



Evan Sivesind treats four knotweed stems-Clallam River 2013

2013 Olympic Knotweed Working Group

**Prepared by
Clallam County Noxious Weed Control Board**



Phillip Blackcrow stands before a forest of knotweed-Clallam River 2007

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CONTENTS

EXECUTIVE SUMMARY.....	1
PROJECT DESCRIPTION	7
Project Goal	7
Project Overview	7
2013 Overview	7
2013 PROJECT ACTIVITY SUMMARY	8
2013 PROJECT PROCEDURES	11
OBSERVATIONS AND CONCLUSIONS	13
RECCOMENDATIONS	13
PARTICIPATING GROUPS	15
FUNDING	15
PROJECT ACTIVITIES BY WATERSHED	16
CLALLAM COUNTY	16
Quillayute River System	16
Forks	19
Big River and Hoko-Ozette Road-	20
Sekiu River	20
Hoko River	22
Highway 112, Clallam Bay and Sekiu	22
Clallam River	23
Pysht River.....	25
Deep Creek	25
Salt Creek	25
Elwha River	28
Port Angeles Area Streams.....	29
Dungeness River and surrounding area	32
EAST JEFFERSON COUNTY	34
Port Townsend Area:	34
Quilcene Area:.....	35
Big Quilcene River	35
Tarboo Creek	37
Little Quilcene River	37
Dosewallips/Duckabush.	38
Spencer Creek.....	38
Dosewallips River	39
Duckabush River	40
MASON COUNTY	41
Tahuya River	41
Union River	42
Dewatto River	42
Skokomish River	43
Other Mason County Sites.....	43
WEST JEFFERSON COUNTY AND GRAYS HARBOR COUNTY	44
Quinault River, Lake Quinault, Queets and Clearwater Rivers	44
Hoh River	47
Appendix I: Herbicide Use	49
Appendix II: Clallam/Jefferson NWCB landowner agreements	50
Appendix III: Contact Information	51
Appendix IV OKWG Exercise.....	52
Appendix V New Treatment Form.....	58
Appendix VI Template for Reporting Knotweed Work.....	60

EXECUTIVE SUMMARY

Project Goal

The goal of this project is to protect the natural resources, ecosystem functions and land values in Clallam and Jefferson Counties from the impacts of invasive knotweeds.

Project Overview

The Olympic Knotweed Working Group (OKWG) is a loose-knit consortium of governments, tribes, non-profits and private landowners, working together since 2005 to eliminate invasive knotweed in riparian habitat. The group meets twice a year for the purpose of sharing information and strategically planning for knotweed control across jurisdictional boundaries. Clallam County Noxious Weed Control Board (CCNWCB), as the *de facto* group leader, coordinates the meetings and supports the work of other group members by acquiring Landowner Agreements, distributing herbicide, coordinating projects and in some cases supplying an aquatic applicator. CCNWCB also attempts to "fill in the gaps" by controlling knotweed in areas not otherwise covered and educates the community about knotweed impacts and control. Most of our partners have sought and received independent funding and knotweed control has expanded in all four Peninsula Counties.

2013 Overview

Many groups are now involved in knotweed control on the Olympic Peninsula. Details of work by all groups can be found in the body of this report. Clallam and Jefferson County Weed Boards continued to coordinate and support the work of other entities in their own counties.

In 2013 the Washington Department of Natural Resources funded a Puget Sound Corps (PSC) in each of Clallam, Jefferson and Grays Harbor Counties, primarily for riparian weed control, including knotweed. Having crews able to treat other invasives as they found them was a great benefit, but the crews were inexperienced. If they are available again next year, they will need more training and oversight by sponsors.

In Clallam County we decided to forgo treatments on the Big and Hoko Rivers per our risk assessment matrix which was developed last year to assist with prioritizing resource allocations. We focused on the Sekiu and Clallam Rivers, continuing treatments and assessing the effectiveness of last year's exclusive use of imazapyr. We solicited agreements and started surveys and treatments on Salt, Nordstrom and Deep Creeks. We again worked on Port Angeles area streams and did some treatments on and near the Dungeness River. The Quileute Tribe continued work on the Quillayute River system, including the lower Sol Duc.

In Jefferson County the East Jefferson WCC crew, funded by the Hood Canal Salmon Enhancement Group (HCSEG), re-treated the Big Quilcene and Dosewallips Rivers. The Weed Board or PSC treated small sites.

In Mason County the East Jefferson WCC and/or HCSEG worked on the Union, Dewatto and Tahuya Rivers. The Mason County NWCB and Mason PSC controlled knotweed on many small sites and the Mason Conservation District once again worked on the badly-infested Skokomish River.

In West Jefferson and Grays Harbor County, the 10,000 Years Institute surveyed and treated the Hoh River and the Quinault Indian Nation continued treatment on the Quinault, Queets and Clearwater Rivers, respectively. Grays Harbor NWCB assisted as funding allowed.

2013 Accomplishments

CCNWCB and JCNWCB

- Managed **354 existing Landowner Agreements**, solicited and obtained **32 new Landowner Agreements** (covering **759** parcels in all—see Appendix II)
- Conducted detailed surveys and treatment of an estimated **14 miles of rivers (46 acres)**
- Worked with **27** other OKWG partners, representing a mix of federal, state, tribal and local entities
- **Other OKWG partners** reported treatments or work on an additional **124 miles** of streams.
- Conducted an 3 day-intensive workshop for 4 crews (PSC and WCC)
- Coordinated a spring and a fall meeting of the OKWG.
- Acquired an NPDES permit for aquatic use, and completed associated reporting for our work only.
- Overall, OKWG members reported using a total of approximately **101 gallons** of herbicide, a substantial **reduction from 2012's total of 231 gallons**. (See Appendix I for a table of herbicide use)

Comment [Im1]: Need river miles

Conclusions and Recommendations

Where knotweed treatments have occurred, populations are greatly reduced. More research is needed to answer questions about how best to handle small, symptomatic re-growth that is still capable of generating new knotweed colonies. High crew turn-over or inexperience is a difficult obstacle to surmount as programs look to achieve greater efficiency. As knotweed projects progress, the working group is increasingly interested in methods of coping with a broader range of invasives species encroaching into areas where knotweed has been eliminated. We encourage integrating an early intervention policy into all restoration projects to address any aggressive non-native plant, especially those are not well established. We gratefully acknowledge the support and help from WSDA which makes this work possible.

OVERVIEW MAP OF THE OLYMPIC PENINSULA



Green dots indicate 2013 knotweed treatments. Brown polygons indicate the Quinault Indian Nation project area.

OVERVIEW MAP OF WEST CLALLAM COUNTY



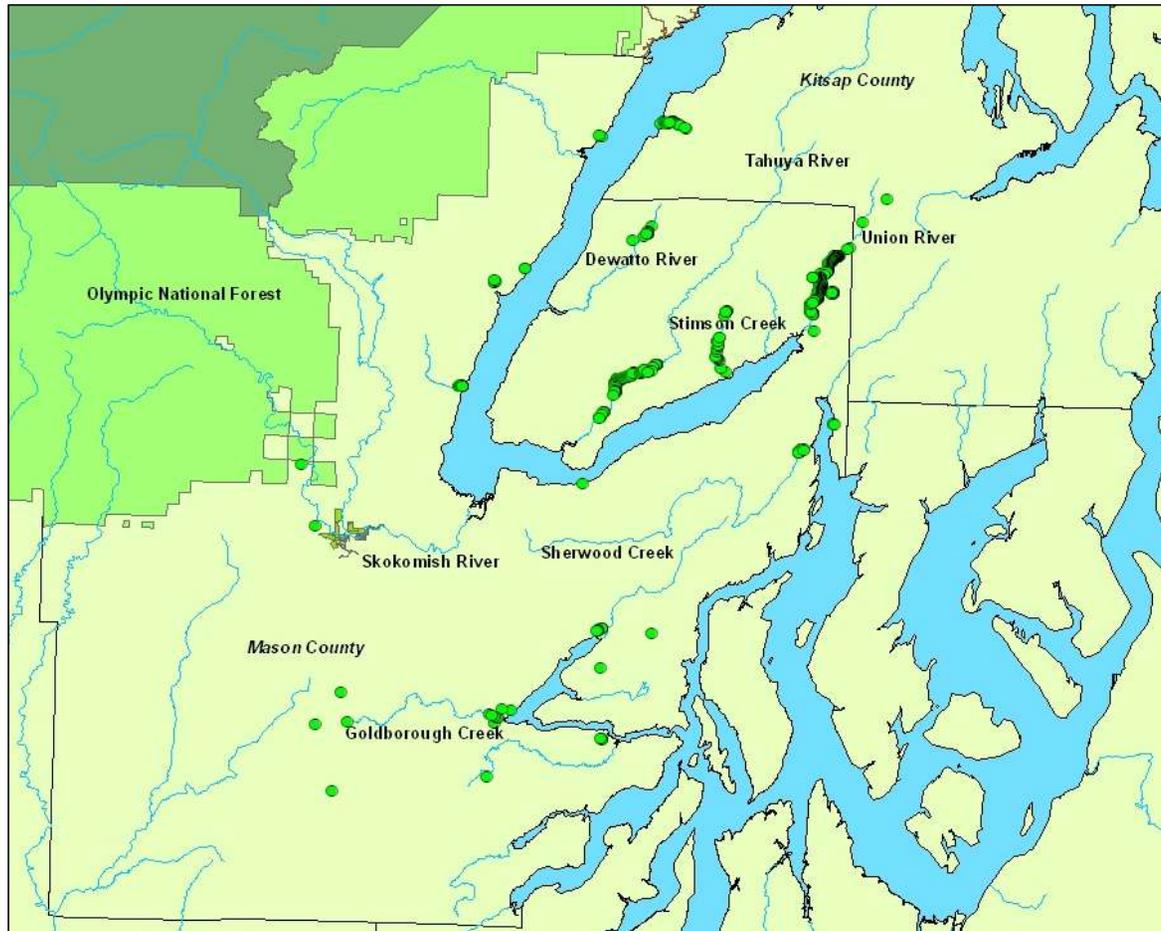
Green dots indicate 2013 knotweed treatments.

OVERVIEW MAP OF EAST CLALLAM COUNTY AND EAST JEFFERSON COUNTY



Green dots indicate 2013 knotweed treatments.

OVERVIEW MAP OF MASON COUNTY



Green dots indicate 2013 knotweed treatments.

OVERVIEW MAP OF GRAYS HARBOR COUNTY AND WEST JEFFERSON COUNTY



Green dots indicate 2013 knotweed or other weed treatments. Brown polygons indicate the Quinault Indian Nation project area.

PROJECT DESCRIPTION

Project Goal

The goal of this project is to protect the natural resources, ecosystem functions and land values in Clallam and Jefferson Counties and the rest of the Olympic Peninsula from the negative impacts of invasive knotweed. The project focused on riparian areas; rivers were chosen for their high significance to fish and wildlife or their natural resource value to public or tribal entities.

Project Overview

The Olympic Knotweed Working Group (OKWG) is a loose-knit consortium of governments, tribes, non-profits and private landowners, all working to eliminate invasive knotweed from riparian areas in Clallam and Jefferson Counties and the rest of the Olympic Peninsula. The group has met twice a year since 2005 for the purpose of sharing information, creating a strategic plan, and working collaboratively to control knotweed across jurisdictional boundaries. Clallam County Noxious Weed Control Board (CCNWCB), as the *de facto* group leader, coordinates the meetings and supports the work of other group members. We also attempt to “fill in the gaps” by controlling knotweed in areas not otherwise covered. Most of our partners have sought and received independent grant funding and knotweed control is taking place in all four Peninsula Counties.

2013 Overview

Many groups are now involved in knotweed control on the Olympic Peninsula. (See the 2013 Project Activity Summary for details of work by all groups.) Clallam and Jefferson County Weed Boards continued to coordinate and support the work of other entities in their own counties. Three Puget Sound Corps, (one each in Clallam, Jefferson and Mason Counties), funded by the Washington Department of Natural Resources Aquatic Lands Management, greatly expanded opportunities to cover additional waterways as well as some upland sites. Collaboration between all four counties continues to be excellent, with knotweed detection and control expanding in both Grays Harbor and Mason Counties.

Clallam County—because knotweed populations on both the Big and Hoko Rivers had been greatly reduced, it was decided to skip treatments on those two rivers in 2013. Treatment did take place on the Sekiu and Clallam Rivers—the two other west end rivers where knotweed control is now mandatory. We began soliciting landowner agreements on Deep Creek, Salt Creek and Nordstrom Creek—all in the Lower Elwha Klallam Tribe’s U and A, and of significance to the Tribe. Salt Creek is an especially densely populated area, with over 100 separate parcels—we had only about a 25% return of landowner agreements. The PSC crew surveyed and treated where possible. Otherwise, CCNWCB’s work focused on Port Angeles area streams and sites on or near the Dungeness River. The Quileute Tribe continued work on the Quillayute River system, including the lower Sol Duc.

Jefferson County—Weed board staff and/or the PSC crews treated on Spencer Creek, Tarboo Creek and a number of small sites throughout the county. We succeeded in getting permission from the Port of Port Townsend to treat a long-established stand at the Marina in Quilcene. The East Jefferson WCC crew, funded by the Hood Canal Salmon Enhancement Group (HCSEG) re-treated the Big Quilcene and Dosewallips Rivers. For the third year, Jefferson County Noxious Weed Control Board (JCNWCB) received funding from the Quinault Indian Nation to acquire landowner permissions for knotweed survey and control in the Queets-Clearwater watershed, and known sites in the Queets-Clearwater watershed were treated. 10,000 Years Institute continued work on the Hoh River.

Mason County—the MCNWCB and the Mason PSC treated knotweed on Stimson Creek, Sherwood Creek and Goldborough Creek and other small sites throughout the county. The PSC also treated knotweed on the Davis Farm on the Union River. Mason Conservation District continued to work on the badly-infested Skokomish River and the East Jefferson WCC crew and/or HCSEG once again worked on the Union, Tahuya and Dewatto Rivers.

Grays Harbor County—a separate Cooperative weed management area (CWMA) has been formed in Grays Harbor to treat knotweed in the Lake Quinault, Queets-Clearwater area. (See the Overview Map for the project area). The Quinault Indian Nation (QIN) has been especially active in surveying and treating. Cascade Land Conservancy and Grays Harbor Weed Board have also participated. In 2013 the QIN did a first-year treatment of the Lower Quinault floodplain. Dense stands of knotweed on over 43 acres were treated.

In all four counties the North Cascades EPMT with the National Park Service treated knotweed within their jurisdiction—on the Quileute River, Big River, Lake Crescent, Ennis Creek and the Quinault River.

2013 PROJECT ACTIVITY SUMMARY

Landowner Contacts and Agreements (within Jefferson and Clallam Counties):

- Managed **354 existing Landowner Agreements**. [Clallam County Noxious Weed Control Board (CCNWCB) and Jefferson County Noxious Weed Control Board (JCNWCB)]
- Identified and requested permission from approximately **93 landowners** on Deep, Salt and Nordstrom Creeks. 15 new agreements were returned, but many other parcels in those areas are owned by entities with whom we had an existing agreement. Existing agreements were modified to accommodate additional parcels. [CCNWCB]
- Obtained **32 new Landowner Agreements** [CCNWCB and JCNWCB].
- Many agreements covered multiple parcels. We are currently managing agreements on **759 parcels** [CCNWCB and JCNWCB]
- Each landowner either received a letter or a phone call prior to this season's treatments.

Survey and Treatment:

This list summarizes work accomplished in 2013 and reported to CCNWCB by members of the Olympic Knotweed Working Group (OKWG). It may not be a comprehensive list of activities of all OKWG partners. It is ordered geographically starting in south-west Clallam County with the Quillayute River system and, working clockwise around the Peninsula, ending in the Hoh River system. The Project Activities by Watershed is similarly ordered.

- Re-treated **7 miles (75 acres)** on the Dickey River [Quileute Nation].
- Re-treated **10.7 miles (64 acres)** on the Calawah River [Quileute Nation].
- Re-treated **12 miles (131 acres)** on the Bogachiel River [Quileute Nation].
- Re-treated **25.6 miles (155 acres)** on the Sol Duc River [Quileute Nation]
- Re-treated **0.8 miles (3 acres)** on the Sekiu River [CCNWCB]
- Re-treated **2 parcels (2 acres)** of shoreline on Highway 112 [CCNWCB].
- Re-treated **3 miles (10 acres)** on the Clallam River [CCNWCB].
- Surveyed **0.5 miles (3 acres)** on the Pysht River [CCNWCB].
- Treated approx. **1 mile (2 acres)** on Deep Creek [CCNWCB].
- Treated approx. **0.5 miles (0.5 acre)** on Salt Creek [CCNWCB].
- Re-treated several sites on the Elwha River [Lower Elwha Klallam Tribe]
- Re-treated approx. **4 miles (10 acres)** on Valley, Peabody, Lees, East Fork Lees and Bagley Creeks [CCNWCB].
- Re-treated knotweed on the Big Quilcene River, about **4 miles (56 acres)** [HCSEG].
- Retreated less than **1 acre** on the Little Quilcene River [HCSEG].
- Surveyed **8 miles** and treated **10 acres** on the Dosewallips River [HCSEG, CCNWB].
- Re-treated small sites in Jefferson County, including **3.5 miles (14.5 acres)** on Spencer Creek and **0.5 miles (0.5 acres)** on Tarboo Creek, small sites on the Duckabush River and Chimacum Creek, and the Kah Tai Lagoon Park in Port Townsend [JCNWCB and CCNWCB].
- Re-treated knotweed on the Union, Dewatto River and Tahuya Rivers [HCSEG and MCNWB].
- Surveyed and treated extensive knotweed infestation on **9.7 miles (42.3 acres)** of the Skokomish River. [Mason Conservation District].
- Surveyed and/or treated on the Quinault, Queets and Clearwater Rivers [Quinault Indian Nation]. **Project area encompasses 227,774 acres.**
- Monitored and re-treated **37 miles (2,500 acres)** on the Hoh River [10,000 Years Institute and Hoh River Trust].
- Treated **1.7 acres** of knotweed within Olympic National Park boundary on the Quileute River, Big River, Lake Crescent, Ennis Creek and the Quinault River. [North Cascades EPMT with NPS]
- In Clallam and Jefferson Counties—helped at least **160 private landowners** by monitoring, treating or re-treating knotweed [CCNWCB, JCNWCB, HCSEG]
- In Clallam and Jefferson Counties—treated land owned by **10 public entities** including US Forest Service, **3 state agencies** (WA State Parks, WA Department of Natural Resources and WA Department of Fish and Wildlife), **3 cities** (Port Angeles, Sequim and Port Townsend), the Port of Port Townsend and **2 counties** [CCNWCB and JCNWCB].
- Olympic Knotweed Working Group (OKWG) members reported a total of approximately **101.2 gallons** of herbicide. (See Appendix I for a table of herbicide use).

Data Management and Documentation:

- Maintained the **Knotweed Projects Database for Clallam and Jefferson Counties' Noxious Weed Control Boards**. Continued to use a contractor to troubleshoot the database and to train staff in its use.
- Clallam and Jefferson Counties' NWCBs separately applied for NPDES permitting and did the necessary reporting. The 10,000 Years Institute was covered under Jefferson County NWCB.

Outreach and Training

- We did not conduct knotweed specific workshops in 2013 as most landowners who were interested had already attended previous workshops. Both Clallam and Jefferson NWCBs loaned equipment and supplies to previous attendees who were treating their own knotweed infestations away from water.
- For the first time, Clallam, Jefferson and Mason Counties all had the use of a Puget Sound Corps (PSC), funded by the Washington Department of Natural Resources. The PSC were available to assist with invasive plant control in riparian areas. Unlike the "knotweed only" focus of our crews who were funded with knotweed dollars, this crew was able to use an all invasive approach, especially for early or pioneer infestations of additional non-native plants known to be problematic. Because most of these crews were inexperienced, we gave them an intensive 3-day training which was organized by the county coordinators with the help of volunteers and a grant from the Washington State Department of Agriculture (WSDA). Training topics included: impact of invasive species on wildlife and ecosystem function, integrated pest management strategies, pesticide laws and safety, survey and documentation methods, field safety, public interaction, Washington State water quality monitoring, and the role of biocontrols in pest management. Each day included a morning classroom session followed by a session of outdoor practical application in the afternoon. For schedules of the 3-day training, contact CCNWCB.



Left : Cathy Lucero teaches tank mixing. Right: Patricia Grover teaches stem injection



Left : Puget Sound Corps works on a herbicide label reading exercise. Label reading is an important element of proper herbicide handling and application.. Right: Jill Silver teaches pulling and cut stump application for Scotch broom

- We continued to coordinate a spring and fall meeting of the Olympic Knotweed Working Group. These meetings are a forum for exchanging information and ideas, networking and pooling resources. They

also help us identify future needs, data gaps, obstacles and solutions to problems. Meetings have expanded, attracting a more diverse audience every year. As a function of this group interaction, we have identified the need to control additional invasive plant species of special concern. Therefore, we are increasing efforts to expand cooperation to include additional species, depending on the need of members.

- The spring meeting, held at the Mason County Public Works building, was also the final day of training for the PSC crews. The second, fall meeting, was held in Port Townsend, located in Jefferson County 70-100 attendees at each meeting included representatives from 6 Native American Tribes, 6 Federal agencies, 6 State agencies, 1 State University, 7 counties, and 10 non-profits.
- At the fall meeting we undertook an exercise to identify and compile the experiences of different groups regarding their knotweed treatments, herbicides used and perceived efficacy of different herbicides and herbicide combinations. It was **NOT** intended to be a substitute for scientifically deduced information. The exercise was intended to stimulate discussion of best management practices and land owner interactions, and to explicitly identify data gaps requiring actual scientific research. It was an opportunity for practitioners to discuss their decision making process for choosing one treatment over another. It was also a means of ensuring that available information was uniformly dispersed among attendees. Finally, it was means of eliciting interesting innovations that crews might have developed that could be of use to others. A summary will be supplied to WSDA for incorporation into their website containing the State's BMPs for knotweed. For results of this exercise see Appendix IV.



Attendees at the Fall OKWG meeting learn from Kevin Aitken about the possible ESA listing of the Oregon Spotted Frog and from Tim Miller about the "swimming pool studies" to determine how well herbicides translocate in knotweed rhizomes.

- Staff updated **Clallam County Weed Control Board's website**, including several pages on knotweed—the minutes of meetings of the Olympic Knotweed Working Group and many of the presentations from those meetings.
- CCNWCB and JCNWCB staff highlighted our knotweed program at **29 educational events**.

2013 PROJECT PROCEDURES

1. Surveys and Monitoring

CCNWCBC and JCNWCBC surveys, monitoring and treatments took place, on foot from August 20th through October 8th. Other entities may have had a different season.

2. Project Teams

Teams were typically comprised of 2-5 people and always included a licensed aquatic applicator.

- **The Quileute Nation crew**, led by Garrett Rasmussen (licensed aquatic applicator), worked on the Bogachiel, Calawah, Dickey and Sol Duc Rivers.
- **The CCNWCBC crew**, consisting of Stephen Marsh (licensed aquatic applicator) and Allyce Miller worked on the Sekiu and Clallam Rivers, Lees and East Fork Lees Creeks, and Ennis Creek.
- **The Clallam Puget Sound Corps (PSC)**, led by Kate Bradshaw (licensed aquatic applicator), worked on Salt, Deep, Valley, Peabody Creek and the Dungeness River and surrounding areas.
- A combined **CCNWCBC and JCNWCBC crew** (Eve Dixon and Jessica Coyle, both licensed aquatic applicators), treated small sites in Jefferson County, on Chimacum Creek, Spencer Creek, Quilcene Bay and near the Duckabush River.
- **The East Jefferson WCC crew**, led by Owen French (licensed aquatic applicator), did extensive treatments on the Big and Little Quilcene, Dosewallips, Union and Dewatto Rivers in collaboration with the Hood Canal Salmon Enhancement Group (HCSEG).
- **The Jefferson PSC**, led by Elijah Roulst, with Kia Abby (licensed aquatic applicator), treated on Spencer Creek and at the marina in Quilcene.
- **The Hood Canal Salmon Enhancement Group crew**, led by Michelle Myers (licensed aquatic applicator), treated on the Tahuya River.
- **Mason Conservation District** treated knotweed on the Skokomish River.
- **The Mason PSC**, led by Amber Palmeri-Miles (licensed aquatic applicator), treated on the Union River and on Finch, Stimson and Sherwood Creeks
- **Mason County NWCB** treated terrestrial knotweed infestations.
- **Total Vegetation Management and Britland Company crews**, (led by Bonnie Eyestone, Quinault Indian Nation staff, licensed aquatic applicator), worked on the Quinault River.
- **The Pacific Salmon Coalition crew**, led by Jill Silver (licensed aquatic applicator) worked on the Queets, Clearwater and Hoh Rivers.
- **The North Cascades Exotic Plant Management Team with the National Park Service**, led by Dan Lucero (licensed aquatic applicator) worked on knotweed populations within the Olympic National Park, on the Quillayute and Big Rivers, Lake Crescent, Ennis Creek and the Quinault River.

3. Invasive Species Surveyed or Treated

Bohemian knotweed (*Polygonum bohemicum*) was the dominant knotweed species of concern. The next most common species was giant knotweed (*Polygonum sachalinense*). Only a few sites contained Japanese knotweed (*Polygonum cuspidatum*). No Himalayan knotweed was reported this year in Clallam or Jefferson Counties.

4. Data Collection & Equipment

Electronic data is collected differently depending on funding and technical capacity of each group. Some data collection systems are described below.

- A recreational grade GPS unit (Garmin 78 CX loaded with Hunt GPS maps) with track log was used to keep track of null surveys (sites that crew visited but found no knotweed), and was increasingly used to mark sites where knotweed was found and treated.
- A Trimble GEO XT instrument, using the "Data Dictionary" developed by the Olympic Knotweed Working Group (OKWG) and using *Pathfinder* software for post-processing. A copy is available.
 - The Data Dictionary contains the following required fields: Agency Name, Collector, GIS Projection Reference, Site ID, Species of Knotweed, Cluster Type, Average Stem Height, Stem Count, Phenology, Site Type and Action.
 - The following fields are optional: Herbicide, Surfactant, Treatment, Ownership, Canopy, Substrate, Plant Erosion Potential, Site Erosion Potential, Area, Unit, and Comments. Date, and Time fields autofilled.
- We converted waypoints collected during surveys into shapefiles, and added them as layers to the county parcel map.

- We instructed the crews to turn on the track logs on their devices. Office staff downloaded the track logs and were able to determine where crew had been and had NOT found knotweed—a “null survey”.
- We track herbicide use in watersheds from year to year. In previous years, herbicide use has been used as a proxy for change in biomass to help measure treatment efficacy. Due to changes in treatment, this is no longer as directly comparable in many cases. This method of measuring effectiveness is used only when we have the necessary treatment details to make a comparison. Herbicide quantity and active ingredient, when available, is included in the section “Project Activities by Watershed”. The amount used in each watershed is summarized in Appendix II.
- All survey and treatment data was added to the Knotweed Database. This database facilitates tracking of landowner contacts, agreement expiration, treatments, site status and monitoring. In 2013, treatment of additional invasive plants was included as a separate infestation record.

5. Landowner Contacts and Agreement Management

- We determined rivers of concern where knotweed was known or suspected to occur and extracted corresponding landowner information from GIS layers.
- We solicited Landowner Agreements by phone, letter, face-to-face contact or email.
- We used the standard Landowner Permission forms produced by WSDA. CCNWCB staff explained to landowners that they could cancel the agreement at any time.
- We monitored expiration dates and solicited new agreements as needed.
- We monitored property ownership, and solicited new agreements when ownership changed.
- We contacted landowners before entering their property for survey or treatment.
- We entered all landowner data into the new Knotweed Database. This included contact information, site information and date the Agreement was signed.
- Staff acquired Landowner Agreements from February through October.

6. Permits

- CCNWCB and JCNWCB obtained NPDES permits from WSDA for water ways of concern.
- Crews followed all posting and notification requirements as outlined in the permit.
- Total amounts of herbicide used by CCNWCB and JCNWCB crews were submitted on-line to WSDA at the end of the treatment season.

7. Treatment, Equipment, and Rate

Foliar—may be used on any site; other options for specific uses are listed below.

Equipment- low pressure, Solo Backpack Sprayers with a 4 gallon capacity

Application Rate-variable,

- Up to 1% of aquatic imazapyr solution, 1% surfactant, marker dye
- Up to 6% solution of aquatic glyphosate, 1% surfactant, marker dye
- Combination of up to 4% solution aquatic glyphosate and 1%imazapyr, 1% surfactant, marker dye

Application method- *Spray to wet.*

Injection—uses may include small sites, during inclement weather or where knotweed is mixed with desirable species, or other sites where high selectivity is critical. Canes must be at least ½ in diameter.

Equipment-JK Injection Systems injection guns.

Application rate- Between 3 and 5 ml of a 100% solution of a glyphosate product per cane (no surfactants or dyes). Glyphosate formulations must be labeled for this method.

Application method- Knotweed canes exceeding ½ inch in diameter are injected with herbicide in a lower internode using a short injection needle. If pressure is encountered, an additional hole is punched near the top of the internode to allow air to escape as herbicide is put in. Treated canes are marked with paint to prevent retreatment.

Wipe—for small sprouts or highly selective treatments (no crew reported using this method in 2013)

Equipment-foam paint brush. .

Rate -33% glyphosate solution with 10% surfactant, by volume, (or as allowed by label)

Application method Wipe herbicide onto the surface of leaves and stems. Or, cut each cane to height of three feet, wipe all sides of stem.

8. Records

- Crews filled out a WSDA approved Pesticide Application Record for each herbicide treatment. We retain original copies of Pesticide Application Records, as required by law.

OBSERVATIONS AND CONCLUSIONS

- We used a mix of 1% imazapyr/1% Competitor for all treatments except where crews came upon knotweed when doing non-knotweed specific control work.
- We monitored last year's treatment effectiveness with 1% imazapyr on two rivers with low level infestations. Both appeared to be very successful-we continue to see a reasonable decline in overall biomass. We will continue to use this prescription for re-treatments in the future.
- We initially used DNR funded crews (PSCs) that could treat not only knotweed, but also small, pioneer infestation of additional invasive plants, which we saw as an effective strategy to combat non-natives invading areas cleared of knotweed. However, they were not as thorough with surveys or treatments, nor as skilled in working with landowners as we hoped. We had to divert the weed board's crew to complete treatment of most sites we felt obligated to finish this season. This was disappointing and frustrating for all. There were quite a few lessons learned, and we have lots of ideas for better managing these crews should they become available in the future.
- Herbicide expended on re-treatments continues to decline. Because rates and formulations are changing as projects mature, herbicide usage from year to year is no longer a reliable proxy for treatment efficacy when comparing applications from year to year. In the past we associated less herbicide use with less knotweed biomass. In future, we should depend on dimension, density and habit information (as was previously collected with GPS data dictionaries), to document progress. We created a new form that captures this information. The form was approved for use by the WSDA. (See Appendix V)
- Documentation of sites after initial baseline information was captured, has not been consistent. Crews everywhere tended to collect less information in subsequent years. Annual updates continue to be extremely valuable to both inform efficacy and document progress. Collecting detailed information is much more doable at this stage, where we are not experiencing huge or frequent infestations.
- We used the new Hunt GPS maps compiled from a Missoula based company and purchased through Garmin for about \$100. These maps were an inexpensive and simple way to provide a lot of parcel information (such as outlines and ownership) to crews in the field. They weren't perfectly accurate, but often close enough. The maps include many Washington counties, although Jefferson is excluded.
- Track logs from the GPS units provide extremely valuable information about where crews went and where they missed. Downloads occurred both during and post season to analyze this information.
- In 2013 we used our knotweed specific data base system to collect information about other invasives treated at the same time by PSC crews. We need to spend more training time to ensure the proper information is collected to meet all needs.
- OKWG meetings have been very useful for sharing ideas and solutions for common problems, identifying needs, and addressing research gaps. The meetings have been invaluable for understanding new and changing Federal and State permit and reporting guidelines. We hope the meetings will also become a valuable forum for issues around other invasive species such as reed canarygrass and even Scotch broom. It was evident at the fall meeting that there is a lot of interest in reed canarygrass and many entities would like more help on addressing that species specifically.
- We continue to report on knotweed activities around the Peninsula to show the level of effort and collaboration that has been generated to combat this threat to our natural resources and investments in human-made infrastructure. We sent out a standardized form under which we asked partners to report. (See Appendix VI)
- Jefferson County's policy regarding spot treatment of roadside noxious weeds continues to be contentious. It is critical to support the weed board's ability to treat knotweed with herbicides, especially along roadsides where simple management activities such as ditch cleaning and mowing spread fragments to areas that are much more difficult to treat and contain. In Clallam County we are pursuing an updated policy that allows limited herbicide use only for the control of noxious weeds and other invasive plants of special concern. Prevention and early intervention will always be the preferred strategy. Those become better options, now that we have greatly reduced overall knotweed infestations in both counties.
- The State's knotweed program continues to be indispensable. In addition to providing base funding, it has helped us with permitting and technical advice. We greatly appreciate the leadership and guidance supplied by WSDA. The Olympic Knotweed Working Group continues to draw a diverse membership and MANY other groups now participate in knotweed control Peninsula wide. The Weed Boards are invested in supporting these groups and interested residents county wide. In many cases WSDA funding is being used to leverage other grants.
- Stretching WSDA grants over a longer timeline allows for better planning and preparation for a subsequent season. We greatly appreciate this change.

RECOMMENDATIONS

- Increase pre-season communication with other project managers. Discuss reporting protocols. Look for more cross boundary project opportunities.
- Assured funding for 2014 allows us to create a comprehensive treatment plan in February. In Clallam this will specifically include Salt Creek, Hoko, Big and possibly the Sol Duc Rivers.
- Seek crew continuity or attempt to include at least one member who is experienced in knotweed control and local sites. Crew leader inexperience was probably the greatest difficulty for youth crews this year.
- Where there is sufficient time, crews should perform Early Detection and Intervention.
- Continue to nurture relationships that encourage landowners who live on site to control knotweed themselves.
- Focus on timber companies, who are LARGE land managers, to increase their involvement in monitoring, prevention and treatment of terrestrial sites, especially rock sources. Seek contracting standards with timber companies that take invasives issues into account.
- Look for ways to better engage hunters, fishers and other recreationists in knotweed detection.
- Consider establishing a small number research sites in each county. Record more detailed information about site status and history including which species re-occupy knotweed infestations after treatment.
- Update Best Management Practice documents, based on recommendations of Working Group members and other experts at the last meeting. Provide information to WSDA.
- Canvass Working Group for training needs; specifically ways to better use technology, standardize data collection and simplify data management to document progress.
- Continue to incorporate information about other invasives in our working group meetings. Develop some guidelines for defining ED/RR within the context of river restoration or develop another term to better describe opportunities to maximize early intervention.
- Work with Clallam County Roads Department to update the Vegetation Management Plan to increase prevention activities, reduce the spread of noxious weeds by mowers, and to develop additional tools to control noxious weeds on roadsides. Support Jefferson County decision makers to ensure that there is maximum flexibility and that a broad array of tools continues to be available to prevent the spread of noxious weeds. Routine maintenance activities on roadsides are a major vector for knotweed spread.
- Continue to update our web page to include information highlighting work by partners, including contact information. Encourage partners to get work posted on more restoration sites-or incorporated into Lead Entity sites.
- Encourage planners to include weed inventory in pre-project check list.
- Support a weed-free materials source webpage with information from each county. Clallam County Department of Community Development has offered to host such a website with information about which quarries have been surveyed and certified to certain standards.
- Support research that provides guidance on when or if it is better to delay treatment of epinastic or an entire knotweed infested area showing minimal re-growth.
- Continue to support research that quantifies knotweed impacts on environmental and habit.
- Provide a representative to watershed groups (such as lead entities) to ensure an invasive species management plan is incorporated into restoration proposals and to work towards grant schedules that allow for longer timelines for implementation.
- Simplify NPDES reporting by requiring only total herbicide usage per watershed. This would eliminate the complication of reporting by species.

PARTICIPATING GROUPS

Clallam County Noxious Weed Control Board
Grays Harbor Noxious Weed Control Board
Jefferson County Noxious Weed Control Board
Mason County Noxious Weed Control Board
Mason Conservation District
King County Noxious Weed Control Board
Snohomish County Noxious Weed Control Board
Pierce Conservation District
US Forest Service
US Fish & Wildlife Service
USFWS National Marine Refuge
Olympic National Park
US Department of Agriculture
N. Cascades Exotic Plant Management Team/NPS
US Natural Resource Conservation Service
WA State Department of Natural Resources
WA State Department of Ecology
WA State Veterans Administration
WA State Department of Transportation
WA State Department of Agriculture
WA State Department of Fish and Wildlife

Washington State University
Jamestown S'Klallam Tribe
The Lower Elwha Klallam Tribe
The Makah Nation
The Quileute Nation
The Quinault Indian Nation
Samish Indian Nation
10,000 Years Institute
Jefferson Land Trust
Hoh River Trust
North Olympic Land Trust
Hood Canal Coordinating Council
Hood Canal Salmon Enhancement Group
North Olympic Salmon Coalition
Pacific Coast Salmon Coalition
Northwest Watershed Institute
Forterra
Center For Natural Lands Management
East Jefferson WCC
Mason County WCC
Clallam, Jefferson, Mason PSC
See Appendix III for contact information.

FUNDING

Projects summarized in this report were funded by: Washington State Department of Agriculture and Forest Health Protection (WSDA and NFS), the Washington State Department of Natural Resources-aquatic resource division, Clallam County Noxious Weed Control Board, the Salmon Recovery Funding Board (through North Olympic Salmon Coalition and Hood Canal Salmon Enhancement Group) and separate funding administered by the Quinault Indian Nation (through SRFB and EPA grants), 10,000 years Institute, the Quileute Nation, and Mason Conservation District.

PROJECT ACTIVITIES BY WATERSHED CLALLAM COUNTY



Quillayute River System: Green indicates knotweed sites found in the original surveys on the Dickey, Calawah, Bogachiel and Quillayute Rivers. All sites have since been treated at least once—many of them multiple times. New shape files are not available. Purple indicates sites worked on by the North Cascades EPMT with the National Park Service.

Quillayute River System

Crews—Quileute Natural Resources Crew, North Cascades Exotic Plant Management Team with the National Park Service (NCEPMT with NPS)

The Quillayute system includes the Sol Duc, Calawah, Bogachiel, Quillayute and Dickey, along with their tributaries. The entire Quillayute system is popular for fishing. The rivers host the healthiest stocks of wild winter steelhead in the Pacific Northwest, with as many as 19,000 fish returning in some years. These rivers also support large runs of Chinook and Coho salmon. There are no Threatened or Endangered species within the Quillayute watershed. The Quileute Tribe endeavors to preserve the ecosystem in its current, functioning state believing this to be easier and more cost-effective than restoring a system once it is degraded. Knotweed elimination is an important factor in preserving habitat for fish species. It is also important for elk and deer and other species that forage on the floodplain, where knotweed is out-competing native vegetation. Frank Geyer, Deputy Director/TFW Program Manager of Quileute Natural Resource Department has observed that elk and deer do not actively feed on knotweed and that elk have returned to calve on restoration areas previously infested with knotweed.

Dickey River

The Dickey is a large, low gradient river, draining 108 square miles, characterized by sandy bank soils and extensive off-channel fish habitat and riparian areas. The mainstem Dickey River flows for 8 miles from the confluence of the East and West Forks, joining the Quillayute River approximately one mile from the Quillayute's mouth on the Pacific Ocean at La Push. Knotweed infestation levels in the Dickey before treatment began were possibly the worst on the Olympic Peninsula. The source was probably an old homestead approximately a quarter of a mile upstream of the East and West Fork confluence.

Knotweed treatment on the Dickey River began in 2002 and has been continued each year since. Work had been undertaken mainly by the Quileute Tribe; the North Cascades Exotic Plant Management Team (The North Cascades EPMT) with the National Park Service has treated patches within Olympic National Park. Additionally, Lauren Urgensen, a University of Washington Graduate student studying knotweed impacts and control, established plots along the Dickey as part of her study from 2006 to 2008.

In 2012 crews noted that tansy ragwort coming in after knotweed treatments is a big problem on this waterway.

In 2013 15 miles (counting both sides)—75 acres—were surveyed and treated on the Dickey River. Almost all the treated acreage on the Dickey is owned by Washington Department of Natural Resources (DNR) or Rayonier, a large timber company, making landowner permissions easy to obtain.

Herbicide use-Dickey River (gallons)							
	2007	2008	2009	2010	2011	2012	2013
Acres Treated	140	50	95	101	NA	56	75
Total Herbicide:	12.65	0.165	18	7.21	NA	2.91	4.31

Calawah River

Both the North Fork and South Fork of the Calawah River originate in the Olympic National Park. They converge close to the town of Forks and the Calawah flows into the Bogachiel on the west side of Forks. The Calawah is 31 miles in length, with a drainage basin of 133 square miles.

In 2006 the Quileute Tribe surveyed the Calawah, recording 344 sites, all downstream from the North Fork-South Fork confluence. The Calawah was treated by the Quileutes each year from 2007 through 2012. Most of the knotweed on the Calawah is giant knotweed and has responded well to treatment.

In 2013 the Quileute Tribe surveyed and treated 21 river miles (64 acres). As with the Dickey, almost all land on the Calawah is owned by DNR or Rayonier.

Herbicide use-Calawah River (gallons)							
	2007	2008	2009	2010	2011	2012	2013
Acres Treated	202	100+	110	127	NA	65	64
Total Herbicide:	11.12	2.31	1.59	0.24	NA	0.15	0.18

Bogachiel River

The Bogachiel River joins with the Sol Duc, forming the Quillayute, about 4 miles from the town of La Push where the Quillayute empties into the Pacific Ocean. The Bogachiel is 46 miles in length, with a drainage basin of 154 square miles.

In 2006 the Quileute Tribe surveyed the Bogachiel, recording 1,336 sites. Knotweed infestation on the Bogachiel was so extensive it was not attempted immediately and attention was focused on the Dickey. Treatment began in 2008 and continued in 2009. Clallam County supplied a crew for 8 or 9 days, helping the Quileutes and supplying some grant match. In 2010 the remaining stretch was treated. In 2011 the entire river was re-treated. Knotweed populations were much reduced.

In 2012 the Quileute Tribe surveyed and retreated 12 river miles (131 acres) on the Bogachiel River.

In 2013 the Quileute Tribe surveyed and re-treated 26 river miles (131 acres) on the Bogachiel. As with the Dickey, almost all land on the Calawah is owned by DNR or Rayonier.

Herbicide use- Bogachiel River (gallons)							
	2007	2008	2009	2010	2011	2012	2013
Acres Treated	4.1	900+	693	725	NA	131	131
Total Herbicide:	0.65	33.88	77.34	62.1	NA	3.12	5.43

Quillayute River

Although the Quillayute has the largest drainage area on the Peninsula (629 square miles) the river itself is only 5 ½ miles long and approximately half its length is in the coastal strip of the Olympic National Park.

The Quileute Tribe treated knotweed on the Quillayute River in 2008 and 2009. Clallam County crews spent approximately 3 days in 2009 treating in and around a county park on the Quillayute. In 2010 The North Cascades EPMT with the National Park Service treated 0.94 acres of knotweed on the Quillayute, within the Olympic National Park.

In 2011 the Quileutes treated the right bank of the Quillayute from the mouth of the Sol Duc River to the Olympic National Park; as well as the tribal property on the left bank and the North Cascades EPMT with the National Park Service treated knotweed within National Park boundaries.

In **2013** the North Cascades EPMT with the National Park Service once again treated knotweed within National Park boundaries, on the Quillayute mainstem and at Lake Ozette (see map above), using approximately 0.12 gallons imazapyr and 0.2 gallons glyphosate.

Herbicide use-Quillayute River (gallons)							
	2007	2008	2009	2010	2011	2012	2013
Acres Treated	N/A	170	40	.5	NA	0	0.2
Total Herbicide (gallons):	N/A	6.77	1.7	0.64	NA	0	0.14

Sol Duc River and tributaries

The Sol Duc sub-basin, within the Quillayute watershed, drains over 200 square miles. The Sol Duc River originates within Olympic National Park and stretches for nearly 20 miles before emerging from Park boundaries. It then runs for 45 miles until it joins with the Bogachiel, forming the Quillayute. It contains timber lands, agriculture, and residential development. The Sol Duc supports numerous salmonids such as Chinook, Coho, chum, sockeye, and steelhead, as well as cutthroat and rainbow trout.

Upper Sol Duc

North Cascades Exotic Plant Management Team with the National Park Service has for several years treated a small patch of Himalayan knotweed (0.001 acres) in the upper part of the river. In **2013** they reported, for the first time, that no Himalayan knotweed was found within Olympic National Park boundaries

Mid Sol Duc

In 2005, Clallam County Noxious Weed Control Board (CCNWCB) conducted a float survey on the mid section of the Sol Duc River (from the Park boundary to Whitcomb-Diimell boat launch on Highway 101). The Snider Work Center was the furthest upstream site found. Treatment began in 2006 and continued through 2010. No treatment was done on the Sol Duc in 2011. In 2012 the Quileutes surveyed and treated 26.6 river miles (155 acres) on the Sol Duc. 2.13 gallons of Aquaneat were used. In **2013** no knotweed was found at the Snider Work Center, and no treatments took place on the mid Sol Duc .

Lake Creek and Lake Pleasant

In **2013** no treatment took place on Lake Creek or Lake Pleasant. In 2012 the CCNWCB performed a full survey and treatment was carried out on all parcels where permission had been received. Infestations were very light in most cases. On Lake Pleasant itself, Weed Board crew treated a very large terrestrial knotweed infestation for the first time and retreated some smaller areas. It was determined that this area would be a good candidate for skipping treatment in 2013. For a history of treatment in these areas, see previous reports.

Lower Sol Duc

In 2006 the Quileute Tribe surveyed the lower section of the river (from Whitcomb-Diimell to the confluence with the Bogachiel). They recorded 447 sites. Almost half the sites had canes taller than six feet and some consisted of thousands of canes. More than half of the sites recorded in the lower Sol Duc were identified as giant knotweed, in contrast to the mid-section, which was virtually all Bohemian. Treatments or re-treatments took place from 2007 to 2010, done by the Quileute Natural Resource Crew and/or CCNWCB.. No treatment was done on the lower Sol Duc in 2011 or 2012.

In 2013 the Quileutes surveyed and treated 51 river miles (155 acres) on the lower Sol Duc.

Herbicide Use, Lower Sol Duc River (gallons)							
	2007	2008	2009	2010	2011	2012	2013
Acres Treated	17	45	30	35	0	0	155
Total Herbicide	9.656	6.67	0.945	1.26	0	0	1.09

Forks

Knotweed has been observed in the city of Forks for several years and it is of concern because Forks is close to both the Calawah and the Bogachiel. One tributary to the Bogachiel passes through Forks and close to some of the knotweed sites. The Calawah and Bogachiel are major waterways in the Quillayute System. Both rivers have knotweed which the Quileute Tribe is trying to eradicate and there is fear of re-infestation if the Forks sites go unchecked.

Treatment began in 2006 and continued through 2009, done by CCNWCB and/or the Quileute Tribe. No treatment took place in Forks in 2010 through 2012, although the Pacific Salmon Coalition, based in Forks, may have taken on some of these areas, but did not specifically report treatments.

In 2013 the Quileute Natural Resource crew treated 3 acres in Forks and Beaver, all privately owned. They used one gallon of AquaNeat.

For more information about the Quillayute River System, please contact Garrett Rasmussen at (360) 374-2027 or garrett.rasmussen@quileutenation.org

Big River and Hoko-Ozette Road-

Crew—North Cascades Exotic Plant Management Team with the National Park Service

In 2011 CCNWCB treated high-priority-sites. In 2012 the CCNWCB thoroughly surveyed and treated four miles of the Big River, upstream from the National Park boundary. This covered all of the historic heavily infested areas. Most of the knotweed consisted of individual stems or scattered clumps. Knotweed was still pervasive but the density was drastically reduced from past years.

In 2013 it was determined that this area would be a good candidate for skipping treatment, however, the North Cascades Exotic Plant Management Team with the National Park Service treated within their jurisdiction at the mouth of the river where it empties into Swan Bay. No treatment took place on the Hoko-Ozette Road. For a history of treatment in these areas, see previous reports.



Sekiu River: Green indicates sites treated in 2013. Blue indicates knotweed sites identified in the original 2006 surveys.

Sekiu River

Crew—CCNWCB

The Sekiu is a low gradient coastal river with many small forested, scrub-shrub and emergent wetlands scattered throughout. It flows into the Straits of Juan de Fuca about 10 miles east of the Makah Reservation. Much of the land in the watershed is zoned for commercial forestry. Chinook, Coho and chum salmon have been recorded in the Sekiu River, as well as winter steelhead and cutthroat.

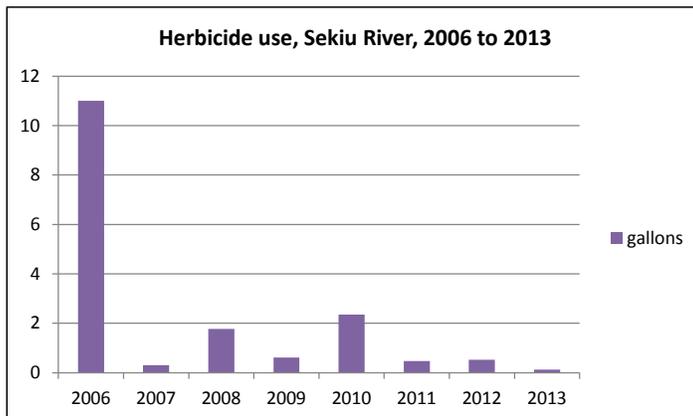
Knotweed control on the Sekiu River began in 2006 and has continued each year since. Work has been performed by the Makah Tribe and/or Clallam County Noxious Weed Control Board. In 2010 control was made mandatory and one previously reluctant landowner then allowed us to treat rather than do it himself. In 2011 a small crew surveyed and re-treated on the Sekiu River, focusing on sites that had been treated just one or two years, as opposed to 4 or 5 years.

In 2012 a 4 person crew surveyed and treated all knotweed sites on the Sekiu River. Very few plants remain on most parcels and several landowners are looking out for knotweed and treating it themselves, which is our long-term goal. Two parcels that had belonged to a reluctant landowner were sold to a landowner who is very supportive of knotweed control efforts. We spent the majority of time treating extensive knotweed infestations on those two 5-acre parcels. The parcels are across the road from the river, but the largest portion of the infestation is in a swampy swale where the river backs up when it floods (reported by an adjacent land owner).

In 2013 a two-person crew re-treated most sites on the Sekiu River, focusing their attention on the two 5-acre parcels that had been treated for the first time in 2012. Thousands of stems were still present, but herbicide use on those parcels decreased from 0.48 gallons (injected or sprayed) to 0.065 gallons (all sprayed). A couple of sites on the Sekiu River were not completed in 2013 because a crew injury made access difficult.

Herbicide Use-Sekiu River (gallons)								
	2006	2007	2008	2009	2010	2011	2012	2013
Inspected/ Known Parcels	N/A		1/11	10/11	10/11	10/11	10/11	9/11
Acres Treated	N/A	1.78	2	16	8.5	1.17	5.9	2.79
AquaNeat injected	0	0.1	1.7	0	2.125	0.25	0.25	0
AquaNeat sprayed	0	0.18	0.06	0.487	0.18	0.18	0	0
Habitat or Polaris (imazapyr) sprayed	0	0.02	0.007	0.122	0.045	0.045	0.276	0.125
Total Herbicide	11	0.3	1.767	0.609	2.35	0.475	0.526	0.125

Note: The term "inspected" is used, rather than "treated" because in many cases crews looked for plants but did not find them. "Acres Treated" were calculated by adding together the acreage on all of the Pesticide Application Records and may vary depending on whether the applicator recorded strictly the area treated or the whole infested area.



Herbicide use increased in 2008 and 2010 because new, heavily infested sites were added. It declined in 2009 when treatments were switched from injection to foliar spray. Herbicide use was similar between 2011 and 2012 even though a large infestation was added. This was because most of the treatment in 2012 used a low concentration of imazapyr instead of injection or the higher concentration of sprayed glyphosate that was used in previous years. It decreased again in 2013 because none was injected and, again, low concentrations of imazapyr were used.

Hoko River

In 2013 no treatment took place on the Hoko River. In 2012 crews surveyed and treated all known knotweed on the Hoko, including some sites on the upper Hoko that had not been surveyed or treated in more than three years because of poor access. In 2013 it was decided that the Hoko River would be a good candidate for a skip treatment.

Highway 112, Clallam Bay and Sekiu

Crew—CCNWCB

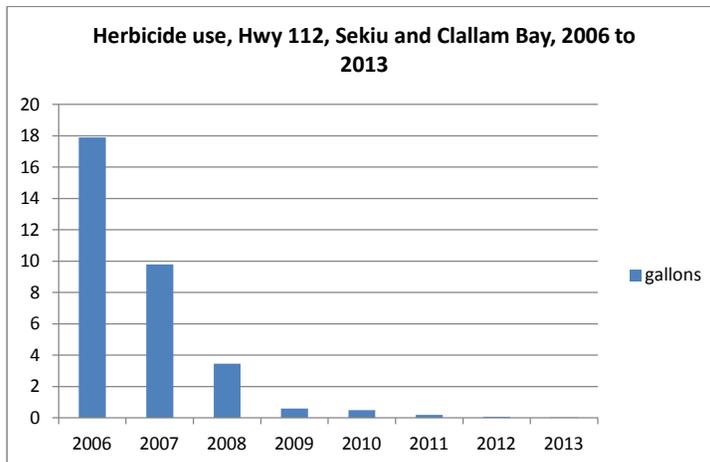
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- Sekiu and Clallam Bay are small coastal towns about two miles apart, consisting mostly of fishing resorts and residential properties. Knotweed in the Sekiu and Clallam Bay area has a long history, dating back to 1930. Knotweed has long been associated with the coming of the railroad, although it is not clear whether it was planted intentionally or came as a contaminant.

- Highway 112 runs west-east near the shoreline and crosses the Sekiu, Hoko and Clallam Rivers. The Hoko-Ozette Road, which heads south-west from Highway 112, runs very close to both the Hoko River and the Big River. Both these roads serve as significant vectors of knotweed through movement of plant fragments in the course of road maintenance and related activities.

By 2004 there were large stands of knotweed in both Clallam Bay and Sekiu and along Highway 112. Many of the infestations were in or close to water (Straits of Juan de Fuca). CCNWCB treated knotweed in Clallam Bay and Sekiu, and on the coastal bluff between the two towns, each year from 2006 to 2012.

In 2013 our crew observed some unanticipated re-growth in Sekiu, which they did not treat because landowner permissions had expired. Because this area is not a top priority for treatment we recommend that in 2014 we focus on education and encouraging landowners who still have knotweed to treat it themselves. CCNWCB crew treated small sites on the breakwater west of Clallam Bay, shown on the Clallam River map below. Very small amounts of herbicide were used.





Clallam River Green indicates knotweed sites treated in 2013. Blue indicates sites that were identified in initial surveys in 2006 and 2007.

Clallam River
 Crew—CCNWCB

The Clallam is a low-gradient river, flowing into the Straits at the town of Clallam Bay. It is a unique system in that sand and gravel frequently block the mouth of the river. This phenomenon can cause flooding and can trap anadromous fish behind the gravel bar with no way to escape to the safety of the ocean, making them easy prey. In 1998 a channel was excavated to allow fish to escape. It was effective but was only a temporary solution. There is a popular County Park at the mouth, and also a large portion of land owned by Washington State Parks. The Clallam River is about 13.4 miles long. Coho and winter steelhead spawn in the mainstem, and in several tributaries. Moderate numbers (500 or less) of chum have been observed in the lower mainstem.

The first reported sightings of knotweed on the Clallam River were around 1998 and it has spread rapidly since then (Mike McHenry, Lower Elwha fish biologist, pers. com), although it is likely to have been present, but unnoticed, for much longer.

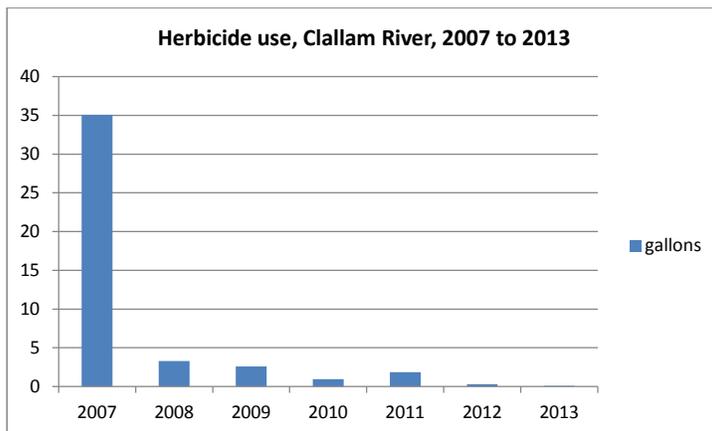
In 2006 the Makah Tribe surveyed the lower portion of the Clallam River and in 2007 funding from a NFWF grant with the Clallam Conservation District became available for the Lower Elwha Klallam Tribe to treat the knotweed there, with help from CCNWCB. Treatment has continued each year since. In 2010, knotweed control was made mandatory on the Clallam River, in hope of persuading reluctant landowners to allow us to treat. This was not as successful as it was on the Big, Hoko and Sekiu Rivers. There is still one parcel where the owners do not want us to treat, however, they are aware that they are responsible for treatments and that the CCNWCB will inspect for compliance. In 2011 and 2012 we attempted to re-treat all parcels on the Clallam River. For the most part

knotweed infestations were drastically reduced along the length of the river. However, it was apparent that the family owning the property with the most upstream infestation had been cutting knotweed and throwing it in the river channel. We removed cut canes and advised the landowner of proper treatment methods. We also found a handful of dense patches that were located farther away from the river channel in the flood plain, or that were obscured by dense vegetation and had been missed in past years.

In 2013 we made the Clallam River one of our priorities and a beefed-up crew searched the entire river corridor where knotweed has been known to occur. Herbicide use was reduced considerably yet again, by about 75%, between 2012 and 2013. *We discovered and treated a tiny pioneer patch of yellow archangel; yellow archangel was seen nowhere else in the river corridor.* This is a prime example of early detection and intervention, the most efficient noxious weed control strategy of all.

Herbicide Use-Clallam River (gallons)							
	2007	2008	2009	2010	2011	2012	2013
Parcels Inspected/Known Parcels	16/20	16/20	18/20	13/20	21/23	23/23	18/23
Acres Treated	26	21.5	55	18.75	14.78	22	2.84
AquaNeat injected	32.95	0.52	0	0.43	0.93	0	0
AquaNeat sprayed	2.14	1.34	2.05	0.401	0.78	0	0
Polaris (imazapyr) sprayed	0	0.34	0.53	0.1	0.16	0.2827	0.077
Total Herbicide:	35.09	3.28	2.58	0.931	1.87	0.2827	0.077

Note: "Acres Treated" were calculated by adding together the acreage on all of the Pesticide Application Records and may vary depending on whether the applicator recorded the area treated or the whole infested area.



Herbicide use continues to decline from year to year, though it increased in 2011 because more sites were accessed and treated. Herbicide was reduced in 2012 even though new stands of knotweed were discovered and treated. This is likely a result of switching from an herbicide mixture that used 4% Glyphosate and 1% Imazapyr to a strictly 1% Imazapyr mixture. It decreased again in 2013, even though the area was treated thoroughly. Presumably knotweed infestations had also been reduced.

Pysht River

Crew—*Clallam PSC*

The Pysht River is approximately 16.3 miles long and drains into the Straits of Juan de Fuca at Pillar Point, eight miles east of Clallam Bay. The Pysht supports Coho and chum salmon and winter steelhead.

In 2005 knotweed on the Pysht was first observed and treated. No complete survey was taken that year, but two property owners notified CCNWCB of knotweed infestations. One of these owners was Merrill & Ring, which owns a large amount of land on the Pysht including a tree farm near the mouth. They were enthusiastic about controlling their knotweed and hired a crew to do the work, with help from CCNWCB. The other landowners who came forward were the Burdicks, who had a knotweed infestation covering 80,000 square feet. In 2005 they started manually digging knotweed as an alternative to herbicide use.

In 2006 Merrill and Ring hired a crew who treated their knotweed sites with help from CCNWCB. The crew noticed good results from the previous year's treatments. By 2006 only 50 to 100 canes remained; they were about 3 feet tall. Treatment continued each year through 2010. No treatment was done in 2011 on the Pysht because of reduced funding, but we did receive a renewed agreement to work with Merrill and Ring and their subsidiary companies through 2016. In 2012 Merrill and Ring staff conducted knotweed surveys, and a CCNWCB crew member treated those locations. Knotweed infestations on these parcels were reduced to a handful of clumps and scattered stems.

In **2013** the Clallam PSC visited the Pysht River, treated other weeds, but did not find knotweed. A private contractor reported treating some small amounts of knotweed on terrestrial sites on behalf of the company. Merrill and Ring has been an exemplary steward working to combat knotweed on their far flung county-wide holdings.



Deep Creek: Green indicates first knotweed treatment by CCNWCB, 2013

Deep Creek

Crew—Clallam PSC

Deep Creek drains 11,048 acres, and the elevation ranges from zero to 3,400 feet. It historically supported significant levels of Coho and chum production, with most of the chum salmon spawning in the lower three miles. Coho and winter steelhead spawners have been documented to RM 3.7 and 3.1 respectively. Fall Chinook used to spawn in Deep Creek but according to Mike McHenry, fisheries biologist for the Lower Elwha Klallam Tribe, they have been extirpated.

Because of the importance of Deep Creek to the Lower Elwha Klallam Tribe, and because there had been reports of knotweed infestations, CCNWCB sent a crew to survey and treat in **2013**. As discussed in previous sections, the Puget Sound Corps was able to treat other invasives, as well as knotweed, which we believe to be more effective than a single-species approach. They treated large amounts of Canada thistle, bull thistle and fox glove as well as knotweed. The herbicide usage on other species is not included in the following table. Because only two landowners were involved, landowner contact and getting permissions signed was easier than on many waterways.

Herbicide Use-Deep Creek (gallons)	
2013	
Acres Treated	0.5
Polaris (imazapyr) sprayed	0.033
Total Herbicide:	0.033



Salt Creek and surrounding area: Green indicates first knotweed treatments, 2013, by Clallam PSC. Purple indicates treatments by the North Cascades EPMT with the National Park Service.

Salt Creek

Crews—Clallam PSC

Salt Creek drains a basin of 44.6 square miles. The mainstem and its tributaries provide important Coho salmon spawning and rearing habitat downstream of a passable dam at RM 6.5. This same area used to support chum salmon, while Chinook salmon were limited to the reaches downstream of RM 3.5. Chum and Chinook salmon have not been documented in Salt Creek in recent years. Loss of large woody debris may be impacting habitat. In the Salt Creek estuary, about 15 acres of tidal marsh has been lost to a road that cuts across the estuary and disconnects the salt marsh from the tidal-influenced reaches of Salt Creek. This impacts juvenile rearing of all salmonids produced from Salt Creek.

Salt Creek has significance for the Lower Elwha Klallam Tribe, and CCNWCB had been aware for some time that knotweed might be present in Salt Creek and some of its tributaries. In **2013** we solicited landowner agreements from all landowners on Salt Creek and on Nordstrom Creek—one of the major tributaries. Nordstrom was selected because of reports of knotweed being seen there. Because Salt Creek and its tributaries are among the most heavily populated waterways in WRIA 19, over 100 landowners were involved, some having several parcels. Because we are in early stages of obtaining landowner permissions, we were only able to obtain 19 permissions, including some large landowners, such as the DNR and Green Crow. However, this left a checkerboard pattern typical of early stages of a project. Crew treated knotweed on just one parcel, using 0.015 gallons of imazapyr.

However, Mike McHenry, fish biologist with the Lower Elwha Klallam Tribe, reports having seen knotweed on the west bank of Salt Creek, downstream from Hwy 112, and on Nordstrom Creek at the end of Miller Road. We plan to continue seeking additional permissions for a full look at Salt Creek next year.

The above map shows a terrestrial knotweed site that the crew treated on the Joyce Access Road. 0.08 gallons of glyphosate was used on that site. It also shows 2 sites on Lake Crescent, treated by NCEPMT with NPS. 0.14 gallons of herbicide were used.

Herbicide Use, Salt Creek	
	2013
Acres Treated	1
Polaris (imazapyr) sprayed	0.015
Total Herbicide:	0.015

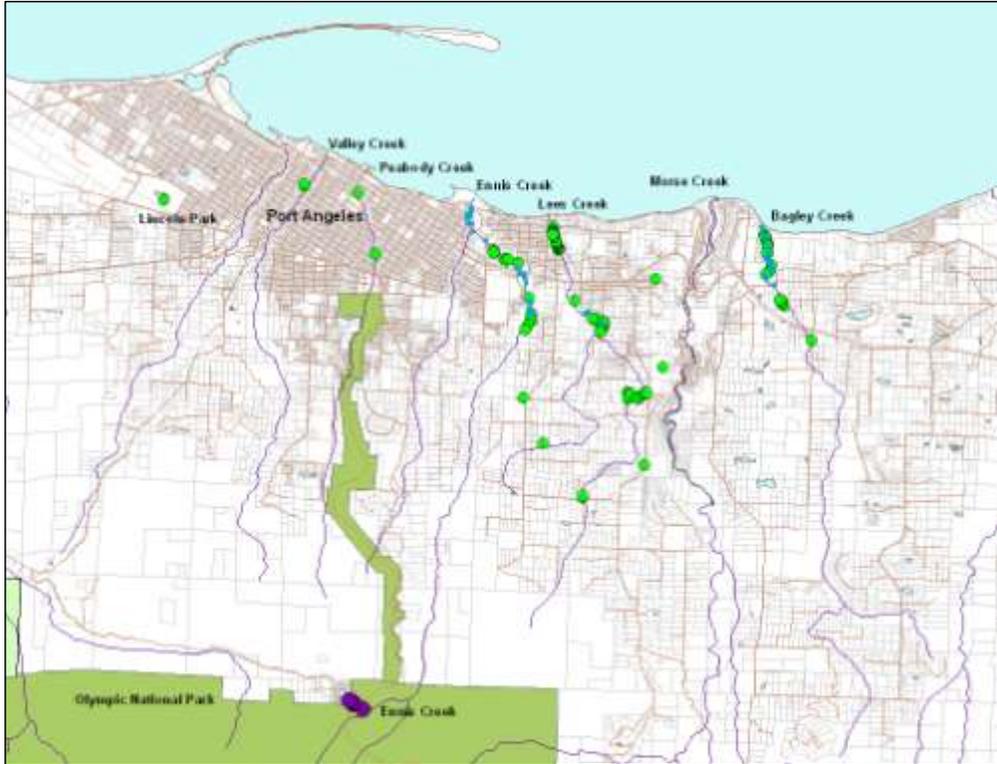
Elwha River

Crews— Lower Elwha Klallam Tribe, WCC, NCEPMT with NPS

The Elwha is a river in transition. Two dams were removed in 2012, and the former reservoir lake-beds and river ecology are subject to intense research and restoration efforts.

In **2012** and **2013** Lower Elwha Tribal crews, a Washington Conservation Corps, and North Cascades EPMT crew conducted noxious weed treatments throughout the season. Knotweed infestations of the Elwha have been very light in the last few years. We do not have 2013 information specific to knotweed and other invasives activities from these crews.

For more information contact Mike McHenry, Lower Elwha Tribe Fisheries Biologist Mike.McHenry@elwha.nsn.us



Port Angeles area streams: Green indicates 2013 knotweed treatments by Clallam County crews. Blue indicates knotweed sites that were identified in initial 2007 and 2008 (Ennis Creek) and 2011 (Bagley Creek and Lees Creek) surveys. Purple indicates treatments by the North Cascades EPMT with the National Park Service

Port Angeles Area Streams

Crews—CCNWCB, Clallam PSC, and the North Cascades EPMT with the National Park Service

Valley Creek

Valley Creek is a small stream which empties into the Port Angeles Harbor. Salmon and steelhead have probably been extinct from the creek since the late 1940's, when the final sections of the approximately 2,000-foot culvert at the mouth were installed. Recent surveys of fish in this system revealed numerous resident cutthroat trout up to 11 inches in length. The section of the creek by Valley Street has been severely infested with knotweed for decades and treatment has been ongoing for several years, up until 2010. No treatment took place in 2011 (due to bridge construction blockages). In 2012 we conducted a survey with a Streamkeeper team, where very minor or small epinastic growth was documented. In 2013 full treatments were planned through the use of a Puget Sound Corps, but did not take place due to crew attrition by early September. Instead, only one site where a small amount of re-growth was seen, was treated. At the same time, the only known purple loosestrife site in and around Port Angeles was eliminated (total of 15 plants) before it could become a major problem.

Peabody Creek

Peabody Creek is a small urban stream, draining a watershed of 2.6 square miles, with its headwaters in the northern part of the Olympic National Park. Some logging has occurred in the upper watershed but good stands of mature timber still remain. The 4.8 mile long stream flows through heavily urbanized areas of Port Angeles. Sewage was historically discharged directly into Peabody Creek and large quantities of stormwater are still

directed into it. Coho and possibly chum salmon were observed historically but are thought to be extirpated. Currently only cutthroat trout are known to utilize Peabody Creek. In 2009 we received permission to treat from 4 landowners whose property covered about ½ mile of the creek, within the City of Port Angeles. In 2010 these sites were re-treated and we surveyed further upstream, finding large stands of knotweed. In 2011 no treatment took place because funding uncertainties made advance planning difficult. Additionally, this creek which is severely degraded, was not a high priority for restoration for a variety of reasons.

In **2013**, renewed interest in this creek led its inclusion as a site for citizen-science and volunteer restoration efforts. We treated small amounts of knotweed re-growth within in the first ½ mile of the river where we able to renew permissions.

Lincoln Park

Lincoln Park is on the west side of Port Angeles, close to the Fairgrounds. Two ponds in the north-eastern corner are home to several species of waterfowl and are subject to intense recreational activity. The PSC crew treated a small stand of knotweed there in **2013**, and because their funding was not exclusively for knotweed they were able to treat a significant infestation of meadow knapweed, herb Robert and Canada thistle..

Ennis Creek

Because the headwaters of Ennis Creek are at 6000', in the Olympic National Park, it is significantly affected by both snowmelt and runoff. This type of system typically has the highest stock diversity of anadromous fish. Historically Ennis Creek supported stocks of Coho, steelhead, and chum. Currently Coho stocks are highly degraded. Steelhead and cutthroat numbers are higher. The lower reaches of Ennis Creek flow through urban areas of Port Angeles where water quality is impacted by stormwater runoff. An old Rayonier mill site is at the mouth of Ennis Creek and this portion of the creek has been rocked, channelized and the riparian corridor highly degraded. The old mill site has had a significant knotweed infestation for many years.

Knotweed treatment has taken place on Ennis Creek and the nearby Waterfront Trail from 2007 through 2010, implemented by the CCNWC and/or the North Cascades EPMT with the National Park Service. In 2011 The North Cascades EPMT with the National Park Service treated within their jurisdiction near Lake Dawn, but the lower reaches were not treated. In 2012 an almost complete treatment was carried out in the lower part of Ennis Creek.

In **2013** most known sites were re-treated, excepting the old Rayonier mill site (because of company concerns about ongoing litigation over historic pollution clean-up). The North Cascades EPMT with the National Park Service treated knotweed on Ennis Creek, near Lake Dawn, within Olympic National Park. 0.233 gallons of herbicide were used.

Lees Creek

Lees Creek is a medium-sized stream, entering the Strait of Juan de Fuca just east of Port Angeles. It currently supports very low numbers of anadromous salmon, limited to a few returning Coho and steelhead. It is a "naturally closed channel" through the summer, as the mouth of the channel is isolated from the Strait of Juan de Fuca by a natural sand spit during low flow periods. Lees Creek has been significantly altered from its historic condition. Fish passage is constricted, large woody debris is lacking and stormwater negatively impacts water quality. No active restoration or improvement actions are known in the Lees Creek watershed. Surveys in 2011 found only a small amount of knotweed on Lees Creek (the East Fork of Lees Creek was not surveyed), and treatment occurred in June. One half gallon of Aqua Neat was sprayed or injected on the Lees Creek during 2011. No treatment or surveys took place in 2012.

In **2013** we did more landowner contact and received a significant number of new landowner permissions for both Lees Creek and the East Fork of Lees Creek, which had never been surveyed. Six sites on Lees Creek and 3 sites on the East Fork were treated, using a total of 0.2 gallons of herbicide (imazapyr). Yellow archangel was also treated on the East Fork—another important opportunity to eradicate an infestation before it has spread.

Morse Creek

No knotweed has been found on Morse Creek

Bagley Creek

Bagley Creek is a medium-sized independent drainage, entering the Strait of Juan de Fuca approximately 2 miles west of Green Point. Coho and fall chum salmon and winter steelhead are the only identified anadromous fish known to exist in Bagley Creek. The watershed has experienced widespread timber harvest and conversion to residential use.

Knotweed had been observed previously near the mouth, but surveys and treatment did not occur in the creek until 2011. In 2011 a survey and two treatments were completed along the lower 3/4 mile of the creek, and a partial survey was completed further upstream. Slightly less than a gallon of AquaNeat was sprayed or injected on Bagley Creek during these treatments. In 2012 crews identified the source of the knotweed infestation on Bagley Creek about ¼ mile south of highway 101. Permission was obtained from all but two landowners in the source area, and treatments were carried out in those locations.

In 2013 crews re-treated knotweed on the lower ¾ mile, which had been badly infested in 2011. Knotweed populations there were much reduced. One other site, north of the highway was also treated but the source area, south of the highway, was not. The crew took a point marking a site where Bagley Creek crosses Bagley Creek Road, but they did not treat it. Very small amounts of herbicide were used—0.015 gallons of imazapyr and 0.023 gallons of glyphosate.

Other Sites

Knotweed was sprayed with 0.152 gallons of imazapyr in 2 pits near Port Angeles—Deer Park and Mount Pleasant gravel pits. Treating weeds in pits and other gravel sources is crucial to the success of our program, because these are places from which knotweed can spread across the county.

Herbicide use, Port Angeles Area, 2013 (gallons)		
Waterway	Glyphosate Sprayed	Imazapyr Sprayed
Lincoln Park	0	0.002
Peabody Creek	0	0.056
Valley Creek	0	0.015
Ennis Creek	0.06	0.015
Lees Creek	0	0.001
East Fork Lees Creek	0	0.001
Bagley Creek	0.023	0.015
Other Sites	0	0.001
Total	0.083	0.106



Dungeness River and associated creeks: Green indicates knotweed sites that were treated in 2013

Dungeness River and surrounding area

Crews—Jamestown S'Klallam Tribe and Clallam PSC

The Dungeness River, which is in the eastern portion of WRIA 18, drains 198 square miles. The mainstem extends 31.9 miles and its primary tributary, the Gray Wolf River, adds another 17.4 miles. There are an additional 256 miles of tributaries in the basin. Historically, the Dungeness was highly productive and diverse containing 11 individual salmonid populations. The Dungeness has experienced significant decreases in stock productivity levels and has been the subject of extensive habitat restoration and conservation for many years. In many cases, the Jamestown S'Klallam Tribe, in partnership with other local agencies has been instrumental in implementing restoration efforts. The Tribe treated knotweed on the Dungeness from 2004 through 2008. From 2009 to 2012 they did not survey or treat for knotweed. They focused their attention on other invasives, particularly butterfly bush.

In 2013 the PSC crew treated knotweed at 2 different Clallam County parks on the Dungeness—Mary Lukes Wheeler and The Railroad Bridge Park. Several other species were treated at Mary Lukes Wheeler, and at the Railroad Bridge Park large amounts of butterfly bush were treated by the cut-stump method. About 100 knotweed canes were found at Mary Lukes Wheeler and 52 at Railroad Bridge. Herbicide amount had to be extrapolated based on these figures and we estimate about 0.1 gallons of glyphosate was used in total on knotweed.

The crew also treated a WDFW site in a critical wetland area near Three Crabs Road, close to Meadowbrook Creek, where knotweed has been present for some time. Other species—Canada thistle, Scotch broom, blackberry, poison hemlock and teasel—were also treated. Although the crew was specifically instructed to use imazapyr or glyphosate, it appears that was not the case. Approximately 0.02 gallons of triclopyr were used (as estimated from their spray record.)

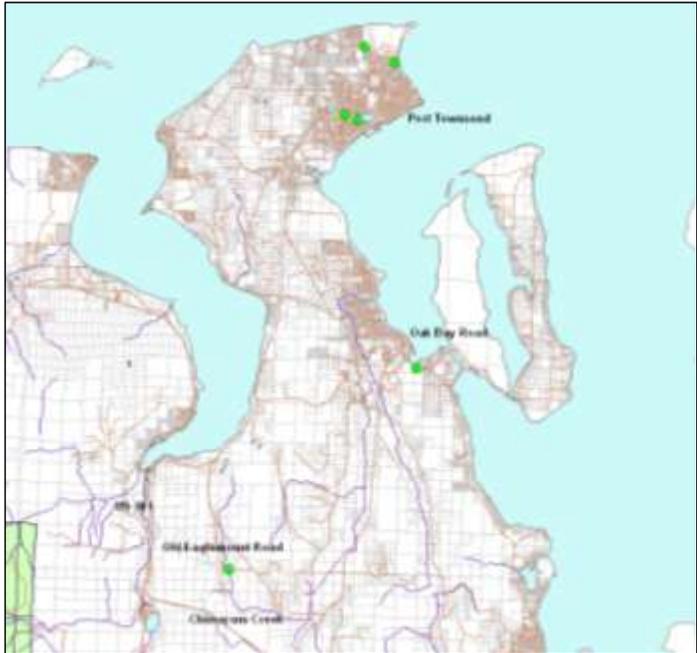
Bell Creek

Bell Creek is approximately 3.8 miles long and drains 8.9 miles of low elevation watershed. It flows from Happy Valley, through the eastern portion of Sequim, into Washington Harbor at the entrance to Sequim Bay. It has been heavily influenced by irrigation runoff since the initiation of irrigation in the Sequim-Dungeness Valley. We had been aware for some time of a patch of knotweed on an industrial site on Bell Creek in Sequim and in **2013** the PSC treated it, using 0.02 gallons of glyphosate.

Herbicide Use,-Dungeness River and Surrounding Area (estimated gallons used on knotweed)	
	2013
Acres Treated	0.5
Triclopyr sprayed	0.02
Glyphosate sprayed	0.12
Total Herbicide:	0.14

For more information about control efforts on the Dungeness River, please contact Hilton Turnbull at (360) 681-4603 or hturnbull@jamestowntribe.org.

PROJECT ACTIVITIES BY WATERSHED—CONTINUED
EAST JEFFERSON COUNTY



Port Townsend area: Bright green indicates knotweed treatment by CCNWCB and JCNWCB

Port Townsend Area:
Crew—JCNWCB and CCNWCB

- **Kah Tai Lagoon Park** in Port Townsend. A highly visible knotweed infestation of approximately 0.75 acres had been present at an entrance to the park for many years. Its location adjacent to the lagoon makes it likely that winter flood events could move plant parts off site. This site was treated each year from 2008 through 2011. This patch of about 20 remaining canes was re-treated in **2013**, along with three other small sites in Port Townsend.
- **Old Eaglemount Road** runs close to Chimacum Creek, a stream which is home to federally listed Hood Canal summer-run chum. The tidelands at the mouth of Chimacum Creek are popular for clam-digging. A small stand of knotweed on Old Eaglemount was treated in 2010 and 2011. Very little is left. It was re-treated in **2013**—only 4-5 small stems remained.
- **Oak Bay** near Port Hadlock, off of Admiralty Inlet, is a popular shellfish-harvest area, well known for geoduck. Weed board staff had observed a stand of knotweed close to the water and treated it with permission from the landowner 2011. This site of about 40 remaining canes was re-treated in **2013**. Knotweed populations were much reduced, but teasel has taken over.

Herbicide Use, Port Townsend Area (gallons)			
	2011	2012	2013
Port Townsend (several sites)	0.15	0	0.014
Old Eaglemount Road	0.004	0	0.0008
Oak Bay	1.125	0	0.01
Total	1.279	0	0.0248



Quilcene area: Bright green indicates knotweed treatment by CCNWCB and/or Jefferson County PSC. Dark green—East Jefferson WCC. Blue—2008 Big Quilcene River survey.

Quilcene Area:

Crew—East Jefferson WCC, CCNWCB, JCNWCB, Clallam and Jefferson PSC, Northwest Watershed Institute (NW)

Big Quilcene River

The Big Quilcene River drains a basin of approximately 70 square miles, most of which is under federal ownership. The Big Quilcene mainstem is 19 miles long, with its headwaters located at a high elevation in the Olympic National Forest. The upper reaches of the Big Quilcene River are high gradient, highly confined channels. The City of Port Townsend has a diversion dam at River Mile 9; most of the water used in Port Townsend comes from the Big Quilcene. The middle reaches between River Mile 5 and RM 2.5 are moderate gradient channels with widened floodplains. There is Federal Fish Hatchery at River Mile 3. Low gradient, unconfined channels characterize the lower 2.5 miles, while the lower mile meanders across a broad alluvial fan. The lower reaches of the Big Quilcene are a popular fishing area, the main species being chum and Coho. Large stands of giant knotweed have been visible for many years on the alluvial floodplain at the mouth—one local resident remembers playing in the knotweed 40 years ago!

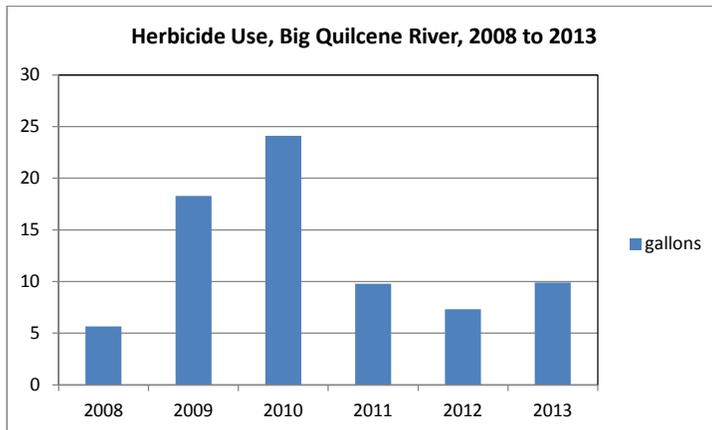
In 2008 JCNWCB and the Hood Canal Coordinating Council surveyed the river to determine how far upstream the infestation went. The furthest upstream knotweed found on the Big Quilcene mainstem was a little upstream from the Fish Hatchery. Dense populations were found half a mile downstream from the Hatchery and they continued intermittently to the mouth. Knotweed on the Big Quilcene was treated by a Clallam County crew in 2008 and 2009. In 2010 the East Jefferson WCC crew, jointly funded by North Olympic Salmon Coalition, Hood Canal Coordinating Council and the Hood Canal Salmon Enhancement Group (HCSEG), spent 19 days treating knotweed on the Big Quilcene. Good progress was made. In 2011 the WCC crew re-treated all sites on the Big

Quilcene. JCNWCB assisted with landowner contacts. In addition to treatment, landowners were given the option of having native plants installed on their property. In 2012, knotweed was retreated in all known sites with the assistance from East Jefferson WCC crew, HCSEG volunteers and HCSEG Americorps members.

In 2013 treatment was done solely by the East Jefferson WCC crew, funded by HCSEG. HCSEG's report states that "in 2013 all previously treated knotweed sites were treated, including some new parcels. Knotweed re-growth is not evident in the upper reaches of the river near Hwy 101, but remains consistent in the mid and lower reaches. The Big Quilcene River has a combination of all three types of knotweed including giant knotweed. A few properties showed resilience to previous years' herbicide treatments. It was noted that seeds were found on some plants on this river, which may explain the lack of response to previous treatment." HCSEG plans to offer plantings of native plants to property owners in the upper and middle reaches of the river in 2014.

Herbicide Use-Big Quilcene River (gallons)						
	2008	2009	2010	2011	2012	2013
Acres Treated	13	55.75	42.75	4.06	NA	5 (est)
AquaNeat injected :	2.06	0	0	0	0	0
AquaNeat sprayed	3.6	18.291	31.43	9.77	7.33	9.92
Polaris AQ sprayed	0	0	0.94	0	0	0
Total Herbicide	5.66	18.291	24.1	9.77	7.33	9.92

"Acres Treated" were calculated simply by adding together the acreage on all of the Pesticide Application Records and may vary depending on whether the applicator recorded strictly the area treated or the whole infested area. The discrepancy between acres treated in different years may be due to different counting methods being used. In 2011 the crew recorded strictly the acreage covered by knotweed, not the total infested area, as they had done in previous years. This accounts for the greatly reduced acreage.



Herbicide use increased from 2008 to 2010 as more sites were treated. It decreased in 2011 and 2012 because infestations were drastically reduced by previous treatments along the whole waterway. It increased again slightly in 2013; the shape file shows that several sites some way off the river were treated—this may explain the increase.

Town of Quilcene

The Jefferson PSC crew re-treated a site where a private landowner had been battling knotweed on her farm for years. The Jefferson PSC and the Weed Boards worked on several small sites along East Quilcene Road, which runs alongside the Little Quilcene River and Quilcene Bay. Most significantly, the Jefferson PSC began treating a medium stand of knotweed at the Herb Beck Marina in Quilcene. Dealing with this will be a multi-year project.

Lake Leland

The Lake Leland County Park is a popular fishing destination. Four distinct knotweed patches have been observed around the south end of the lake divided between County road right-of-way and private property. Permission was obtained from private landowners, and all sites were treated or re-treated in 2011. No treatment took place in 2012. In **2013** the Jeffers PSC treated large amounts of reed canarygrass on Lake Leland and Leland Creek. We hope, but lack proper documentation, that they treated knotweed there as well.

Tarboo Creek

Tarboo Creek, which drains into Dabob Bay, is a small but significant stream. 2,700 acres near its mouth are now protected by many different groups and agencies including Jefferson Land Trust, WDNR and the Northwest Watershed Institute (NWI). The lower portion of Tarboo Creek is virtually undeveloped and it includes both conifer and deciduous forests and supports protected species such as bald eagle, northern spotted owl and marbled murrelet. Knotweed was treated in 2011 and 2012 in a joint effort between JCNWCB and NWI. In **2013** the Weed Boards again teamed up with NWI. No knotweed was found in two upstream sites; we treated re-growth on the site near the mouth.

Little Quilcene River

The Little Quilcene River drains a basin of approximately 40 square miles. Its headwaters originate above 4,400 feet on the north slopes of Mount Townsend and its runoff is derived from both rainfall and snowmelt. The upper watershed is within the Olympic National Forest and is steeply dissected with high gradient, confined stream channels. The lower valley and the flood plain have been developed for domestic and agricultural use and timber harvest. The lower 0.8 miles have been diked and the banks armored to protect property in the floodplain. The Little Quilcene River discharges to Quilcene Bay approximately one mile north of the mouth of the Big Quilcene. The estuary supports populations of Chinook, pink, chum, steelhead, Coho, sturgeon and cutthroat. However, the dike system, put in place nearly 100 years ago, has disturbed tidal function in the estuary. Sediment washed downstream has caused the formation of a "delta cone"—a build-up of sediment in the estuary that can bury the salt marsh—important to young salmon because it offers food and protection from predators. The Hood Canal Salmon Enhancement Group (HCSEG) owns land near the mouth of the Little Quilcene and has mounted a large restoration effort in the estuary. 35,000 cubic yards of soil have been removed and the shoreline has been moved back 400 feet. In 2009 HCSEG noticed knotweed growing near the mouth and asked JCNWCB for help in removing it. In 2010 the East Jefferson WCC crew sprayed the remaining knotweed near the mouth of the Little Quilcene River. Only a small amount remained. In **2013** the East Jefferson WCC crew treated a couple of small patches near the mouth of the Little Quilcene River.

Herbicide Use, Quilcene Area (gallons)			
Waterway	2011	2012	2013
Quilcene Town	0.56	0	0.325
Tarboo Creek	1.96	2.25	0.03
Herb Beck Marina--Quilcene	0	0	0.34
Little Quilcene River	N/A	N/A	0.09
Total	2.52	2.25	0.782

Note that 2011 and 2012 treatments were solely glyphosate. In 2013 the Weed Boards used imazapyr at 1%. In most cases this explains the herbicide decrease.



Dosewallips/Duckabush :Bright green indicates knotweed treatment by JCNWCB, CCNWCB and/or Jefferson County PSC. Dark green—East Jefferson WCC. Blue—2008 Dosewallips survey.

Dosewallips/Duckabush and vicinity

Crews—JCNWCB, CCNWCB, Clallam and Jefferson PSCs, and the East Jefferson WCC

Spencer Creek

Spencer Creek is a comparatively short waterway that flows into Jackson Cove in the northwest section of the Hood Canal. We have treated an upstream site on Spencer Creek since 2008. In 2011 a large infestation was discovered at the mouth and was treated. When treating we also found and treated a large infestation of giant hogweed, a class A noxious weed. In 2012 we retreated the upstream site and discovered more large stands of knotweed downstream that had never been treated. We received permission for all affected parcels but one. The CCNWB and JCNWCB treated all permissioned sites. We also re-treated both the knotweed and the giant hogweed at the mouth of Spencer Creek. Both were much reduced.

In 2013 the Jefferson PSC re-treated Spencer Creek from US 101 to the mouth, except for one parcel for which we still do not have permission. Although herbicide usage is greatly reduced, poor documentation by the crew makes it difficult to determine if this is because of reduced amount of plants or whether they failed to search in all permissioned sites.

Herbicide Use, Spencer Creek (gal)		
2011	2012	2013
1.69	3.29	0.32

Dosewallips River

The Dosewallips River is one of the largest rivers in Jefferson County. It flows east from the Olympic Mountains into the Hood Canal at the town of Brinnon. It drains approximately 130 square miles and includes close to 132 miles of streams and tributaries. Out of the 130 square miles, 93% is contained within the Olympic National Park and Olympic National Forest. Land use of the remaining 7% is rural residential, commercial, and private forested land. The Dosewallips River supports Chinook, steelhead and Hood Canal Summer Chum, the last of which are listed as Threatened under the Endangered Species Act.

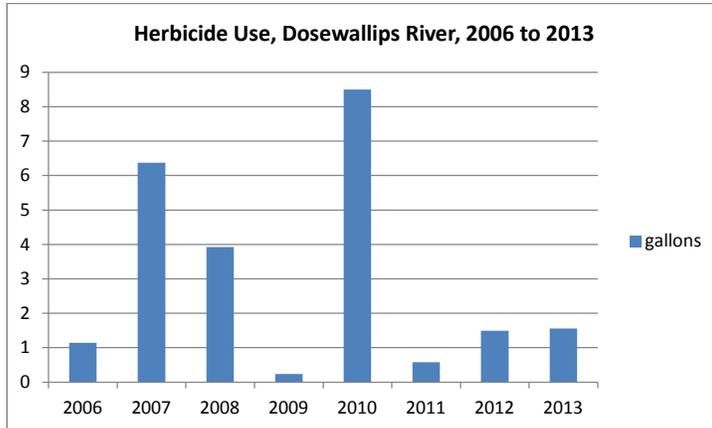
In 2006 Jefferson County Noxious Weed Control Board (JCNWCB) surveyed the Dosewallips. CCNWCB provided training, herbicide and equipment. Treatment took place from 2007 through 2009, using a combined JCNWCB/CCNWCB crew. In 2010 the East Jefferson WCC crew began additional surveys along the left, more accessible bank of the Dosewallips, finding more sites than previously, and more upstream sites. Most sites found in 2010 were treated by the same crew. Re-treatments took place in 2011 and 2012. Drier conditions in 2012 allowed surveying and treatment on the right bank for the first time.

In 2013 the East Jefferson County WCC crew again worked on the Dosewallips. HCSEG was the funder and their report states “Crews completed knotweed surveys and treatments along both banks of the river mainstem. Overall, knotweed infestation along the river consists of smaller patches in the upper reaches and slightly larger patches toward the lower river. Continued outreach efforts produced a few new property owner consents and these properties were all surveyed and treated if knotweed was present. Knotweed re-growth showed a significant decrease from previous years; very little or no knotweed remained where it previously grew above the lower two miles of the river. Crew time and herbicide used were also significantly lower than previous treatment seasons.” As on the Big Quilcene, HCSEG plans to offer native plantings to landowners in 2014.

CCNWCB crews also worked on the Dosewallips in 2013, especially on the upper reaches where there are private landowner in-holdings in the Olympic National Forest. For the first time, the county had access to crews (Clallam and Jefferson PSC) that were able to work on other weeds besides knotweed—see Page 39. Serious herb Robert infestations have been found on the upper reaches of the Dosewallips and the PSC were able to work on these as well as knotweed. They also treated a severe butterfly bush and Scotch broom infestation at near the mouth of the river. Herbicide use for non-knotweed treatments is not included in the following table.

Herbicide Use-Dosewallips River (gallons)								
	2006	2007	2008	2009	2010	2011	2012	2013
Acreage Treated	2	5	7.75	5.5	14.05	0.3	0.57*	5 (est)
AquaNeat injected	0.77	3.175	0.8	0	0	0	0.031	0
AquaNeat sprayed	0.375	3.2	3.12	0.234	8.48	0.58	1.443	1.56
Polaris AQ sprayed	0	0	0	0	0.02	0	0.02	0.003
Total Herbicide	1.145	6.375	3.92	0.234	8.5	0.58	1.494	1.56

Note: Acres treated were calculated by adding together the acreage on all of the Pesticide Application Records and may vary depending on whether the applicator recorded the area treated or the whole infested area. The discrepancy between acres treated in different years may be due to different counting methods being used. In 2011 and 2012 the crew recorded strictly the acreage covered by knotweed, not the total infested area, as they had done in previous years. This accounts for the greatly reduced acreage.



Thorough treatment in 2010 led to a drastic reduction in knotweed in 2011. Herbicide use increased in 2012 because low water flow in the river allowed treatment to be extended to the right bank of the river for the first time. It stayed relatively constant in 2013 although CCNWCB crew found and treated some new sites.

Duckabush River

The Duckabush is one of the major waterways in Jefferson County. It originates near Mount Duckabush, within Olympic National Park, flowing into the Hood Canal south of the town of Brinnon. It is 24.5 miles long with over 50 tributaries contributing an additional 94 stream miles. The watershed covers an area of approximately 75 square miles. The upper watershed, lying within the National Park, has been minimally logged and is used recreationally for hiking and camping. The lower 3.4 miles are accessible to salmon and support populations of Chinook, coho, chum and pink salmon, as well as steelhead and searun cutthroat.

In 2006 windshield and foot surveys were conducted on the Duckabush River. No knotweed plants were found. In 2007 a landowner off channel notified us of knotweed on his property, which we treated. This site was re-treated in 2008, 2010 and 2012. In 2012, HCSEG funded another complete survey of the river. No knotweed was found.

In 2013 the CCNWCB/JCNWCB crew re-treated the small off channel patch of about 10 plants near the mouth. Despite re-treatments over many years, this patch remains inexplicably undiminished.

Herbicide Use, Duckabush off-channel site		
2011	2012	2013
0	0.01	0.0008

Note that 2011 and 2012 treatments were solely glyphosate. In 2013 the Weed Boards used imazapyr at 1%. In most cases this explains the herbicide decrease.

PROJECT ACTIVITIES BY WATERSHED—CONTINUED
MASON COUNTY



Dark green indicates sites treated by East Jefferson WCC crew, funded by HCSEG. Light green indicates sites treated by MCNWCB and/or the Mason PSC. Parcels in red on the Skokomish River indicate treatment by Mason CD

Tahuya River

Crew— *Hood Canal Salmon Enhancement Group*

The Tahuya River is the largest stream on the Kitsap Peninsula, draining 45 square miles of land. The mainstem is 21 miles long with an additional 65 miles of tributaries. The numerous tributaries are an important factor in the Tahuya’s ability to produce large numbers of coho salmon. In 2010 the first knotweed survey on the Tahuya found small intermittent patches. Access to the river is difficult, due to large undeveloped parcels and its remoteness. Complete treatments of known (56 properties) knotweed patches were conducted in 2010, 2011 and 2012, when a few additional permissions were added. Planting plans by HCSEG staff on a few properties have been created and await plantings.

In 2013, for the fourth consecutive year, crews completed knotweed surveys and treatments on all approved parcels along the Tahuya River mainstem. Outreach efforts produced a few new property owners that gave consent for survey and treatment. Knotweed re-growth compared from the previous year’s showed an overall decrease. 8.3 gallons of glyphosate were used on the Tahuya River in 2013. Native revegetation planting efforts occurred on four large properties utilizing native conifers. Planting plans have been established for additional plantings to occur during the 2013-14 winter months with maintenance of existing plantings.

Union River

Crew—East Jefferson WCC, Mason County NWCB and Mason PSC

The Union River enters Lynch Cove at the terminus of the east arm of Hood Canal, draining 24 square miles of land. The mainstem is 10 miles in length with 30 miles of tributaries. The Union Reservoir supplies up to 5 million gallons of water per day to the City of Bremerton and the Puget Sound Naval Shipyard. The Union River is the only watershed in west WRIA 15 and north WRIA 14 to support a healthy run of summer chum salmon. Knotweed survey and control on the Union River began in 2009 and has continued each year since. Most landowners provided permissions for knotweed treatments and are very accommodating to crews. In 2011, 89 properties were treated, totaling 2.5 acres compared with 55.8 acres that were treated in 2010, an obvious decline in plant mass.

2012 marked the fourth consecutive year of knotweed treatments along the main stem of the Union River and its tributaries including Bear and Courtney Creek. Tributaries including Viola and Irene Creek were surveyed and treated for the first time in 2012. Access to the river is good with most landowners allowing treatment. All previous knotweed patches were treated in the 2012 season with the vast majority knotweed showing noticeable decrease in patch size. A total of 71 properties were treated. Replanting efforts on various properties were conducted winter of 2011 and 2012. Viola Creek had a few but large knotweed patches close to its headwaters, which were completely surveyed and treated in 2012 except for one property. Irene Creek had small, diffuse, knotweed patches which were completely surveyed and treated. Knotweed treatment and planting were conducted HCSEG staff, volunteers and MCWCC.

In 2013, for the fifth consecutive year, knotweed was surveyed and treated along the river mainstem. Additionally, four tributaries received second- and third-year treatments. Knotweed regrowth on the river mainstem appeared to be at an all-time low compared to previous years' regrowth. 8 gallons of glyphosate were used on the Union River in 2013. *HCSEG have observed that in some areas where knotweed has been controlled, other invasives such as spotted jewelweed, policeman's helmet or giant hogweed have invaded.* Native plant revegetation efforts continued and were maintained on properties along the upper and lower reaches of the river and tributaries. Planted vegetation focused on native coniferous trees, and includes deciduous trees and shrubs along the river's riparian zone for erosion control and habitat complexity. Native planting and maintenance efforts will continue in 2014.

Dewatto River

Crew— East Jefferson WCC

The Dewatto River enters Hood Canal about 5.5 miles north of the Great Bend of Hood Canal, draining about 23 square miles. The mainstem is 8.7 miles in length with about 30 miles of tributaries. Several wetlands are present near the mouth, providing quality rearing habitat for juvenile salmonids. Although logging was historically the dominant land use and much of the watershed is still managed for timber production, the estuary remains relatively undisturbed. Knotweed survey and control on the Dewatto River began in 2009 and has continued each year since. Access is relatively easy in the lower reaches as the main road runs along the river. In the upper reaches there is a fairly large gap between the road and the river, often separated by wetlands or thick woods, making access more challenging. Knotweed in the Dewatto River is found in smaller patches spread intermittently throughout the river. All known knotweed patches were treated in 2009, 2010 and 2011.

In 2012 HCSEG conducted its fourth year of comprehensive knotweed survey and treatment along the Dewatto River. In addition to treating known patches, two tributary creeks, "Tributary 8" and "Cutthroat Creek" (both unofficial names), were completely surveyed and treated for the first time in 2012. Knotweed dispersal on both tributaries is similar to that of the main stem river.

In 2013 the Dewatto River and its tributaries were surveyed and treated for the fifth consecutive year. Properties that have been identified with knotweed are mainly owned by private forest companies, all of which have given full consent for access and knotweed treatments. All knotweed on the river mainstem and targeted tributaries was completely treated, and shows an overall decrease in knotweed plant numbers. 0.123 gallons of herbicide were used on the Dewatto River in 2013.

For more information about the Tahuya, Union or Dewatto Rivers please contact Mendy Harlow, 360-275-9722
mendy@hcseg.org or Michelle Myers, 360-275-9722 michelle@pnwsalmoncenter.org

Skokomish River

Crew—Mason County Conservation District

The Skokomish River drains a basin of about 247 square miles. It empties into Annas Bay in southern Hood Canal near Potlatch, Washington. The upper reaches of the Skokomish River lie within the Olympic National Park. The North Fork basin includes Lake Cushman, a reservoir maintained for hydroelectric power generation. The entire basin is sparsely populated and rural; it provides important habitat to a variety of terrestrial wildlife such as elk, deer, beaver, and waterfowl. Wildlife, shellfish, and finfish are important cultural and economic resources for the Tribe. The Skokomish River system provides valuable habitat for important species of fish such as Chinook, Coho, and chum salmon; steelhead; and various trout. From 2010 to 2012 the Mason Conservation District (MCD) treated knotweed on the Skokomish River. In 2012 crews focused on taking a systematic top-down approach to treatment, and almost 43 acres were treated.

In 2013 the Conservation District continued to treat knotweed in the Skokomish Valley, which is a large area with a high level of infestation. To improve efficiencies MCD adopted a new method of documenting knotweed infestation and treatment this year which will make it difficult to compare this and future treatments with past years. This year MCD treated 29 parcels, (shown on the map in red) in the Skokomish Valley. 16.84 gallons of herbicide were used—a significant reduction from 2012, when 143.25 gallons were used.

The MCD also was contracted by the Squaxin Island Tribe to treat knotweed in the Skookum Creek Watershed. They surveyed 38 parcels, 2.79 miles of stream, and 39.34 acres and treated 20 parcels and 1.05 acres.

For more information about the Skokomish River please contact Evan Bauder at the Mason Conservation District, 360-427-9436 ext 13 or evan@masoncd.org

Other Mason County Sites

Crew—MCNWCB and the Mason PSC

In 2013 Mason County was able, for the first time, to utilize a Puget Sound Corps (PSC), funded by the DNR. (See Page 9 for more information about PSC). Many knotweed sites throughout Mason County were treated. Large concentrations of knotweed on Sherwood Creek and Finch Creek were treated for the first time, mainly with injections of Aquaneat. A “top-down” strategy was used, which will be continued in 2014. The PSC also treated large stands of knotweed on Stimson Creek, at the Davis Farm on the Union River, and a number of upland sites. Other small Mason County sites were treated by Mason County Noxious Weed Control Board and/or the PSC crew. These include sites on Waketickeh Creek, Goldborough Creek, North Bay, Oakland Bay and some upland sites. All treated sites are shown on the watershed overview map above.

Herbicide Use, Mason County, 2013 (gal)		
	Glyphosate injected	Glyphosate and/or imazapyr sprayed
Skokomish River	0	16.84
Tahuya River	0	8.3
Union River	5.69	8.55
Dewatto River	0	0.123
Finch Creek	2.06	0.03
Stimson Creek	3	1.15
Sherwood Creek	3.23	0
Other riparian sites	1.32	0.85
Terrestrial sites	1.54	1.33
Total	16.84	37.173

On the three rivers where treatment has been on-going for several years, treatment was mainly foliar spray—the exception being the Davis Farm on the Union River. On Finch, Stimson and Sherwood Creeks, where treatment was mostly first-time, treatment was mainly injection.

For more information about Mason County work, please contact Pat Grover, 360-427-9670 ext. 592 patriciaq@co.mason.wa.us

PROJECT ACTIVITIES BY WATERSHED—CONTINUED WEST JEFFERSON COUNTY AND GRAYS HARBOR COUNTY

Quinault River, Lake Quinault, Queets and Clearwater Rivers



The brown polygons indicate the Quinault Indian Nation's Project Area. Shape files of their treatment are not available. The entire project encompasses 227,774 acres. Purple indicates sites treated by the North Cascades EPMT with the National Park Service.

The Quinault River, Lake Quinault and the Queets-Clearwater watershed are all included in WRIA 21. This WRIA contains some of the last remaining free-flowing large rivers in the lower 48 states. It contains areas of habitat that are relatively pristine (especially those within the Olympic National Park), as well as areas that have been greatly affected by logging and other activities over the last century. The entire WRIA is included in the Quinault Indian Nation's (QIN) Usual and Accustomed Fishing and Hunting Area. It is a rural, sparsely-populated area where land ownership is dominated by ONP, USFS, Washington Department of Natural Resources and large timber companies. Unlike the protected marine and estuarine environments of Puget Sound and the Hood Canal, these streams drain directly into the Pacific Ocean. Ocean survival is less for fish leaving these coastal streams, making in-stream survival of juvenile fish more significant.

The Quinault River, tributaries and floodplain, Lake Quinault and Prairie Creek

Crew—Total Vegetation Management and Brittlund Company crews, led by Bonnie Eystone, Quinault Indian Nation staff.

The Quinault River is 69 miles long and originates in the Olympic National Park. It flows into and out of Lake Quinault and empties into the Pacific Ocean at Taholah. The Quinault River has healthy stocks of sockeye and also supports Chinook, chum and Coho. The upper reaches offer spawning and rearing habitat for federally-listed

bull trout. Prairie Creek is located near the outfall from Lake Quinault and is a source of knotweed infestation in the lower Quinault River.

In 2007 the Quinaults received a SRFB grant for five years of knotweed control on **Prairie Creek** and work has taken place each year since. 2011 was the final year and the grant was amended to include the North Shore of Lake Quinault and Amanda Park. The Prairie Creek treatments have been successful and natural vegetation is establishing. In 2010 the Quinaults were awarded a SRFB grant for knotweed survey and control in the **lower Quinault River**. The lower watershed has 68,000 acres of tributaries, 600 miles of roads, 300 miles of streams and many harvest units and gravel mines. It also includes the town of Neilton, which was found to have large knotweed infestations that were being spread by mowing, cutting or dumping and was obviously another source for the lower Quinault River infestation. Most of the sub-watersheds were surveyed and treated in 2010. Treatment continued in 2011 and there was a marked reduction in size of plants in previously treated areas. The Lower Quinault project area encompasses 63,000 acres.

In 2011 the upper Quinault River, above the lake, was surveyed and treated by the North Cascades EPMT with NPS and by Grays Harbor NWCB. In 2012 the Lower Quinault Tributaries were treated for the first time, by the QIN crew.

In **2013** the Quinaults did a first-year treatment of the Lower Quinault floodplain. They surveyed over 1,000 acres. Dense stands of knotweed on over 43 acres were treated. The Lower Quinault tributaries were also treated, for a second year. Over 12,000 acres were searched for knotweed. Re-vegetation was begun—conifers were planted on some of the Lower Quinault Tributaries. Knotweed in the town of Neilton was re-treated by the QIN crew.

In **2013**, the North Cascades EPMT with the National Park Service treated knotweed on the upper river, above Lake Quinault.

Queets-Clearwater Watershed

Crew—Pacific Coast Salmon Coalition Crew, led by Jill Silver

The Queets River is 53 miles long and is mainly within the boundary of the Olympic National Park. The last four miles, outside the Park, are within the Quinault Indian Reservation. The Queets supports stocks of Chinook, Coho, chum and steelhead; additionally, the upper reaches offer spawning and rearing habitat for federally-listed bull trout. The Clearwater, which is 39 miles long, is one of the main tributaries. It joins the Queets at approximately RM 4, as the Queets leaves the National Park. It also supports stocks of most salmon species. Conservation efforts are underway on the Clearwater.--The Nature Conservancy recently purchased 3,088 acres.

In 2011 the Quinaults received a **3-year EPA grant** (2 seasons of knotweed control) for detection and treatment on the Queets and Clearwater. Jefferson County NWCB was contracted to obtain landowner permissions. The project area covers 153,000. The survey was 2/3 completed in 2011, the source of knotweed on the Clearwater River was located and only one site was found on the Queets. In 2012 crews treated all previously recorded knotweed infestations and completed surveys and treatment along the remaining length of the Queets and Clearwater rivers. The surveys covered 23.95 river miles, and approximately 1040 acres. The total area treated was 2.25 acres.

In **2013** known sites on the Queets and Clearwater were re-treated. Significant decrease in knotweed was noted on the Clearwater River, upstream from the town of Clearwater.

The Quinaults have observed that knotweed is being spread by activities such as timber harvest, gravel mining, road construction and recreation and think that their biggest challenge is to connect with each industry or individual companies within each industry to prevent re-infestation of areas already treated. In **2013** they began implementing Best Management Practices in timber harvesting, to prevent the spread of knotweed.

In many cases the Quinaults found that other invasives, primarily Scotch broom, tansy ragwort and reed canarygrass, are moving into areas previously infested with knotweed. In most cases they treated these invasives along with knotweed. They also treated both knotweed and gorse on the reservation, but outside of the grant-funded area.

The Quinalts are now working with multiple sources of funding—Salmon Recovery Funding Board, Environmental Protection Agency (Clean Water Act), Natural Resource Conservation Service and the United States Fish and Wildlife Service.

Herbicide Use (gals) QIN Project Area, 2013 (all weeds)		
	Acres Treated	Triclopyr sprayed
Quinalt River	43.1	20.02
Quinalt Tributaries	5.9	2.09
Queets River	4.1	2.14
Clearwater River	1.5	0.83
Total	54.6	25.08

For more information about knotweed treatment on Quinalt, Queets and Clearwater Rivers, please contact Jim Plampin, at 360-276-8215 or jlampin@quinault.org.

Hoh River

Crew—10,000 Years Institute and Pacific Coast Salmon Coalition



Green dots indicate 2013 knotweed treatment. Brown—reed canarygrass. Pink—herb Robert. Yellow—Scotch broom

The Hoh River Knotweed Control Project has been underway in the Hoh watershed since 2001. The 300 square mile watershed is famous for wild stocks of winter steelhead, fall Coho, and spring/summer and fall Chinook salmon. Restoration and maintenance of a functional mature riparian forest is considered a primary component of a salmon recovery strategy by the WRIA 20 salmon recovery and watershed planning groups, and knotweed eradication is critical to that outcome. The Hoh knotweed infestation initiated from a single clump, identified by Hoh Tribe field staff in 1999, located at an old homestead near the Olympic National Park (river mile 30). The clump was eroded and spread down the river during a winter flood. By the end of 2003 18,585 canes, in 1,247 sites widely dispersed over 20 river miles had been documented and treated. Annual surveys and re-treatments of the 30 mile river corridor have been conducted since 2003 by 10,000 Years Institute in partnership with the Hoh Tribe, Hoh River Trust, and ONP. Knotweed plant density and distribution continues to be reduced, and many remaining plants are now less than 3' in height.

In **2012**, 3700 of 4500 acres on 27 river miles were surveyed. **An additional grant** was provided by the Washington State Department of Agriculture (WSDA) **for Early Detection/Rapid Response** surveys and control for a number of other invasive plants observed to be expanding in recent years including Scotch broom, herb Robert, reed canarygrass, tansy ragwort, and Himalayan blackberry. Correctional camp crews supervised by PCSC pulled and cut Scotch broom at three large infestations on river gravel bars, and PCSC crews worked with 10,000 Years Institute staff to control reed canary grass and herb Robert by manual and chemical means at river floodplain locations and on one large tributary.

In **2013** 10,000 Years Institute and crew from Pacific Coast Salmon Coalition began fieldwork at the end of July with two days of donated airboat time on the Hoh River's mainstem river channel and banks. Surveys and treatment continued as weather permitted through mid-October; covering river bars, riparian thickets and floodplain forests within the river's floodplain. The project surveyed approximately 65% of the total project area from River Mile (RM) 30 to RM 0. Knotweed surveys and treatment took place on right bank sites from river mile 30.35 to 15 (Upper Brandeberry to the Hoh Oxbow). Left bank surveys and treatment were conducted from RM 23 to 1 (Clear Creek to Braden Creek). Scattered Bohemian, Japanese, and Giant knotweed was observed; most without flowers, the majority of knotweed plants were under 6'. In total, the crew encountered 39 knotweed sites

Of the 39 sites, 22 had plants that were less than 3' tall, 12 had plants that were less than 6 feet. The three sites with the tallest plants were under 10' tall. Scotch broom was pulled on four days with correctional crews, and herb Robert was pulled in many locations, and sprayed at two sites. Reed canarygrass has spread exponentially; seed heads were pulled, clumps were bundled and sprayed along Elk Creek, and along the Hoh River at many small sites from RM 29.75 to RM 1. 49 gallons of spray using aquatically-labeled imazapyr (Habitat or Polaris) @ 1% were applied to 1.13 acres of treated sites within the 2500 surveyed acres of river floodplain. The project received funding from the SRFB and WSDA Knotweed Program.

Herbicide Use, Hoh River (gallons)						
	2008	2009	2010	2011	2012	2013
Acres Treated	1093	1000	NA	0.16	0.14	0.11
AquaMaster or AquaNeat Injected	0.0151	0.188	0.25	0.13	0	0
AquaMaster or AquaNeat Sprayed	0.5645	0.13	0.78	0.73	0.37	0
Polaris AQ Or Habitat Sprayed	0.06382	0.043	0.206	0.02	0.09	0.145
Total Herbicide	0.64342	0.361	1.247	0.88	0.46	0.145

For more information about knotweed treatment on the Hoh River, please contact Jill Silver, 10,000 Years Institute, at 360-385-0715 or jsilver@10000yearsinstitute.org.

Appendix I: Herbicide Use (gallons)

Organization	River or Location	2006	2007	2008	2009	2010	2011	2012	2013
Quileute Tribe & NCEPMT with NPS	Quillayute, Dickey, Calawah and Bogachiel Rivers	101.5	43.97	43.125	98.63	69.55	118.2	6.2	10.06
CCNWCB and/or NCEPMT with NPS	Big River, Hoko-Ozette Road	65.39	5.14	2.181	5.12	3.17	0.64	0.46	0.07
CCNWCB	Sekiu River	10.98	0.3	1.76	0.61	2.35	0.475	0.52	0.125
CCNWCB	Hoko River	2.6	4.23	2.516	1.54	0.56	0.28	0.15	skip
CCNWCB	Sekiu, Clallam Bay & Hwy 112	17.9	9.79	3.28	0.605	0.5	0.18	0.066	0
CCNWCB	Clallam River	0	35.09	3.28	2.58	0.93	1.87	0.28	0.077
CCNWCB & Merrill and Ring	Pysht River	1.2	0.72	0.005	0.005	0.01	0	0.01	0
CCNWCB & NCEPMT / NPS	Sol Duc River (mid)	14.05	12.725	7.63	1.62	0	0	0	0
CCNWCB	Lake Creek, Lake Pleasant & Beaver	0	27.09	0.82	1.06	0	0	0.1542	skip
CCNWCB and/or Quileute Tribe	Sol Duc River (lower)	0	9.656	6.67	0.945	1.26	0	2.1	1.09
NCEPMT with NPS	Lake Crescent	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.14
Quileute Tribe and/or CCNWCB	Forks	2.5	4.25	1.662	0.468	0	0	N/A	1
CCNWCB	Deep Creek	0	0	0	0	0	0	0	0.033
CCNWCB	Salt Creek	0	0	0	0	0	0	0	0.015
CCNWCB	Valley Creek	2.3	1.52	0.063	0.023	0.01	0	0	0.015
CCNWCB	Peabody Creek	0	0	0	1.98	0.14	0	0	0.056
CCNWCB and/or NCEPMT with NPS	Ennis Creek	0	0.68	1.34	1.91	3.641	<1	0.123	0.015
CCNWCB	Lees Creek & E Forks Lees	0	0	0	0	0	0.48	0	0.002
CCNWCB	Bagley Creek	0	0	0	0	0	0.97	0.328	0.015
Jamestown S'Klallam Tribe or Clallam PSC	Dungeness River & surrounding area	30	<2	1.5	0	0	0	0	0.14
JCNWCB & CCNWCB	Snow & Salmon Creek	0.745	0.408	1.33	1.714	0.43	0	0.001	0
JCNWCB & CCNWCB	Port Townsend & other Jefferson County sites	0	0	2.212	0.99	1.157	2.31	0	0.0248
JCNWCB & CCNWCB	Spencer Creek	N/A	N/A	N/A	N/A	N/A	1.69	3.29	0.32
JCNWCB & CCNWCB	Tarboo Creek	N/A	N/A	N/A	N/A	N/A	1.96	2.25	0.03
HCSEG	Big Quilcene River	0	0	5.66	18.291	32.37	9.77	7.33	9.92
HCSEG	Little Quilcene River	0	0	0	0.6	0.1	0	0	0.09
HCSEG	Dosewallips	1.145	6.375	3.92	0.234	8.503	0.58	1.543	1.56
MCNWCB & Mason PSC crew	Sherwood Creek, Finch Creek, Stimson Creek, plus others	N/A	N/A	N/A	N/A	N/A	N/A	9.6	11.64
Mason CD	Skokomish River	N/A	N/A	N/A	N/A	17.57	N/A	143.25	16.84
HCSEG	Union, Dewatto & Tahuya Rivers	N/A	N/A	N/A	25.56	27.16	10.98	46.69	22.69
Quinault Indian Nation	Queets, Clearwater & Lower Quinault	N/A	N/A	N/A	N/A	12.65	N/A	31.75	25.08
10,000 Year Institute	Hoh River	2.36	1.23	0.643	0.361	1.247	0.88	0.46	0.15
TOTAL		260.49	169.66	92.331	165.6	186.86	152.28	231.75	101.2

NCEPMT with NPS = North Cascades Exotic Plant Management Team with the National Park Service.

Appendix II: Clallam/Jefferson NWCB landowner agreements

This table is a conservative visualization of a complex web of agreements. Multi-parcel owners are counted only once, even though the agreement is "amended" to add parcels. This table summarizes current agreements held by Clallam and Jefferson NWCBs. Agreements held by other agencies are not included.

Watershed	Existing Valid Agreements, Prior to 2013	New Agreements, 2013	Number of Parcels	Note
Big River and Hoko-Ozette Road	19	0	34	A few large land owners, mainly timber companies, each hold several parcels.
Sekiu River	4	0	10	
Hoko River	7	0	31	A few large land owners each hold several parcels. These include timber companies and Washington State Parks. If agreements have already been counted in another watershed, they are not included here, but the parcels are included.
Sekiu, Clallam Bay and Highway 112	3	0	6	Most agreements in this area have expired
Clallam River	7	0	19	
Pysht River	0	0	0	
Sol Duc River	3	0	3	Most agreements in this area have expired
Lake Creek, Lake Pleasant and Beaver	7	0	9	
Forks	3	0	3	Most agreements in this area have expired
Deep Creek	0	1	20	A few large land owners, mainly timber companies, each hold several parcels and their agreements have already been counted.
Nordstrom Creek	0	4	9	
Salt Creek	0	10	25	
Elwha River	4	0	6	
Valley Creek	1	1	23	City of PA holds multiple parcels on Valley Creek
Peabody Creek	12	1	29	
Ennis Creek	27	1	41	
Lees Creek	19	0	28	
East Fork Lees Creek	15	1	19	
Morse Creek	19	0	53	
Bagley Creek	32	0	52	
Siebert Creek	11	0	39	
Bell Creek	0	3	4	
Dungeness River	0	1	9	
Snow Creek	0	0	1	
Port Townsend	0	1	7	
Lake Leland	5	2	9	
Big Quilcene River	20	0	42	
Little Quilcene River	2	1	4	
Tarboo Creek	2	1	4	
Spencer Creek	4	0	6	
Dosewallips River	13	0	32	HCSEG now holds many agreements
Duckabush River	1	1	2	
Queets/Clearwater	114	3	180 (est)	
Total	354	32	759	

Appendix III: Contact Information

This list encompasses agencies treating knotweed. Please see our website for past and present working group attendees and their contact information—www.clallam.net/weed

Comment [Im3]: Should I add contact info for all the other attendees?

Clallam County

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Hood Canal Salmon Enhancement Group

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North Olympic Salmon Coalition

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Pacific Coast Salmon Coalition

Carl Chastain
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Appendix IV: OKWG Exercise

This exercise was intended to identify data gaps, current treatment regimes and decision-making processes for choosing different treatments. The information presented here merely represents the opinions and experiences of field practitioners present during the OKWG fall meeting. This information will be provided to WSDA as background information that may be useful to update the states knotweed Best Management Practices.

Based on responses of the group, in the right-hand column:

T = True, F = False, U = Uncertain, C = Consensus.

I. Things we think we know

Answers are italicized

Biology	
<p>Starts growing late spring (what is earliest?)</p> <p>Dies back by? <i>Feb, March, April, all given as times. Depends on weather, site specific conditions.</i></p> <p>Data gap: Is there a temperature, or other information to determine when knotweed might appear? There is no information on whether there is deviation between species, but generally no one had observed a marked difference.</p>	T F U C
<p>Deep, 9-10 feet Long roots, 20 feet Leaky? <i>Consensus that the roots are leaky.</i></p> <p>Questions about whether there is "flashing" to other species' roots. Answer from Dr. Miller, possible, but unlikely given the way the roots are growing. Actual roots are fairly fine, rhizomes are the major problem, and are not growing "into" roots of other plants, just growing in close proximity. Lots of questions regarding this topic, such as distance herbicide will travel, whether one herbicide "burned" more than another and therefore didn't get as much into the rhizomes and roots.</p>	T F U <u>C</u>
<p>Heavy cuticle on all species? <i>General consensus that there was not a heavy cuticle, but that Japanese had the thickest leaves.</i></p>	
<p>Other observations? <i>There can be very late emergence, especially when deeply buried. Plants growing from fragments may not even emerge in the first growing season.</i></p>	T F U <u>C</u>
<p>Best Growing Conditions-Stress Conditions</p>	
<p>Easier to kill in dry conditions versus wet? <i>General consensus was that this appeared true. Eastern WA practitioners find it easier to kill.</i></p>	<u>I</u> F U <u>C</u>
<p>Difference between terrestrial and riparian? <i>Generally terrestrial infestations seemed to easier to kill, but the group thought this might relate more to soil conditions of wet or dry, or other conditional stresses.</i></p>	<u>I</u> F U <u>C</u>
<p>Grows best in sunny conditions? <i>No consensus, perhaps just a little slower in shade. There were stories of single plants just gaining a toehold into forested areas, as pioneers from stands, or even sporadic plants in more open areas. The rhizomes were growing into wherever they could. Many suspected small plants in shaded areas were just getting started and were simply younger infestations. However, this is still a gray area. Generally the consensus was that knotweed was not inhibited in shaded areas just grown out to its full potential.</i></p>	T F U C

<p>Responds less to herbicides if it is growing in shade? <i>Unclear, no consensus, some thought slower response, others thought bigger leaves, so more surface area?</i></p> <p>Other observations?</p>	<p>T F U C</p>
<p>Response</p>	
<p>Different response between early and established patches? <i>There was consensus that young infestations were easier to kill, highlighting the importance of early intervention.</i></p>	<p>I F U <u>C</u></p>
<p>At what point is there a major difference? Stem#? <i>There appeared to be consensus that number of stems or patch size was merely a surrogate estimate of infestation age, which was actually more important. It all depended on how established, extensive, and connected the rhizome system was. There is no clear way of determining these conditions from the surface. Knowing the history of the site and how long it had been there would be helpful for the same reasons as mentioned above.</i></p>	<p>T F U C</p>
<p>The bigger the biomass, the better an herbicide treatment works? <i>In concept, there was consensus, but there is not enough information to determine how big or tall a shoot should be for a treatment to be worth the effort. In practice, any size would be treated if crews were already on site. Additionally, work schedules were adapted to allow for maximum knotweed re-growth before re-treatments, especially where previously treated for a couple of years.</i></p>	<p>I F U <u>C</u></p>
<p>Previously mowed or cut knotweed does not take successive treatments as well? Even if left alone for a season? <i>The Quinault Tribe had the most familiarity with this issue after undertaking projects in several Gray's Harbor towns. They got significantly inferior results on infestations that had been previously mowed. Although it is not clear, this difference may relate to rhizome response to above ground disturbance. It is possible that individual rhizomes may disconnect more or sooner from each other when "disturbed" resulting in less herbicide conductivity.</i></p>	<p>I F U C</p>
<p>Comes up later if it was treated in the previous year? <i>There was consensus that this was the general trend.</i></p>	
<p>Other observations?</p>	<p>I F U <u>C</u></p>
<p>Treatment</p>	
<p>First treatment has a major impact on success of later treatments? <i>Most felt that there were a number of successful herbicide options, but that thoroughness and <u>complete coverage</u> was the most important factor.</i></p>	<p>T F U C</p>
<p>Other observations? <i>Critical traits for exemplary applicators-focus, attention to detail, good spray technique. There was some discussion of hesitancy by those who were inexperienced or fearful of herbicides which resulted in poorer coverage which in itself might explain less than satisfactory results.</i></p>	
<p>Timing</p>	
<p>Biologically best time to treat is at or after flowering? <i>After, from petal drop on.</i> Time frame? mid-August? <i>Discussion of spraying undersides to avoid bees-but</i></p>	<p>T F U <u>C</u></p>

<p><i>possibly nectaries might still carry into pollen. Better to wait until after flower petal drop. This again brought up issue of shrinking treatment time frame.</i></p> <p>There is biologically no timing difference between glyphosate and imazapyr? <i>No-Dr. Miller.</i></p> <p>There is no timing difference between species, sexes? <i>No information here. Does this mean that male and female flowers develop within the same timeframe?</i></p> <p>There is no timing difference between untreated plants, epinastic or non-flowering? <i>There was some confusion about this question. What was intended was thinking about epinastic growth versus non-symptomatic plant that didn't look like it was going to flower that season for some reason. There was agreement that epinastic plants should be treated later so that as many sprouts and as much of the plant was up as possible, non-flowering should be treated within the same timeframe as ones that would flower. No information on why a never treated plant might not flower except that it might not have matured for some reason.</i></p> <p>Other observations? <i>Many wanted re-assurance that application timing was as good as possible. There is a lot of concern about short time frame to do a lot of work and how to manage this. Some delay re-treats until later in the season by starting with newer, or first treatment sites first. There was some interest in whether additional stresses, such as weather conditions could contribute to better kill in addition to timing.</i></p>	<p>I F U C</p> <p>T F <u>U</u> C</p> <p>T F <u>U</u> C</p>
Application	
<p>It is best to apply herbicide to all plant surfaces, including undersides? <i>There appeared to be consensus that all surfaces were photosynthetic. Is there any data to support this? There was some concern expressed that it can be difficult to stay within rate with imazapyr.</i></p> <p>Re-growth of less than 6 inches should be left for the following season? <i>There was no consensus This is probably where the greatest data gap lies. Many of us are afraid to skip a treatment. Need more info on whether skipping allows more root growth than will be killed by waiting until there is more surface area or greater conductivity of herbicide to the roots.</i></p> <p>Depends on the herbicide? Other observations?</p>	<p><u>I</u> F U <u>C</u></p> <p>T F U C</p> <p>T F <u>U</u> C</p>
Moisture/Rain impacts	
<p>Adding more surfactant reduces moisture impacts/rainfastness? <i>One program utilized this method with some success.</i></p> <p>Adding more surfactant impacts herbicide efficacy? <i>Generally satisfied with up to 1%</i></p> <p>The best surfactant for moisture/rain is? <i>All seem to work pretty well</i></p> <p>Other observations? <i>There did not seem to be much concern that we aren't using perfectly effective surfactants, however, this facilitator wonders whether this might not still be an area for improvement.</i></p>	<p>T F U C</p> <p>T F U C</p>
Temperature	
<p>Sequesters nitrogen at end of season? <i>True, based on Lauren Urgenson's data, consensus.</i></p>	<p>I F U <u>C</u></p>

<p>Can be successfully treated when leaves are yellow? <i>True, based on Dr. Miller's data. His rule of thumb, until 50% leaf drop. This is a very useful trait, when the weather cooperates. By this time, most native understory leaves have dropped; even small knotweed plants become very visible.</i></p>	<p>I F U C</p>
<p>Can't be treated when temperature falls below 50 at night? <i>Can be treated until there is a hard frost, or at least until several nights of hard frost.</i></p>	<p>T E U C</p>
<p>Which herbicide is least affected by low temperatures? <i>There did not appear to be a difference between imazapyr and glyphosate. There is an impact for triclopyr, aminopyralid and others in that chemical family.</i></p> <p>Other observations?</p>	

II. Prescriptions we've used, currently using, like to try

(On the Board-Please give your County, Organization, Name)

1. Injection:

Ever injected glyphosate? What species? How many milliliters/stem? Are you still using it? Under what conditions? Why? What kind of results have you seen after the 1st year? % regrowth? Retreat?

Quite a few had used this method at some point. Results were generally good, but could really only be used for initial treatment, and there was inevitable some small percentage of re-growth or canes that were too small to be treated. Rates ranged from 3-5 ml/cane. Many had moved away from this method for a number of reasons. Some mentioned were:

- the large amount of herbicide that was used, and potential for going over rate on large stands
- too labor intensive
- could only be used in initial treatment, and even then some canes were too small and would have to be sprayed to get complete coverage

Some reasons for using injection still included:

- can be used on wet days
- better public perception where socially/culturally sensitive, or herbicide sensitive individual
- for similar reasons where there were specific wildlife/species concerns
- to treat a buffer between water edge and the bulk of the patch to lessen possible drift into water even though permitted and using aquatically approved formulations

2. Foliar:

A: Glyphosate

Used foliar glyphosate? What species? What rates? What surfactants? Marker dye? Under what conditions? Results after the 1st yr? Are you still using? What changes? Why? Anything different? Rates/Surfactant combos?

Most have used or are using aquatically approved foliar glyphosate products. Rates ranged from 4%-6%, most common is 4%.

Surfactants products included Agridex, Competitor, Dynamic, Liberate at rates ranging from 0.75%-2%, the most common is 1%. One reason given for upping the surfactant rate to 2% was dealing with moisture. It wasn't clear whether this improved rainfastness, or improved spread in spite of moisture (dew) already present on leaves, not due to rainy weather.

Reasons given for choosing specific surfactant varied from

- client requirement,
- availability,
- easy to remember formula, such as 1 oz /gallon.

Many had moved from Agridex because it seemed to bead up and did not spread as well as some of the others. Some chose Competitor over Dynamic because of lower toxicities, even though all were orders of magnitude below any aquatic threshold of concern. Some chose Liberate because of availability. No one reported any significantly different results between surfactant products, except for those found by practitioners using Agridex who subsequently switched.

B: Mix-Glyphosate/Imazapyr

Used mix of foliar glyphosate/imazapyr? What species? What rates? What surfactants? Marker dye? Results after the 1st yr? Are you still using? What changes? Why?

Many had used a mix of aquatic glyphosate/imazapyr for epinastic. The most common rate with a mix was 4% glyphosate/1% imazapyr with 1% surfactant. Many using this mix for re-growth had moved to simply using imazapyr. One reason for switching was less overall herbicide, while seeing little difference between results. Some felt there was less symptomatic re-growth with just imazapyr.

C. Imazapyr: Used foliar imazapyr? What species? What rates? What surfactants? Marker dye? Results after the 1st yr? Are you still using? What changes? Why?

There was still some reluctance to use imazapyr. However, many programs were moving in this direction. Rates ranged from 0.5% to 1%, with various surfactants with rates ranging from 0.75%-2%. Concerns included:

- treatments within 100 feet of wellheads where imazapyr is not allowed
- staying within labeled rates per acre while getting good coverage
- in ornamental settings because landowners had greater concerns for special plants and any kind of off target damage in the vicinity. This combined with the fact that imazapyr is more active at lower concentrations than glyphosate.

Reasons for using included:

- works well at lower concentrations which means less has to be carried into remote sites
- is not as sensitive to water quality which makes it more likely that on-site water can be used
- may provide longer lasting results?
- re-growth may be less symptomatic?
- may travel farther through the rhizomes because it is less sensitive to dilution by plant fluids?

While tantalizing, the last three reasons have not been tested.

D: Other herbicides/surfactants or combos that show promise? Does it have an aquatic label?

According to Dr. Miller, a number of other herbicides such as triclopyr and aminopyralid have been tested, but do not have significantly better results but do carry some additional drawbacks. Aminocyclopyralid has not been tested to anyone's knowledge, nor does it carry an aquatic label, but may be used up to water's edge.

There has been no additional testing of surfactants, although R-54 a more recent, lower toxicity reincarnation of R-11 was mentioned. This surfactant is not listed on Ecology's list of approved surfactants, but if it held special promise, there is potential for it to be requested. No one had any other surfactant suggestions.

Overall, Dr Miller noted, we were getting very good results with both imazapyr and glyphosate. Knotweed is just a very tough plant to completely kill mainly because of the nature of its extensive rhizome system. There was little likelihood for creating resistance by relying heavily on these two herbicides because knotweed's main method of reproducing is through fragments which are essentially clones. While some hybrids may have or gain greater tolerance, our applications would not cause it to occur. Tolerance is merely a natural outcome of natural genetic variation.

3. Non-herbicide methods or Combo method?

What are you doing? What kind of site? What results? How long? Is it a combination?

Only the City of Seattle and King County had done much testing with fabric. They found some of the roots came closer to the surface after 6(?) years of cover. This was a very monitoring intensive project and only suitable for flat, easily assessable sites. Some programs had used bending or cutting prior to spraying. In a survey of most programs, this was not viewed as very useful, too labor intensive, no visible results. However, there might be value under very specific conditions.

The first release of sap sucking psyllids was approved.

OTHER QUESTIONS WE DIDN'T HAVE TIME TO ASK

III. Other Factors: Teasing out problems and tricks used to overcome them

1. How many just did your first year of treatment ever?
2. In a watershed or project area-How many of you were able to complete ALL treatment in one year? Were there skips or incomplete coverage? Do you see any patterns, specific reasons? Difficult terrain, crew couldn't find, poor application?
3. How many have done two or more years of treatment in a project area?
4. How many treatment seasons does it seem to take before you feel you have complete coverage-at least one real treatment, good coverage, found all the patches?
5. How about re-treatments? Is it harder to relocate them?
6. What seems to be some of the obstacles? Does anyone have any recommendations to shorten this? Ways to show poor coverage, GPS track logs, training,

Appendix V

**2013 Puget Sound Corps
Herbicide/Manual Treatment Data Form**

Project ID #: (From project list)

Project Complete? **Y** or **N** (add notes)

Name of Entity/Person for whom Treatment was applied:
 Clallam County Noxious Weed Control Board
 Street Address: 223 E 4th Street, Suite 15 City: Port Angeles State: WA Zip: 98362
 Address or Exact Location of Site: (If you have the parcel number you do not need to enter the address.) Ex: Collins Campground
 PIN(Parcel Identification Number): (Federal lands do not have parcel numbers, so you will have to enter the address or describe site locations.)

General Activity Fields

County (circle one)	WRJA (circle one)	Project Name (from project list)	Owner (circle one)	Workforce**
Clallam Mason	14 15 16 17 18 19		Private Public Non-Profit (if you know)	Puget Sound Corps Crew

Crew Members Present: (Who worked on the project that day?)

Site/Inventory Fields

Start Date	Stop Date	Acres examined for weeds	Treatment Site (circle one)		Total Manual Infested Area Treated: (DO NOT lump plants together)
Use if on same site for multiple days.		Approximate acreage of the area you surveyed.	Road edge/ROW Riparian	Forest Other	
					2 ACRES
Weeds Treated (Just the PLANTS code is OK)		Infested Area (DO NOT lump plants together)		% of area examined for weeds infested with this species (lump plants together - use cover classes 1 - 9 listed below)	Manual/Herbicide or Survey
(List all the weeds you saw in this column. If you need more space use notes on back side.)		(List approximate size of infestation.) acres		(If the plants were all next to each other, what percentage of the infested area would they cover?)	(How did you treat this plant? Mark S if you only saw it.)
Tansy Ragwort/SEJA		1/4 acres		4	H
Scotch Broom/CYSC		2 acres		6	M
Himalayan Blackberry/RUDI		1 acres		9	S
		acres			

* Cover Classes: 1 = Trace, 2 = 1 - 1%, 3 = 1 - 5%, 4 = 5 - 10%, 5 = 10 - 25%, 6 = 25 - 50%, 7 = 50 - 75%, 8 = 75 - 95%, 9 = 95 - 100%
 Note: Cover classes are meant to be approximations only.

All Licensed Applicators: Name and License # Kate Bradshaw 12345, Scottie Mienke 12345
 Firm Name: Washington State Department of Ecology Phone # Ask Jason
 Firm Address: 300 Desmond Drive City: Lacey State: WA Zip: 98503-1274

Application Date	Time Start	Time Stop	Temp (F)	Wind Speed (MPH)	Wind Direction	Cloud Cover	Remarks - Weather forecast
						FS only	FS only. Is rain expected?

Application Area (acres)	Total Volume of Mix Applied (gal)	Dilutant	Special comment
(Acres treated with herbicide)	(Generally 3x number of packs)	Water	

Product Name	EPA Registration #	Amount of herbicide used (oz)	Herbicide Applied/Acre or other measure	Concentration Applied
Aqua Neat	228-365			
Element 3A	62719-37			
Polaris	228-534			
Competitor	2935-04001			
Blazon	N/A			

Was this application made as a result of a permit? Yes No If yes, Permit # <u>Enter number for them</u>	WA State NPDES Acres:	Bankfull Acres:	Acres Treated within 150' of Water:
		FS ONLY	FS ONLY

Notes: Application made as a result of a permit?: Washington state needs to know if this was an aquatic application. Did you get herbicide in a water system? Did you spray plants growing out of water? Were you standing in water when you sprayed? If yes, then circle yes, if no then circle no.

Bankfull Acres: Only a requirement for forest service land. How many acres did you spray that was within a riverbank? Some rivers are seasonal, if you spray in a dry riverbed, it will be included in bankfull acres.

Acres treated within 150' of water: Again, FS only. Estimate the area within 150' of a water system. A mud puddle is not a water system.

Page 2

Appendix VI

TEMPLATE FOR KNOTWEED WORK REPORTING (Please fill in one line for each waterway if possible—or let us know if you are aggregating all your work)

Agency	Crew used and leader's name	Waterway or location	Miles treated	Acres searched	Acres treated	Cover class OR number of stems	Herbicide used	Amount (total)	Number of landowner permissions—any new this year?	Number of parcels treated	Number of landowners helped	Numbers of public vs private landowners	Other weed species treated

EXPLANATION

Agency	Who you are—eg, Hood Canal Salmon Enhancement Group
Crew used and leader's name	Crew—eg East Jefferson WCC, with name of leader
Waterway or location	River or general area—eg Sekiu River or Forks.
River miles treated	Count both banks. If you treat one mile of river, but do both banks, put 2 river miles
Acres searched	Ideally, length of river searched, times average width. If you do it differently, please tell us how you derived your estimate. (ie, if you count an entire parcel, even if you haven't searched it, please indicate this.)
Acres treated	As above
Number of stems (or cover class)	Aggregate number of stems treated, if possible (or cover class—percentage of treated area occupied by the plants—eg, 1%, 20% etc)
Herbicide used	Product name
Amount (total)	In gallons
Number of landowner permissions—any new this year?	Total number held by your agency, with new ones broken out—eg 25\3, where 25 would be the total, 3 of which are new
Number of parcels treated	Total number of parcels—one agreement may cover many parcels
Number of landowners helped	Number whose property you actually worked on
Numbers of public/private landowners	Eg, if you have 25 permission forms and 6 are from public agencies such as WDFW, write 6\19
Other weed species treated	Did you treat weeds besides knotweed?

NARRATIVE (SUMMARY)

Example from last year:

Jefferson County—Weed board staff treated Spencer Creek, Tarboo Creek and a number of small sites. A WCC crew, funded by both North Olympic Salmon Coalition (NOSC) and the Hood Canal Salmon Enhancement Group (HCSEG) re-treated the entire Big Quilcene, Little Quilcene, Dosewallips and Duckabush Rivers. Jefferson County Noxious Weed Control Board (JCNWCB) received funding from the Quinault Indian Nation to acquire landowner permission for knotweed survey and control in the Queets-Clearwater watershed.

Other information (fill in the blanks)

1. What was significant about this year's work?

2. Any specific success story?

3. Any breakthrough treatment?

4. Progress made?

5. Recommendations for next year?

6. Is there a reveg or management plan in place?

7. What partners did you work with?

8. Where was your funding from?

9. Did you sponsor any educational events?

10. Please include contact information—contact person, address, phone number, email and website
