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Control of Japanese Knotweed (Polygonum cuspidatum)

Background:
Japanese knotweed is an exotic-invasive plant that is all too common in Massachusetts. It is a perennial that sends up multiple, hollow, bamboo-like shoots from its roots. In advanced infestations, thickets of 8-10' tall knotweed stems can crowd out nearly all other vegetation. Knotweed thrives in moist, rich soil and is especially troublesome along riverbanks, where it readily colonizes areas disturbed by floods or scoured by ice. Knotweed colonies expand rapidly by underground runners, which grow out from the main root and send up new shoots. The movement of infested soil with small segments of knotweed root and stem are the primary mechanisms by which new colonies are established.

Knotweed, like all exotic plants, is not used by native insects for food. Consequently, areas in which native vegetation has been displaced by knotweed do not contain the insect larvae that many young birds need for growth and energy in the critical fledgling stage. Besides having little to offer wildlife and the ecosystem, knotweed can be a safety hazard, growing over guard rails and into sight lines along roadways faster than road crews can keep up with it.

Control:
Control of knotweed can seem overwhelming. Anyone who has tried cutting or digging a small patch of knotweed knows what a resilient weed it is. Applying those techniques to the huge infestations common along our riverways would truly be an exercise in futility. Killing large patches with herbicides is possible, but large areas devoid of vegetation will likely be re-colonized by more knotweed or other invasives. This paper will recommend a three-part approach called **I**ntegrated **V**egetation **M**anagement (**IVM**). Working with practical knowledge of knotweed biology and response to control measures, **IVM** uses well-timed **mechanical** and **chemical** treatments to release the **natural** response of native vegetation. When native plants are restored on the site, they provide a barrier to re-

infestation by exotics. **IVM**, with its combination of three strategies, can achieve what would be impossible using any single method. It will also reduce the amount of herbicide used to the minimum amount necessary to accomplish the task.

Natural control:

The true goal of IVM control and the measure of its success is the re-establishment of native vegetation on the site. A vigorous barrier of native plants, maintained by monitoring and spot-treatment of exotics will block further infestation by exotics and free land managers from expensive and unsustainable mechanical and chemical re-treatments.

Mechanical treatment:

Mechanical control of knotweed is difficult and frustrating. Cutting or pulling up the stems has little effect on the plant, as new sprouts quickly grow. Repeated cutting of the sprouts will slow the spread of the plant, as it will reduce the energy available for new shoots. Cutting twice per month is recommended, however no amount of cutting short of turning the area into a closely cropped lawn will come close to eradicating a knotweed colony. In addition, care must be taken in disposal of cut stems, since they can readily grow into new plants in contact with soil.

Likewise, digging of the large, branching root must be done repeatedly, since rootlets readily break off and are easy to miss. Areas that have been worked on painstakingly will sprout new knotweed plants and will need to be dug multiple times. Disposal of a large amount of dug root material is difficult to do without starting new colonies.

Neither repeated cutting nor extensive digging is a recommended activity along the bank of a river or stream, especially for several years in succession over the large areas presently infested by Japanese knotweed. All work that alters the land or vegetation within 100 feet of a wetland or 200 feet of a stream subject to the Rivers Protection Act requires approval from the town conservation commission, whether that work involves mechanical or chemical treatments.

Chemical treatment:

The reason for using herbicides on invasive-exotic plants is to control re-sprouting from the roots. This is especially important with knotweed, which will sprout so vigorously after being cut that large infestations are often impossible to keep under control with mechanical means alone.

Within the framework of **IVM**, herbicide use in areas of conservation commission jurisdiction must be guided by the following parameters:

- Appropriate chemical selected for site. The herbicide needs to be effective on the species to be controlled, non-toxic to animal and aquatic life (as applied per product label) and readily bio-degradable.

- Application must be selective so that an adequate native plant community will remain to re-colonize the site. Where natives are not present in sufficient numbers, replanting with site-appropriate native species may be necessary.

- Application must minimize both the quantity of herbicide used and the impact to the site, while still being effective at controlling the target species.

The following paragraphs outline a specific treatment protocol for knotweed control under the framework of **IVM.** It is hoped that this or similar methodology can be used wherever needed in Massachusetts as part of a Request For Determination (RFD) to a town conservation commission. It is here emphatically stated that this protocol is not the only method for knotweed control, simply one that, in the experience of Bay State Forestry Service, has been very effective. It is hoped that by offering a suggested method for knotweed control that is approvable for use along river banks, we will stimulate action that will lead to the restoration of native ecosystems in these important habitats.

Step 1. Cutting in preparation for foliar spraying In June, when the knotweed has grown 3-4' tall, it is cut down. The plant will re-sprout and be 3-4' tall again by late August, the most advantageous time to spray knotweed. The re-sprouted knotweed will be smaller and easier to spray without hitting adjacent native plants or having overspray get into water bodies than it would have been without cutting. This practice should be done within 10' of any wetland, open water, and within 10' of the top of the bank of any stream or river. It should also be done adjacent to perennial native plants that must not be sprayed. If this cutting is not done, the knotweed plants will be 8' or more tall and difficult to spray with precision.

The most cost-effective way of dealing with the cut stems is to leave them where they fall. Subsequent treatments will take care of knotweed stems that set roots and sprout. The large expense of removing and properly disposing of cut knotweed stems is difficult to justify in this scenario. Perhaps one reasonable precaution would be to not allow cut knotweed stems to remain below the top of the river bank so that a high water event is not likely to transport them to a new location.

Step 2. Foliar spraying Between August 15 and September 15, the knotweed is sprayed with a dilute solution of glyphosate. The formulation of glyphosate should not be Roundup, which contains a surfactant that is toxic to aquatic life. The manufacturer's label, approved by EPA, will govern how and where an herbicide may be safely used, including use in relation to wetland areas. Other formulations of glyphosate are labeled for use adjacent to wetlands. A surfactant labeled for aquatic use is added to the glyphosate in order to penetrate the waxy coating on knotweed leaves and increase the effectiveness of the glyphosate. It should be noted that herbicide application to water is not part of this proposed treatment. Rather, the use of a less toxic surfactant adds another level of safety.

It cannot be stressed enough that the success of this step is dependent on it being done by licensed professionals, properly trained and experienced in herbicide application (and

preferably in exotic-invasive plant control). In most situations in Massachusetts, it would also not be legal to do otherwise.

Timing is important, as glyphosate is most effective in late growing season when target plants are moving material from the leaves down to the roots. If timing guidelines are followed, effective control of the root system can be achieved using minimal herbicide.

If other exotics are present in the knotweed treatment area, they would receive essentially the same control measures. (Exception: glyphosate is not an effective herbicide to use on oriental bittersweet.) In order to successfully implement **IVM**, it is critical to achieve separation between the target exotics and the native vegetation so that the herbicide application is selective.

Step 3. Follow-up Treatment It is expected that spot re-treatment with a foliar spray will be necessary in late summer for the following two years. The size and duration of follow-up treatment will vary depending on the severity of the infestation and the effectiveness of the initial treatments. By the fourth year, volunteer monitors should be able to eradicate small infestations of young plants by hand pulling/digging.

Expected results:

Based on the author's past experience, treatment of knotweed in riverbank situations and/or moist, rich soil is likely to result in the re-colonization of the site by a variety of different plant species, including jewelweed, goldenrod and grasses. If the site has not regenerated to native vegetation by the end of the growing season during the year following initial treatment, herbaceous or woody native species may be planted.

In the long run, it will be necessary to control knotweed from the upstream areas of watersheds downward in order to maximize results. However, it is critical now to establish demonstration areas where knotweed control results in the re-establishment of native vegetation. Many people do not believe it can be done, nor do they remember how beautiful our native vegetation along riverbanks is.

Information:

For more information on appropriate herbicides for exotic-invasive plant control, see the following links to the MA Pesticide Bureau's website:
http://www.mass.gov/agr/pesticides/rightofway/Sensitive_Area_Materials.htm
This list of herbicides appropriate for use in "sensitive" (e.g. wetland) areas was developed for right-of-way management in Massachusetts by MA DEP and DAR. To be included on the list, a chemical needs to have low toxicity and be readily bio-degradable.

http://www.mass.gov/agr/pesticides/rightofway/index.htm
This site includes fact sheets on various herbicides.