STATEWIDE KNOTWEED CONTROL PROGRAM

2015 Progress Report

March 2016

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Cover Photo: knotweed infestation in the debris field of the 2014 State Route 530 landslide near Oso, Washington (Snohomish County Noxious Weed Control Board).

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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 works with groups throughout Washington to identify knotweed infestations, develop control projects, and secure grant funding. In order to minimize duplication of effort 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.

WSDA has received approximately $6.5 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. For the 2015-2017 biennium (July 1st, 2015 to June 30th, 2017), the WSDA Knotweed Control Program budget is $938,154, which allows for the support of project activities in watersheds of 20 counties. This level of program support allows cooperators to leverage additional funding from tribal, local, non-governmental, and federal sources to these knotweed control projects. Developing successful partnerships is key to controlling knotweed over large areas (see *Appendix B*).

For the 2015-2017 biennium, 28 proposals requesting a total of $1,285,595 were submitted. WSDA furnished support to 24 of these projects and one biological control development project, providing a total of $624,000 for agreements and contracts. With the combination of funds available in 2015, approximately 379 solid acres of knotweed were treated with integrated pest management techniques, and project work occurred in 964 river miles for a total of 4,572 landowners assisted.

WSDA will continue to support knotweed control as program funding allows. The funding outlook in 2016 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, and budget for the 2015-2017 biennium and results for calendar year 2015.

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: solid acres of knotweed treated, river miles worked, and the number of landowners assisted. These metrics allow for the comparison of activity level through time.

Analyzing the total acreage surveyed, monitored, or 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 from 2004-2012. 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, negatively 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 natural means 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 floodwaters 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 a knotweed-infested watershed in Pacific County.

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

Figure 3. Watershed in Pacific County infested by Bohemian knotweed.

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 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 stream channels. 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 (Figure 4). 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. Negative impact of knotweed on transportation in King County.

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.

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 5). 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 5. 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 6). 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 6), 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 6. 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 6). 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 7. 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 7), 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 8).

Figure 8. 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 9 shows the location of a knotweed plant being recorded in the Hoh 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 9. Recording the location of a knotweed plant in the Hoh 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 10 shows a crewmember making a targeted herbicide application to knotweed in Clark County. 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 2015. The use of herbicide has been proven to be the most effective treatment method.

Figure 10. Crewmember treating knotweed in Clark County.

Program cooperators use herbicides that are registered in Washington State for use in or near water. WSDA requires that all aquatic 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.

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.

For the 2015-2017 biennium, WSDA prioritized and supported projects that:

- protected 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.

For the 2015-2017 biennium, 28 proposals requesting a total of $1,285,595 were submitted. WSDA furnished support to 24 of these projects and one biological control development project, allocating a total of $624,000 for agreements and contracts. Figure 11 shows the location and scope of the supported projects.

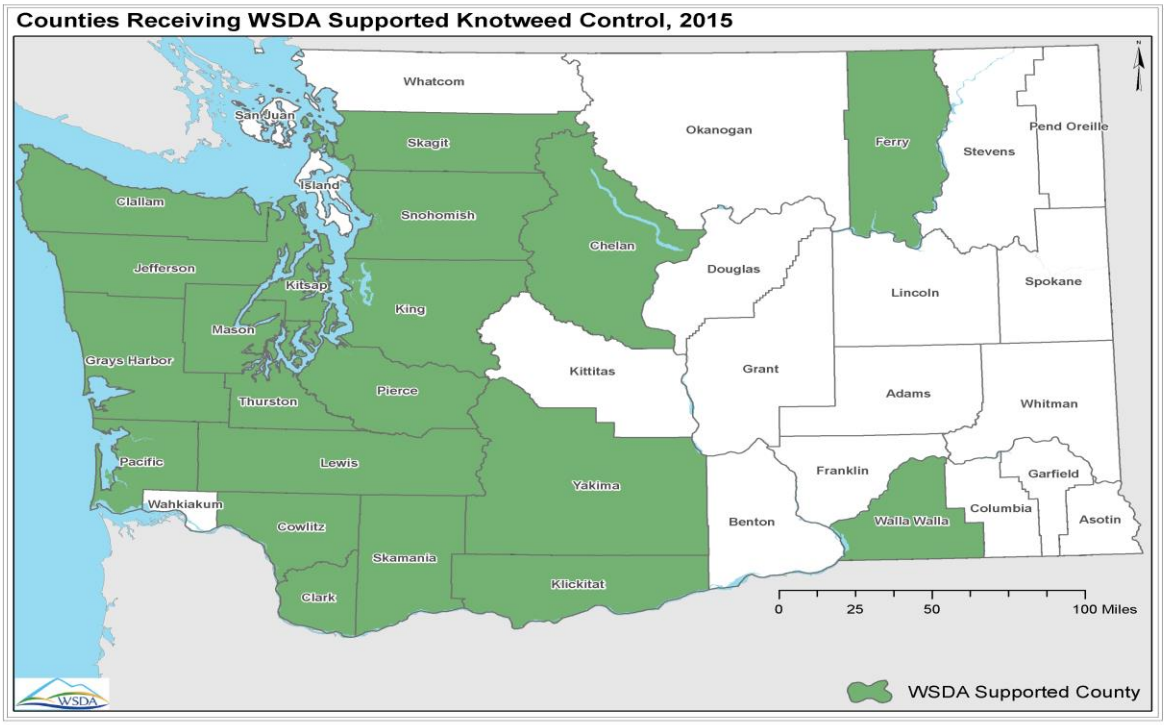

Figure 11. Map depicting the counties where WSDA supports knotweed control projects.

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. In total, WSDA has received around $6.5 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.

For the 2015-2017 biennium, the WSDA knotweed control program budget is $938,154 (Table 1). 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 2015-2017 biennium.

Activity			Expenditure
Purchased services			$624,000
	10,000 Years Institute	$30,000	
	Chelan County	$40,000	
	Clallam/Jefferson County	$25,000	
	Clark County*	$40,000	
	Cowlitz County	$25,000	
	Ferry County	$3,500	
	Grays Harbor Conservation District	$35,000	
	Hood Canal Salmon Enhancement Group	$30,000	
	King Conservation District	$15,000	
	Kooskooskie Commons	$7,500	
	Lewis County	$20,000	
	Mason County	$10,000	
	Oregon State University	$40,000	
	Pacific County	$25,000	
	Pierce Conservation District	$40,000	
	Skagit County	$15,000	
	Skagit Fisheries Enhancement Group	$40,000	
	Skamania/Klickitat County	$40,000	
	Snohomish County	$40,000	
	Thurston County	$25,000	
	Yakima County	$7,000	
	Yakama Nation	$5,000	
	Washington State University	$5,000	
	Unobligated Purchased Services*	$61,000	
Herbicide/Equipment			$60,000
Coordination			$254,154
	Total Biennial Expenditures		**$938,154**
* appropriated for second year of biennium (FY17)			

Results

In addition to a biological control development project with Oregon State University and Washington State University (see *Appendix A*), in 2015 WSDA provided resources to the 10,000 Years Institute, Skagit Fisheries Enhancement Group, Hood Canal Salmon Enhancement Group, Kooskooskie Commons, Grays Harbor Conservation District, Pierce Conservation District, King Conservation District, Yakama Nation, and the noxious weed control boards of Chelan, Clallam, Clark, Cowlitz, Ferry, Jefferson, Klickitat, Lewis, Mason, Pacific, Skagit, Skamania, Snohomish, Thurston and Yakima counties to control knotweed. These cooperators implemented knotweed control projects in watersheds of 20 counties.

WSDA uses three metrics to track the progress of each project. *Solid Acres Treated* is a measure of how many acres a dispersed population would occupy if all knotweed plants were grouped together. *River Miles* and *Landowners Assisted* includes any survey, treatment, and/or 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. Table 2 shows a summary of the work performed by program cooperators in 2015.

Table 2. Results by program cooperator for the 2015 control season.

Organization	**Solid Acres Treated**	**River Miles**	**Landowners Assisted**
10,000 Years Institute	2.86	31	86
Chelan County	1.17	64	837
Clallam/Jefferson County*	6.48	57.68	51
Cowlitz County	57.5	59.66	172
Ferry County	0.83	1	13
Hood Canal Salmon Enhancement Group	1.01	26.93	266
King Conservation District	0.73	2	5
King County	190.65	104	1695
Kooskooskie Commons	11.2	107	32
Lewis County	4.7	39	153
Mason County	4.82	2.08	39
Pacific County	10.25	87	186
Pierce Conservation District	12.9	45	73
Skagit County	4.98	9	26
Skagit Fisheries Enhancement Group	0.8	77.2	44
Skamania/Klickitat County*	0.86	78	85
Snohomish County	58.69	24.7	335
Yakima County/Yakama Nation*	4.67	73	380
Thurston County	3.86	21	94
Total	**378.96**	**909.25**	**4572**
*These groups worked in a shared project area with a combined crew			

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 2016, 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 2016 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.

Appendix A

Annual Progress Report
Knotweed Biological Control Program 2015

Submitted by Fritzi Grevstad, Oregon State University

Introduction

The biological control program for invasive knotweeds (*Fallopia* spp.) is in the final stages of testing and permitting. In November of 2013, the knotweed psyllid (*Aphalara itadori*) from Japan was approved by the Technical Advisory Group for Biological Control of Weeds (TAG) for release into North America. The project is now in the regulatory hands of the USDA Animal and Plant Health Inspection Service (APHIS) and is posed for review by the U.S. Fish and Wildlife for compliance with the National Environmental Policy Act.

Two biotypes of the psyllid are proposed as biocontrol agents. Colonies of both biotypes are maintained in the Oregon State University Quarantine facility in Corvallis, Oregon. The northern biotype from the Island of Hokkaido performs best against giant knotweed and some genotypes of hybrid knotweed. The southern biotype from the Island of Kyushu is most effective against Japanese knotweed and most genotypes of hybrids. Both are needed to control the varied knotweed species complex that is invasive in North America. The objectives proposed in this project represent the final steps to bring the knotweed biocontrol program into the implementation phase.

Progress by Objective for 2015

(1) Maintain colonies of the two biotypes of *Aphalara itadori*

Two separate colonies of the knotweed psyllid (north and south strains) were maintained throughout 2015 in the Oregon State University Quarantine Facility. This required growing a steady supply of potted knotweed plants to feed the psyllids. Both Japanese and giant knotweeds were collected periodically from the field sites in Oregon and were grown in pots in a greenhouse (separate from the quarantine). Fresh healthy plants are moved into the colony cages every two weeks or so and the dead or depleted plants are removed from the quarantine through the autoclave.

(2) Carry out additional tests and other requirements for obtaining release permits

In 2015, additional testing of the knotweed psyllid was completed as requested by APHIS:

Tests on additional varieties of buckwheat. In previous host specificity trials for the knotweed psyllid, only one variety of buckwheat (*Fagopyrum esculentum*) was included. In 2015, testing of 6 additional named varieties of buckwheat was completed at the Oregon State University Quarantine Facility. The methods used were identical to those used in the original host specificity testing (Grevstad et al. 2012). Both the Hokkaido and Kyushu strains of the psyllid

were found to oviposit on buckwheat when they were caged onto the plants. However, the number of eggs was far fewer than on knotweed controls (Fig. 1) and development to adulthood was zero, or near zero, on all buckwheat varieties (Fig. 2). The results of these new tests on buckwheat varieties are in alignment with previous results presented in the TAG petition using an unnamed variety of buckwheat. These results indicate that there is very little risk that *A. itadori* will colonize or cause harm to this economically important plant species.

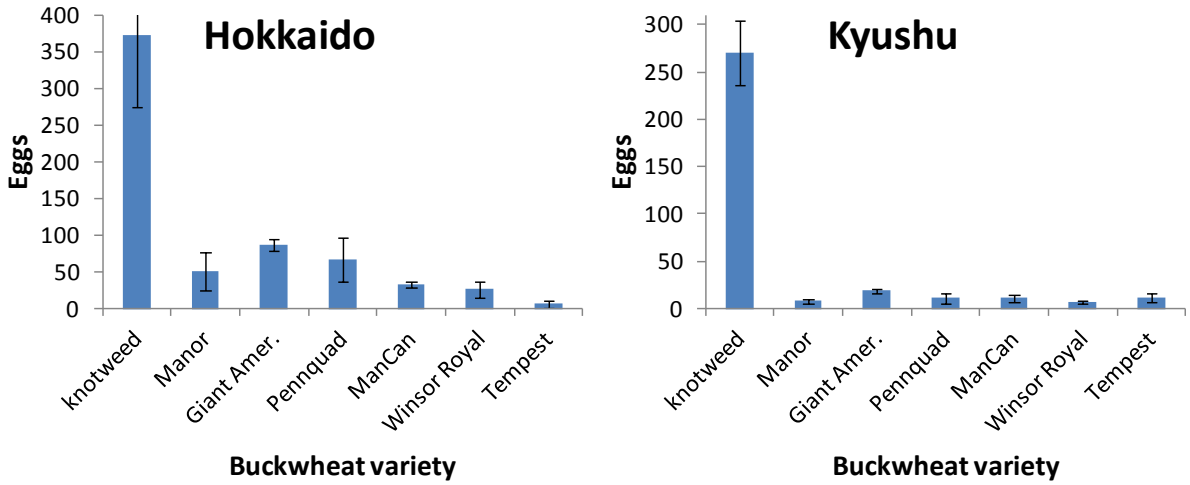

Figure 1. Mean number eggs found on plants following exposure to 5 pairs of *Aphalara itadori* adults for 5 days.

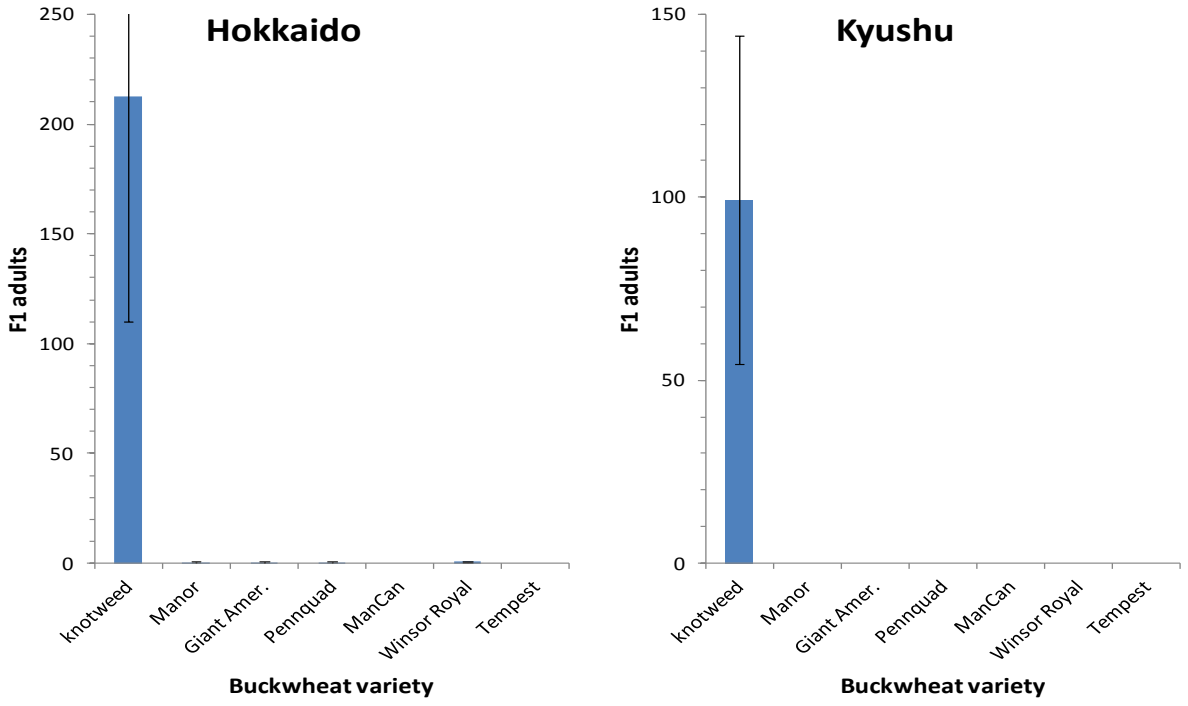

Figure 2. Number of F1 adults developing from eggs laid during the 5 day exposure period.

Assessing potential for impacts to T and E species. In prior testing it was found that *A. itadori* has reduced adult survival and zero or very low development of eggs to adults on non-target plants, populations will not be capable of persisting or building up on any federally listed threatened or endangered plant species. However, previous testing was not designed to detect impacts from adult stages that could occasionally migrate onto the non-target plant species and temporarily feed and/or oviposit before dying or dispersing. With a focus on the surrogates for T and E species, a new set of experiments was carried out to determine if the adult stage alone could have non-target impacts. *A. itadori* adults were put into cages that either had only knotweed plants or only non-target plants. Similar cages were set up with just plants and no psyllids.

Psyllids in cages containing non-target plants (surrogate species) were found to die off much faster than they did in cages with knotweeds (Fig. 3). By day 2, the number of psyllids per plant in the non-target cages was already ~40% fewer than the number per plant in the knotweed cages. Psyllids declined steadily to zero within 2 weeks, for the Eriogonoid plant species, and in just over 3 weeks,for the Polygonoids plants. In contrast, 9.5 psyllids per plant, on average, were found alive at the end of the experiment in the knotweed cages. Psyllids were also much more likely to be found on the cage surface in the non-target cages, reflecting a greater propensity for dispersing away from these plants.

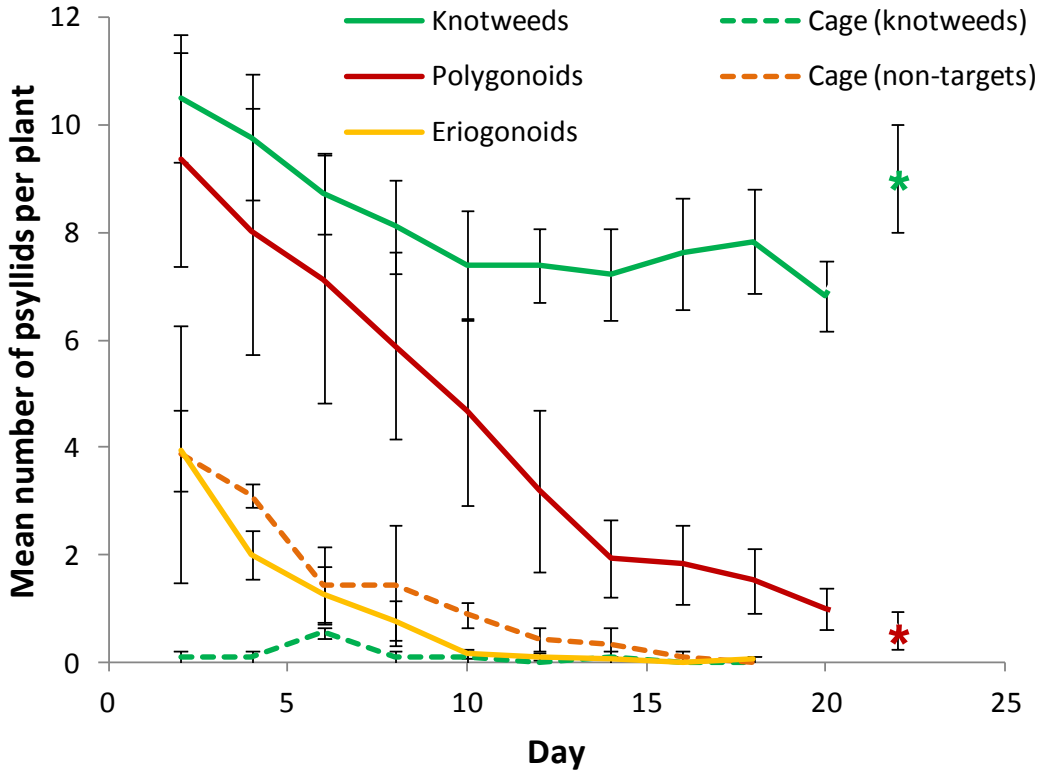

Figure 3. Decline in the number of psyllids per plant in cages with knotweeds vs. cages with non-target Polygonoid species or Eriogonoid species (error bars represent one standard error).Also shown are the number of psyllids found on the cage surfaces for cages with knotweeds or cages with non-target plants. All cages started with 16 psyllids per plant. The asterisks indicate the number removed at the end of experiment (as opposed to estimates from visual counts).

No significant differences in plant growth, final above or below biomass, or total biomass were detected as a result of exposure to adult psyllids for the duration of their lifetime. No reproduction occurred on the non-targets in this experiment. Figure 4 shows the effect size for each measured trait. Here effect size is defined as the difference in the measured values between each pair of psyllid treated and untreated plants. A significant effect was found only in the case of giant knotweed for both below ground and total biomass. There was also a trend toward a negative effect in the case of Japanese knotweed. The effects on knotweed are likely the result of the large number of early stage *A. itadori* nymphs that were developing on the knotweed plants by the time the experiment was terminated. (Much larger impacts were already measured in previous experiments with greater exposure time to developing nymphs.)

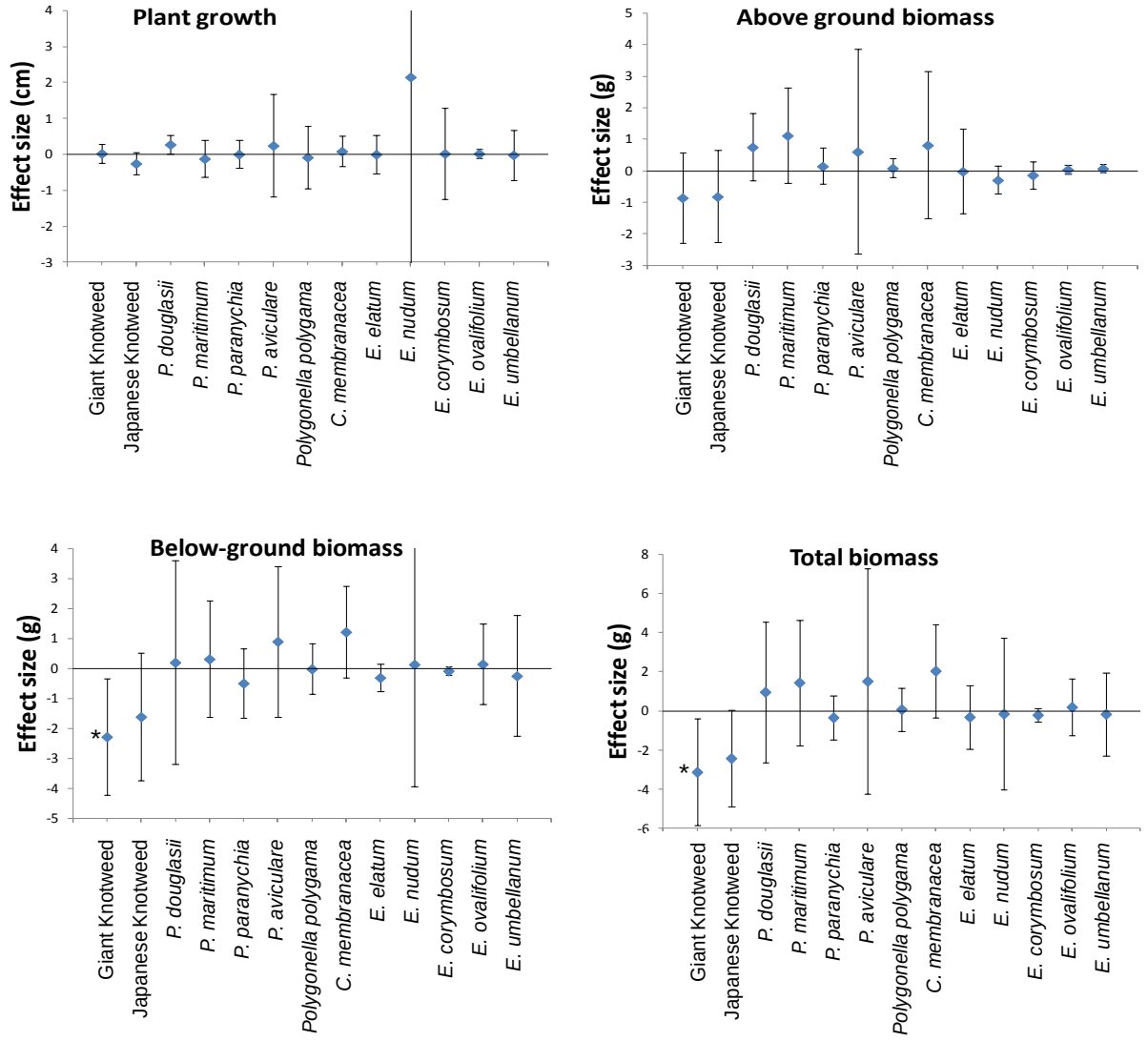

Figure 4. Effect of adult psyllids on tested plant species measured as the difference between paired plants in the treatments with and without psyllids. A value less than zero indicates a potential negative effect of the psyllid.

Error bars represent 95% confidence intervals and a significant effect (* $p<0.05$) is present where the error bars do not overlap with zero.

Overall, these results indicate that the adult stage alone will not impact non-target plants in the unlikely event that they are colonized by adult stages in the field. These results were written up into a report that was provided to APHIS on September 2, 2015.

(3) Preparations for release and monitoring

In April of 2015, several cooperators from OSU, Oregon Department of Agriculture, and Washington State University Extension gathered to plan and test out the knotweed monitoring protocol at a field site along the Lower Nehalem River in Oregon. The protocol was also applied to some of the planned release sites in Washington by J. Andreas (WSU Extension). The final preparations for release, including mass rearing of insects and more extensive pre-release measurement of knotweed population densities will be carried out once permits are issued by USDA-APHIS.

Appendix B

Olympic Knotweed Working Group Leadership Award

Submitted by Cathy Lucero, Clallam County Weed Board Coordinator

Introduction

Partnerships are crucial to successfully prevent and control invasive species. The Olympic Knotweed Working Group (OKWG) is a loose-knit consortium of governments, tribes, non-profits and private landowners that sets the gold standard for cooperation, coordination and achievement.

Started by the Clallam County Noxious Weed Control Board (NWCB) in 2005 with the specific goal to eliminate invasive knotweed in riparian habitat within Clallam County, the OKWG has grown into a four county and beyond Cooperative Weed Management Area that includes multiple invasive plant targets. The Clallam County NWCB, as the de facto group leader, coordinates working group meetings, supports the work of other members, and publishes an annual report summarizing all project activity. The Working Group meetings are a forum for exchanging information and ideas, networking and pooling resources. Meeting discussions help identify future needs, data gaps, obstacles and solutions to problems. Area experts and other professionals present the latest research and data allowing licensed applicators to accrue required education credits with topics that best serve their needs while encouraging a higher professional standard.

Importantly, this OKWG collaboration yields impressive results on the ground. More than twenty entities across the four Peninsula counties, working on 29 different waterways encompassing over 200 miles of river, helped hundreds of landowners with their knotweed infestations in 2015 alone!

Leadership Award

In February of 2015, Cathy Lucero, the Clallam County Weed Board coordinator, traveled to Washington D.C to accept a leadership award from the National Invasive Species Council in recognition of her efforts to unite entities across the Olympic Peninsula battling the spread of invasive plant species, while protecting natural resources and native ecosystems. Department of the Interior Deputy Assistant Secretary Olivia Ferriter and Kevin Shea, administrator for Animal and Plant Health Inspection Services, USDA officiated at the awards ceremony that recognized nine individuals and organizations in three categories; Lifetime achievement, Leadership, Outreach and Education/Volunteerism, with either a terrestrial or aquatic component.

A group photo shows just some of the people involved in the combined OKWG effort. Cathy Lucero is shown (center) holding her leadership award during a break at the 2015 spring Olympic Invasives Working Group meeting hosted at the Jamestown S'Klallam Tribal campus.