

Controlling non-indigenous vegetation at eight national parks in Virginia

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Overview

The Virginia Invasive Vegetation Management Team (VIVMT) is a project tackling invasive vegetation at eight National Park Service (NPS) Virginia Subcluster parks: Appomattox Court House National Historical Park, Booker T. Washington National Monument, Colonial National Historical Park, Fredericksburg and Spotsylvania County Battlefields Memorial National Military Park, George Washington Birthplace National Monument, Petersburg National Battlefield, Richmond National Battlefield Park, and Shenandoah National Park. The VIVMT, funded by the NPS Natural Resource Protection Program (NRPP), has had notable success in its first year of operation. This paper describes the progress and activity to date. Perhaps the greatest project benefit, beyond acres treated and documents completed, is the engendered cooperative spirit between the project team and participating parks, as well as between individual parks themselves. It is a spirit that will prove beneficial well into the future.

Project objectives

The VIVMT strives to:

- Assess invasive vegetation problems and create strategic plans at each park for invasive control, site restoration, and treatment monitoring. Incorporate ongoing assessment into planning.
- Eradicate or control targeted alien populations.
- Assist parks in conducting site restoration to achieve sustainable plant communities.
- Create a sustainable program that survives beyond NRPP funding. This must include expertise, equipment, organization momentum, and funding.

Funding source

The project is funded through NRPP resource management national funding as part of the NPS Northeast Region allotment for FY2000-2001. Support came in two allotments: \$185,000 for FY2000 and \$205,000 for FY2001.

Organization

The organization includes park superintendents, resource management specialists, a project manager, and the funded VIVMT crew (Figure 16.1). The integration of crew and local park staff is essential to increase field accomplishments and sustain

organizational memory of intent and protocols. Figure 16.2 illustrates the team's organization and communication lines.



Figure 16.1. The Virginia Invasive Vegetation Management Team (l-to-r): Matthew Patterson (crew leader), Norman Forder, Zachary Bolitho, and Carolyn Davis. Shenandoah National Park photo.

Park assessments

The Subcluster began working on the cooperative project before funding at the park level was in hand (which occurred in March 2000). It was prudent to get started with initial assessments and planning before that date so that project-funded field crews had work to tackle right away. The project manager and one Shenandoah seasonal employee began conducting field visits with local park staff in September 1999. Parks supplemented field data by clarifying questions of species presence and locations. Several obtained global positioning system (GPS) documentation for precise mapping and treatments. Excellent cooperation and host-park energies kept the planning phase proceeding at a brisk pace.

The project manager led the planning effort by analyzing park-specific data, conducting prioritization analysis of identified invasives, assembling documentation of best management practices for targeted species, and gathering local staff input on zonal treatment considerations and natural and cultural resource protection concerns. Host parks ensured that the draft documents received appropriate review from the perspectives of cultural resource protection, maintenance, public safety, and ranger activities.

Each park's plan forms a rallying point to strategically address what had seemed an overwhelming situation. Indeed, each park does have a sizable invasive vegetation problem, but the process of assessing and prioritizing treatments and gathering regional best-management practices protocols has armed us to move forward. Planning created greater understanding and did not merely satisfy an administrative need (Table 16.1).

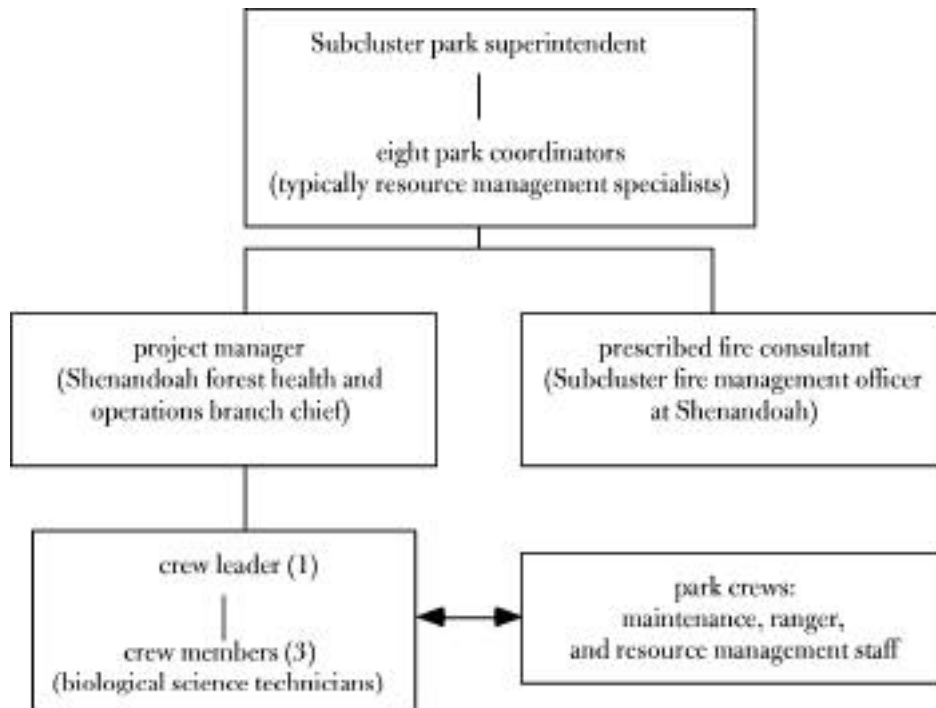


Figure 16.2. VIVMT organizational chart.

Targeted invasive species

Each park arrived at their subset of targeted invasive species through a four-tiered approach.

1. Published information from the commonwealth of Virginia (*Invasive Alien Plant Species in Virginia*, co-published by the Virginia Native Plant Society and the Virginia Department of Conservation and Recreation) provided a first cut at winnowing. Though Virginia has hundreds of non-indigenous species, certain species are known to be highly invasive and of particular threat to preserving natural and cultural resources.
2. Using field data, the NPS *Handbook for Ranking Exotic Plants for Management and Control* (Hiebert and Stubbendieck 1993) was used to correlate potential environmental impacts with potential for treatment success. Localized conditions and species-presence information is incorporated into the system. The method assesses each species according to its environmental threat potential and its current control or eradication potential. The resulting plot of species values on a four-quadrant grid allows easy comparison. The first priority for treatment are those invasives that have a high environmental threat but which are easily controlled. The second priority includes those posing high threats but with lesser control potential. The third priority pose lesser threats and have easier control potentials, while the lowest priority are those posing lesser threats coupled with lesser control potentials.

3. Species and epicenter priorities were adjusted for cultural and natural resource protection concerns.
4. Lastly, priorities were adjusted for operational practicality. For instance, certain epicenters might be combined with others to aid fieldwork efficiency, though a given one might not rank highly on its own merits.

Table 16.2 shows how species were identified and prioritized for treatment at each park.

Item / Park	Initiated Analysis	First Draft Forwarded for Review	Final Document Approved & Published
Strategic Plans			
Booker T. Washington	Oct 1999	4 Nov 1999	19 Apr 2000
Geo. Washington Birthplace	Nov 1999	9 Nov 1999	20 Apr 2000
Petersburg	Nov 1999	2 Dec 1999	20 Jul 2000
Richmond	Nov 1999	21 Jun 2000	5 Sep 2000
Colonial	Dec 1999	20 Mar 2000	25 May 2000
Shenandoah	Dec 1999		
Fredericksburg & Spotsylvania	Mar 2000	14 Apr 2000	2 Jun 2000
Appomattox Court House	Aug 2000	6 Sep 2000	19 Sep 2000
Treatment Monitoring Plans			
All	Dec 1999	Dec 1999	With the above
Safety Plans			
All	May 2000	Jun 2000	25 Jul 2000

Table 16.1. Strategic planning progress.

Achievements to date

- Initial field reconnaissance and assessments were completed at all eight parks.
- Strategic plans for managing alien invasive vegetation were completed and adopted at seven parks.
- Staffs charged with protecting natural and cultural resources worked together toward the common goal of reducing alien species impacts.
- Programmatic or site-specific environmental clearances were completed at all eight parks.
- On-the-ground treatments began at all eight parks, amounting to 74 acres of initial controls during five months of FY2000, with an additional 125 acres accomplished during the first six months of FY2001, for a total of 199 acres.

Park	Targeted Invasive Species (listed in order of priority)
Appomattox Court House	Princess tree, tree of heaven, multiflora rose, Japanese honeysuckle, Johnsongrass, Japanese stiltgrass, Japanese barberry, Chinese wisteria, bull & Canada thistles, crowned vetch, privet, mimosa tree, mulleins, periwinkle, spotted knapweed, chicory
Booker T. Washington	Kudzu, Johnsongrass, tree of heaven, Japanese honeysuckle, Japanese stiltgrass, gorse
Colonial	Princess tree, tree of heaven, Asian bamboo, privet, Japanese knotweed, oriental bittersweet, non-indigenous wisteria, Phragmites, kudzu, English ivy, Japanese honeysuckle, Johnsongrass, periwinkle, Japanese stiltgrass, multiflora rose, mimosa, wineberry, barberry, gill-over-the-ground, non-indigenous thistles
Fredericksburg & Spotsylvania	Multiflora rose, tree of heaven, Japanese honeysuckle, English ivy, periwinkle
George Washington Birthplace	Autumn olive, Phragmites, English ivy, periwinkle, non-indigenous grasses, multiflora rose, Japanese honeysuckle, giant mullein
Petersburg	Tree of heaven, Johnsongrass, privet, Japanese stiltgrass, Japanese honeysuckle, Asian bamboo, mimosa, Chinese lespedeza, multiflora rose, periwinkle
Richmond	Tree of heaven, privet, mimosa, Japanese honeysuckle, oriental bittersweet, princess tree, English ivy, Johnsongrass, Japanese stiltgrass, multiflora rose

Table 16.2. Targeted invasive species, by priority, for parks within the Virginia Subcluster.

- VIVMT specialists at all eight parks trained host-park staff. Training included botanical species identification, integrated pest management, specific control techniques, and herbicide use safety.
- Monitoring plots were established at five parks.
- Treatment site records were established for all eight parks that incorporate GPS, U.S. Geological Survey quad maps, and aerial photography imaging via ArcView. The resulting database includes directions to treatment sites and monitoring plots, field evaluation data, herbicide usage data, and ground-photography referencing. A centralized database contains all Subcluster data. From that, park-specific information in database form was transmitted to each park at the end of FY 2000, and will be again at the end of FY 2001.
- Organizational capacity was increased at all eight parks by acquiring tools for efficiently implementing invasive vegetation management and enhancing staff understanding of the program.
- Public information pieces were promulgated including op-ed news releases; television, radio, and newspaper interviews; and posters.

Park-by-park treatments

What follows are descriptions of control activities at each park within the Subcluster. Brief invasive species descriptions are in Table 16.3. These species occur virtually throughout Virginia and are merely a representation of the overall challenge.

Appomattox Court House. Documenting candidate treatment sites for monitoring and data tracking in advance of fieldwork were the highest park-driven priorities. Therefore, 2000-2001 treatment sites were set up, recorded by GPS, and documented. Pretreatment surveys were conducted at several locations. To date, field treatments of princess tree (*Paulownia tomentosa*), tree of heaven (*Ailanthus altissima*), and multiflora rose (*Rosa multiflora*) were accomplished on 5.1 acres at the park.

Booker T. Washington. Over the course of 3 four-day visits, seven invasive species were treated, totaling 39 acres at the park. Treated species include tree of heaven, mimosa tree (*Albizia julibrissen*), kudzu (*Pueraria lobata*), Japanese stiltgrass (*Microstegium vimineum*), giant mullein (*Verbascum* spp.), gorse (*Ulex europaeus*), and Johnsongrass (*Sorghum halepense*). Follow-up retreatment was accomplished on 3.1 acres of tree of heaven and stiltgrass. As part of the cooperative, the Appomattox Court House resource specialist treated 15 acres of Johnsongrass using a farm implement that wipes herbicide upon the taller Johnsongrass stalks. Herbicide for that action was furnished through project funding. As a result of the spirit of cooperation in this project, the farm implement is available for use by other Subcluster parks.

Colonial. Work focused on Jamestown Island, but Yorktown also received treatment. Seven species were treated, totaling 33 acres, during the course of 23 days over four visits to Colonial. Treated were tree of heaven, princess tree, privet (*Ligustrum* spp.), Oriental bittersweet (*Celastrus orbiculatus*), English ivy (*Hedera helix*), Japanese honeysuckle (*Lonicera japonica*), and Japanese barberry (*Berberis thunbergii*). Plans are going forward to treat kudzu on the Colonial Parkway in the spring of 2001.

Fredericksburg and Spotsylvania. Five species were controlled on 22.7 acres at the park. This took place over the course of 28 days in four visits to the park. Treated were tree of heaven, multiflora rose, Japanese honeysuckle, Oriental bittersweet, and bamboo (*Phyllostachys aurea*).

George Washington Birthplace. Autumn olive (*Elaeagnus umbellata*), privet, common reed (*Phragmites australis*), tree of heaven, and periwinkle (*Vinca major/minor*) were treated during the course of 23 days over four visits to the park. Six sites were treated, totaling 25.2 acres. Follow-up retreatments were accomplished on 0.1 acre.

Petersburg. Tree of heaven, privet, multiflora rose, Johnsongrass, crown vetch (*Coronilla varia*), silver poplar (*Populus alba*), Oriental bittersweet, and Japanese honeysuckle were treated during a period of 27 days in four visits. Eighteen sites were treated totaling 29.8 acres at the park. Follow-up retreatments were accomplished on an additional 8.8 acres.

Richmond. Eight sites were treated totaling 11.7 acres. Tree of heaven, mimosa tree, privet, autumn olive, Japanese honeysuckle, and Oriental bittersweet were treated. The VIVMT crew had 22 on-site workdays over the course of three visits.

Shenandoah. Work concentrated on three species: Oriental bittersweet, princess tree, and tree of heaven. Two general areas were treated totaling 32.8 acres, including Big Meadows and the North Fork of the Moormans River. VIVMT conducted 16 on-site workdays.





Tasks remaining for FY2001

- Complete a strategic plan for one remaining park (Shenandoah).
- Continue initial and follow-up invasive controls at all parks.

- Install additional monitoring plots at all eight parks.
- Coordinate with all parks to continue invasive controls and monitoring beyond FY2001. Continue field training of park staff in vegetation controls and monitoring protocols.

Table 16.3. Brief descriptions of some prominent invasive species in the Virginia Subcluster.

Description	
	<p>Tree of heaven (<i>Ailanthus altissima</i>) Distinguishing characteristics: Large leaves, having 11-41 leaflets, not toothed except for a pair of gland-tipped teeth near bases. Bark is gray-brown, smooth or with light brown grooves. Clusters of small yellow flowers. Scent is said to resemble burnt peanut butter. Colonial National Historical Park photo.</p>
	<p>Johnsongrass (<i>Sorghum halepense</i>) Distinguishing characteristics: Large dense clumps with long smooth leaves and white mid-vein. Produces red-brown seeds. Can reach anywhere from 2 to 8 ft in height. Colonial National Historical Park photo.</p>
	<p>Kudzu (<i>Pueraria lobata</i>) Distinguishing characteristics: An aggressive vine that forms a continuous blanket of foliage. It has large leaves with small purplish pea-like flowers. This vine has the potential to grow up to 60 ft per season. Colonial National Historical Park photo.</p>
	<p>Multiflora rose (<i>Rosa multiflora</i>) Distinguishing characteristics: Leaves are 4-12 in long with 7-9 leaflets; stipules are deeply fringed. It has numerous white flowers. Colonial National Historical Park photo.</p>

	<p>Common reed (<i>Phragmites australis</i>) Distinguishing characteristics: Perennial wetland grass 3-13 ft tall. Strong rhizomes grow on or beneath the ground surface. Tough vertical stalks support sheath-type leaves near the base and tapering to a point. Foliage is gray-green during the growing season, with purple-brown seed plumes appearing by late June. Colonial National Historical Park photo.</p>
	<p>Privet (<i>Ligustrum</i> spp.) Distinguishing characteristics: Lance or oblong evergreen, opposite leaves, 1-2 in long. Tubular flowers, in dense panicles. Usually shrubby up to 20 ft tall. Colonial National Historical Park photo.</p>
	<p>Oriental bittersweet (<i>Celastrus orbiculatus</i>) Distinguishing characteristics: Shiny, green, nearly round leaves are found on dense vines. The plant's vine base is often thick and woody. Flowers are green and the berries are bright orange with a yellow sheath. J. Swearingen photo.</p>
	<p>Princess tree (<i>Paulownia tomentosa</i>) Distinguishing characteristics: Large, paired, heart-shaped leaves, velvety and hairy on the underside. The trunk is slightly rough with some smooth areas that are at times shiny. It has large clusters of purplish flowers. Colonial National Historical Park photo.</p>

Program sustainability

Activities and expenditures of the VIVMT project are aimed at creating a sustainable program of invasive vegetation control to preserve and protect native park species and resource values. Elements of sustainability have come from (1) on-site

training, (2) on-the-ground work and cooperation, (3) inter-divisional and inter-park cooperation, and (4) acquisition of specific tools of the trade. The VIVMT is equipped to conduct vegetation control and site restoration into the future. A number of acquisitions also directly benefited participating parks in an effort to out-plant organizational capacity to deal with invasives. Each park was provided an invasive management “tool kit” with application tools, safety equipment, and supplies. Each park provided input to refine the items and quantities it received.

Conclusions

The first year of the VIVMT program has been very successful. Through it we have garnered outside expertise on invasives and begun to take on the difficult job of assessing, treating, and monitoring invasive vegetation in the eight parks. We have been delighted by the enthusiasm shared within the Subcluster. Funding has allowed us to increase organizational capacity for future invasive management efforts at each park. Together, the funding, expertise, and cooperation are enabling us to create sustainable programs that are so necessary if we are to adequately control the impacts of invasives on our natural and cultural resources. The challenge of alien invasives is large. It will take a sustained campaign to reduce targeted species to manageable levels.

Reference

Hiebert, Ronald D., and James Stubbendieck. 1993. *Handbook for Ranking Exotic Plants for Management and Control*. Natural Resources Report NPS/NRMWRO/NRR93/08. Denver: National Park Service, Natural Resources Publication Office.