

Citizen's Guide to the Control of Invasive Plants in Wetland and Riparian Areas



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Table of Contents

Part 1: Introduction to the Impact of Invasive Plants	1
Invasive Plants Defined	1
Ecosystem and Economic Costs of Invasive Plants	2
About this Manual	3
 Part 2: Volunteer Recruitment, Deployment and Retention	 5
Why Use Volunteers	5
Steps for Planning a Project Using Volunteers	6
Volunteer Recruitment and Publicity	7
Work Day Agenda	8
Safety	9
Supervision	10
Volunteer Retention	10
 Part 3: Invasive Plant Control Techniques	 11
Special Considerations in Riparian and Wetland Areas	11
Keeping Records	12
Plant Identification	13
Plan to Monitor	13
Control Methods	14
 Part 4: The Case Studies	 18
One-Time Events	
Dauphin County Parks & Recreation and Alliance for the Chesapeake Bay	21
Friends of the Patapsco Valley Heritage Greenway	24
Regular Work Days	
Maryland Native Plant Society and Sierra Club Maryland Chapter	27
Northern Virginia Conservation Trust	31
Independent Volunteers	
The Nature Conservancy Maryland/DC Chapter	33
Maryland - National Capital Park and Planning Commission	36
 Appendices	
A. Invasive Plants of Maryland, Pennsylvania, and Virginia	
B. Related Resources	
C. Example Outreach and Volunteer Forms	
D. Regulation of Herbicides	

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Japanese Honeysuckle climbs a fence to invade a riparian area in Dauphin County, PA



Multiflora Rose invades edge of wetland in Lancaster County, PA



English Ivy spreads up a mature tree in Montgomery County, MD

Part 1: INTRODUCTION TO THE IMPACT OF INVASIVE PLANTS

Throughout the Chesapeake Bay watershed, citizen groups have made considerable progress in their efforts to restore native vegetation in riparian areas and wetlands. State and federal assistance from programs such as the Stream ReLeaf initiative, Conservation Reserve Easement Program (CREP) and Pennsylvania Growing Greener have produced many new miles of riparian buffer. Audits of the survival of these new buffers indicate that encroachment by invasive plants prove a substantial threat to these fledgling buffers. Effort and vigilance are required to prevent the takeover by invasive plants of native vegetation, particularly in crucial riparian and wetland settings.

This booklet offers a survey of the efforts of a variety of groups that have mobilized volunteers in an effort to control invasive plants in natural areas. It is hoped that the case studies presented can provide motivation and methods for recruiting and deploying volunteers charged with the task of invasive plant control.

Invasive Plants Defined

Invasive plants can be defined as those plants that are non-native, grow aggressively, and can often dominate whole native communities and crowd out existing native plants. Where they dominate, the native ecosystem can become degraded for all of its inhabitants, from native plants to insects, birds and animals. Not all non-native plants are invasive. Those considered invasive have the following traits that help them out-compete native plants and dominate an entire plant community:

- Aggressive spreaders and/or prolific reproducers
- Adapt to a variety of conditions
- Have few natural controls in their new habitat
- Are difficult to control or eliminate once established



The Impact of Garlic Mustard

The impact of garlic mustard (*Alliaria petiolata*) on the native ecosystem in wooded areas is a good illustration of the multiple impacts invasion of a non-native plant can have on an ecosystem. This plant can quickly establish itself, even in relatively undisturbed forest and replace the existing herbaceous understory, particularly spring ephemerals (wildflowers).

Not only does an invasion of garlic mustard eliminate diversity of herbaceous plants but it has also been found to be a population sink for the West Virginia white butterfly (*Pieris virginiensis*). The butterfly misidentifies garlic mustard as a host plant when it lays eggs. The eggs laid on garlic mustard do not hatch due to the inhospitable chemical properties of the plant. Additionally, garlic mustard changes soil chemistry in areas it infests resulting in a change in the numbers of earthworms and salamanders in the infested area.

Ecosystem and Economic Costs of Invasive Plants

Invasive plant species can destroy natural habitat and threaten endangered plants and animals in riparian and wetland areas directly, by smothering and covering native flora. They have also been observed to cause changes to the native ecosystem as a whole, resulting in decreased numbers and types of native organisms supported by the invaded area.

The invasion of aggressively spreading non-native plants has increasingly been recognized as one of the greatest threats to biodiversity and the management of natural areas in this country. Invasive plants impact the biodiversity of native ecosystems through three processes, each related to the successful adaptive techniques found in invasive plants. These processes have been documented in a number of scientific studies and are summarized by the Virginia Department of Conservation and Recreation¹.

1 - Change of Function

One process that occurs as an invasive plant species begins to dominate a native system is the alteration of the native ecosystem processes and regimes to which native plants and animals are adapted. Documented changes in a native ecosystem after invasion of an aggressive non-native plant include changes in erosion and sedimentation rates, changes in water and moisture levels, and changes in the native system's nutrient levels and patterns. An example of changes in local water and moisture levels resulting from invasive plant infestation is the occurrence of drying observed in wetlands invaded by purple loosestrife (*Lythrum salicaria*). Loosestrife forms dense mats of substrate that can begin to fill in wetlands. Eventually, moisture levels in the invaded wetland decrease significantly impacting the important water quality functions of the wetland.

2 – Loss of Native Plants

A second process associated with invasion of a non-native plant is a change in the community structure as a new and highly aggressive invading plant adds an additional layer to a native community. The new plant increases competitive pressure for light and nutrients in the community and can result in the loss of many native plants. English ivy (*Hedera helix*) adds such a dense layer to the understory of wooded areas, growing along forest floor and up trees killing and shading natives.

3 – Prevention of Native Plant Regeneration

A third component of the threat is the change over time in the composition of the entire community as a successful and aggressive invasive plant competitor takes over a plant layer. In many cases the invader also impacts regeneration in other layers because of the density of the infestation or other factors. An example of this is invasion of Japanese knotweed (*Polygonum cuspidatum*) along riparian areas. An invasion can result in the elimination of all other understory vegetation and over time can threaten the regeneration of trees.

The economic impact nationwide of invasive plants in terms of direct costs was estimated in 1993 to be \$3.6 to \$5.4 billion annually. Some of these costs pertain to agriculture and grazing and some to degraded natural habitats that have lost value for hunting, fishing and tourism.

Recognizing the impact of invasive species on both the environment and the economy, President Clinton authorized Executive Order 13112 in 1999. The executive order defines an invasive species as one that is non-native to the affected ecosystem and whose introduction causes or is likely to cause harm to economic enterprises, the environment, and/or human health. It directs federal agencies to prevent the introduction of invasive species and provide for their control to minimize the economic, ecological, and human health impacts that invasive species cause. This order set up the Federal Invasive Species Council and authorized the development of a national invasive species management plan.

About This Manual

The biology of many invasive plants makes their control seems to be impossible with current levels of resources. The seedbank for many of these plants appears endless – by nature many of the plants on each state’s invaders list exhibit several successful strategies for reproduction and regeneration. All this said – groups of volunteers are making a difference in controlling invasive plants. The case studies presented in this manual are just a fraction of the work occurring in Pennsylvania, Maryland and Virginia in our parks and conserved lands. They are presented as a model for other similar organizations to mobilize volunteers for the control of invasive plants.

Riverfront Park Wilkes Barre, PA: Personal Security Concerns Caused by Japanese Knotweed Infestation

Before control efforts began in Wilkes Barre’s Riverfront Park, over 15 acres around a riverside nature trail were completely dominated by Japanese knotweed. Despite extensive use of the open areas of the park by local residents, few ventured along the trail because the inability to see through the dense understory resulted in concerns for personal safety.



A knotweed control project was begun in 1999 along the trail. The park’s Friends group with assistance from the Cooperative Extension Urban Forester, Vinnie Cotrone, planned control measures that would best use their limited resources. The group began working with volunteers to cut knotweed in June. The cutting was followed in July by spraying of the resprouted plants with glyphosate, by a certified pesticide applicator. The process has continued for three years, resulting in far less knotweed and the reemergence of the native herbaceous understory. The control of knotweed has also led to an increase in trail use by local residents.



Mayfly and Multiflora Rose

Multiflora Rose (*Rosa multiflora*) is a plant invader along riparian areas in the Chesapeake Bay watershed. The impact of an invasion of multiflora can be felt not only by the native plants that it crowds out but also by instream communities. Research done by Stroud Water Research Center, in Kennet Square, PA, looked at the feeding preferences of mayfly for non-native leaf litter. Mayflies are an important macroinvertebrate shredder in most waterways in the Chesapeake Bay watershed. Stroud found that when offered multiflora rose leaves, the mayfly will refuse to feed even when no alternative food is available. It is expected that as multiflora rose begins to dominate riparian vegetation, the large percentage of multiflora leaf litter in-stream will result in a change in the composition of the macroinvertebrate population. This in turn will impact the in-stream food web of which mayflies are an important part.

The manual emphasizes the use of volunteers for a number of reasons.

- Volunteers learn first hand about the dangers of invasive plants and can communicate the information to neighbors and friends.
- Invasive plant control, particularly in sensitive areas, can be very labor intensive, often requiring targeted herbicide application or extensive hand-pulling of plants. Trained volunteers are an inexpensive and high-quality source of labor for such projects.

Part 1 of this manual gives a short introduction to the impact of invasive plants. Part 2 provides an overview of suggestions for the recruitment and retention of volunteers. This is followed by Part 3, Invasive Plant Control Techniques, which focuses on control methods appropriate for use by volunteers. The six case studies of Part 4 illustrate several successful models of volunteer engagement in invasive plant control. Appendix A gives a summary list of the current invasive plant lists for Maryland, Virginia and Pennsylvania, as compiled by organizations in cooperation with the state natural resources departments. This chart includes a brief summary of control methods for each of these plant, as recommended by various resources. An annotated bibliography of resources appears as Appendix B. Appendix C includes examples of volunteer fact sheets, sign-in sheets, waivers, and press releases. Appendix D provides an overview of state and federal regulation of herbicides.

¹Heffeman, K.E., et al. Ranking Invasive Exotic Plant Species in Virginia. Natural Heritage Technical Report 01-12. Virginia Department of Conservation and Recreation. Richmond, VA. 27 pp.

Part 2:

Volunteer Recruitment, Deployment and Retention

Why Use Volunteers

Engaging volunteers in environmental restoration projects can yield multiple benefits to the environment and to the organizing group.

- Volunteers can expand the project area and stretch limited project funds.
- Volunteers used for initial invasive plant control can subsequently provide long-term monitoring becoming the eyes and ears of a restoration project.
- Volunteers will learn first hand the impact of invasive plants on the environment.
- These informed volunteers can in-turn spread the word about the impact of invasive plants.
- All volunteers are also potential members of a volunteer organization.

Volunteer involvement in invasive plant removal falls into three broad categories: (1) one-time events, often making use of a large number of volunteers to control one species, (2) regular volunteer work days - usually monthly on a consistent day (for example the first Sunday of the month) and (3) independent volunteers that have been trained and certified to monitor and remove invasive plants in a designated area. Each level of involvement is appropriate for certain types of projects and to the resources of different conservation organizations.

One-time events require a large amount of up-front planning and coordination. Single events are a good way to remove large amounts of invasive plants from an area. A smaller group of monitors can return to remove any plants missed by volunteers and control resprouts. This approach, however, is not for all sites. Some sites could be damaged by large numbers of volunteers working on the site, and some control methods may be inappropriate or dangerous for large group use. Regular volunteer work days can be appropriate for the long-term maintenance and control of invasives in an area. This type of project





The Psychology of Volunteering

A psychological study into the motivations of individuals that volunteer for environmental restoration projects indicates “doing something meaningful” and “fascination with nature” are valued as the two highest ranked benefits of this type of volunteer work. These findings can be used to better recruit and retain volunteers by reminding organizers to provide information about the impact of restoration work to the surrounding ecosystem and the potential rewards such as attracting and supporting wildlife or native plant species through invasive removal. This can be communicated at several points: in recruitment ads, during orientation at the beginning of a workday and during the workday by showcasing the important natural features of a site.

will benefit from repeat and increasingly skilled volunteers. Routine work days require a sustained commitment from at least one organization member. The independent volunteer approach of invasive control involves the greatest amount of investment in volunteer training. It is very well suited to the monitoring of large project areas. The case studies in this manual include examples of each of the engagement categories.

Steps for Planning a Project Using Volunteers

The following are elements to consider when planning to use volunteers in a restoration project:

1. Determine project goals to delineate the focus area of your project. Remember that the project will require monitoring over time for resprout of plant material or the seed bank of an invasive plant.
2. Determine what control method will be most effective on the target plant(s) given the resources of your organization. Several Internet sites have excellent control write-ups be sure to consult several sources.
3. Identify any organizations that may want to form a partnership. Partner organizations can provide additional sources of volunteers and will also add buy-in from additional community members.
4. Identify all landowners associated with the project area and adjacent areas to obtain permission to work on the land.
5. Identify potential liabilities and develop a legal waiver form. An example waiver is included in Appendix C.
6. Before recruiting volunteers for a project, evaluate the project needs to consider the physical scope of the project and determine tasks that can be preformed by volunteers. Determining required numbers is important both to plan for adequate volunteer supervision and to consider the extent of advertisement the project will require. The optimal outcome is to obtain enough volunteers to accomplish the task within a workday of 4-6 hours. Volunteers should feel that their effort in showing up at the site is important. Though the idea may seem contradictory, too many volunteers can be a negative. Not only will they present management problems but too many volunteers will also diminish an individual volunteer’s belief in the value of his or her service and thus his or her likelihood to volunteer again.

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7. Finally, when planning for an event consider:
- transportation
 - parking
 - snacks and water
 - restrooms
 - required equipment (example: gloves or pruners)

Volunteer Recruitment and Publicity

Conservation organizations have successfully recruited volunteers by using one or a combination of publicity strategies. Among them are:

- Flyers/posters: mailed, posted or taken door to door
- Media: newspaper, radio or TV either through press releases that generate a story about the project or in established “Volunteers Wanted” features
- Personal Contact: phoning or canvassing area residents
- Organization newsletters – your own and other organizations
- Websites
- Corporate sponsors

Another useful avenue for volunteer recruitment is through forming project partnerships with citizen organizations. Some of these potential partners include neighborhood groups, service groups (such as Rotary, Lions and garden clubs); schools; religious groups; master gardeners; scouts and centers for aging.

When writing flyers, media releases or making phone calls, communicate a connection between the project and the individual by stressing the project’s proximity to a community, or importance to an ecosystem that impacts that community. This may include the site’s importance in supporting wildlife or protecting an upstream source of drinking water. Also, be positive and enthusiastic. Make your recruits want to get involved. If you are recruiting by phone, don’t leave a conversation open ended – get a commitment.

When recruiting, remember to communicate the skills/capabilities required of the volunteers and develop a job description before you begin to recruit volunteers. Consider ahead of time who you are looking for in terms of age, education and physical ability. Also, consider creating roles for those who may not be able to perform some of the more difficult physical or technical tasks.



PUBLICITY

All publicity should answer the questions Who? What? Where? and When? Flyers, posters or media releases should include:

- date, time and place
- rain dates
- sponsors
- directions or a means to get them
- a contact person’s phone number
- restrictions in age or fitness
- required pre-registration
- other qualifications
- equipment needed (for example gloves)

Make the Public Aware of Your Project

Posting a “Volunteers at Work” sign during work days will build awareness in the public about the threat of invasive plants to natural areas. Consider using a sign that describes the threat of the target plant to the work area and provides a phone number or web site for more information and, if appropriate, information about volunteering.

A sample media release is included in the Appendix C with critical features in italics. Make sure you follow-up a press release with a phone call. If possible, target the appropriate reporter; this could be the local reporter for your community, the gardening editor or the environmental editor. Several web resources can guide you in more effectively communicating with the media. These include:

- www.green-room.org for an overview of techniques for working with the media written for environmental groups.
- www.Newspaperlinks.com is a complete resource for finding area newspaper web links
- www.journalism.org gives pointers for communication with the media

Be sure to also add your project to a list of volunteer opportunities in the local paper.

Work Day Agenda

A volunteer opportunity will be perceived as more rewarding if you take the time to inform the participants about many aspects of the project. The workday or work shift should begin with an orientation, which should include:

- Information about the special natural features of the project location
- An overview of the impact of invasive plants
- If applicable, describe how the project may be part of a larger project
- Identification of the target plant(s)
- Removal techniques
- Safety precautions

Take time throughout the work shift to point out interesting features of the project area. If your resources will allow, provide a plant description/drawing for each participant to help them continue to identify the target plant throughout the day and to keep as a future reference.

If you can, provide snacks, drinks and perhaps lunch to your volunteers. If you do not plan to provide food and drink, communicate that in recruitment information.

Safety

The following is a list of concerns to include in your safety briefing and should be repeated as reminders throughout the workday. Some parts of this list may seem obvious; however, volunteers are of many backgrounds and experiences. The adage 'it's better safe than sorry' applies when leading volunteers. Louisa Thompson of the Maryland Native Plant Society developed this list during her many years leading volunteers in restoration projects.

- Ask that volunteers do nothing they consider unsafe
- Carefully explain tool or if applicable herbicide safety precautions
- Alert volunteers to hazards such as poison ivy, ticks and sunburn
- Alert them of slippery surfaces
- Remind them to drink plenty of water and wear gloves
- Instruct volunteers to carry long-handled tools vertically - not horizontally and to place unused tools in such a way that they cannot be hazards
- Minimize use of sharp-edged tools.
- Space volunteers well apart when using sharp tools
- Explain safe use of all available tools

Perhaps the most significant safety risk to volunteers working in a natural area in the Chesapeake Bay watershed may be from deer ticks with lyme disease. The disease is prevalent in areas in which deer or mice hosts are present. The deer tick transmits the lyme disease bacteria to its host after attaching; transmission does not occur until at least 36 hours after attachment to the host. The nymph phase of the deer tick occurs in spring and summer. During this phase the tick is nearly impossible to see and so presents a greater risk of attaching undetected to humans. The ticks prefer a moist and shaded environment.

Precautions for personal protection against deer ticks include wearing light-colored, fully covering clothing so that the ticks can be more easily spotted. The ticks tend to be present close to ground level therefore, tuck pants into socks or boots to prevent entry under pant legs. An insect repellent containing DEET will also reduce risk of tick attachment. For more information about lyme disease visit the Centers for Disease Control web site at <http://www.cdc.gov/ncidod/dvbid/lyme>.

Safety Tips For Herbicide Use

Developed by Louisa Thompson

- Herbicide should only be used by authorized volunteers according to state regulations
- Follow label directions scrupulously.
- If kept in small jars, a copy of the label should be kept with the herbicide
- Provide disposable, chemical resistant gloves for handling herbicide - bring enough to replace torn ones
- Carry disposable wet wipes and water for rinsing
- Provide plastic trash bags for glove and wipe disposal



Supervision

The ratio of supervisors to volunteers can vary depending on the experience of the volunteers and the complexity of plant identification. Those who supervise volunteers should expect to spend very little time actually doing the control activity. Paying attention to the volunteers can take all of a supervisor's time. Volunteers should be redeployed and checked to make sure they continue to recognize the target plant and that they are working safely. Ideally a 10:1 ratio of volunteers to supervisory help should ensure efficient, effective and safe use of volunteers.



Volunteers will work regardless of the weather when they understand the importance of the work. Above is a group at Ruth Swann Park in Maryland on a day with high temperatures around 20 degrees. Below is a weeding group working along the Middle Patuxent in MD in temperatures in the 90's.



Volunteer Retention

Several factors have been found to improve volunteer retention and were often found to be integrated into the volunteer projects surveyed for this booklet. Some rules of thumb include:

1. Be sure to communicate the importance of the work done by the volunteers as part of a larger purpose. Information to communicate includes detailing the threat of invasive plants to the diversity of a setting, describing the importance to the ecosystem of healthy riparian, wetland or other natural settings, and describing the specific plants and animals impacted by invasives within the project area.
2. Give volunteers enough to do so that they feel that their time is being put to good use.
3. Provide opportunities to the volunteer throughout the day to be fascinated with nature. That is, help point out the elements of the natural setting that are particularly special in any location. This can be as simple as pointing out a rare native plant, an animal trail or exceptional tree specimen.
4. Show appreciation for each volunteer. A sincere, "thank you for coming out," is very important, as is a follow-up thank you note or certificate for a one-time project. Volunteers in the Weed Warrior program are given a certification card and cap and the Restore Corps ailanthus project gave tee shirts to all volunteers (see Case Studies for information on these projects).

Part 3:

INVASIVE PLANT CONTROL TECHNIQUES

Special Considerations in Riparian and Wetland Areas



Invasive plants threaten the special functions of riparian vegetation sometimes overrunning native vegetation or preventing the long-term sustainability of native riparian vegetation in invaded sites. Non-native species can degrade the habitat for wildlife and diminish the pollution prevention capacity of a vegetated buffer.



Some invasive weed species are known to quickly overrun and choke a new buffer planting. A survey of riparian forest buffer survival and success in Maryland¹ finds that competition from weeds was the most common problem in the surveyed plots. Thirty-five percent of the surveyed plots were deemed to be impaired by weeds. The most common invasive plants found on the survey plots are (in order of frequency): biennial thistle (*Cirsium vulgare* or *Cardus nutans*), multiflora rose (*Rosa multiflora*), Canada thistle (*Cirsium arvense*), Japanese honeysuckle (*Ligustrum sinense*), mile-a-minute (*Polygonum perfoliatum*), and ailanthus (*Ailanthus altissima*).

An informal survey of 99 sites in Pennsylvania also found a strong inverse relationship between buffer survival and weed competition. The most common invasive plant found in this survey again was multiflora rose followed by Canada thistle, purple loosestrife, Japanese honeysuckle, and ailanthus.



Invasive plant control in riparian and wetland areas should be approached with caution for a number of reasons:

1. Proximity to water makes chemical contamination of surface and ground water much harder to avoid or impossible to control.
2. Riparian and wetland areas are critical habitat areas for a large number of wildlife species. Invasive plant control can disturb or destroy habitat.
3. Mechanical removal of invasive plants can lead to erosion and resulting siltation of the waterway.

These considerations should influence the choice of control method. The presence of water in or near a control area creates a far greater

risk for spreading herbicides beyond the target plant. In riparian or wetland sites ground water is typically closer to the surface. Any active herbicide residue or components from herbicide breakdown have a shorter distance to travel as runoff before reaching water.

When invasive plants have invaded wetland or riparian areas the habitat value of the area may be reduced; however, the area may still provide nesting sites for many animals. Wildlife present in the area may be disturbed by efforts to mechanically or chemically remove invasive plants. If possible, time any removal effort for periods when nesting does not take place, either before April 1 or after September 30, in the Chesapeake Bay region. For some invasive plants timing of control is critical and may fall within the nesting time.



Japanese knotweed is cut in June and will be sprayed with glyphosate after it reaches knee height. This method will reduce the amount of herbicide used and has been found to be effective in reducing the size and density of a knotweed infestation.

Mechanical removal of invasive plants can loosen the soil and potentially cause erosion. If timed correctly to prevent seed development, the removal of most annual plants does not require the removal of root systems that hold soil in place. However, effective mechanical removal of many biennials and perennials will require the removal of the root system or additional cutting to weaken the plant and prevent resprout. Disturbed soil not only creates the potential for erosion but it can also be an avenue of entry for other invasive plant species. Several techniques can minimize the risk for erosion, they include leaving vegetative strips that will slow and filter run-off, using erosion control materials, and mowing or cutting the invasive followed by hand applied herbicides.

Keeping Records

Keeping records of invasive plant control will serve a number of purposes. At a riparian buffer restoration site it will help to remind where the seed bank may exist for future monitoring and control. Records will also enable the evaluation of particular control methods or provide details for evaluating man-hours required to clear an area of a particular invasive. Useful records can be as simple as a map and workday log. A map should show the location of plant control efforts in detail. A site map sketch, an existing trail map, or orienteering map could be used. A log of the day's activities should include:

- Types and numbers of plants pulled in a delineated area
- Native plants in the area
- Soil type
- Disturbance history of site
- Numbers of volunteers and workday length

Plant Identification

Concern that a plant may be an invasive may be raised when a plant appears to possess an invasive plant's typical qualities. When a plant seems to be spreading aggressively, or grows back quickly and tenaciously after weeding, it should be identified to research appropriate control methods. Also, if a plant appears to be encroaching on or over-running plants in a natural area of concern, identification and control may be appropriate. At present, no keys exist for the invasive plants of the Bay Region. Sample plants should be cut and if possible identified by using plant identification resources on the web and in your library. A list of some of those resources is included in Appendix A. If those resources cannot help you make a positive identification, call your county Conservation District office or Cooperative Extension office to arrange identification of the sample.

Many invasive plants look similar to one or more native plants. Your research should include an understanding of how the invasive plant differs from similar natives. It is recommended that you check at least two sources to confirm identification and research control methods.

Plan to Monitor

Invasive plant control requires significant resources of time and effort if not money. Perhaps the most important element in invasive plant control is to anticipate the need to monitor for regrowth after the initial control effort is complete. Many invasive plants are prolific seeders whose seedbank may remain viable for a number of years. Regeneration of the plant through plant parts missed during removal can and will occur as well. A natural area disturbed by removal of one invasive species may also become invaded by another invasive species. If regrowth is not controlled early, a group's initial control efforts will need to be repeated, wasting valuable resources.

Restoration sites that may not have contained invasive plants at the time of restoration, may develop an unanticipated infestation due to the disturbance associated with planting. Monitor restoration sites as well! Many newly fenced riparian buffer sites that had formerly been grazed have been besieged with formerly unseen invasive plants. For example, many fenced riparian zones in Lancaster County, PA have sprouted complete covers of Japanese hops (*Humulus japonicus*) within a growing season of fencing.

Plan to monitor for invasive plants in spring and fall for several years after removal and restoration efforts.

Goats: Not a Baaad Idea

It's true that goats will eat nearly anything. Wildlands Conservancy in Emmaus, PA is one group that has taken advantage of their voracious appetite to control invasive

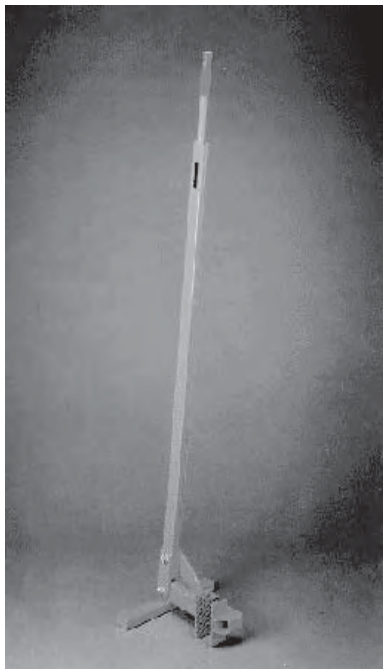


plants. Goats actually show preference to eating multiflora rose and will prune back the plant to a more manageable size making it easier to manage with a saw or basal bark application of herbicide.

Wildlands has found moveable fencing to be the best way to manage goat grazing. Goats can be very skittish and can be hurt by a chain tether.



Root Talon



Weed Wrench

Control Methods

Choice of control method is based on a number of considerations: the size of the infestation, the amount of vegetation that should be retained, and resources available to the group (both labor and money). Broadly, control methods fall into three categories:

- Mechanical alone
- Mechanical with application of systemic herbicide
- Herbicide alone

Mechanical Control Methods

Mechanical methods are those that stop the invasive plant from growing and spreading without the use of chemical herbicides. Methods used depend on the plant, the location and the resources available. Among them are:

- Hand pulling
- Cutting
- Pulling with tools
- Mowing
- Grazing
- Covering
- Brush hogging or bulldozing

After conclusive identification of the plant invader, consult several resources for the best control methods. The web has the most up-to-date set of suggestions. A listing of many of the web sites devoted to invasive plant identification and control appears in the Appendix B. Two of particular note for control discussions are: <http://tncweeds@ucdavis.edu> and <http://www.IPCNYS.org>. The IPCNYS site includes a weeds directory with input from multiple land managers detailing their experience in controlling particular plants.

If the plant to be removed is an annual, removal and disposal of the flower or seed head may be the only control required. Timing of removal of the flower or seed head should be considered to prevent the development of a second flower before the end of the growing season and also to prevent seeds from beginning to disperse. Some seeds will form even on flower heads that have been removed from the plant like those of garlic mustard (*Alliaria petiolata*), so disposal of the flower head in a landfill is important. When appropriate, mowing with a string trimmer or mower can be a good way to control large areas of annual plants.

Repeated cutting or mowing of a perennial or woody plant can effectively deplete the plant's energy stores. This procedure must be repeated several times over several years to completely control a plant. Some of the invasive plants in the Chesapeake Bay region initially grow stronger after a total "pruning," but eventually even the most persistent plant can be controlled in this manner. Of course this method takes persistence and is not appropriate without strong commitment over many years.

In certain settings using goats or sheep for control of certain invasives is effective. Typically the animals are fenced into the control area and are rotated out to ensure that they will not overgraze other vegetation.

Typically, plants considered invasive are not easily killed. For example, *Ailanthus* will return with greater vigor when girdled. For this reason, the root system of most perennials and woody plants must be removed to prevent regeneration. Several tools can be very helpful for removing the roots of perennials and woody plants. Depending on the plants, spading forks, screwdrivers and weed talons are helpful with small to medium sized plants. The weed wrench provides a lever effect for removing the plant and root system of small trees and medium to large shrubs. If possible, wait for conditions when the ground is wet and pulling is easier, allowing for a thorough removal of the root system.

When an infestation is small and desirable plants are separated from the target plant, smothering a plant infestation with black horticultural fabric, cardboard or other covering that prevents light from reaching the plant is effective. This technique has been successfully used to cover and control small infestations of Japanese knotweed (*Polygonum cuspidatum*). The cover must stay over the infested area for at least 2 years.

When economically possible, larger equipment such as a brush hog is a very efficient way of controlling large infestations of woody shrubs in the right locations. A brush hog can clear many acres of multiflora rose in a fraction of the time that it takes for hand removal and prevents contact with thorns. Cost, access, and a greater potential for erosion are all considerations when choosing this method.



Targeting Herbicide Applications

The Pennsylvania Chapter of the Nature Conservancy has been controlling a phragmites infestation in a wetland preserve using targeted herbicide application. Volunteers are outfitted with pruners and dropper bottles of an aquatic form of glyphosate. After clipping the top of the phragmites plant the glyphosate is applied to the cut to kill the plant. Though highly labor intensive, this procedure has been found to be the best method of controlling small infestations of the plant.



A Few More Words About Glyphosate

Glyphosate is the most widely used herbicide in the world. Its annual sales are worth approximately \$1.2 billion annually. It is a broad spectrum, nonselective herbicide that works by inhibiting the shikimic acid pathway, a biochemical process of plants that does not exist in animals, making its toxicity in animals very low. However, other compounds contained in some formulations of glyphosate can be toxic to animals particularly in some formulations of the surfactant – that is the chemicals that make the glyphosate adhere to the plant.

Glyphosate has been found to be toxic to soil microorganisms, although it quickly becomes inactive in the soil.
Use with caution.

Herbicides

In some instances herbicides are appropriate to use - with caution. Herbicides are one type of pesticide. All pesticides are regulated in several ways: 1) use of any pesticide on property not owned by the applicator can only be done by a Certified Pesticide Applicator or someone working under a Certified Pesticide Applicator, 2) purchase of or use of *restricted use* pesticides can only be done by a Certified Pesticide Applicator, 3) pesticide recommendations can only be made by a Certified Pesticide Applicator. Check for the exact rules governing your situation with state authorities listed below. The decision to use herbicides should be made after assessment of the area to determine the level of infestation and occurrence of any native plants that should be preserved. For many invasive plants and infestation levels, careful application of appropriate herbicides may be the best management strategy. It is extremely important that the rules and best management practices of pesticide application be followed when this approach is used.

There are several methods of herbicide application:

1. Foliar
 - a. wipe-on
 - b. backpack sprayer
 - c. spray bottle
 - d. cut and spray
 - e. boom application
 - f. injection
2. Basal Bark
3. Pre-emergent (used primarily in newly planted areas)

Using Herbicides in Sensitive Areas

Some of the risk factors associated with using herbicides in sensitive areas have been addressed in innovative ways by conservation groups. Techniques using direct placement of a systemic herbicide to minimize drift to water or desired plants have been found to be highly effective, though labor intensive. Wiper applicators in various forms are used for direct placement, among them, herbicide dampened gloves (worn over a nitrile glove) used to wipe herbicide over the leaves of the target plant. This technique is used on purple loosestrife (*Ligustrum sinense*) in wetland areas by the Pennsylvania Chapter of the Nature Conservancy. Other wiper application methods include tongs with herbicide dampened sponges or sponge applicator bottles (sold for painting). The Nature Conservancy also uses droppers to deliver herbicide into cut stems of phragmites

(*Phragmites australis*). Generally, glyphosate and to a lesser extent triclopyr (sold as Garlon) are selected for direct applications in natural areas. Both are systemic herbicides - they travel throughout the plant and will kill the roots. Glyphosate has formulations for use in or near water, has limited persistence in the environment and does not harm animals.

Clearly, chemicals must be applied with pinpoint accuracy in wetland areas to avoid drift to desired plants and wildlife. An additional concern associated with using herbicides in wetlands involves oxygen depletion from the presence of decomposing plants in the water. Large amounts of dead plants should not be allowed to fall into the water and decompose.

Glyphosate is available under many product names and is a broad-spectrum, non-restricted use herbicide. It is formulated and approved for wetland and riparian settings marketed by Monsanto as Aquamaster™ and Dow as Rodeo®. These are virtually the same product – Glyphosate, N-(phosphonomethyl)glycine in the form of its isopropylamine salt. The product label is available on the web. An excellent, non-biased source for information on herbicides is the National Pesticide Information Hotline: 1-800-858-PEST.

Another herbicide often used in natural areas is triclopyr, marketed under the Garlon name. Like glyphosate, it is a systemic herbicide. It has a longer persistence in the soil and should not be used near water. It can be applied to basal bark on woody plants and is often recommended for ailanthus (*Ailanthus altissima*).

Several “alternative” herbicides have been found to be effective on some plants and in certain settings, such as 10% - 15% acid vinegar and corn gluten. The higher acid vinegar is hard to find but is currently being sold in some gardening catalogues. A spray of high acid vinegar has been found to be very effective on some herbaceous annuals. Corn gluten meal is the protein fraction in corn that can be used as a pre-emergent herbicide to inhibit root formation in a wide variety of grasses and broadleaf weeds during germination. Neither of these products has been tested by regulating authorities for efficacy and environmental safety.

¹ Maryland Department of Natural Resources Forest Service. Riparian Forest Buffer Survival and Success in Maryland. April 2001. Annapolis Maryland. Available on line: www.dnr.state.md.us/forests/publications



Wissahickon Valley Watershed Association: Controlling Multiflora Rose

The Wissahickon Watershed Association has been restoring the natural features of a property along a tributary to the Wissahickon over the past several years. The property is a former farm with extensive multiflora rose infestation that required removal before replanting the streambank with native riparian species. Bob Adams, the grounds manager, undertook the clearing with the help of a Boy Scout troop and a come-along tool. The come-along tool is a non-motorized winch. The volunteers, wearing protective clothing, wrap a chain around the base of the rose bush. The other end of the chain is attached to the winch that is in turn attached to a large tree. The rose bush is winched out – hopefully with the roots. Volunteers remove any roots that remain. Bob says the key to using the come-along is to attach as low on the bush as possible. He also suggests wrapping leather around fore arms to protect from scratching. He attaches the leather with duct tape.

Bob monitors regrowth and uses a shovel to pop out any resprouting plants.



Part 4: The Case Studies



ONE-TIME EVENT

Organizations:

Dauphin County Parks & Recreation and Alliance for the Chesapeake Bay

Program: RestoreCorps

Target Plant: Ailanthus

Contacts: Rebecca Wertime and Susan Richards

Program Overview

The Wildwood Lake Nature Sanctuary has provided a natural oasis to residents of Harrisburg, Pennsylvania since the early 1900's.

The park includes wetlands and a lake with several miles of hiking trails. Nestled between an industrial park and two major highways, the park none-the-

less attracts many species of waterfowl and is a stop-over for migrating birds. Although the park hosts many native plants and wildlife, it is also a poster child for the spread of invasive plants in a highly disturbed environment. A survey of the property in 1999 found 32 species of invasive plant. In the past few years, the park's volunteer group, led by volunteer coordinator Alan Marshall, has battled some of the most pressing invasions.



Volunteer Efforts

The Alliance for the Chesapeake Bay chose Wildwood Park to pilot a volunteer effort because it presented such a wide array of invasive plants in a highly visible site. With the participation and oversight of Dauphin County Parks and Recreation

Department, the Alliance convened a steering committee of interested professionals representing: Pennsylvania Department of Natural Resources, the Capital Area Greenbelt Association, Paxton Creek Watershed and Education Association, and Skelly and Loy, Inc. Guided by Alan Marshall, the steering committee chose a site for their efforts that appeared to fall within several criteria:

1. The size of the activity was manageable for a one-time event with follow-up. The Steering Committee delineated a 200-ft by 200 ft area and planned two workdays.
2. Recognition of the target invasive plant, Ailanthus, would be easy for the volunteers as it was quite pervasive at the control site and few of its look-alikes were in the vicinity.
3. The project site has a high amount of foot traffic; many citizens would see signs detailing the intention of the project and the threat of invasive plants thereby providing a good opportunity for outreach.

The project area was on a steep slope beside a paved hiking trail that runs along the lake. The slope is composed of fill dirt trucked in during the building of two adjacent roads. In the poor soil of the slope, Ailanthus was quickly becoming the dominant plant species.

The steering committee consulted with several references on the web concerning ailanthus control and with Dr. Guy Stucke of Millersville University who has extensive experience in controlling Ailanthus.

Stucke suggested a novel approach to using herbicide on the larger trees. This

approach uses a simple device that delivers a glyphosate solution to the cambium of the target tree through a PVC tube that feeds the herbicide into a



hole drilled into the tree's bark (see photograph).

The first workday occurred in early March, 2002 and was devoted to removing the *Ailanthus* from the site. Seedlings were pulled and left on the site. Larger trees were given the Glyphosate injection.

The second workday was devoted to planting the control site with 15 varieties of native trees and shrubs in the hopes that they would shade out surviving *ailanthus* seedlings and develop a richer plant base for the slope.

Recruitment and Training

It was determined that the two volunteer days would require different numbers of volunteers. The first workday required a small number of people working under close supervision to recognize and remove the



Ailanthus and apply glyphosate solution to the trees. The volunteers worked with the oversight of three volunteer leaders and the Wildwood grounds manager. At this site the *ailanthus* was easy to recognize, even during winter, because few similar-looking trees were present and the *ailanthus*' coloring and the distinctive leaf scars verified its identity. Twenty volunteers pulled the smaller *ailanthus* by hand and by using weed wrenches. Those smaller plants that volunteers were not able to remove were assumed to be root sprouts of a larger tree and were left in the expectation that the glyphosate injection would kill them when the mother tree was treated. Four volunteers in groups of two worked under the supervision of the Wildwood grounds manager, applying glyphosate feeder bottles to the larger trees.

The second control day required less workday supervision and more brute force as the primary goal of the day was to plant 250 bare-rooted tree

seedlings in the control area. Coordination of the labor of a large number of volunteers required more site preparation, primarily labeling the planting location for each tree species. Two days before the workday, members of the steering committee spent several hours marking the location for each tree with flags labeled with tree species. At the workday, volunteers were briefed on the system that included flags for tree placement and buckets labeled with tree species name. Volunteer supervisors divided volunteers into four teams: one dug holes, another delivered the appropriate tree species and planted the tree, a third mulched the newly planted trees and the fourth team watered the seedlings.

In the morning of that workday, a small party of well-supervised volunteers scouted for *ailanthus* seedlings missed or sprouted since the first control day. The supervision ratio of the larger tree-planting group was 1 to 15 while one supervisor worked with four volunteers to search for seedlings.

Because a large number of volunteers were needed for this labor-intensive part of the project, a large recruitment

effort was required. Under its RestoreCorps program, Alliance for the Chesapeake Bay recruited 65 volunteers for the one-day



event. The program supports grassroots citizen organizations through the development of volunteer networks to support restoration projects. The local watershed association, Paxton Creek Watershed and Education Association, provided support in volunteer recruitment. This effort was supplemented by newspaper announcements and promotion by a local school, the Alliance's corporate sponsors, and the South Central Pennsylvania Rotary Club.

The volunteers were organized in two, 3-hour shifts, the first from 9 a.m. to 12 p.m. and the second from 1 p.m. to 4 p.m. Although some volunteers stayed through both shifts, the majority were too tired to continue after three hours.



TheRestoreCorps' program goal is to maintain a large number of repeat volunteers. Recognition is important to maintaining the volunteers. As a thank you, each volunteer received an event tee shirt and a thank you post card after the event that asked for help in maintenance of the project site.

An additional, small workday during the early fall was used to remulch the tree seedlings and monitor for and pull any ailanthus seedlings. That was accomplished in under 4-hours using ten volunteers. The Steering Committee plans to continue monitoring the control site with planned workdays in the spring and fall of 2003.

Target Plants

Ailanthus, alternately known as tree-of-heaven and stinking sumac, is a fast growing deciduous tree that quickly forms dense stands and can overrun native vegetation. It can seed prolifically and also spread through root sprouts. Girdling and cutting has limited benefit as the tree stump sprouts with vigor. Work done on ailanthus control indicates that a systemic herbicide such as glysophate is necessary to kill established trees.

Ailanthus was chosen as a target plant because it had just begun to dominate the natural setting along the part of the park selected for the project. Once established, ailanthus is known to alter the soil with an allelopathic chemical given off by its roots that prevents other plants from growing near it and competing for the limited resources. The project area was a highly disturbed setting adjacent to a more intact and important wooded area, whose margin could soon be threatened by the ailanthus. In this disturbed site, the ailanthus had opportunistically found a niche to dominate; however, with the introduction of a number of potentially successful native tree and shrub species, it is hoped that native plants will eventually take over the site.

Lessons Learned

As is the case with most invasive plant species, part of ailanthus' reproductive success is associated with its prolific seed production. A successful effort to remove the plant requires several years of monitoring and removal of any newly sprouted seedlings. It is believed that a dense planting of native tree species after removal of the invasive plants will prevent another invasive plant from taking advantage of the disturbed soil caused by pulling of the seedlings.

ONE-TIME EVENT

Organization:

Friends of the Patapsco Valley and Heritage Greenway, Inc.

Program:

Garlic Mustard Challenge

Target Plant: Garlic Mustard

Contact: Sally Voris

Program Overview

The Patapsco Valley and Heritage Greenway is a natural and historic greenway running along the Patapsco river valley in Maryland's Baltimore and Howard counties. Its Friends group is an active grass-roots organization made up of residents of the area. The Friends group was formed to preserve the environ-

ment of the Patapsco River Valley and to tell the story of the area. As part of its mission of environmental preservation, the Garlic Mustard Challenge was initiated in the spring of 1999 to engage local

residents in invasive plant control and provide hands-on environmental education. The Challenge has become an annual event for the Friends of the Patapsco Valley and Heritage Greenway, Inc. The event is the brainchild of Sally Voris, who hatched the idea during a dinner conversation with a friend who had completed a native plant survey of the greenway and expressed concern over the amount of garlic mustard and other invasive plants in the park. The Friends group has found that the event produces several desirable outcomes: it educates



local residents about the impact of invasive plants, lures new visitors to the park, and addresses a serious threat to the park's biodiversity.

Volunteer Efforts

The Garlic Mustard Challenge has become an annual event and, each year more volunteers have come out to participate. In 2002, the third year of the Challenge, 60 participants picked a total of 1,705 pounds of garlic mustard. The organizing committee hopes to attract 400 participants to the 2003 event. One reason for its growing popularity is the focus on creating a day of fun rather than a day of work for participants. Groups compete to see who can pull the most garlic mustard by weight. Teams made up of family and friends furiously pick garlic mustard throughout the morning, filling garbage bags labeled with the team's number. The good natured competition is fueled by the encouragement of organizers and culminates when each group's harvest is weighed at the end of the morning and the winner is announced.

Garlic mustard was originally brought to North America by European colonizers as a culinary herb. The afternoon of the Challenge is devoted to a garlic mustard cook-off, featuring dishes developed by contestants in several

categories: professional chefs, adult amateurs and youth. The slogan "Conquer the Villain of the Valley and Feast on its Remains!" captures the tongue-in-cheek sentiment of the day's fun.



Recruitment and Training

The event is widely publicized by area newspapers, local newsletters and flyers. It is also listed in the state's tourism calendar. The announcements create a light hearted and comical tone for the event. For example, the Garlic Mustard Cook's Challenge offers the opportunity for the winning professional chef to be awarded the "soon-to-be world famous Spoonelheimer Spoon." Organizers also directly recruit local youth groups through phone calls.

The day is organized so that garlic mustard picking teams work in the morning. Many of the morning's teams are from youth groups including 4-H and Scouts as well as home school groups and families.



They begin the event at the registration table where participants sign-in (as a liability precaution) and receive their team number and plastic bags. The competitors register as large or small teams and compete in that category. A very basic orientation teaches the participants to identify garlic mustard and poison ivy and a literature packet provides additional information about the threat of invasive plants and about Patapsco Valley Park. Their harvest is gathered and weighed at the weight station using a doctor's baby scale, weight totals are calculated and awards are announced during a lunchtime break. Area merchants contribute items as awards for the competitions. A simple lunch of hot dogs, soda and chips, prepared by a local church group, is available for a small price (\$2).

Some participants save their appetite for dishes offered in the Cook's Challenge. Each Cook's Challenge competitor brings enough of their entry dish to feed 12. Observers and the two judges sample the sumptuous garlic mustard recipes. After lunch the coveted Spoonelheimer spoon is awarded to the winning Cook's Challenge competitor and a country music band entertains the participants. To wrap-up the event, the picked garlic mustard and participants are driven in the weed wagon to an area in which a compost pile is created for the garlic mustard (combined with straw).

The organizers have focused on pulling garlic mustard in one area along the Patapsco flood plain and believe that the efforts may be making a difference. Garlic mustard seeds can remain viable for at least five years, it is expected that the impact of the Challenge will not be evident for some years. The primary purpose of the event is awareness building; organizers feel that the event is indeed serving that purpose.

A one-time event of this type requires a lot of event-day help. During the '02 Challenge, 15 volunteers worked to smoothly run the 5-hour event. The volunteer organizers man activity stations that include: registration, the weed wagon, weight station, cooks challenge, master of ceremonies, set-up and clean-up. Before the event, a committee of 10 does all initial planning. With the expectation of 400 participants in the 2003 event, organizers are planning to have at least 40 volunteers to help run the event.

Target Plants

The Patapsco Heritage Greenway has a long history of environmental disturbance. Development, erosion and flooding have left many parts of the greenway open to invasions of exotic invasive plants. Invasive plants used for landscaping are also a problem as escaped invasive landscaping plants from adjacent

backyards also put pressure on the native communities within the park.

Garlic mustard is found throughout the park particularly in the moist shaded areas of the woods and floodplain. Because it is very easily identified and picked, it provides an excellent plant for novice weeder. Garlic mustard can pose a serious threat to native plants and animals in forest communities in the eastern U.S. It frequently out-competes spring ephemerals and monopolizes light, moisture, nutrients, soil and space. Garlic mustard is a cool season biennial easily recognized in its second year as a 2 – 3 ½ -foot, white flowering plant. Because the seeds will develop in flowering plants that have been pulled, garlic mustard should be bagged and disposed of after pulling.

Lessons Learned

A one-day event of this size requires a great deal of planning with a core group of 3-5 very active organizers who continue to innovate and promote the project as well as communicate the fun and humor of the event. Voris suggests that an organizing committee with contacts in various areas, for example, restaurant/food, media, and youth groups, really helps to bring an event like this together. Voris feels that starting the planning process nearly one year in advance can make a huge difference. Scheduling the event date ahead enables organizers to contact Scouts, 4-H and other groups in September to get the event on the organization's calendar at the beginning of a new activity year. The Friends group has used each event as a learning experience to improve the next year's event. The 2003 event is planned for April 26; they hope to greatly increase participation to around 400 by getting information out early. To streamline registration for such a large group, organizers plan to have many participants pre-register and also plan to mail information packets to pre-registered participants. To get additional information about this event, visit the Garlic Mustard Challenge web site at <http://lhi5.umbc.edu/patapsco/gmustard.htm>.



Rabbit Liver Pate with Garlic Mustard **Submitted by Sally Voris**

½ pound of fresh rabbit livers
white wine
Chicken broth
1 bay leaf
1 tsp salt
2 TBSP butter
¼ tsp. Nutmeg
2 TBSP minced onions
1 tsp dry mustard
2 TBSP chopped garlic mustard

Soak rabbit livers overnight in salt water. Boil in white wine and chicken broth (enough to cover) and 1 bay leaf for 15-20 minutes. Chop liver in food processor. Add remaining ingredients and blend until mixed. Pack in crock and serve with cocktail rye bread, sliced cucumbers and bronze fennel. Serve immediately, refrigerate or freeze.

REGULAR WORK DAYS

Organizations:

Maryland Native Plant Society & Sierra Club Maryland Chapter

Program:

Chapman Forest/Ruth Swann Park Project

Target Plant(s): Varied

Contact: Marc Imlay, Ph.D.

Program Overview

Chapman Forest is a historic and natural treasure, consisting of old growth forest land as well as farm fields and historic buildings along the Potomac River in Charles County, Maryland. This 2,250 acre parcel was recently acquired by the state to prevent development in this beautiful and biologically diverse forest. The forest boasts many areas of old growth trees and is an example of a rare shell-marl ecosystem with many native plants and more varieties of oak than all of the Great Smoky Mountain National



Park. Adjoining the state forest along the Potomac River, Ruth B. Swan County Park contains mature forestland as well as playing fields and walking trails. In an effort to preserve and improve these natural areas, local resident and Vice President of the Maryland Native Plant Society (MNPS), Marc Imlay, began coordinating a volunteer invasive plant

removal project in January 1999 in partnership with Sierra Club Maryland Chapter. Since that time, nearly 400 volunteers have worked in both areas during monthly invasive plant control days.

Volunteer Efforts

The Chapman Forest/Ruth Swann Park project is the first and longest running of the MNPS invasive plant removal projects. Workdays are the first Sunday of every month, year round regardless of weather. Initially, the project tapped into local interest generated by a citizen effort to rescue what is now the Chapman Forest State Forest from a planned development. Since that time, local volunteers, as well as visitors from other areas, have formed a band of weed control workers, systematically staving off new invasions as well as controlling well-established invasive plants bit-by-bit. The project emphasizes:

- Systematic removal of entire weed populations
- Meticulous record keeping of each month's efforts
- Experimentation with and assessment of various control methods forwarded by a number of sources.

The program has benefited greatly from the expertise of Imlay, a retired ecologist who during his career was Natural Resource Manager for the Army National Guard managing 54 states and territories.

Recruitment and Training

Volunteers are recruited for work days through informational brochures at the park, notices posted on the MNPS website and the Sierra Club Maryland Chapter website, as well as on other related web sites and in both partners newsletters. An important element of the volunteer recruitment is emphasis on the elements of learning and appreciation of the natural environment. Work day advertisements typically contain alluring descriptions of the natural areas that will be visited during the day. An example ad appears in the box.

Over time, a core group of volunteers has emerged who can be counted on to attend most work days and to recruit others by word of mouth. Many of these volunteers return because they have learned, through their work on this project, the importance of managing invasive plants and the appreciation of the diverse plant and animal life in the two areas.

A successful feature of these workdays is Imlay's emphasis on making the experience more rewarding for volunteers by taking time to point out the unique and special natural features adjacent to or within the work area.

The 6-hour workday begins at 10 a.m. A volunteer orientation agenda includes:

- Orientation about the problem of invasive plants in natural areas
- Identification of the target species
- Introduction to natural features of the park
- Demonstration of specific control methods to be used
- Description of safety precautions

Target Plants

Control efforts have concentrated on a variety of exotic, invasive plant species. Imlay emphasizes flexibility in planning for workdays. That is, pulling of perennials and woody plants when soil is moist and roots are more easily removed and making use of

dry conditions for cutting or herbicide applications. This project has a permit to apply herbicides and they primarily use glyphosate, with care, on appropriate plants and in appropriate locations.

A species of particular concern for Imlay is Japanese stilt grass



(*Microstegium vimineum*), because of its ability to spread rapidly in a wide variety of habitats and its aggressive displacement of many native plants.

Three to four years before the weed control project began, stilt grass had aggressively spread in Swann Park. After several workdays targeting stilt grass in 1999, its presence was greatly diminished.



Lessons Learned

This is the first and longest running invasive plant removal project sponsored by the MNPS and has become a model for many succeeding projects. During his years leading the project, Imlay has systemized many of the lessons learned in his efforts. Listed below are some of his “words of wisdom.”

Six Principles for Controlling Weeds with Volunteers:

1. Morale – have enough volunteers, usually 10 or more to get the job done and see real results.
2. Judicious use of herbicides carefully targeted to the alien invasive species where they biodegrade relatively quickly.

3. Flexibility – pull plants after a rainstorm when it is easy in wet soil and root fragments can be completely removed. You can remove annuals when the weather is dry or spray at that time. Doing work that complements the weather conditions will also help to maintain volunteer morale.
4. Compare fact sheets from different groups especially:
 - Maryland Native Plant Society – <http://www.mdflora.org>
 - Virginia Natural Heritage/Virginia Native Plant Society- <http://www.state.va.us/~dcr/dnh/invallia.htm>
 - Tennessee Natural Heritage/Tennessee Native Plant Society – <http://www.se-eppc.org>
 - Invasive Plants of Canada Project – <http://infoweb.magi.com/~ehber/factgarl.html>
 - Alien Plant Working Group – <http://www.nps.gov/plants/alien/factmain.htm>
 - The Nature Conservancy's Wildland Invasive Species Program – <http://tncweeds.ucdavis.edu>
5. Inventory and prioritize by harm, ability to control with resources available and incipient populations. Some invasives cause more harm than others. Some may be too difficult to remove now. Newly established invasives are a high priority.



6. Follow through with monitoring. Plan on coming back to get them all to avoid repeating the same work in the future.

Control Scenarios for Invasion Level

In general, there are six site scenarios that require remarkably different control regimes:

1. *Pristine*. These areas are typically less than 10% invaded, in terms of biomass or canopy and cover. Recommend proactive strategy of identifying and protecting relatively pristine areas from invasion.
2. *Very sensitive areas*. Recommend proactive strategy of identifying and protecting areas supporting desirable species from invasion. A guide might be “protect the last of the least and the best of the rest.”
3. *Somewhat more disturbed areas*. This classification would include areas with a 10-30% cover of invasives. Selectivity during control is extremely important because monocultures of invasives have not necessarily formed yet.
4. *Very large, generally disturbed areas*. Identify remnant patches of native vegetation to protect before aggressive treatments of the monocultures with biocontrols, extensive spraying and revegetation with native species.
5. *Areas undergoing ecosystem function restoration*. For areas undergoing restoration of nutrient-depleted eroded areas, such as, cropland and plantations, remove alien invasive species before restoration actually begins.
6. *Areas undergoing rapid conversions into monocultures by particularly aggressive species*. These site conditions would apply to any type of project including but not limited to residential, rangeland/farms, backcountry, aquatic wetland, right of way.

The first of these six land conditions, *relatively pristine*, requires a preventive approach using the tools of screening, early detection, and rapid response. The distinction is to focus on what is being protected (endangered species, natural areas) rather than on what the resources are being protected from (alien invasive species).

Description of MNPS Herbicide Use

In certain situations the MNPS has found the judicious use of herbicides carefully targeted to the alien invasive species to be an appropriate and effective tool. They apply 2% glyphosate with a 3-gallon backpack sprayer and find that there is virtually no impact on native plants. Sprayers are first taught to recognize native plants. They proceed slowly in order to avoid natives and spray-to-glisten rather than lingering on each plant to avoid herbicide dripping onto desirable plants.

To learn more about this successful project and their control strategies, join MNPS for an invasive plant control workday. Workday notices can be viewed on the MNPS web site (<http://www.mdflora.org>) under *Restoration Projects*.



It's All in How You Say It

An excellent example of the project volunteer ad, this one appeared on the SpiritVoices.org web site:

**CHAPMAN FOREST ECOSYSTEM ALIEN INVASIVE
PLANT REMOVAL PROJECT & NATIVE PLANT WALK**
[recurring monthly, every first Sunday]

10:00 am - 4:00 pm

*Ruth B. Swann Park/Potomac Branch
Library*

*Help control and learn about alien invasive
verses native plant species. Removal will be
in the county park and in Chapman Forest
State Park next to it. We will identify 3-foot
diameter Sassafras trees and other beautiful
giant trees. We will explore the Sassafras
Trail and Potomac Overlook.*

*Alien invasives are the second biggest
threat to biodiversity after habitat loss.
Removing invasive plants is a new and
rapidly growing field only recently recog-
nized as to its importance in preserving
native flora and fauna.*

*We are actually developing and experiment-
ing with many of the techniques we use.
Join us! It's a great way to get outdoors, you
learn about different plants and know
you're doing something good for the
environment at the same time!*

Recommended clothing: wear long pants,
long sleeves, tennis shoes or boots, a hat if
it's sunny, layers if the weather might
change.

Bring: lunch and water (beach picnic)

Where: Meet at Ruth B. Swann Park/
Potomac Branch Library.

Directions:...

Cancellations: ...

Contact: ...

REGULAR WORK DAYS

Organization:

Northern Virginia Conservation Trust

Program:

Adventures in Conservation

Target Plant(s): Multiple

Contact: Paul Gilbert

Program Overview

The Northern Virginia Conservation Trust (NVCT) is a nonprofit land trust focused on preserving and restoring the natural and historic land resources of rapidly growing Northern Virginia. The trust has properties or easements in Arlington, Fairfax, Loudoun, Prince William and Stafford counties. Included in NVCT properties is one of the largest Great Blue Heron nesting sites in the lower Potomac region and a rare basic oak hickory forest in Fairfax County. NVCT has also played a significant role in creating two citizen groups in the region, Friends of Donaldson Run in Arlington and Trust For Crow's Nest in Stafford County.

NVCT has developed an ongoing volunteer program, Adventures in Conservation, to mobilize and educate area residents by providing frequent, typically



monthly, events that enhance the region's natural areas and provide an opportunity for the volunteers to learn more about their natural surroundings. Some of the activities sponsored by Adventures in Conservation include invasive species removals, clean-ups, tree plantings, hikes, and canoe trips.

Volunteer Efforts

The Adventures in Conservation program is designed to keep volunteers engaged and involved in the efforts of the Trust by offering at least one volunteer opportunity per month. One goal of the program is to give volunteers an appreciation for the natural environment of the region and greater awareness of the threats to the ecosystem. The program can also serve to introduce residents to natural areas they had not previously visited. Adventures in Conservation events do not solely focus on properties owned by NVCT. Events are also planned in parkland throughout the region. Many of the projects are undertaken in cooperation with other citizen groups and municipal organizations.

Jeannie McPherson, the Outreach Manager of NVCT, has been in charge of organizing events for Adventures in Conservation. She says that one emphasis of the program is to make the event fun as well as informative for volunteers.

One example of an Adventures in Conservation event that addressed invasive plants took place on June 29, 2002 at Riverbend Park in Great Falls, Virginia. The event was cosponsored by Friends of Riverbend Park and focused on removal of a variety of invasive species including wisteria and Japanese stilt grass. On hand was the park naturalist to provide information on invasive species in the area and give eradication techniques. The removal work ran from 8 a.m. – 12 noon and was followed by a picnic event that included a barbecue lunch, guided hikes in adjacent conservation easements, and raffle items. A media advisory sent to newspapers before the event resulted in an article on the front page of the Metro section of *The Washington Post*.

Recruitment and Training

NVCT precedes each event with a media advisory to local and regional newspapers. Events are also submitted to community and volunteer calendars. The media advisories are faxed or emailed to a specific person at the paper at least one week in advance and a follow-up call is made to confirm its receipt. When a story is generated by the advisory, McPherson sends a thank you letter or email to the reporter. Volunteers who have participated in previous activities are included in a volunteer listserve and are alerted about upcoming events. NVCT also includes a calendar of upcoming events on its web site.

An information sheet about the event is distributed to volunteers at the beginning of the workday, and detailed instructions are also given. McPherson has found that communication and organization are both key to retaining volunteers. They include a sign-up sheet at each event to capture names and addresses to use for event announcements and to send regular thank you letters to volunteers.

Target Plants

Target species varies for each location and event. The Virginia Department of Recreation's Conservation and Natural Heritage Program and the Virginia Native Plant Society have identified 115 invasive plant species in Virginia.

Lessons Learned

McPherson has found that there is nothing worse than recruiting volunteers and not having enough for them to do. Be sure to attempt to gauge your volunteer needs to not over-recruit. Also, she suggests that a group be prepared to provide additional volunteer jobs if necessary. Above all, in order to retain volunteers in a program like Adventures in Conservation, she feels the organization must "do what you promise during the work day." That is organizers should arrive on time and be prepared to work with volunteers; the organizing group must be prepared to make the most of each volunteer's time.

She also suggests organizers bring information sheets about the particular project and extra tools. "Always remember that volunteers work for you because they choose to," asserts McPherson. "As soon as the job ceases to be fun or rewarding, they will leave!"

To learn more about the Northern Virginia Conservation Trust and the Adventures in Conservation program visit their web site at <http://www.nvct.org>.



INDEPENDENT VOLUNTEERS

Organization:

Maryland/DC Chapter of the Nature Conservancy

Program:

Weed Watchers/Weed Busters

Target Plant(s): 13 Target Species

Contact: Deborah Barber and Meredith Malone

Program Overview

The Maryland/DC Chapter of The Nature Conservancy (TNC) currently manages 27 preserves in Maryland and Washington DC. The Chapter has protected 57,000 acres of critical natural lands in the region since its creation. Like the Nature Conservancy nationally, this chapter obtains and preserves land of natural importance to the region. The Weed Watchers/Weed Busters program engages volunteers in the monitoring and control of invasive plants on some of the Chapter's preserves, as part of its land management strategy. With assistance from an extensive network of volunteers, the program works to locate and manage recently emerged infestations of invasive exotic plants on high priority sites. This case study features many organizational elements involved in managing volunteers who are working independently in far-flung sites. These elements include adequate training, communication using systemized reports and well delineated procedures for monitoring.

Volunteer Efforts

As the name implies, there are two components to this volunteer program: a group of volunteers who have been trained to monitor for invasive plants in assigned areas of a TNC preserve (Weed Watchers) and a group of volunteers who control invasive plant infestations (Weed Busters). TNC staff use the information gathered by the Weed Watchers to identify, track and manage an invasive plant infestation. The program assigns each Watcher a high

priority site that they are expected to monitor, at a minimum, four times per year (at least once in the fall and three times in spring and summer). Monitoring visits result in a visit report and if one

of the target species is sighted, a hit report is submitted to let TNC staff know the exact location of the newly spotted infestation. The location of the infestation is mapped and flagged by the volunteer. A TNC staff person will inspect the site and make decisions about the management of that particular infestation based on the organization's goals.

Weed Busters are then relied on to implement the weed management goals through scheduled weed control days. The Busters are alerted about control days via email and the Chapter's newsletter.

Throughout this process TNC staff keep meticulous records of the location and control of weeds identified by the Watchers. Records include the size of the infestation and date and type of actions taken to control the plant. Between 2000 when the program was first organized and 2001, volunteers participating in the program had located and begun controlling 19 different invasive plant infestations within the 11 sites monitored by Weed Watchers.



Recruitment and Training

The Nature Conservancy relies on volunteers to assist in management efforts in many of its preserves and has ongoing volunteer workdays. The organization expends much effort in the recruitment of volunteers from the ranks of its members and publishes information about each workday in its newsletter. A special Weed Busters email list is also

used to alert volunteer Busters. The Chapter also advertises for volunteer Weed Watchers through the newsletter and has been successful in recruiting nearly a full complement of volunteers.

Each Weed Watcher volunteer receives a manual that contains reference materials on monitoring techniques, facts sheets and photos of the 13 hit list species, general plant identification techniques, and map and compass reading information. Volunteers are asked to review the manual before their training. Training is one full day and consists of one half day for manual review and one-half day of field experience for actual application of the skills explained in the manual. Among the skills taught are:

1. Weed identification focusing on the 13 species on the hit list.
2. Compass and topographical map reading
3. Flagging and mapping skills

After they are trained, each volunteer is assigned to a site as close as possible to his or her home. A TNC staff person provides an orientation of the assigned site for the volunteer, who is also given a second opportunity to practice plant identification and navigational skills.

Because of the far-flung locations of sites monitored by Weed Watchers, the volunteers are also trained on reporting procedures that aid in communication with TNC staff. Volunteers file *Visit Reports* for each visit and *Hit Reports* if any of the 13 hit list species are detected. They also report back to TNC staff if infestations of any other invasive plant is identified or suspected. Using information from these reports, TNC staff are able to keep records about each site monitored. This helps them track the spread of target plants and set priorities for control.

Target Plants

Before the Weed Watcher training program was developed, a list of target weeds was determined to give volunteers a manageable number of plants to

learn to identify and also to help develop management priorities for TNC staff. These target species are currently considered the greatest threat to natural areas in Maryland. The Chapter determined which plants species to include on the Hit List after study of the pertinent literature and analysis of the results of a survey of invasive plant management profes-



sionals in the region.

The Hit List contains 13 target plants. At certain sites, additional species have been added to the target plant list to reflect local conditions. Over time, this list may expand for all of the preserves to include new species of particular threat entering Maryland's natural areas. The hit list species are listed on the following page.

Lessons Learned

When asked to share advice for others interested in developing a similar program, Meredith Malone had several suggestions. She said that during the first field season of the program, her office received numerous calls from volunteer Weed Watchers asking for a more compact field manual. The manual that had been constructed was full of great information but is a little too heavy and cumbersome for some volunteers to take into the field. If possible, develop a manual that is as small as possible and arranged in such a way that allows the volunteer to add to it, or rearrange it for their personal preference. One method might be to package it in a small ringed binder.

Malone thought that a new resource, the “Plant Invaders of Mid-Atlantic Natural Areas” booklet, published by the U.S. Fish & Wildlife Service and the National Park Service, could be used to replace a field manual. This booklet is light and compact and contains identification information about a variety of invasive plants, along with detailed color photos. It can be ordered through the U.S. F&WS, Chesapeake Bay Field Office by calling (410) 573-4582 or (410) 573-4581 or through the National Park Service, Center for Urban Ecology, at (202) 342-1442, ex. 218.

Although most anyone can be trained to be a Weed Watcher, Malone said that they have found those volunteers who have previous plant identification skills make especially great Weed Watchers. In some cases, these volunteers have noticed other invasive plants on the preserves that are not on the hit list and alerted staff to their presence. Their ability to recognize additional invasive plants has proven extremely helpful in the management of even more potentially threatening species. In order to recruit volunteers with these skills, Malone suggests that recruiters introduce the program to groups such as local master gardeners or Native Plant Societies.

Invasive Plants on the Maryland TNC Hit List



- ◆ **Tree-of-heaven (Ailanthus)**
- ◆ **Garlic Mustard**
- ◆ **Autumn Olive**
- ◆ **Japanese honeysuckle**
- ◆ **Bush honeysuckle**
- ◆ **Purple loosestrife**
- ◆ **Japanese stiltgrass**
- ◆ **Canary reedgrass**
- ◆ **Common reed**
- ◆ **Japanese knotweed**
- ◆ **Mile-a-minute**
- ◆ **Lesser celandine**
- ◆ **Multiflora rose**

INDEPENDENT VOLUNTEERS

Organization:

Maryland - National Capital Park and Planning Commission

Program: Weed Warriors

Target Plant(s): Varied with emphasis on vines

Contact: Carole Bergmann

Program Overview

The Maryland - National Capital Park and Planning Commission (M-NCPPC) maintains 31,000 acres of park property in Montgomery County, Maryland, an area of suburban development just outside of Washington, D.C. The park system maintains parks for a wide variety of uses, from small neighborhood parks with playgrounds and ball fields to stream valley parks and conservation parks with tracts of undeveloped land. Among its many resources, Montgomery County parks contain 34 miles of hiking trails.

Carole Bergmann, Forest Ecologist for M-NCPPC in Montgomery County has found many challenges in maintaining trees in these ecologically disturbed suburban parks. Porcelain berry, Japanese honeysuckle, Kudzu and English ivy are only a few of the exotic invasive plant species that make their home within the parks and threaten resident native species. The presence of invasive plants has greatly reduced the ability of park staff to plant new, native trees. Vines quickly overgrow the young trees making reforestation a difficult venture in invaded areas of the park system.

Volunteer Efforts

Park staff began tackling the massive problem of invasive plant control in 1996. However, resources for controlling invasive plants are very limited as this issue is just one of many for the large park system. To supplement staff efforts, Bergmann devised the Weed Warriors program in June 1999 as an innovative method to engage volunteers to contain and



control the invasive plants wreaking havoc on the park ecosystem. Bergmann's long-term vision for the program is to use Weed Warriors to monitor, cut and remove

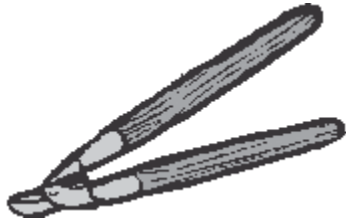
invasive plants while park staff bush hog and spray the larger infestations.

Recruitment and Training

Weed Warriors are recruited through posters and flyers located at M-NCPPC parks, as well as through lectures, park sponsored nature walks and word of mouth. Newly recruited Weed Warrior volunteers initially fill out a Volunteer Services Form for M-NCPPC. They must be at least 18 years old and go through a formal training before they can work in the parks. The two-hour group training focuses on plant identification and eradication and is conducted at an outdoor park site. Training focuses on identifying several of the most significant invasive plant species. Volunteers are referred to web resources that provide supplemental plant identification information. The National Park Service web site: www.nps.gov/plants/alien is one of those recommended for use by volunteers. In the last three years, approximately 180 individuals have completed Weed Warrior training.

Weed Warriors are not permitted to use herbicides in the park. Instead they use hand tools for cutting and pulling of weeds. After completing training, Weed Warriors are given leather gloves, an official hat, and an ID card that verifies they are authorized to remove weeds in the park. Volunteers with the program have a wide range of technical knowledge and physical ability. Most volunteers are very knowledgeable; those who are less so focus on one weed. They may come to additional workdays to

learn to recognize and remove other weeds. The Weed Warriors work independently and at their own pace, determining their own hours and work location. Every three months the volunteers are asked to report to M-NCPPC with the approximate number of hours they spent working for the program.



Sligo Creek. This group has included additional stewardship activities in its agenda such as park clean ups and has developed a *Stream Section Steward* position that assigns individuals responsibility for sections of Sligo Park. Stream Section Stewards lead groups of volunteers in weed eradication events in their section of Sligo Park.

Target Plants

Currently, Bergmann would like the volunteers to emphasize the eradication of vines such as porcelain berry, Oriental bittersweet, kudzu and Japanese honeysuckle that attack growing trees. She believes that preserving the existing trees represents the best use of volunteer time. Volunteers are asked to use pruners to make two cuts in vines, one low to the ground and another as high as can be reached. This method will kill the vine growing in the tree and slow regrowth from resprouted roots.

Lessons Learned

Despite a workload that gives very little time to this element of her position with M-NCPPC, Bergmann sees her effort in recruiting and training volunteers as yielding multiple benefits. Weed Warriors not only assist in the massive process of weed eradication but more importantly, they act to build awareness of the problem of exotic invasive plants in the community. By doing so, this provides an opportunity for the information to spread via word of mouth and ultimately engage homeowners to remove invasive plants from their own property and to avoid planting these invasives in the first place.

Not only have Weed Warriors taught others about the threat of invasive plant species but one volunteer was inspired to form a citizens group - Friends of



Appendix A

Invasive Plants of Maryland, Pennsylvania, and Virginia

APPENDIX A

Invasive Plants of Maryland, Pennsylvania, and Virginia

This list combines the state lists from the Maryland, Pennsylvania, and Virginia as published by each state's natural resource department.

SCIENTIFIC NAME	COMMON NAME	STATE LISTED MD PA VA	FORM	NOTES	SUMMARY OF CONTROL METHODS (MULTIPLE SOURCES)
<i>Acer platanoides</i>	Norway maple	X X X	Tree	Tree escapes from cultivation and invades open fields, meadows and woods where it spreads aggressively by seed forming thickets. Prolific seed germinates in shade.	Seedlings can be hand pulled. Glyphosate can be used to treat freshly cut stump, trunk girdle or hack holes.
<i>Ailanthus altissima</i>	Tree-of-heaven	X X X	Tree	Tree with prolific seeds also spreads clonally over large areas. Very difficult to control and allelopathic.	Seedlings can be hand pulled. Cut or girdled trees re-sprout however frequent re-cutting will eventually weaken and kill the tree. Herbicide can be highly effective when used during growing season. Glyphosate can be used as a foliar spray, stump treatment, injected or through the hack and squirt method. Basal bark treatment with Garlon 4 is also very effective particularly when done in the fall
<i>Alliaria Petiolata</i>	Garlic mustard	X X X	Herbaceous	Herbaceous biennial, spreads aggressively by seed, adaptable to shady forests.	Hand pull before seeds have set in spring. Flowers may ripen into seeds after pulling and should be bagged. Pulling best done when the soil is moist to aid in root removal, plant will re-sprout from root. Glyphosate can be sprayed on foliage to kill.
<i>Allium vineale</i>	Wild garlic	X	Bulb	Perennial bulb invades lawns, fields, and meadows.	Once established, hard to control. Weed mats control emergence
<i>Alternanthera philoxeroides</i>	Alligatorweed	X	Herbaceous	Perennial forms dense mats in aquatic and wetland habitats. Spreads through root fragments.	Mechanical control can inadvertently spread plant. Biological control insects effective but not cold tolerant. Glyphosate herbicides are recommended used with extreme caution.
<i>Ampelopsis brevipedunculata</i>	Porcelain berry	X K ¹ X	Vine	Escaped from cultivation berries spread by birds and other wildlife. Established in a variety of habitats.	Seedlings can be pulled. Fruit should be bagged or burned before it ripens. Full strength glyphosate can be brushed on freshly cut stumps.
<i>Artemisia vulgaris</i>	Mugwort	X	Herbaceous	Perennial that escapes from fields, roadsides and wastes into native habitats. Has persistent rhizomes.	Responsive to a number of herbicides.

¹ K represents plants that are known to invade native plant communities and are deserving of vigilance.

Invasive Plants of Maryland, Pennsylvania, and Virginia (cont.)

SCIENTIFIC NAME	COMMON NAME	STATE LISTED MD PA VA	FORM	NOTES	CONTROL METHODS
<i>Berberis thunbergii</i>	Japanese barberry	X K ⁱ X	Woody	Shrub escaped from cultivation into woodlands and forests. Seeds spread by birds and other wildlife. Produces bright red oblong berries. Grows in sun & shade. Has spines on branches	Hand pull, hoe or dig early in season before seed set. Weed wrench can be used. Can re-sprout from its shallow roots
<i>Carduus acanthodes</i>	Plumeless thistle	X	Herbaceous	Biennial invades roadsides, pastures, and native habitats. Its spiny winged stems. Seeds dispersed by wind and wildlife MD Noxious Weed	Best controlled in early spring when in rosette stage. Dig or pull. Glyphosate is preferred herbicide.
<i>Carduus nutans</i>	Musk thistle	X X	Herbaceous	Biennial invades roadsides, pastures and native habitats. Perfuse seeds can blow miles. Seeds can stay viable in soil for over 10 years Hybridizes with plumeless thistle. PA and MD Noxious Weed.	Hand pull small populations prior to seeding. Bag seeds or flowers to prevent dispersal. Biocontrol insect may be harmful to natives. Glyphosate 2%, triclopyr or chlorpyralid all effective. Spray during rosette stage.
<i>Carex kobomugi</i>	Asiatic sand sedge	X	Herbaceous	Highly invasive perennial. Adapted to coastal beaches. Forms extensive colonies through very tough rhizomes.	Early detection and treatment is crucial. Hand pulling possible. It is recommended that the rhizome be kept intact. Rhizome can cause cuts. Glyphosate is effective. Any control method will require repeated treatment.
<i>Celastrus orbiculatus</i>	Oriental bittersweet	X X X	Vine	Woody vine, escaped from cultivation. Spreading rapidly into woodlands and forests. Vine grows rapidly overtaking trees and shrubs. Reproduces through root and berries that are dispersed by birds and other wildlife	Cutting of vegetation to the ground in early spring followed by application of Garlon 4 to regenerated foliage successfully kills roots. Large vines in trees can also be cut and stump treated with triclopyr containing herbicide. The vines remaining in the tree will decompose and fall with in 2-3 years.
<i>Centaurea dubia</i>	Short-fringed knapweed	X	Herbaceous	Highly invasive though less common than spotted knapweed.	Information unavailable. See Spotted knapweed.
<i>Centaurea maculosa</i>	Spotted knapweed	X X	Herbaceous	Biennial that escapes from fields and roadsides into native habitats. Grows in tufted clump. Rapidly colonizes disturbed areas and will slowly invade relatively undisturbed areas. Root systems do not hold soil well resulting in significant erosion in invaded areas.	Hand pulling, cutting or mowing can control an invasion if done over several years. Bio control insect is available from USDA.

Invasive Plants of Maryland, Pennsylvania, and Virginia (cont.)

SCIENTIFIC NAME	COMMON NAME	STATE LISTED MD PA VA	FORM	NOTES	CONTROL METHODS
<i>Cirsium arvense</i>	Canada thistle	X X X	Herbaceous	Perennial invades fields and pastures, establishing clonal colonies, seeds distributed by wind and wildlife. PA and MD Noxious Weed.	Mechanical methods are effective if repeated over several years. Glyphosate is also effective. Seed bank is persistent.
<i>Cirsium vulgare</i>	Bull thistle	X X X	Herbaceous	Biennial that escapes from fields and roadsides into native open habitats. PA and MD Noxious Weed.	Similar to Canada Thistle.
<i>Datura stramonium</i>	Jimsonweed	X	Herbaceous	Annual. Sometimes cultivated and often found in cultivated fields, spreads by seed. All plant parts are poisonous in large doses. Abused as a hallucinogen. PA Noxious Weed.	
<i>Dioscorea batatas</i>	Chinese yam	X	Herbaceous	Highly invasive	
<i>Elaeagnus umbellata</i>	Autumn olive	X X X	Shrub	Invades a variety of native habitats from grassland to forest. Escaped from cultivation. Berries rapidly spread by birds and wildlife.	Hand pull seedlings. Apply glyphosate or triclopyr to freshly cut stumps. Cutting or burning will result in re-sprout.
<i>Euonymus alatus</i>	Winged burning bush	SE ² X	Shrub	Highly invasive shrub escaped from cultivation. Produces large numbers of seeds. Can develop dense thickets in woodlands.	Seedlings can be easily hand pulled. Larger plants can be removed with weed wrench. Larger plants can also be cut and stumps painted with glyphosate. Glyphosate can be used as a foliar spray on large populations.
<i>Galega officinalis</i>	Goatsrue	X	Herbaceous	Perennial whose seeds spread along waterways. Can form dense crowns. PA and Federal Noxious Weed	Mowing proves ineffective. Herbicide is recommended.
<i>Hedera helix</i>	English ivy	X X	Vine	Woody vine invades forests and woodlands. Escaped from cultivation. Birds and wildlife spread berries. Plant threatens all vegetation levels. Shades and eventually kills. Also a reservoir for bacterial leaf scorch.	Hand pull vines will not re-sprout from pulled plants. In trees, cut vines as high as can be reached and at base. Remove vines by prying. Either re-cut root sprouts until roots die or apply triclopyr to cut stem.
<i>Hemerocallis fulva</i>	Daylily	X	Herbaceous	Perennial invades a variety of native habitats, escaped cultivation.	Control information being developed.

² SE refers to plants considered invasive in southeastern Pennsylvania.

Invasive Plants of Maryland, Pennsylvania, and Virginia (cont.)

SCIENTIFIC NAME	COMMON NAME	STATE LISTED MD PA VA	FORM	NOTES	CONTROL METHODS
<i>Heracleum mantegazzianum</i>	Giant hogweed	X	Herbaceous	Perennial. Reproduces through seeds and buds. Found in riparian areas forms dense canopy. Is a public health risk. Sap causes blistering and pain from skin contact. PA and Federal Noxious Weed	Persistent mowing can be effective. Wear protective clothing. Plant can be removed by digging. Glyphosate most effective. Should be applied during early spring. Plant can be removed by digging.
<i>Humulus japonicus</i>	Japanese hops	X	Vine	Annual, introduced as cultivated plant. Vines covered in hooked hairs	Pull before seeds set in August and September. Can re-sprout from root stock or vines so remove after pulling. Herbicide with glyphosate – also before seeds set. Seedbank should be exhausted in 3 years.
<i>Hydrilla verticillata</i>	Hydrilla	X	Herbaceous	Perennial. Highly invasive hydric plant. Found in the southern U.S. Forms dense monocultures	Mechanical removal, water draw downs.
<i>Imperata cylindrica</i>	Cogon grass	X	Herbaceous	Perennial, highly invasive rhizomatous grass. 2-4" high. Forms a dense thatch and disrupts native fire regimes.	Multiple control methods are recommended: mowing in spring followed by disking 6-8 weeks later, followed by application of 2% glyphosate in early fall. Re-vegetation is recommended.
<i>Lespedeza cuneata</i>	Chinese lespedeza	X	Herbaceous	Highly invasive, warm season perennial herb. Threatens meadows, prairies and wetland edge.	Has extensive root system. Mow at flower bud stage several years in a row can deplete plant vigor. Herbicide treatment in early to mid summer recommended – 2% triclopyr or 2% glyphosate.
<i>Ligustrum sinense</i>	Chinese privet	X	Shrub	Large shrub is highly invasive and shade tolerant.	Hand pulling is effective will re-sprout from roots if not removed. Late summer application of glyphosate also effective.
<i>Lonicera japonica</i>	Japanese honeysuckle	X X	Vine	Highly aggressive woody vine invades a variety of habitats. Escaped from cultivation	Very persistent root systems and seeds. Mowing can encourage extensive root suckering. Hand pull to remove entire root system. Apply glyphosate or Garlon 4 to cut stem or apply to re-sprout foliage.
<i>Lonicera maackii</i>	Amur honeysuckle	X X	Shrub	Invades a variety of habitats, introduced as cultivated plant. Fruit dispersed by birds and wildlife.	Will re-sprout from any roots not removed by pulling. Use systemic herbicides for cut stump or foliar spray.
<i>Lonicera morrowi</i>	Morrow's honeysuckle	X X	Shrub	Escaped from cultivation. Invades a variety of habitats and is dispersed by birds and other wildlife.	See Amur honeysuckle.
<i>Lonicera standishii</i>	Standish honeysuckle	X	Shrub	Escaped from cultivation. Seeds spread by birds.	See Amur honeysuckle.
<i>Lonicera tatarica</i>	Tartarian honeysuckle	X X	Shrub	Escaped from cultivation. Invades a variety of habitats is spread by birds and wildlife.	See Amur honeysuckle.

Invasive Plants of Maryland, Pennsylvania, and Virginia (cont.)

SCIENTIFIC NAME	COMMON NAME	STATE LISTED MD PA VA	FORM	NOTES	CONTROL METHODS
<i>Lythrum salicaria</i>	Purple loosestrife	X X X	Herbaceous	Escaped ornamental perennial that overtakes native wetlands. Prolific seeder can form dense homogeneous stands. PA Noxious Weed.	Reproduces through seed and underground stems. Hand pull before seed set. Glyphosate is effective. Bio control insects are available in PA from PA Dept. of Agriculture.
<i>Melilotus alba</i>	White sweet clover	X	Herbaceous	Highly invasive annual or biannual adapted to a wide range of climates.	Proscribed burns must be timed correctly. Hand pull in late summer/early fall. Clipping very close to the ground also effective.
<i>Melilotus officinalis</i>	Yellow sweet clover	X	Herbaceous	Highly invasive annual or biannual adapted to a wide range of climates. Typically invades open areas.	See White sweet clover.
<i>Microstegium vimineum</i>	Japanese stiltgrass	X X X	Herbaceous	Annual grass rapidly spreads through woodlands and other native habitats. Shade tolerant.	Shallow rooted plant can be hand pulled. Cut with mower or weed whacker in late summer at peak bloom before seed formation. Glyphosate or herbicidal soap both effective.
<i>Miscanthus sinensis</i>	Eulalia, Maiden grass or Silvergrass	X K X	Herbaceous	Ornamental grass escapes to roadsides.	
<i>Perilla frutescens</i>	Perilla, Beefsteak plant	X K X	Herbaceous	Annual escaped from cultivation. Spreads by seed.	
<i>Phragmites australis</i>	Common reed	X X X	Herbaceous	Perennial overtakes wetland ecosystems and forms large colonies. Native and introduced strains.	Combined use of glyphosate based herbicide in the late summer or early fall followed by a proscribed burn of the standing dead plants the following spring. It will be necessary to repeat this procedure for several years.
<i>Polygonum cuspidatum</i>	Japanese knotweed	X X X	Herbaceous	Perennial invades a variety of habitats and forms large colonies particularly beside waterways and ditches. Spreads by roots and seeds. Very difficult to control.	Mechanical removal proves very difficult because of the extensive network of underground rhizomes. Cutting plants at least 3 times during the growing season will weaken the rhizomes and eventually control the plant over several years. Shading with black plastic will also weaken plant. Cutting plant in June to manage plant size and spraying of re-growth with glyphosate in July and spot treatment in September will eventually control plant over several years.
<i>Polygonum perfoliatum</i>	Mile-minute	X X X	Vine	Annual thorny vine. Range rapidly expanding especially along waterways. Rapidly overtakes shrubs and trees. PA Noxious Weed.	Mow or cut with a scythe before seeds set can be effective. Hoeing of seedlings also effective. Spines make plants difficult to handle. Several pre-emergence and post-emergence herbicides control the plant. It requires several years of control as seedbank remains viable for at least 5 years.

Invasive Plants of Maryland, Pennsylvania, and Virginia (cont.)

SCIENTIFIC NAME	COMMON NAME	STATE LISTED MD PA VA	FORM	NOTES	CONTROL METHODS
<i>Pueraria Montana</i> Var. <i>lobata</i>	Kudzu	X X X	Vine	Woody vine rapidly overtakes trees and shrubs. Can grow up to 1-foot per day and has massive (and edible) tap-root. PA Noxious Weed.	Repeated cutting can exhaust reserves. Cutting and application of systemic herbicide to cut stems can also be effective.
<i>Ranunculus ficaria</i>	Lesser celandine	X vig X	Herbaceous	Perennial that takes over native floodplain and wetlands spreads by roots and shoots. Competes with spring ephemerals. Difficult to control.	Resembles a native wetland plant – marsh marigold. Use care in identification. Hand pull small infestations taking care to remove tubers. For larger infestations glyphosate immediately after plant emerges in January or February.
<i>Rosa multiflora</i>	Multiflora rose	X X X	Shrub	Takes over open and semi-open habitats. Forms dense thickets. Fruits dispersed by birds and other wildlife. PA Noxious Weed.	Plants can be pulled with chain and tractor or similar set-up. Removal should be followed with monitoring for re-sprouting plants. Sheep and particularly goats eat all parts of the plant they can reach. 8-10 goats-per acre for two seasons has been found to control the plant. Basal bark and foliar treatment are also effective.
<i>Rubus phoenicolasius</i>	Wineberry	K X	Shrub	Highly invasive shrub likes shade to partial sun.	
<i>Sorghum bicolor</i>	Shattercane	X X	Herbaceous	Annual grass invades agricultural and natural ecosystems. PA and MD Noxious Weed.	Plants can be hand pulled, hoed or mowed before seeds develop. The plant can also be controlled by a variety of foliar herbicides.
<i>Sorghum halepense</i>	Johnsongrass	X X X	Herbaceous	Perennial grass spreads by roots and seeds. Invades agricultural and natural ecosystem. PA and MD Noxious Weed.	Plants can be hand pulled, hoed or mowed before seeds develop. The plant can also be controlled by a variety of foliar herbicides.

Appendix B

Related Resources

RELATED RESOURCES

More literature is becoming available on the topic of invasive plants. The following is a list of some of the many resources on the impact, identification and control of invasive plants.

Books and Manuals

Haber, Erich. Guide to monitoring Exotic and Invasive Plants. National Botanical Services. Ottawa, ON, Canada. 1997.

Guide with two case studies in design of invasive monitoring program. Available on the web at cciw.ca/eman-temp/research/protocols/exotic/.

Heffernan, K.E. Managing Invasive Alien Plants in Natural Areas, Parks, and Small Woodlands. Natural Heritage Technical Report 98-25. Virginia Dept. of Conservation and Recreation, Division of Natural Heritage. Richmond, VA. 1998.

This 17 page document discusses the development of a management plan for the control of invasive plants. It is available on the Virginia DCR web site.

Plant Conservation Alliance. Weed Buster's Handbook. August 10, 2001 (DRAFT)

When available, this manual will be an excellent resource book in the training of volunteers used in the control of invasive plants in natural areas of the Mid-Atlantic. A one-day training program is being developed by the Plant Conservation. The manual contains descriptions, photographs, and management techniques specific to 26 of the Mid-Atlantic region's most problematic invaders. Control methods have been selected for their documented effectiveness.

Reshetiloff, K., Slattery, B. Swearingen, J., Zwicker, S. Plant Invaders of Mid-Atlantic Natural Areas. 2002. National Park Service & U.S. Fish and Wildlife Service. 82 pp.

The booklet is an invaluable resource. It contains information about 44 invasive plants found in the mid-Atlantic including very good pictures, look-alike natives, distribution and ecological threat, and prevention and control. To order call the National Park Service (202) 342-1443 or U.S. Fish and Wildlife Service (410) 573-4500.

Tennessee Exotic Pest Plant Council and Great Smoky Mountains National Park. Tennessee Exotic Plant Management Manual. Tifton, GA. 1997. 121 pages.

Manual provides details of 20 of Tennessee's worst exotic pest plants, most of these occur throughout the mid-Atlantic states. Many control recommendations were field tested in a three year control and management project within Great Smoky Mountains National Park. The manual is available on the web. Printed copies must be ordered from members of the Tennessee Exotic Pest Plant Council.

Tu, Mandy, Hurd, Callie, & Randall, John. Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas. The Nature Conservancy. 4/01.

The very useful resource provides extensive discussion of all elements of invasive plant control. Can be view on the web at <http://tncweeds.ucdavis.edu>.

U.S. Fish and Wildlife Service. Invasive Plants – Changing the Landscape of America - Fact Book. 1998.

The fact book is a comprehensive non-technical overview of invasive plants in the US and includes a discussion of impacts in particular environments. Also contained are weed facts by state and a list of Federal and state contacts. This book is available on line at refuges.fws.gov/FICMNEWfiles/FactBook.html or from the GPO for \$15.00 (item # 024-001-03607-0).

Van Driesche, R.G., Blossey, B., Hoddle, M., Lyon, S., and Reardon, R. (eds). Biological Control of Invasive Plants in the Eastern United States. U.S. Forest Service FHTET-2002-04. Morgantown, WV. 2002.

Looks at the biology, impacts, and biological control of 30 invasive plants. Copies can be ordered via email from Richard Reardon: rreardon@fs.fed.us.

Ver Steeg, Barbara Invasive and Exotic Species Compendium 2002. Natural Areas Association. Bend, OR

Excellent compendium of articles related to the topic. Also includes a list of web sites. Available on CD ROM from the Natural Areas Association, P.O. Box 1504, Bend, OR 97701 (541) 317-0199.

Web Sites

Agricultural Research Service, USDA. Tektran Invasive Plants Research. <http://www.nal.usda.gov/ttic/tecktran/news/invasion>.

Site includes a large list of technical articles including abstract and contact information.

Brooklyn Botanic Garden. <http://www.bbg.org>.

Web site includes the worst invasives in the US list.

Cornell University Department of Natural Resources. Biological Control of Nonindigenous Species. <http://www.invasiveplants.net>.

Discussion of biocontrol of Purple Loosestrife, Garlic Mustard, Phragmites, and Eurasian Watermilfoil. Additional topics are being added to the site.

Invasive Plant Council of New York State. <http://www.ipcnys.org>

Very good site. This web site features a Weed Manager Directory organized by plant species that facilitates information sharing between land managers working on similar plants. It allows managers to share specific control methods and results. Also includes good photos of the top 20 Invasive Plants in New York State, current research funded by the Council and quarterly newsletters.

Maryland Native Plant Society. <http://Mdflora.org>.

Includes an eleven page guide for gardeners and homeowners in the Mid-Atlantic Region on the control of Invasive non-native plants. An excellent part of this guide is a list of native plant alternatives to invasive species.

National Agricultural Library. AGRICOLA – Agricultural On Line Access. <http://www.nalusda.gov/ag98/ag98>.

Large searchable database of books and articles.

National Agricultural Library of U.S. Department of Agriculture. <http://www.invasivespecies.gov>.

This excellent web site includes pertinent technical articles on many topics, up-to-date news and events lists, and databases from both government agencies and cooperating NGO's.

The Nature Conservancy. Wildland Invasive Species Program. <http://www.tncweeds.ucdavis.edu>.

A very useful web site featuring a catalogue of control methods, success stories and plant by plant descriptions and control information.

The Nature Conservancy. <http://www.tnc.org>

A search brings many site specific articles on controlling invasive plants.

New England Wild Flower Society. <http://www.newfs.org/invasive>.

Includes a nice reference page and Q&A for three invasives.

Northwest Coalition for Alternatives to Pesticides. <http://www.pesticide.org>

Website includes publications on alternatives to herbicides and pesticides and discussions about the inert ingredients in various pesticides. Plant specific discussions relate to pest plants of the Northwest.

Plant Conservation Alliance. “Weeds Gone Wild, Alien Plant Invaders of Natural Areas”. <http://www.nps.gov/plants/alien>

Excellent web site with fact sheets, calendar, plant lists, and links

Southeast Exotic Pest Plant Council. <http://www.se-eppc.org>.

Links to many useful websites . On-line publications include 17 of their plant fact sheets plus links to five other group's exotic invasive plant fact sheets. Also available for download on this web site is the excellent Tennessee Exotic Plant Management Manual.

Northern Prairie Wildlife Research Center, US Geologic Survey. <http://www.npwrc.usgs.gov/resource/literatr/exotic/exotic>.

This web site has a searchable database scientific articles.

USDA, Natural Resources Conservation Service. Plants Database.

<http://plants.usda.gov/index.html>

Extensive list of plants both invasive and noninvasive. The Gallery of Plants allows search by growth habit and will retrieve thumbnail photos. The database does not have a comprehensive list of invasive plants.

Virginia Native Plant Society. <http://Vnps.org>

Site links with the VA Dept. of Conservation and Recreation site for information on invasive plants in VA. It also lists volunteer opportunities in VA.

Virginia Department of Conservation and Recreation. DCR and Virginia Native Plant Society Cooperative Project. <http://www.dcr.state.va.us/dnh/invproj>.

Site includes 30 factsheets, a list of all invasive plants found in VA, and a downloadable management document.

State Invasive Plant Lists

Maryland Department of Natural Resources – Wildlife & Heritage Service. “Invasive Exotic Plants that Threaten Native Species and Natural Habitats in Maryland.” Annapolis, MD. 1/03. 4pp.

List available on the Maryland DNR web site at <http://www.dnr.state.md.us/wildlife/iepinintro.html>

Pennsylvania Department of Conservation and Natural Resources. Invasive Plants in Pennsylvania. Harrisburg, PA. 4/00.

Pamphlet shows area of distribution in state and includes a resource list.

Virginia Department of Conservation and Recreation and Virginia Native Plant Society. “Invasive Alien Plant Species of Virginia.” Richmond, VA 8/01. 6pp.

This six page list includes invasiveness rating, region, light and moisture requirements of many alien invasive plants found in Virginia.

Miscellaneous Resources

Burrell, C. Colston. “More than a Pretty Face – Native Alternatives to Invasive Exotics” 5 pages. Free Union, VA.

Provides alternatives to 18 exotic invasive plants and also recommends native plants with certain esthetic attributes such as color form texture fragrance and luminescence. To order contact author at 5685 Peavine Hollow Trail, PO Box 76, Free Union, VA 22940-0076, (804) 975-2859,

Pennsylvania Department of Conservation and Natural Resources. “Invasive Plants.” Harrisburg, PA. 1/03. Poster.

Large, colorful poster features photographs of 12 invasive plant species. The back of the poster contains general information about invasive plants and specific information about each plant featured on the poster.

Information on Related Topics

Irene Miles, William Sullivan and Frances Kuo. "Ecological Restoration Volunteers: the Benefits of Participation." Urban Ecosystems, Kluwer Academic Publishers. 1998, 2, 27-41.

Discusses the results of a survey to determine motivations of volunteers for restoration projects. The 263 respondents of a survey to determine satisfaction with volunteering in restoration projects indicated that the most important elements in their satisfaction with their work were taking meaningful action and fascination with nature.

Appendix C

Example Outreach and Volunteer Forms



PressRelease

3310 Market Street - Suite A
Camp Hill, PA 17011
voice 717-737-8622 - fax 717-737-8650 - www.AllianceChesBay.org

for more information, contact Susan Ricahrds 717-737-8622

ACB to Launch RestoreCorps Regional Volunteer Program in Harrisburg Volunteers needed for April 27 Wildwood Lake Sanctuary restoration project kickoff

Camp Hill, PA (04/08/02) - To make it easier for volunteers throughout the region to take part in the restoration and protection of the Chesapeake Bay and its rivers, the Alliance for the Chesapeake Bay will launch its RestoreCorps program with the first "Volunteer Action Day" on April 27 at Wildwood Lake Sanctuary in Harrisburg. Through the generous support of the William Penn Foundation, RestoreCorps will recruit volunteers and train local watershed organizations to help improve the Bay through grassroots restoration projects.

"We're excited to launch the program in the beautiful wetlands and woodlands of a Dauphin County park," said ACB Director of Watershed Stewardship Brook Lenker. "South Central Pennsylvania is the perfect backdrop for the many volunteers who want to do their part to help the Susquehanna River and Chesapeake Bay."

Volunteers are needed for three hour shifts (9:00 a.m. to 12 noon and 1:00 p.m. to 4:00 p.m.), in which they will help remove invasive plants and replant those areas with native trees and shrubs. Lunch will be provided to all volunteers who register.

"Hands-on restoration and getting involved with the work of local watershed groups is a great way for volunteers to make a difference for the environment in their own community," Lenker added. "Every person in the Susquehanna basin has a stake in these issues."

The Volunteer Action Day is being conducted in partnership with the Paxton Creek Watershed and Education Association, the Capital Area Greenbelt Association and Dauphin County Parks and Recreation Department. Founded in 1971, the Alliance for the Chesapeake Bay is a regional non-profit organization that builds partnerships for the restoration of the Bay and its rivers.

For more information contact: Brook Lenker, Director, Watershed Stewardship (717) 737-8622

Wildwood Lake Sanctuary

Invasive Plant Removal Volunteer Job Description

Training:

Volunteers will be instructed on “how to” properly:

- remove tree-of-heaven by hand;
- use tools such as weed wrenches; and
- remove other invasives using either handsaws and/or loppers.

Volunteers will be instructed on how and where to remove these invasives species within the project area.

Responsibilities:

Volunteers will be assigned to an area and will work under the supervision of a member from the Alliance for the Chesapeake Bay’s technical invasive steering committee. Volunteers may be assigned other tasks specific to this project.

Miscellaneous:

All volunteers should be cognizant of potential hazards (ticks, poison ivy, etc.) and take necessary precautions.

Please be aware of own personal needs including consuming sufficient water and take the necessary breaks for restroom and/or snacks.

Liability Waiver and Photo Release

**VOLUNTEER ACTIVITY
WAIVER & ASSUMPTION OF RISK**

NAME OF ACTIVITY: Wildwood Lake Sanctuary/Invasive Plant Removal

DATE OF ACTIVITY: March 02, 2002

I have read a description of this volunteer activity and/or have been briefed on the activity by a staff member of the Alliance for the Chesapeake Bay, Inc. and understand that this activity may involve hazards to me, my real or personal property. However, I am willing to take the risk of such hazards in order to participate as a volunteer in this activity. I hereby agree to assume those risks.

I understand that I am not acting as an agent, authorized representative or employee of the Alliance of the Chesapeake Bay, Inc. and Dauphin County Parks and Recreation Department and not entitled to any benefits, which may accrue thereto.

In consideration of being allowed to participate in this activity, I hereby release and hold harmless the Dauphin County Parks and Recreation Department and the Alliance for the Chesapeake Bay, Inc. and aforementioned organization's employees, directors, officers and agents from any and all claims that may arise from or relate to my participation in this activity, including negligence on the part of any of them.

((To be completed by the volunteer))

DATE: _____

SIGNED: _____

PARENT/GUARDIAN SIGNATURE: _____

(For participants under 18 years old)

Photo Release

I hereby give permission for my photo to be taken during the activities with Dauphin County Parks and Recreation and the Alliance for the Chesapeake Bay, Inc. to use said photographs in commercial or non-commercial publicity (i.e. radio, newsletters, newspapers, website, television, etc).

SIGNED: _____

PARENT/GUARDIAN SIGNATURE: _____

(For participants under 18 years old)



Volunteers At Work

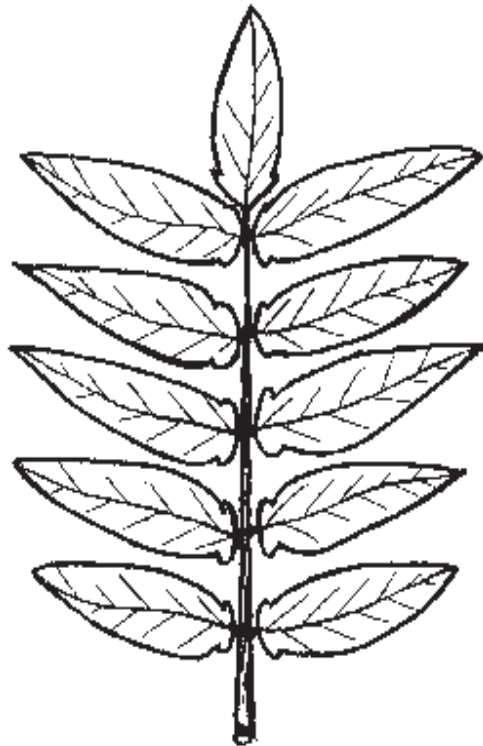
Control of exotic invasive plants is underway in this part of the park. Volunteers are using several weed control techniques, appropriate to this environmentally sensitive site, to restore the landscape for a wider variety of native plant and animal species



This project is a partnership between Dauphin County Parks and Rec, Paxton Creek Watershed Association, Capital Area Greenbelt Association and Alliance for the Chesapeake Bay.

Tree-of-Heaven

also known as Ailanthus, Chinese sumac & Stinking sumac, is a rapidly growing, quickly spreading tree that can quickly take over a natural site – crowding out native vegetation and creating a monoculture. Tree-of-heaven is often present along roadways and other disturbed areas, crowding out native plants and decreasing the capacity of these landscapes to support wildlife.



Control Methods

Volunteers will pull seedlings as they sprout. Larger trees are being killed using herbicide inserted directly into the tree's sap.

Appendix D

Herbicide Regulation

APPENDIX D REGULATION OF HERBICIDES

Overview of Herbicide Regulation

Both federal and state regulations control pesticide products. The federal government gives approval and designates use restrictions for individual products while each state determines the protocols and training for the licensing of pesticide applicators and regulates pesticide application of non-restricted use pesticides by those who are not the landowner. Pesticides designated as *general use* do not require special certification for purchase. These pesticides, though by nature toxic to plants and/or animals, tend to present fewer risks to the applicator and the environment. *Restricted use* pesticides require that the purchaser be certified as a pesticide applicator by the state. Because of the higher degree of risk associated with the misuse of this type of chemical, a greater understanding of its potential risks and proper use is necessary for safety. Both types of pesticides have labels that describe proper use, storage, and disposal of the product. Always read the product label before using.

State Regulations

Rules for using pesticides vary among states. Formulation and oversight of these rules is done, in Maryland, Virginia and Pennsylvania, by the state Agriculture Department. Rules concerning situations in which volunteers will apply general use pesticides on land they do not own vary between states.

Maryland

Regulating Authority:

MD Department of Agriculture

Pesticide Regulation Section

50 Harry S Truman Parkway

Annapolis, MD 21401

Phone: 410-841-5710

Web site www.mda.state.md.us/geninfo/general10

When any pesticide is used on public land, the project must first receive a material permit from the state for the activity. Volunteers may handle and use a herbicide on state land but must be supervised by a certified pesticide applicator. Supervision of a pesticide applicator is also required for volunteer projects on private land when volunteers – not the landowner – are applying a herbicide. In Maryland, before individuals may take the licensing test, applicants must have at least one year of experience in a setting in which the individual works with a certified applicator or have at least a BS degree in a biological field.

Pennsylvania

Regulating Authority:
PA Department of Agriculture
Bureau of Plant Industry
2301 N. Cameron St.
Harrisburg, PA 17110-9408
Phone: 717-787-4843
Web Site: www.Pacode.com

Similar to Maryland's regulations, Pennsylvania requires that volunteers must work under the supervision of a certified applicator if they are working on any property they do not own. To get additional information on the certification process, visit the PA code web site and search Title 7.

Virginia

Regulating Authority:
Virginia Department of Agriculture and Consumer Services
Office of Pesticide Services
P.O. Box 1163
Richmond, VA 23218
Phone: 804-371-6558
Web Site: www.vdacs.state.va.us/pesticides

When working on public land, Virginia requires that volunteers work under the supervision of a certified pesticide applicator; however volunteers are not regulated on private land when using general use pesticides.