STATEWIDE KNOTWEED CONTROL PROGRAM

2012 Progress Report

March 2013

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Cover Photo: Courtesy of Pierce Conservation District. Photo taken of Bohemian knotweed in Pierce County.

Extreme care was used during the compilation of the data in this report to ensure accuracy. However, due to changes in data and the need to rely on outside sources of information, the Department of Agriculture cannot accept responsibility for errors or omissions, and, therefore there are no warranties which accompany this material. Original data were obtained from the Washington State Department of Ecology, Washington State Department of Natural Resources, and program cooperators.

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Executive Summary

The Washington State Department of Agriculture (WSDA) Knotweed Control Program is a key component of the intergovernmental effort to control invasive knotweed in Washington State. Knotweed includes four closely related noxious weeds that aggressively invade high value habitats and displace native vegetation. This program provides funding, coordination, and other resources to cooperators that conduct invasive knotweed control projects and has partnered with, or directly supported, tribal governments, local governments, non-governmental organizations, and other state agencies. The program maintains or creates green jobs across the state, benefiting the environment and economy of Washington, and has provided training and employment to many individuals since 2004.

WSDA serves as a clearinghouse for knotweed information and assists any group interested in control. WSDA works with groups throughout Washington to identify knotweed infestations, develop control projects, and secure grant funding. In order to minimize duplication of efforts by program cooperators, WSDA fulfills state-level environmental review requirements, coordinates Federal Clean Water Act permit compliance, provides public notification and education materials, and publishes required notices and maintains a database of known knotweed locations.

WSDA has received approximately $4.5 million for knotweed control since 2004. This funding has been critical for our program cooperators to secure additional resources by providing them with state-origin matching funds. In 2011 and 2012, the combined WSDA Knotweed Control Program budget was $840,241, which allowed for the support of project activities in watersheds of 20 counties. This level of program support allowed cooperators to leverage additional funding from tribal, local, non-governmental, and federal sources to these knotweed control projects.

With the combination of funds available in 2011, approximately 1,100 acres of knotweed were treated with integrated pest management techniques, and project work occurred in 760 river miles for a total of 1,413 landowners assisted. In 2011 proposals requesting a total of $411,528 were submitted. WSDA furnished support to 14 of these projects and one biological control development project, providing a total of $319,278 for agreements and contracts.

With available funds in 2012, approximately 1,169 acres of knotweed were treated, work occurred in 1,174 river miles for a total of 1,808 landowners assisted. In 2012 proposals requesting a total of $308,108 were submitted. WSDA supported all 17 proposals including a biological control project totaling $288,108 for agreements and contracts.

WSDA will continue to support knotweed control as program funding allows. The funding outlook in 2013 appears stable. In the past, funding reductions have led to the abandonment of projects and reduced support for ongoing initiatives. In contrast, knotweed projects that have received stable funding have shown a vast decrease in knotweed presence. Stable funding will remain imperative to the success of knotweed control in Washington State.

Introduction

This is a progress report for the Statewide Knotweed Control Program coordinated by the Washington State Department of Agriculture that describes the program framework, survey methods, treatment methods, project selection process, budget, and results for calendar year 2013.

This report presents the methods and results that are common to the knotweed projects that WSDA supports. The results are divided into a programmatic summary to describe the general activity level of program cooperators, and monitoring results that describe the changes at infested sites. Three program measures are used to describe the activity level of program cooperators: river miles, acres of knotweed treated, and the number of landowners assisted. These metrics allow for the comparison of activity level through time.

Analyzing the total acreage of knotweed treated by program cooperators on an annual basis is a reasonable method to describe the amount of area affected by knotweed, but it is not a precise way to detect the change that occurs within infested sites following herbicide applications. Due to this challenge, WSDA used monitoring plots to detect the within-site change of knotweed populations following annual treatment activities implemented by program cooperators since 2004. The trend of these data shows a significant decrease in knotweed following a series of annual treatments.

This trend of significant reductions is consistent with the results seen in all project areas. Across the state, the knotweed populations that persist in project areas have fewer stems per acre and the knotweed that is present exhibits reduced stem height, stem diameter, and overall vigor. As a result of program cooperator efforts, many native plants, including tree and shrub species, have reestablished in areas where they had previously been displaced. Sustained funding is critical to protecting these accomplishments and continuing to remove knotweed from valuable watersheds.

Budget reductions have previously resulted in the inability to support follow-up activities at project sites. When a site is left untreated, small amounts of living knotweed can return to original infestation levels in as few as three seasons, placing the site back on a path towards a monoculture of knotweed and subjecting the project area to the negative consequences of knotweed invasion.

The Problem

The invasive knotweeds are non-native plants that have been introduced to Washington State without the factors that keep their populations under control in their native range. Knotweed alters riparian vegetation communities, disrupts nutrient cycling, negates riparian restoration efforts, affects the recreational use of watercourses, and decreases property values. Knotweed has been reported in every county of Washington State. These plants are pioneer species that quickly colonize disturbed areas. Once knotweed becomes established, it is very difficult to remove, and single patches can persist for more than 100 years.

In the Pacific Northwest, knotweed spreads when roots and stems are moved by flowing water or human activities. Human activities include moving soil that contains knotweed plant material, mowing or cutting knotweed, or discarding knotweed plant material in vulnerable habitats.

Figure 1. Gravel bar in the Washougal River during summer flow (left) and winter flow (right) levels.

Figure 2. Knotweed plants sprouting from plant fragments deposited by flood water.

In river corridors, knotweed reproduces from fragments and seeds that travel downstream, affecting the gravel bars and riparian forests of entire river systems. Figure 1 shows natural flooding of a knotweed-infested gravel bar. This site served as a source for new infestations as knotweed stem and root fragments were transported downstream by the flowing water. Root and stem fragments as small as one inch can produce a new plant. As a result, one patch can be the source of many downstream populations.

Figure 2 shows knotweed sprouting from fragments deposited by flood waters in the Cowlitz River valley. If left untreated, these small plants will form multi-stemmed patches. When these patches coalesce, they exclude all other vegetation. Figure 3 shows the knotweed infestation of a riparian forest of the

Dickey River in 2005. Knotweed had displaced most of the understory plants at this site and occupied any opening created by natural disturbance.

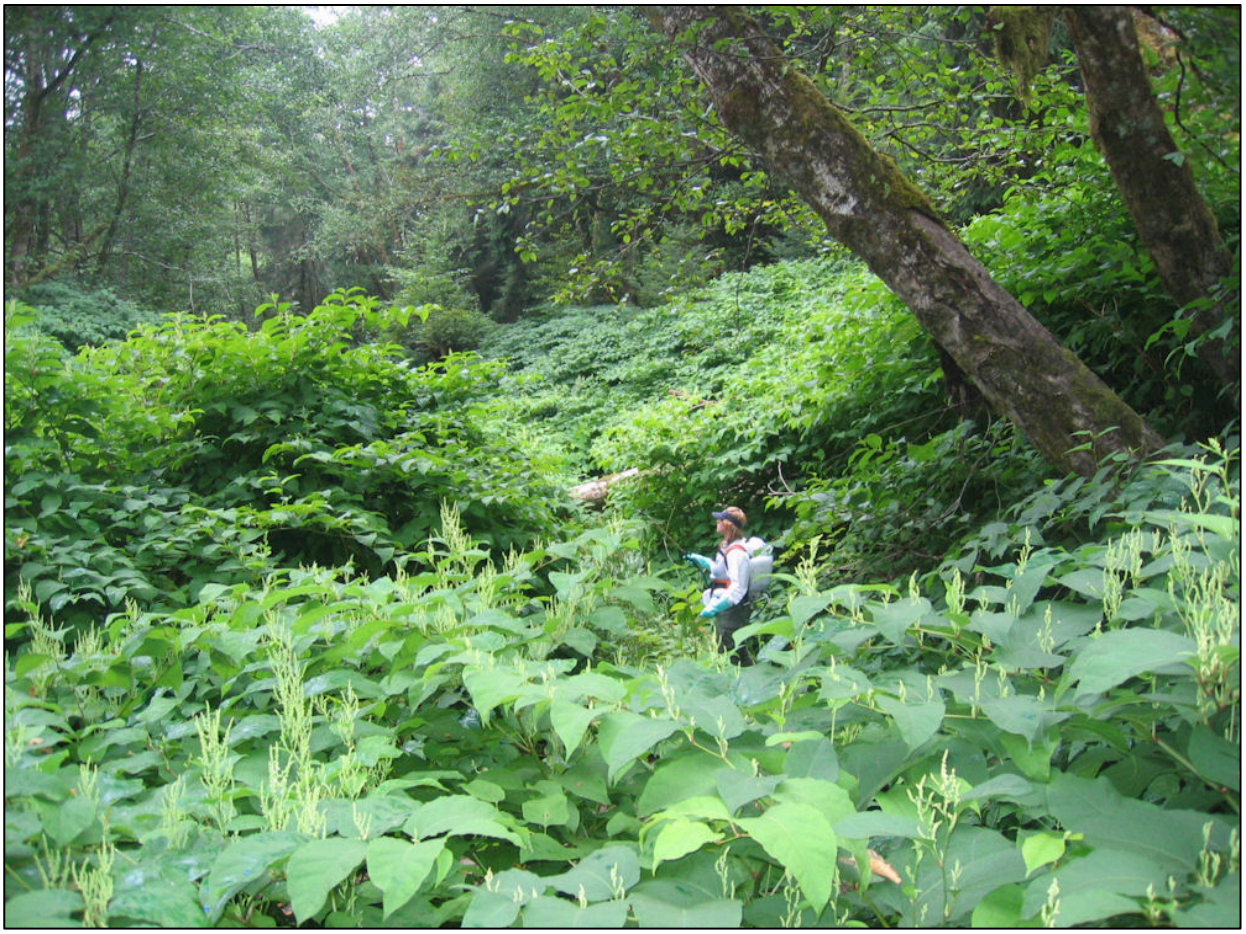

Figure 3. Riparian forest of the Dickey River infested by Bohemian knotweed (Photo courtesy of the National Park Service).

Riparian areas are transitional habitats located between terrestrial and aquatic ecosystems such as lakes or rivers. Riparian areas provide shade, nutrients, and large woody debris to both aquatic and terrestrial ecosystems. Over time, riparian areas that are occupied by early-successional native species such as alder, willow, and other shrubs, move toward a plant assemblage dominated by conifers. These functions take many decades to recover once impacted by any disturbance.

Substantial resources have been applied to the protection or restoration of riparian areas in Washington State for the benefit of fish, wildlife, and recreation. Many of these projects seek to reintroduce or protect riparian vegetation that is critical to self-sustaining ecological services of forests and streams. However, many of these projects are located in areas vulnerable to knotweed invasion. Knotweed infestations can ruin the sustainable benefits of these projects by

out-competing the offspring of the native plantings and dominating the vegetation community in the long-term.

When sites are heavily infested by knotweed, there are fewer juvenile trees available to replace mature trees removed by natural disturbances such as wind, flood, or fire. Instead, the knotweed present in the understory fills any gaps that are created. Failure to control knotweed at these sites will result in a monoculture of knotweed that excludes all beneficial riparian vegetation in the future.

The lack of juvenile tree species in knotweed-infested riparian forests could also result in a decrease in large trees available to fall into the stream channel. These large pieces of wood, also known as large woody debris are important to the rivers and streams of the Pacific Northwest. Large woody debris creates pool habitats, retains spawning gravels, and provides cover for juvenile salmonids. The loss of large woody debris can disrupt natural processes, leading to a down-cutting of the stream bed, loss of side channel fish habitat, loss of pool habitat, decreased retention of spawning gravels, and decreased cover for juvenile salmonids and their prey. Depending on the time of year and salmon species, a decrease in the number of pieces and volume of large woody debris has been shown to decrease the number of salmon that utilize the section of stream lacking large woody debris. This could negatively impact efforts to restore salmon populations.

Knotweed can also have a negative effect on aquatic invertebrates that are the basis of the aquatic food chain by disrupting or altering the quality and timing of leaf litter inputs. This lowers the species diversity of invertebrates and negatively affects the organisms and processes that depend on them. Invertebrates are the primary food source of juvenile fish species.

Knotweed often negatively affects residential property and transportation infrastructure. Along right-of-ways, knotweed can grow through materials used for roadways, causing the need for expensive repairs. Knotweed patches also pose potential sight-distance hazards to vehicle operators due to rapid growth, affecting public safety on roadways (Figure 4).

Figure 4. This knotweed patch obscured the road sign on an annual basis and required increased site visits due to its vigorous regrowth.

Habitat modeling performed by WSDA indicates that knotweed currently occupies a small fraction of its potential habitat in Washington. However, there is evidence that knotweed populations outside of current project areas will continue to expand, and will eventually invade these suitable areas.

Trends in plant population growth can be identified using the cumulative number of herbarium specimens recorded over time. When the total number of records are viewed versus time, the trend of the data can be used to determine whether the populations are increasing, decreasing, or are stable. Figure 5 shows the cumulative areas infested by knotweed since 1936 based on regional herbarium records.

Although the absolute rate of spread cannot be calculated with the herbarium data, the trend suggests that knotweed populations are increasing exponentially in Pacific Northwest. The pattern in the data is consistent with population growth free of any natural suppression.

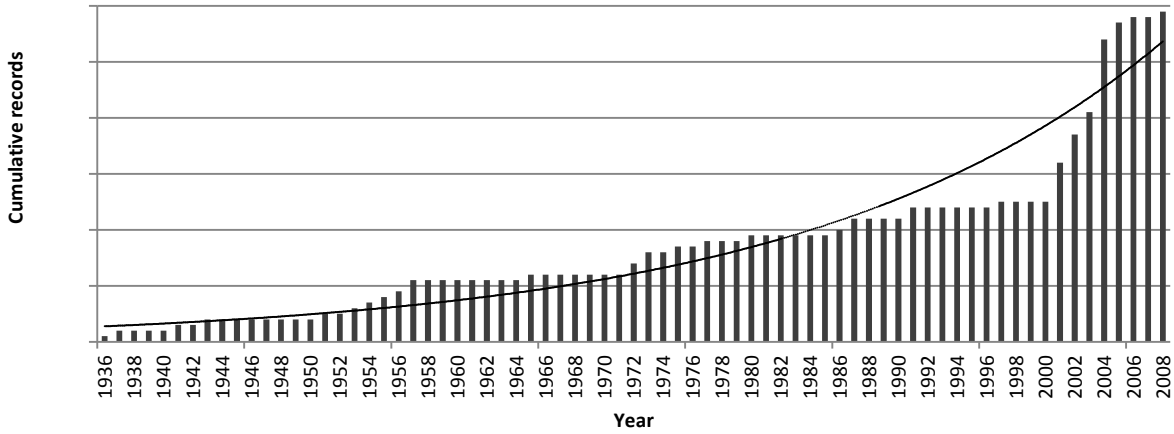

Figure 5. Cumulative area occupied by knotweed since 1936. Records were obtained from the Consortium of Pacific Northwest Herbaria for Japanese, giant, and bohemian knotweed.

The increase of knotweed populations will result in increased future control costs and increased costs associated with negative impacts caused by knotweed as these populations expand exponentially. The cumulative number of localities occupied by knotweed reported in regional herbaria has been increasing exponentially with a rapid expansion following 2000. The only way to reverse this trend is to implement an active control project.

For a more detailed explanation of the methodologies WSDA used to reach these modeling conclusions, please see WSDA Knotweed 2011 Progress Report.

The Plants

The invasive knotweed complex is comprised of four herbaceous perennial plant species from the buckwheat family (Polygonaceae) that are native to Asia. They are broadleaf plants that have green stems and reddish nodes (Figure 6). The plants were introduced to the United Kingdom and the United States as garden ornamentals in the early part of the 20th century. The four species are commonly referred to as Japanese, giant, Bohemian, and Himalayan knotweed. All four species occupy similar habitats and cause similar negative impacts. They are collectively referred to as knotweed in this report. The four species are alternatively placed in either *Polygonum* or *Fallopia* genus.

Figure 6. The green, bamboo-like stems of invasive knotweed.

- **Japanese knotweed** (*Polygonum cuspidatum* Sieb. & Zucc.) The leaves of this plant are blunt at the base and sharply tapered at the tip (Figure 7). The stems of this plant usually grow to 7 feet tall. Stem diameters range from one-half to one inch.

- **Giant knotweed** (*P. sachalinense* Schmidt) This is the largest of the four invasive knotweed species. It has large heart shaped leaves (Figure 7), stems that can grow up to 12 feet tall, and stem diameters up to two inches.

- **Bohemian knotweed** (*P. x bohemicum* Chrtek & Chrtkova) This is the hybrid produced by giant and Japanese knotweed. Leaf shape, stem diameter, and stem heights are variable, but are usually within the range of the smaller Japanese knotweed and larger giant knotweed. It is the most common invasive knotweed species in Washington State.

Figure 7. Leaves of three species of knotweed. From left to right are the leaves of giant, Japanese, and Himalayan knotweed.

- **Himalayan knotweed** (*P. polystachyum* Wall) has lance-shaped leaves that make it readily identifiable when compared to the other species (Figure 7). The stems of this plant usually reach one half inch in diameter, and four to five feet in height. It is most common in the coastal areas of southwest Washington.

All four species are listed as Class B noxious weeds on the Washington State Noxious Weed List (WAC 16-750-011). Class B noxious weeds are designated for control in regions of Washington State where they are not yet widespread. In regions where Class B noxious weeds are abundant, mandatory control is decided at the county level. In addition, all four species are included in the Washington State noxious weed seed and plant quarantine list (WAC 16-752-610). Under this rule, it is illegal to transport, buy, sell, or trade any of the invasive knotweed species.

Figure 8. Flowering knotweed in Skamania County.

Invasive knotweeds have extensive underground rhizome and root systems. They thrive in moist soil or river cobble, in full or partial sunlight, and are most common along rivers, creeks, beaches, and disturbed areas.

The aerial stems of knotweed emerge in spring and reach full height by early summer. The plants flower in late summer or early fall (Figure 8), and the aerial shoots die after the first frost leaving living underground root systems. The dead shoots persist through the winter, and can remain standing for several years (Figure 9).

Figure 9. Dead aerial stems of knotweed on the East Fork Lewis River in Clark County.

WSDA Knotweed Control Program

Since 2004, the Washington State Department of Agriculture has partnered with multiple organizations to locate and control knotweed in select watersheds across the state. Implementing annual field surveys and targeted herbicide applications has proven to be a very effective means of controlling knotweed. Program cooperators survey for knotweed by wading or boating streams and driving right-of-ways in each project area. The location of knotweed is documented, and this information is used to identify the ownership of affected parcels. Figure 10 shows crew members recording the location of a knotweed patch in the Upper Skagit River. Program cooperators provide educational materials and notification to each landowner prior to the performance of any control activities. Most landowners are familiar with the negative impacts of knotweed and welcome the assistance provided by program cooperators.

Figure 10. Crewmembers performing a survey of the Upper Skagit River.

Treatment methods are selected based on site and infestation characteristics according to integrated pest management (IPM) principles. An important IPM consideration for the program is the treatment of all known knotweed populations in the selected river corridor, starting at the upstream source of the infestation and working in a downstream direction. This strategy helps to ensure that untreated knotweed plant material will not re-infest treatment sites as it moves downstream.

Treatments are conducted when the knotweed plants are actively growing. Figure 11 shows a crewmember making a targeted herbicide application to knotweed regrowth. All program cooperators apply formulations of the systemic herbicides imazapyr or glyphosate, alone or in combination. Foliar delivery of herbicide was the primary treatment method used by project cooperators in 2012. The use of herbicide has been proven to be the most effective treatment method.

Figure 11. Knotweed crewmember treating knotweed regrowth.

Program cooperators use herbicides that are registered in Washington State for use in or near water. WSDA requires that all herbicide applications be made under the supervision of a licensed applicator. Funding to support the WSDA knotweed program helps to ensure that licensed and trained professionals make herbicide applications near water.

Biological Control Program

Dr. Fritzi Grevstad of Oregon State University has been working with an international group of scientists to develop a classical biological control program for the control of Japanese, giant, and Bohemian knotweed. In biological control, natural enemies from the weed's native range are introduced to the invaded range to provide long-term suppression of the plant population. Partners include the U.S. Forest Service Forest Health Technology Enterprise Team, Washington State Department of Agriculture, Oregon Department of Agriculture, Oregon State University, CABI- Biosciences United Kingdom, Washington State University Extension, Agri-Food and Agriculture Canada, and the BC Ministry of Forests.

After extensive tests of safety and efficacy, the knotweed psyllid *Aphalara itadori* from Japan was found to be suitable and effective biological control agent. Colonies of two biotypes of the psyllid are being maintained in the Oregon State University Quarantine Facility. The following progress was made in 2012.

Figure 12. *Aphalara itadori* adult in a knotweed leaf axle.

Petition for release submitted for review

Results of 5 years of host specificity and efficacy testing were compiled into a 54 page "Petition for Release" document that was submitted to the Technical Advisory Group on Biological Control of Weeds (TAG). This document includes information on the biology, taxonomy, and impacts of knotweed as well as the biology, host specificity, and potential impacts of the candidate biocontrol agent. The TAG is a panel comprised of members from various federal environmental agencies that reviews potential weed biocontrol agents prior to application for a federal release permit from USDA-APHIS-PPQ. The review can take 6 months to a year or more to complete.

The petition proposes to release two biotypes of the psyllid. The northern biotype was collected from the Island of Hokkaido from giant knotweed (*Fallopia sachalinensis*) and reproduces best

on this knotweed species. The southern biotype was collected from Kyushu from Japanese knotweed (*F.japonica*) and performs well on both *F. japonica* and the hybrid *F. x bohemica.*

Potential field release sites identified

In September, several sites along the Skykomish and Skagit Rivers were surveyed and found suitable as future release sites. DNA sequencing of leaf samples taken along these rivers by John Gaskin (USDA-ARS in Sidney, MT) indicates that the Skagit is primarily one clone of Bohemian knotweed. It is a male-flowered genotype that is common throughout Oregon and Washington. The Skykomish River appears to have a wide variety of genotypes and all three species of knotweeds.

Comparison of performance of the psyllid biotypes on different knotweeds

An experiment was carried out to compare impacts of the two psyllid biotypes on different species and genotypes of knotweed. In 2012, an earlier study was expanded to include F. japonica and additional replicates for *F. sachalinensis* and *F. x bohemica*. Potted plants were grown from rhizomes collected from various field sites in Oregon and Washington. Rhizomes were cut into 3 similar sized pieces to grow sets of 3 plants of identical genotypes to which the three treatments were applied. Plants were covered with a sleeve cage into which were placed 20 adult psyllids of the Hokkaido biotype, 20 adults of the Kyushu biotype, or no psyllids (control). Each of these blocks was replicated 8 times for each knotweed species. The plants were maintained for 7 weeks, at which point the new generation of psyllids was counted and the plant was harvested (roots and shoots separate), dried, and weighed.

Both psyllid biotypes had strong impacts on all three knotweed species (Fig. 13). In the short term, the Hokkaido psyllid had a slightly greater impact on giant and bohemian knotweeds, while the Kyushu psyllid had a greater impact on Japanese knotweed. These results will be informative in selecting the best psyllid biotype for each targeted release site based on the knotweed species and genotypes present.

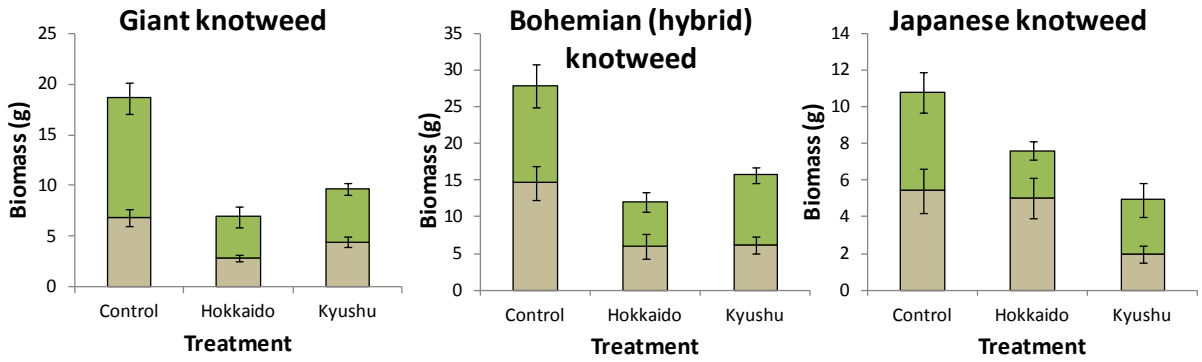

Figure 13. Final plant biomass of giant, bohemian and Japanese knotweed following exposure to 20 pairs of Hokkaido or Kyushu biotypes of *Aphalara itadori* and their offspring for 50 days. Green shading is shoot biomass. Brown shading is root biomass. N=8 replicates per treatment.

Figure 14. Damage to giant knotweed caused by the psyllid *Aphalara itadori.*

2012 Project Selection

The organizations that implement knotweed control projects in Washington State are growing in both numbers and type. Many cooperative weed management groups have formed to combat invasive knotweed, bringing together landowners, land management agencies, tribal governments, county noxious weed control boards, fisheries enhancement groups, conservation districts, and other conservation organizations and citizen groups. With the increase in organizations involved in knotweed control comes an increase in need for funding to support cross-jurisdictional projects on the scale of whole river systems.

In 2012 stakeholders recommended that WSDA support projects that:

- protect previous accomplishments;
- can cost-effectively control knotweed populations; and
- will protect large, ecologically important areas.

In combination with these recommendations, WSDA used the project area's current infestation level, health of riparian areas, and the extent that requested funds would be used to leverage additional funding to rank proposals and develop a list of projects that would be supported.

In 2011 and 2012, thirty-two proposals requesting a total of $719,636 were submitted. WSDA furnished support to 31 of these projects and one biological control development project, allocating a total of $607,386 for agreements and contracts. Figure 15 shows the location and scope of the supported projects.

Figure 15. Map depicting the counties where WSDA supports knotweed control projects.

Budget

The Washington State Department of Agriculture has administered a knotweed control program since 2004 when the Legislature provided an appropriation of $500,000 per year for a pilot program in southwest Washington. Including that initial investment, WSDA has received around $4.5 million to control knotweed since 2004. This funding has been critical for the ability of our program cooperators to secure additional resources by providing them with state-origin matching funds.

In 2011 and 2012, the WSDA knotweed control program budget was $840,241 (Table 1). WSDA provided $607,386 for contracts and agreements, $40,000 for herbicide and application equipment, and $192,855 for WSDA coordination. WSDA coordination expenses include agency administration costs, salaries and benefits for coordination, legal and clerical support, equipment costs, printing, and other goods and services.

Table 1. Estimated budget activity for the 2012-2014 biennium.

Activity			Expenditure
Purchased services			$607,386
	10,000 Years Institute	$23,558	
	Center for Natural Lands Management	$95,196	
	Chelan County	$43,755	
	Clallam/Jefferson County	$47,485	
	Clark County	$57,820	
	Cowlitz County	$10,029	
	Hood Canal Salmon Enhancement Group	$58,120	
	Island County	$10,185	
	Lewis County	$17,145	
	Oregon State University	$65,065	
	Pacific County Conservation District	$23,977	
	Pierce Conservation District	$69,560	
	Skagit Fisheries Enhancement Group	$20,750	
	Snohomish County	$34,700	
	Sound Salmon Solutions	$3,969	
	Skagit County	$13,072	
	Walla Walla Conservation District	$2,750	
	Yakima County	$10,250	
Herbicide			$40,000
Coordination			$192,855
	Total Biennial Expenditures		**$840,241**

Results

In addition to a biological control development project with Oregon State University, in 2011 and 2012 WSDA provided resources to the 10,000 Years Institute, Skagit Fisheries Enhancement Group, Sound Salmon Solutions, Hood Canal Salmon Enhancement Group, Center for Natural Lands Management, Pacific Conservation District, Pierce Conservation District, Walla Walla Conservation District and the noxious weed control boards of Chelan, Clallam, Clark, Cowlitz, Island, Lewis, Okanogan, Skagit, Skamania, Snohomish, and Yakima counties to control knotweed.

These cooperators implemented knotweed control projects in watersheds of 20 counties. WSDA continued to support on-going and new projects throughout Washington State in 2011 and 2012. Table 2 and 3 are a summary of the work performed by program cooperators in 2011 and 2012.

Table 2. Results by program cooperator for the 2011 control season.

Program Cooperator	Acres Treated	River Miles	Landowners Assisted
10,000 Years Institute	0.02	30	10
Chelan County	1.0	87	100
Clallam County/Jefferson County*	780.0	80	378
Clark County	0.0	0.0	0
Cowlitz County	7.5	6.6	90
Lewis County	1.0	1.0	6
Pierce Conservation District	130.0	75	36
Skagit Fisheries Enhancement Group	1.3	88	22
Hood Canal Salmon Enhancement Group	23.9	19.0	150
Snohomish County	114.0	29	150
Sound Salmon Solutions	11.4	0.2	35
Center for Natural Lands Management	10.0	204	135
Skagit County*	19.4	58	19
Yakima County	1.4	82	282
Total	**1,100.8**	**759.8**	**1,413**

* These groups worked in a shared project area with a combined crew

Table 3. Results by program cooperator for the 2012 control season.

Organization	Acres Treated	River Miles	Land Owners Assisted
Center for Natural Lands Management	23.51	158.54	153
Chelan County	1.82	90	162
Clallam/Jefferson County*	175	23	305
Clark County	306.5	12.36	250
Cowlitz County	1.62	6.6	90
Hood Canal Salmon Enhancement Group	11.3	24	221
Island County	1.28	1	19
Lewis County	9.5	31	106
Pacific Conservation District	229.5	599	59
Pierce Conservation District	338	30.25	18
Skagit Fisheries Enhancement Group	1.1	68.5	31
Snohomish County	54.62	29.52	28
Sound Salmon Solutions	0.175	7.66	29
Skagit County*	7.8	5.3	14
Walla Walla Conservation District	6	5.65	41
Yakima County	1.38	82	282
Total	**1169.105**	**1174.38**	**1808**
* These groups worked in a shared project area with a combined crew			

WSDA uses three metrics to track the progress of each project. The river miles column includes survey, treatment, and monitoring activities. In cases where our projects are focused on the treatment of upland knotweed populations in order to prevent the infestation of the shorelines of rivers, the river miles measured does not apply.

Approximately 1,100 acres of knotweed were treated with IPM techniques in 2011. Project work occurred in 760 river miles for 1,413 landowners. With available funds in 2012, approximately 1,169 acres of knotweed were treated, work occurred in 1,174 river miles for 1,808 landowners. Figure 16 shows one site in Skamania County where knotweed populations have been reduced.

Figure 16. Knotweed control site in Skamania County showing typical results. Image on the left was taken in 2004, and the image on the right was taken in 2010 following annual treatment and the implementation of a restoration project by the Skamania County Noxious Weed Control Board.

Outlook

The WSDA Knotweed Control Program is a key component of the intergovernmental effort to control knotweed in Washington State. This program provides funding, coordination, and other resources to cooperators that conduct knotweed control projects and partners with, or directly supports, tribal governments, local governments, non-governmental organizations, and other state agencies.

WSDA continues to work with program cooperators to develop sustainable knotweed control strategies. As in the past, state resources were utilized to leverage additional funding. Combining funding and resources from multiple sources allows program cooperators to implement projects on the scale of entire watersheds. In 2013, program cooperators will continue to place emphasis on landowner participation and education. This provides landowners and land managers with the knowledge and experience to be the long term stewards of their respective project areas.

WSDA will continue to support the development of biological control methods for knotweed. Typically, biocontrol agents do not reduce the populations of invasive plants as much as other control techniques. However, if self-sustaining populations of biocontrol agents can be developed in the future, this may constitute a cost-effective and self-sustaining suppression strategy for sites heavily infested by knotweed.

If left untreated, there is evidence that the small amount of live knotweed present at treatment sites can return to the original infestation level in as little as three seasons, eventually surpassing the infestation level present prior to any investments in knotweed control. This would result in the loss of progress toward long-term knotweed control, increased future control costs, degradation of environmental quality, and the alteration of the sustainable ecological services of invaded sites.

WSDA will continue to support knotweed control as program funding allows. The funding outlook in 2013 appears stable. In the past, funding reductions have led to the abandonment of projects and reduced support for ongoing initiatives. In contrast, knotweed projects that have received stable funding have shown a vast decrease in knotweed presence. Stable funding will remain imperative to the success of knotweed control in Washington State.