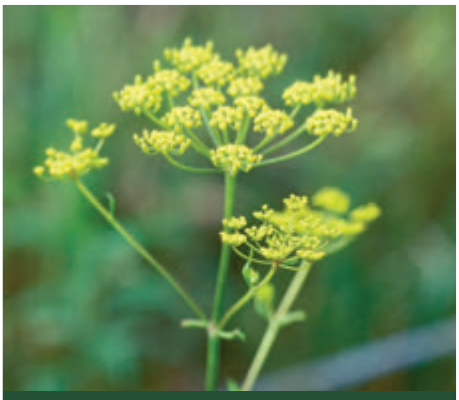
Managing Invasive Plants in Riparian Areas

Garlic Mustard



Wild Parsnip

Oriental Bittersweet

NEW YORK STATE OF OPPORTUNITY.
Department of Environmental Conservation

Introduction

This document provides guidance for land managers to prioritize invasive species management in order to successfully establish native trees and shrubs in riparian planting areas.

Riparian areas are stretches of vegetation bordering creeks, streams and other water bodies. These areas contain unique soil and vegetation characteristics that are found in no other habitat. Riparian areas provide important breeding and nesting areas for wildlife. Vegetation and soil in these areas create an important buffer zone within the watershed by providing the following functions: reducing flood damage, absorbing flood waters, filtering surface runoff, enhancing water quality, and maintaining cool water temperatures. These areas are vulnerable to storms, eroding banks and flooding.

Disturbed riparian areas are particularly susceptible to invasive species introductions. Invasive species are plants and animals that are not native to an area and cause harm to the environment, economy or human health. Restoration of riparian areas can cause disruption of riparian soils, making them optimal locations for invasive species introductions. It is not always possible to eradicate all invasive species from a property, but this document will help guide you in limiting their impact on the native plants used to restore your riparian area. Planting hardy, native vegetation is critical to preventing unwanted introductions and ensuring successful plant establishment.

This guide is not an exhaustive list of invasive species that impact riparian areas, but it is a way to prioritize invasive species management, no matter what species you are dealing with. For more detailed information, visit the “Resources” found at the end of each section.

Post-flood site being replanted - an opportunity to prevent future invasions.

The Invasive Species Management Process

Invasive species management is an ongoing, iterative process. Five basic steps in invasive species management are outlined below and are described in more detail in the subsequent sections.

Steps to managing your invasive species.

1. Establish Management Goals

Before taking any management action on the landscape, it's important to think about your goals for the site, and the resources (time, labor, funds) that you are able to dedicate. This will help inform which type of management strategy you should employ when dealing with invasive plants in riparian areas. Depending on the site, your desired outcomes, and the species present, your control strategy may be one of the following:

a. Eradication – eliminate all invasive plants and the seed bank from an area.

b. Containment – prevent infestations of invasive species from spreading to uninfested areas.

c. Suppression – reduce the size, abundance, and/or reproductive output of an invasive plant population below the threshold needed to maintain native species or ecosystem functions. Such functions include stream bank stabilization, flood mitigation, instream temperature control, uptake of nutrients in storm runoff, and wildlife habitat.

Additionally, there is the option to do nothing and simply accept the presence of invasive species at the site.

To justify spending limited resources on a control project, it should include all of the following:

- The species in question must cause environmental or economic harm, or harm to human health.
- The project should be feasible.
- The project should give a good return on the investment of resources.

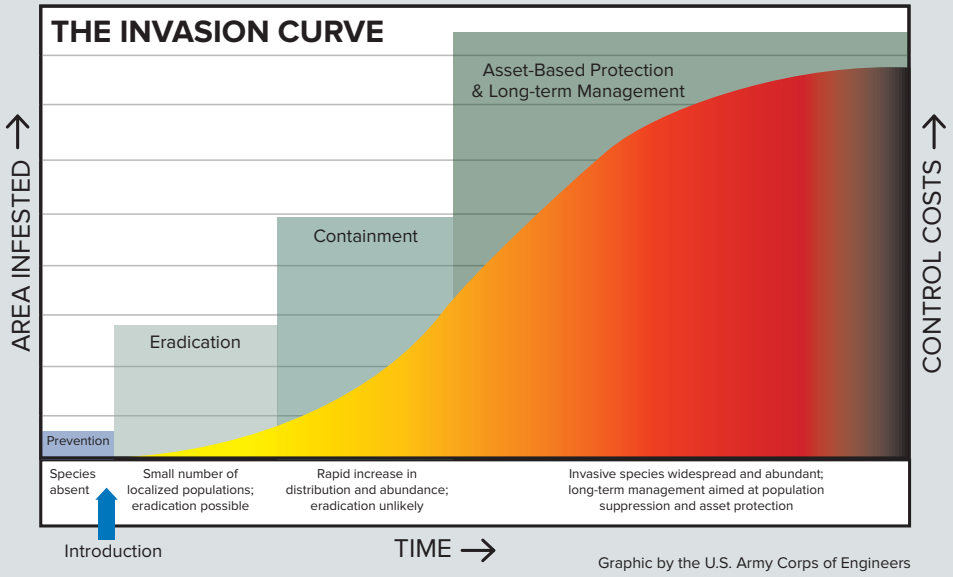
Establish Management Goal Resources

Invasive Plant Management Decision Analysis Tool: http://www.ipmdat.org/home.html

2. Prioritize Species and Infestations

As illustrated on the invasion curve below, the amount of resources needed is directly related to the size and age of the infestation. Eradication is only feasible for infestations that are detected soon after the species is introduced. At this stage on the invasion curve, the area infested is still relatively small, and the control costs are reasonable. The longer an infestation persists on the landscape, the more opportunities it has to reproduce and spread to new areas within your site. If an infestation remains undetected or resources are not sufficient for an immediate response, the likelihood of successful eradication or containment dwindles. Then the land manager is faced with the challenge of long-term invasive species management, which often proves to be both labor-intensive and costly.

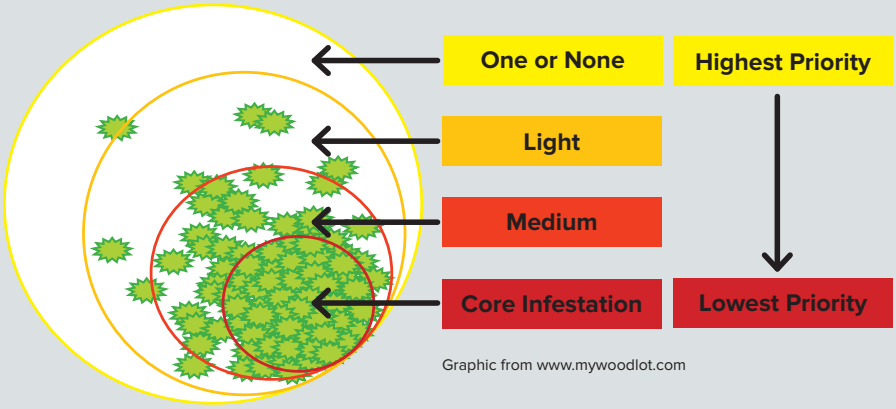
The invasion curve showing when eradication, containment and long-term management can be expected when dealing with an invasion.



Graphic by the U.S. Army Corps of Engineers

Tools for Prioritization

Once you have decided to implement a control strategy for invasive species at a site, you'll need to prioritize the work. One approach for doing this is to prioritize control efforts by density, meaning how many invasive plants are present in an area. Control work should begin where invasive plants are few, and work toward areas where they are more plentiful. Core infestations, or areas where invasive plants are most dense, may be difficult, labor-intensive, and expensive to control. Leave these areas for last. This strategy helps to prevent minor, manageable infestations from becoming larger in size and more costly to control.



Graphic from www.mywoodlot.com

Invasive species management begins in areas where you have only a few individuals, then works back toward the core infestation over time.

While the density strategy works well for some sites, there may be other factors to consider:

Invasive vines

Invasive vines like kudzu, mile-a-minute, oriental bittersweet, and swallow-wort often strangle and kill trees, including the native trees and shrubs you plant. This can lead to stream bank erosion, nutrient loading, increased stream exposure to sunlight and warmer water temperature, decreased biodiversity, and a disturbed site where additional invasive species may become established. For these reasons, you may want to prioritize control of invasive vines in your management plan.

Photo Credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

Mile-a-minute has triangular leaves and barbs on the vine and underside of its leaves which aid its ability to climb.

Public access sites

Public access sites for fishing, launching a canoe, birdwatching, etc., within your riparian buffer zone should be a high priority for control. Due to incoming and outgoing traffic, these areas are most susceptible to new infestations from users who may inadvertently transport invasive seeds and spores between infested areas and your site on their clothing or gear. Public access sites are also high priority areas because uncontrolled invasive plants may create a barrier to public use and enjoyment.

Dangerous plants

Several invasive species pose a threat to human health and safety, including giant hogweed and wild parsnip. The sap of these plants reacts with sunlight and the moisture on human skin to cause painful lesions and burns. It's important to identify and control these plants immediately. Proper personal protective equipment must be worn when removing plants, cutting seed heads, or applying herbicide. **If you discover giant hogweed in your riparian area, please call NYS DEC's Hogweed Hotline for guidance and management assistance: 1-845-256-3111.**

Photo Credit: John Cardina, Ohio State University, Bugwood.org

Wild parsnip has small yellow flowers that are clustered in a flat-topped array.

Wild parsnip has a hollow, grooved stem that is hairless. Plants can grow to four feet tall.

Photo Credit: Donna R. Ellis, University of Connecticut, Bugwood.org

Giant Hogweed has deeply lobed leaves that can be up to five feet wide. Plants can grow as tall as 15 to 20 feet in height.

Photo Credit: Terry English, USDA APHIS PPQ, Bugwood.org

Giant Hogweed has white flowers with 50-150 rays clustered in an umbrella shape.

Proximity to water's edge

Invasive plants that are directly at the water's edge should be a control priority. Seeds, rhizomes and roots, and plant fragments can easily flow downstream during periods of high water and establish elsewhere at your site, or on an adjacent property. Avoid having to duplicate your efforts by tackling these individual plants early in your project. If you are removing invasive plants within highly erodible areas, be sure to plant native plants directly following removal to establish plants and prevent further erosion on site.

Proximity to significant natural communities or critical wildlife habitat

Infestations that threaten to overcrowd or shade out important native species and/or communities or compromise wildlife habitat may also be a high priority for management action. The New York Natural Heritage Program maintains online guides to help you identify and understand these communities and habitats if they occur at your site. Refer to the "Resources" section for more information.

For example, vernal pools (pictured to the right) offer a breeding and feeding refuge to a variety of amphibians and reptiles including frogs, toads, turtles and salamanders. These pools are shallow depressions in the landscape that are filled with water during spring thaw or after a heavy rain storm. Rare species found in vernal pools include the tiger salamander and several sedge species, including false hop, brown bog, and cat-tail sedges. Invasive species that spread into these areas can threaten sensitive habitat and the species that rely on it.

Infestations that threaten to overcrowd or shade out important native species and/ or communities or compromise wildlife habitat may also be a high priority for management action.

Photo Credit: Yuvalr via Wikimedia Commons.

Prioritization and Species Resources

Corbin, J. D., Wolford, M., Zimmerman, C. L. and Quirion, B. (2016), Assessing feasibility in invasive plant management: a retrospective analysis of garlic mustard *(Alliaria petiolata)* control. Restoration Ecology. doi:10.1111/rec.12429

Health Hazards and Safety Instructions for Giant Hogweed (http://www.dec.ny.gov/animals/72556.html)

Prioritizing Control Work – My Woodlot.com (http://mywoodlot.com/item/prioritize-my-control-work)

New York Natural Heritage Program Conservation Guides: http://www.acris.nynhp.org/

3. Develop a Site Management Plan

Invasive species are by their very nature difficult to control, and developing a sound management plan and maintaining realistic expectations is important. Most management efforts are ongoing and long-term and will never reach a state of "eradication." However, there are many approaches and techniques that are effective, even without the use of herbicides. Early detection and rapid response to invasive species play a key role in determining the needed level of effort and potential success; the smaller the population and the more recently it was established, the easier it will be to control.

Understanding the life cycle of the target species is critical to developing a management plan. Learning when the target species starts to sprout, flowers, drops seed, delivers nutrients to the roots, etc. is essential to understanding when the best time to manage a species is, depending on the management tool you choose. Each species has its own annual pattern and characteristics that help it take advantage of a particular habitat. Mowing, cutting or hand pulling at the proper times will eventually exhaust the root storage, or inhibit the invasive plant's ability to reproduce or spread clonally. Species that grow vigorously, such as invasive knotweeds *(Reynoutria sp.)*, may need to be cut more than once per growing season. Refer to the "Resources" section below for more information.

Herbicides can be very effective for managing large, well-established, dense infestations that would be extremely laborious and time consuming to control with other methods. Certain chemicals and methods of application work best on specific kinds of invasive plants. Please contact a certified pesticide applicator to discuss the unique parameters for your site and follow all chemical labels carefully.

Below are examples of three types of invasive plants you may encounter in your riparian area and how to tackle site management of each species. You can learn about more species-specific management strategies for other species by using the "Resource" sections in this guide.

Herbaceous Plants: Garlic Mustard

Garlic mustard *(Alliaria petiolata)* is an invasive terrestrial herbaceous plant, known for its prolific seed production and quick spread, flowering from April to June. Depleting the seed bank and preventing seed set are integral to garlic mustard management.

Management:

Fortunately, the plant is easy to identify and easy to hand pull, which makes mechanical removal a great management option for small areas of infestation. Management of this species should begin before seeds are formed. Mowing or cutting flowering plants at ground level will kill a high percentage of plants, the lower the cut the better. Ideally, only the garlic mustard is cut, leaving desirable vegetation intact. However, mechanical cutting does not remove the root crown, and it may be necessary to cut multiple times per season to prevent seeds from developing on secondary stems.

Photo Credit: Bugwood.org.

Garlic mustard is identified by its white flowers, ovate leaves and garlicky smell when crushing the leaves.

Multiflora rose can be very difficult to remove due to its thorns.

Oriental bittersweet can climb and strangle riparian trees. Removing it should be a high priority to protect your trees.

Woody Plants: Multiflora Rose

Multiflora rose *(Rosa multiflora)* is a thorny, perennial shrub that often invades riparian areas. In sensitive areas, cutting the individual stems is preferred over mowing to minimize habitat disturbance.

Management:

Pulling plants by hand is effective when plants are small, and care should be taken to remove the entire root. Repeated cutting will control the spread, but not eradicate the plants, and stems should be cut at least once per season as close to ground level as possible. For very dense infestations, mowing can be done three to six times per year to restrict top growth and spread.

Vines: Oriental Bittersweet

Oriental bittersweet *(Celastrus orbiculatus)* is a terrestrial invasive vine that can grow densely through the forest floor and climb up trees.

Management:

Small infestations can be hand pulled, but the entire plant should be removed, including all the root portions. First, cut the vines near the ground and remove. When cutting climbing vines, extra care should be taken to minimize damage to the host tree. If roots are too large to remove, be aware that shoots will continue to regrow and will need to be cut back every year.

Plant Material Disposal

After plant material is cut, mowed or pulled, put it into black, 3mm plastic contractor bags, securely fasten and take to a landfill facility. This will prevent seeds or plant fragments from escaping or infesting another area of the site. Alternatively, black plastic bags can be left in the sun to destroy and liquefy the plant material. It is NOT safe to compost or bury many invasive plants. You should research the method of spread of the plant and consider the timing of control to understand if you can safely compost it. If in doubt, bag all parts of the plants and follow instructions above for proper disposal. For more information on alternative methods of disposal, please contact DEC Invasive Species Unit: 518-402-9405.

Management Planning Resources

NYSDEC Rapid Response Program Policy: A Framework for Response:
http://www.dec.ny.gov/docs/lands_forests_pdf/isrrprogrampolicy.pdf

Managing Japanese Knotweed in the Salmon River and Salmon River Estuary: SLELO PRISM:
SLELO publication: http://www.sleloinvasives.org/wp-content/uploads/2015/10/FINAL-PROJECT-REPORT-2015-PDF1.pdf

Non-Native Plant Species Invasiveness Assessment: http://nyis.info/?action=israt_nn_plant

4. Implement Management Actions

Riparian zones are particularly susceptible to invasion due to frequent habitat disturbance, both natural and human influenced. Take care when managing invasive species in riparian zones to prevent them from spreading downstream.

Site Recommendations to Prevent Invasive Species Introductions

Preventing invasive species from spreading into disturbed riparian areas can be difficult. Invasive species can arrive at your site in various ways, including from the water with plant fragments floating by, from the air with air dispersal of seeds, or seeds from animal droppings or on hiking boots.

We recommend taking the following preventive precautions at your riparian restoration site

Check your gear to ensure you are not bringing seeds or plant fragments to the restoration site from other sites you have visited:

- Check boots for lodged seeds in the tread.
- Check clothes for lodged seeds, burs or other plant material.
- Check shovels and digging equipment for clumps of soil that may contain seeds or plant fragments.
- Check any reused tree protection materials for plant fragments or seed caches.
    - Remove invasive species existing on the site before tree planting activities to prevent further spread within the site.
    - If removal is not possible, trim flower heads or pull flowering individuals to ensure seeds do not get dispersed prior to tree planting activities.
    - Avoid digging planting holes near invasive plants to prevent fragmentation and spread of plant material.
    - Avoid mowing sites that have invasive plant species in seed to prevent seed spread throughout the restoration site.
    - Plant native grass seed mixes after tree planting on disturbed soils to stabilize sediments and prevent invasive species establishment.
- Seed mixes can include a mixture of native, fast-growing grasses, native pasture wildflowers and native legumes. Forty-seven pounds of seed per acre is recommended, but may vary based on the composition of your seed mix. Information on local seed mixes can be found at your local garden supply store.
- Be sure to read the label of the mix to ensure it does not include invasive species
- Only use weed-free seed, mulch, topsoil and fill on planting sites.

Soil exposed after tree planting can be covered with weed mats and native seed mixes to prevent invasive introductions in this disturbed site.

5. Monitor and Assess Impacts of Management

Follow-up monitoring is an essential piece of the invasive species management process. Management sites must be revisited on a regular basis to monitor for re-growth or spread of invasive species. If you observe the re-sprouting of unwanted vegetation, begin the treatment process again, starting in the areas with the newest infestations and working toward the primary infestation (see Tools for Prioritization section).

If your site acreage is significant, you may wish to develop a rotational monitoring plan to ensure that all management sites are visited at least once annually. If no new plants are observed after five consecutive years of monitoring and/or additional treatments, you can reduce your monitoring intensity.

Preventing the Spread of Invasive Species

Land managers working on removing invasive species, or planting trees on sites where invasive species are present should follow the guidelines below to prevent the spread of invasive species to other riparian areas and terrestrial sites.

- Check your gear and clothing for seeds and plant materials before traveling to another location.
- Clean equipment, vehicles and gear between sites.
- Never compost terrestrial invasive plants.
- Never throw terrestrial invasive plants in the water.
- Bring a net to sites where invasive removals are occurring near water to catch fragments if they fall in the water.

Check planting bars, shovels, boot treads and clothing for seeds and soil contaminated with invasive species seeds or plant fragments.

Photo Credit: Troy Bishopp

Monitoring and Management Resources

Links to Decision Making and Site Assessment Assistance

Cornell Cooperative Extension Local Offices: http://cce.cornell.edu/localoffices

New York State Partnership for Regional Invasive Species Management (PRISMs): http://www.nyis.info/?action=prism_partners

Links to Potential Funding Sources

New York State Grants Gateway: https://grantsgateway.ny.gov/IntelliGrants_NYSGG/module/nysgg/goportal.aspx

New York State Invasive Species Research Institute: http://www.nyisri.org/resources/funding-opportunities/

Soil and Water Conservation Districts: http://www.nys-soilandwater.org/contacts/county_offices.html

New York State Partnership for Regional Invasive Species Management (PRISMs): http://www.nyis.info/?action=prism_partners

Purple loosestrife is another riparian invader that responds well to hand pulling.

Flowering Japanese knotweed, a tough invasive that likes riparian areas.

Japanese knotweed grows readily along streams and chokes out native plants.

Multiflora Rose

Purple Loosestrife

Japanese Knotweed

NEW YORK STATE OF OPPORTUNITY.

Department of Environmental Conservation