# Japanese Knotweed Control in the Rondout Reservoir Watershed, 2010-2013

## Summary of Program Activities
## March 13, 2014


**Prepared by:**
**Brenden Wagner**
**Riparian Field Technician**
**Rondout Neversink Stream Management Program**
**Bwagner@RondoutNeversink.org**

**Sponsored by:**


**Rondout Neversink Stream Management Program**
**PO Box 256**
**273 Main Street**
**Grahamsville, NY 12740**

**Sullivan County Soil & Water Conservation District**
**64 Ferndale-Loomis Road**
**Liberty, New York 12754**


**Catskill Invasive Species Partnership**
**Molly Marquand: Program Coordinator**
**PO Box 504**
**43355 State Highway 28**
**Arkville, NY 12406**

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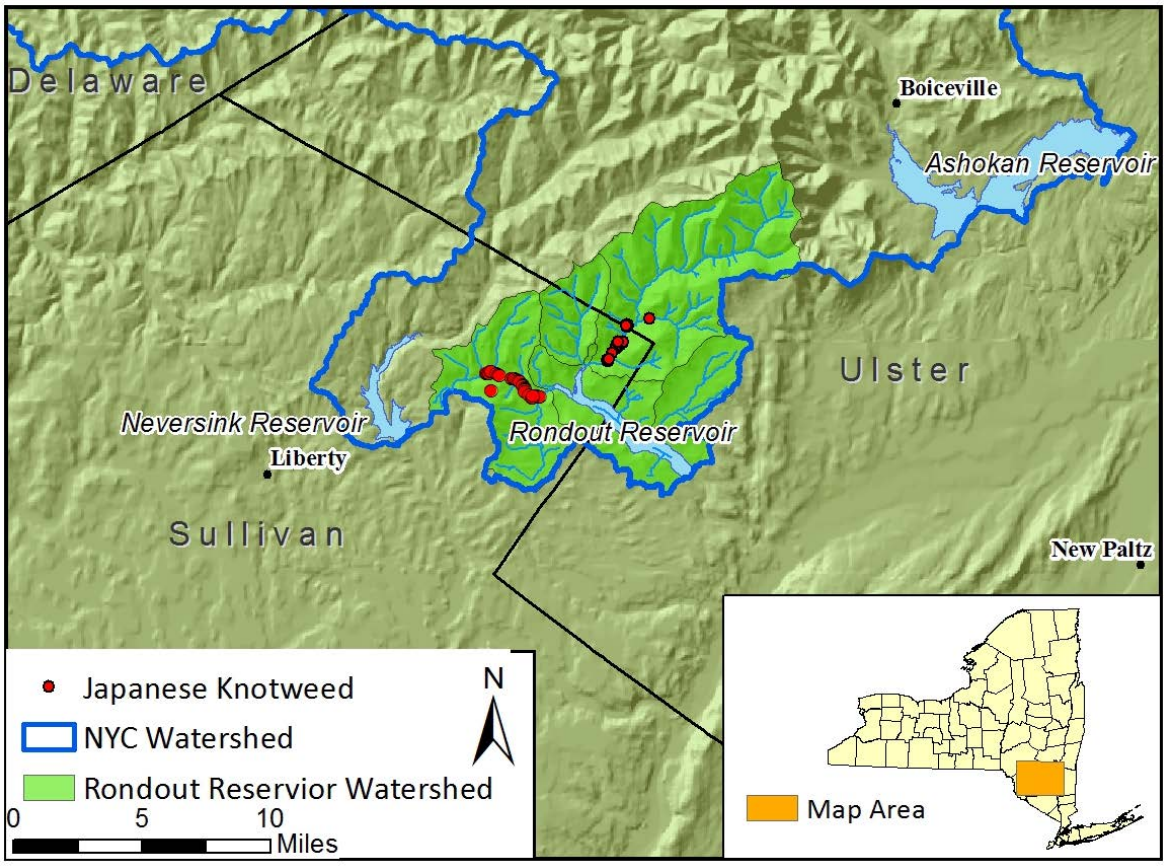
## Introduction

The Rondout Neversink Stream Management Program was established in 2009 as a partnership between the Sullivan County Soil and Water Conservation District (SCSWCD) and the New York City Department of Environmental Protection (NYCDEP), with the goal of assisting local landowners and municipalities to better manage the riparian forests and streams which feed the Rondout and Neversink Reservoirs, part of the New York City drinking water supply in




the Southern Catskill Mountains of New York.

**Figure 1: Location of Rondout Reservoir Watershed within New York State**

Control of Japanese Knotweed (*Fallopia japonica*) was identified through landowner survey as a top ten priority for the 2010 Upper Rondout Creek Stream Management Plan, which has been adopted by the primary watershed towns of Neversink (Sullivan County) and Denning (Ulster County.) It is believed that Japanese knotweed (hereafter referred to as knotweed or JKW) was introduced to the Rondout Creek watershed sometime in the late 1990s or early 2000s through contaminated fill imported for bridge repairs on East Mountain Road and on Sundown Road near the Sullivan/Ulster County line. Since then it has spread downstream on the floodplain of an unnamed tributary near the county line, as well as up Sundown Road, and has vigorously invaded the area near E. Mtn. Bridge.

It is less clear how knotweed entered the Chestnut Creek watershed, where it is more widespread but colony sizes are smaller on average. Once established, JKW can rarely be eradicated from a watershed due to its rapid growth and reintroduction from upstream flood deposits. Lying at the top of the watershed with a limited infestation area, the Rondout and Chestnut Creeks present a rare opportunity to reestablish a knotweed-free riparian ecosystem.

## Knotweed Background and Biology

Japanese Knotweed is a non-native herbaceous species of flowering plant, native to Japan, Northern China, and Taiwan (Child & Wade, 2000). Introduced to the United States sometime in the late 1800's (Seiger, 1991), JKW can be found in 41 states and 8 Canadian Provinces according to the USDA National Plant Data Team. Often invasive throughout its range, JKW has been listed by many states as a noxious weed, and is listed on the New York Interim List of Invasive Plants with the ranking "Very High."

**Figure 2: Floodplain Monoculture of Japanese Knotweed in nearby Roscoe, NY.**

Knotweed can be found throughout NY State, most commonly associated with roadside disturbances and the direction of water flow in riparian habitats (Miller, 2004). During flood events, knotweed stem and root fragments are moved downstream and deposited when water levels subside. Knotweed's rapid growth habit and ability to withstand limited nutrient conditions help it colonize denuded point bars and stream banks, where it can quickly cover large areas with monospecfic stands which displace virtually all other vegetation (Seiger, 1991). This habit disrupts the natural successional pattern of floodplain forests, however it is not known if knotweed can be considered climax species in these environments (Kiviat, 2004).

It is believed that the rhizotomous root systems of knotweed are weaker than the woody root systems of native Catskill trees and shrubs, increasing the risk for stream bank erosion; however this has not been verified by any published scientific data. In addition to outcompeting native plants, JKW restricts recreational access to rivers, creates management issues for highway maintainers, causes damage to infrastructure, and lowers the quality of riparian leaf litter inputs to streams (Urgenson, 2006).

**Figure 3: Strong, Dense Root Structure of Native Catskill Riparian Trees.**

The following references are recommended for further information on the background of Japanese Knotweed:

Talmage, E & Kiviat E. 2004. Japanese knotweed and water quality on the Batavia Kill in Greene County, New York: Background information and literature review. Hudsonia Ltd. http://www.gcswcd.com/images/Knotweed/Documents/JKandwaterquality.pdf

McHugh, JM. 2006. A review of literature and field practices focused on the management and control of invasive knotweed. The Nature Conservancy. West Haven, Vermont. http://www.invasive.org/gist/moredocs/polspp02.pdf

## Control Methods

Typical management strategies include mechanical, chemical, and biocontrol techniques. Mechanical techniques include pulling/digging, cutting, and shading, but are labor intensive and can be used to suppress plant growth, but will rarely result in eradication (Baker, 1988). Pulling, digging, and cutting present a risk of spread if plant fragments are moved off site. The New York Department of Transportation recommends deep burial, burning, or enclosure in multiple layers of plastic until full decomposition (Miller, 2004). Recent research from the Delaware County Soil and Water Conservation District suggests that municipal solid waste co-composting facilities are capable of effectively decomposing small amounts of JKW (Day, 2009). Pulling and digging methods are not recommended on larger sites, as they disturb soils, creating a high potential for erosion.

Chemical techniques include foliar spray, cut and fill, and injection of herbicide to eradicate or suppress knotweed stands and have been found to be more effective than mechanical methods, however multiple years (more than two) of treatment are needed for full eradication (Delbart, 2012). Injection can result in greater than 90% injury within one month, but regrowth, often with stunted forms should be expected (Hagen, 2008). Because of this, multiple years of resource commitment should be combined with prevention and public awareness for a successful management project (Delbart, 2012).

Biocontrol methods currently under consideration for knotweed include a psyllid insect and leaf spot fungus, but are still under research and are not yet available for land managers (wiki.bugwood.org).

The RNSMP has utilized an Integrated Vegetation Management (IVM) strategy to manage knotweed stands within the Rondout Reservoir watershed since 2010, combining mechanical and chemical treatment options and Best Management Practices (BMP's). The preferred method of treatment is stem injection of glyphosate (N-(phosphonomethyl)glycine), a broad spectrum systemic herbicide. Herbicide is applied after flowering to minimize contact with pollinators, and before the first killing frost. At this time knotweed is translocating nutrients from its leaves to its root system. Stem injection reduces herbicide contact to non-target organisms and has been found to be the most effective method of knotweed control (Delbart, 2012). Pulling and covering are also utilized where appropriate on smaller individuals.

## Management 2010-2012

Monitoring and control efforts were initiated in 2010 by then RNSMP Catskill Stream Buffer (CSBI) Coordinator Bobby Taylor. Locations of JKW colonies were mapped with GPS using the Catskill Streams Data Dictionary (see Activities Summary: Survey, p. 10). Select locations were hand pulled on the Chestnut Creek.

In 2011 the author was hired through a Student Conservation Association internship, and began working on knotweed control efforts. Monitoring was continued on the Chestnut Creek in 2011-2012, and a Pesticide Technician license was obtained from the New York State Department of Environmental Conservation to provide chemical treatment to existing stands. A pilot program was started in the fall of 2011 using a 5 ml, 50.2% glyphosate stem injection on one privately owned parcel with a dense knotweed infestation. The following year an estimated 70% reduction in knotweed canopy coverage was observed throughout the site. The treatment was repeated in October of 2012, with further estimated reduction by 60% of the remaining stand.

**Figure 4: Estimated 70% Reduction after 2011 Injection.**

Treatment was also initiated at the East Mountain Road site with approval by Sullivan County Division of Public Works (DPW). Years of mowing at this site had resulted in a dense, stunted growth pattern, not practical for injection. After allowing the colony to grow for the 2012 growing season, stems were cut one foot above the ground and a 25% solution of glyphosate was sprayed into the stems. The first killing frost of the year occurred two days after the application, limiting the time for herbicide absorption and translocation. Little to no effect was seen at this site in the following year.

## CRISP Grant

In January of 2013 Catskill Regional Invasive Species Partnership (CRISP) Coordinator Molly Marquand contacted the Stream Program concerning a grant for invasive species management. The grant was awarded in May to the Stream Program for $20,000 split into seven tasks as follows. The full contract can be found in the appendices of this report.

1. Determine management strategy and expectations using The Nature Conservancy's Invasive Plant Management Decision Analysis Tool (IPMDAT).
2. Design and coordinate a training session for town and county DPW's on preventing the spread or reintroduction of Japanese knotweed in the Rondout and Neversink watersheds.
3. Survey the Chestnut and Rondout Creeks using photographs and GPS for iMap Invasives Assessment.
4. Obtain all necessary permits and permissions, and treat knotweed patches in both watersheds. Develop a press release describing the projects for local media.
5. Design weatherproof signage for knotweed identification with Stream Program and CRISP contact information.
6. Hold landowner training session for knotweed identification and reporting procedures.
7. Submit a final report summarizing grant activities.

# Grant Activities Summary

## IPMDAT

The Invasive Plant Management Decision Analysis Tool (IPMDAT) was developed by The Nature Conservancy of New York to help natural resource managers decide on the best management strategy for dealing with invasive species by determining if the project is warranted, feasible, and will lead to a successful outcome.

From Zimmerman 2011:

> "The IPMDAT is comprised of a strategy-selection decision tree and three control-strategy decision trees (eradication, containment/exclusion and suppression) as well as associated worksheets and documentation. The strategy selection tree is used to determine if the harm caused by an invasive plant species is significant enough to warrant control. Then the tree is used to identify the appropriate control strategy based on the abundance and distribution of the invasive plant. Subsequent trees are used to determine whether control is feasible given the socio-political environment, biological attributes of the plant, effectiveness of control methods, risk of non-target impacts or unintended consequences, and available resources. If the project is determined to be feasible, then the user is asked to weigh the cost and benefits of control project. Lastly, a pre-and post-control monitoring plan is required for a control project to proceed."

The decision tool was used in June 2013 and resulted in a Control Decision of Proceed (project feasible and warranted). The complete tool can be found in the report appendices.

## Training

A training session and slideshow was prepared in May and June of 2013 for town highway departments and county division of public works employees and officials. The presentation included information on the history of knotweed infestation in the US, plant identification, current status of knotweed's spread in Sullivan County and the Towns of Neversink and Denning, management plans, and methods to prevent the spread or reintroduction of knotweed into the Rondout and Neversink watersheds. Presentations were given to over 20 crew members including the Sullivan County DPW on June 26th, Denning Highway Department on October 26th, and Neversink Highway Department on December 11th.

**Figure 5: Training Denning Highway Department Employees on Identification and Effects of Japanese Knotweed**

A separate presentation was adapted for use in training landowners, and included in interactive display of plant leaves to help landowners learn to identify knotweed and common lookalike species. This workshop was advertised through local print (Tri-Valley Townsman), radio (WJFF), and online (watershedpost.com) resources, and was held on September 13th.

## Survey

Landowners with creekside property were contact by mail in May, notifying them that Stream Program staff would be surveying for Japanese knotweed. GPS and photo surveys were continued on the Chestnut Creek in May and June and on the Rondout Creek in June and July. Colonies were surveyed using a Trimble GeoExplorer 2008 series equipped with TerraSync software and catalogued using the NYCDEP Stream Program 2008 data dictionary criteria which includes length (ft.), width (ft.), location (river left or right), and zone (edge, bank, floodplain, upland). Only rough estimates of length and width were used. Data was analyzed using ESRI ARCMAP GIS 10.1 software to determine which landowners were affected.

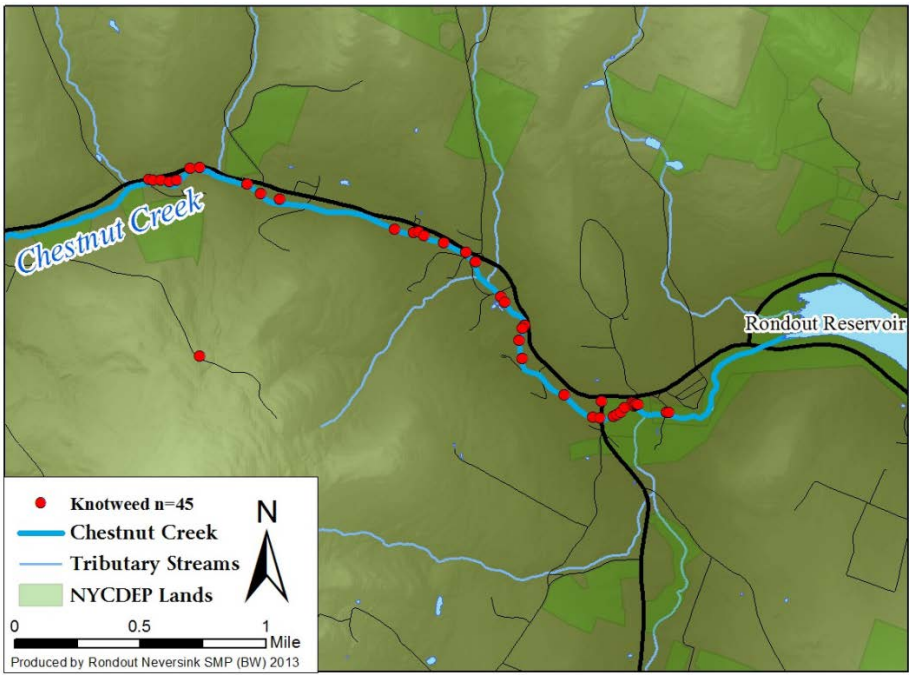



**Figure 6: Knotweed Locations on the Chestnut Creek, Neversink, NY**

Forty-five separate colonies were found in the Chestnut Creek watershed on 18 properties including private landowners, NYCDEP, and the Town of Neversink. Landowners whose property contained knotweed colonies were contacted by mail, phone, or in person, notified of its presence, and informed about its negative impacts on stream-side habitat. Three landowners were unable to be reached by any methods. All landowners who were reached signed an agreement allowing a licensed contractor to chemically treat the locations on behalf of the Sullivan County Soil and Water Conservation District.

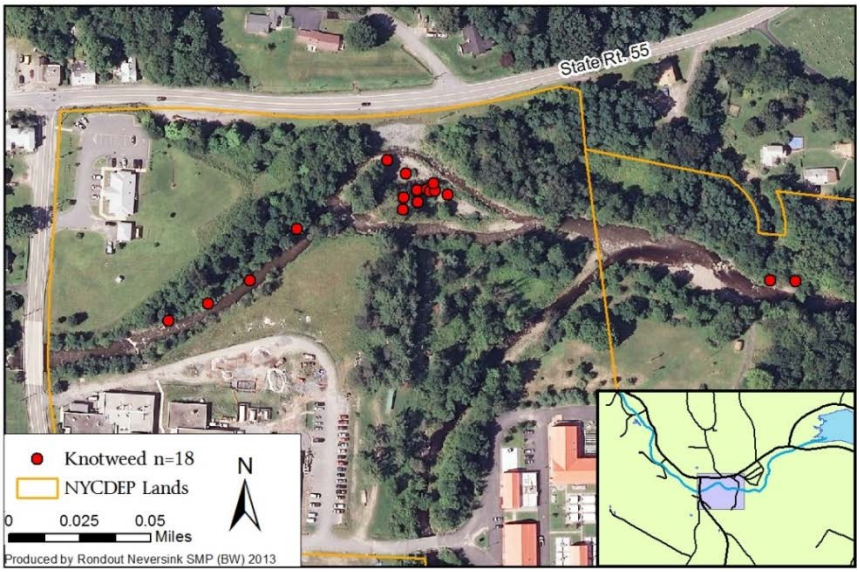



**Figure 7: Knotweed Locations on Lower Chestnut Creek, Grahamsville, NY**

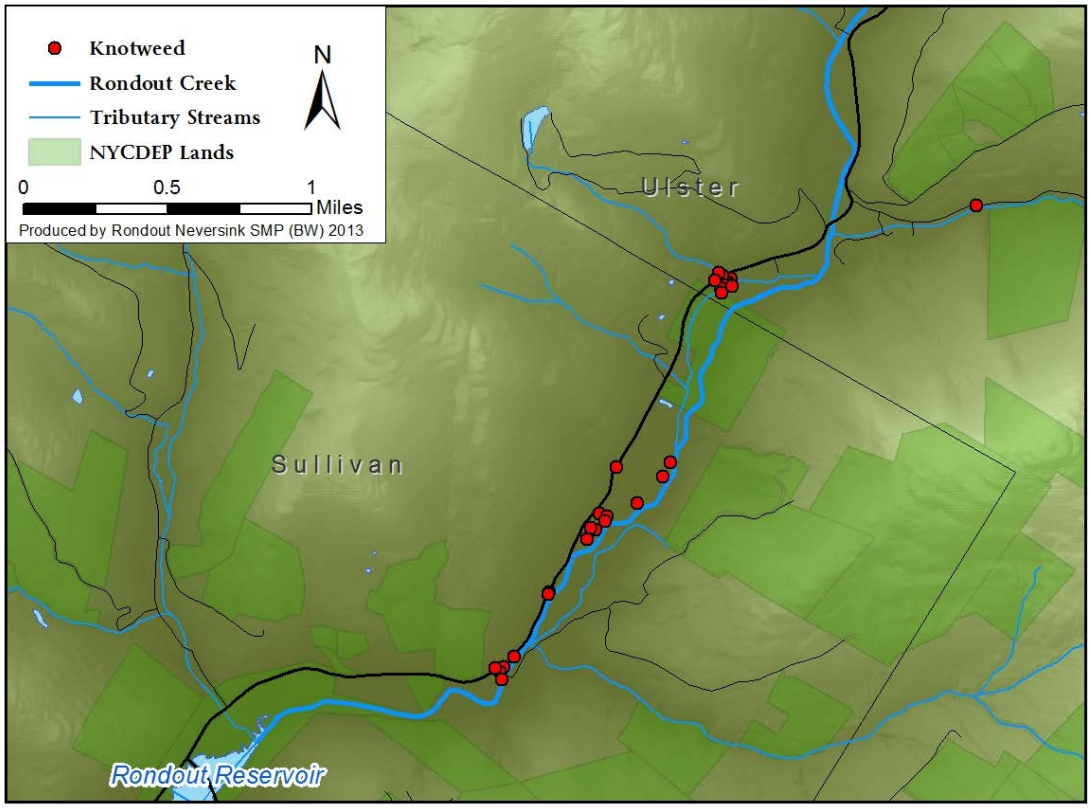



**Figure 8: Knotweed Locations on the Upper Rondout Creek, Sullivan and Ulster County, NY**

In the Rondout Creek watershed six larger areas of knotweed infestation were found on 5 private properties and in the Sullivan County right of way. All landowners in the Rondout Creek Watershed agreed to have their plants treated.

## Treatment

Certified Pesticide Applicators specializing in the removal of invasive plants were researched and contacted in July. After speaking with three contractors, Allied Biological Inc. from Oneonta, NY was chosen based on their level of experience, competitive estimate, and rapid response. A Permit to Apply Pesticides for the Maintenance of Rights-of-Way within the NYC Watershed System and on Aqueduct Property was granted by the NYC DEP in June of 2013.

Treatment took place on all properties with landowner agreements on September 13, 2013 performed by Joshua Burns, Allied Biological Project Manager, and supervised by Brenden Wagner of the RNSMP. Forty out of forty-five of the plots treated received stem injection. Four colonies in the Rondout and one in the Chestnut watershed were too large to treat via stem injection and received a foliar spray. The first killing frost was observed at least three weeks after treatment, and treated knotweed was observed yellowing and wilting before untreated knotweed in other parts of the county.

## Signage

In November, a sign highlighting knotweed identification was designed by Fabia Wargin Design of Stone Ridge, NY with information provided by the Stream Program. The sign instructs highway departments and landowners to contact the Stream Management Program if knotweed is observed within the watershed, and displays the CRISP logo. Signs were given to the highway departments for display in their offices and garages in late December, and a press release was sent to the Tri-Valley Townsman.


**Figure 9: Denning Town Highway Supervisor Dan VanSaders with JKW Signage**

## Future Management (2014-2018)

Survey of each plot will continue in spring of 2014 and will be expanded to include Red Creek, a tributary of the Chestnut Creek, and stem counts or total area of each colony. Each plot will be photographed for a rough estimate of treatment efficacy. Grant monies not dispersed in 2013 have been retained to be used for future treatments. It is estimated that monies retained will fund treatment through 2018.

Two upland knotweed locations have been found in the Neversink watershed since treatment in the fall of 2013, and landowner agreements will be sought to treat these locations in 2014. In addition, two locations of the invasive wetland plant *Phragmites australis* (common reed) have been identified in the watershed. Phragmites, a highly invasive plant, is not yet common through the Rondout and Neversink watershed, and the program will seek to expand control measures to include these populations as well.

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# Appendices:

Table of Chestnut Creek Survey Data
IPMDAT

## Chestnut Creek Survey Summary Table

| Colony ID | Location | Zone | Bank State | Length | Width | Area |
|---|---|---|---|---|---|---|
| 1 | Right Bank | Upland | N/A | 60 | 40 | 2400 |
| 2 | Left Bank | Bank | Uneroded | 20 | 12 | 240 |
| 3 | Right Bank | Bank | Uneroded | 10 | 5 | 50 |
| 4 | Right Bank | Flood Plain | Uneroded | 10 | 4 | 40 |
| 5 | Left Bank | Bank | Severely Eroded | 12 | 4 | 48 |
| 6 | Both | Bank | Uneroded | 7 | 7 | 49 |
| 7 | Right Bank | Edge | Eroded | 4 | 4 | 16 |
| 8 | Right Bank | Bank | Uneroded | 5 | 4 | 20 |
| 9 | Left Bank | Bank | Uneroded | 12 | 8 | 96 |
| 10 | Left Bank | Edge | Uneroded | 40 | 25 | 1000 |
| 11 | Left Bank | Flood Plain | Uneroded | 18 | 10 | 180 |
| 12 | Left Bank | Upland | Uneroded | 15 | 15 | 225 |
| 13 | Left Bank | Bank | Uneroded | 13 | 12 | 156 |
| 14 | Left Bank | Bank | Uneroded | 15 | 13 | 195 |
| 15 | Right Bank | Upland | Uneroded | 13 | 10 | 130 |
| 16 | Left Bank | Bank | Uneroded | 28 | 23 | 644 |
| 17 | Left Bank | Bank | Uneroded | 15 | 12 | 180 |
| 18 | Left Bank | Bank | Uneroded | 12 | 10 | 120 |
| 19 | Right Bank | Bank | Uneroded | 10 | 10 | 100 |
| 21 | Right Bank | Bank | Uneroded | 10 | 10 | 100 |
| 21 | Right Bank | Bank | Uneroded | 3 | 3 | 9 |
| 22 | Right Bank | Bank | Uneroded | 3 | 3 | 9 |
| 23 | Left Bank | Edge | Uneroded | 18 | 15 | 270 |
| 24 | Left Bank | Bank | Uneroded | 6 | 4 | 24 |
| 25 | Right Bank | Edge | Uneroded | 15 | 12 | 180 |
| 26 | Right Bank | Edge | Uneroded | 15 | 8 | 120 |
| 27 | Left Bank | Edge | Uneroded | 15 | 12 | 180 |
| 28 | Left Bank | Upland | N/A | 12 | 12 | 144 |
| DEP 1 | Left Bank | Bank | Uneroded | 10 | 6 | 60 |
| DEP 2 | Left Bank | Bank | Uneroded | 4 | 3 | 12 |
| DEP 3 | Left Bank | Edge | Uneroded | 20 | 10 | 200 |
| DEP 4 | Left Bank | Bank | Uneroded | 20 | 10 | 200 |
| DEP 5 | Left Bank | Upland | Uneroded | 20 | 20 | 400 |
| DEP 6 | Left Bank | Upland | Uneroded | 22 | 22 | 484 |
| DEP 7 | Left Bank | Upland | Uneroded | 4 | 4 | 16 |
| DEP 8 | Left Bank | Upland | Uneroded | 6 | 5 | 30 |
| DEP 9 | Left Bank | Edge | Uneroded | 12 | 8 | 96 |
| DEP 10 | Left Bank | Upland | Uneroded | 5 | 4 | 20 |
| DEP 11 | Left Bank | Upland | Uneroded | 3 | 2 | 6 |
| DEP 12 | Left Bank | Upland | Uneroded | 2 | 3 | 6 |
| DEP 13 | Left Bank | Upland | Uneroded | 4 | 3 | 12 |
| DEP 14 | Left Bank | Upland | Uneroded | 3 | 2 | 6 |
| DEP 15 | Left Bank | Edge | Uneroded | 10 | 7 | 70 |
| DEP 16 | Left Bank | Bank | Uneroded | 2 | 1 | 2 |
| DEP 17 | Left Bank | Bank | Uneroded | 2 | 1 | 2 |

# INVASIVE PLANT MANAGEMENT DECISION ANALYSIS TOOL
# PROJECT COVER SHEET

## Project Summary

| | |
|---|---|
| Scientific name: | Polygonum cuspidatum |
| Common name(s): | Japanese Knotweed |
| Scale (See Figure 1, page 2) | Local |
| PRISM or Weed Management Area | CRISP |
| Conservation target impacted: | Riparian Cooridor |
| Project area (site) name and size: | Rondout & Chestnut Creeks, <2 acres |
| Property owner(s) | Multiple |
| IPMDAT date assessed: | 6/17/2013 |
| Assessors: | Brenden Wagner, Sullivan County Soil & Water Cons. Dist. |
| Reviewers (if peer review required): | |

**Part 1 - Decision Analysis Summary** (Refer to completed worksheets)

**Control Decision**

- [x] Proceed (project feasible and warranted)
- [ ] Stop (project not feasible and/or warranted)
- [ ] Peer Review (project feasibility uncertain)
- [ ] Stop (secure sustainable funding source)

**Total Project Cost:** $20,000

**Project Timeframe** Years: From: 2011 To: 2018

**Distribution and Abundance:** (Obtain from Strategy Selection Worksheet questions)

Total gross invaded area: (hectares) <2 (acres) (square meters)

Total number of occurrences: 30

- [ ] Limited in the state (question 1.2)
- [x] Limited in project area [b] (question 1.4)
- [ ] Moderate in the state (question 1.3)
- [ ] Moderate in project area [b] (question 1.5)
- [x] Widespread in the state (question 1.3)
- [ ] Widespread in project area [b] (question 1.5)

**Control Strategy Selected:**

- [ ] Eradication at state scale
- [ ] Containment/Exclusion in project area
- [ ] Containment at state scale
- [ ] Suppression
- [x] Eradication in project area scale

**Project Goal:** (Desired outcome)

Target organism eradicated from watershed by 2018 with little chance of reintroduction through DPW and community education and monitoring.

**Ecological Impact or Harm to other Values:** (Obtain from Strategy Selection Worksheet question 1.1)
Significant Ecological Impact

**Treatment Type:**

☒ Manual ☒ Herbicide ☐ Mechanical ☐ Biological Control

**Treatment Description:**
Manual removal of small, isolated plants. Stem injection with glyphosate for mature, established colonies. Foliar spray only as last resort on large stands located away from watercourse.

**Cause of Invasion:** (What is the likely cause of the invasion? Is the cause persistent and likely to lead to reinvasion?)
Brought in by contaminated fill material by county DPW.

**Additional Information:** (History of the species in the project area, vector of the species, etc.)
Has been in watershed for aprox. 10 years. Travels via storm floods and roadside mowing.

**Part 2 – Measuring Success and Restoration Needs** (Complete if project proceeding or if peer review)

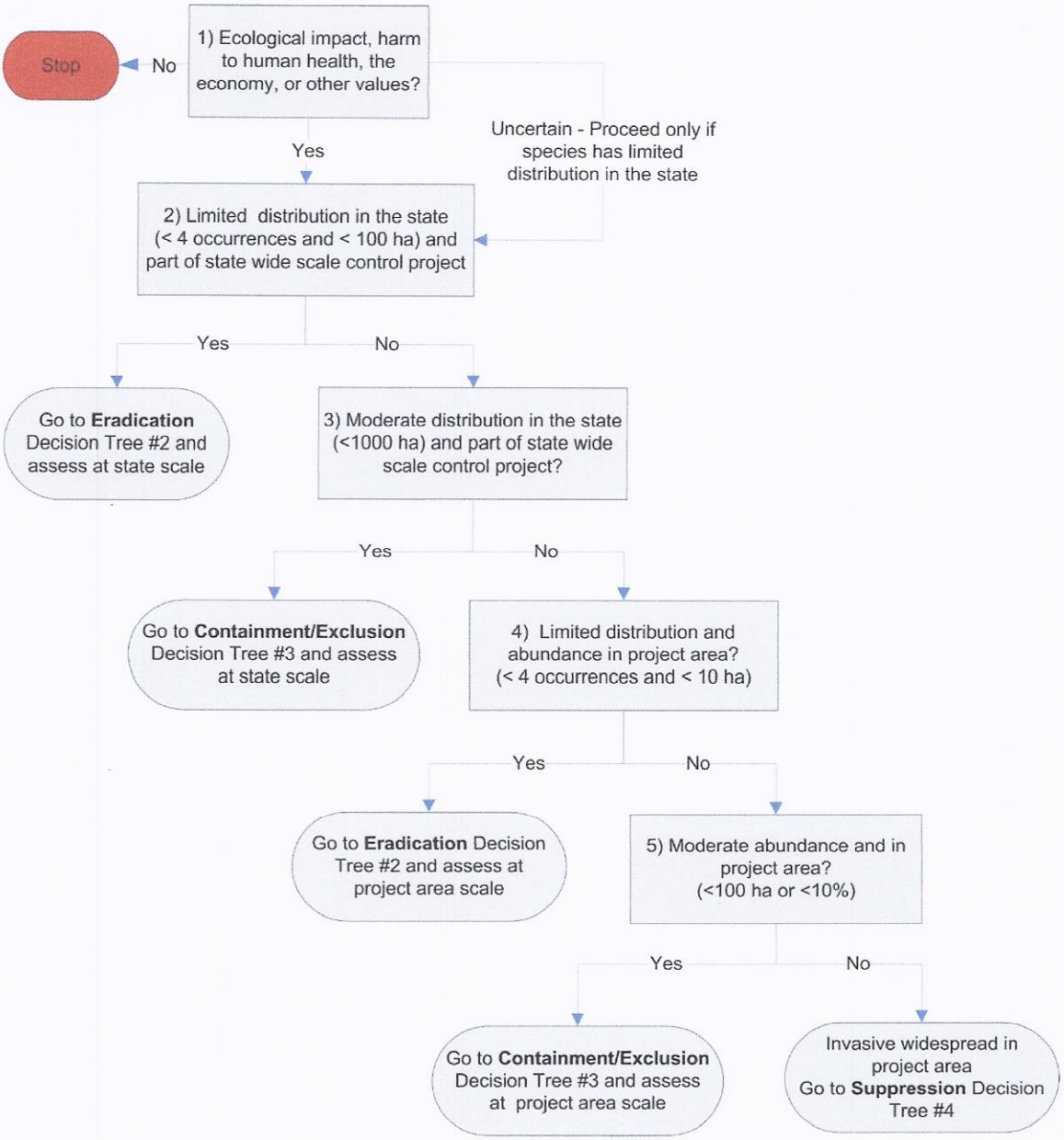
**Monitoring Plan Description:** (Briefly describe methods, analysis and timeline. Attach monitoring plan)
Walk both creeks in spring for initial monitoring and project planning, and again durring inflorescence for best visibility. GPS and photograph each occurrence with estimate of stem density and crown size.

**Control Objective:** (i.e. Reduce stem density by 95% by 2020)
Eradication by 2018

**Restoration Needs:** (Is active restoration necessary? Attach restoration plan if applicable)
Some areas (E. Mountain Road bridge) will need native ripaian planting by Catskill Stream Buffer Initiative after eradication.

## Tree 1. Strategy Selection Decision Tree.

Use with associated worksheet.




* Project area is defined as local, landscape, or PRISM scale.

**Strategy Selection Worksheet**
Use with Strategy Selection Decision Tree (Tree 1)

| | |
|---|---|
| 1.1 | Does the species cause significant ecological impact, harm to human health, the economy, or other values?<br>▪ Enter the total NYS Ecological Impact point score below from Section 1 of the appended New York State Ranking System for Evaluating Non-Native Plant Species for Invasiveness (Jordan et al. 2011 at http://nyis.info/Resources/IS_Risk_Assessment.aspx). Species with a score of either 7 or 10 for at least one question in Section 1 meet ecological impact criteria.<br>▪ If the species has not been assessed for NYS, use assessments from other states in the northeast, or other suitable information. Explain in the Documentation box below and attach supporting documents.<br>▪ If impacts to other values (e.g. human health, the economy, etc.) explain in the Documentation box below and attach supporting documents. |
| ☒ | 1a Significant ecological impact - If the score for any of the four questions 1.1 through 1.4 in NYS ranking form was 7 or 10 points, then go to 1.2. |
| ☐ | 1b Ecological impact uncertain - If total score for Section 1 of the NYS ranking form was at least 9 but no question scored 7 points. Go to 1.2 only if the species has a limited distribution in state. |
| ☐ | 1c Negligible impact or harm - If total score for Section 1 of the NYS ranking form was <7, then stop. |
| ☐ | 1d Significant harm to human health, the economy, or other values. |
| Total NYS Ecological Impact Score: | (maximum 40 points possible) |
| Documentation:<br>Relative Max Score: 97.94 | |

| 1.2 | Does the invasive plant have limited distribution and abundance in the state (< 4 occurrences and < 100 gross hectares (247 acres) and part of a statewide initiative? |
|---|---|
| ☐ | If "Yes" go to Eradication Decision Tree (Tree 2) and assess at state scale. |
| ■ | If "No" go to 1.3. |
| Documentation: | |

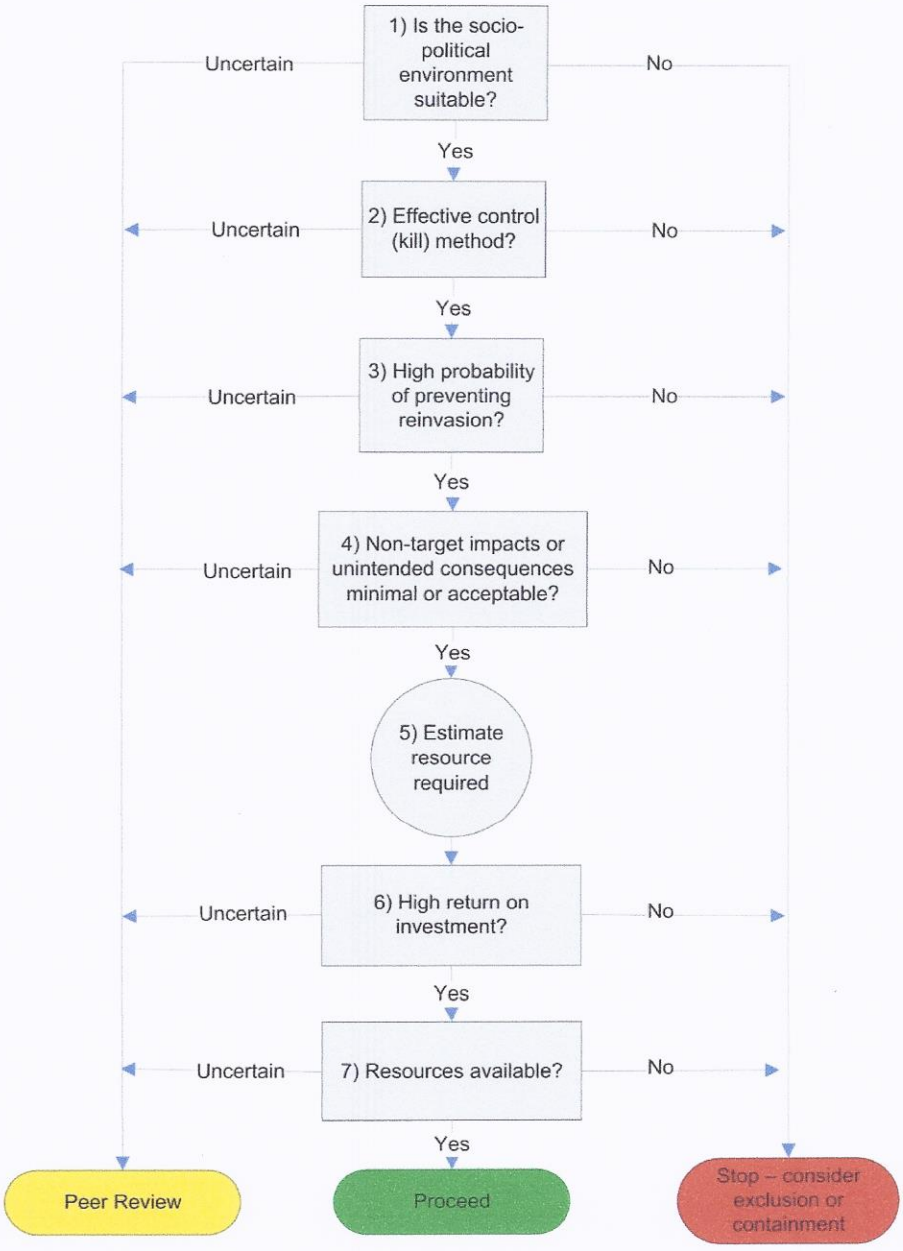
| 1.3 | Does the invasive plant have moderate abundance in the state (<1,000 gross hectares (2,471 acres) and part of a statewide initiative? |
|---|---|
| ☐ | If "Yes" go to Containment Decision Tree (Tree 3) and assess at the state scale. |
| ■ | If "No" invasive plant widespread across the state or not part of statewide initiative, go to 1.4 and assess distribution at project area scale. |
| Documentation: | |

| 1.4 | Does the invasive plant have limited distribution and abundance in project area (< 4 occurrences or < 10 gross hectares (24.7 acres)? |
|---|---|
| ■ | If "Yes" go to Eradication Decision Tree (Tree 2) and assess at the project area scale. |
| ☐ | If "No" go to 1.5. |
| Documentation:<br>Less then 2 acres. | |

| 1.5 Invasive plant has moderate abundance in the project area (<100 gross hectares (247 acres) or covers <10 % of project area (if project area is <1,000 acres). |
|---|
| ☐ If "Yes" go to Containment/Exclusion Decision Tree 3 and assess at the project area scale.<br>☐ If "No" invasive plant widely distributed, go to Suppression Decision Tree 4 and assess at the project area scale. |
| Documentation: |

**Tree 2. Eradication Decision Tree** - State and Project Scale Assessments (Adapted from Panetta and Timmins, 2004). Use with associated worksheet.

The goal of eradication is to eliminate all individuals and the seed bank with the low likelihood of needing to address the species in the future.



**Eradication Worksheet**

Use with Eradication Decision Tree (Tree #2) at the state or Project Scale

| 2.1 | Is the social-political environment suitable?<br>Is social resistance to eradication expected? Within the invaded area, do all the agencies, organizations and/or landowners agree to participate? |
|---|---|
| ■ | If "Yes" go to 2.2. |
| ☐ | If "No" do not proceed. Consider containment (Decision Tree 3). |
| ☐ | If "Uncertain" initiate peer review process and go to 2.2. |
| Comments:<br>Knotweed eradication ranked in top ten management objectives on Rondout Creek Stream Management Plan, 2009. | |

| 2.2 | Effective control (kill) method available?<br>Is there a method available to kill the plant, prevent reproduction and eliminate seed bank within 10 years? Species with seeds (or vegetative propagules) that remain viable in soil for more than 10 years may not be able to be eradicated. Document the type of treatment that is anticipated to be used. Refer to NYS Plant Ranking System (Jordan et al. 2011) questions 4.1 and 4.3. |
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| ■ | If "Yes" go to 2.3. |
| ☐ | If "No" do not proceed. Consider containment (Decision Tree 3). |
| ☐ | If "Uncertain" initiate peer review process and go to 2.3. |
| Documentation:<br>Glyphosate injection found to be ~90% effective after first treatment from experience in the project area. | |

2.3 High probability of preventing reinvasion?

A. Are spread prevention measures (i.e. inspections, cleaning stations, regulations, sanitation protocols and/or focused education efforts), early detection, and rapid response program underway and funded for 2 years?

B[1]. If assessing feasibility of eradication at the *state scale*, is the species not likely to reach state within 10 years determined by the predicted spread of the species from the nearest known occurrence?

B[2]. If assessing feasibility of eradication at the *project scale*, is the species not likely to reach the project area within 10 years determined by the predicted spread of the species from the nearest known occurrence?

Preventing reinvasion may be difficult if the species has the potential to spread rapidly (abundant reproduction (vegetative or by seed) and/or long distance or human dispersal including commercial sale) and/or if the initial cause of the invasion persists (e.g. regular natural or human disturbance or road runoff). Refer to NYS Plant Ranking System (Jordan et al. 2011) questions 2.1, 2.2 and 2.3 for guidance.

- [x] If "Yes" to both A and B go to 2.4.
- [ ] If "No" do not proceed. Consider exclusion or containment (Decision Tree 3).
- [ ] If "Uncertain" initiate peer review process and go to 2.4.

Documentation:

Yes on A and B2. Migration upstream prevented by Rondout Reservior and along road by training session with local town and county DPW workers.

| 2.4 | Is the risk low that the proposed control action could result in a non-target impact or unintended consequences that are unacceptable to the land manager, stakeholders or the public? For example, long-term damage to native plants; chemical contamination of soil, surface water or groundwater; removal of important habitat for wildlife that cannot easily be replaced; another invasive species replaces the one that was removed; or native plants are exposed to high deer herbivory. |
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| ■ | If "Yes" go to 2.5. |
| ☐ | If "No" do not proceed. |
| ☐ | If "Uncertain" initiate peer review process and go to 2.5. |
| Documentation:<br>Injection eliminates chemical exposure to non-target organisms. No treatment will be done durring flowering to aviod honey bee exposure. | |

| 2.5 | Estimate resources required to achieve eradication.<br>Complete eradication effort scoring system (See Appendix I), estimate project cost, and then proceed to Question 2.6. Eradication effort is calculated by multiplying the gross infested area times the impedance factor score (Eradication effort = gross infestation area x impedance score). See Appendix III for a budget worksheet. Cost estimate should include resources required for early detection survey work. |
|---|---|
| Gross infestation area = <2 acres | Impedance score = 15 |
| Eradication effort = 30 | Estimated project cost = $ 30,000 |
| Comments: | |

| 2.6 Is there a high return on investment?<br>Compare estimated invasive plant control project cost (Question 2.4) to conservation benefits of maintaining/restoring conservation target. See Figure 2 on page 7 and associated text for guidance on determining conservation benefit and return on investment. In general, high cost projects with low conservation benefit should not proceed. |
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| ☒ If "Yes" go to 2.7.<br>☐ If "No" do not proceed. Consider containment (Decision Tree 3).<br>☐ If "Uncertain" initiate peer review process and go to 2.7. |
| Comments: |

| 2.7 Resources available?<br>Funding for core operations is secure for at least two years, and the project has undertaken the necessary financial planning and achieved partial success in developing sources of long-term funding to sustain core costs for the next 5 years. |
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| ☒ If "Yes" Proceed – complete coversheet parts 1 and 2.<br>☐ If "No" do not proceed with implementation. Complete part 1 of the coversheet and secure sustainable funding source.<br>☐ If "Uncertain" initiate peer review process and complete coversheet parts 1 and 2. |
| Comments:<br>Initial funding through CRISP grant. Additional funding for next five years through Sullivan County Soil and Water Conservation District Rondout Neversink Stream Program. |