Puget Sound Knotweed Forum, November 12, 2013
Brightwater Education & Community Center, Woodinville Snohomish Rd NE, Woodinville, WA
Meeting Notes by Sasha Shaw

Update on Washington State's Knotweed Program
Chad Phillips/Jon Still (State Knotweed Coordinator, WSDA)
WSDA has 22 contracts with groups in Washington to do knotweed projects for the current biennium that goes through next year. They funded about 90% of the applicants, about $600,000 granted out of $1.2 million applied for. Chad explained that the goal of the WSDA knotweed program is as a stabilizing pot of money to make sure groups can retain staff between other grants, stay in operation and as a match to apply for other funding sources. Jon is finishing the contracts, which were a bit delayed this year, and is starting to visit project sites. They are also interested in finding a common ground in control methods since groups are using a wide range of timing, rates, and methods. Chad would like to track different treatment histories to see if there are any patterns and better methods for eradication success. He also explained that they are interested in consolidating funds in key areas instead of funding smaller, disjunct areas. For example, the Snoqualmie Tribe will be working on Kimball Creek, a tributary of the Snoqualmie, which coordinates with the work being done on the upper Snoqualmie.

Chad also explained that contracts will be required to include information on match sources in Appendix A so that WSDA can more accurately track where other funding is coming from and also see the value gained from putting state DNR dollars into knotweed control.

Washington's Water Quality Monitoring Program
Kelly McLain (Pesticide Use Specialist, WSDA)
Kelly described the surface water monitoring program that WSDA runs. They have the most extensive program of its kind in the US. They have 10 years of data covering a broad range of watersheds and pesticides. They are working to encourage EPA to integrate their dataset into the model-based process EPA is using to assess the environmental and endangered species impacts of pesticides.

The program monitors 170 pesticides and degradates (both current and legacy products) in the following watersheds: WRIA8 Thornton Creek, lower Yakima, lower Green/Duwamish Longfellow Creek, Entiat/Wenatchee, Nooksack, Skagit. They collect weekly samples for 26 weeks between March and September.

The main impetus for the program is to study engendered species act impacts but it also allows for pesticide usage tracking, real life exposure assessment (as opposed to modeled values), mitigation assessment (e.g. the change after diazinon was removed from home use), and trend analysis of pesticide usage.

In the urban watershed monitoring, they get herbicide detections in about 75% of their samples, most common type of chemical. Mostly likely this is because they are the most commonly used type of pesticide and also the most water-soluble. They very rarely get a detection that is at toxic levels of any kind for herbicides. This happens more often with insecticides because they are toxic at much lower levels, especially to aquatic organisms. Whenever they find a high detection level, they work to find the source and to educate the users to find ways to reduce the runoff issues.

Also, they often find a combination of pesticides as opposed to just one. In addition, there are many other pollutants and chemicals in the water from other sources like heavy metals (copper especially), oil,

phamaceuticals, fecal coliform, nutrients, etc. There is very little known about the impacts of the "chemical soup" often found in waterways.

They have found that urban pesticide use has changed over time, generally going down for several products including diazinon, diuron, MCPP and triclopyr.

Kelly gave an example of an organically-derived pesticide (pyrethrin from daisies) compared with an analogous synthetic pesticide (permethrin). The organic product is twice as toxic to rainbow trout as the synthetic product, because it was modified in the lab to be less toxic. The point was that organic doesn't necessarily mean less toxic. Also, arsenic and copper are both considered organic and they are highly toxic.

Tips for the applicator to minimize pesticides in surface water were:
1. Use the best available science to determine the lowest effective rate. Don't use a lower rate than is effective because you will likely have to re-apply and possibly use even more herbicide.
2. Avoid/minimize drift – go above and beyond, consider droplet size, weather, etc. For example, use run off mitigation methods like drainage swales, filter strips and timing (rain-free), increase residence time on application site to increase effectiveness and reduce run-off into surface water.
3. Use extra care in sensitive areas (i.e. around water of any sort, even puddles)
4. Keep up to date on where ESA defined sites are located (new species might be protected or new areas designated)
5. Always watch out for human exposure

Kelly explained that they don't monitor for glyphosate because it would double their yearly budget of $500,000/yr (the lab testing method is really expensive). In 2014, they will start monitoring imazapyr and several new insecticides as well. She also mentioned that will start using WSDA staff to do the sample collections but will continue to use the Ecology lab to test samples.

Quantifying Knotweed Control and Natural Regeneration
Frances Lucero (KCNWCP) presenting for Laura Hartema (Ecologist, KC Small Habitat Restoration Program)
The county's Carlin Levee removal project on the Raging River, which began in 2006, included monitoring data before and after levee removal on the native and invasive vegetation cover. This was collected to show that replanting with natives was not necessary because of natural recruitment would result in sufficient native plant cover. The project treated the knotweed on site for one year before construction (injection and spraying small stems) and didn't replant any natives or use any hydroseed or other re-veg. Because there was knotweed above the site on the river, they expected some re-invasion of knotweed as well as some regrowth since they only treated one year. But they also expected native tree recruitment from the surrounding area. After 5 years, there is less than 10% as much knotweed in terms of both cover and area.

The project controlled 8 acres of knotweed with about 568 crew hours total over 5 years, or about 80-120 hrs/year. It cost about $12,000 over 5 years to treat 8 acres, or $1500/acre.

The data was both points and patches. They were able to track new point locations that probably came from introductions from upstream. The initial large patches are now much smaller and more dispersed and lots more small points scattered around the site. Overall cover went down as well as area.

Their natural recruitment study showed that they got lots of natural seeding in of deciduous trees, especially cottonwood, which is plentiful in the area. They have great photo documentation as well showing the natural recruitment. They didn't get many conifers, suggesting that, if conifers are the desired

vegetation, they will need to be planted, but not until after a few years when natural recruitment has had a chance to stabilize the site and after the initial dynamic change has subsided following the levee removal.

The Swimming Pool Trials: Research on Knotweed Rhizomes and Herbicide Translocation
Dr. Tim Miller (Extension Weed Scientist, WSU Mount Vernon Research Station)
Tim Miller reported on knotweed rhizome studies conducted in 2010-2013. Wading pools were used to contain individual knotweed plants that were then treated with a range of treatments, followed by measurements of the rhizomes one day after treatment and three days after treatment. Either glyphosate (Rodeo) or imazapyr (Habitat) were sprayed on the foliage, each at the rate of 2.5 ml per plant (2.5% solution plus 0.25% surfactant). Treatments were done either in late August and mid-October. Rhizomes were harvested either one or three days after treatment and separately counted and measured and then grown out in the greenhouse to measure growth of new foliage from the rhizomes.

In general, results showed that both glyphosate and imazapyr were translocated into the rhizomes within three days after treatment and significantly reduced shoot growth from the rhizomes in the same season. Imazapyr at the rate applied resulted in fewer new shoots and less biomass than glyphosate, especially in the one day after treatment results as well as the late August time of treatment. Glyphosate results were almost as good as imazapyr in the October treatment when rhizomes were collected three days after treatment.

An interesting observation from this study was that seasonal variation in rainfall had a significant impact on knotweed rhizome growth. In 2011, when there was more rainfall, rhizomes grew an average of 11.4 ft total per plant and there were 7.9 rhizomes per plant. In 2013, with less rainfall, the average total length was 4.1 feet and there were an average of 3.6 rhizomes per plant.

The main conclusions from the study were:

1. Seasonal growing conditions impact knotweed rhizome production
2. Fall glyphosate treatment resulted in no new shoot growth off of rhizomes
3. Imazapyr treatment in August or October resulted in no new shoot growth.
4. Three days after treatment is sufficient for translocation of imazapyr and glyphosate into the rhizomes.

Tim also shared some general observations about knotweed treatment. In his experience, glyphosate is most effective when applied at 3% or higher and imazapyr when applied at either ¾% or 1% solution. He has seen symptomatic growth ("chia pet") with both glyphosate and imazapyr, which makes sense since they are both amino acid inhibitors. Also, it is hard to get to zero re-growth with either chemical on older stands of knotweed. On new populations, eradication is easier, like in eastern Washington. Tim hasn't seen any benefit from combining glyphosate and imazapyr, they each work just as well separately. Also, these are two chemicals that have shown best results with knotweed. Tim suggests a strategy of treating for a few years and then monitor and re-treat only when plants are growing back vigorously and asymptomatically again. It may not be possible to eradicate old stands of knotweed. The old rhizomes are not connected by phloem as much so the herbicides are not getting translocated to the "dormant" rhizomes in the soil, that can start to growth new shoots again years later.

The recent genetic surveys of knotweed have shown that there is likely some spread of knotweed by seed along rivers. There don't seem to be a lot of viable plants produced from seed, but perhaps enough to get some new populations upstream of the source populations.

Using Biological Controls for Knotweed
Jennifer Andreas *(Director, WSU Extension Integrated Weed Control Project)*
The research on knotweed resulted in a proposal to use the sap-sucking psyllid. The proposal is currently being studied by TAG and then will be forwarded to USDA-APHIS for approval. It is likely that the approval won't be complete until at least 2015. There don't appear to be any problems with the proposal, it is just a slow bureaucratic process. There are plans to start pre-release monitoring in 2014.

The psyllid doesn't go through metamorphosis. It has 5 nymphal instars and has one generation every 33 days. The researchers believe that we will see 2 generations per year in most of the sites in the northwest. The damage to the plants in the lab can result in plant death, but the prediction is for reduction in knotweed growth as opposed to outright plant death. The leaf gets twisted and curled so there will be less surface area for photosynthesis and overall reduction in energy storage. The insect overwinters in conifer bark (but does no damage to the conifers).

There are two strains of the psyllid. The southern strain (Kyushu) attacks both Japanese and Bohemian knotweed and the northern strain (Hokkaido) attacks only giant knotweed. They are trying to get both strains for North America and also are attempting to cross the strains to see if that will make it attack all three species.

Jennifer said they have picked monitoring sites in Washington and Oregon for when the insects become available, but they are open to getting a better site that is predominantly infested with giant knotweed because the current site is a mix of giant and bohemian.

Regional Project Report Out
Each watershed or sub-watershed group report out to the entire group giving project highlights for the 2013 season

<u>WRIA 3 & 4</u>
Tom from WDFW reported they did less knotweed control in 2013 than 2012 but still did some. Brandy Creek off the Skagit had good control. Also worked on the Pilchuk and in King County. They generally use 2% glyphosate plus 0.5% imazapyr foliar spray.

Also working in this area are the Skagit County Weed Board and the Skagit Fisheries Enhancement Group, who have done considerable work over the years.

<u>WRIA 5</u>
The Snohomish County Weed Board and Sound Salmon Solutions have been working on knotweed on the Stilly for 10 years. The North Fork is heavily infested and the South Fork is cleaner. Generally Sonny has been using glyphosate only but is considering a switch to imazapyr.

<u>WRIA 7</u>
New Zealand Mud Snails have been found in Everett on the lower Snohomish River in 5 to 6 locations. The King County Weed Program worked on knotweed on the Skykomish River including Maloney and Money Creeks and on the South and Middle Forks of the Snoqualmie, making it to within 1½ miles of the confluence this year on the South Fork and all the way to the confluence on the Middle Fork. Mountains to Sound has continued to work on the upper Raging River and King County Rivers treated knotweed extensively on the Raging River on county levees and facilities, including easements on many private properties. The contractor was Applied Ecology and Justin reported that they have really made a difference

on that river. KC Rivers has also treated facilities on the South Fork and Upper Snoqualmie. KC Roads has treated roads extensively in WRIA 7 as well.

WRIA 8

Bridget Lamp from SE Seattle Parks treated knotweed for the first year in her district with stem injection mostly with good results.

KC Roads is fully treating this WRIA, so Anna asked people to notify them of any untreated knotweed patches on county roads in the WRIA and to clearly flag any knotweed they treat themselves so Roads will know it has been done.

KC Parks has worked on knotweed from Dorre Don to Renton on Parks lands along the Cedar. SPU controls knotweed in the Cedar River Watershed and just announced that the Ordinance was passed to allow them to use imazapyr on knotweed in the watershed for another three years. They have about 15 acres of knotweed. The King County Weed Program is treating all the knotweed from mile 22 to about mile 10 on the river. Forterra treats knotweed downstream from that to about the Renton City Limits, where knotweed control is not required under the state noxious weed law. There are lots of private property owners in this area. This was the first year knotweed control was regulated on the Cedar. The noxious weed program issued 3 NOV's to require landowners to allow control of about 12 acres of knotweed.

Mountains to Sound continued control on Issaquah Creek and Mark Cross from the City of Bellevue continued work on Sunset Creek with KC Solid Waste.

Snohomish County began working on Little Beak Creek with a grant to assess knotweed and other forest health issues. This is an overall riparian forest health project and includes landowner education. They distributed a survey to landowners and received a 13% return rate. They also did a road right-of-way and road-crossing stream survey and are developing a map with all the data to determine the extent and distribution of knotweed on the creek. They are planning on doing BMP training to focus on teaching landowners not to spread it and to contain it until treatment is possible. The project developed a great website and outreach materials for landowners are more than happy to share.

WRIA 9

The King County Weed Program continued work on the Green River and Soos Creek. They have been working in this area since 2004. The City of Kent is treating wetland sites and trying to work with Kent Parks to begin treating on Parks lands as well. Elissa from King County has a project with Tukwila on the Duwamish. King County Rivers is treating knotweed from Highway 516 downstream to Tukwila on facilities. King County Roads is treating county roads throughout WRIA 9. They are having some issues with communicating with cities, as in the other WRIA's as well.

WRIA 10

King County is doing some limited work from the Reservation to Pacific, but there isn't much knotweed on county facilities. WSDA worked on a knotweed survey on the Puyallup and found it was much more heavily infested than they had thought, past the early detection point for sure. Chad asked that if anyone finds knotweed above Mud Mountain Dam, they should notify him because that would be a high priority to deal with.

WRIA 11

The project on the Nisqually has made great progress and they are pretty much in maintenance for the whole river now. About 11 ½ miles and 150 acres are in treatment.