USA: Vermont: EDRR Management of Japanese knotweed following extreme flooding

Original fragment. credit Brian Colleran

Flood distributed Japanese knotweed at edge of flood deposition. Begi
Brian Colleran

Overview

In response to the floods following tropical storm Irene, and the potential for a significant increase in the Japanese knotweed popuation, the state of Vermont hired a coordinator to develop and carry out an early detection & rapid response (EDRR) work plan to eliminate as many of these new plants as possible, using only manual labor. Removal work was carried out eleven to thirteen months after Irene, along four river systems. During removal work, morphological data was collected from plants to help develop and refine the EDRR protocols that had been used. Our goal was to determine what each new shoot could tell us about the rest of the new plant, and develop management strategies based on the results. We found that the size of the emergent shoot is not related to the extent of underground growth, though it is related to the size of the propagule. We also found that 70% of new plants originated from rhizome fragments, and 30% were from stems. This proportion is similar to regeneration rates shown in laboratory studies conducted over much shorter time frames, suggesting that regenerative abilities are longer lasting than previously documented. Our findings suggest that the best way to prevent the spread of knotweed along rivers is to focus control efforts on those stands most susceptible to erosion. Additionally, our work provides evidence that by applying an early detection & rapid response framework to knotweed control, the spread of knotweed can be effectively controlled without the use of herbicides or heavy tools.

Quick Facts

Project Location:
Vermont, USA, 44.5588028, -72.57784149999998

Geographic Region:
North America

Country or Territory:
United States of America

Biome:
Temperate Forest, Freshwater

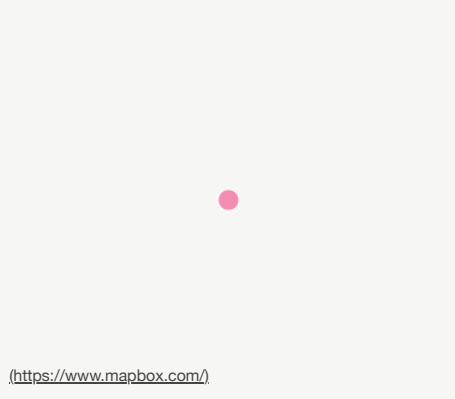
Ecosystem:
Freshwater Rivers & Streams, Temperate Forest - Mixed, Freshwater Wetlands, Other/Mixed

Project Lead:
Vermont Agency of Natural Resources, Natural Heritage Program

Organization Type:
Governmental Body

Project Partners:
Vermont Youth Conservation Corps, Guilford Conservation Commission

Location



TIMEFRAME

Project Stage:
Completed

Start Date:
2012-04

End Date:
2013-12

DEFINING THE PROBLEM

Primary Causes of Degradation

Climate Change, Fire & Weather Events, Fragmentation, Invasive Species (native or non-native pests, pathogens or plants)

Degradation Description

The degradation was a direct result of extreme flooding, which washed out many stands of Japanese knotweed on the banks of rivers. The fragmented stems and rhizomes were distributed throughout downstream floodplains. As this was an early detection and rapid response (EDRR) project, no degradation was observed. On rivers which experienced similar localized events several years past, the elimination of the riparian forest could be observed in various stages.

PLANNING AND DESIGN

Defining the Reference Ecosystem

The reference ecosystem is primarily based on contemporary reference sites or existing analogues of the pre-degradation ecosystem.

Reference Ecosystem Description

As an EDRR project, the reference ecosystem was the same as the ecosystem we were working in.

Project Goals

Demonstrating the ability to control the spread of Japanese knotweed without the use of chemicals, to be successful within an EDRR framework, and to demonstrate that such actions can lead to the long-term eradication of new populations.

Monitoring

The project does not have a monitoring plan.

Stakeholders

Stakeholders were primarily the communities through which these rivers ran, and the private landowners along the stream banks. Education and outreach was conducted primarily in partnership with the town government's volunteer conservation commissions, which hosted and advertised workshops and workdays.

PROJECT ACTIVITIES

How this project eliminated existing threats to the ecosystem:
This was an effort focused on a single target species, at a very specific stage of development. The threat to the ecosystem posed by the development of new stands of knotweed was eliminated, but no other threats addressed, including those posed by existing knotweed stands.

How this project reinstated appropriate physical conditions (e.g. hydrology, substrate)",:
We prevented the loss of appropriate physical conditions, rather than reinstating any.

How this project achieved a desirable species composition:
Our actions ensured that the current species composition was not further degraded/impacted

How this project reinstated structural diversity (e.g. strata, faunal food webs, spatial habitat diversity):
Our actions ensured that the current structural diversity was not further degraded/impacted

How this project recovered ecosystem functionality (e.g. nutrient cycling, plant-animal interactions, normal stressors):
Our actions ensured that the current ecosystem functionality was not further degraded/impacted

How this project reestablished external exchanges with the surrounding landscape (e.g. migration, gene flow, hydrology):
Our actions ensured that the current external exchanges with the surrounding landscape was not further degraded/impacted

Activities were undertaken to address any socio-economic aspects of the project:
NA

PROJECT OUTCOMES

Ecological Outcomes Achieved

Eliminate existing threats to the ecosystem:
The single threat we addressed was completely eliminated in our work areas

Reinstate appropriate physical conditions",:
NA

Achieve a desirable species composition:
NA

Reinstate structural diversity:
NA

Recover ecosystem functionality:
NA

Reestablish external exchanges with the surrounding landscape:
NA

Factors limiting recovery of the ecosystem:
NA

Socio-Economic & Community Outcomes Achieved

Economic vitality and local livelihoods:
NA

Provision of basic necessities such as food, water, timber, fiber, fuel, etc.:
NA

Cultural dimensions such as recreational, aesthetic and/or spiritual:
NA

Regulation of climate, floods, disease, erosion, water quality, etc.:
Circumstantial evidence suggests that Japanese knotweed contributes to erosion, and that erosion during flooding may be a primary driver of the spread of this species. In the case that this hypothesis proves true, the elimination of knotweed plants should decrease streambank erosion.

Has the project had any negative consequences for surrounding communities or given rise to new socio-economic or political challenges?:
No.

KEY LESSONS LEARNED

Key Lessons Learned

EDRR of Japanese knotweed is a viable management strategy with excellent chances for long-term success

70% of new Japanese knotweed propagules dispersed by flooding originate from rhizomes

The window for EDRR management of flood dispersed Japanese knotweed propagules is 18-20 months; or through the whole of the first growing season following flooding, and into the beginning of the second spring

LONG-TERM MANAGEMENT

Long-Term Management

Sites were inspected at the end of the first growing season, and new plants that sprouted after initial management had taken place were removed. Site visits the following spring found no plants had been missed, or sprouted after the initial follow-up inspection. No long-term management plans were required. In subsequent floods, landowners are now in possession of the knowledge needed to successfully remove any new knotweeds in left behind by those future floods.

FUNDING

Sources and Amounts of Funding

The Vermont Youth Conservation Corps (VYCC) received an award by the State of Vermont following Tropical Storm Irene to help with recovery work. As our project was ready and waiting, we were able to benefit from that arrangement. The VYCC provided 3 crews, which each worked 4 10-hour days. All other labor provided was conducted by volunteers.

LEARN MORE

Other Resources

Colleran B, Goodall K (2014) | In Situ Growth and Rapid Response Management of Flood-Dispersed Japanese Knotweed (Fallopia japonica) | Invasive Plant Sci Manage | 7(1): 84-92

Colleran B, Goodall K (2015) Extending the Timeframe for Rapid Response and Best Practice Management of Flood-Dispersed Japanese Knotweed (Fallopia japonica) | Invasive Plant Sci Manage | 8(2): 250-253

Related Research

Colleran B, Goodall K (2014) | In Situ Growth and Rapid Response Management of Flood-Dispersed Japanese Knotweed (Fallopia japonica) | Invasive Plant Sci Manage | 7(1): 84-92 Colleran B, Goodall K (2015) Extending the Timeframe for Rapid Response and Best Practice Management of Flood-Dispersed Japanese Knotweed (Fallopia japonica) | Invasive Plant Sci Manage | 8(2): 250-253

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