extend treatment seasons, and increase contract services.

- ❖ In the Northern Great Plains, leafy spurge and Canada thistle threaten native ecosystems. Extensive areas of Badlands and Theodore Roosevelt National Parks have been infested. These invasive plants are displacing native plants, serving as seed sources for new invasions, altering natural fire regimes, and causing economic

damage to adjacent agricultural lands. The supplemental funding received in 2007 allowed the Northern Great Plains EPMT to treat over 3,000 acres of the Badlands Wilderness Area for Canada thistle. This treatment will further aid in maintaining native prairie and habitat for the rare swift fox and endangered black footed ferret reintroductions.



Figure 5. Teams use a variety of methods to treat invasive plants.

- ❖ The Colorado Plateau EPMT used the additional funding to control woody species along the Rio Grande River corridor at Bandelier National Monument. Enlisting support from the Lake Mead and Chihuahua Desert Teams, more than 5.5 miles of invasive woody species were treated along the riverbank. Rafts were used to float in equipment and supplies because the site was so remote and inaccessible.
- ❖ The Chihuahuan Desert / Southern Shortgrass Prairie EPMT used this funding to remove tamarisk and river cane on national parks located in the Rio Grande River watershed. The removal of tamarisk and river cane contributes greatly to the restoration of the riparian ecosystem by increasing the diversity and improving the delicate balance of woody, herbaceous and aquatic plant species. The Rio Grande at Big Bend National Park and Amistad National Recreation Area were the primary areas treated.

Inventory and Monitoring

A critical component of invasive species management is inventory, or knowing the location and distribution of invasive plants across the landscape. This information facilitates identifying treatment locations, setting priorities, identifying pathways of invasion, and writing management plans. Monitoring determines changes in the size, location, density, and distribution of invasive plants and the efficacy of management practices. The Teams work in close

cooperation with park staff and the NPS Inventory and Monitoring program to gather this information.



Figure 6. Colorado Plateau-Petrified Forest EPMT using GPS to inventory for invasive plants.

A common axiom of invasive species management is *weeds know no boundaries*. Effective weed management requires coordinated management across ownerships. Managing invasive species across jurisdictions requires creating mechanisms to share information. Over the last eight years, there has been acceptance of the North American Weed Management Association standards for the inventory and monitoring of invasive species. The EPMT program has implemented these standards so that information can be shared with other parks, across agencies, and across jurisdictions. Inventory and monitoring data collected by the Teams can now be used in local and regional weed coordination efforts such as Cooperative Weed Management Areas and state weed planning efforts.

In 2007, the Teams inventoried more than 221,600 acres. These inventories recorded information on 374 invasive plant taxa. Over the last five years, 2,700,000 acres have been inventoried by the EPMT program.

Like inventories, monitoring is an important component of invasive species management. Monitoring can reveal changes in the location, size, density, and distribution of invasive plant populations. Monitoring can also identify pathways for the introduction and spread of invasive plants, efficacy of treatments, ecological changes prior to and following treatments, and the need for site restoration.

The Teams monitored more than 17,750 acres and 194 invasive plant taxa in 2007. Over the last five years, there has been a steady increase in monitoring. As initial park surveys and inventories become more complete, a decline in acres

inventoried will likely occur and be replaced with by an increase in acres monitored. The following examples demonstrate team inventory and monitoring activities:

- ❖ The Colorado Plateau EPMT completed inventories on more than 4,500 acres within the Petrified Forest National Park. This inventory is providing critical information for the management of tamarisk within the park.
- ❖ The Great Lakes EPMT inventoried 40 miles of Lake Superior shoreline in 2007.

Treatment and Control

Control or treatment of invasive plants continues to be the focus of the Exotic Plant Management Teams. Treatment comprises between 40 and 70 percent of the team's time and effort, based on the needs of the parks they serve.



Figure 7. Honeysuckle thicket at Fort Necessity National Battlefield.

In 2007, the Teams treated more than 14,400 acres of invasive plants. The species treated varies greatly between Teams. In 2000 with only a few Teams in operation, only 17 taxa were treated. In 2001, the number of taxa treated had increased to 107 and in 2007 more than 329 taxa were treated. Since 2001, more than 600 taxa have been treated. The same trend is occurring in the number of parks serviced by the teams. In 2000, fewer than 20 parks were served by an EPMT; in 2007, Teams operated in more than 160 parks, more than 230 parks have been served since the beginning of the program. Following are some highlights of EPMT programs in 2007:

- ❖ The Natchez Trail Parkway recently added more than six miles to the southern end of the parkway. The new acquisition contained the largest kudzu infestation along the parkway. In 2007, the Gulf Coast EPMT used

an innovative herbicide application that effectively treated the 50-acre infestation while protecting water resources in Saint Catherine Creek.

- ❖ In 2007, the North Cascades EPMT visited and treated invasive plants at Nez Perce National Historic Park for the first time. The park is facing a variety of weed problems including yellow star thistle, diffuse knapweed, and black locust.
- ❖ The Chihuahuan Desert EPMT added an additional three parks to its network: Pecos National Historic Park, Fort Union National Historic Park, and the Sand Creek Massacre National Historic Site.



Figure 8. Phragmites at Cape Cod National Seashore.

Prevention

The most effective and economical approach to managing invasive plants is to prevent their introduction and spread. Prevention is a combination of early detection and prompt treatment of new populations, management practices that limit introduction, and enlisting the support of the public and park staff through education. Such practices as cleaning equipment and vehicles, monitoring and treating along known pathways like roads, trails, parking lots and campgrounds, and using weed free material in construction and maintenance projects can significantly reduce invasive plant introductions. The Teams spend between 5 and 15 percent of their time on prevention activities. Examples of prevention practices implemented by the Teams include:

- ❖ Roads and trails have been well documented as a principal pathway and corridor for invasive species spread. The Teams are working on cooperative efforts between engineering, maintenance and the invasive plant program to implement simple practices

and methods to reduce the introduction and spread of invasives plants. Such prevention practices as the use of weed free materials, equipment cleaning, using weed free gravel sources, and road maintenance practice can minimize the introduction and spread of invasive plants.

- ❖ The Pacific Island EPMT has developed protocols for preventing the spread of highly mobile invasive miconia seeds.
- ❖ The Northern Great Plains EPMT has prioritized leafy spurge treatment areas. The Team has targeted waterways, roads, bikeways, hiking and horse trails to minimize the transportation of invasive plant seeds to other area both in and outside the park.
- ❖ The Gulf Coast EPMT, with assistance from the Biological Resource Management Division staff, is participating the a partnership between the National Park Service, Lady Bird Johnson Wildflower Center, Garden Clubs of America, and others in the “Be PlantWise” program. It is an educational program, which encourages gardeners to plant native alternatives to invasive species.



Figure 9. Resource Manager Bob Mattos applying basal treatment to Kahili ginger at Hawaii Volcanoes National Park.

Cooperation and Collaboration

One of the central tenants of invasive plant work is that weeds know no boundaries. The management of invasive plants requires cooperation and coordination across jurisdictions and property lines. To achieve the goal of coordinated management the EPMT program has focused on identifying opportunities for coordination, fostering partnerships with organizations and agencies, and removing any institutional boundaries. The Teams are leaders and active participants in regional and local

cooperative efforts; as illustrated by the following examples:

- ❖ The Pacific Island EPMT continues to play a major role in the Maui Invasive Species Committee. The committee is a diverse partnership made up of federal, state, and county agencies dedicated to reducing the influence of invasive species on the native flora and fauna of Maui. The Team is leading the Island's miconia control program using innovative aerial applications to reduce mature trees on more than 37,000 acres.
- ❖ The Great Lakes EPMT has become a leader in collaborative and interagency activities in the Midwest. This Team helped to organize the Northwoods Cooperative Weed Management Area and the Midwest Natural Resource Group. The Great Lakes EPMT leader was recognized for these efforts in 2007.



Figure 10. Great Lakes Team using a variety of treatment tools.

- ❖ The California EPMT liaison is a member of the California Interagency Noxious and Invasive Plant Committee, which coordinates weed control efforts across all ownerships in California.
- ❖ During 2007, the Southeast EPMT expanded outreach activities to the general public as well as professional resource managers. The Southeast EPMT continues to provide classroom and hands on training to many groups including the Tennessee Exotic Pest Plant Council, Eastern Band of the Cherokee Indians, and the Southern Appalachian Man and the Biosphere.
- ❖ The Northeast EPMT has given several presentations at regional meetings such as Connecticut Invasive Plant Working Group.

- ❖ The Southeast, Florida, and California Team liaisons are in leadership roles in regional and national Exotic Plant Pest Councils.
- ❖ The Mid-Atlantic EPMT has been a leader in enlisting volunteers in invasive plant management. Volunteers working on invasive plants have become an annual event at Shenandoah National Park, providing valuable resources to control invasive plants and opportunities for education.
- ❖ The North Cascades EPMT has been instrumental in the formation of a cooperative weed management area around local parks. Coordination with area tribal governments has led to more effective treatment of advancing populations of knotweed along local rivers.
- ❖ The Alaska EPMT is helping to create cooperative weed management areas to facilitate local activities with adjacent landowners. They are working to control orange hawkweed across the Kenai Peninsula.



Figure 11. Knotweed along coastal rivers treated by the North Cascades EPMT.

Early Detection and Rapid Response

While virtually all 391 park units have recorded the presence of invasive plants, the majority of NPS lands are still weed-free. As mentioned previously, approximately 2.6 million acres (three to five percent) of NPS lands are currently infested with some invasive plant species. Conversely, this translates to close to 95% of NPS lands are still free of invasive plant species. Prevention and early detection are the most efficient and effective mechanisms to manage invasive plants. The most effective time to treat invasive plants is when infestations are new to an area and infestations are small. This window of opportunity is often called Early Detection and Rapid Response (EDRR). Invasive plants can expand from a few plants to several hundred acres in less than five years. A 2007 Exotic Plant Management Team Annual Report 6

new infestation of a few plants may require only a small investment of time and resources to control. Infestations of several hundred acres may take thousands of dollars. For very large infestations, eradication or control may no longer be possible. The Teams embrace the EDRR concept by helping parks identify and locate new infestations, and focusing priority treatment activities in these areas. Teams also work to protect uninfested area by closely monitoring pathways of introduction and treating new infestations as soon as they are detected. Some examples of this work include:

- ❖ Pampass grass is a relatively recent invader to the Hawaiian Islands and is threatening rare pristine sites within Haleakala National Park. The Pacific Islands EPMT is working on an extensive five year survey and control program to prevent the establishment and proliferation of the species on Maui and the remainder of the Hawaiian Islands.
- ❖ The California EPMT located a small infestation of diffuse knapweed, a species currently uncommon in the area. This species has been shown to be very problematic in other areas of the West. In cooperation with the state of California the Team was able to eliminate this isolated occurrence before it had the chance to become widespread.
- ❖ Craters of the Moon National Monument and the Northern Rockies EPMT developed a quick response plan when dyer's woad was first located in the park. The plan called for a coordinated effort between park staff and the team to treat the entire infestation. This swift response treated all the plants prior to releasing seed.



Figure 12. Park and EPMT crews working together at Grand Teton National Park.

Special Programs

Invasive species management is a growing and expanding scientific field. The teams are providing an important opportunity for mentoring and on the job training in invasive species management.



Figure 13. SCA and Northern Rocky Mountain EPMT working together at Craters of the Moon National Monument.

The program employs the Student Conservation Association (SCA) Native Plant Corps, SCA intern program, AmeriCorps, and other youth programs. This partnership provides opportunities for young students and professionals interested in natural resource careers to gain valuable work experience. Several of the former interns have now become permanent members of the EPMT Teams. Some examples of this program are:

- ❖ The Alaska EPMT has worked for several years with the Tribal Civilian Community Corps teams. They worked in a number of Alaska's parks including the Denali and Glacier Bay National Park units, controlling more than 300 infestations.
- ❖ The Chihuahuan Desert EPMT trained the SCA Native Plant Teams to control arundo and tamarisk at Big Bend National Park. The SCA team worked along side the team for more than two months.
- ❖ At Voyageurs National Park, SCA interns inventoried over 84 acres at campsites, trails, and the interpretive center.
- ❖ All the Teams have relied on these organizations to meet program objectives. Since 2000, over 60,000 hours of invasive plant work has been accomplished using SCA personnel. This represents around ten percent of all field hours for the Teams.

Invasive Plant Management Plans

The EPMT program has become an integral part of managing invasive plants in the NPS. The Teams are frequently called upon to provide technical assistance to park, regions, and cooperators. The program has become a catalyst for invasive plant programs within National Park units. In recent years, the teams are playing a greater role by leading or assisting parks in strategic planning for restoration and invasive plant management. The threat to our national parks and wildlands from invasive plants will only increase in the coming years. The millions of annual visitors from across the country and around the world to our national parks increase the opportunity for plant introduction and dispersal. The teams are working closely with parks to anticipate and plan for this growing invasive plant problem through the development of long-term prediction modeling, analyzing environmental consequences, and developing strategic plans. Some examples are:

- ❖ Invasive plants are relatively rare in Alaska. Over the last few years, the Alaska EPMT has focused on surveying the likely pathways and ties for invasive plant introduction. This information is now being used to create a ten-year management plan. The plan will create strategies for prevention, early detection and treatment for invasive plants across all parks in the Alaska region.
- ❖ The Northern Great Plains EPMT led the effort to devise a management plan, including an environmental assessment for the management of invasive plants for parks in the area. The plan outlines a strategic approach to controlling invasives while restoring native plant communities.
- ❖ The Florida/Caribbean EPMT is helping to lead an effort that will provide strategies and a framework for invasive plant management within nine parks in South Florida and the Caribbean. The goal of the plan is to preserve and protect native habitats within these parks and the surrounding landscapes.
- ❖ The Northern Rocky Mountain EPMT is leading an effort on ten parks in the Northern Great Basin and Rocky Mountains. They are cooperating to establish a series of strategic management plans for the management of invasive plants within these parks.

Safety

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

To manage these hazardous working conditions, the EPMT program emphasizes safety and caution in all operations. Each Team prepares a job hazard analysis for each type of operation. These analyses are updated frequently to reflect current conditions. On-the-job safety meetings are held regularly and often, reinforcing good safety practices. The Teams work with each park to ensure that the safety plans and hazard analyses meet park standards and local environmental conditions. The Teams have recorded more than a half million-field hours over the last three years with lost time injuries representing less than 0.0002 percent of field hours worked.



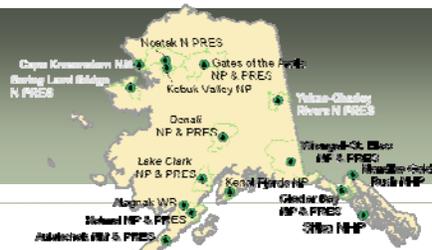
Figure 14. Wavy thistle at Yellowstone National Park.



Team Reports

Alaska

Exotic Plant Management Team



Partner Parks: Alagnak WR, Aniakchak NM & PRES, Bering Land Bridge N PRES, Cape Krusenstern NM, Denali NP & PRES, Gates of the Arctic NP & PRES, Glacier Bay NP & PRES, Katmai NP & PRES, Kenai Fjords NP, Klondike Gold Rush NHP, Kobuk Valley NP, Lake Clark NP & PRES, Noatak N PRES, Sitka NHP, Wrangell-St. Elias NP & PRES, Yukon-Charley Rivers N PRES

In its fifth year, the Alaska EPMT (AK-EPMT) grew to its largest size and most effective efforts yet to keep invasive plants from becoming a major problem in Alaska's National Parks.

2007 Accomplishments	
Inventoried Acres	691
Gross Infested Acres	1,292
Infested Acres	336
Treated Acres	24
Monitored Acres	2,459
Retreated Acres	20
Restored Acres	3.6

Eleven employees and five interns inventoried, controlled, and monitored infestations in nine of Alaska's ten parks with documented invasive plants. We educated visitors, local residents, and park staff about both problems and solutions through presentations and publications. While EPMTs in other regions are treating large infestations; the AK-EPMT is able to thoroughly search for, map, and control small infestations so that large infestations never develop.

To bolster our early detection and rapid response program, the AK-EPMT has developed a sophisticated data collection, processing, and storage protocol. In the field, we compiled nearly 3,000 precise data records in 2007, each representing an infested or uninfested area that was inventoried, treated, monitored, retreated, or restored. The precision of the GPS units enables us to revisit virtually every known infestation in Alaska parks each summer and evaluate the effectiveness of our efforts to within a meter change in patch shape. As a result, we know what is working and when to change strategy using an adaptive management approach.

For controlling large infestations, two Tribal Civilian Community Corps teams assisted our seasonal staff for over two months of control work. They traveled the vast distances between Alaska parks from rainforest to tundra and

worked to help us remove the few large infestations we have. Of equal benefit, the young adults learned about park resources, issues, and management and came away knowing that their work prevented the development of future problems. Many other volunteers assisted our efforts throughout the summer, contributing thousands of work hours toward keeping invasive plants at bay in Alaska parks.

Nothing is more cost-effective in the long run than early eradication of arriving invasive plants, and this year we had plenty: 35 infestations of 13 different invasive plant species were eradicated in Alaska parks by previous years' treatments. Examples include yellow toadflax in Sitka National Historical Park, quackgrass in Wrangell-St. Elias National Park and Preserve, common burdock in Glacier Bay National Park and Preserve, and bird vetch in Denali National Park and Preserve. Our GIS database and GPS protocol dramatically simplify the tracking of each individual infestation.



Figure 15. Alaska EPMT members learn GPS data collection at the seasonal training.

For better coordination across the NPS 54 million acre Alaska Region, a comprehensive Invasive Plant Management Plan was developed this year. The plan was prepared through public, interagency, and NPS participation in evaluating the current situation and strategizing best

management for the future. A companion Environmental Assessment is in process and will be finalized in 2008. The unified direction of this plan complements the field efforts and data management of the AK-EPMT to complete a holistic invasive plant management program for Alaska.

Special Project

The Tribal Civilian Community Corps (TCCC) is an AmeriCorps program of the Tanana Chiefs Conference of Interior Alaska and provides development and leadership opportunities for Native Alaskan youth. In 2007, TCCC provided two work teams for over a month each to assist our seasonal employees in controlling large infestations. They worked in many of Alaska's parks, including Denali, Glacier Bay, Katmai, Kenai Fjords, Klondike Gold Rush, Sitka, and Wrangell-St. Elias, and learned about the varied cultural and natural resources across the region. A common theme was the recognition that this partnership is a model for building relationships between parks and rural Alaska communities.



Figure 16. The Tribal Civilian Community Corps rids Sitka National Historical Park of invaders.

In total, the TCCC teams controlled over 300 infestations of 15 invasive plant species, the largest and most threatening ones in Alaska parks. The TCCC teams complement the work of our seasonal employees, who generally work alone or in pairs, by providing the labor needed for our few infestations that are difficult to control. With one or two work weeks in midsummer, the TCCC teams can knock out the infestations that have been prioritized earlier in the summer, and after the teams leave, we sweep the area and monitor the control effectiveness for the rest of the summer and beyond. This partnership between the Alaska EPMT and the TCCC program provides mutual benefit by educating our future

stakeholders and enabling them to make a difference by helping parks fight this problem in a cost-effective way.

Collaboration

Because Alaska still has the opportunity to prevent invasive plants from irreparably damaging its natural resources, collaboration is a mainstay of the AK-EPMT. In particular, we work closely with other agencies and organizations through the statewide Committee for Noxious and Invasive Plants Management to address invasive plants before they arrive in parks from elsewhere in the state. In addition to serving a leadership role on the Committee, this year the EPMT Liaison collaborated with partners to revise its strategic plan, plan for its annual meeting, and prepare recommendations for an Alaska state invasive plant program.

In collaboration with NASA and the University of Alaska Fairbanks (UAF), we are midway through a 3-year project to model the spread of invasive plants onto burned lands in Interior Alaska. Massive areas of the region have burned in recent years; multiple invasive plant species are poised to invade these lands from adjacent roadways. This year, we worked cooperatively with UAF to develop a sampling strategy that they implemented to determine what species are invading burns and what habitats and burn severities are most susceptible to invasion. The modeling will answer important management questions about how to prevent the most widespread dispersal of invasive plants in Alaska to date.

Finally, we collaborated with local Cooperative Weed Management Areas in several regions of Alaska to coordinate on-the-ground activities with other landowners and managers. Projects include collaborative surveys and control of white sweetclover to keep it away from the Copper River, orange hawkweed across the Kenai Peninsula, and purple loosestrife in an Anchorage wetland at its only known wild infestation in Alaska.

California

Exotic Plant Management Team



Partner Parks: *Cabrillo NM, Channel Islands NP, Devils Postpile NM, Golden Gate NRA, John Muir NHS, Lassen Volcanic NP, Pinnacles NM, Point Reyes NS, Redwood NP, Santa Monica Mountains NRA, Sequoia and Kings Canyon NP, Whiskeytown NRA, Yosemite NP*

The California Exotic Plant Management Team (CA-EPMT) is based out of Point Reyes National Seashore and serves 14 parks within the California Floristic Province.

2007 Accomplishments

Inventoried Acres	2,278
Gross Infested Acres	2,793
Infested Acres	119
Treated Acres	49
Monitored Acres	1,790
Retreated Acres	53
Restored Acres	0

This is a zone of Mediterranean-type climate, having high levels of plant endemism, and has been designated by The Nature Conservancy as a “global biodiversity hotspot.” The range of invasive species and the nature of sites treated by the CA-EPMT are also diverse. The elevation of the sites treated by the CA-EPMT, extends from a few feet above sea level in Channel Islands National Park, to the Sierra Nevada range in Sequoia and Kings Canyon National Parks.

In 2007, three CA-EPMT teams treated over 70 different species at more than 110 different sites throughout the state. Some of the highlights for this year include events at Yosemite National Park, John Muir National Historic Site, and Whiskeytown National Recreation Area. In the last six years, we have successfully contained a major Himalayan blackberry infestation in the Mirror Lake basin of Yosemite National Park. All outlying patches were treated over the past 5 years and in 2007 control efforts focused on the core infestation. This effort, combined with much hard work by the park has reduced the area from 30 acres in 2002 to 11 acres in 2007.

On Mount Wanda, John Muir National Historic Site, four years of treatment has resulted in a significant reduction of yellow starthistle (*Centaurea solstitialis*). This starthistle population

dropped from 82 acres in 2002, to 1.4 acres in 2007.

At Whiskeytown National Recreation Area, the team discovered a small infestation of diffuse knapweed (*Centaurea diffusa*), a species designated as important to control and highly invasive by the state of California. This species has not previously been found in the park. The park’s prompt follow-up reporting to the California Department of Food and Agriculture led to this population being controlled, and has sparked a keen interest in this population and a budding partnership between the agencies.



Figure 17. Treatment of Himalayan blackberry at Yosemite National Park.

In 2007, we expanded services offered by establishing contract projects with adjacent stakeholders to facilitate expansion of the team and control neighboring populations. We worked with Sierra National Forest (adjacent to Yosemite National Park), and the Presidio Trust and Mount Tamalpais State Park (adjacent to Golden Gate National Recreation Area). As in past years, we sponsored and trained two, satellite Student Conservation Association Teams. The strategic use of intern teams on a more local level has helped us reduce the travel time associated with

covering such a large territory and has resulted in more hours dedicated to field work.

The CA-EMPT has played an instrumental part in helping Sequoia and Kings Canyon National Parks (SEKI) protect their montane meadows and riparian wetlands where high concentrations of rare vegetation are found. In the Grant Grove area of Kings Canyon National Park, reed canarygrass (*Phalaris arundinacea*), a perennial, rhizomatous exotic species has invaded montane meadows and riparian wetlands, where it forms dense monocultures that exclude native vegetation. Reed canarygrass is extremely invasive, forming a dense sod and thatch layer up to 0.5 meters thick and a tall canopy up to 2 meters height that out competes native meadow and riparian vegetation. Reed canary grass can alter wetland hydrology by using large quantities of soil moisture, by increasing the distance to the water table, and by clogging stream courses with thick thatch. The CA-EPMT has worked in concert with park staff on the treatment of reed canarygrass since 2002 when it had formed monocultures in meadows. For five of the last six years, the CA-EPMT has inventoried and treated all previously mapped infestations in 80 acres of the greater Grant Grove area.



Figure 18. Treatment of reed canarygrass at Sequoia Creek, Sequoia and Kings Canyon National Parks.

The CA-EPMT participated in the first-ever, 100% treatment of “all broom species” event at Whiskeytown National Recreation Area (WHIS). Whiskeytown National Recreational Area’s aggressive and disciplined focus on broom species in the park is a tremendous success story. Over the past six years the CA-EPMT program has treated 164 acres of Scotch broom and 95.6 acres of French broom. In 2007, the EPMT acres treated dropped to 17.3 acres of Scotch broom and 10.6 acres of French broom. This constituted one-third

of the Scotch and French broom treatment the park coordinated this year, and served to complement pivotal treatments funded by maintenance staffs and the French Fire Burned Area Rehabilitation project. This strategic collaborative effort by this park, CA-EPMT, Pacific West Region, WHIS Fire Program and volunteers has resulted in a “one-two punch”, providing the combined amount of treatment needed to achieve 100% treatment. As such, this action has begun to turn the tide of broom invasions within the park. Efforts to control these species will continue with a committed, seedling removal follow-up treatment.

Over the last six years, our projects are moving from inventory and initial treatment to monitoring and retreatment. Over 50% of our treatments in 2007 were classified as retreatments. This year we increased our acres monitored by 21% for a total of 1,791 acres. This constitutes 37% of the 4,899 acres we have monitored since the beginning of the CA-EPMT program in 2002. This trend shows a decline in the size of many of these sites, but the number of sites requiring follow-up treatment (retreatment) are increasing. In the future, we will be able to retreat greater numbers of sites more effectively as overall population size declines. We anticipate more invasive plant populations reaching a control level in future years.

Lake Mead

Exotic Plant Management Team



Partner Parks: Arches NP, Bryce Canyon NP, Canyonlands NP, Capitol Reef NP, Cedar Breaks NM, Death Valley NP, Great Basin NP, Hovenweep NM, Joshua Tree NP, Lake Mead NRA, Manzanar NHS, Mojave NP, Natural Bridges NM, Parashant NM, Pipe Spring NP, Timpanogos Cave NP, Zion NP

The Lake Mead Exotic Plant Management Team (LAME-EPMT) has been the largest team with the most crewmembers since its inception. Although the base funding for all the Teams is roughly the same during the 2007 season, the LAME-EPMT consisted of five year round full time employees and 21 six-month seasonal crewmembers. This was accomplished through extensive collaboration with a variety of organizations in the regional area.

partnership funds. Although partnerships are important for successful weed management programs, they substantially increase administrative duties such as the formulation of cooperative agreements and additional reporting requirements.

2006 Accomplishments	
Inventoried Acres	7,058
Gross Infested Acres	3,379
Infested Acres	167
Treated Acres	134
Monitored Acres	3,386
Retreated Acres	18
Restored Acres	0



Figure 19. Buffel grass control at Saguaro NP, Arizona.

Opportunities to leverage our base funds are constantly investigated and many times the team's services are solicited by other agencies. Common alternative funding sources include Burned Area Emergency Rehabilitation Funds, and weed implementation funds from other National Park Service (NPS) units and other land management agencies. Our team currently conducts weed control projects on five U.S. Fish and Wildlife Service Refuges, four Bureau of Land Management Districts in three states and one National Forest. The majority of external partnership funds for the LAME-EPMT are provided through the Southern Nevada Public Lands Management Act and support weed control on several million acres of land throughout Clark County, Nevada. These partnerships not only improve government efficiency and provide for habitat improvement but also many of these projects are adjacent to NPS units and therefore protect the boundaries of these units from weed invasions. The most significant beneficiary from all of this collaborating is our 18 NPS partner parks. We are able to increase the amount of acres treated in their parks due to the large crew created by the additional 15

The Lake Mead NRA (Host Park) continues to provide strong administrative support for the LAME-EPMT and its infrastructure despite the additional burden on park staff and resources. Our team also assists other NPS units that are not currently within an EPMT network. For example, Saguaro National Park had received funding for a buffel grass control project. Buffel grass has invaded and established dense populations at Saguaro NP in recent years. This species threatens native vegetation throughout the park. A portion of the team was able to assist Saguaro park staff in accomplishing control in high priority areas. The LAME-EPMT was able to respond to this urgent park need.

At Zion National Park, we controlled annual brome grasses to reduce wildfire threats to visitors, park resources and the historic Zion Lodge with funding obtained from the park's Fire Management Program. We also recently assisted Zion National Park and the United States Geological Survey (USGS) in annual brome grass control research. The results of this

study not only benefit our program but also will aid treatment on millions of acres across the western United States that are plagued by exotic brome grasses.

We improved our operating efficiency by sharing vehicles with Zion National Park. Their peak vehicle requirements are during the summer and the LAME EPMT need peaks in the winter to support our large seasonal crew. Sharing vehicles reduces overhead costs without compromising the needs of either program. The result of this partnership is more money spent on the ground controlling weeds. The LAME-EPMT has leveraged NPS base funds to a 1:3 ratio through these various partnerships.

Tamarisk or salt cedar is a widespread invader of riparian areas throughout the west. It consumes vast amounts of water and displaces native plant communities. Long-term monitoring for more than 15 years has proven that tamarisk control is effective with minimal follow-up treatments necessary to maintain the sites tamarisk free. The strategy of the team is to use a watershed approach. High priority exotic invasive species are systematically removed from drainages within each park. Weeds are then effectively managed beyond park boundaries through collaboration with adjacent land management agencies. This approach has been highly successful, and has virtually eliminated all known tamarisk populations from Mojave, Joshua Tree, and Zion National Parks. Any remnant or newly discovered tamarisk becomes an immediate high priority for treatment.



Figure 20. Russian olive control along the Fremont River in Capital Reef NP, Utah.

Tamarisk and Russian olive co-mingle in many drainages throughout the Colorado Plateau. Although tamarisk has been the primary target species, the team's focus is shifting to Russian olive. The introduction of the leaf beetle as a biological control agent for tamarisk is showing some early success. Tamarisk in some of our project sites has been defoliated and now most of our efforts in these areas are spent controlling Russian olive instead of tamarisk; anticipating that the leaf beetle will

continue to expand in this region. This is a good example of integrated pest management and adaptive management concepts merging.

Another exciting event that occurred was the additional base funds for the team to assist with controlling riparian weeds in NPS units throughout the Rio Grande Watershed. With these funds, the LAME-EPMT provided the majority of labor and personnel while conducting tamarisk, Russian olive and perennial pepperweed control during a multi-EPMT project at Bandelier National Monument. The team also provided crew leaders for several weeks during the hot summer to a Student Conservation Association crew controlling giant cane grass at Big Bend National Park on the Rio Grande River.



Figure 21. Thistle and tamarisk control on the Rio Grande River in Bandelier NM, New Mexico.

Restoration and maintenance of native plant communities are the team's priority. The team has planted nearly 1,000 native trees and seeded with native grasses to aid in the establishment of desirable vegetation in areas where native plant populations are severely depleted. Several of the team's tamarisk control and restoration sites have been featured in recent studies related to tamarisk management including Harms, 2004, Northern Arizona University study; and Bay, 2006, University of Denver. The team also participated in a three state research project to evaluate the effectiveness of aminopyralid (Milestone) a new herbicide, on Russian knapweed.

North Cascades

Exotic Plant Management Team



Partner Parks: *Ebey's Landing NH RES, Fort Vancouver NHS, John Day Fossil Beds NM, Lake Roosevelt NRA, Lewis and Clark NHP, Mount Rainier NP, North Cascades National Park Complex (Lake Chelan NRA, North Cascades NP, Ross Lake NRA), Nez Perce NHP, Olympic NP, San Juan Island NHP, Whitman Mission NHS*

In 2007, the North Cascades Exotic Plant Management Team (NC-EPMT) entered its sixth field season, contributing to weed management efforts at ten NPS units across Idaho, Oregon, and Washington.

2007 Accomplishments	
Inventoried Acres	1,465
Gross Infested Acres	1,452
Infested Acres	539
Treated Acres	510
Monitored Acres	297
Retreated Acres	19
Restored Acres	0

Activities conducted by the NC-EPMT continued to focus primarily on controlling the spread of invasive, non-native plants from developed sites into wilderness areas and sensitive riparian zones. During the 2007 field season, the NC-EPMT contributed to the treatment of over 500 acres using a combination of EPMT field crews, park staff, and contractors. While work in Western Oregon and Washington focused on expanding and completing projects from previous field seasons, the team also made significant progress on new projects in eastern Washington and Idaho.

In the North Cascades National Park Complex, over 50 acres of invasive plant species were treated. Work focused on the Highway 20 corridor and associated trailheads, the construction zone of the Cascade River Road, maintenance of knotweed populations along the Skagit River, and continued maintenance of known weed populations in the Stehekin Valley of the Lake Chelan National Recreation Area. The NC-EPMT assisted staff with invasive species project proposals for new funding, and survey crews detected a previously unknown population of yellow toadflax within the park's designated wilderness.

At Ebey's Landing National Historical Reserve, the NC-EPMT continued to successfully implement control of poison hemlock in conjunction with other shareholders as part of on-going Cooperative Weed Management Area (CWMA) efforts. Work at San Juan Island National Historic Park focused on the restoration of Garry oak habitat in conjunction with prescribed burn activity. The goal of this work is to reduce the spread of Canada and bull thistle, and St. Johnwort at the Young Hill management site. The Team also continued to provide support for prairie restoration research activities, by providing weed management of research sites as needed.

At Mount Rainier National Park, the Team assisted staff with continuing maintenance of known weed populations. Additionally, the team provided funding and support for two Student Conservation Associates. The Team also organized a pilot meeting to resurrect the Highway 410/123/12 CWMA which encompasses habitat on both sides of the Cascade crest.



Figure 22. Treatment of Himalayan blackberry by NC-EPMT on newly acquired property at Lewis and Clark National Historic Park.

At Olympic National Park, the Team brought populations of Japanese and giant knotweed along the Dickey River to maintenance control levels after three years of significant effort. Project work at Lewis and Clark National Park shifted from along the Fort to Sea Trail and the

park's developed areas to the Lewis and Clark River and adjacent properties. After two years of treatment, the Team brought established stands of phragmites on newly acquired properties under maintenance control. The team worked with park staff to control recently discovered populations of yellow flag iris along the banks of the Lewis and Clark River. The NC-EPMT also assisted staff with invasive species project proposals for increased funding.

East of the Cascades, the NC-EPMT continued to assist park staff at Lake Roosevelt National Recreation Area with an aquatic plant management plan, and public outreach regarding the status of Eurasian watermilfoil and other aquatic weeds. Crews also treated remote infestations of Japanese knotweed at a number of sites around the lake.



Figure 23. Crews re-treat newly emerging Scotch broom along the Fort to Sea Trail property at Lewis and Clark National Historic Park.

The Team continues to provide funding for maintenance of known weed populations through an on-going services contract, and to support park staff engaged in weed management.

2007 was the first year that the NC-EPMT provided services to the Nez Perce National Historic Park. The team worked with park staff at three different units to manage a variety of invasive species. In addition to controlling species such as diffuse knapweed and black locust in the heavily trafficked visitor use areas at the Spaulding visitor center, and East Kamiah, the team began creating buffers around stands of native grass by controlling yellow starthistle.

Pacific Islands

Exotic Plant Management Team



Partner Parks: *Hawaii Volcanoes NP, Haleakala NP, Kalaupapa NHP, Kaloko-Honokohau NHP, Pu'uuhonua o Honaunau NHP, Pu'uukohala Heiau NHS*

In Hawaii, invasive alien plants threaten pristine isolated island ecosystems that exist nowhere else in the world. For the last seven years, the Pacific Islands EPMT (PI-EPMT) has augmented efforts to mitigate invasive weed threats by leveraging support from partner organizations and integrating diverse existing programs into unified efforts. This approach resulted in at least a five fold increase in the capacity to protect Hawaiian natural areas from weed invasion.

2007 Accomplishments

Inventoried Acres	90,935
Gross Infested Acres	11,120
Infested Acres	96
Treated Acres	96
Monitored Acres	137
Retreated Acres	59
Restored Acres	160

The PI-EPMT continued to collaborate closely with the Maui Invasive Species Committee (MISC) on numerous species, emphasizing the tropical super-weed miconia. The MISC diverse partnership includes numerous federal, state, and county agencies working with watershed protection organizations and private companies. The miconia control program led by the PI-EPMT is characterized by an intensive aerial and ground based strategy that is successfully reducing total number of plants and, more significantly, reducing sexually mature individuals over a 37,000 acre area of concern.

On the Big Island of Hawaii, the PI-EPMT continued to support control programs at Hawaii Volcanoes National Park (HAVO), systematically removing ecologically disruptive weeds in specially managed units, and intensively controlling invasive weeds that appear to be in early stages of invasion in the Park and adjacent lands.

PI-EPMT personnel integrate with HAVO Resources Management staff to control invasive weeds that threaten the biological integrity of these high value areas. For example, in the 605 acre Koa Rainforest, PI-EPMT contributed 50 worker days in 2007 controlling a suite of invasive plants, including Himalayan yellow raspberry, Kahili ginger, and strawberry guava. These weeds are considered by experts to be among the most detrimental to native Hawaiian communities. Early and systematic control will prevent the buildup of large populations that would be more difficult and costly to manage.

A more appropriate strategy to control weeds in early stages of invasion emphasizes intensive control of populations found in localized areas. These localized populations are characterized by relatively small, well defined infestations. This strategy is an integral part of alien plant control on the Big Island, where more than 60 localized species are controlled or monitored at HAVO.



Figure 24. Hawaii Volcanoes National Park Resource Manager, Jon Makaike, clipping seed-heads from invasive fountain grass prior to treatment.

The PI-EPMT has lead control efforts of localized weeds in the newly acquired 116,000 acre Kahuku Ranch, where numerous disruptive weeds

were mapped during earlier systematic surveys. Included are species notable for their invasiveness in Hawaii such as German ivy, silk oak, night blooming jasmine, African olive, Kahili ginger, and Strawberry guava. Additionally, several potentially problematic species were mapped in Kahuku, with little known about their invasive potential; such as Bella Donna, California privet, and jaboticaba. Based on field observation, relevant publications, and taxonomic associations, a decision was made to control these species as a preemptive measure.

The owners association for Hawaiian Ocean View Estates collaborated with the PI-EPMT to control invasive fountain grass along roadsides adjacent to natural areas. Fountain grass alters the fire potential of natural and urban areas. Since the project began, a partnership of state and federal governments, local residents and students have removed 8,084 fountain grass plants from the 156 miles of community roadsides. This project was presented at the Hawaii Conservation Conference, which is the largest gathering of private and public resource managers in the Hawaiian Islands.

Invasive plants threaten isolated island ecosystems in Hawaii. The remnant natural communities are highly susceptible to invasion due to millennia of isolation from continental landmasses. Among the thousands of non-native invaders, several dozen invasive plants have shown themselves to be highly destructive and particularly difficult to control in wildland settings. Among these



Figure 25. Maui Field Leader, Mike Ade, with a pampas grass found in native forest.

invaders are two species of pampas grass, introduced as ornamental plantings over the past several decades. Pampas grass is generally not considered to be naturalized on most Hawaiian Islands, except on Maui. The Maui infestations are threatening pristine portions of Haleakala National Park. The invasion covers both residential and wildland areas. The wildland

populations exist in highly remote locations characterized by extreme topography and extreme weather. Normal weather patterns on these remote sites in can be characterized by high winds, massive rainfall, and ground level clouds most days of the year.

An extensive five year survey and strategic control program includes helicopter and residential surveys. Helicopters are effective on wildlands, but cannot detect nonflowering pampas plants. Initial results from control work in residential populations are encouraging, however wildland infestations are continuing to expand. Managers recognized that new strategies must be adopted.



Figure 26. Proven control methods for miconia have been modified for pampas grass control, leader Sam Akoi (L) and Floyd Helekahi, de-brief after an arduous ascent in East Maui.

New adaptive management strategies have resulted in an increase in efficiency and effectiveness. Residential populations continue to receive attention by the MISC crew while the control strategy on wildlands was modified as follows: 1) during flowering season helicopters survey remote locations and perform surgical herbicide application, and 2) Helicopters deploy ground-based control crews to remote locations throughout the year, augmenting the effort to treat plants that lack conspicuous seed heads. The addition of a ground-based approach has enabled more comprehensive control of remote sites due to ground crew ability to respond quickly to infrequent favorable weather conditions.

The adapted control effort for pampas grass on Maui has yielded resulted in an excess of 2,200 plants eliminated and more than 20,600 acres surveyed during 2007. The effort benefits from a strong core of field technicians that can work effectively in adverse environmental conditions and who follow strict decontamination and seed-dispersal prevention protocols. These protocols have been refined by the cooperative weed management groups on Maui over the past seven years through the efforts of MISC and the National Park Service.

Chihuahuan Desert / Shortgrass Prairie

Exotic Plant Management Team

Partner Parks: *Alibates Flint Quarries NM, Amistad NRA, Bent's Old Fort NHS, Big Bend NP, Capulin Volcano NM, Carlsbad Caverns NP, Fort Davis NHS, Guadalupe Mountains NP, Lake Meredith NRA, Washita Battlefield NHS, White Sands NM*



The Chihuahuan Desert/Southern Shortgrass Prairie Exotic Plant Management Team (CDSP-EPMT) serves 11 partner parks distributed across 500 miles of the desert southwest. This EPMT was established in 2000. Since its inception, the team has eradicated hundreds of acres of exotic, invasive plants and helped restore native, wildland habitats.

2007 Accomplishments

Inventoried Acres	845
Gross Infested Acres	463
Infested Acres	459
Treated Acres	419
Monitored Acres	362
Retreated Acres	4
Restored Acres	0

To illustrate the significance of this team's impact, it is important to understand that an acre of exotic salt cedar in the Southwest uses four acre-feet of water every year (approximately 1,300,000 gallons of water). Its removal contributes greatly to restoring native plant communities and saving valuable water resources. These trees must be sawed limb by limb, including the trunk, which is cut within two inches of the soil surface; a herbicide is then applied to the stump. The entire process is slow and arduous. Detailed safety briefings, training, and standard safety practices are followed stringently, which attests to the commendable safety record with no lost-time injuries.

Highlights

The CDSP-EPMT culminated a very successful year by eradicating several hundred acres of exotic plants from its member parks. Twenty-three projects were completed. In addition to the work conducted on member parks, the team assisted

the following additional parks in the treatment of exotic plants.

At Pecos National Monument, the team was successful in eradicating the remaining stand of salt cedar from the park and several acres of invasive Scotch thistle. The CDSP-EPMT also assisted Rocky Mountain National Park in the treatment of several exotic, invasive species.

Three additional national parks will be added to the CDSP-EPMT charter this coming year: Pecos National Historic Park, Fort Union National Historic Site in New Mexico, and Sand Creek National Historic Site in Colorado.



Figure 27. CDSP EPMT treating Scotch thistle at Pecos National Historic Site.

The CDSP-EPMT continually conducts outreach and awareness training to member parks, schools, and the public. This past spring, the CDSP-EPMT coordinated a training session on exotic plants with Eastern New Mexico University. Renee West, Supervisory Biologist of Carlsbad Caverns National Park, made the presentation to Felicia Harvey's Biology class and covered native and non-native plants of the Chihuahuan Desert. Instructional materials were provided by the CDSP-EPMT.

Outreach and partnerships continue to enhance the accomplishment record of this EPMT. Interagency partners, such as the Bureau of Land Management (BLM) provided the use of a trailer-mounted large-capacity tank sprayer to conduct treatments at Big Bend National Park.

The CDSP-EPMT once again utilized Student Conservation Association (SCA) interns in 2007. After receiving several hours of training in safe herbicide applications and chainsaw use, the four students worked for three months alongside the National Park Service (NPS) Exotic Plant Management Team. Additionally, the SCA interns helped in the exotic plant treatment project conducted at Rocky Mountain National Park.



Figure 28. SCA Interns assist with plant propagation project at Rocky Mountain National Park.

There are several other partnerships the CDSP-EPMT continues to foster, these include:

- The Bureau of Reclamation, funding of potential biological control treatments, salt cedar removal projects, and restoration;
- The Canadian River Water Authority, water sampling funding and treatment of salt cedar;
- Texas State Parks and Wildlife, habitat restoration funding;
- The Wild Turkey Federation;
- The National Interagency Fire Management Program which provides funding for prescribed burns and hazard fuels reduction of salt cedar;
- Texas Tech University Cooperative Agreements, provide monitoring and treatments;
- The World Wildlife Fund, Friends of the Big Bend National Park, and Texas State Parks, which provide volunteers and assistance;

- The Trull Foundation which provides funding for international salt cedar work including adjacent areas in Mexico;
- Colorado State Forestry Division providing coordination with private landowners to remove salt cedar;
- Colorado State Correctional Department crews which provide inmate labor to conduct salt cedar removal;
- The U.S. Air Force at Holloman Air Force Base which conducts exotic plant management projects on neighboring lands and provides support for area and regional maps;
- Bureau of Land Management provides training in chainsaw use and coordination on environmental compliance;
- U.S. Forest Service provides research, informational bulletins, chainsaw training, and use of tools and equipment when working adjacent to forest and NPS lands;
- New Mexico State University Cooperative Extension Service provides herbicide application training, plant identification, and research on chemicals and treatments;
- Natural Resources Conservation Service assist with the use of equipment, tools, and propagation of native plant seed;
- Sul Ross State University assists with plant propagation services).

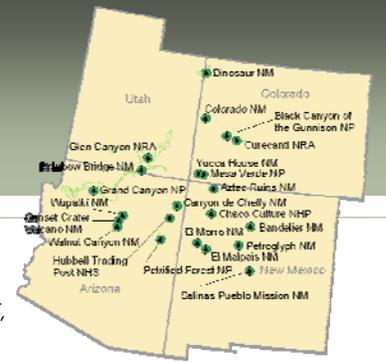
The CDSP-EPMT coordinated a training session on exotic plants with Eastern New Mexico University. Renee West, Supervisory Biologist with Carlsbad Caverns National Park, made a presentation to covering native and non-native plants of the Chihuahuan Desert with educational materials provided by the CDSP-EPMT.

The Chihuahuan Desert EPMT continues to assist the United States Department of Agriculture, Agricultural Research Service (USDA-ARS) by providing input into the development of long-range planning for use of biological control treatments on salt cedar.

The CDAP-EPMT also assists their host park, Carlsbad Caverns National Park, in presenting the "ParKids" summer program on exotic plants for 3rd and 4th graders.

Colorado Plateau

Exotic Plant Management Team



Partner Parks: Aztec Ruins NM, Bandelier NM, Black Canyon of the Gunnison NP, Canyon De Chelly NM, Chaco Culture NHP, Colorado NM, Curecanti NRA, Dinosaur NM, El Malpais NM, El Morro NM, Glen Canyon NRA, Grand Canyon NP, Hubbell Trading Post NHS, Mesa Verde NP, Petrified Forest NP, Petroglyph NM, Rainbow Bridge NM, Salinas Pueblo Mission NM, Sunset Crater Volcano NM, Walnut Canyon NM, Wupatki NM, Yucca House NM

The Colorado Plateau Exotic Plant Management Team (CP-EPMT) just completed its fifth year serving Colorado Plateau parks. The EPMT serves 23 parks identified above plus three additional sites: Montezuma Castle, Montezuma Well, and Tuzigoot National Monuments.

2007 Accomplishments	
Inventoried Acres	8,581
Gross Infested Acres	4,550
Infested Acres	170
Treated Acres	142
Monitored Acres	1,091
Retreated Acres	11
Restored Acres	0

This EPMT is assisted by public land corps groups, such as the Coconino Rural Environment Corps, which serve as our supplemental crews.

This year, CP-EPMT worked on project sites within fourteen of our 23 partner parks, including three parks not previously visited: Curecanti National Recreation Area, Bandelier National Monument and Salinas Pueblo Missions National Monument. All three projects involved riparian corridors. Throughout the Colorado Plateau parks, the primary target weeds continue to be woody, riparian-related species such as *Tamarix*, Siberian elm, and Russian olive. Other species include perennial pepperweed, a weedy riparian associate, as well as *Clematis*, Russian knapweed, Russian thistle, yellow sweet clover, and a variety of invasive thistles, such as musk thistle at Mesa Verde National Monument.



Figure 29. CP-EPMT cutting tamarisk at Tuzigoot National Monument.

Lack of compliance continues to hinder efforts at treatment within partner parks. In September 2007, the newly formed advisory group for the CP-EPMT identified this shortcoming as a major obstacle in meeting treatment requirements of the EPMT. The Colorado Plateau parks are primarily smaller-sized cultural parks that have significant natural resources. However, in most cases, these parks lack a natural resource chief or staff member assigned with the duty of overseeing vegetation management. The advisory group seeks to find ways to eliminate this deficiency through a concerted effort at identifying parks' needs and by securing funding for invasive plant management plans.

At Colorado National Monument, all initial tamarisk removal is complete and activity has shifted to monitoring status. The tamarisk was treated and retreated and seems to be under control at this time. We have controlled *Tamarix* species and Russian olive at both Montezuma Castle and Tuzigoot National Monuments down to these same maintenance and monitoring levels.

Russian knapweed and tamarisk were controlled at El Malpais National Monument. The southern half of Petrified Forest National Park had woody tree species infestations treated down to a monitoring level in the past two years.

The CP-EPMT controlled invasive woody and associated riparian species along the Rio Grande River Corridor in Bandelier National Monument (BAND). BAND is located in north-central New Mexico in the Jemez Mountains. This 33,000-acre park contains some of the Southwest's most unique archeological sites. Woody species such as tamarisk, Russian olive and Siberian Elm, as well as perennial pepperweed and Russian knapweed, have invaded the Rio Grande corridor within the park and continue to move up side drainages closer to these important archeological sites.

The CP-EPMT completed two trips to control invasive species at BAND in the Rio Grande River Canyon. The first trip was a coordinated effort between three of the southwest EPMT. The CP-EPMT was the lead on the project with the Lake Mead EPMT and the Chihuahuan Desert/ Short-grass Prairie EPMT providing great expertise, labor, and equipment to complete this logistically and physically demanding phase of the project.

Due to the difficult terrain in the canyon, a local rafting contractor provided rafts and services to ferry supplies and equipment to base camp. This enabled us to be much more efficient in setting up a camp and transporting gear into the canyon. Approximately 3 miles of riverbank and side canyons were treated on this first trip. Species treated included tamarisk, Russian olive, Siberian elm, Russian knapweed and perennial pepperweed.

A second trip conducted in September 2007 used a partner, Coconino Rural Environment Corps, for additional personnel. Supplies and equipment were again rafted into a campsite further downriver, which reduced hiking time to the treatment area. Another 2.5 miles of riverbank and associated side canyons were cleared of the species mentioned above. Some areas along the river were difficult to access and will require innovative treatment methods in the future. It will take approximately one more trip into the canyon to complete most of the project. When initial treatment is concluded, Frijoles, Loomis, Alamo Canyons and the Rio Grande River corridor in Bandelier National Monument will have been treated for woody invasive species, with future trips focusing on the invasive riparian associates.

Extensive areas of native willows exist along the riverbank along the Rio Grande River and some of these stands were being suppressed by the invasive trees. Completing this treatment should allow many of these stands to be released and provide excellent habitat for native wildlife including the endangered Southwestern Willow Flycatcher.

The CP-EPMT initiated an extensive inventory in wilderness areas of Petrified Forest National Park for tamarisk in 2007. This inventory was needed to assist the park in developing a wilderness management plan and a Puerco River riparian restoration plan. The developments of these plans were crucial to the CP-EPMT to begin treatment of woody species in the wilderness areas of Petrified Forest. The team has completed most tamarisk control work outside the wilderness boundaries.

The Team conducted the inventory through the winter and into the summer as time permitted. The close proximity of the mapping area allowed the crew maximum use of their time if another planned project had to be cancelled because of weather or other circumstances. Approximately 4,500 acres were inventoried which covered a park area of over 32,000 acres.

This information will be useful to the team in developing logistical strategies to maximize efficiency when completing treatment work in these remote wilderness areas. Completion of this inventory will allow park managers to have the best knowledge available to them when completing these important management plans.



Figure 30. Loading rafts for float out of Rattlesnake Canyon in Bandelier National Monument.

When these plans are completed, the Colorado Plateau EPMT will work aggressively in these areas to control tamarisk and other exotic woody species.

Gulf Coast Exotic Plant Management Team



Partner Parks: Big Thicket N PRES, Gulf Islands NS, Jean Lafitte NHP & PRES, Lyndon B. Johnson NHP, Natchez Trace PKWY, Natchez Trace NST, San Antonio Missions NHS, Vicksburg NMP

The Gulf Coast Exotic Plant Management Team (GC-EPMT) is situated in a region of relatively warm year round temperatures, high precipitation, and high plant diversity, including a high diversity of exotic vegetation.

2007 Accomplishments	
Inventoried Acres	9,375
Gross Infested Acres	2,660
Infested Acres	370
Treated Acres	122
Monitored Acres	0.5
Retreated Acres	0.5
Restored Acres	0.5

As a result, the GC-EPMT employ a strategy of early detection and early eradication. New species of exotic vegetation are discovered annually in our parks and we make every effort to eradicate those new populations before they have a chance to spread to a larger area. Exotic species that have become well established are managed by a strategy of containment to avoid further spreading into undisturbed native plant communities.

Exotic species of concern vary by geography and include Chinaberry tree, Japanese privet, giant cane and Johnson grass in our western upland parks. Coastal park concerns include Chinese tallow tree (particularly after hurricanes Katrina and Rita), Japanese climbing fern, cogon grass, Chinese privet, mimosa tree and Japanese honeysuckle. Parks in the interior humid south are primarily concerned with Kudzu but also include populations of the species present in the coastal parks. The top 10 priority species for control by the Gulf Coast Exotic Plant Management Team include Chinese tallow (*Triadica sebifera*), kudzu (*Pueraria Montana*), Chinese privet (*Ligustrum sinense*), glossy privet (*Ligustrum japonica*), Japanese honeysuckle

(*Lonicera japonica*), cogon grass (*Imperata cylindrical*), Japanese climbing fern (*Lygodium japonicum*), Chinaberry (*Melia azedarach*), giant cane (*Arundo donax*), and Johnson grass (*Sorghum halepense*). Control techniques thus far have concentrated on chemical methods utilizing an understanding of each species ecology and growth habits. Biological controls for the species in our region are not yet well developed and mechanical methods have not proven effective.



Figure 31. Clearing Chinese parasol tree at Natchez National Historical Park. A wood chipper was employed to remove debris that might detract from interpretation of the historic property.

Three small historic parks were added as Gulf Coast EPMT partners this year. The addition of these parks required development of new control methodologies to address safety and aesthetic concerns of parks in urban settings and with concentrated visitor use. Plant debris resulting from control efforts could present a hazard to visitors and are unsightly in otherwise manicured landscapes. As a result, a chipper has been employed in these small urban parks to facilitate our efforts while leaving no visible trace on the land. These urban parks also present a challenge due to the large area of urban interface and large number of exotic species from surrounding seed sources. In a local context, these parks have become important natural islands for protection

of native plants and wildlife in otherwise biologically impoverished urban ecosystems.

Partnerships from previous years have been maintained and new partnerships added to help provide the resources required for the new expanded network. A larger contribution of manpower from the partner parks has helped compensate for the additional acreage. The use of large concentrated labor sources from the AmeriCorps and American Youthworks has helped us achieve our expanded goals without the necessity for expanded fixed infrastructure. The largest projects are now contracted to allow for the use of specialized equipment to get the job done more efficiently and economically.

Natchez Trace Parkway, an original partner of the GC-EPMT, was recently completed and connected to Natchez, Mississippi by the addition of a new six mile stretch at the southern terminus of the parkway. The GC-EPMT was asked to treat a newly acquired parcel at mile-maker 1 that constituted the largest single population of kudzu for the entire length of the parkway. Kudzu control is essential to this park unit's mandate to provide a scenic byway similar to what travelers would have experienced two centuries ago; the park must insure that its viewsheds are kept clear of exotics. The primary exotic threatening this view is kudzu. Kudzu grows very aggressively, prevents regeneration of native plant species, smothers native vegetation with extensive above ground vine/leaf structure, and obscures cultural features that define the Natchez Trace Parkway.



Figure 32. Kudzu growing along the banks of Saint Catherine's Creek near the southern terminus of the Natchez Trace Parkway, Natchez, Mississippi.

The target 50 acre population of kudzu is situated along the banks of Saint Catherine's Creek a few miles upstream of the Saint Catherine Creek National Wildlife Refuge. We wanted to implement the project in a way that would satisfy

the requirements of the park and protect downstream water and uses. The site received an experimental application of an aquatic approved herbicide with very satisfactory results. This herbicide has not previously been used to treat kudzu and was not expected to be effective by many sources consulted. The results of this one time application will be monitored and if proven effective, the chemical will be used on future kudzu applications.



Figure 33. Results of a single application of an aquatic approved herbicide with unproven efficacy on kudzu. The herbicide was chosen to protect the water and down stream water users including the Saint Catherine Creek National Wildlife Refuge.

Active restoration, planting or seeding, may be required when localized eradication of kudzu is achieved at The Saint Catherine's Creek site. The kudzu is growing on and currently conceals highly erosive steep loess slopes and bluffs. Seeding with native grasses to stabilize the soil followed by planting native trees to form a shaded canopy will be employed in the event that active restoration is required. Shaded canopy cover is the only insurance that the area will not become re-invaded by kudzu. Other potential restoration options will include spot treatments of particularly persistent kudzu and use of erosion blankets in conjunction with grass seeding on the steepest slopes. It is hoped that the results of these efforts will achieve the interpretive mandate of the park, restoration of the native wildlife habitat and protection of downstream aquatic habitats.

Northern Rocky Mountain Exotic Plant Management Team



Partner Parks: Bear Paw Battlefield, Big Hole NB, Bighorn Canyon NRA, City of Rocks N RES, Craters of Moon NM, Fossil Butte NM, Glacier NP, Golden Spike NHS, Grand Teton NP, Grant-Kohrs Ranch NHS, Hagerman Fossil Beds NM, John D. Rockefeller Jr. Memorial Parkway, Little Bighorn Battlefield NM, Minidoka Internment NM, Yellowstone NP

The Northern Rocky Mountain Exotic Plant Management Team (NRM-EPMT) has been serving 15 partner national parks in the states of Idaho, Montana, Utah, and Wyoming for five years.

2007 Accomplishments

Inventoried Acres	10,424
Gross Infested Acres	8,213
Infested Acres	461
Treated Acres	409
Monitored Acres	5,356
Retreated Acres	39
Restored Acres	0

2007 has been one of our most successful and rewarding years to date. The team is comprised of an NRM-EPMT liaison, nine crewmembers and five Student Conservation Association Native Plant Corps (NPC) crewmembers. The team inventoried more than 10,425 acres, monitored 5,334 acres, treated and retreated 448 acres of more than 37 different invasive weeds in our partner parks.

The partner parks served by the NRM-EPMT vary from high desert to montane forest, alpine and sub-alpine meadow, sagebrush-steppe, and wetland and riparian areas, to unique hydrothermal communities. More than four million acres of land are managed by the partner parks and serve millions of visitors each year; increasing the potential for new invasive weed 'hitchhikers' to invade the parks by arriving on visitor's vehicles, clothing, animals, and gear.

One such example of a new invader was the identification of a previously unknown dyer's woad (*Isatis tinctoria*) infestation located early in the season at Craters of the Moon (CRMO). Early detection of this new invader to CRMO warranted and elicited a rapid response to immediately halt the invasion and spread. With unprecedented coordination and quick planning, the partners

(CRMO, NPC and NRM-EPMT) spent four days backpack spraying 2.5 acres of dyer's woad rosettes with herbicide and hand pulling 1.2 acres, preventing the drop of millions of seeds in a very remote and rugged area.

Control efforts continued at Grand Teton National Park (GRTE). The NRM-EPMT doubled the number of acres treated this year by utilizing ATV boom equipment to spray large, densely infested areas. Musk thistle (*Carduus*



Figure 34. Backpack spraying exotic weed species in Grand Teton National Park (GRTE), a cooperative project with the GRTE weed management.

nutans), houndstongue (*Cynoglossum officinale*), oxeye daisy (*Chrysanthemum leucanthemum*), and spotted knapweed (*Centaurea maculosa*) are just a few of the 13 invasive species treated at GRTE.

At Golden Spike National Historic Site (GOSP), the EPMT acted decisively to treat the single, localized infestation of saltcedar (*Tamarix ramosissima*) growing along the Blue Creek. In May, the NRM-EPMT applied a cut-stump herbicide treatment to this invasive riparian tree. Removing this small infestation was an important step in preventing additional spread.

In the North District of Bighorn Canyon National Recreation Area (BICA), near Fort Smith, a new infestation of babysbreath (*Gypsophila paniculata*) was discovered by the NRM-EPMT. This is the only known location of this new invader and

therefore a high priority. The babysbreath was mapped and treated with herbicide to control this 4.4 acre infestation.

The NRM-EPMT continues to focus the majority of its time and expertise to on-the-ground weed treatment and control. It is the goal of the team to provide highly trained integrated weed management experts to safely and efficiently assist partner parks.

For the third year, the NRM-EPMT focused on locating and controlling invasive orange hawkweed (*Hieracium aurantiacum*) and for the second year focused on yellow hawkweeds in Yellowstone National Park (YELL). Whiplash hawkweed (*Hieracium flagellare*) has yellow flowers, long stolons and is highly invasive. It is found at only two locations in the park, making whiplash hawkweed our top priority in YELL. This invader forms monocultures of extremely dense mats that crowd out desirable native plants. Treatments of whiplash hawkweed have been highly effective, with as much as 95% control. Hawkweed seeds are extremely light and wind-borne, which makes eradication of this invasive species an extremely challenging goal.



Figure 35. The NRM-EPMT at Grant-Kohrs Ranch National Historic Site.

The entire 10-person NRM-EPMT gathered for the second season to implement the large riparian control and restoration project at the Grant-Kohrs Ranch National Historic Site (GRKO). The GRKO riparian area is a haven for white-tailed deer, sand hill cranes and many other animals. It is heavily infested with leafy spurge and yellow toadflax, which are state-listed noxious weeds in Montana. As part of the efforts to reclaim this important river corridor, the team treated 115 acres of noxious weeds in the more than 200-acre GRKO riparian area. This is a 40% increase in the number of acres treated over last year. The increase in acres treated when compared to last year is due to an expansion of the project scope this year: treating Russian knapweed (*Acroptilon*

repens) and Canada thistle (*Cirsium arvense*) infestations, one section at a time, in addition to the original leafy spurge and yellow toadflax targets. The primary goal of this large project remains unchanged to: contain and control leafy spurge and yellow toadflax and to facilitate recovery of willows, trees, sedges, grasses and other native plants. Photo point monitoring during the first year indicates some positive results; our initial treatment efforts are beginning to have some control of leafy spurge along the riparian corridor.

This year the team was extremely fortunate to have an additional partnership with NPC. The five-member Native Plant Core team was stationed at Craters of the Moon National Monument and Preserve (CRMO). They were tasked with an extremely important project to inventory and treat the recently expanded portion of the Monument and Preserve's harsh terrain of lava flows for noxious weed species, with special emphasis on invaders such as rush skeletonweed (*Chondrilla juncea*), leafy spurge (*Euphorbia esula*), diffuse knapweed (*Centaurea diffusa*) and spotted knapweed (*Centaurea maculosa*). The NPC worked cooperatively with the CRMO and NRM-EPMT staff. This was a highly successful project for all participants. The NPC team completed inventory on nearly 2,758 acres and walked more than 822 miles to treat 2.8 acres of these highly dispersed priority weeds. They produced a detailed spatial map of all noxious weeds identified and located. They also worked with the NRM-EPMT and CRMO staff on treatment projects along the roadsides and monitored the health of unique kipuka communities, which are areas of land spared from destruction as the lava flowed around them.

In addition, the NPC assisted with the organization and implementation of the annual CRMO 'Weed Awareness Week'. This enormously successful weeklong weed public education and community outreach effort culminated in over 600 public contacts. As Matthew Szymanowicz, the NPC team leader, stated in his final report, "One field season of a NPC team working on noxious weeds is enough to lay the groundwork in a particular region, however if our work is not continued, it would be at risk of being rendered ineffectual." The entire NPC project was an unprecedented success and we hope to continue this partnership, between Native Plant Core, Craters of the Moon and NRM-EPMT, well into the future.

Great Lakes

Exotic Plant Management Team



Partner Parks: *Apostle Islands NL, Indiana Dunes NL, Isle Royale NP, Mississippi NRR, Pictured Rocks NL, Saint Croix NSR, Sleeping Bear Dunes NL, Voyageurs NP*

The Great Lakes Exotic Plant Management Team (GL-EPMT) serves eight National Parks located in four states in the western Great Lakes Region.

2007 Accomplishments	
Inventoried Acres	323
Gross Infested Acres	309
Infested Acres	63
Treated Acres	45
Monitored Acres	50
Retreated Acres	0.1
Restored Acres	0

Some of the parks, such as Isle Royale National Park, are predominantly wilderness and relatively unencumbered by exotic plants. Other parks such as Indiana Dunes National Lakeshore, exist in a mosaic of both urban and natural areas. The Great Lakes parks, extending from the boreal forest of northern Minnesota to the sand dunes of southern Lake Michigan, also work in association with the Great Lakes Network Inventory and Monitoring Program (I&M). Co-location of the GL-EPMT and I&M Network in Ashland, WI provides the opportunity for the two programs to work closely together, taking advantage of shared positions and functions.

This past field season (2007) marked the fourth year that seasonal teams have worked in parks served by the GL-EPMT. Seasonal teams included a three-person traveling team, Student Conservation Association (SCA) interns at Voyageurs National Park and Sleeping Bear Dunes National Lakeshore, and a seasonal biotech working with park staff at St. Croix National Scenic Riverway.

The GL-EPMT continues to focus its seasonal efforts on three areas of exotic plant management: inventory of high visitor use areas and reported new invasions, rapid response to control early infestations, and efforts to combat

larger populations within park landscapes that are in need of restoration.

The traveling team spent several weeks along the 40 mile stretch of Lake Superior within the boundary of Pictured Rocks National Lakeshore inventorying trailheads and day use areas associated with the North Country National Scenic Trail. The team also spent several days canoeing the St. Croix National Scenic River, inventorying boat landings and campsites and manually removing smaller populations of invasive plants. At Voyageurs National Park, SCA interns inventoried over 84 acres of high visitor use including tent and houseboat campsites, trails and interpretive centers.



Figure 36. Early season treatment of black locust at Sleeping Bear Dunes National Lakeshore.

Early detection efforts in GL-EPMT parks target several species. The team worked on early season eradication efforts on small populations of garlic mustard at Sleeping Bear Dunes National Lakeshore and a mid-season effort to control Japanese knotweed in Apostle Islands National Lakeshore and Bayfield, WI, its gateway community. Although purple loosestrife and *Phragmites* are widespread throughout much of the western Great Lakes area, these species are

new invaders to the relatively unimpacted, rare panne wetland habitats of Indiana Dune National Lakeshore. Past early detection and rapid response efforts have resulted in a dramatic decrease of spotted knapweed in Isle Royale National Park and the near eradication of creeping bellflower in visitor use areas there.

The larger landscape efforts by the GL-EPMT have emphasized the importance of partnerships with other land managers and conservation groups. Sleeping Bear Dunes National Lakeshore has begun to manage several species such as black locust that were initially part of the cultural landscape of the park. Other activity at this park has included efforts to control baby's breath using Student Conservation interns, park management teams, the Nature Conservancy and generous support from the Meijer Corporation. Partnerships with several land managers within the Mississippi National River and Recreation Area have focused on restoration efforts in critical habitat along the river corridor.

The GL-EPMT has continued its efforts outside of park boundaries to enhance cooperative activity through the Northwoods Cooperative Weed Management Area in northern Wisconsin, and has actively participated in the Midwest Invasive Plant Network and the Midwest Natural Resources Group of federal agencies.

Partnership Project Control and Restoration Efforts

The Mississippi National River and Recreation Area (MISS) occupies only 35 acres along the Mississippi River but works in concert with 25 urban and rural communities to manage 72 miles of river corridor. One of the most exciting results of several years of cooperative effort was the identification of a new location of a threatened plant, kitten tails (*Besseyia bullii*), in Riverside Park. Riverside Park is an eight acre natural area located in the backwaters of the Mississippi River in the City of St. Paul Park, MN. The National Park Service has been working with the city since 2001 to help restore this natural area. During the last four years, the GL-EPMT team and EPMT-funded contractors have been active in removing buckthorn from the area. It has been a slow but steady process to remove the larger seed bearing trees and shrubs, and we continue to work toward removal of the smaller seedlings. This iterative process has allowed a gradual opening of the canopy and native plants have increased in abundance. As a result of this activity, plant surveys indicate an increase in species richness from 89 species in 2001 to 128

species in 2005 including the re-appearance of *B. bullii*.

Kitten tails is native to seven states in the upper Midwest and can be found in sandy grasslands, prairies, open oak woods or hillsides, savanna, barrens, and wetlands. Few populations exist and it is listed as state threatened, endangered or presumed extirpated in all areas of its native range.



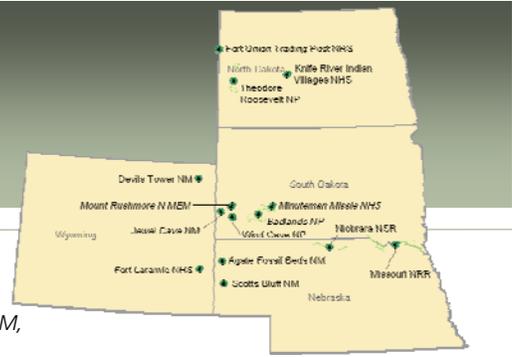
Figure 37. Long-term partnership efforts at Riverside Park demonstrate successful recovery of a threatened plant population (*Besseyia bullii*) in the Mississippi National River and Recreation Area.

While the reappearance of kitten tails represents an ecological success, the partnership activity between the NPS, City of St. Paul Park, GL-EPMT and contractors represents a management success. Several key factors have contributed to this success. The most important factor was the continued, modest effort over several years. Instead of a large monetary allocation for a project that may have resulted in a large scale control effort, followed by frustration when control was not achieved in one or two years, smaller targeted goals have allowed for continued interest by the City in managing this area. The City's maintenance team has developed an understanding of how management of a natural area is different from that of a baseball field and the pride of the City crews and community is evident. Another important factor in the success of this project was the participation by several different groups in the restoration effort. The combined effort and support helped continue the interest by the City when budgets were tight and other priorities existed.

The work at Riverside Park will continue in the next few years and will include a change to the parking area to facilitate better drainage, native reseedling of a City compost area and plantings of native trees and shrubs.

Northern Great Plains

Exotic Plant Management Team



Partner Parks: *Agate Fossil Beds NM, Badlands NP, Devils Tower NM, Fort Laramie NHS, Fort Union Trading Post NHS, Jewel Cave NM, Knife River Indian Villages NHS, Minuteman Missile NHS, Missouri NRR, Mount Rushmore NM, Niobrara NSR, Scotts Bluff NM, Theodore Roosevelt NP, Wind Cave NP*

Northern Great Plains Exotic Plant Management Team (NGP-EPMT) completed its sixth year of operation serving 14 partner parks in four states and two regions consisting of 452,567 acres.

2007 Accomplishments	
Inventoried Acres	64,477
Gross Infested Acres	8,571
Infested Acres	8,150
Treated Acres	8,149
Monitored Acres	0
Retreated Acres	0
Restored Acres	22

The team has multiple goals, all of which revolve around controlling the spread of invasive species and restoring areas to native plant communities. The team emphasizes and uses Integrated Pest Management techniques for systematic long-term management and control of invasive species. This approach resulted in the EPMT completing a Northern Great Plains Exotic Plant Management Plan and Environmental Assessment, signed by the Midwest and Intermountain Regional Directors in September of 2005. The intent of the plan is to manage exotic plants using an Integrated Pest Management approach.

The NGP-EPMT has concentrated the majority of its efforts on two particular species, Canada thistle and leafy spurge, although numerous other species such as tamarisk, Russian olive, eastern red cedar, purple loosestrife, black henbane and common mullein are treated as well. The parks and the NGP-EPMT are seeing tremendous control and recovery of native species on sites that have been prioritized for treatment. However, due to long seed viabilities deep-rooted perennial species characteristic of the Great Plains require repeated treatments for multiple years.

Since its inception, the NGP-EPMT has conducted several projects that have seen dramatic decreases in certain invasive species populations. The team has cut down and treated several thousand tamarisk and Russian olive trees at Fort Laramie National Historic Site, Scotts Bluff National Monument, and Knife River Indian Villages National Historic Site. Follow-up treatments have been and will continue to be conducted at these locations to treat new infestations. Fort Laramie NHS has seen dramatic decreases in density and number of infestations of Canada thistle since initial treatments were conducted in 2003.



Figure 38. Cutting Russian olive at Knife River Indian Villages NHS.

The largest tree removal project took place this year at Missouri National Recreational River (MNRR). The park recently acquired 250 acres of Missouri River frontage, called the Bow Creek Recreation Area, which had several thousand native but invasive eastern red cedars that the park’s natural resources staff identified for removal. The NGP-EPMT along with park staff and the Minnesota Conservation Corp spent the week of August 5-13, 2007, working 10-hour days, helping park staff fell, limb, and pile cedars.

Also helping at MNRR was Steve Cinnamon, Chief of Natural Resource, Stewardship, and Science (MWRO), and Theresa Smydra of Missouri Rivers Future, a land protection venture operating at MNRR. Several trunks measuring 4-inches in diameter or greater were retained separately for future fencing projects on park property. Over 13,000 eastern red cedars were cut and piled.

Eastern red cedar is a native invader of upland and riparian areas at MNRR and across the tall grass prairie region. Historically, fire controlled eastern red cedar in the uplands, and Missouri River flood events limited its encroachment in riparian forests. Today, both environmental forces are essentially gone from the landscape. As well, the degrading river channel below today's Missouri River dams (particularly at MNRR, Fort Randall Dam and Gavins Point Dam) have lowered local water tables and impacted riparian vegetation communities while abetting upland vegetation regimes. It is anticipated that fire will be reintroduced into this landscape to prevent further colonization by eastern red cedar.



Figure 39. NGP-EPMT crew photo at Missouri National Recreational River.

Badlands National Park consists of nearly 244,000 acres of the largest, protected mixed grass prairie in the National Park Service. The Wilderness Area in Badlands includes numerous prairie dog colonies and is the site of the reintroduction of the swift fox and the black-footed ferret, one of the most endangered land mammals in North America.

The integrity of the parks native prairie ecosystem is threatened by non-native, invasive forbs, primarily Canada thistle. These non-native populations are widespread throughout the park, displacing native plants, serving as seed sources for new invasions, potentially harboring predators in black-footed ferret reintroduction sites, altering natural fire regimes, and causing economic damage to adjacent agricultural lands. The

supplemental funding received in 2007 allowed the NGP-EPMT to treat via helicopter over 3,000 acres of the Badlands Wilderness Area for Canada thistle. This treatment will further aid in the integrity of the mixed grass prairie, swift fox and black footed ferret reintroductions. Continued treatments will be necessary because of the extensive seed bank that persists



Figure 40. Helicopter application at Badlands National Park.

Over the past two decades, the detrimental consequences of leafy spurge and Canada thistle have become apparent at Theodore Roosevelt National Park. The rapid invasion and expansion of these species has disrupted the complex and delicate badlands ecosystem. This aggressive invasion has displaced many native plant species, including some North Dakota rare species. In addition to destroying the rich species diversity, the habitat loss to the park's ungulate species is a major concern. Aerial spraying was implemented to treat nearly 3,000 acres of leafy spurge and 2,000 acres of Canada thistle, primarily in the Wilderness Area of Theodore Roosevelt National Park.

Helicopter application is a necessity for parks like Theodore Roosevelt and Badlands. With remote locations, rough terrain and Wilderness Areas ground crews cannot effectively cover large areas. Evaluation of the minimum tool analysis shows that aerial spraying is an effective and environmentally preferred means of treating invasive plants in the 2003 Integrated Weed Management Plan (IWMP) for Badlands National Park and the 2005 Northern Great Plains Exotic Plant Management Plan and Environmental Assessment that includes Theodore Roosevelt National Park. Use of aerial treatment is the least disruptive means in areas designated wilderness because it does not impact the terrestrial resources and is relatively short-term in its noise and visual impacts for visitors and wildlife.

Mid-Atlantic Exotic Plant Management Team



Partner Parks: *Appalachian NST, Appomattox Court House NHP, Booker T. Washington NM, Colonial NHP, Eisenhower NHS, Fredericksburg and Spotsylvania NMP, George Washington Birthplace NM, Gettysburg NMP, Hampton NHS, Hopewell Furnace NHS, Petersburg NB, Richmond NBP, Shenandoah NP, Thomas Stone NHS, Valley Forge NHP*

The Mid-Atlantic Exotic Plant Management Team (MA-EPMT) had an excellent year in field operations and public outreach. 2007 saw increased productivity, improved efficiency, research activity, increasing partner park participation, and growing engagement by the public.

2007 Accomplishments	
Inventoried Acres	5,206
Gross Infested Acres	4,824
Infested Acres	415
Treated Acres	301
Monitored Acres	540
Retreated Acres	35
Restored Acres	0

The MA-EPMT served 15 park units in Virginia, Maryland, and Pennsylvania. Invasive plant treatments were completed through a blend of workers from federal, private sector, nonprofit, and public ranks.

Treatment accomplishment increased by 6.4% from the previous year. This achievement was a direct result of diversifying control efforts. The mainstay of the fieldwork was performed by the MA-EPMT, a field team of three permanent staff, one summer Student Conservation Association (SCA) intern, and participating park staff. They treated 234 acres at 14 parks. A four-month SCA Team of five interns treated 69 acres at six parks. A private contractor treated 27 acres at three parks. Finally, the team organized public volunteers who treated seven acres.

The impact of invasive annual plants is especially heavy in the Mid-Atlantic area. Many produce copious amounts of seed, which is an effective invasive trait. Field research was conducted to test three herbicides with pre-emergent properties

against two targeted annuals, mile-a-minute vine and Japanese stiltgrass. Monitoring for impacts to non-target plants was also noted. The goals of the research were to determine whether pre-emergents (1) offered better control against annuals and (2) were a means of expanding the treatment window. Pre-emergent herbicides are typically applied in late winter/early spring prior to seed germination. Where the herbicides imazapic, aminopyralid, and pendimethalin were compared, results indicated that imazapic at 4-6 ounces per acre offered the best control against mile-a-minute and stiltgrass with least non-target impacts. Since all seed germination can be impacted, we recommend that the application of pre-emergent herbicides be reserved for sites highly impacted by invasives plants where local park botanists concur with its use.



Figure 41. Mid-Atlantic EPMT staff speaks to 160 college students on issues of invasive species threats and ways they can participate in avoiding future invasions by purchasing native nursery stock for their future homes. The talk was followed by hands-on control of Japanese stiltgrass and Oriental lady's thumb.

The MA-EPMT increased public awareness of invasive species threats by participating in ten news media interviews, speaking at ten public or professional meetings, published two articles in professional newsletters, creating seven reports

available to the public, and responding to numerous public queries.

In its five-year history, the Mid-Atlantic Cooperative brought 925 acres into a controlled status. Invasive plants no longer dominate those areas. Thus, those areas are left clean to thrive and function in a native, natural condition. The benefits extend beyond the plant kingdom to animals, fungi, and other species that inhabit those areas. The accomplishment was brought about by effective treatments, annual monitoring, retreatment as needed, and the integral field work of park partners.

Also in its five year history, the MA-EPMT grew from serving eleven park units in year 2003 to the present 15 parks in three states. Plans for expanding the Team's role and impact to parks in West Virginia are underway. Expansion of the Cooperative was made possible by effectively controlling the highest priority invasives to maintenance levels at the initial parks and by increasing operational efficiencies.

Collaboration has been the hallmark for operations within the Mid-Atlantic Cooperative. Both prevention and control activities were greatly enhanced by using the excellent



Figure 42. Public volunteers at Shenandoah National Park. Volunteers are an excellent way to get fieldwork done while conveying the invasive species message.

energy, knowledge and skills of partner parks staffs, contractors, nonprofit agencies, and public volunteers within the overall operations.

Working alongside park staffs creates improved outcomes in control work. The MA-EPMT provides technical assistance to local park staffs on invasive plant control techniques, surveys and best management practices. Mini-training takes place as work takes place. Organizational memory of treatments and program intent is also enhanced for more effective follow-up and monitoring.

The flexible contract managed by the MA-EPMT is a tremendous benefit to the Cooperative. Year-end funds from the MA-EPMT, from partner parks, and even from other EPMTs were used on field treatments. During the years 2003-07, nearly 480 acres have been treated benefiting 11 parks on over 2,700 gross infested acres.

Nonprofit organizations contribute tremendously to the program budget. The first such collaboration took place when the Colonial Williamsburg Foundation offered to work alongside our Team to tackle a 4-acre patch of kudzu vine that infested adjoining properties owned by the foundation and Colonial National Historic Park. Over the course of three years, the foundation paid for their share of herbicides and staff time on initial treatments and nearly all subsequent follow-up staff time and expenses. Today the area is clean of invasive plants.

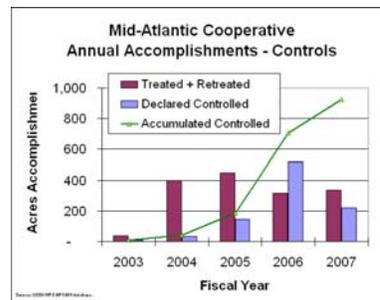


Figure 43. Mid-Atlantic Cooperative Annual Accomplishments, 2003 - 2007; showing annual treatment and control as well as accumulated control efforts.

The National Park Foundation, in cooperation with the Tauck Foundation contributed funds for the development of a short-term volunteer program at Shenandoah National Park. The MA-EPMT created, organized and managed the program for its first three years. In two years of full operations (2006-07), over 1,100 volunteers have contributed nearly 2,300 hours of invasive plant control fieldwork. Over 70 acres were treated thus greatly contributing to the protection of the Park. The park is now preparing to take over the management after the program's successful initiation.

The MA-EPMT was aggressive in public outreach to prevent or reduce future invasive species introductions. Our estimates indicate that during the period 2003-2007, we reached out to approximately six million citizens through media releases, public speaking engagements, and professional presentations. These figures do not include household multipliers for newspapers and other media. Through those contacts, we conveyed that the public could make a difference as consumers in slowing the introduction and spread of invasive species by purchasing native plant nursery stock for their homes and as volunteers to control local infestations. We hope the public caught the spirit of our Mid-Atlantic Cooperative motto: "Keep it beautiful, native and natural!"

Northeast

Exotic Plant Management Team

Partner Parks: Acadia NP, Allegheny Portage Railroad NHS, Appalachian NST, Boston Harbor Islands NRA, Cape Cod NS, Delaware Water Gap NRA, Fire Island NS, Fort Necessity NB, Friendship Hill NHS, Gateway NRA, Johnstown Flood N MEM, Marsh-Billings-Rockefeller NHP, Martin Van Buren NHS, Minute Man NHP, Morristown NHP, Roosevelt-Vanderbilt NHS, Sagamore Hill NHS, Saint-Gaudens NHS, Saratoga NHP, Saugus Iron Works NHS, Steamtown NHS, Upper Delaware SRR, Weir Farm NHS



Since 2003, the Northeast Exotic Plant Management Team (NE-EPMT) has been serving 23 parks in the upper Northeast Region, from Pennsylvania and New Jersey north to Maine. This year, the Team visited 12 parks during its active season, May through October, and funded work in two more.

2007 Accomplishments	
Inventoried Acres	1,184
Gross Infested Acres	4,262
Infested Acres	119
Treated Acres	48
Monitored Acres	844
Retreated Acres	45
Restored Acres	28

This season saw new activities with new parks and partners. We visited Fire Island NS (FIIS) for the first time, working with park staff, Student Conservation Association interns, and the Northeast Region's GIS Program Manager, Nigel Shaw. Nigel recruited the GIS Specialist at Cape Cod National Seashore to help us train FIIS staff and interns in using Trimble GPS units and conducting invasive plant inventories. We then split up to cover the paths and fields of FIIS's William Floyd Estate. FIIS staff and interns returned to EPMT headquarters to learn how to process the data into useful information.

Another new activity was harvesting native warm-season grass seed at Saratoga National Historic Park (SARA). SARA is restoring an 11-acre farm field to native grassland. The EPMT and New York State Department of Transportation (NYSDOT) helped harvest native grass seed. The Team helped with treating the 11-acre farm field for invasive plants.

Two new parks were helped with EPMT contracts: Fort Necessity National Battlefield (FONE) and Johnstown Flood National Memorial (JOFL). A

total of 15 acres of exotic honeysuckles were treated at FONE, the first step to restoring the site for woodcock habitat. At JOFL, several species of exotic shrubs were treated in the old lakebed and in front of the visitor center to keep the site in its historical condition and maintain the viewshed.

The NE-EPMT is playing an increasing role in regional invasive plant management both within and outside of the National Park Service. This year, the team spoke on invasive plant impacts to Penn State Master Gardeners. Presentations were



Figure 44. NE-EPMT crew, FIIS staff & interns and Regional GIS Program Director "suit up" against ticks as they prepare to try out their Trimble GPS units at the Otis Pike Wilderness Area on Fire Island.

also made at the Connecticut Invasive Plant Working Group symposium, the annual meeting of the Invasive Plant Council of New York State and a summer lecture series sponsored by the Friends of DEWA. The team sponsored an eight-hour pesticide training for new crews, inviting maintenance and natural resource staff at DEWA and two nearby national park units to attend and receive pesticide license update credits.

Collaborations play an important role in NE- EPMT work. This August, the Liaison was officially



Figure 45. "Blue-Stem, Smiling at Me . . ." Peter Howard of NYS DOT sits happily amongst the nine bags of bluestem seed that harvested in mid-October. The native bluestem fields at Saratoga National Historic Park can be seen behind Peter.

elected to the Board of the Mid-Atlantic Exotic Pest Plant Council. The EPMT, along with Appalachian National Scenic Trail and Appalachian Trail Conservancy, are working to engage hiking clubs to help with invasive plant removal. Two clubs have asked for presentations and one of these clubs expressed interest in helping with control. A third club has agreed to monitor a globally rare sedge and conduct yearly work days pulling Japanese stiltgrass threatening the sedge.

Efficiencies are being realized through strategic deployment of crew, encouraging active involvement of park staff and volunteers, and utilizing appropriate equipment. The NE-EPMT has been steadily improving in all these areas.

Restoration or rehabilitation of natural areas and their functions is the endpoint of invasive plant control. Being able to participate actively in that restoration, through seeding or planting of native plants, after controlling invasives, is not only satisfying, but also accomplishes the fundamental mission of the EPMT program.

In late September, the EPMT harvested little bluestem seed in a 4.2 acre field at SARA. The harvested site is part of a larger set of fields of little bluestem grass (*Schizachyrium scoparium*), an important native grass in the park. The seed will be used to convert an old cornfield to a native dominated warm-season grass field. In preparation for planting in the spring, the NE-EPMT helped to remove invasives from the cornfield.

In the past, SARA's little bluestem grass fields have been harvested by the New York Chapter of The Nature Conservancy (TNC-NY) and used to

restore sites in the Albany Pine Bush, habitat for the federally endangered Karner blue butterfly. Because of this work, SARA's native bluestem fields have become known in New York. NYSDOT, needing little bluestem seed for roadside restoration in Adirondack Park, was directed to SARA by TNC-NY. They harvested seed with great success. The Big Flats Plant Material Center will clean the seed and return a portion of the cleaned seed harvested by both the EPMT and NYSDOT back to the park. This newly formed collaboration of diverse partners is and will be very valuable to SARA.

The NE-EPMT has also been working on restoring a series of old agricultural fields at DEWA, either by knocking out invasive shrubs and trees and allowing native plants already present to fill in or by spraying the whole field and then planting it with warm-season grass seed mixes. In both cases, follow-up mowing and/or targeted spraying is done when needed. At first, follow-up activities must be done each year, but we expect that after 4-5 years, depending on the particular site, we can back off to one visit per year or every other year. At that point, we would look to the park to continue maintaining these areas.



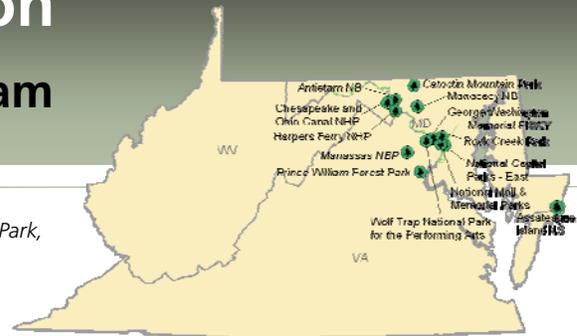
Figure 46. Walpack Field (DEWA) in 2007, formerly invaded with invasive shrubs, mainly honeysuckles. The brown vegetation is native warm-season grasses, which now occupy the site.

At both these parks, SARA and DEWA, one of the important end goals of the restoration is to provide much needed habitat for grassland and shrubland birds. Historically, there had been more of both bird species in the parks. Many of these species populations are in sharp decline. As fields are restored or improved, the hope is that some of the missing species will return and that existing species will increase in number. Time and more work by the NE-EPMT, park staff and partners will tell.

National Capital Region

Exotic Plant Management Team

Partner Parks: Antietam NB, Assateague Island NS, Catoctin Mountain Park, Chesapeake and Ohio Canal NHP, George Washington Memorial PKWY, Harpers Ferry NHP, Manassas NB, Monocacy NB, National Mall and Memorial Parks, National Capital Parks-East, Prince William Forest Park, Rock Creek Park, Wolf Trap National Park for the Performing Arts



The National Capital Region Exotic Plant Management Team (NCR-EPMT) continues to serve its 13 partner parks and the Appalachian Trail by advising resource managers on best practices, developing treatment protocols, and conducting control projects in areas that are biologically important. The team works closely with park staff to integrate our efforts into the parks' natural resource management programs, advising resource managers on best practices, developing treatment plans, and conducting control projects.

We hope to control isolated infestations of lesser celandine in three parks while we seek an effective treatment for larger populations.

2007 Accomplishments	
Inventoried Acres	1,848
Gross Infested Acres	1,930
Infested Acres	287
Treated Acres	90
Monitored Acres	1,272
Retreated Acres	157
Restored Acres	0

During 2007, the NCR-EPMT identified 93 non-native species in 58 locations where we conducted projects. Surveys (inventories or monitoring) documented that these species covered more than 3,121 acres. The NCR-EPMT treated 56 species with a total canopy cover of 247 acres. In order to attain long-term control, the team put most of its effort into returning to locations to re-treat remnant infestations and prevent them from recovering. This persistence has brought under control tree-of-heaven (*Ailanthus altissima*), bush honeysuckle (*Lonicera spp*), Japanese honeysuckle (*Lonicera japonica*) and other woody exotics in areas at Antietam National Battlefield, Assateague Island National Seashore and Monocacy National Battlefield.

The NCR-EPMT has started treating several herbaceous invaders. In 2007, the team treated more acres of lesser celandine (*Ranunculus ficaria*) (32.7 ac) than any other species. This buttercup engulfs riparian corridors, it's dense mat of vegetation leaves little room for the numerous spring wildflowers that would otherwise fill the floodplain.



Figure 47. Annual change in the wisteria infestation from 2004 to 2007, Sandy Landing, Great Falls, VA, George Washington Memorial Parkway.

The major challenges we face in serving the National Capital Region (NCR) parks is the diversity of landscapes we encounter and the diversity of exotic species to treat. The NCR-EPMT works in such varied habitats as coastal dunes, tidal marshes, and riparian corridors, grasslands, coastal plain forests and mountain forests. Numerous non-native plants find their way into these habitats from the urban surroundings the parks share. Treatment protocols get very complex because of site conditions, the various species being controlled, the presence of rare species, necessary equipment, personnel available, and seasonal weather.

Since 2001, the NCR-EPMT has worked in 167 locations in 18 parks and other federal facilities. Staff identified 183 non-native species with a total canopy of 37,900 acres although most species were not high-priority for treatment. The urban environment surrounding NCR parks provides a source for large numbers of non-native species. A large majority of non-native invasive plants in NCR parks were horticultural species that have invaded from surrounding urban areas. Many sites contained more than 30 species, although 19 locations covering 1,058 acres were found to be free of exotics. The team concentrated efforts on the most aggressive, ecologically threatening species – mostly woody vines, trees and shrubs. Sixteen species accounted for 90% of the 3,627 acres treated, and half the treated acres were comprised of the top three species; tree-of-heaven, multiflora rose (*Rosa multiflora*) and Japanese honeysuckle.

These years of cumulative efforts have had their effect. It has been gratifying to find little to treat on many of the original sites. In 2008, we expect several sites with bamboo, wisteria, and other species will have been reduced to maintenance level. The team can then give some attention to new locations and new species. The NCR-EPMT and park staff continue to collaborate with Maryland Department of Natural Resources to test treatments for Japanese hops (*Humulus japonica*), a newly problematic invader. Staff are also searching for effective treatments for lesser celandine, garlic mustard (*Alliaria petiolata*), and Japanese stilt-grass (*Microstegium vimineum*).

A large contribution to the success of 2007 field season has been the Student Conservation Association Native Plant Corps Team (SCA Team) whose good work over the past three years moved forward five projects at Manassas National Battlefield, George Washington Memorial Parkway, Prince William Forest Park, and Catoctin Mt. Park. The SCA Team approached everything they were asked to do with enthusiasm and energy.



Figure 48. Asiatic tear thumb at Catoctin Mt Park.

For several years, the EPMT has tried to gain control of an infestation of Asiatic tear-thumb (*Polygonum perfoliatum*) at a popular overlook on a ridge at the end of a mile of switchback trail at Catoctin Mt. Park.

The logistics at the site made it a daunting task; we felt we needed as many people as possible together to tackle the problem. The team enlisted the help of the SCA team, Catoctin Mt. Park staff, and a Youth

Conservation Corps (YCC) Crew that was working in the park. Eighteen workers spent two days shuttling tools and herbicides up the mountain then spraying and pulling the infestation, which had grown dramatically since the previous year. This effort seems to have reduced the infestation of this thorny vine to a level that can be handled by one team in the future, and the YCC teens were introduced to the subject of invasive plants.



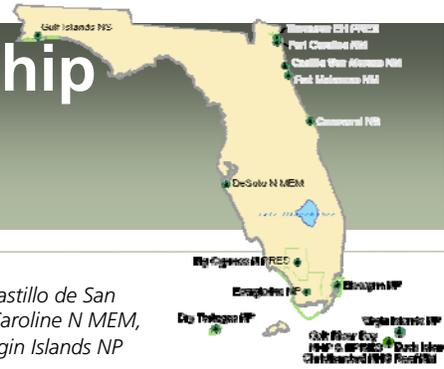
Figure 49. Youth Conservation Corps volunteers getting instructions for pulling Asiatic tear-thumb.

The SCA team also took part in Rock Creek Park Day. The SCA team created a fun and informative puppet show, which they gave several times during the daylong celebration, delighting and impressing everyone who saw it. The NCR-EPMT conducted seven classes and field trainings for teachers, horticultural professionals, master gardeners, public land managers, and the public. Education can be a potent tool in the battle against exotics. Informing the public, enlisting teachers to include the subject in their curriculum, convincing gardeners and horticulturists to use only non-invasive species can prevent invasion by non-native plants.

Collaboration can make controlling exotics more efficient through the exchange of information and sharing of resources. With its affiliation with the mid-Atlantic Exotic Pest Plant Council and the DC Cooperative Weed Management Area, the NCR-EPMT furthers the exchange of information, as well as encouraging cooperative control efforts at sites where neighboring jurisdictions have similar problems.

Florida Caribbean Partnership

Exotic Plant Management Team



Partner Parks: Big Cypress NP, Biscayne N PRES, Buck Island Reef NM, Canaveral NS, Castillo de San Marcos NM, Christiansted NHS, DeSoto N MEM, Dry Tortugas NP, Everglades NP, Fort Caroline N MEM, Fort Matanzas NM, Gulf Islands NS, Salt River Bay NHP & EPRES, Timucuan EH PRES, Virgin Islands NP

The natural areas of Florida and the Caribbean are threatened by the spread of invasive plants. In Florida, over 1.5 million natural acres are infested with invasive exotic plants.

2007 Accomplishments	
Inventoried Acres	10,759
Gross Infested Acres	10,691
Infested Acres	2,721
Treated Acres	2,186
Monitored Acres	534
Retreated Acres	534
Restored Acres	0

Invasive exotic plants have demonstrated the ability to rapidly dominate native plant communities, reduce biological diversity, disrupt natural processes such as natural fire regimes and water flow, and change the landscape both visually and ecologically. Over 400,000 acres of the approximately 2,000,000 acres of National Park Service lands in Florida are currently infested with exotic pest plants.

The Florida and Caribbean EPMT (FLC-EPMT) supports National Park Service units in Florida and the Caribbean by augmenting existing exotic plant control efforts including inventory and monitoring, control, education and research. The FLC-EPMT is a partnership with the Florida Department of Environmental Protection's (FDEP) Bureau of Invasive Plant Management and the South Florida Water Management District (SFWMD) as well as many other federal, state and local governments and non-government organizations working together toward the management and control of invasive exotic plants. The FLC-EPMT consists of resource managers from each partner park unit as well as representatives from the FDEP, SFWMD, US Fish and Wildlife Service and the US Army Corps of Engineers. This collective group identifies and prioritizes regional exotic plant control projects and functions as the

Team's steering committee. Exotic plant control is primarily conducted through private contractors. Smaller control projects are accomplished by the FLC-EPMT "Small Parks/Projects Hit Squad."

The "Hit Squad" is comprised of the FLC-EPMT liaison/leader and expert volunteers from each park. In 2007, the FLC-EPMT "Hit Squad" provided support to Timucuan Ecological and Historic Preserve, Big Cypress National Preserve, Fort Caroline National Memorial, Desoto National Memorial and Fort Matanzas National Monument in their continued efforts to thwart the spread of invasive plants in their park units.



Figure 50. Timucuan EHP Resource Management Staff preparing a Chinese tallow tree (*Sapium sebiferum*) for herbicide treatment at Fort Caroline NM.

The squad also assisted the Department of Commerce's National Oceanographic and Atmospheric Administration in South Florida by controlling invasive exotic plants located within a globally imperiled habitat on property under their management.

The "Hit Squad" approach has proven to be cost-effective in treating small remote and isolated populations of invasive plants. Additional 2007 highlights include discovering and treating a new infestation of salt cedar in Timucuan Ecological and Historic Preserve, treating the aquatic species *Nymphoides cristata* in Big Cypress National Park, and enlisting the assistance of Boy Scout volunteers conducting an Eagle Scout project at Desoto National Monument.

The FLC-EPMT, with matching funding from FDEP and SFWMD, facilitated treatment of over 700 acres of latherleaf (*Colubrina asiatica*) in Biscayne National Park. Again, using matching funds from the FDEP, three FLC-EPMT projects were completed in

Everglades National Park including the aerial treatment of over 800 acres of old world climbing fern (*Lygodium microphyllum*). In coastal marshes work continued with the initial treatment of the invasive Australian Melaleuca tree (*Melaleuca quinquenervia*) from the East Everglades, and the re-treatment of latherleaf on the Gulf Coast islands.



Figure 51. Latherleaf (*Colubrina asiatica*) treatment at Biscayne NP by private contractors.

FLC-EPMT and FDEP cooperative efforts continued in 2007 to control Brazilian pepper tree (*Scinus terebinthifolius*) and Old World climbing fern in the northern portions of Big Cypress National Preserve. In the Caribbean, the Team conducted the fourth re-treatment of ten species of invasive exotic plants on Buck Island, a 176-acre tropical dry forested island within the Buck Island Reef National Monument off the US Virgin Island of St. Croix. Within the Virgin Islands National Park on and around the island of St. John, the FLC-EPMT conducted two projects beginning the management and control of invasive exotic plants on nine adjacent islands and around a historic sugar plantation.

This year the FLC-EPMT established and collected data from permanent efficacy monitoring plots at the majority of the 2007 projects as well as re-sampling plots established in 2006. These monitoring plots were first established in 2006 in coordination with the South Florida and Caribbean Inventory and Monitoring Network to provide a quantitative measure of treatment efficacy. Goals of this monitoring program are to: 1) determine the effectiveness of the invasive exotic plant treatment methodology, 2) follow the recovery of the native plant community, and 3) determine if additional treatment or restoration management action is required.

The FLC-EPMT staff has taken a leadership role in the establishment of an Everglades Cooperative Invasive Species Management Area (Everglades CISMA). Modeled after the Western US

Cooperative Weed Management Areas, the Everglades CISMA is a formal partnership of federal, state, and local government agencies, tribes, individuals and various interested groups that manage invasive species in the greater Everglades area. The desire for restoration of the Everglades poses new challenges for invasive species management, and has created a need for a more defined commitment to cooperation among agencies and organizations at higher levels of policy and management. The creation of the Everglades CISMA is expected to enhance Everglades restoration by the establishment of a formal framework for staff and management cooperation.

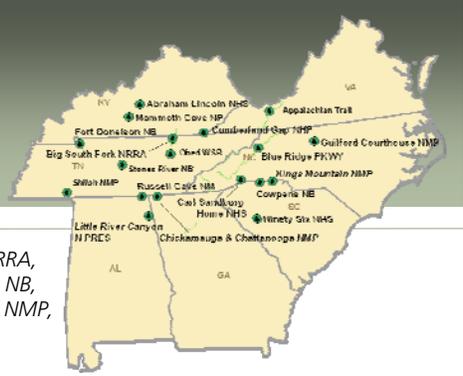


Figure 52. Florida/Caribbean “Small Project/Parks Hit Squad” treating floating heart (*Nymphoides cristata*) in a Big Cypress NP slough.

Finally, the FLC-EPMT expanded its efforts in the management and control of all taxa of invasive exotic species in 2007 by initiating, developing, and implementing a management plan aimed at the control of an invasive vertebrate. The Mexican red-bellied squirrel (*Sciurus aureogaster*) was introduced into Biscayne National Park (BISC) in the early 1900’s and has been shown to be a significant threat to the park’s natural resources. Additionally, the Mexican red-bellied squirrel population within Biscayne NP has the potential to spread to the mainland of Florida where it may have deleterious environmental, agricultural and economic effects. To eliminate the potential spread of this species outside the park and to manage the existing population, the FLC-EPMT, Biscayne NP staff, and researchers from the University of Arizona have cooperatively embarked on the implementation of a Mexican red-bellied squirrel management project.

Southeast

Exotic Plant Management Team



Partner Parks: Abraham Lincoln Birthplace NHS, Appalachian NST, Big South Fork NRR, Blue Ridge PKWY, Carl Sandberg NHP, Chickamauga and Chattanooga NMP, Cowpens NB, Cumberland Gap NHP, Fort Donelson NB, Guilford Courthouse NMP, Kings Mountain NMP, Little River Canyon N PRES, Mammoth Cave NP, Ninety Six NHS, Obed WSR, Russell Cave NM, Shiloh NMP, Stones River NB

The Southeast Exotic Plant Management Team (SE-EPMT) has completed another successful year in providing services to our partner parks. Since establishment in 2003, the SE-EPMT has steadily increased in efficiency and ability to provide effective exotic plant treatment strategies.

2007 Accomplishments	
Inventoried Acres	6,243
Gross Infested Acres	5,823
Infested Acres	1,259
Treated Acres	757
Monitored Acres	167
Retreated Acres	0
Restored Acres	0

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 other countries.

In 2007, the SE-EPMT treated 757 acres of 33 invasive exotic plant species. Treatment was conducted in 17 of our 18 partner parks and a section of the Appalachian Trail in Virginia and North Carolina. The most commonly treated species in 2007 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 ranged 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 SE-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 reestablishment of native species in many treatment areas. Sites must be, on occasion, re-treatment because of new plants sprouting from the existing seed bank.

Over 70 of the SE-EPMTs reported 764 treated acres were accomplished with the assistance of a Student Conservation Association Native Plant Corp (SCA-NPC) assigned to Abraham Lincoln Birthplace National Historic Site in Kentucky and Stones River National Battlefield in Tennessee.



Figure 53. Student Conservation Association team leader Julie Vargo treating Japanese privet at Stones River National Battlefield.

This SCA-NPC worked at each park for approximately 10 weeks. Staff at these parks provided enthusiastic on-site support and guidance helping to ensure the success of this effort. The SCA-NPC was instrumental in treating several challenging sites containing large infestations of multiflora rose at Abraham Lincoln Birthplace National Historic Site. Rose had become established because of severe storms in

2003 that brought down several large oaks. Had this site been left untreated the control efforts would have been much more challenging and costly.

Opportunities to provide outreach to the public as well as professional resource managers have continued to expand for the SE-EPMT. During 2007, the Team continued to provide classroom and hands on training to many groups including the Tennessee Exotic Pest Plant Council, Eastern Band of the Cherokee Indians, and the Southern Appalachian Man and the Biosphere. Workshop topics included early detection and rapid response strategies, plant identification, safe and effective use of herbicides, treatment techniques, and planning and prioritizing strategies. The SE-EPMT continues to provide the monthly "Have You Seen This Plant" submission to the regional newsletter in an effort to solicit early detection from all parks in the National Park Service Southeast Region.



Figure 54. SE-EPMT Team Leader Toby Obenauer oversees Wildland Saw Operator Training at the Blue Ridge Parkway in North Carolina.

The SE-EPMT has enjoyed several successes during 2007, but none more significant than the completion of the fourth year of scheduled work without an accident or injury. Because the Team uses a variety of power equipment tools, numerous chemicals, and travels approximately 22,000 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 2007 include 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) for the SE-EPMT Team Leader, and implementing an All

Terrain Vehicle and trailer pre-trip safety check-list to enhance safe operations and transport.

Throughout 2007, the SE-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 prevention, early detection and rapid response to new introductions are playing increasingly important roles in our long-term success.



Figure 55. The SE-EPMT works to eradicate multiflora rose along the Obed Wild and Scenic River in Tennessee.

The Exotic Plant Management Teams (EPMT) do not function in isolation. The achievements of the Teams are due in large part to the time, resources and contributions of many. The EPMT program and the EPMT Team is a coordinated effort made up of park leadership, park staff, seasonal and permanent Team members, the Student Conservation Association, Americorp and hundreds of volunteers. Following is a partial list of people who contributed to the 2007 achievements described in the report.

Alaska EPMT

Admin: Jeff Heys (Liaison), Whitney Rapp (GLBA, Data Manager)

Crew: Wendy Mahovlic (DENA), Heather Wetherbee (KEFJ), Jeff McKinney (KLGO), Kristi Link (SITK), and Lil Gilmore (WRST)

Fieldwork Assistance: Judy Alderson (AKRO), Matt King (KATM), Lucretia Fairchild (KLGO), Dashiell Feierabend (KLGO), and Jennifer Mitchell (YUCH)

Interns: Raquel Aguirre (DENA), Pyper Dixon (KEFJ), Julie da Silva (GLBA), Linnea Rowse (GLBA), and David Goldsmith (WRST)

Volunteers: Tribal Civilian Community Corps, Brent Mitchel (Campus Coordinator)

Park and regional contacts: Jennifer Allen (AKRO), Joel Cusick (AKRO), Greg Daniels (AKRO), Russ Kucinski (AKRO), Bud Rice (AKRO), Guy Adema (DENA), Pat Owen (DENA), Carl Roland (DENA), Jobe Chakuchin (GAAR), Gary Youngblood (GAAR), Lewis Sharman (GLBA), Roy Wood (KATM), Shelley Hall (KEFJ), Christina Kriedeman (KEFJ), Dave Schirokauer (KLGO), Geof Smith (SITK), Mary Beth Cook (WRST), Eric Veach (WRST), and Maura Longden (YUCH)

Steering Committee: Susan Boudreau (KLGO), Page Spencer (LACL), Carl Roland (DENA), Eric Veach (WRST), Michael Shephard (SWAN I&M Coordinator), Jennifer Allen (AKRO Fire Ecologist), Sara Wesser (AKRO I&M Coordinator), Tim Hudson (AKRO Assoc. Regional Director), Jeanne Standley (BLM), and Larry Johnson (AK DOT)

California EPMT

Admin: Bobbi Simpson (Liaison), Daniel Boughter (Crew Leader), Andrew Georgeades (Data Manager), Adam McClure (Data Manger/Admin Support)

Crew: Lisa Barnes, Matt Below, Beth Points, Ryan Rupert

Park and Regional Contacts: Jay Goldsmith

Student Conservation Corp : Morgan Cromwell, Laura Fieselmann, Katherine Ross, Rachael Rowland, T.Scott Smeltz, Rachel Durling, Aaron Darden, Caitlin Feather, Bryan Powell, Stephen Bush, Emily Jablonski, Dan Pulver, Maia Beh, David Allen, Adam Erickson, Aidan Hutchins, Ryan Tietjen, Lindsey Scholl, Chase Bodkin

Steering Committee: John Randall (The Nature Conservancy), Jay Goldsmith (Pacific West Regional Office) Athena Demetry (Sierra Network), Christy Brigham (Mediterranean Network), Sue Fritzke (San Francisco Bay Area Network), Michelle Cox (Klamath Network), Paul Reeburg (PWR)

Chihuahuan Desert / Shortgrass Prairie EPMT

Admin: Luis J. Florez (Liaison), Kelly Mathis (Crew Leader)

Crew: Amorita Brackett, Patrick Wharton

Park and Regional Contacts: Gerald McCrea, IPM coordinator

Student Conservation Corp Interns: Allison James, Max Conington, Graham Sivak, Marieke Jackson.

Steering Committee: Gopaul Noojibail (CAVE), David Bustos (WHSa), Fred Armstrong (GUMO), John Heiner (FODA), Karl Zimmermann (BEOL), Joe Sirotnak (BIBE) Mike Bland (LAMR/ALFL), Chris Moos (CAVO), Greg Garetz (AMIS), Ted Benson (PECO), Marie Frias (FOUN), Wendy Lauritzen (WABA).

Colorado Plateau EPMT

Admin: Diane Dobos-Bubno (Liaison), Brennan Hauk (Crew Leader), Robert Gaunt (Asst. Crew Leader), Adam Heberlie (Asst. Crew Leader)

Crew Partners/Contractors: Coconino Rural Environmental Corps, Rocky Mountain Youth Corps, Southwest Youth Corps, Olathe Spraying Service

Park and regional contacts, fieldwork assistance, and various types of technical assistance: Terry Nichols, Karen Beppler-Dorn, Lee Baiza, Pat Thompson, Danguole Bockus, BLCA Ranger Staff, Elaine Leslie, Brad Shattuck, Kirk Petersen, Dave Price, Liz Rodgers, Lou Lorber, Dan Miller, Joe Wolfman, Tamara Naumann, Emily Spencer, Herschel Schulz, Lori Makarick, Kate Watters, Melissa McMasters, Nancy Stone, Anne Worthington, George San Miguel, Yvonne Marlin, Dennis Casper, Steve Mitchelson, John Spence

Florida / Caribbean Partnership EPMT

Admin: Tony Pernas (Liaison), Daniel Clark (Crew Leader)

Park and regional contacts, fieldwork assistance, and various types of technical assistance:

Jim Burch, Jimi Sadle, Jonathan Taylor

Steering Committee: Jonathan Taylor (EVER), John Stiner (CANA), Jim Burch (BICY), Shelby Moneysmith (BISC), Richard Bryant (TIMU), Riley Hoggard (GUIS), Andrew Rich (FOMA), Clif Kevill (DESO), Dan Thayer (South Florida Water Management District), Jon Lane (US Army Corp of Engineers), Greg Jubinsky (FL Department of Environmental Protection)

Great Lakes EPMT

Admin: Carmen Chapin (Liaison),

Crew: Cari Manson, Marlon Opelt, Jim Burka

Park and Regional Contacts: Steve Cinnamon

Student Conservation Corp Interns: Brad Behrens, Greg Pipis, Rochelle Halama, Jeff Pesz

Steering Committee: Jean Battle (ISRO), Nancy Duncan (MISS), John Kwilosz (INDU), Bruce Leutscher (PIRO), Robin Maercklein (SACN), Julie Stumpf (Midwest Regional Office), John Snyder (VOYA), Julie Van Stappen (APIS), Steve Yancho (SLBE)

Gulf Coast EPMT

Admin: Eric Worsham (Liaison), Pat Wharton (Crew Leader)

Crew: Scott Szabo (Alternate Crew Leader), Suanne Bacque, Genevieve Skora, Jarret LeJeune

Volunteers: Sierra Club, AmeriCorps, EnviroCorps.

Park and Regional Contacts: Jerry McCrea, Chris Furqueron, Fulton Jeansonne, Curtis Hoagland, Rolando Garza, Darrell Echols, Greg Mitchell, Sherry Justus, Nancy Walters, Gary Hopkins, Riley Hoggard, Kurt Foote, Kathleen Jenkins, Virginia Dubowy.

Lake Mead EPMT

Admin: Curt Deuser (Liaison), James Roberts (Data Manager), Sue Knowles (Admin Asst.)

Crew Leaders: Tarl Norman (Crew Supervisor), Angela Sokolowski (Asst. Crew Supervisor), Dwayne Coleman (Squad Leader)

Crew: Jared Burian, Joe Castello, Gayan de Silva, Zeph Friedman-Sowder, Dennis Hoots, Eric Kelley, Brian Lumley, Mike Messier, Ken Musick, Chris Overbaugh, Mickey Pierce, Beth Points, Michelle Reilly, Ryan Rupert, Sara Schuster, Chris Starkweather, Adam Throckmorton, Eric Walker

Park and Regional Contacts: Jay Goldsmith (PWR), Kent Turner (LAME)

Steering Committee: Matt Brooks (USGS Research Botanist), Ron Hiebert (NAU/CPSU), Todd Esque (USGS Research Ecologist), Pam Benjamin (NPS/IMR Plant Ecologist), Gayle Marrs-Smith (BLM Plant Ecologist)

Mid Atlantic EPMT

Admin: James Åkerson (Liaison), Kate Jensen & Norman Forder (Crew Leaders)

Crew: Robert Jennings, Nathan Wender, Dale Meyerhoeffer, and Kate Jensen

Park and Regional Contacts: Wayne Millington, IPM Specialist

Student Conservation Corp Interns: Nicolette Riggins; SCA Team 2: Jesse Rogers (crew leader), Jenni Polisenio, Alaina MacEachern, Julie Yeung, and Nichleson Cook; and SCA Team 1: Ben Richey (crew leader), Isadora Albert, Jennifer Van Wyk, Miles Boiko, and Adam Volz

Volunteers: Unnamed 640 individuals contributing 2,327 hours

Contractor: Invasive Plant Control, Inc., Steve Manning (President), Lee Patrick, Bobby Servis

Steering Committee: Brian Eick (APCO), Kent Schwarzkopf (APPA), Timothy Sims (BOWA), Dorothy Geyer (COLO), Gregg Kneipp (FRSP), Randy Krichten (GETT/EISE), Rijk Morawe (GEWA/THST), Paul Bitzel (HAMP), Steven Ambrose (HOFU), Dave Shockley (PETE), Kristen Allen (RICH), Gordon Olson (SHEN), Kristina Heister (VAFO)

Park contacts, fieldwork assistance, and various types of technical assistance: B. Eick, R. Tillotson (APCO); T. Sims, K. Arrington, C. Facchina, J. Mitchell (BOWA); D. Geyer (COLO); G. Kneipp, S. Gibson, T. Mehler, C. Tanner (FRSP); J. Johnson, Z. Bolitho, R. Krichten, C. Brown, G. Thomas, M. McCullough (GETT/EISE); R. Morawe, V. Stewart-Hill (GEWA/THST); P. Bitzel, M. Lynch (HAMP); S. Ambrose, G. Martin (HOFU); D. Shockley, T. Blumenschine, M. Caldwell, A. Coble, T. Laxson, I. Roberts (PETE); K. Allen, A. Trivizas, T. Smith (RICH); G. Olson, W. Cass, J. Hughes, N. Fisichelli, S. Bloch, A. Jensen, T. Pryor, W. Anderson, E. Berg, A. Dutcher, J. Koenig (SHEN); K. Heister, M. Carfioli, D. Bazzett, F. Angelo (VAFO); D. McCarthy and others (Olmstead Center)

National Capital Region EPMT

Admin: Sue Salmons (Liaison), Ron Dean (Former Team Leader), Trouper Snow (Data Manager)

Crew: Eric Johnson, Martin Kraemer, Matthew Rhodes, Cristina Torres, Brian Black; Matthew Fagan

Park and Regional Contacts: Dan Sealy (Deputy Chief of Natural Resources and Sciences)

Student Conservation Corp Interns: Joseph Wilbur, Jesse Rogers (crew leader), Alaina MacEachern, Jennifer Polisenio, Juli Yeung, Nickleson Cook; Ben Richey (crew leader), Miles Boiko, Jenny Vanwyk, Isadora Albert, Casey O'Keefe

Youth Conservation Corps Crew (CATO): Brad Maze, Morgan Maze, Mallory Metheny, Kelly Purcell, Dustin Thompson, Grace Wintermyer.

Volunteers: Gary Sikora

Park Contacts, technical and field assistance: Joe Calzarette (ANTI), Jonathan Chase (ASIS), Becky Loncosky (CATO), P. Scott Bell (CHOH), Melissa Kangas (GWMP), Dale Nisbet (HAFE), James Rosenstock (NACE), Tony Magliocci (NACE), Geoff Clark (ROCR), Ken Ferebee (ROCR), Betsy Chittenden (WOTR); Matt Gilford (CATO)

Steering Committee: Jim Sherald (NCR Chief of Natural Resources and Sciences), Diane Pavek (NCR Botanist and Research Coordinator), Jil Swearingen (NCR Integrated Pest Management Specialist), Shawn Carter (NCR I&M Regional Coordinator), Ed Wenschof (ANTI), James Voigt (CATO), Brian Carlstrom (CHOH), Brent Steury (GWMP), Bill Hebb (HAFE), Bryan Gorsira (MANA), Andrew Banasik (MONO), Steve Syphax (NACE), Mary Willeford Bair (NAMA), Paul Petersen (PRWI), Joe Kish (ROCR), Duane Erwin (WOTR)

North Cascades EPMT

Admin: Todd Neel (Liaison), Dan Campbell (Crew Leader)

Crew: Alison Fawcett, Valerie Taylor, Daniel Lucero

Student Conservation Corp Interns: Sarah Waldo, Eric Gassner-Wolwage

Steering Committee: Jack Oelfke (NOCA), Mignonne Bivin (NOCA), Regina Rochefort (Network Science Advisor), Steve Acker (OLYM), Julie Hover (MORA), Scott Stonum (LEWI), Leigh Smith (EBLA), Bill Gleason (SAJH), Erv Gasser (IPM coordinator)

Northeast EPMT

Admin: Betsy Lyman (Liaison), Brian McDonnell (Crew Leader)

Crew: Kelly Garrison

Student Conservation Corp Interns: Geoffrey Tarbox, Emily Vance

Park and Regional Contacts: Wayne Millington

Park contacts, fieldwork assistance, and various types of technical assistance: Kent Schwarzkopf (APPA), Susan Charkes (Batona Hiking Club, volunteer), Michele Miller (Appalachian Trail Conservancy (ATC)), Al Dugan (MA Dept. of Conservation & Recreation), Marc Albert (BOHA/SAIR), Susan Kane (MA Dept. of Conservation & Recreation), Mark Adams (CACO), Stephen M. Smith (CACO), Brad Boynton (DEWA), Jon Bugan (DEWA), Mike Croll (DEWA), Mike Fernalld (DEWA), Larry Hilaire (DEWA), Jeff Shreiner (DEWA), Mike Bilecki (FIIS), Melissa Borowiak (FIIS SCA intern), Bernardo Felix (FIIS), Joe Heinrich (FIIS), MaryLaura Lamont (FIIS), Walter Martens (FIIS), Melinda Sergi (FIIS SCA intern), Fernando Villalba (FIIS), Connie Ranson (FONE/FRHI), Andy Brady (GATE seasonal), Ben Burt (GATE seasonal), Colleen Ely (GATE seasonal), Bruce Lane (GATE), Mike Byer (GATE), Kathy Penrod (JOFL/ALPO), Ian Bane-Herzog (MORR VIP), Kathleen Onorevole (MORR SCA intern), Robert Masson (MORR), Sheila Colwell (NER), Nigel Shaw (NER), Clark Darzell (SARA), Chris Martin (SARA), Cindy Vanderwerker (SARA), Jeff Wells (SARA), Linda White (SARA), Jeremy Cunningham (SARA seasonal), Jamie Myers (UPDE)

Northern Great Plains EPMT

Admin: Chad Prosser (Liaison), Taryn Flesjer (Biologist/Data Manager), Mark Slovek (Crew Leader)

Crew: Ryan Murdoff, Lee Vaughn, Tom Diemer, Miyeko Kimitch, Jared Burian, Eric Vial

Park contacts: Justin Cawiezel, Bob Manasek, Jim Cheatham, Rod Skalsky, John Moeykens, Andy Banta, Wayne Werkmeister, Stuart Schneider, Stephen Wilson, Mark Herberger, Jessica Eggers, Marie Curtin, Bill Mathews

Steering Committee: Brian Kenner (BADL), Dan Foster (WICA), Bill Whitworth (THRO), Cody Wienk (NGP Fire Ecologist), Dan Licht (NGP I&M Coordinator), Steve Cinnamon (Midwest Regional Office)

Northern Rocky Mountain EPMT

Admin: Brenda Waters (Liaison), Gary Ludwig (Crew Leader), Martin Hutten (Crew Leader), Chris Overbaugh (Crew Leader)

Crew: Adam Birely, Andy Christy, Janelle Cossey, Mickey Pierce, Leslie Riser, Heather Smith

Native Plant Corp SCA Crew: Matt Szymanwicz (Crew Leader), Becky Bickford, Alicia Dunphy, Justin Pomeranz, Jeremy Rentsch

Park and Regional Contacts: Erv Gasser, Jerry McCrea, Daniel Reinhart, Paige Wolken, Dawn LaFleur

Steering Committee: Jason Lyon (BEPA), Cassity Bromley (BICA), Robert West (BIHO), Tim Bennett (CIRO), Paige Wolken (CRMO), Clayton Kyte and Deborah Spicer (FOBU), Dawn LaFleur (GLAC), Tammy Bensen (GOSP), Ben Bobowski and Chris Ford (GRKO), Kelly McCloskey (GRTE), Fran Gruchy (HAFO), Kelly McCloskey (JODR), Melana Stichman (LIBI), Fran Gruchy (MINN), Dan Reinhart (YELL)

Pacific Islands EPMT

Admin: Jeremy Gooding (Liaison),

Crew Leaders: Sean Grossman (HAVO, PUHO, PUHE, KAHO), Sam Akoi (Interagency Miconia Management Crew, MISC Hana Crew), Michael Ade (MISC Piiholo Crew), Adam Radford (MISC Peripheral Miconia and Vertebrate Crew)

Data Managers: David Benitez (HAVO, PUHO, PUHE, KAHO), Sean Birney (Interagency Miconia Management Program Maui Crew, HALE), Brooke Mahnken (MISC)

MISC Field Technicians: Elisse Deleissegues, Imi Nelson, Brooke Mahnken

Steering Committee: Dr. Rhonda Loh (HAVO), Steve Anderson (HALE), Teya Penniman (MISC Manager), Lloyd Loope (USGS), Elizabeth Anderson (MISC Admin), Randy Bartlett (Puu Kukui Watershed Mgr Maui Pineapple Co, MISC Chair), Fern Duvall (Hawaii Division of Forestry and Wildlife, MISC Vice Chair), Pat Bily (The Nature Conservancy Hawaii, Maui Program)

*MISC: Maui Invasive Species Committee

Southeast EPMT

Admin: Nancy D. Fraley (Liaison), Tobin M. Obenauer (Crew Leader)

Park and Regional Contacts: Bambi Teague

Student Conservation Corp Interns: Andrew Gentry, Brett Forkner, Matt Beauregard, Wesley DeWitt, Jacob Rigby, Lisa Ferensak, David Christy, Nathan Wender, Jeffrey Mallinson

Volunteers: Warren Wilson College, Asheville Weed Team, Eastern Band Cherokee Indians, Tennessee Exotic Pest Plant Council

Steering Committee: Chiris Furqueron (SER IPM Coordinator), Kris Johnson (GRSM), Sandy Brue (ABLI), Jenny Beeler (CUGA), Mary Shew (LIRI & RUCA), Chris Revels (KIMO)

Natural Resource Program Center, Biological Resource Management Division

Jerry Mitchell (Division Chief)

Linda Drees (Invasive Species Branch Chief)

Rita Beard (Invasive Species Coordinator)

Ric Hupalo (Invasive Species Database Administrator)

Debi Reep (Administrative Assistant)

Gross Infested Area

Like *Infested Area*, it is the area of land occupied by a single weed species. Unlike *Infested Area*, the area is defined by drawing a line around the general perimeter of the invasive plant population not the canopy cover of the plants. The gross area may contain significant parcels of land that are not occupied by weeds.

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

Inventoried Area

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

Infested Area

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

approximately a 3' x 4' area and is equivalent to approximately one plant.

Monitored Area

Monitored Area is the collection and analysis of repeated observations or measurements over time. The collection of information overtime by measuring changes in the density, distribution, abundance, or location of an invasive plant. Monitoring may include ecological factors such as soils and plant composition. Monitored area is reported in acres.

Treated Area

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

Retreated Area

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

Exotic, Invasive, Noxious, and Weed

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

EPMT: Exotic Plant Management Team

GIS: Geographic Information System

GPS: Geographic Positioning System

NPS: National Park Service

National Park Service

U.S. Department of the Interior



Natural Resource Program Center

Biological Resources Management Division

1201 Oakridge Drive, Suite 200

Fort Collins, CO 80525

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