

# Leaf Litter

*Restoring the Earth and Inspiring Ecological Stewardship*

A publication of Biohabitats, Inc.

[www.biohabitats.com](http://www.biohabitats.com)

## Invasive Plant Species

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### What's so bad about invasive plants anyway?

*Did you know that:*

- The **Bradford Pear** (*Pyrus calleryana* 'Bradford'), planted throughout the east and Midwest as an ornamental street and landscape tree, has escaped plantings and is invading natural habitats in the eastern United States?
- **Privets** (*Ligustrum obtusifolium*, *L. sinense*, *L. vulgare* and *L. japonicum*), widely used as hedges, have escaped cultivation and are now established throughout the eastern part of the country, often blanketing floodplains in the South and displacing native plants?
- **Norway Maples** (*Acer platanoides*), a European and Western Asia cousin to the native Sugar Maple, has escaped cultivation and frequently invades forests, fields and other natural habitats?
- **Purple Loosestrife** (*Lythrum salicaria*), widely sold as an ornamental in the Northeast, adapts readily to natural and disturbed wetlands, crowding out native species and impacting biodiversity?

Estimating the total economic impact of harmful non-native species is very difficult. Some estimates put the damage at more than \$100 billion each year (Pimentel et al., 1999) while others estimate that nearly half of the species currently listed as threatened or endangered under the U.S. Federal Endangered Species Act are impacted by invasive species.

So what is an invasive plant? Invasive plants can be both native and exotic. Typically we associate invasive plants with exotic plants, like Kudzu. However, it is important to remember that not all exotic plants are invasive. Most of our food crops and ornamental landscape plants are not invasive. However, there is a small but growing cadre of both native (to North America) and exotic (non-native) plants that pose serious threats to native habitat and biodiversity. Invasive plants can be

defined as those plants that are non-native, grow aggressively, and can often dominate whole native communities. Invasive plants 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

Invasive plants can be introduced into the environment through gardening, landscaping, erosion control planting, disposing of unwanted plants, and the purging of ballast water from ships. Like an uninvited party crasher who refuses to leave, invasives wreak havoc on ecosystems. They take over and disrupt the often fragile balance that exists between native plants, animals and microorganisms. Since invasive plants are rapid reproducers and spreaders without many natural enemies, they can grow out of control, reducing shelter for native wildlife; eliminating host plants which support native insects; and in some cases completely eliminating native plants and forming an impenetrable mat. Alteration of ecosystem processes combined with a loss of native plants is causing the rapid decline of biodiversity.

Recognizing the impact of invasive species on both the environment and the economy, the Federal Government, along with experts from across the globe are tackling the problem head on. In 1999 President Clinton authorized Executive Order 131212 [<http://www.fleppc.org/execorder.htm>] to direct federal agencies to prevent the introduction of invasive species and provide for their control to minimize economic, ecological and human health impacts that these species cause. More recently, in 2001 experts from across the globe met at the Missouri Botanical Garden to explore and develop workable, voluntary approaches for reducing the introduction and spread of exotic, invasive plants. The meeting generated findings (1) and principals (2) and draft voluntary codes of conduct [<http://www.fleppc.org/FNGA/St.Louis.htm>]. Read selections from the workshop proceedings [<http://www.mobot.org/invasives/mbgN.html>]. Biohabitats encourages architecture, engineering, planning and environmental consulting firms to read the Draft Voluntary Codes of Conduct and consider adopting them in to their practice.

**“Stop the Invasion and Go Native!”** says *Ed Morgereth* [[www.biohabitats.com](http://www.biohabitats.com)], *Biohabitats senior ecologist and resident invasive species expert.*

Whether you're planning a 150-acre meadow restoration or small back yard garden, spend time doing a little research on native plants before you design and dig – it will be well worth it. The first step in combating invasive plants is not to plant the invader in the first place. Native plants help protect and maintain healthy ecosystems. They minimize labor, maintenance costs and worry because in their

natural environment they require little attention. Once established, native plants usually do not need fertilizers, pesticides or watering. Landscape planting with species native to your region can provide habitat for migratory songbirds and pollinators such as bees, improve soil structure and even help filter and reduce the volume of stormwater runoff from our roads and driveways. Native plant communities can often be used in lieu of more expensive and environmentally damaging engineered stormwater management facilities.

Biohabitats recommends you begin by familiarizing yourself with what plants are considered invasive [[www.invasivespecies.gov](http://www.invasivespecies.gov)]. You will be surprised! Then get a list [<http://tncweeds.ucdavis.edu/links.htm>] of native plants from your local native plant society or state natural resources department. Keep that list handy when developing a landscape planting plan or visiting your favorite nursery. It's best to purchase native plants that originated within the same physiographic region and hardiness zone of your site. Also, consider using native, warm season grasses the next time you contemplate creating a lawn. Don't be afraid to ask the nursery where they obtained the plant material and be sure it came from a local source.

And never take plants from the 'wild.' Our native plant communities are already struggling to survive without the indiscriminate loss of plants. There are plenty of plant nurseries [<http://directory.ceramlinks.com/landscape-and-garden/nurseries/native-plants/>] that now cater to propagating and selling native plants.

Don't be fooled – many local nurseries sell invasive plants like English Ivy, and many landscape design professionals still recommend planting invasives such as periwinkle for ground cover. Educate yourself and help conserve habitat for our native wildlife.

If you've already got an invasive problem, there are several options available to you. The size of your impacted area and the type of weed will help determine which path to take. The Nature Conservancy has put together the *Weed Control Methods Handbook: Tools and Techniques for Use in Natural Areas* [[www.fleppc.org/execorder.htm](http://www.fleppc.org/execorder.htm)], which is just one source that includes an abundance of helpful information.

Basically, though, there are three methods of removal. None is entirely fool-proof, and you'll often find success in using an integrated approach.

- 1) **Pull** the invasives out by hand or with a machine. This is most effectively done in a small area. Be careful not to spread seeds (and make the problem worse!) as you pull.
- 2) **Biological control** using introduced insects, plants or other organisms. This can slow the spread of weeds but can't usually eradicate the species. This approach often relies on the introduction of non-native organisms that could result in unknown, future problems. Take care to target the specific weed so that other plants aren't impacted.

- 3) **Herbicides** can be effective, especially when infestations are detected early. But be sure to apply herbicides carefully and have confidence that it will do more conservation good than harm. Refer to the herbicide manufacturers' recommendations and associated federal and state regulations for guidance.

To help you out, we've put together a list of common invasive plants and suggested native alternatives.

<b>Invasive Plant</b>	<b>Native Plant Alternatives</b>
Garlic Mustard <i>A single plant can produce hundreds of seeds that can scatter several yards.</i>	Wild ginger; creeping phlox
Purple Loosestrife <i>Invades wetlands and river banks; one mature plant can produce 2-3 million seeds per year.</i>	Cardinal flower; Blazing Star of Gayfeather
Multiflora Rose <i>Often used as a living fence, this plant grows aggressively and can be detrimental to nesting birds.</i>	Common blackberry; Flowering raspberry
English Ivy <i>Dense groundcover prevents sunlight from reaching seedlings, vines kill trees from the base upward.</i>	Virginia Creeper; Foam flower

## Getting' Inspired by Invasives

**Weed Identification** (a poem by Arlys Gay Lykes) from The Washington State Noxious Weed Control Board  
[<http://www.nwcb.wa.gov/education/educationhome.html>]

### by Arlys Gay Lykes Stevens County Noxious Weed Control Board

*I had a call to check some weeds  
And since that's how I'm paid  
I'll do the deed.*

*My jeans were pressed  
My shirt was clean  
when I arrived upon the scene.*

*As I surveyed the humble farm  
my eyes were filled with some alarm.  
"A bracken fern" I sternly said  
"if your horse eats this he'll sure be dead*

*"Well, that's all fine," she said to me  
"but that's not the weed  
I've called you to see."*

*"It's in the pasture, past the trees  
Over the hill--- look out for bees!*

*Up the creek and down the brook  
off we set to take a look.  
Oh joy, oh rapture, when after awhile  
she said, "It's not far now, just another mile."*

*Oh wonder, wonder - what will it be?  
This horrid weed we've set out to see?*

*By this time my feet were froze  
but onward, onward, on we goes.  
It's just down this little slope  
hang on to the branches as down we grope.*

*And then she said "Hi ho! We're there!"  
And I looked around and asked her  
"Where?"*

*She eyed me then with some distrust  
Her voice echoes her disgust.  
"It's all right here within your sight  
See all those blooms so large and white.*

*And I looked and to my sorrow  
All I could see was common yarrow.*

*"It's just yarrow, ma'am, no need to fear,  
A common plant that's native here.  
It seems to like this rocky clime  
where the sun shines freely all the time."*

*She looked at me like I'd gone mad  
and lost what little sense I'd had.*

*She softened then and I heard her say,  
"Thanks for coming out today,  
and I hope your feelings won't be hurt,  
but I'm going to ask my neighbor -He's a weed  
expert.*

## **Cooking With Invasive Plants**

### **From the Invasive Plant Atlas of New England**

[<http://invasives.eeb.uconn.edu/ipane/index.html>]

*Invasive plants can often be confused with others; be sure you have correctly identified what you pulled before you eat anything. If in doubt, throw out.*

### **Garlic Mustard Pesto**

4 cloves of garlic

3 tbs. garlic mustard [<http://www.wildmanstevebrill.com/Plants.Folder/Garlic%20Mustard.html>]

taproots

3/4 cups parsley

1 cup garlic mustard (no) leaves

1 cup basil

1-1/2 cup low-sodium olives

2 cups walnuts

1 cup pine nuts

1/2 cup mellow miso

1-1/4 cups olive oil or as needed

1. Chop the garlic and garlic mustard roots in a food processor.

2. Add the parsley, garlic mustard and basil and chop.

3. Add the nuts and chop coarsely.

4. Add the olive oil and miso and process until you've created a coarse paste.

Makes 4 cups

### **Wild Garlic Soup**

Peel the tough outer layer of the whole plant and boil in water for 30 minutes. Strain out cooked bulbs and season with butter, salt and pepper to use as a side dish. Retain liquid. In a sauce pan melt 2 tablespoons butter and stir in 2

tablespoons flour. Add 1 cup milk and simmer, stirring until thick. To this slowly add retained water until desired consistency is reached for your soup.

Make pickled garlic by packing the immature bulb clusters in a pickle jar. Add 1 tablespoon pickling spice and fill with a mixture of 2 parts cider vinegar and 1 part water. Seal and store in a cool place for one month before using.

This super simple recipe can be made over a campfire or become the base for other recipes at home. You can substitute wild onions, field garlic or ramps for the wild garlic.

### **Wild Garlic and Greens Soup**

For every cup of water you will need:

1/4 cup wild garlic bulbs, peeled

1/2 cup shredded wild greens (I like this best with a mix of stronger tasting greens such as dock, and mild ones like chickweed, but use whatever the day brings)

salt and pepper to taste

Put garlic and cold water in a pot. Place over heat and simmer uncovered for 20 min. Add greens, salt and pepper and cook for another 10 min. You can serve this as is with the greens and garlic in it, or strain to use as a vegetable stock in other recipes. If you're at home, serve with croutons and a sprinkle of grated cheese.

### **Apple and Knotweed Pie**

From *SHOOTS AND GREENS OF EARLY SPRING in Northeastern North America*

[<http://www.econetwork.net/~wildmansteve/Books.Folder/S%20%26%20G%20Folder/S%20%26%20G.html>]

### **Crust**

2 cups whole wheat pastry flour or buckwheat flour

1/4 tsp. salt

1 tsp. dried spearmint

1 tsp. cinnamon

1/4 cup almond oil, vegetable oil, or butter

1/2 cup apple juice, or as needed.

1. Chill all ingredients

2. Mix the flour with the seasonings.

3. Cut in the oil. Mix until you have the consistency of wet sand. Use your judgment to determine exactly how much oil or butter you need.

4. Slowly mix in the cold apple juice until you have a dough that's elastic and pliable but not mushy.

5. Press this into an oiled 9" pie pan. (A 50/50 mixture of liquid lecithin and oil makes the best substance for oiling baking surfaces.) Save the excess dough. You can use it on top of the pie filling or you can freeze it for later use.

### **Filling**

- 2-1/4 cups sliced tart apples  
1/4 cup sliced Japanese knotweed  
[<http://www.econetwork.net/~wildmansteve/Plants.Folder/Knotweed.html>]  
1/2 cups apple juice  
1 tsp. cinnamon  
1 tsp. powdered ginger  
1/2 tsp. nutmeg  
1/4 tsp. ground cloves  
1/2 cup sunflower seeds  
1/4 cup each black walnuts and English (commercial) walnuts, or 1/2 cup English walnuts  
3 tbs. tapioca, arrowroot, or kudzu
1. Mix all filling ingredients together.
  2. Prick holes in the crust with a fork, then fill it with the filling.
  3. Put excess dough on top, lattice style, if desired.
  4. Bake at 425 degrees ten minutes, checking to see that the crust doesn't burn.
  5. Reduce the heat to 350 degrees and turn the pie pan so the heat is better distributed.
  6. Bake another 30 minutes or until the crust is crisp and the filling is bubbly.

### **Invasive Plant News**

Exotic grasses' role in Joshua Tree blazes to be studied (8/03)

[<http://www.bayarea.com/mld/cctimes/living/science/6500931.htm>]

The National Oceanic and Atmospheric Administration (NOAA) is establishing a new National Center for Research on Aquatic Invasive Species in Ann Arbor

[[http://www.enn.com/news/2003-07-17/s\\_6606.asp](http://www.enn.com/news/2003-07-17/s_6606.asp)]

### Congress Takes Up the Fight Against Invasive Plants

Federal legislation is working its way through Congress that will help in the effort to control invasive plants. The proposed bill, known as the "Harmful Invasive Weed Control Act," would create a program in the Department of Interior to provide assistance through States to eligible weed management entities to control or eradicate harmful, nonnative weeds on public and private land. It is sponsored by Senators Craig (R-Idaho) and Daschle (D-South Dakota) in the Senate and by Representative Hefley (R-Colorado Springs) in the House of Representatives. Work has been progressing on the bills and public meetings were held recently across the U.S. to solicit feedback from local citizens.

The text of the House and Senate versions of the bills, as well as their current status may be viewed at: <http://thomas.loc.gov>. Enter a search for bill number H.R. 1462 or S.198, or search by using "invasive weed".

(<http://www.fs.fed.us/r6/invasiveplant-eis/legislation.htm>)

New England Wild Flower Society announces list of invasive plant species in Massachusetts.

Framingham, Massachusetts [May 2003]– The New England Wild Flower Society announces the publication of a list of plant species declared to be invasive in Massachusetts, as a result of the collaborative work of the Massachusetts Invasive Plants Group.

This initial list represents the first 39 plants evaluated by the collaborative, which is comprised of the nursery industry, conservation groups, state agencies, and academics, working together using established scientific criteria, to determine which plants are invasive on the Massachusetts landscape. The next 40 plant species are scheduled for definitive evaluation in June of 2003. The issue of Invasive Plants is critical because, second only to loss of habitat, it is the primary cause of the reduction of diversity in native plant populations worldwide. As of today, more than 28% of the world's native plant species are threatened or endangered, including over 200 species in Massachusetts, alone. For more information visit [www.newfs.org](http://www.newfs.org).

### The National Wildlife Refuge Association Receives Invasives Awareness Award

Washington, DC, February 27, 2003 – The National Wildlife Refuge Association (NWRA) was honored by the Invasive Weeds Awareness Coalition (IWAC) for its “exceptional educational efforts and cooperative support in the battle against invasive species in the United States.” The award was given at an awards reception held at the Smithsonian Institution commemorating the launch of National Invasive Weeds Awareness Week (NIWAW).

NWRA has committed itself to increasing the public's understanding of the harmful impacts of invasive species to the 95-million-acre National Wildlife Refuge System. In October 2002, the organization launched a national media and grassroots campaign with the release of Silent Invasion, a report that details threats to a large majority of the 540 refuges across the country. Invasive species are now the #1 threat to refuges as reported by refuge managers, and have degraded an estimated eight million acres within the System. Silent Invasion urges Congress and the Administration to provide \$150 million over the next five years to train and mobilize 5,000 volunteers; deploy 50 rapid response strike teams; and implement the strategic management plan of the National Invasive Species Council.

The National Wildlife Refuge Association is the only organization working exclusively to protect, enhance and expand the National Wildlife Refuge System, lands and waters set aside by the American public to protect our country's diverse wildlife heritage. Established in 1975, the NWRA provides a national voice for refuge staff and volunteers and for the wildlife that depend on refuges for their survival. For more information on the NWRA or its efforts to stop the spread of invasives on refuges, visit: [www.refugenet.org](http://www.refugenet.org).

### **Invasive Species Links**

Mid Atlantic Exotic Pest Plant Council [<http://www.ma-eppc.org>]



Plant Conservation Alliance, Alien Plant Working Group [[www.nps.gov/plants/alien/](http://www.nps.gov/plants/alien/)]  
Nature Conservancy Wildland Invasive Species Team  
[<http://tncweeds.ucdavis.edu/>]  
Bureau of Land Management's Weed Website [[www-a.blm.gov/weeds](http://www-a.blm.gov/weeds)]  
Control of Invasive Non-native Plants; a Guide for the Mid-Atlantic Region  
[[www.mdflora.org/publications/invasives.htm](http://www.mdflora.org/publications/invasives.htm)]  
National Invasive Species Council [[www.invasivespecies.gov](http://www.invasivespecies.gov)]  
U.S. Geological Survey-Nonindigenous Aquatic Species [<http://nas.er.usgs.gov>]  
Center for Invasive Plant Management [[www.weedcenter.org](http://www.weedcenter.org)]  
Natural Resources Conservation Service Plants Database [<http://plants.usda.gov/>]  
A SourceBook on Natural Landscaping for Public Officials  
[<http://www.epa.gov/greenacres/toolkit/about.html>]  
Maryland Native Plant Society [[www.mdflora.org](http://www.mdflora.org)]

## **Integrating Invasive Species Management into Restoration Projects**

### *Case Study: Norbeck Road Wetland Project*

Montgomery County, Maryland, situated between Baltimore and Washington, D.C. has experienced tremendous growth in the last 20 years. In order to keep up with this growth, the County has taken on an ambitious program to upgrade their road network. Concurrently, the County also recognizes that environmental protection and resource conservation play a critical role in preserving the quality of life in the region. As part of upgrading their transportation system, the County undertook the Norbeck Road Extension project. This rather routine road construction project resulted in the unavoidable impact of approximately 4 ½ acres of non-tidal wetlands. Through state and federal regulations, the County was charged with restoring over six acres of non-tidal wetlands within the same watershed. The County retained Biohabitats to identify potential wetland mitigation sites, develop wetland mitigation plans, oversee construction and perform monitoring of the wetlands for three years. While the County recognized that they had to restore wetland habitat, invasive species management was not initially on their radar screen.

While many components make for a successful wetland mitigation project, the preparation of an invasive species management plan is perhaps one of the most important. The success of many ecological restoration projects hinges on the management of invasive plant species, specifically in urban areas where invasive species are often ubiquitous. As with many wetland mitigation projects, the sites chosen for the Norbeck Road project contained, and were virtually surrounded by, a variety of exotic invasive plants such as mile-a-minute weed; multiflora rose; Japanese barberry; Japanese stiltgrass, and Canada thistle, to name a few.

Successful management of invasive plants requires a plan and commitment to continual effort towards the specific landscape restoration goals for the project. The most economical way to avoid the spread of invasive plants is to disturb as

little soil, and remove as little native vegetation, as possible. Achieving invasive plant management goals sometimes necessitates obtaining commitments from other agencies and/or private property owners in order to efficiently prevent further invasion. Inventory and assessment of adjacent surrounding habitat will determine planning direction. Here are some principles of site design that have proven beneficial to managing invasive plant species:

### **Principles of Non-native / Invasive Plant Species Management**

- Minimize disturbance activities including clearing existing vegetation and disturbing the soil.
- Reduce known existing populations of invasive plant species prior to beginning work.
- Provide control measures for the possible introduction of new populations of invasive plants.
- Monitor and treat re-growth of targeted invasive plants for an extended time period.
- Immediately supplement gaps in the vegetation community with native plants/seed.

There are many well published strategies to combat non-native/invasive plant species, but how do you integrate them into a comprehensive program that fits within the larger framework of the wetland mitigation project? Meeting schedules, budgets and project performance expectations must all be taken into account when developing an invasive species management plan for a restoration project. Years of experience, along with trial and error, have provided Biohabitats with an invasive species management process that has been successfully applied to many restoration projects throughout the Northeast and Midwest, including the Norbeck Road project.

Our invasive species management process includes three distinct phases.

#### **Phase 1: Pre-Construction Invasive Species Management**

Managing invasive plants *prior* to beginning construction activities is the most cost-effective and sensible action to take. Once disturbed, many invasive species have a propensity to survive, often employing a host of regenerative mechanisms that will make control efforts more difficult and time consuming. Employing an invasive species management program a minimum of one year prior to any earth disturbance activities will greatly diminish management efforts during and after construction activities. An invasive species management program should identify targeted invasive species and specify control measures.

#### **Phase 2: During-Construction Invasive Species Management**

Provided pre-construction invasive species management is employed on the project, minimal effort will be required during construction activities. For all restoration construction projects, best management practices (BMPs) should be incorporated into the construction plans and specifications. For example, on Norbeck Road there were conditions imposed on the excavation and disposal of soil known to contain seed from an infestation of invasive plants. When excavated, this soil had to be either used as sub grade material or hauled to a

landfill. Other BMP practices included ensuring that temporary seed for erosion and sediment control did not contain invasive species; identifying and eradicating invasive species discovered during construction activities; minimizing the use of fertilizers; and ensuring that a good cover of native species is established.

### **Phase 3: Post-Construction Invasive Species Management**

Finally, post construction invasive species management is needed to ensure that the native plant community becomes well established and able to ward off the invasive species. Realistically a commitment of two to 10 years of post-construction management is required to ensure that the native plant community becomes established and stable. One to three years after construction is complete is the most critical period for post construction invasive plant management. During this period the new vegetation is adapting to the environment and coverage is still not 100%, providing ample opportunity for the establishment of invasive plants. Typically after this period management activities can begin to taper off.

The Norbeck Road wetland project has successfully employed all three of these phases into the overall mitigation plan.

### **What We're Doing At Biohabitats!**

#### Bryon Salladin joins the team

Bryon is an environmental technician with experience in natural resource inventory, assessment, and restoration. He conducts wildlife population studies, ecological forest inventories, forest and wetland resource investigations, and develops restoration planting design, implementation and oversight and monitoring.

Bryon is working toward an M.S. in Forest and Natural Resource Management with an emphasis on Watershed Management from S.U.N.Y. College of Environmental Science and Forestry and holds a B.S. in Environmental Science from Unity College. He has researched the potential of constructed wetlands for contaminated soil and water treatment, focusing on the tolerances of wetland plants to petroleum contamination. He enjoys many outdoor activities including whitewater and sea kayaking, sailing, back-country skiing, and gardening. When indoors Bryon enjoys hand carving wooden utensils, knitting and playing "old-time" music on his banjo.

#### Baltimore County On-call Stream Restoration Contract (MD)

Biohabitats, working in concert with Century Engineering and EBA, has been selected by Baltimore County to continue assessment, design and construction oversight services in support of stream restoration projects throughout the county. We're currently completing design for both the Wood Valley and East Branch Honeygo stream restoration projects under our prior on-call contract.

#### Harford County Open-End Environmental Design Services Contract (MD)

For the first time Biohabitats will be working with Harford County to provide environmental assessment, watershed management planning, wetland mitigation and stream restoration design, stormwater management design, and hydrologic and hydraulic studies.

#### Pittsburgh Parks Natural Areas Study (PA)

Biohabitats will be leading a team to investigate more than 1,700 acres of natural area within Pittsburgh's Regional Parks (Frick, Highland, Riverview and Schenley). This process will engage the Pittsburgh community and yield an understanding of the current natural area conditions, issues, opportunities and constraints. The team will build a working database and frame project initiatives according to five functional areas (flora, fauna, soils, geology and hydrology) that will work to renew these natural habitats.

#### Prince George's County Multi-Discipline Engineering and Environmental Services (MD)

As a subcontractor to A. Morton Thomas, Inc., Biohabitats has been selected to provide stream restoration and habitat improvement services as part of the larger contract.

#### Reference Reach Database for Canaan Valley Institute

Biohabitats will work to establish a web-based register of reference reach sections encompassing multiple stream types and multiple substrate sizes in multiple hydrophysiographic regions throughout the Mid-Atlantic Highlands.

#### VDOT Statewide Wetlands & Water Quality On-call Services (VA)

As a subcontractor to Parsons Transportation, Biohabitats will provide stream restoration and aquatic ecology services.

**Biohabitats** is an ecological restoration firm specializing in invasive species management; stream, river and wetland restoration; ecological master planning; water quality best management practices; and ecological monitoring. To learn more about our restoration and design services visit [www.biohabitats.com](http://www.biohabitats.com).

Chesapeake/Delaware Bay Bioregion  
Timonium, MD  
410.337.3659

Ohio River Bioregion  
Louisville, KY  
502.561.9300

Southeast Bioregion  
Canton, GA  
770.704.0098

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### **(1) Findings:**

People are major dispersers of plants. The magnitude of this dispersal is unprecedented and has allowed dispersal of species that manifest aggressive traits in new areas.

Plant introduction and improvement are the foundation of modern agriculture and horticulture, yielding diversity to our supply of plants used for food, forestry, landscapes and gardens, medicinal and other purposes.

A small proportion of introduced plant species become invasive and cause unwanted impacts to natural systems and biological diversity as well as economies, recreation, and health.

Plant species can be invasive in some regions, but not in others. The impacts of invasive plant species can occur at times and places far removed from the site of introduction.

### **(2) Principles (a.k.a. *The St. Louis Six*)**

1. Plant introduction should be pursued in a manner that both acknowledges and minimizes unintended harm.
2. Efforts to address invasive plant species prevention and management should be implemented consistent with national goals or standards, while considering regional differences to the fullest extent possible.
3. Prevention and early detection are the most cost effective techniques that can be used against invasive plants.
4. Research, public education and professional training are essential to more fully understanding the invasive plant issue and positively affecting consumer demand, proper plant use, development of non-invasive alternatives, and other solutions.
5. Individuals from many fields must come together to undertake a broad-based and collaborative effort to address the challenge, including leaders in horticulture, retail and wholesale nurseries, weed science, ecology, conservation groups, botanical gardens, garden clubs, garden writers, educational institutions, landscape architects, foundations and government.
6. A successful invasive plant species strategy will make use of all available tools including voluntary codes of conduct, best management practices, and appropriate regulation. Codes of conduct for specific communities of interest are an essential first step in that they encourage voluntary initiative, foster information exchange, and minimize the expense of regulation.