

## ACTIONABLE SCIENCE

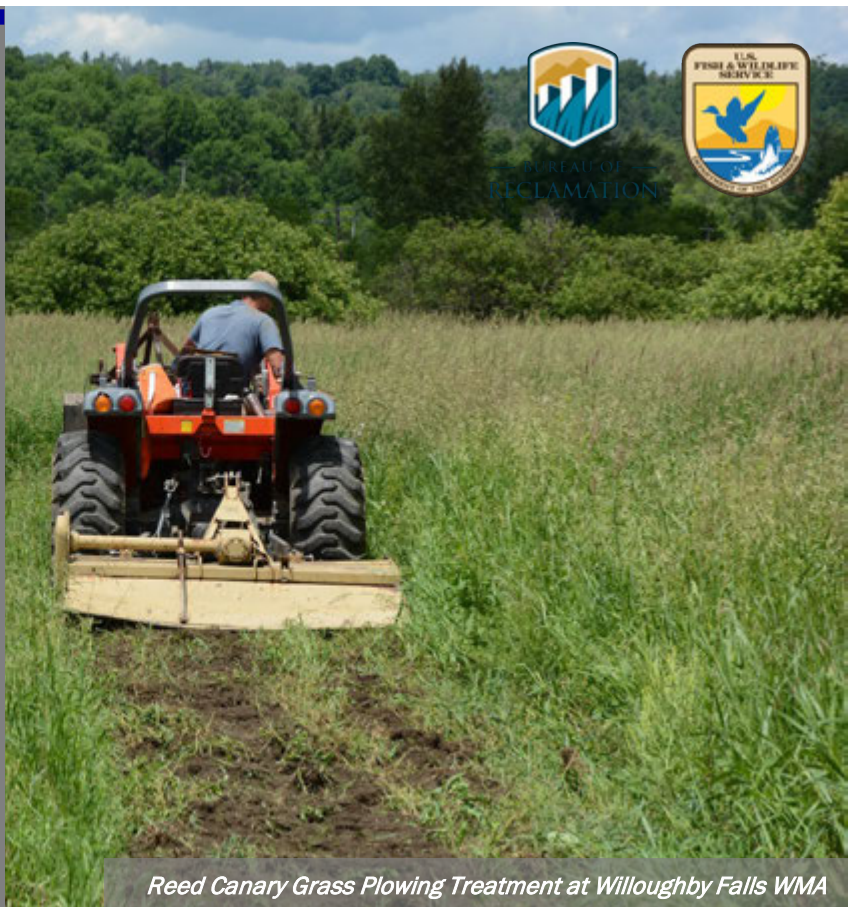
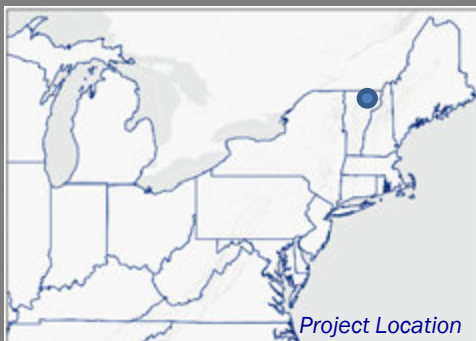
# Riparian Restoration Experiment for Native Species Conservation in Vermont



Clean water. Healthy habitat. Thriving communities.

**Connecticut River  
Conservancy**

The Vermont Fish & Wildlife Department (VFWD), Connecticut River Conservancy (CRC), and their partners are working to restore riparian buffers to improve habitat for native fish and wildlife, stabilize streambanks, and mitigate agricultural runoff. In 2016, VFWD worked with the CRC at the Willoughby Falls Wildlife Management Area (WMA) and began research on different techniques for site preparation and invasive plant control that would improve the efficacy of riparian restoration efforts. The project aimed to determine the best methods to control invasive reed canary grass (*Phalaris arundinacea*) to promote recruitment of native woody species that provide ecosystem services.



*Reed Canary Grass Plowing Treatment at Willoughby Falls WMA*

## KEY ISSUES ADDRESSED

In Vermont, riparian areas were cleared of native vegetation and re-planted with reed canary grass to support hay production and livestock grazing. Additional invasive plants, including field bindweed (*Convolvulus arvensis*) and wild parsnip (*Cicuta maculata*), have also become more prevalent. A decrease in woody plant cover leaves riparian areas susceptible to streambank erosion and promotes stream channelization, which decreases the function of riparian areas as agricultural buffers. Such degradation has also resulted in the loss of Vermont's most important wildlife corridors and decreased heterogeneity in fish populations.

## PROJECT GOALS

- Conduct an experiment to determine best methods for re-establishing floodplain forests and restore ecosystem health and services in areas currently invaded by reed canary grass
- Remove non-native vegetation and create bare earth soils for native tree germination and establishment through plowing and herbicide treatments

## CORNFIELD REPLICATION EXPERIMENT

The experiment attempted to mimic conditions in plowed cropland that allow germination of native riparian tree seeds.



*Native Tree Seedlings in an Experimental Plot*

## PROJECT HIGHLIGHTS

**Experimental Design:** VFWD and CRC established plots at Willoughby Falls WMA in areas with dense reed canary grass. Twelve plots containing four 5m by 30m experimental plots were established in two former hay fields along the Barton River to test the effectiveness of experimental treatments on removing invasive grasses and regenerating woody plants. Plots received one of the following treatments: Control, Plow Only, Plow Then Herbicide, and Herbicide Then Plow.

**Real-World Conditions:** The VFWD and CRC conducted the experiment in a less-controlled environment to match natural stressors. To overwhelm competition from non-native plants and herbivory by deer and small mammals, treatments were implemented to encourage high-density seedling establishment.

**Measuring Success:** Using transects within each plot, VFWD and CRC scientists measured bare soil, plant cover, and woody plant regeneration. As of 2020, these data have been collected for three years.

## Collaborators

- Connecticut River Conservancy
- Vermont Fish and Wildlife Department
- U.S. Fish and Wildlife Service Partners Program

## Funding Partners

- Great Lakes Fisheries Commission
- Vermont Hunting License Sales and Pittman-Robertson Funds

## LESSONS LEARNED

Plow Then Herbicide was the most effective method to remove dense thatch and eliminate competition from non-native grasses. This method provided the greatest percent cover of bare soil, highest density of seedlings (36,757 seedlings per hectare in June 2018), and highest growth rates.

Late summer and fall are the optimal times for reed canary grass control. This timing limits regrowth of invasive species during the growing season and provides bare earth conditions to allow germination of both fall and spring seedlings. Farmers can also offer helpful input in the experimental design because they regularly control unwanted plants when planting row crops such as corn.

This project met some resistance due to the use of the Rodeo label glyphosate herbicide and due to the reforestation of agricultural land. Strong communication and data showing that herbicide amplifies the efficacy of mechanical treatments has alleviated criticism on glyphosate use. General acceptance of land use changes to mitigate sedimentation and nutrient loading have alleviated the criticism related to restoration of agricultural land.

## NEXT STEPS

- Continue monitoring experimental sites at Willoughby Falls WMA
- Apply methods from this experiment to other sites in the Northeast
- Testing of additional restoration methods is currently underway, including direct seeding of native woody species following site preparation

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*Native Riparian Forest in Northern Vermont*

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