

Management Methods: Chemical Methods

Chemical Methods in Action

Slide 1: Introduction

The National Wildlife Refuge System employs chemical control methods of both terrestrial and aquatic invasive plants within an integrated pest management framework. Herbicides can provide rapid and effective control of invasive plants and can be a valuable tool in achieving invasive plant management objectives. The following examples of the use of chemical methods on refuges illustrate the importance of understanding application timing, herbicide characteristics such as selectivity and site of action, biology of the target species, and monitoring.

Slide 2: Early Detection and Control at Silvio O Conte NFWR

Silvio O Conte NFWR and their many project partners are working on the early detection and control of water chestnut (*Trapa natans*) in the 7.2 million-acre Connecticut River watershed. Aquatic herbicides are used on large populations that mechanical harvesters cannot reach in shallow water. The herbicide 2,4-D is applied by foliar spray from airboats and by granules distributed from a boat with a mounted spreader that sink into the sediment and target plants emerging from seeds.

Slide 3: Basal Bark Application at Rappahannock River Valley NWR, VA

At Rappahannock River Valley NWR (Virginia) stands of dense monocultures of tree of heaven (*Ailanthus altissima*) in both fields and forests are controlled using a basal bark application. However, even though great care was taken to avoid nontarget trees, imazapyr, which is highly mobile in soils, was absorbed by the lateral spreading roots of mature, nontarget trees. As a result, imazapyr will be eliminated from the basal bark application mix when treating invasive plants within mature forests in the future.

Slide 4: Herbicide Test Plots and Decision Matrices at Devils Lake WMD, ND

Devils Lake WMD (North Dakota) is a key member of a multi-partner weed management working group including both public and private entities. Refuge staff have been instrumental in developing test plots to determine the effectiveness of herbicide treatments and other control methods. Concerns over groundwater and surface water from herbicide use in the Prairie Pothole Region prompted the inclusion of decision matrices in the Devils Lake WMD IPM plan. These matrices were also presented to partners and stakeholders to assist them in making informed decisions about herbicide use and other IPM methods.

Slide 5: Controlling Perennial Pepperweed at Parker River NWR, MA

In addition to coordinating perennial pepperweed (*Lepidium latifolium*) hand-pulling efforts with landowners and volunteers on and off the Parker River NWR (Massachusetts), refuge staff also apply the herbicide metsulfuron to dense, monotypic stands. This herbicide, which is applied with backpack sprayers when pepperweed is flowering, does not harm native saltmarsh grasses. Continued management is necessary as new plants are produced from the seedbank. Annual surveys of the refuge are planned to identify and eliminate new infestations.

Slide 6: Implementing BMPs at Willamette Valley NWRC, OR

For prairie restoration projects, Willamette Valley NWRC (Oregon) implements Best Management Practices (BMP) when treating invasive grasses where federally listed plant species occur. One of the BMPs involve the application of herbicide by a weed wiper to the upper stems of invasive grasses to avoid contacting lower growing, listed plant species.

Slide 7: Herbicide Application by Ground, Water, and Air at Willapa Bay NWR, WA

Willapa Bay NWR is part of an interagency, landscape-scale smooth cordgrass (*Spartina alterniflora*) eradication program within the marine waters of Washington State. Application of imazapyr or aquatic glyphosate herbicides (with a modified vegetable oil surfactant and a blackberry derivative dye), by ground, water, and air has significantly reduced smooth cordgrass populations. A monitoring program evaluates the effectiveness of eradication methods by comparing smooth cordgrass stem density and occurrence data collected before and after treatment.

Slide 8: Monitoring Herbicide Treatments at Rhode Island NWR Complex, RI

To eradicate common reed (*Phragmites australis*) in coastal wetland habitat, staff at Rhode Island NWRC (Rhode Island) applied herbicide during the fall for three consecutive years, with a single mid-winter mulching. After three years, monitoring results not only showed a significant reduction in the number of live common reed stems, but also that native sedges, rushes, and cattails had reestablished from the seedbank. However, four years post-treatment, common reed populations reappeared. Restoration efforts will therefore require continual monitoring and spot application of herbicides.

Slide 9: Conclusion

In summary, these refuge examples illustrate some of the factors that are considered when applying herbicides: the presence of federally listed species, environmental conditions, and application techniques. Additionally, cooperation and support from project partners as well as monitoring herbicide impacts and effectiveness, increase success when employing chemical methods in an invasive plant management program.