2012
Olympic Knotweed Working Group

New knotweed infestation treated on Bagley Creek, Port Angeles WA

Prepared by

Clallam County Noxious Weed Control Board

Knotweed was greatly reduced on the Clallam River in 2011.
This infestation was reduced again by 80% in 2012

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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 critical 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.

2012 Overview

Many groups are now involved in knotweed control on the Olympic Peninsula. (See the 2012 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.

Dry fall weather led to a very productive knotweed control season. Efforts by Clallam County NWCB focused on complete treatments of the four mandatory control rivers in Clallam County, and treating sites where permission was recently obtained. Years of treatment have greatly reduced most infestations, but the number of waterways needing treatment is still growing. We continued to encourage landowner involvement in terrestrial knotweed treatments and offered two public workshops for landowners, one in western Clallam County, and the other in Jefferson County. Equipment and supplies were made available to landowners who attended a workshop.

2012 ACCOMPLISHMENTS

In 2012 CCNWCB and JCNWCB

- Managed **252 existing Landowner Agreements**, solicited and obtained **50 new Landowner Agreements** (covering **818** parcels in all—see Appendix II)
- Conducted detailed surveys and treatment of an estimated **23** miles of rivers.
- Worked with **18** other OKWG partners, representing a mix of federal, state, tribal and local entities
- Combined treatments/work on additional **121.75 miles** of streams, reported by other OKWG partners
- Offered **two Knotweed Workshops** (in Port Hadlock and Forks).
- Updated and expanded use of a knotweed specific database
- Acquired an NPDES permit for aquatic use, and completed associated reporting (Clallam and Jefferson work only).
- Coordinated a spring and a fall meeting of the OKWG.
- Provided herbicide to another Olympic Knotweed Working Group (OKWG) member, and to private landowners who had completed one of our knotweed workshops. Overall, OKWG members reported using a total of approximately **250.95 gallons** of herbicide. (See Appendix I for a table of herbicide use)

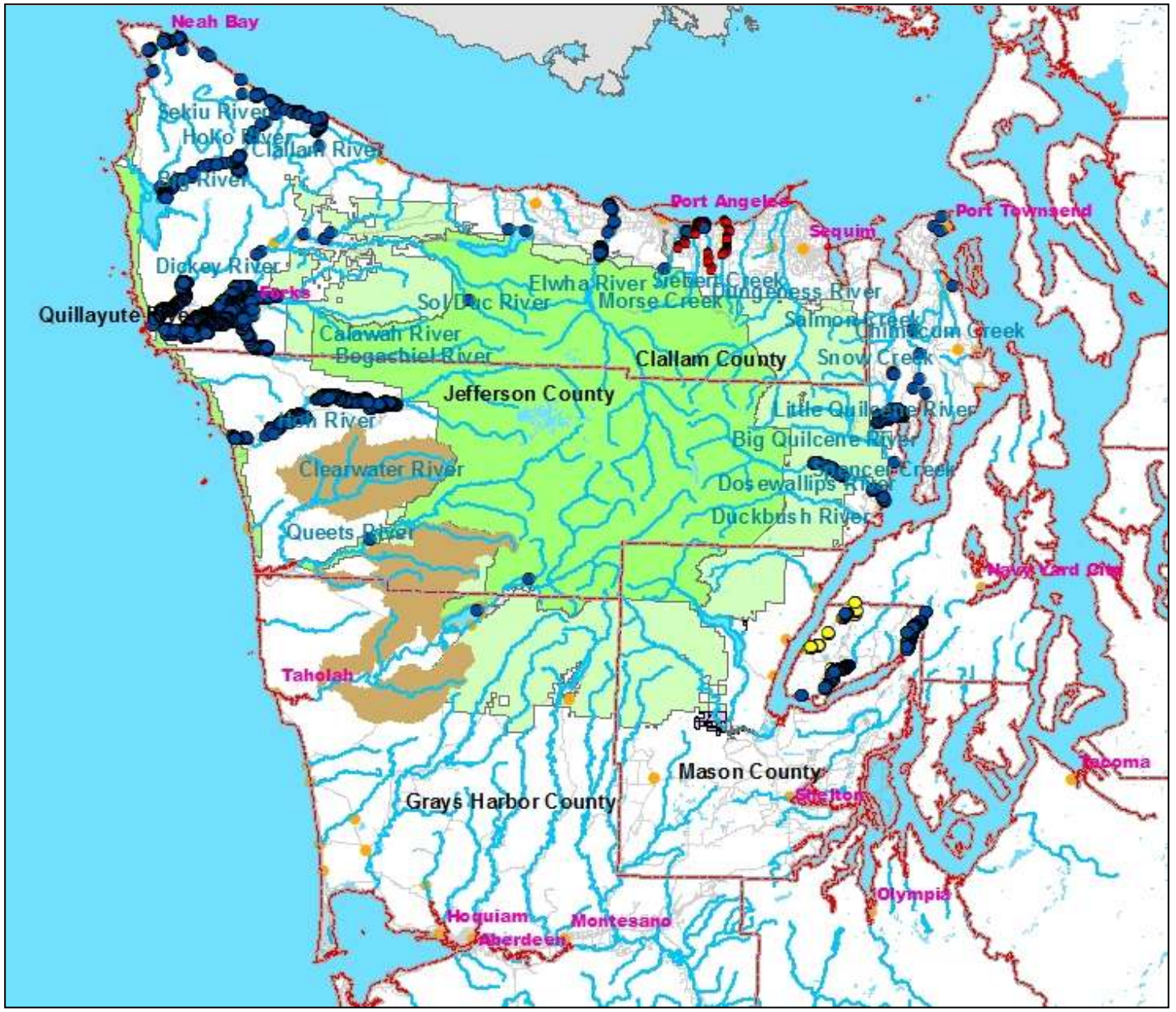
Conclusions/Recommendations

New DNR funded Puget Sound Corps crews working in concert with weed boards next season provide an exciting opportunity for treating comprehensive invasive species problems in many critical aquatic areas.

Using information gleaned from treatment histories, and other observations about river morphology and knotweed species characteristics, CCNWCB developed a decision making tool that we're calling a Risk Matrix. We're hopeful this matrix will help predict whether "*skip treatments*" might be employed without losing ground or allowing significant spread during off years. Given the trend of reduced funding and more dispersed knotweed infestations, this information may enable crews to focus combined treatment efforts where they are most needed. We're soliciting input to test this concept more thoroughly (see pg.9).

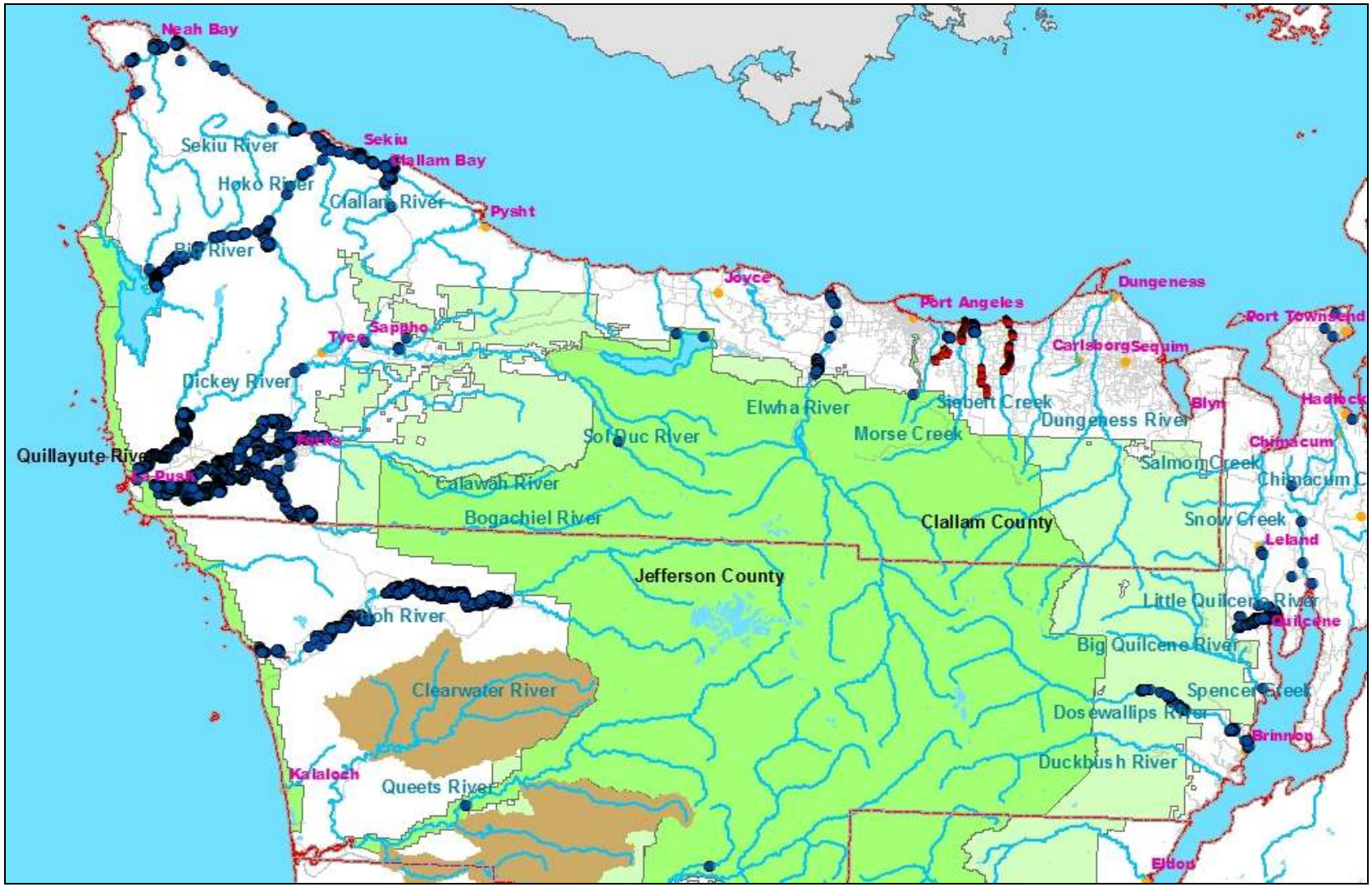
Knotweed projects in Clallam and some in Jefferson County are ahead of those of most other partners. We continue to learn and adapt as projects mature. Most infestations in our project areas are considerably reduced, but we face the increasingly difficult phase of treating in new plantings or partially recovered plant communities. We must be careful not to allow other invasives to exploit areas cleared of knotweed, instead of desirable native vegetation. We work to keep the broadest perspective as we transition to our ultimate goal of improved habitat and ecosystem function in critical riparian habitat.

OVERVIEW MAP OF THE OLYMPIC PENINSULA



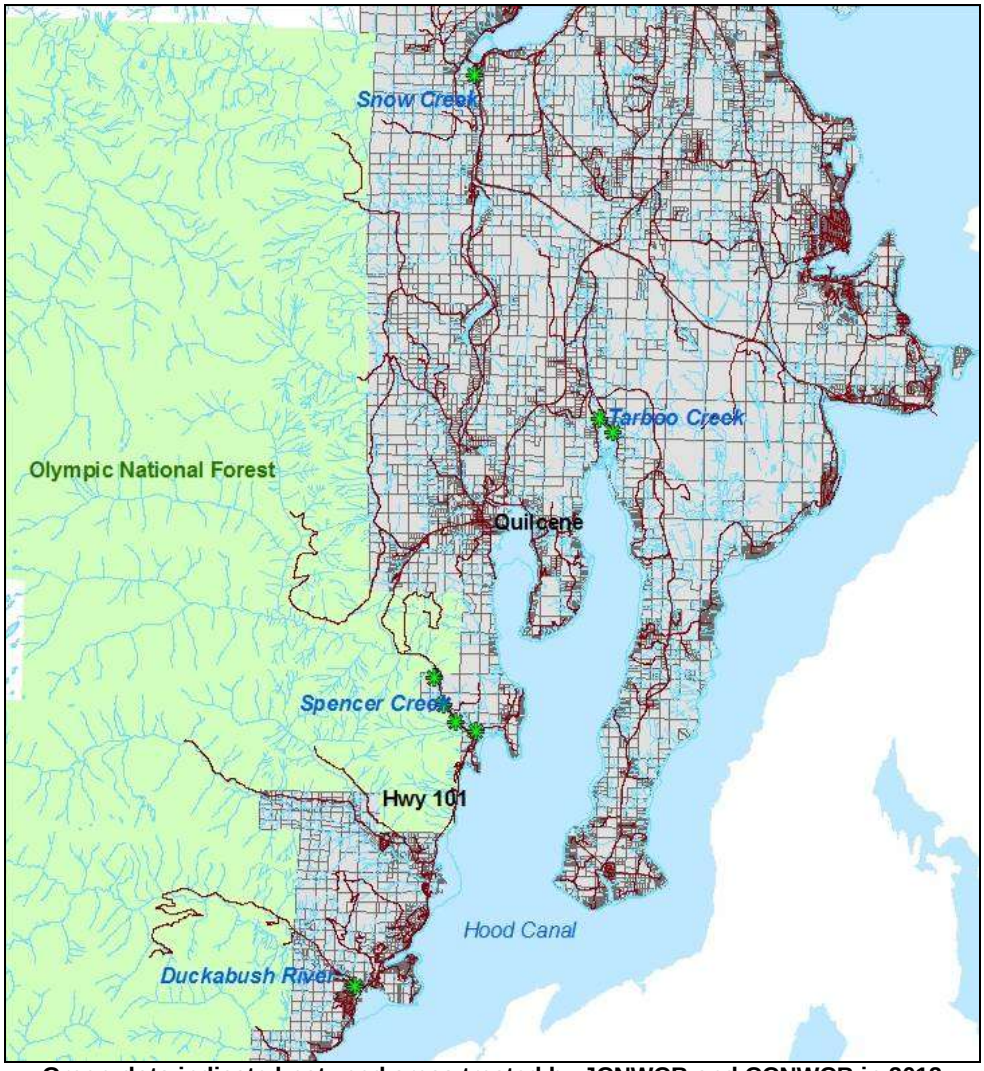
Blue dots indicate where knotweed treatments have occurred. Yellow dots indicate knotweed found but not treated. Red dots indicate a null survey—no knotweed seen. The brown patches indicate the Quinault Indian Nation project area. (Map prepared by Ed McFarlen for OKWG meeting and modified for this report)

OVERVIEW MAP OF CLALLAM COUNTY AND WEST JEFFERSON COUNTY



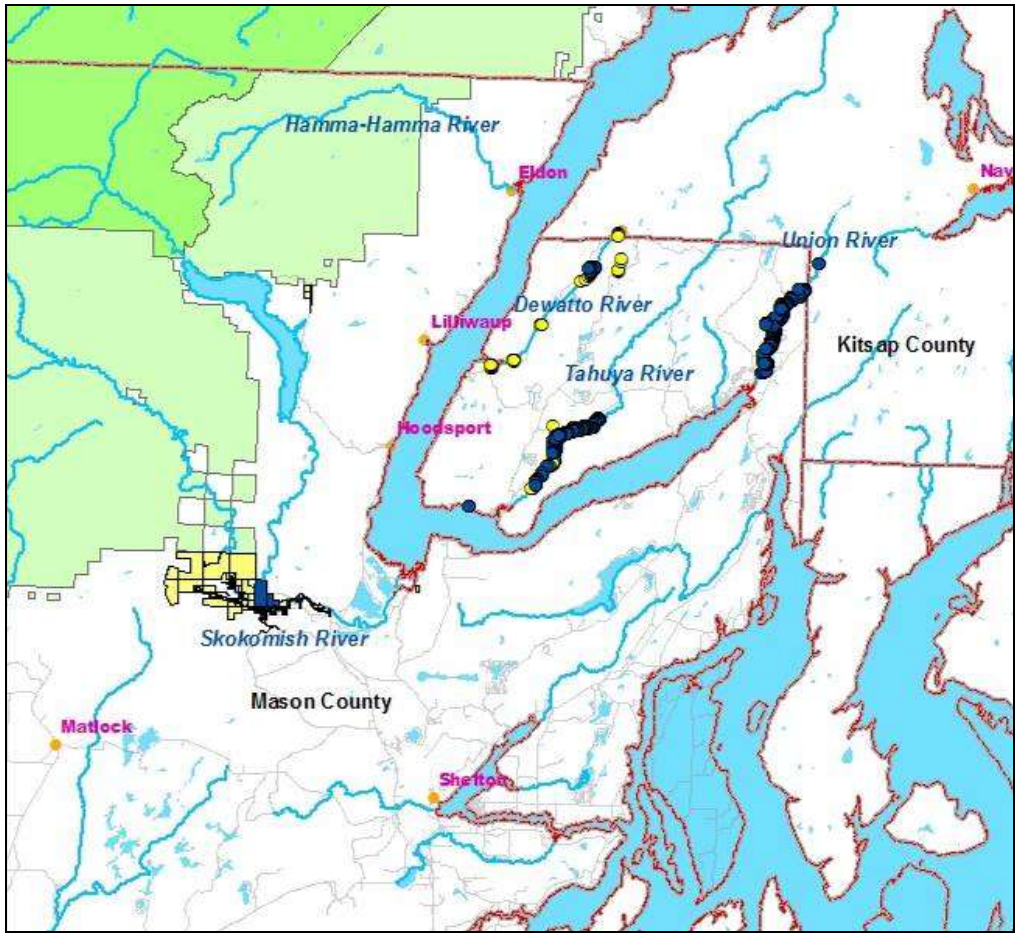
Blue dots indicate where knotweed treatments have occurred. Red dots indicate a null survey—no knotweed seen. The brown patches indicate the Quinault Indian Nation project area. (Map prepared by Ed McFarlen for OKWG meeting and modified for this report)

OVERVIEW MAP OF EAST JEFFERSON COUNTY



Green dots indicate knotweed areas treated by JCNWCB and CCNWCB in 2012
(Map prepared by Eve Dixon**)**

OVERVIEW MAP OF MASON COUNTY



Surveys and treatment carried out in Mason County in 2012

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.

2012 Overview

Many groups are now involved in knotweed control on the Olympic Peninsula. (See the 2012 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.

Dry fall weather led to a very productive knotweed control season. Efforts by Clallam County NWCB focused on complete treatments of the four mandatory control rivers in Clallam County, and treating sites where permission was recently obtained. Years of treatment have greatly reduced most infestations, but the number of waterways needing treatment is still growing. We continued to encourage landowner involvement in terrestrial knotweed treatments and offered two public workshops for landowners, one in western Clallam County, and the other in Jefferson County. Equipment and supplies were made available to landowners who attended a workshop.

Collaboration between all four counties continues to be excellent, with knotweed detection and control expanding in both Gray's Harbor and Mason Counties.

Clallam County—*All* knotweed treatments occurred in the late summer and fall this year. Starting in late August two crew members were dedicated solely to knotweed treatment on the four mandatory control rivers including the Big, Clallam, Hoko and Sekiu Rivers, and three other crew assisted as necessary. After treatment was completed on mandatory rivers, the crew re-treated smaller waterways that had been targeted in the past and expanded efforts on one stream that was partially treated in 2011. We asked the crew to collect detailed information about infestations so that we can better assess the efficacy of past treatments and plan future treatments. Based on an analysis of baseline surveys, past treatments and the results of this season's treatments, we developed a risk assessment matrix as a decision making tool for determining whether some rivers might be eligible to skip a year's treatment. (See page 9 for more explanation of the Risk Matrix).

Jefferson County— Weed board staff treated on Spencer Creek, Tarboo Creek and a number of small sites, and 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 permissions for knotweed survey and control in the Queets-Clearwater watershed.

Mason County—the Mason County Noxious Weed Program, Mason County Conservation District (MCD), the Hood Canal Salmon Enhancement Group (HCSEG), and Washington Conservation Core crews all worked in Mason County in 2012, surveying Eagle Creek and treating on the Skokomish (MCD),Union, Tahuya and Dewatto Rivers (HCSEG). The Mason County NWCB partnered with landowners to treat18 sites that were mostly upland.

These included sites where infrastructure such as driveways and drainfields were threatened by knotweed, riparian restoration sites, and some roadside/private sites.

Kitsap County— HCSEG partnered with Kitsap County Noxious Weed Control and the East Jefferson County Washington Conservation Corps crew to provide a first year survey and treatment of Big Anderson Creek. Infestation levels were very high in some locations and spread throughout side channels and wetlands. All known knotweed was treated there in 2012.

Gray's Harbor County—a separate Cooperative weed management area (CWMA) has been formed in Gray's 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 Gray's Harbor Weed Board have also participated. The GHNWCB worked with the Quinault on the South Shore road as well as portions of Boulder Creek. They have also been successful in convincing the Port of Gray's Harbor to treat a massive knotweed infestation on one of their properties, and to stop mowing where knotweed is present. After receiving treatment help for three years from GHNWCB, the Audubon Society has taken over knotweed control efforts on their property near Westport using equipment and supplies made available by the GHNWCB.

Collaboration between all counties continues to be excellent.

2012 Project Activity Summary

This list summarizes work accomplished in 2012 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.

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

- Managed **259 existing Landowner Agreements**. [Clallam County Noxious Weed Control Board (CCNWCB) and Jefferson County Noxious Weed Control Board (JCNWCB)]
- Identified and requested permission from**10** additional landowners on Bagley and Ennis Creeks. Five permission forms returned. [CCNWCB]
- Obtained **52 new Landowner Agreements** [CCNWCB and JCNWCB].
- Many agreements covered multiple parcels. We are currently managing agreements on **828 parcels** [CCNWCB and JCNWCB]
- Re-contacted **55 West Clallam County landowners on the four rivers where control is required**, to notify them of that funding had become available and that we would be treating at these location. We also reminded them that there would be knotweed treatment workshops available to them, and that they could contact CCNWCB with questions or request assistance.[CCNWCB]
- Solicited **98 and obtained 62 new Landowner Agreements** in the Queets-Clearwater watershed [JCNWCB and Quinault Indian Nation (QIN)].
- Conducted **two Knotweed Workshops** (in Port Hadlock and Forks). The 25 people who attended included landowners, knotweed control workers and 2 Jefferson County Commissioners. [CCNWCB & JCNWCB]
- CCNWCB and JCNWCB staff highlighted our knotweed program at **26 other educational events.**
- Coordinated **2 Olympic Knotweed Working Group meetings**, (one held in Bremerton, Kitsap County, the other in Blyn, Clallam County). 70-100 attendees at each meeting included representatives from 7 Native American Tribes, 4 Federal agencies, 4 State agencies, 1 State University, 11 counties, 1 city, 9 non-profits, 1 volunteer group, and 2 citizen organizations.
- 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.
- Updated and expanded a coordinated knotweed specific database available to all counties.

Survey/Treatment:
This list 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 ordered similarly ordered.

- Re-treated **7 miles (56 acres)** on the Dickey River [Quileute Nation].
- Re-treated **10.7miles (65 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]
- Re-treated **2.6 miles (16 acres)** on Lake creek and three sites on Lake Pleasant **(5 acres)** (CCNWCB)
- Re-treated **4 miles (25 acres)** on the Big River [CCNWCB]
- Treated knotweed on roadsides, at a transfer station and in a quarry on the Makah reservation [Makah Tribe crew].
- Re-treated **over 5 miles (20 acres)** on the Hoko River [CCNWCB].
- Re-treated **0.8 miles (10 acres)** on the Sekiu River [CCNWCB]
- Re-treated **2 parcels (2 acres)** of shoreline on Highway 112 [CCNWCB].
- Re-treated **3 miles (22 acres)** on the Clallam River [CCNWCB].
- Re-treated **.5 miles (3 acres)** on the Pysht River [CCNWCB].
- Re-treated several sites on the Elwha River [Lower Elwha Klallam Tribe and NPS]
- Treated sites within ONP boundaries [North Cascades EPMT with NPS].
- Treated **1.3 miles (8 acres)** on Bagley Creek and **1.4 miles (8 acres)** on Ennis Creek [CCNWCB].
- Re-treated all known knotweed sites, on the Big Quilcene River, about **4 miles (56 acres)** [East Jefferson WCC crew and Americorps volunteers through Hood Canal Salmon Enhancement Group (HCSEG].
- Retreated less than 1 acre on the Little Quilcene River. Plans to treat remaining sites in 2013
- Surveyed **8 miles** and treated **10 acres** on the Dosewallips River [HCSEG, East Jefferson WCC crew and CCNWB].
- Treated or re-treated other small, high priority sites in Jefferson County, including **3.5 miles (14.5 acres)** on Spencer and **0.5 miles (3.95 acres)** on Tarboo Creeks, and small sites on the Duckabush River and Snow Creek [JCNWCB and CCNWCB].
- Re-treated knotweed on **0.7** acres on the Union River, **0.06** acres on the Dewatto River and **.045** acres on the Tahuya River [HCSEG, MCNWCB and volunteers].
- Surveyed and treated extensive knotweed infestation on **9.7 miles (42.3 acres)** of the Skokomish River. [Mason Conservation District].
- Assessed **1.8 miles** on Eagle Creek [Mason NWCB and MCD]
- Trained landowners and assisted treatments of 18 sites [MCNWCB]
- Surveyed and/or treated **23.95 miles (1,000 parcel acres)** on the Queets and Clearwater Rivers [Quinault Tribe, Gray's Harbor NWCB]. **Project area encompasses 227,774 acres.**
- Monitored and re-treated **27 miles (3,700** acres) on the Hoh River [10,000 Years Institute, Hoh Tribe, Hoh River Trust, NPS and the Pacific Coast Salmon Coalition]].
- In Clallam and Jefferson Counties-Helped at least **170 private landowners** by monitoring, treating or re-treating knotweed [CCNWCB, JCNWCB, and the East Jefferson WCC crew]
- In Clallam and Jefferson Counties-treated land owned by **7 public entities** including US Forest Service, **3 state agencies** (WA State Parks, WA Department of Natural Resources and WA Department of Fish and Wildlife), **1 city** (Port Angeles) and **2 counties** (Clallam and Jefferson) (CCNWCB and JCNWCB).
- Distributed herbicide to other Olympic Knotweed Working Group (OKWG) members when requested (**2 gallons** in 2012). Members reported a total of approximately **250.95 gallons** of herbicide, but some figures were still unavailable at the time of this report. The increase over last year was due to the addition of some large new infestations to the workload (See Appendix I for a table of herbicide use).

Data Management/Documentation:

- Hired a contractor to trouble shoot and maintain **Knotweed Projects Database** for **Clallam and Jefferson Counties' Noxious Weed Control Boards**, and to train staff in its use. The database will likely be used soon at Mason County's Noxious Weed Control Board.
- 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.

Proposed Risk Matrix

Others have talked about "skipping" a treatment or letting an area rest, when knotweed re-growth becomes minimal. There is concern that the small, often epinastic re-growth may not provide sufficient surface area or connectivity to underground mass to effectively kill roots, our primary target. We have been reluctant to let a season pass without treatments because we were concerned that it would allow continued renewal of knotweed's considerable below ground mass.

As interest in knotweed and its impacts has spread throughout the environmental community, survey and treatments began on many river systems. Although it could take months or even several seasons to treat knotweed in an entire river corridor, a single application could eliminate more than 95% of a knotweed stand. As each river system grew cleaner, crews could finish a second treatment faster, and could begin work in another area. For the past couple of years, it has been difficult for many organizations to sustain the effort and funding necessary to carry out a protracted follow-up program. Although most knotweed infestations are drastically reduced, the number of rivers requiring follow-up and re-treatments has continued to grow.

To date no one has hit upon a good method or formulation for re-treating small knotweed shoots showing symptoms of severe herbicide injury or epinastic growth. Additionally, knotweed re-growth has become delayed until at least late August which has greatly narrowed our treatment window. All these factors have set the stage for some hard decisions.

Last year in Clallam County, we treated the most infested sites, (generally where landowner permissions had taken some time to obtain), but in most cases, did not do complete treatments. Some rivers or creeks were not included at all. This year we thought we would have sufficient work force to do more complete treatments, but only on selected rivers that were our highest priorities. We decided to focus on four rivers where control had been made mandatory, and added others as time allowed. We wanted to commit our resources fully behind river systems where all sites could be treated without an interruption.

This year we had a completely new crew without any preconceived notions about what sites should look like, or had looked like in the past. After the treatment season we reviewed GPS points collected during baseline surveys from four rivers along with fairly detailed information about patch size, density, plant height and growth habit, and compared them with similar information collected this year. We took note of how many times a site was treated and how long it had been since it was last treated. We noticed some interesting trends.

One intriguing find was that in most cases, new (2012) points seemed to be collected in identical locations as the initial surveys. In only one case, on a river where an uncooperative landowner appeared to have been cutting canes and throwing them in the river, did it appear that plants had spread to new locations since the initial treatment. Some "new" sites were also found that had been missed in past surveys. Even though knotweed was still found in the initial survey locations, reported knotweed densities were about 2% or less of original populations. Some programs have reported knotweed re-appearing even after 2 years of no visible above ground growth. Our 2012 surveys seem to confirm this possibility.

Using information gleaned from treatment histories, and other observations about river morphology and knotweed species characteristics, CCNWCB developed a decision making tool that we're calling a Risk Matrix to determine whether "*skip treatments*" might be employed without losing ground or allowing significant spread during off years.

We like to solicit more input to test this concept more thoroughly.

Our conclusions and directions for use are as follows*:*
"Skip treatment" is a strategy that might be used on waterways that have received at least three consecutive years of treatments that have reduced knotweed populations to very low amounts. The table below contains knotweed population and river characteristics that should be taken into account when making the decision to use skip treatments. Assign points (listed at the top of the column) by choosing one of the characteristics listed in

each column that best represents the river in question. A summed score between 3 and 9 can be assigned to each waterway being examined.

A score of 3-4 indicates that a river has a lower risk for knotweed infestations spreading during skip years; a score 7-9 indicates a higher risk site that should not be considered for a skip treatment; a medium risk score of 5-6 suggests that the river may be carefully considered for a skip treatment, but it is not a preferred site. If effective, *skip treatments* may provide a means of stretching funding and focusing crew resources.

	Score =1point ea.	Score=2 points ea.	Score=3 points ea.
Species	**Giant knotweed**	**Japanese Knotweed**	**Bohemian Knotweed**
Density	**Low density, single plants**	**Moderate density, sporadic clumps**	**High density, multiple clumps-monocultures**
Level of Disturbance/River Characteristics	**Low disturbance, highly confined channel**	**Occasional disturbance, gradual banks**	**High disturbance, followed by quiescence, off channel or bank terraces, log jams**
	Combined Score 3-4= Low Risk	**Combined Score 5-6= Mod Risk**	**Combined Score 7-9= High Risk**

Graphic depicting three significant factors related to increased levels of risk for spread

Observations and Conclusions

- Based on the observation in previous years that knotweed at treated sites emerged later in the season, we delayed returning to previously treated sites until mid-August.
- With funding and crews stretched thin over a wide area, we prioritized treatments on the four rivers where control is required and landowners had been cooperative. We completed thorough treatments on those rivers. We added others as time allowed.
- We switched to 1% imazapyr treatment for a variety of reasons. It will be interesting to see if there is a discernable difference next year. We used glyphosate only where there were wellhead concerns or some other specialty sites.
- There were advantages and disadvantages to brand new crews; they sometimes lacked important access information that had not been written down, but had a fresh approach to old locations. We were somewhat dismayed that we were still discovering "new" sites in locations that had been treated for many years.
- By the third season, most sites that had been treated for two years developed only very small, individual shoots, often very late in the year. Returning to sites this year, where these infestations were skipped for one to two years, we found that knotweed had recovered somewhat, developing 2-5 feet tall, but occasionally achieving full height. The number of canes was still probably less than 2% of the original stand or gone altogether (small patches). We believe this recovery aided discovery for subsequent crews, and provided greater surface area for effective herbicide translocation to roots.
- Treating knotweed sites that are important to the public, even when not near water, creates trust and broadens citizen support for invasive plant control programs.
- As public awareness about knotweed increases, we continue to receive more reports of knotweed on terrestrial and new aquatic sites. Knotweed Workshops not only provided an avenue for landowners to deal with these sites themselves but also were an opportunity for landowners to learn about other invasive species.
- Comparing baseline surveys with current ones showed that knotweed "re-appeared" in the same locations where it was initially found, especially those locations with large dense infestations. This suggests that knotweed roots in treated sites were injured or killed, but some were still viable even after 2-3 years. With this information, we developed a risk matrix as a decision making tool to help prioritize work next year, given limited resources.
- Herbicide expended on re-treatments continues to decline. However, because rates and formulations are less consistent than when projects first started, herbicide usage is no longer a reliable proxy for treatment efficacy. In the past we associated less herbicide use with less knotweed biomass. In future, we will have to depend on dimension, density and habit information (as was previously collected with GPS data dictionaries), to document progress.
- Documentation of each site after the initial baseline information was captured has not been consistent. Crews tended to collect less information in subsequent years. In 2011 and 2012, our crews were instructed to collect detailed information about each site. Collecting detailed information is much more doable at this stage, where there are not huge or frequent infestations.
- In 2012 we moved to a knotweed specific data base system to ease landowner agreement and data management. There is still some confusion surrounding proper and potential uses of the database. It will be essential in future years to bring data entry up to date and create detailed protocol so that field crew collects all data required for the database.
- 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.
- Several organizations made a point of funding Weed Board involvement in projects. This has been greatly appreciated and helps stabilize Weed Board programs while benefiting partners. The enforcement authority held by Weed Boards may become crucial to the success of an up-stream to down approach which is the gold standard with knotweed and other invasive species that are moving into riparian corridors.
- New DNR funded Puget Sound Corps crews working in concert with weed boards provide an exciting opportunity that enables the DNR to shoulder responsibilities for invasive species problems on state land as well as become an active partner in restoration projects in many critical aquatic areas. We look forward to coordinating projects next year.
- 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.

- The Quinault/Queets Cooperative Weed Management Area was formed in 2012. It already includes Grays Harbor and Jefferson Counties' weed boards, The Quinault Nation, DNR, Forterra, and The Nature Conservancy. Olympic National Forest and Olympic National Park are also poised to sign the MOU.
- In 2011 Jefferson County's informal policy to forgo herbicide use on county roads was softened to allow spot treatments of noxious weeds. In 2012 efforts to renew similar roadside weed control activities were challenged by a citizen group. Clallam County still has a no-spray roadside policy in place, but may consider updates in the near future.
- The State's knotweed program has been indispensable. As well as supplying funding, it has helped us with permitting and technical advice. We greatly appreciate the leadership and guidance supplied by WSDA, especially in these tough economic times. The Olympic Knotweed Working Group is expanding and MANY other groups are now doing knotweed control work on the Olympic Peninsula. (See Summary on Page 7) The Weed Boards are supporting these groups and in many cases WSDA funding is being used to leverage other grants.
- Knotweed projects in Clallam and some in Jefferson County are ahead of those of most other partners. We continue to learn and adapt as the program matures. Most infestations in our project areas are considerably reduced, but we face the increasingly difficult phase of treating in new plantings or partially recovered plant communities. We must be careful not to allow other invasives to exploit areas cleared of knotweed, instead of desirable native vegetation. We work to keep the broadest perspective as we transition to our goal of improved habitat and ecosystem function in critical riparian habitat.

Recommendations

- Increase pre-season communication with other project managers.
- Identify which partner is best suited to implementing each component to avoid overlap and undue competition.
- Initiate landowner contact, surveys and treatment on Salt Creek, East Twin, and several other significant streams west of the Elwha River with the assistance of Puget Sound Corp crew. Solicit additional input from the Technical Review Group on other appropriate projects to include in work plan for this crew.
- Complete one more survey and treatment in the 4 mandatory-control rivers in Clallam County before considering a skip treatment. The exception is the Hoko River.
- Apply the Risk Assessment Matrix to determine if skipping a knotweed treatment in a river might be appropriate or too risky. Use resource "savings" to combine multi-crew efforts in heavily infested areas, higher risk areas or other higher priority sites as determined by land managers or partners.
- Encourage crews to look for and identify new plant invaders.
- Where there is sufficient time, crews should perform ED/RR.
- 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.
- Continue to explore alternative treatments for epinastic growth.
- 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.
- Canvass the OKWG to find out what documents or other tools would be useful.
- Update Best Management Practice documents, based on recommendations of Working Group members and other experts.
- Create a standard report parameters and document for partners to fill out and submit for the annual OKWG report.
- Provide training opportunities and workshops on using technology and managing data to document progress. Consider modifying King County mapping techniques for use in our area.
- 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.
- 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.

2012 Project Procedures

1. Surveys and Monitoring

CCNWCB and JCNWCB surveys, monitoring and treatments took place, on foot from August 20th though October 18th. 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 Makah Tribe crew** led by Rob McCoy (licensed aquatic applicator), treated knotweed on roadsides and in a quarry and transfer station on the reservation.
- **The CCNWCB crew**, consisting of Cathy Lucero, Laurel Moulton, Ian Vermeeran, Guyer Bogen and Jon Clevenger (all licensed aquatic applicators) worked on the Big, Hoko, Sekiu, Pysht and Clallam Rivers and Bagley and Ennis Creeks.
- **The JCNWCB crew** (Eve Dixon and licensed applicators from the CCNWCB, treated small sites in Jefferson County, on Snow Creek, Spencer Creek and Tarboo Creek.
- **The East Jefferson WCC crew**, led by Owen French (licensed aquatic applicator), did extensive treatments on the Big Quilcene and on the Dosewallips River in collaboration with the Hood Canal Salmon Enhancement Group (HCSEG).
- **The Hood Canal Salmon Enhancement Group** crew, led by Michelle Myers and Mendy Harlow, (licensed aquatic applicators), treated on the Union, Dewatto and Tahuya, in Mason County. They also collaborated with Kitsap County Noxious Weed Control and the East Jefferson WCC crew to conduct treatments on Big Anderson Creek in Kitsap County.
- **Mason Conservation District** treated knotweed on the Skokomish River—details unavailable at the time of this report.
- **Mason County NWCB** treated numerous terrestrial knotweed infestations, prioritizing those that were or had potential to damage infrastructure such as driveways and septic fields.
- **The North Cascades Exotic Plant Management Team with the National Park Service,** led by Dan Campbell (licensed aquatic applicator) worked on knotweed populations within the Olympic National Park. No further information was available for the report.
- **The Quinault Indian Nation** crew, led by Bonnie Eyestone (licensed aquatic applicator) worked on the Clearwater and Queets Rivers in Jefferson County and Prairie Creek, the Quinault River and Lake Quinault in Gray's Harbor County.
- **The Pacific Salmon Coalition** crew, led by Jill Silver and Carl Chastain (licensed aquatic applicators) and funded by 100,000 Year Institute worked on the Hoh 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. It is not clear at this time how many participants in the Olympic Knotweed Working Group used the same data dictionary or sections thereof so that data taken in different places by different people could be grouped, summarized and mapped.

- A recreational grade GPS unit (Garmin 78 CX loaded with TOPO 24K) 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 track herbicide use in watersheds from year to year. Herbicide use has been used as a proxy for change in biomass to help measure treatment efficacy. (Please see Conclusions and Observation section for more discussion of this topic). Herbicide use and formulation, when available, is included in the section "Project Activities by Watershed" and is summarized in Appendix II
- All survey and treatment data was added to the new Knotweed Database. This database facilitates tracking of landowner contacts, agreement expiration, treatments, site status and monitoring. Currently Clallam County holds the master copy, but it would ideal for the state to hold the master and to distribute copies to weed boards around the state. Contact Frances Lucero at francesism@gmail.com for a copy and more information.

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 converted waypoints from our surveys into shapefiles, and added them as layers to the county parcel map.
- 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 at the beginning of each season 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 worked on Landowner Agreements from February through October. (See Appendix II for a Table of Landowner Agreements).

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.
- We retain original copies of Pesticide Application Records pertaining to aquatic sites as required by law.

7. Treatment, Equipment, and Rate

(See observation section for more discussion**)**

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 2012)
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.

Outreach and Training

We wrote to landowners on the Big, Hoko, Clallam and Sekiu Rivers (the four rivers where knotweed control is mandatory) to let them know that we would be treating in the late summer and fall of 2012. We re-contacted landowners whose agreements had expired and where we planned to work, asking them to renew the agreement. We also solicited new agreements on property where ownership had changed, or where knotweed had been found but never treated. Because timber companies are large landowners in many watersheds, we talked with some of their representatives, renewed agreements and discussed access to sites.

Landowner training was not emphasized as much in 2012. We did conduct two Landowner Workshops-- one in Port Hadlock (Jefferson County), and the other in Forks (Clallam County). We broadened the scope to include general weed control methods and strategy, to attract a larger audience. Both were promoted through various media, and posters were displayed at businesses in both counties. Attendance was required for access to equipment and supplies from the Weed Boards. Multiple depots were available across both counties to increase accessibility to these resources. Two pesticide license credits were offered for each workshop. Several field crew members took advantage of this opportunity. We distributed a knotweed best management practices handout for landowners. Landowners were urged to contact weed boards with questions and to request assistance. (See Appendix IV for a workshop poster). A total of 25 people attended a workshop.

The threat and impacts of knotweed were highlighted by Clallam NWCB staff during 22 other educational and outreach events and during 4 other similar events by the Jefferson NWCB. Similar outreach took place in Mason and Gray's Harbor counties.

To support a higher level of education and professionalism, we encourage all involved with invasive plant control projects that use herbicides to become licensed. We help defray the cost of maintaining a pesticide license by providing free classes with WSDA sanctioned credits. This year our classes garnered a total of **16** free pesticide credits. At the request of professional foresters attending OKWG meetings, we added national forestry credits through the Society of American Foresters. This service will become increasingly important as tribal and federal entities are increasingly regulated by new EPA rules that require proof of licensing. Washington State's licensing requirements and accreditation process meet the new federal requirements.

We coordinated 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, obstacles and solutions to problems. Meetings have expanded, attracting a more diverse audience every year.

- The spring meeting was held in Bremerton (Kitsap County) and the fall meeting in Blyn (Clallam County). We have moved the meeting location to different partner counties to facilitate travel and to encourage local participation. This year, each meeting has attracted 70-100 participants
- Meeting participants included representatives from 7 Native American Tribes, 4 Federal agencies, 4 State agencies, 1 State University, 11 counties, 1 city, 9 non-profits, 1 volunteer group, and two citizen organizations.

Clockwise from top left: Jennifer Andreas (WSU) provides an update about biocontrol insects that are being reviewed for use in the United states; Attendance at the fall meeting was almost standing room only; Attendees listen to Dr. Allan Felsot (WSU) present Myths and Common Misconceptions About Herbicides

Participating Groups

Clallam County Noxious Weed Control Board
Gray's Harbor Noxious Weed Control Board
Jefferson County Noxious Weed Control Board
King County Noxious Weed Control Board
Kitsap County Noxious Weed Control Board
Mason County Noxious Weed Control Board
Mason Conservation District
Pacific County Noxious Weed Control Board
Pierce County Noxious Weed Control Board
Skamania Noxious Weed Control Board
Snohomish County Noxious Weed Control Board
Thurston County Noxious Weed Control Board
US Forest Service (Olympic Region)
US Environmental Protection Agency
Olympic National Park
US Department of Agriculture
N. Cascades Exotic Plant Management Team/NPS
WA Department of Natural Resources
WA Department of Ecology
WA Department of Transportation
WSDA
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
Squaxin Island Tribe
10,000 Years Institute
Pacific Coast Salmon Coalition
North Olympic Land Trust
Hood Canal Coordinating Council
Hood Canal Salmon Enhancement Group
North Olympic Salmon Coalition
Forterra
East Jefferson WCC
Mason County WCC
Clallam County Master Gardeners
North Olympic Bee Keepers Association
See Appendix III for contact information.

Funding

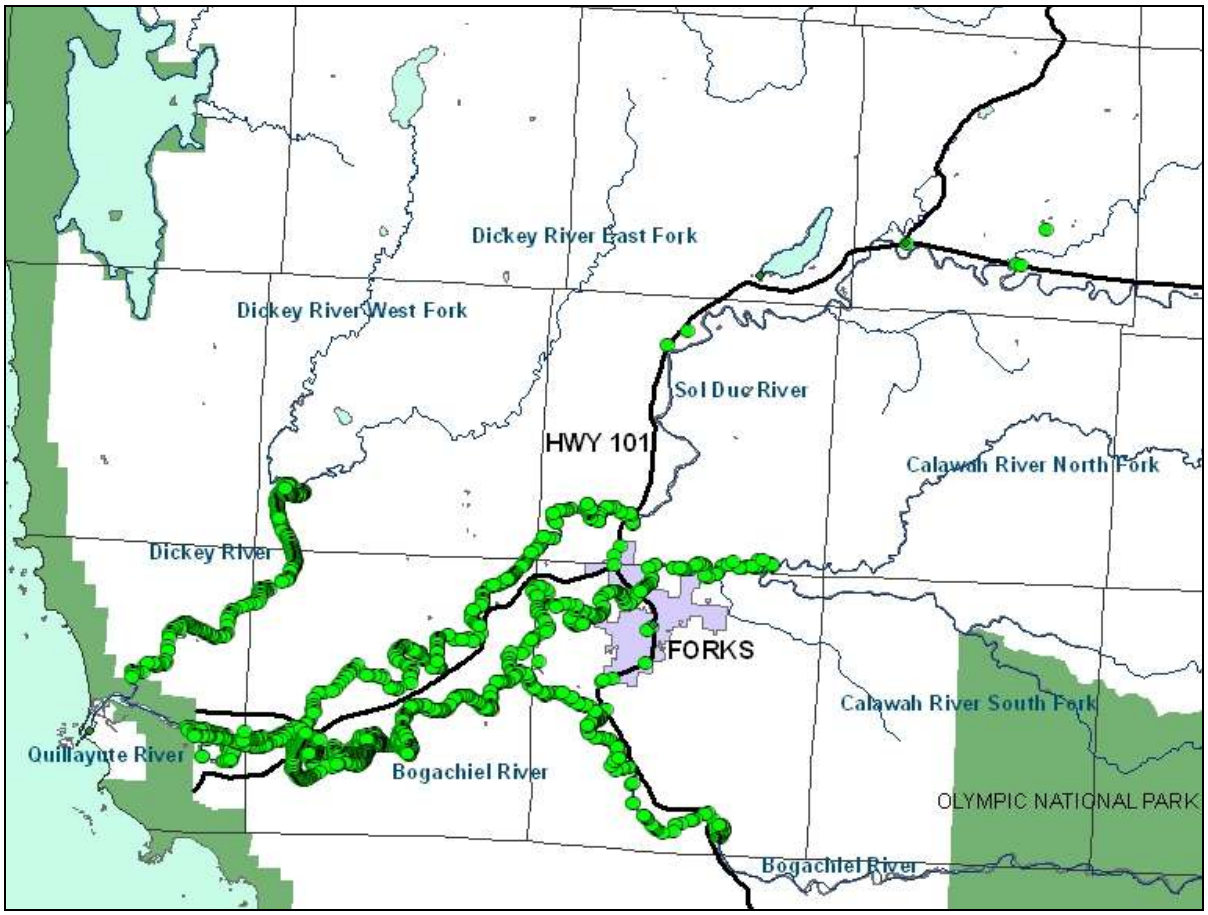
Projects summarized in this report were funded by: Washington State Department of Agriculture and Forest Health Protection (WSDA and NFS), Clallam County Noxious Weed Control Board, the Salmon Recovery Funding Board (through North Olympic Salmon Coalition and Hood Canal Salmon Enhancement Group) and 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

Crews—Quileute Tribal crew



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.

The Quillayute system includes the Sol Duc, Calawah, Bogachiel, Quillayute and Dickey, along with their tributaries. The Sol Duc and its tributaries are dealt with separately. 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 is endeavoring 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, biologist with the Quileutes, has observed that elk and deer do not actively feed on knotweed and that elk have returned to calve on sites 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 at La Push. Knotweed infestation levels in the Dickey before treatment began were possibly the worst on the Olympic Peninsula. Surveys indicated 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 Nation; the North Cascades Exotic Plant Management Team 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 **2011** work continued on the Dickey and the crew reported seeing more shoots and re-growth than usual, despite the long history of treatment. The North Cascades Exotic Plant Management Team with the National Park Service treated knotweed within National Park boundaries.

In **2012** seven miles (56 acres) were surveyed and treated on the Dickey River. Crews noted that tansy ragwort coming in after knotweed treatments is a big problem on this waterway.

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

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 Quileutes surveyed the Calawah, recording 344 sites, all downstream from the North Fork-South Fork confluence. The Calalwah was treated by the Quileutes each year from 2007 through 2010. Most of the knotweed on the Calawah is giant knotweed and it responded well to treatment.

In **2011** the Quileutes did a small amount of re-treatment on the Calalwah.

In **2012** the Quileutes surveyed and treated 10.7 miles (65 acres) on the Calawah river.

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

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 Quileutes 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 Quileutes surveyed and retreated 12 river miles (131 acres) on the Bogachiel River.

Herbicide use- Bogachiel River (gallons)						
	2007	**2008**	**2009**	**2010**	**2011**	**2012**

Acres Treated	4.1	900+	693	725	NA	131
Total Herbicide:	**0.65**	**33.88**	**77.34**	**62.1**	**NA**	**3.12**

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 Exotic Plant Management Team 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. The North Cascades Exotic Plant Management Team with the National Park Service treated knotweed within National Park boundaries.

No treatment occurred on the mainstem of the Quillayute River in **2012**

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

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

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 cutthrout and rainbow trout. North Cascades Exotic Plant Management Team with the National Park Service continues to treat a small patch of Himalayan knotweed (0.001 acres) in the upper part of the river. CCNWCB and the Quileute Tribe operated only in the mid and lower sections of the Sol Duc because the upper section is within the Olympic National Park. The mid and lower Sol Duc are dealt with separately because treatment on the mid Sol Duc has taken place for longer than treatment on the lower Sol Duc. Lake Creek is also discussed separately so it can be shown in more detail

Mid Sol Duc

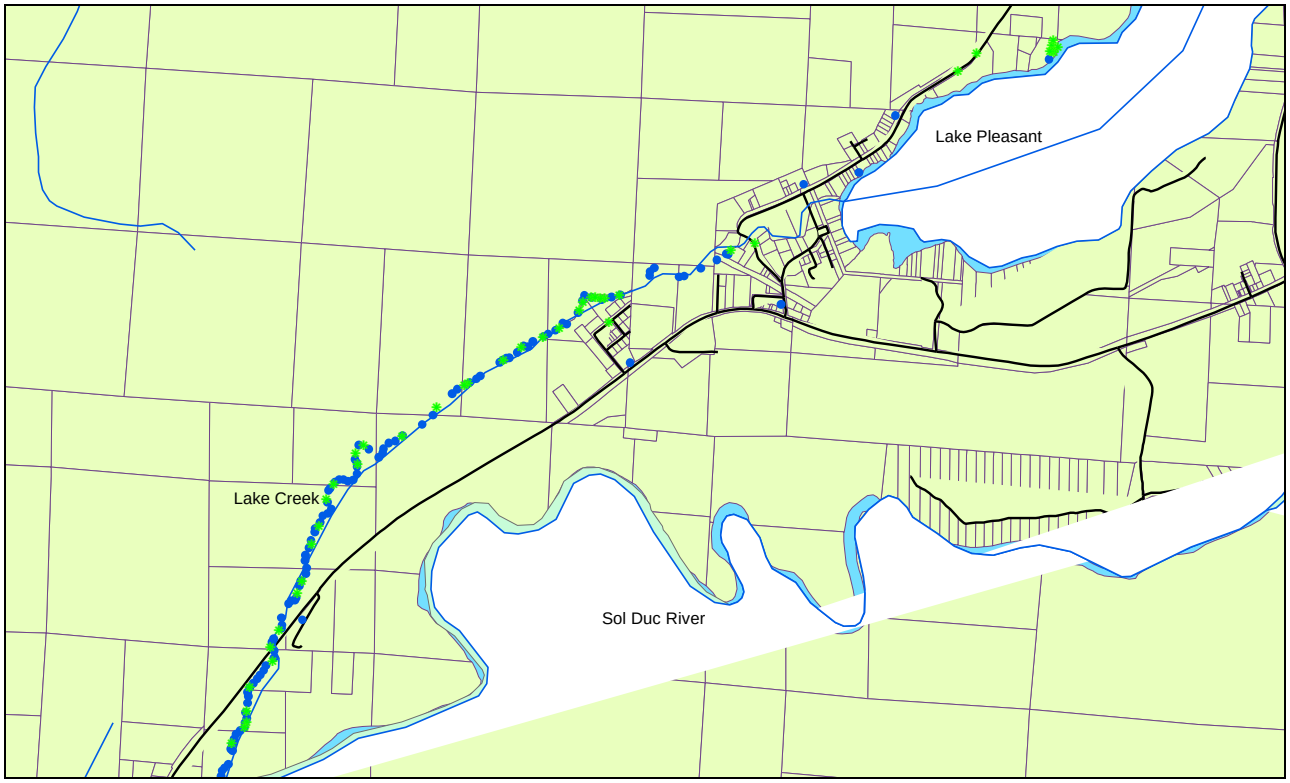
In 2005, Clallam County Noxious Weed Control Board (CCNWCB) conducted a float survey on the mid section of the Sol Duc River (from the Park boundary to Whitcomb-Diimell boat launch on Highway 101). The Snider Work Center was the furthest upstream site found.

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

Lake Creek, Lake Pleasant and Beaver

Crew—CCNWCB



Green indicates knotweed found and treated in 2012. Blue indicates knotweed sites identified in the original 2006 survey.

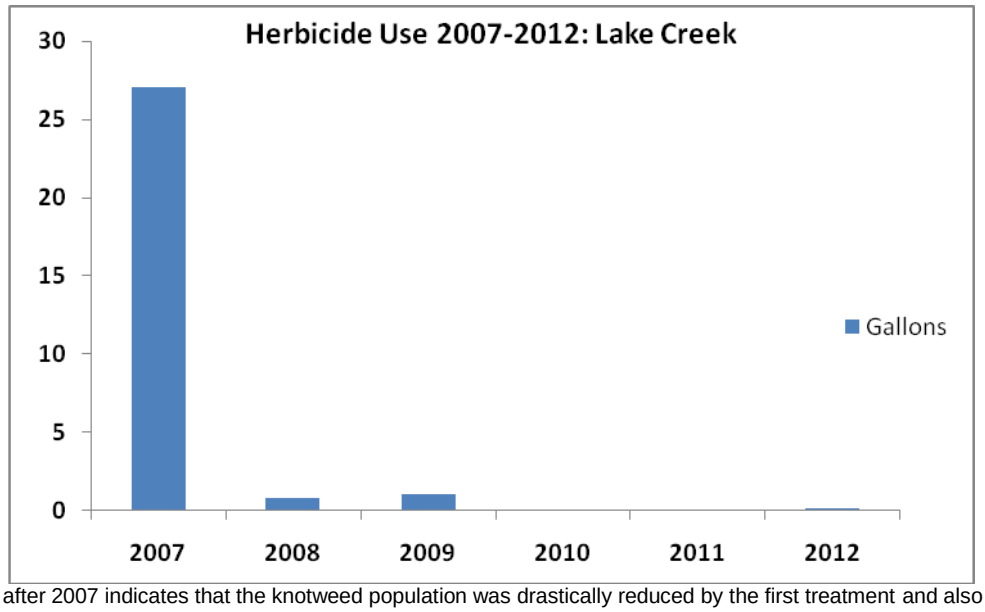
Lake Creek is one of the major tributaries to the Sol Duc and it contains some of most productive coho habitat in the Quillayute system; these coho include a unique, resident population. All of the sockeye in the entire Quillayute system spawn in Lake Pleasant, which they access via Lake Creek.

Treatment began in 2006 and continued through 2009. No treatment was done on Lake Creek in 2010 or 2011 due to funding constraints.

In 2012 a full survey and treatment was carried out on all parcels where permission had been received. Infestations were very light in most cases. This area would be a good candidate for skipping treatment in 2013. On Lake Pleasant itself, we treated a very large terrestrial knotweed infestation for the first time and retreated some smaller areas.

Herbicide Use-Lake Creek, Lake Pleasant and Beaver (gallons)				
	2007	**2008**	**2009**	**2012**
Parcels Visited/All known	NA	25/25	25/25	16/25
Acres Treated	38	60	52	7.6
AquaNeat injected	15.93	0.23	0	0
AquaNeat sprayed	11	0.47	0.853	0
Polaris sprayed	0.16	0.12	0.209	0.154
Total Herbicide	**27.09**	**0.82**	**1.062**	**0.154**

Herbicide use was much reduced even after skipping treatments in 2010 and 2011. The low herbicide use is likely caused by two factors: there was not a significant rebound in knotweed populations after two skip years, and a change in herbicides from glyphosate or a glyphosate/imazapyr mix to only imazapyr , a five-fold decrease in itself.



The herbicide drop after 2007 indicates that the knotweed population was drastically reduced by the first treatment and also that treatment often switched from injection to spraying which requires far less herbicide. This stream was skipped in 2010 and 2011. It is noteworthy that even after skipping treatments for two years, herbicide used did not increase likely indicating that there was little rebound in the knotweed population.

Lower Sol Duc

In June **2006** the Quileute Tribe surveyed the lower section of the river (from Whitcomb-Diimell to the confluence with the Bogachiel). They recorded 447 sites.

Treatment began in **2007** and continued through **2010**. No treatment was done on the Sol Duc in **2011** as noted above.

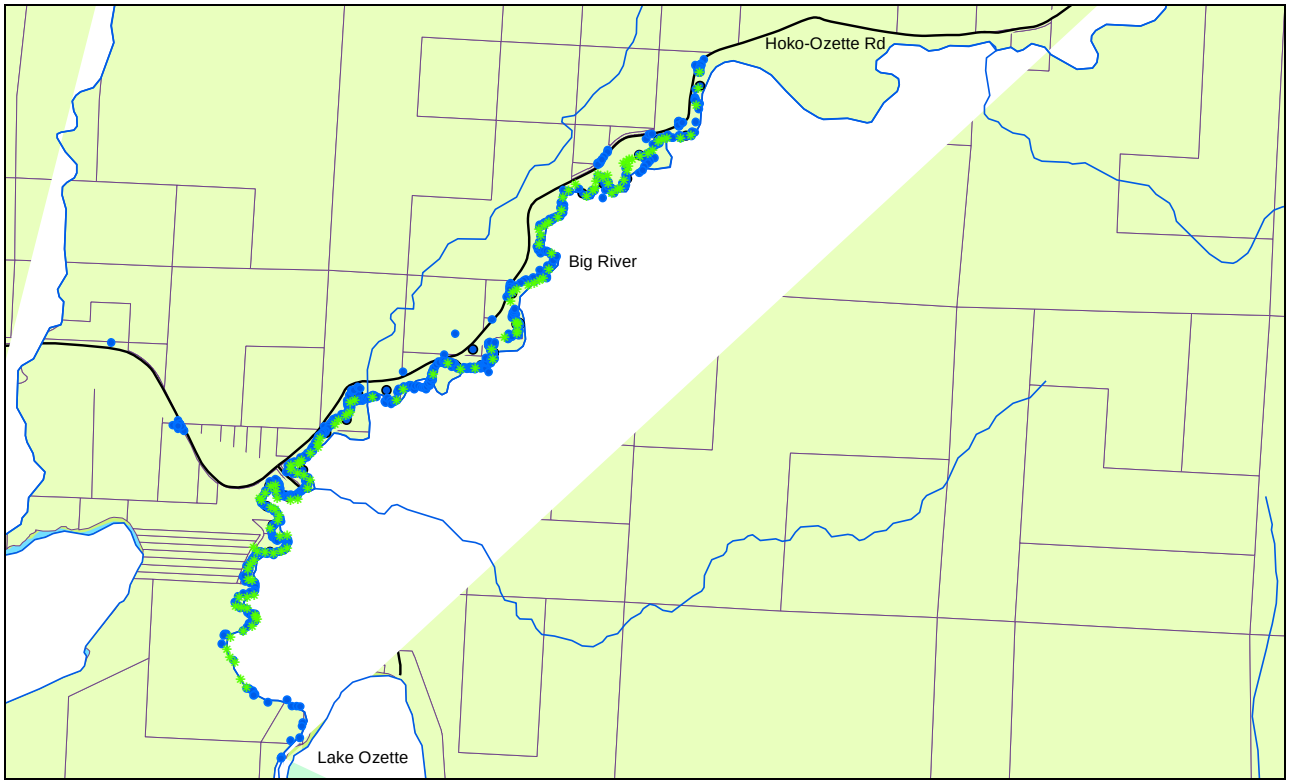
Forks

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 or 2011 although the Pacific Salmon Coalition, based in Forks, may have taken on some of these areas, but did not specifically report treatments.

Big River and Hoko-Ozette Road

Crew—CCNWCB.



Green indicates sites treated in 2012. Blue indicates knotweed sites identified in the original 2007 survey.

• **BIG RIVER**

The Big River is one of several large, low elevation, low gradient streams that drain into Lake Ozette, the third largest natural lake in Washington. Lake Ozette empties through the Ozette River into the Pacific Ocean. The Ozette Basin is approximately 88 square miles and Lake Ozette itself lies within the Olympic National Park in western Clallam County. Major land uses within the Big River watershed include timber production, agriculture, recreation and wildlife preservation (in Olympic National Park).

The Ozette basin supports stocks of coho, sockeye, and kokanee (resident) salmon, small numbers of Chinook and chum salmon, steelhead and cutthroat trout (sea-run and resident), as well as many other native and exotic fish. Sockeye salmon were listed as Threatened under the Endangered Species Act in 1999. It is believed that knotweed infestations, by displacing native vegetation and all of its benefits, are impacting both spawning sites and habitat for juvenile salmonids.

Local residents report that knotweed infestations have been present on the Big River since the 1940s but before 2002 it was not present in significant quantities. By 2004 knotweed had spread to become an extensive monoculture along some of the stream banks.

Knotweed control on the Big River began in 2004, making it the watershed in which CCNWCB had been involved for the longest and it has been an excellent example of private, county, tribal and federal landowners working together towards a common goal. The North Cascades Exotic Plant Management Team has also been treating knotweed in the lower reaches of the Big River since 2004, when knotweed first became established within the National Park boundary. This partnership was taken a step further in 2010 when the Makah Tribe purchased several parcels of land on the river, which have now been turned over to North Olympic Land Trust, to be conserved in perpetuity for conservation and habitat. The knotweed control and an invasive plant survey performed by CCNWCB were used as match to facilitate the purchase.

Knotweed populations on the Big River have been greatly reduced, and knotweed impacts on the river system are now slight. However, because the remaining plants seem harder to kill than in other watersheds, we have more concerns about re-infestation.

HOKO-OZETTE ROAD

Because the Hoko-Ozette Road closely follows the Big River for approximately six miles, and at times comes within a few feet of it, knotweed surveys and control work were undertaken there and considered as part of the Big River project.

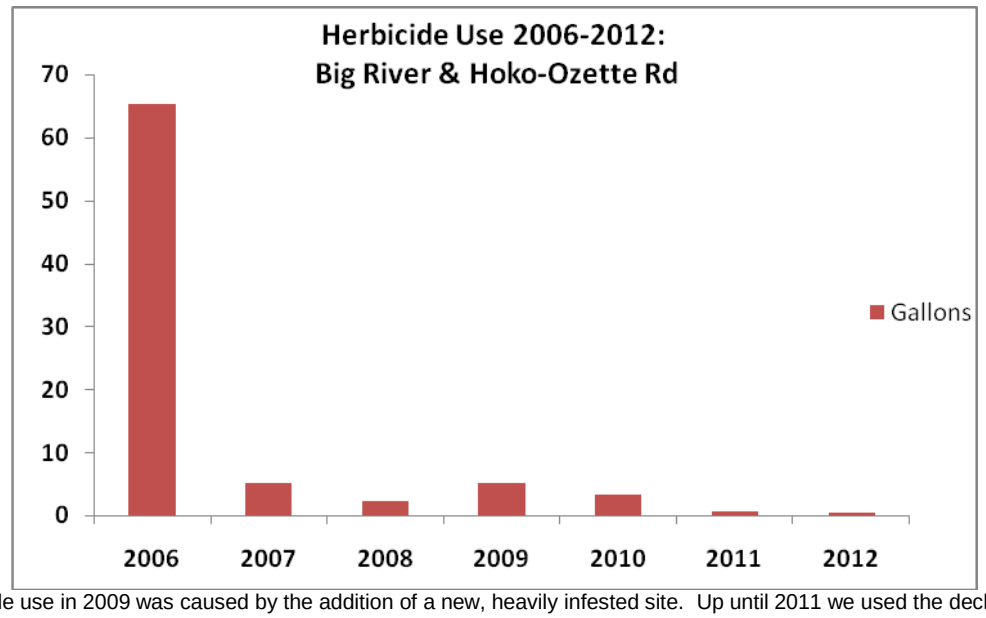
Knotweed treatment on the Big River began in **2004** as a small pilot project and has continued each year since. Work was performed by Clallam County and/or the Makah Indian Tribe. The North Cascades Exotic Plant Management Team with the National Park Service treated within their jurisdiction in the lower portion of the river. In **2009** knotweed control was made mandatory on the Big River, mainly to encourage one reluctant landowner to sign an agreement allowing the county crew to do the work, rather than have to do it himself. In **2010** the county did a small amount of treatment but focused mainly on outreach and education in order to ensure long term control in the face of funding cuts. Most knotweed populations have been significantly reduced to a point that landowners could realistically monitor and control it themselves

In **2011** funding was uncertain. Renewed contracts with landowners were sought, and letters were sent asking landowners to be prepared to monitor and control knotweed on their land. A small amount of funding was obtained late in the year, and a two-person crew focused treatments on sites that received treatments for the fewest years. Crews also collected detailed data to assess efficacy and direct future treatments. North Cascades Exotic Plant Management Team with the National Park Service treated within their jurisdiction, in the lower portion of the river.

In **2012** four miles of the Big River, from the National Park Boundary upstream were thoroughly surveyed and treated by CCNWCB. This area covered all of the historic heavily infested areas. Only small sporadic sites upstream where no knotweed was seen in 2011 were skipped. Most of the knotweed consisted of individual stems or scattered clumps. Knotweed was still pervasive but the density was drastically reduced from past years. We recommend that this river receive one more full treatment before being considered for skip treatments. Reed canary grass is filling in on river point bars where knotweed has been treated. In some locations Himalayan blackberries are starting to move in as well. The crew did a small amount of EDRR treatment in places where blackberries were just moving in. The crew did not treat any roadside sites this year, however it was apparent that landowners have treated in a handful of locations along the Hoko Ozette Rd.

Herbicide Use-Big River and Hoko-Ozette Road (gallons)							
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Inspected/Known Parcels			30/42 (est)	39/43	24/34	12/34	15/34
Acres Treated		28	57	57	22	10.4	25
Aqua Neat or Glypro injected		1.24	0	3.5	0.3	0.496	0.04
AquaNeat or Glypro sprayed		3.3	1.876	1.3	2.28	0.12	0
Habitat or Polaris (imazapyr) sprayed	0	0.6	0.305	0.32	0.594	0.03	0.42
Total Herbicide	**65.39**	**5.14**	**2.181**	**5.12**	**3.174**	**0.646**	**0.46**

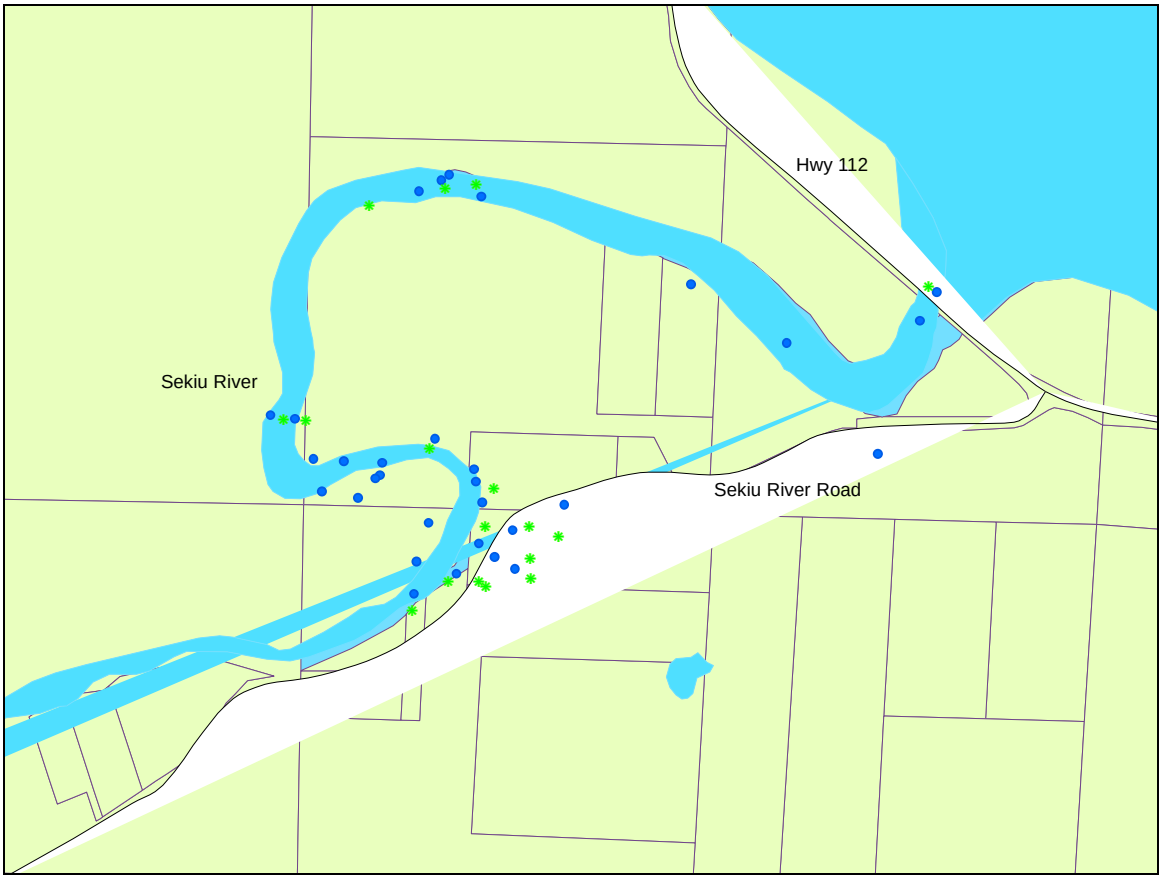
Note: The term "Inspected" is used, rather than "treated" because in many cases crews looked for plants but did not find them. "Acres Treated" were calculated by adding together the acreage on all of the Pesticide Application Records and may vary depending on whether the applicator recorded the area treated or the whole infested area. The discrepancy between acres treated in different years may be due to different counting methods being used. The number of Known Parcels listed has decreased because some initial parcels never had knotweed or were in another body of water.



The rise in herbicide use in 2009 was caused by the addition of a new, heavily infested site. Up until 2011 we used the decline in herbicide use as an indicator of decline in knotweed plant mass and efficacy of treatments. After 2011 herbicide decrease was heavily influenced by the switch from a glyphosate product to imazapyr, which requires a lower rate.

Sekiu River

Crew—CCNWCB



Green indicates sites treated in 2012. Blue indicates knotweed sites identified in the original 2006 surveys.

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.

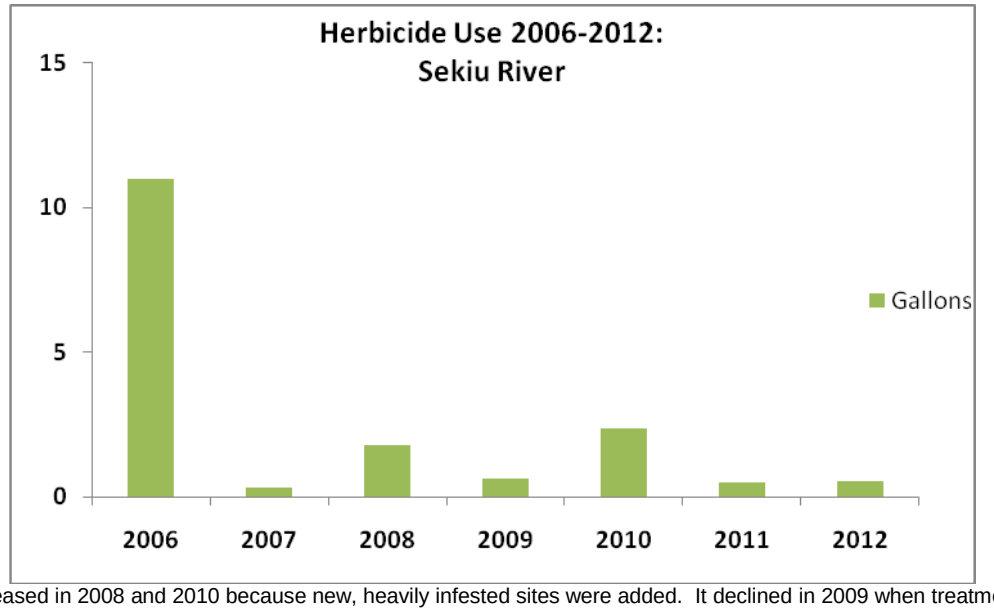
Knotweed control on the Sekiu River began in 2006 and has continued each year since. Work has been performed by the Makah Tribe and/or Clallam County Noxious Weed Control Board. In 2010 control was made mandatory and one previously reluctant landowner then allowed us to treat rather than do it himself. Some other sites were also treated that year, but our focus was on outreach and education because we knew that on most sites knotweed populations had been significantly reduced and landowners could realistically monitor and control themselves. Also, we were aware that funding will not be continued indefinitely and that turning responsibility over to the landowners is the only way to achieve knotweed control long-term. We held a number of workshops for landowners and met with representatives of the timber companies that own much of the land in the Sekiu River watershed, asking them to monitor and treat themselves as much as possible.

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. Even though knotweed control on the Sekiu River is now mandatory, it is a priority watershed and we are attempting a gradual transition. Virtually all parcels on the Sekiu River were visited and treated as necessary. 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. Knotweed impacts have been greatly reduced.

In **2012** a 4 person crew surveyed and treated all knotweed sites on the Sekiu River. Very few plants remain on the river. Two parcels that belonged to a reluctant landowner were sold to a new 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). We recommend that this river (particularly the two parcels with new permissions) be treated one more time before considering a skip treatment.

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

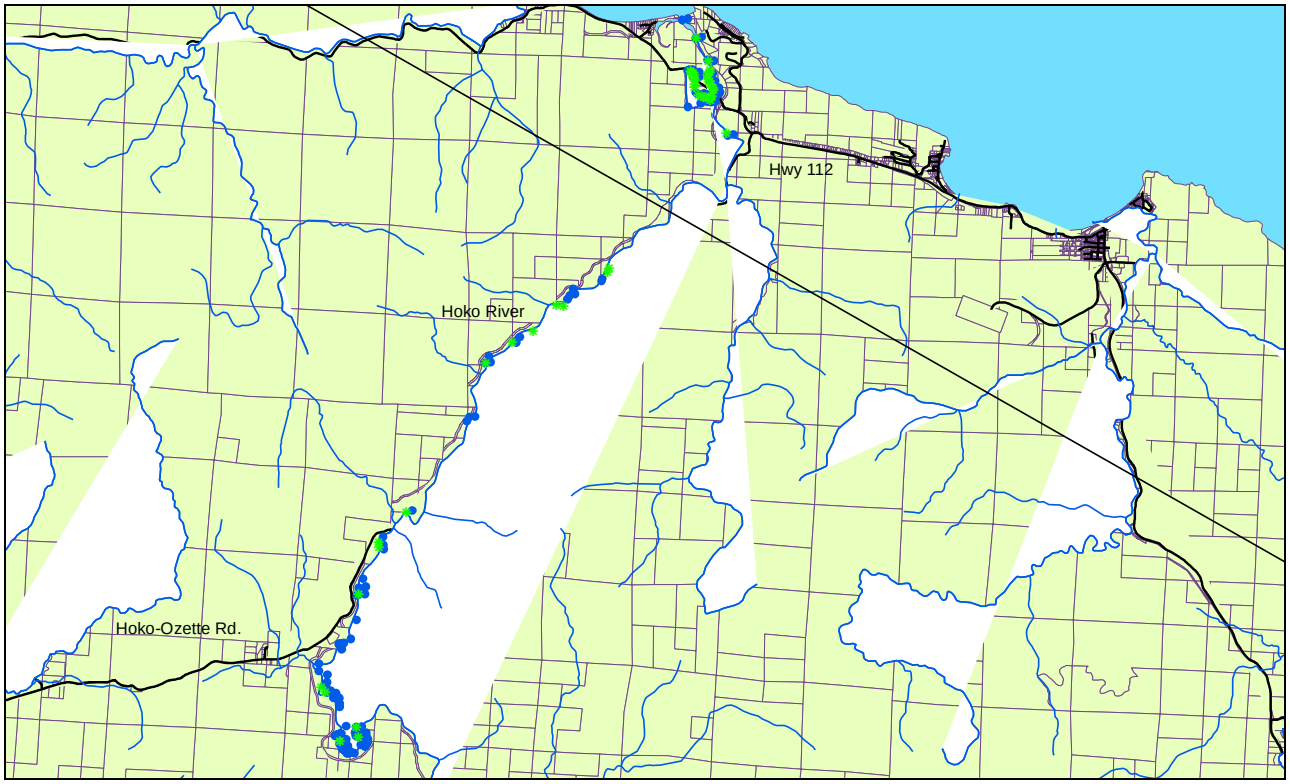
Note: The term "inspected" is used, rather than "treated" because in many cases crews looked for plants but did not find them. "Acres Treated" were calculated by adding together the acreage on all of the Pesticide Application Records and may vary depending on whether the applicator recorded strictly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

Hoko River

Crew—CCNWCB



Green indicates knotweed sites treated in 2012. Blue indicates all sites that were identified in the initial 2006 survey.

The Hoko River flows into the Straits at Eagle Point, about a mile and a half east of the Sekiu River. There is a small residential community known as “The Vista” near its mouth, and Washington State Parks owns a considerable amount of land, also near the mouth, which will eventually become a State Park. The Hoko River supports runs of Chinook, coho, chum and winter steelhead.

Knotweed (mostly giant) was found on the Hoko River in 2006 and has been treated each year since. Work has been accomplished by the Makah Tribe and/or Clallam County Noxious Weed Control Board. In 2009 control was made mandatory and, as on the Big River, one previously reluctant landowner then allowed us to treat rather than do it himself. The mouth of the Hoko is only accessible by boat and was not treated in 2009. In 2010 a boat was available so the mouth was treated, butvery few plants were found. In 2010 the county did a small amount of treatment but our focus was on outreach and education because we knew that on most sites knotweed populations had been significantly reduced and landowners could realistically monitor and control themselves. Also, we were aware that funding will not be continued indefinitely and that turning responsibility over to the landowners is the only way to achieve knotweed control long-term. We held a number of workshops for landowners and met with representatives of the timber companies that own much of the land in the Hoko River watershed, asking them to monitor and treat themselves as much as possible.

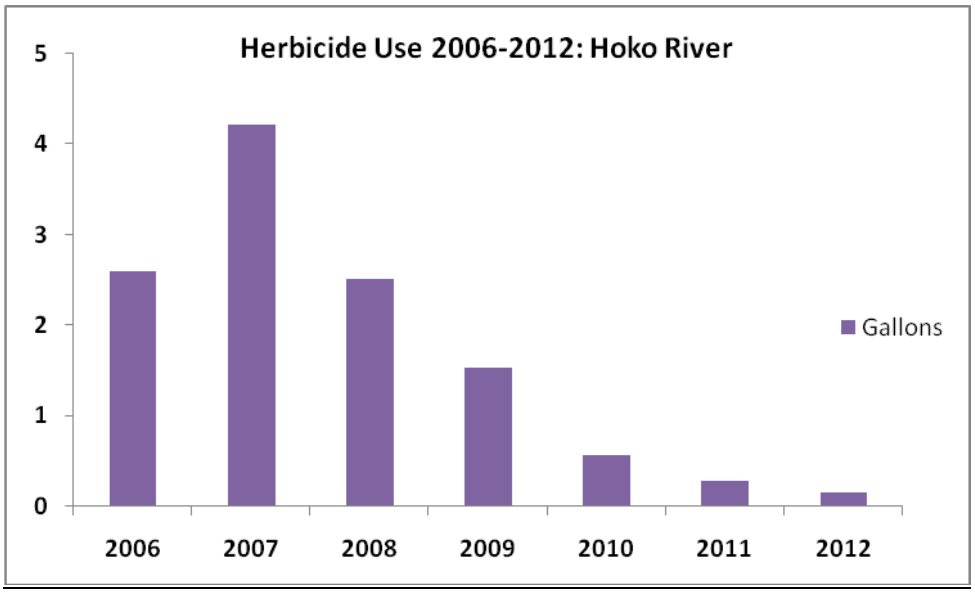
In **2011** funding was uncertain. Renewed contracts with landowners were sought, and letters were sent asking landowners to be prepared to monitor and control knotweed on their land. A small amount of funding was obtained late in the year, and a two-person crew focused treatments on sites that received treatments for the fewest years. The crew went to the furthest upstream sites, which had not been visited or treated for several years and treated all plants that they found. They also did an excellent job of recording data, enabling us to better assess the efficacy future treatments.

In **2012** crews surveyed and treated all known knotweed on the Hoko River. It appears that all knotweed in the upper reaches of the river is giant, and knotweed located on the large oxbow property above the Highway 112

bridge and extending downstream is likely bohemian. A boat was available for the crew, and a complete treatment of the river below the Highway 112 bridge was done in one day. Treatment this year also included sites in the upper river that had not been surveyed or treated in more than three years because of poor access. The crew did some EDRR treatment on a small but dense patch of tansy ragwort near the mouth of the river. Herb Robert is starting to invade riparian areas in the upper river, and perennial fuschia is spreading from a property near the Hwy 112 bridge downstream, though these two species were not treated. The Hoko river upstream from the highway 112 bridge would be good location to skip a treatment if funds are limited in 2013.

Herbicide Use-Hoko River (gallons)							
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Inspected/Known Parcels			25/32 (est)	23/32	18/32	10/32	20/32
Acres Treated		5.82	17.16	12	18.25	2.175	20
AquaNeat injected		1.63	0	1.218	0	0.16	0
AquaNeat sprayed		2.52	2.27	0.26	0.45	0.1	0
Habitat or Polaris (imazapyr) sprayed		0.075	0.246	0.063	0.113	0.025	0.15
Total Herbicide	**2.6**	**4.225**	**2.516**	**1.541**	**0.563**	**0.285**	**0.15**

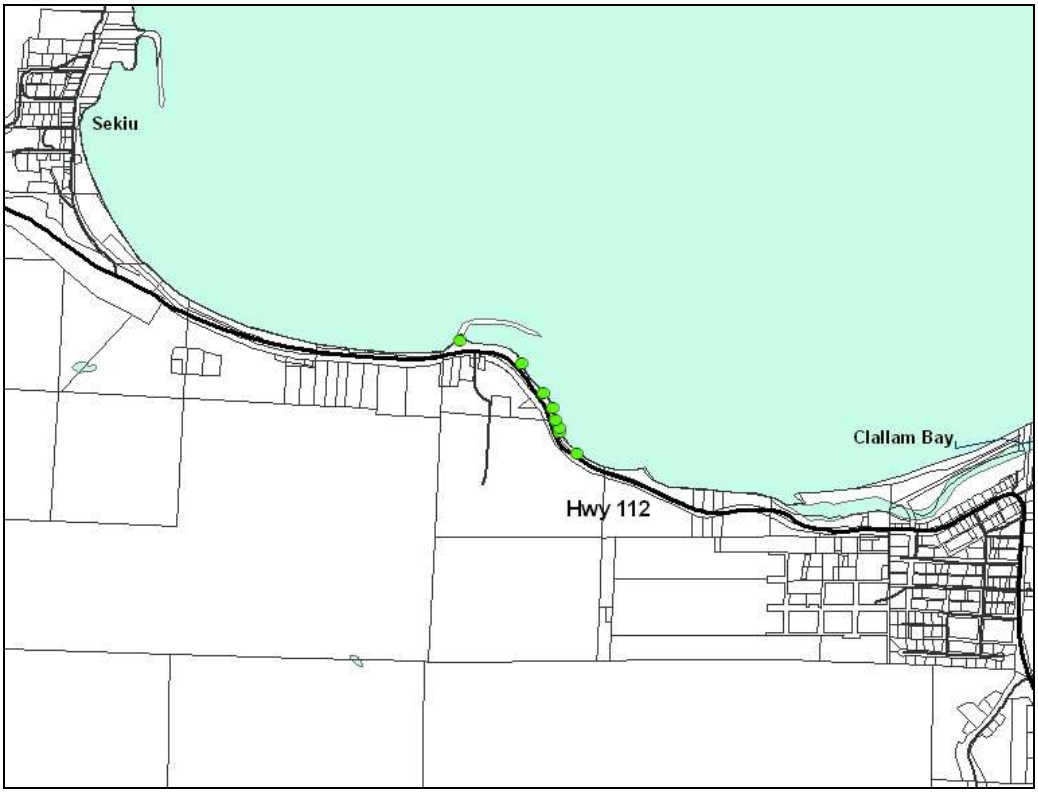
Note: The term "inspected" is used, rather than "treated" because in many cases crews looked for plants but did not find them. "Acres Treated" were calculated by adding together the acreage on all of the Pesticide Application Records and may vary depending on whether the applicator recorded only the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



Herbicide use continues to decline from year to year. Most of the knotweed on the Hoko is giant knotweed and it seems to respond to treatment better than the more common Bohemian knotweed.

Highway 112, Clallam Bay and Sekiu

Crew—CCNWCB



Green indicates sites that were treated in 2012. Blue(hidden) indicates sites that were treated in 2011.

• 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.

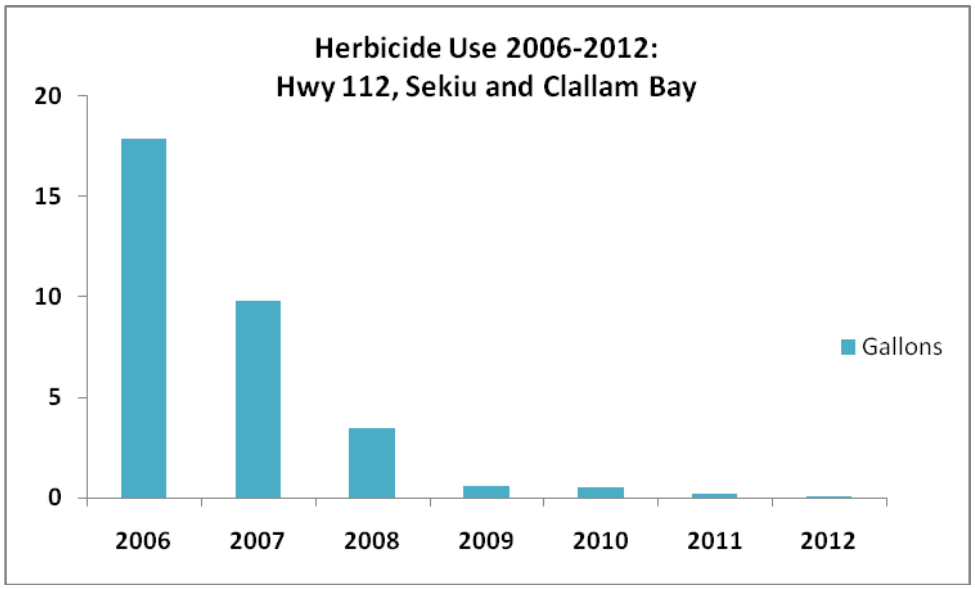
• Highway 112 runs west-east near the shoreline and crosses the Sekiu, Hoko and Clallam Rivers. The Hoko-Ozette Road, which heads south-west from Highway 112, runs very close to both the Hoko River and the Big River. Both these roads serve as significant vectors of knotweed through movement of plant 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). **In 2006** CCNWCB hired local residents to educate landowners about knotweed and collect permission forms. The Makah Tribe and CCNWCB treated in Sekiu and Clallam Bay. The community appreciated the help given by CCNWCB and our efforts in this area helped pave the way when approaching landowners in other areas. Treatment has continued each year since but this area has never been a top priority for our program, because many of the sites are terrestrial.

In **2011** we treated knotweed on a bluff overlooking the Start of Juan de Fuca. This was the only obvious knotweed site in the Sekiu—Clallam Bay area. This is in marked contrast to the huge stands of knotweed previously seen in both towns. Better still, many residents are aware of knotweed and are actively looking for it and treating it on their own property. As has been discussed, this is our long-term goal.

In **2012** the crew treated knotweed on two parcels along the breakwater in Sekiu. All observed knotweed was treated, though it was already yellowing and on its way to dormancy. Late season treatments can be very effective, but we recommend that this site be treated earlier in August in future years. The crew noted that other smaller knotweed infestations on private land bordering highway 112 were treated by landowners.

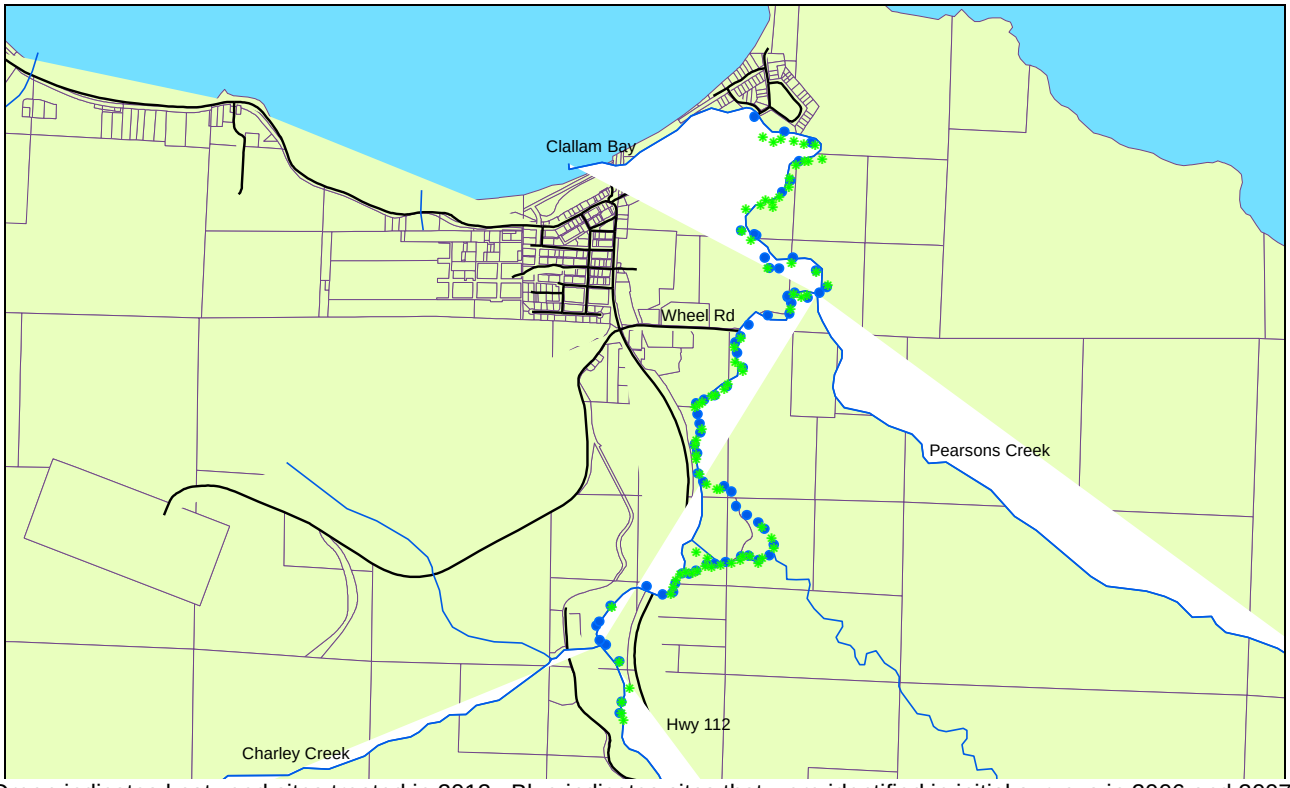
	Herbicide Use-Highway 112, Clallam Bay and Sekiu (gallons)						
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Parcels Inspected/Known Parcels			55/67 (est)	67/68	18/68	2/68	2/68
Acres Treated		25	45	26	3.25	1.8	2
Aqua Neat injected		3.5	1.945	0	0	0.16	0
Aqua Neat sprayed		6.06	1.224	0.45	0.4	0.02	0
Habitat or Polaris (imazapyr) sprayed		0.23	0.29	0.155	0.1	0.005	0.066
Total Herbicide:	**17.9**	**9.79**	**3.459**	**0.605**	**0.5**	**0.185**	**0.066**



Herbicide use in the whole area continues to decline steadily. Only one site on Hwy 112 was treated in 2011 and 2012, leading to very low herbicide use.

Clallam River

Crew—CCNWCB



Green indicates knotweed sites treated in 2012. Blue indicates sites that were identified in initial surveys in 2006 and 2007.

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.

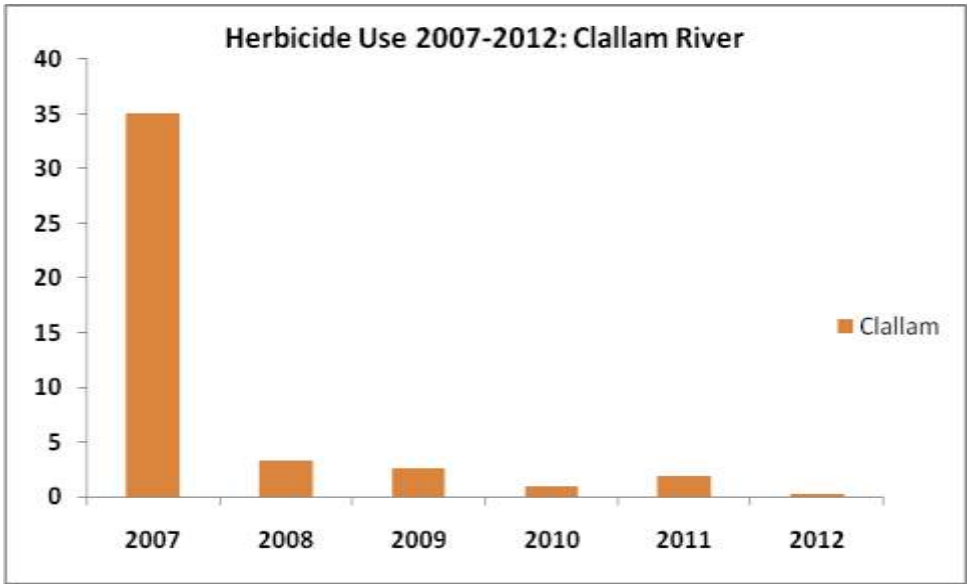
In 2006 the Makah Tribe surveyed the lower portion of the Clallam River and in 2007 funding from a NFWF grant with the Clallam Conservation District became available for the Lower Elwha Klallam Tribe to treat the knotweed there. This was done with the help of an aquatic licensed applicator from CCNWCB. 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. A good solution was reached with the landowner in 2012.

In 2011 we attempted to visit and re-treat all known sites on the Clallam River; this was not done in 2010 because of difficult access. A problem arose when we realized that ownership of one parcel had changed and we could not contact the new owner. Almost all the parcels visited had some plants remaining but they were small and scattered. The slight rise in herbicide use is due to more parcels being surveyed and treated.

In **2012** we contacted all landowners and surveyed and retreated all parcels located 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, though it is unlikely that they will comply. 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. We recommend that this river receive one more year of full treatment before being considered for skip treatment.

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

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.

Pysht River

Crew—CCNWCB

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—one site of approximately 3,060 square feet had been covered with knotweed in 2005. By 2006 only 50 to 100 canes remained; they were about 3 feet tall. 5 separate sites were treated in 2006, including infestations of around 4,000 square feet on both sides of the Old Sappho-Pysht Highway.

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** Merril 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. We recommend keeping an eye on these, but a skip treatment may be possible in 2013.

Elwha River

Crews—National Park Service and Lower Elwha Klallam WCC

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** Lower Elwha Tribal crews, a Washington Conservation Corps crew, and National Park noxious weed technicians conducted numerous noxious weed treatments throughout the summer**.**

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

Port Angeles Streams

Crews—CCNWCB

Valley Creek

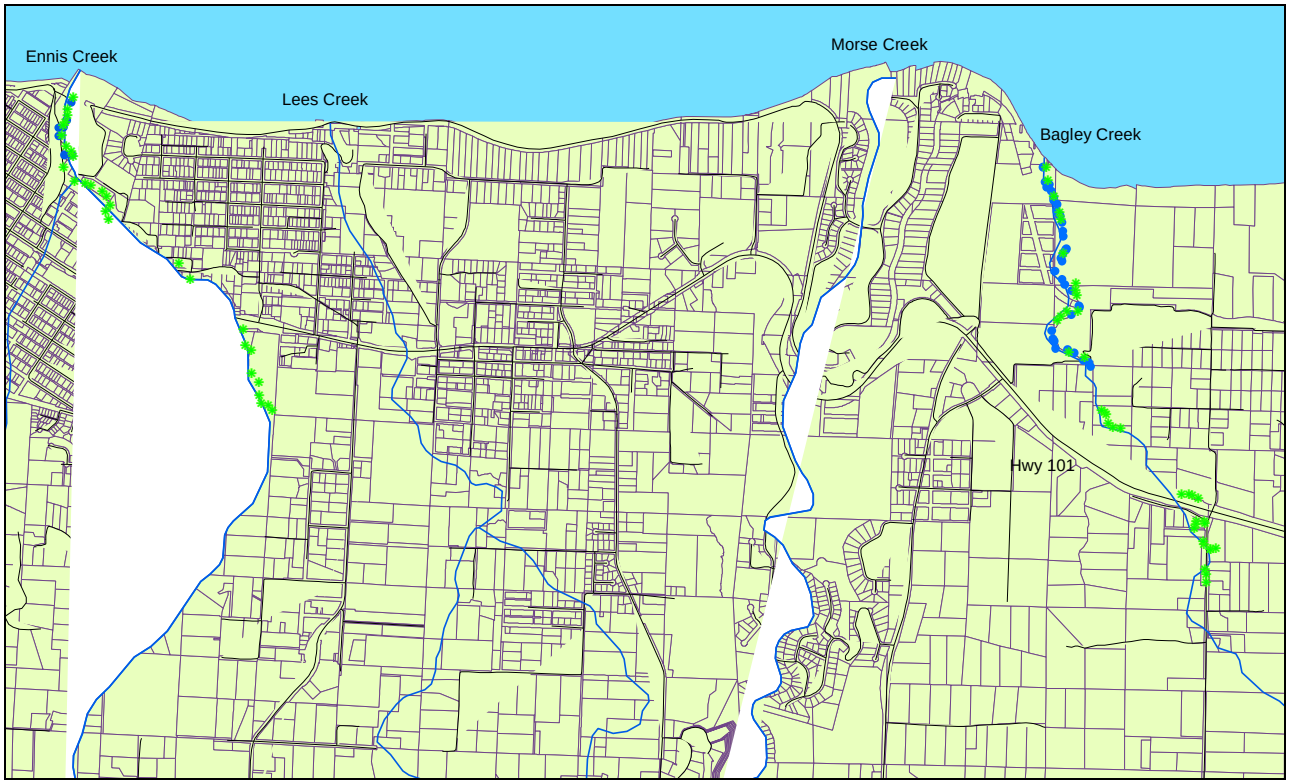
Valley Creek is a small stream which empties into the Port Angeles Harbor. Salmon and steelhead have probably been extinct from the creek since the late 1940's, when the final sections of the approximately 2,000-foot culvert at the mouth were installed. Recent surveys of fish in this system revealed numerous resident cutthroat trout up to 11 inches in length. The section of the creek by Valley Street has been heavily infested with knotweed for some time and treatment has been ongoing for several years, up until 2010. This site was monitored, revealing some sporadic plants instead of the huge stands that previously existed. It is evident that previous treatments were successful as no new plants were noted underneath recently constructed bridge buttresses pace on old sites. No treatment took place in **2011** (due to construction blockages) or **2012**.

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.

Peabody Creek is close to the Clallam County Noxious Weed Control Board office and employees often notice stands of knotweed on or close to the creek. In 2009 we asked for and 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 we re-surveyed but no treatment took place because funding uncertainties made advance planning difficult. Additionally, this creek which is severely degraded under several environmental criteria, is not currently a high priority for restoration. We will consider more treatment when it moves up on our priority list. No treatment was done in **2012**.



Green indicates knotweed sites that were treated in 2012. Blue indicates knotweed sites that were identified in initial 2007 (Ennis Creek) and 2011 (Bagley Creek) surveys. No knotweed has been found on Morse Creek. Lees Creek has minor amounts of knotweed and was not treated in 2012.

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 CCNWCB and/or the North Cascades Exotic Plant Management Team with the National Park Service. In **2011** the North Cascades Exotic Plant Management Team 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. One landowner did not want treatments to continue on his land, and we also found knotweed on land where permission had never been sought. This stream is a good candidate for a skip treatment. More permissions need to be obtained before further treatment takes place.

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.**

Morse Creek

Morse Creek is the largest of the independent drainages to salt water between the Dungeness and Elwha rivers, entering the Strait of Juan de Fuca approximately two miles east of Port Angeles. The stream extends 16.3 miles from its headwaters in the Olympic National Park. The Park boundary is at RM 9. Morse Creek is diverted at RM 7.2 for hydroelectric generation. The headwaters are steep and a natural falls at RM 4.92 divides the watershed, posing an impassable barrier to anadromous fish. The upper reaches of Morse Creek are in generally excellent, near-pristine condition. It is confined in a ravine-like canyon through large portions of its lower reach, but between RM 3 and RM 1 flat bottomland occurs along the creek. Below approximately RM 1.7, the valley broadens into a relatively wide floodplain. Historically, Morse Creek has been an important anadromous fish stream, known to have supported stocks of spring/summer Chinook, coho, chum, and pink salmon, summer and winter steelhead, and searun cutthroat trout. No artificial fish migration barriers are known to exist in this watershed, but channelization, floodplain development, roadway and railway construction, and vegetation management have impacted habitat. Areas of available suitable salmonid spawning gravel or stable large woody debris are virtually absent, indicating that winter storm flows scour and remove these essential habitat features. A major restoration project involving re-contouring channel and 27 large woody debris log jams was completed in **2011**. No knotweed was found in or near Morse Creek, and no more surveys took place in **2012**.

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. More land owner contacts need to be made. Skip treatments may be considered in the lower ¾ mile of the creek in 2013, but the remainder should be treated for 1-2 more years before being considered for a skip treatment.

Flag iris fragments found in Bagley Creek. While surveying for knotweed crews are in an ideal position to catch other weed infestations before they take off.

Crews noticed fragments of yellow flag iris in the stream channel indicating a source upstream. This situation should be monitored, though most of the creek is shady and confined, making it unlikely that this plant could get a foothold in downstream locations.

Siebert Creek

Siebert Creek is a significant independent drainage that remains largely undisturbed. It drains an area of 19.5 mi^2 and includes 31.2miles of mainstem stream and tributaries. Siebert Creek begins in the mountains of Olympic National Park and flows 12.4 miles through forested foothills to join the Strait of Juan de Fuca at Green Point, about halfway between Port Angeles and Sequim. The Siebert Creek estuary is likely similar to its historic condition and is one of the finest examples of an intact, functioning, bar-bound estuary in the state of Washington. The nearshore contains healthy beds of both kelp and eelgrass. The estuary and adjoining nearshore provide critical rearing and feeding areas for juvenile salmonids and a diverse assemblage of waterfowl. The proximity of

the Siebert Creek estuary to the Dungeness National Wildlife Refuge magnifies its significance for waterfowl. Similarly, the Siebert Creek estuary may provide foraging, refuge, and rearing habitat for ESA-listed chum and chinook juveniles from the Dungeness River during their seaward migration. Coho and fall chum salmon and winter steelhead are the only identified anadromous fish known to exist in Siebert Creek. Development has been minimal in this watershed, but throughout the Olympic Mountain foothills of eastern Clallam County, forestland is rapidly being converted to large-lot residential uses. These conversions and other human activities, including roads and stormwater flows, are having an impact on this stream. No knotweed was found in or around Siebert Creek in **2011**, and no further surveys were conducted in **2012**.

Dungeness River

Crew—Jamestown S'Klallam Tribe and east Jefferson County WCC

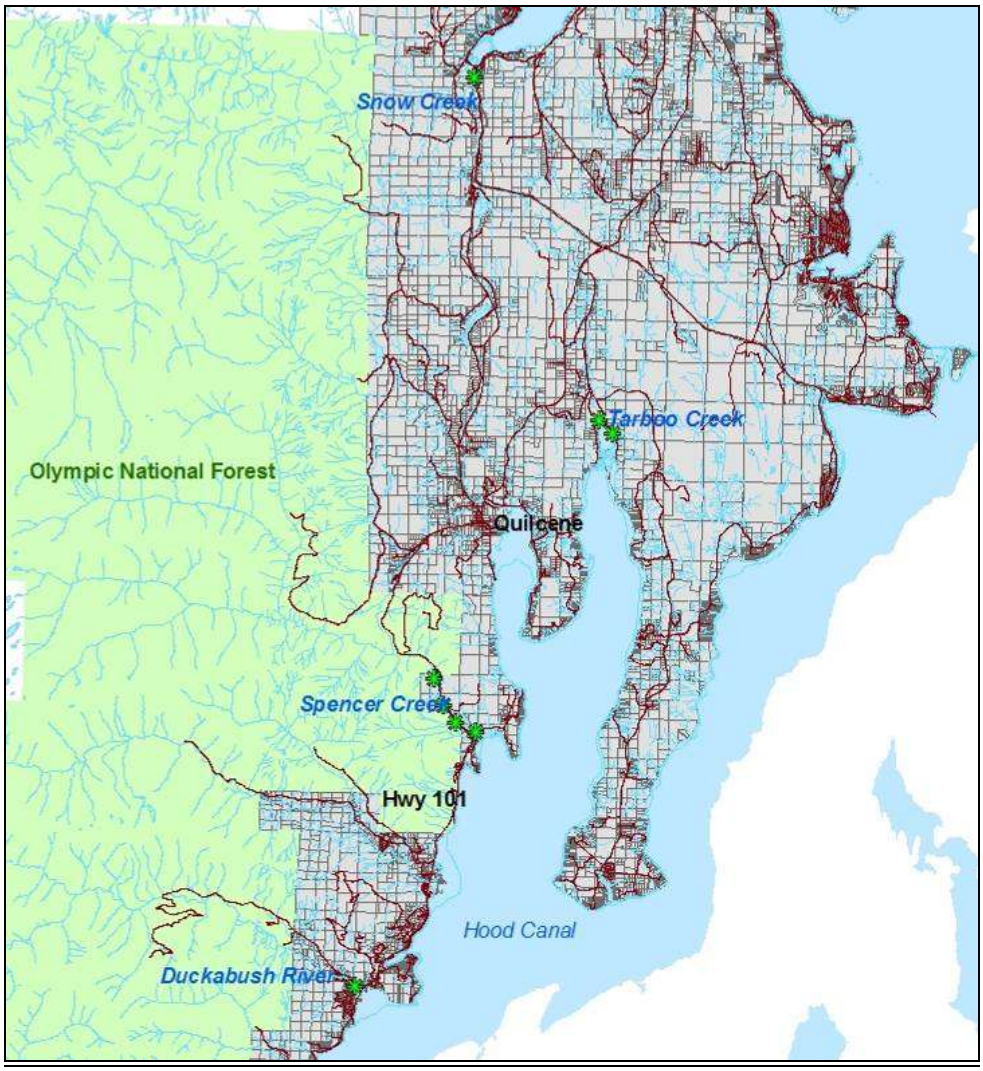
The Dungeness River, which is in the eastern portion of WRIA 18, drains 198 square miles. The mainstem extends 31.9 miles and its primary tributary, the Gray Wolf River, adds another 17.4 miles. There are an additional 256 miles of tributaries in the basin. Historically, the Dungeness was highly productive 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.

For more information, please contact Hilton Turnbull at (360) 681-4603 or hturnbull@jamestowntribe.org.

PROJECT ACTIVITIES BY WATERSHED

EAST JEFFERSON COUNTY



Knotweed sites treated by JCNWCB and CCNWCB in 2012

Snow Creek and Salmon Creek

Crew—*JCNWCB*

Snow Creek and Salmon Creek both flow into the south end of Discovery Bay, where a lumber mill operated until the 1950s. Habitat for salmonids and other species has been seriously impacted for many years because thousands of cubic yards of scrap wood blocked tidal flow. Ammonia and sulfur have been leaching into the water, degrading water quality. A restoration project was started in July, 2008, and was completed by the end of that year. The wood waste was removed, along with five derelict buildings, exposing the old marsh surface and restoring the original tide level. Native marsh vegetation is expected to return in three to four years. Clallam and Jefferson Noxious Weed Control Boards treated knotweed on both Snow and Salmon Creeks from 2006 through 2010.

In **2012** one small site on Snow Creek was treated at the request of the Hood Canal Coordinating Council.

Tarboo Creek

***Crew**—JCNWCB. CCNWCB and Northwest Watershed Institute (NWI)*

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 twice near the mouth in **2011** in a joint effort between JCNWCB and NWI.

In **2012** Weed Board crews teamed up with NWI again for two more treatments. The herbicide table below shows that more herbicide was used in 2012 than in 2011, even though populations appeared to have been reduced.

Spencer Creek

***Crew**—JCNWCB and CCNWCB*

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. Permission was sought for all the affected parcels, and was granted for all but one. The Clallam-Jefferson knotweed crew treated all sites we had permission for. We also re-treated both the knotweed and the giant hogweed at the mouth of Spencer Creek. Both were much reduced.

Duckabush River

***Crew**—JCNWCB treated and HCSEG surveyed*

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 and 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, starting within the U.S. Forest Service boundary where a vehicle had access on Duckabush River Road. Further downstream, a foot survey was conducted at the mouth. No knotweed plants were found.

In 2007 a landowner near the mouth of the Duckabush called to say he had knotweed. He signed a Landowner Agreement and JCNWCB treated the knotweed. This site was re-treated in 2008, 2010 and **2012**.

In 2012, HCSEG funded another complete survey of the river. Dry weather and decreased river flows allowed crews to complete the first full ground survey including the difficult to reach right bank. Surveys were conducted by HCSEG staff and volunteers from the river's mouth to the upper Forest Service Road bridge in 2012. No knotweed was found.

Fulton Creek

Crew—JCNWCB and CCNWCB

In 2009 a landowner on Fulton Creek who had heard about our program called to ask if we could treat their knotweed. The landowner was, of course, happy to sign an agreement and the crew spent half a day treating it.

In 2010 the patch was much reduced and we re-treated. This is one infestation that can safely be turned over to the landowner for control because remaining plants can be sprayed without herbicide getting into water. No work was done on Fulton Creek in **2011 or 2012**.

Small Knotweed sites in Port Townsend and Quilcene

Crew—JCNWCB, CCNWCB and volunteers

The JCNWCB received permission from the City of Port Townsend to treat small knotweed infestions within the city in 2008. JCNWCB treated all of these sites and one in neighboring Quilcene at least one time between 2008 and 2011. All of these sites were skipped in **2012**.

- **Kah Tai Lagoon Park** in Port Townsend. A highly visible knotweed infestation of approximately 0.75 acres has 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**.

- **Oak Bay** near Port Hadlock. The Oak Bay County Park, off of Admiralty Inlet, is a popular shellfish-digging 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 County Parks and Recreation Department in **2011**.

- **Lake Leland**, near Quilcene. The Lake Leland County Park is a popular fishing destinataion. 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**.

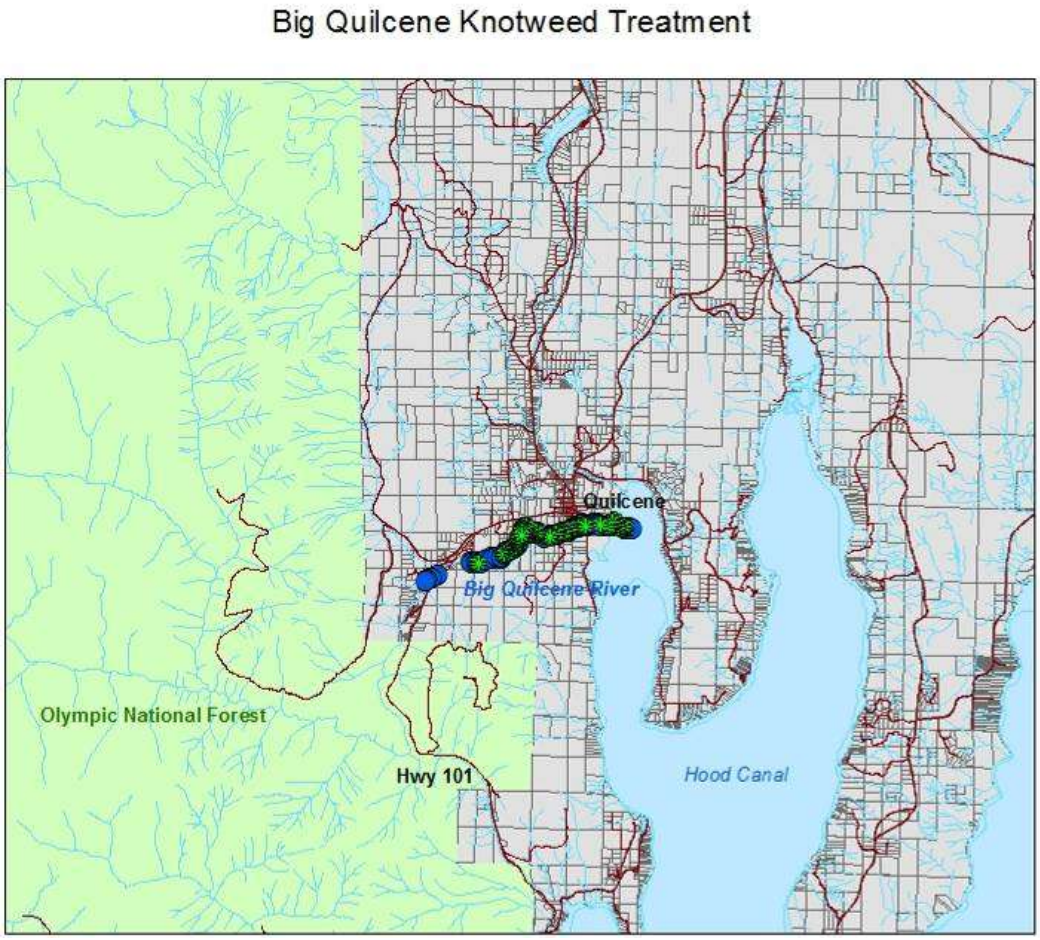
- **Old Eaglemount Road** runs close to Chimacum Creek, a stream which is home to federally listed Hood Canal summer-run chum. The tidelands at the mouth of Chimacum Creek are popular for clam-digging. A small stand of knotweed on Old Eaglemount was treated in **2010 and 2011**. Very little is left.

- **Town of Quilcene:** A private landowner who has been battling knotweed on her farm for several years asked for help and weed board staff supplied herbicide and worked with her to spray in **2011**.

Herbicide Used on Small Jefferson County Sites (gallons)		
Waterway	**2011**	**2012**
Snow Creek	0.15	0.01
Tarboo Creek	1.96	2.25
Spencer Creek	1.69	3.29
Duckabush	0	0.01
Port Townsend	0.15	0
Oak Bay	1.125	0
Lake Leland	0.47	0
Old Eglemount Rd	0.004	0
Quilcene	0.56	0
Total	6.109	5.56

Big Quilcene River

Crew-- East Jefferson WCC



Green indicates treatment in 2012. Blue indicates knotweed sites recorded in 2008. .

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 largest tributaries to the Big Quilcene are Townsend Creek, Tunnel Creek and Penny Creek. The headwaters of both Townsend Creek and Tunnel Creek are at high elevations and the entire length of both tributaries is on Olympic National Forest land. Penny Creek starts at a considerably lower elevation and flows through private and state-owned land. Penny Creek was included in our survey but Townsend Creek and Tunnel Creek were not.

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 the confluence of the Big Quilcene River and Penny Creek, 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. One site was found on Penny Creek, about 3 miles upstream from its confluence with the Big Quilcene. The owner had been controlling it for many years but had not succeeded in eliminating it. No knotweed was found further upstream on Penny Creek.

Knotweed on the Big Quilcene was treated by a Clallam County crew in 2008 and 2009.

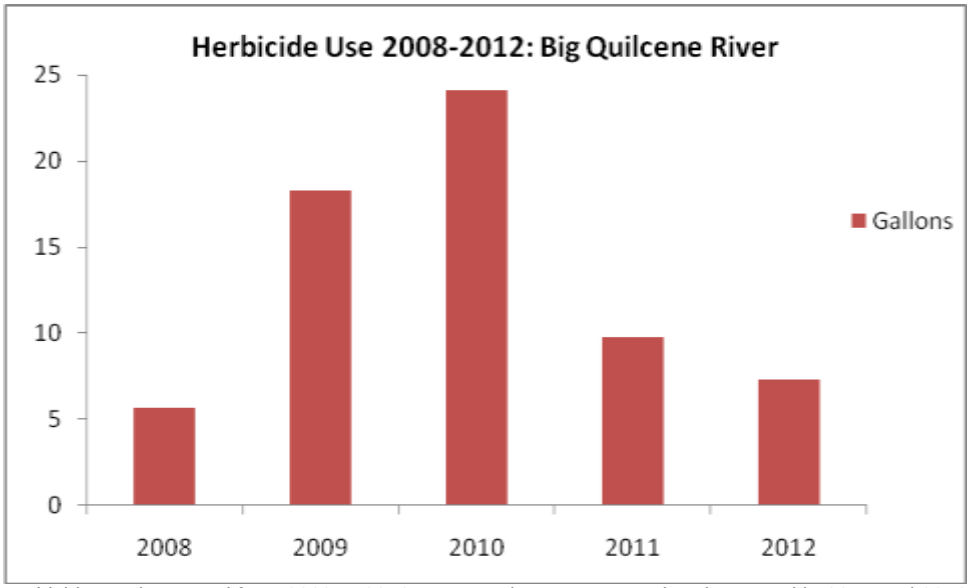
In 2010 the East Jefferson WCC crew spent 19 days treating knotweed on the Big Quilcene. Some stands were still huge, having been "ringed" rather than fully treated in previous years. Others were large, being treated for the first time. Good progress was made in 2010, thanks to North Olympic Salmon Coalition, Hood Canal Coordinating Council and the Hood Canal Salmon Enhancement Group who jointly funded the WCC crew.

In 2011 the WCC crew re-treated all sites on the Big Quilcene, again thoroughly treating every site. JCNWCB assisted with landowner contacts. In addition to treatment, landowners were given the option of having native plants installed on their property. HCSEG (using a grant from the Salmon Recovery Funding Board) funded the WCC crew and the replanting.

In 2012, knotweed was retreated in all known sites with the assistance from East Jefferson County Washington Conservation Corps crew, HCSEG volunteers and HCSEG Americorps members. In addition to treatments, the Hood Canal Salmon Enhancement Group contacted landowners to renew expired property owner consents and conducted a few planting plans.

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

"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.

Little Quilcene River

Crew—HCSEG and East Jefferson WCC

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.

Due to adverse weather only the most upstream knotweed patch on the Little Quilcene River was treated **in 2012**. Remaining knotweed near the mouth was surveyed and will be treated in 2013.

Dosewallips River

Crew—East Jefferson WCC crew and CCNWCB

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 ESA.

Dosewallips Knotweed Treatment

Green indicates treatment in 2012. Blue indicates knotweed sites surveyed and recorded in 2010.

In 2006 Jefferson County Noxious Weed Control Board (JCNWCB) surveyed the Dosewallips. CCNWCB provided training, herbicide and equipment. They recorded eight knotweed sites and acquired seven Landowner Agreements. All sites with Landowner Agreements in place were treated, including a site at the Dosewallips State Park. More treatment took place from 2007 through 2009, using a combined JCNWCB/CCNWCB crew.

In 2010 the East Jefferson WCC crew began a new survey of the Dosewallips, finding more sites than previously, and more upstream sites. Most sites found in 2010 were treated by the same crew.

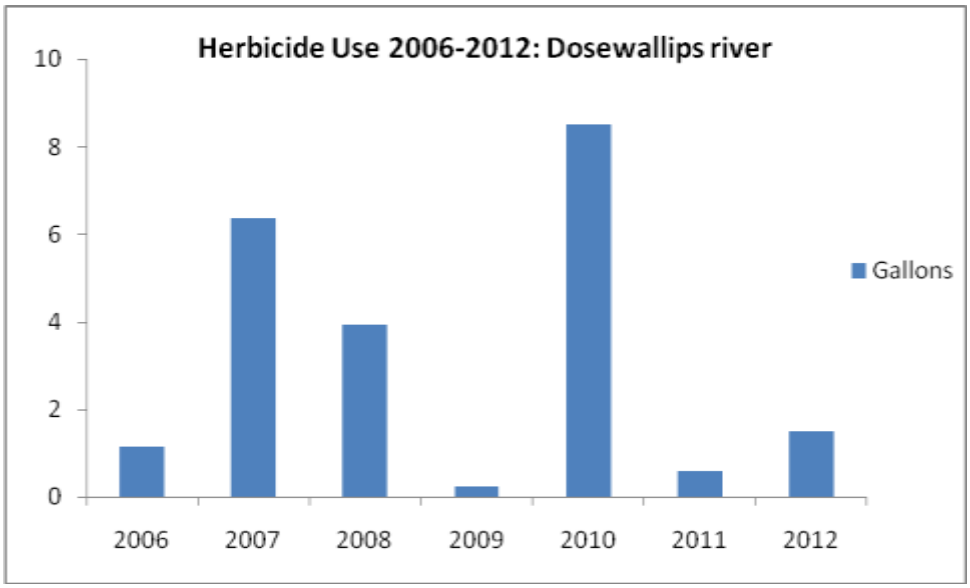
In 2011 the WCC crew continued to survey. Work on the Dosewallips is difficult because of high stream flow and steep banks, but progress was made; also, the majority of known sites were re-treated. 2010 treatments were so successful that only a few small plants remained on most sites that had been treated. Lack of time and bad weather precluded treatment of all known sites. As part of their planning process, USFS discovered knotweed at the site of a large woody debris project and called in the weed board to consult on best management practices.

In all previous years the Dosewallips River was only surveyed and treated along its left bank. Drier conditions in **2012** allowed surveying and treatment on the right bank for the first time. Treatment agreements were obtained from most landowners. HCSEG and East Jefferson County WCC crews completely surveyed and treated both banks where permission had been secured. Infestations on the right bank were light and consisted of small scattered patches. On the left bank small amounts of knotweed was growing back in previously treated locations. Altogether 23 properties were treated.

At the request of USFS personnel, CCNWCB treated remaining small amounts of knotweed in and around the proposed site for a new USFS engineered log jam.

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

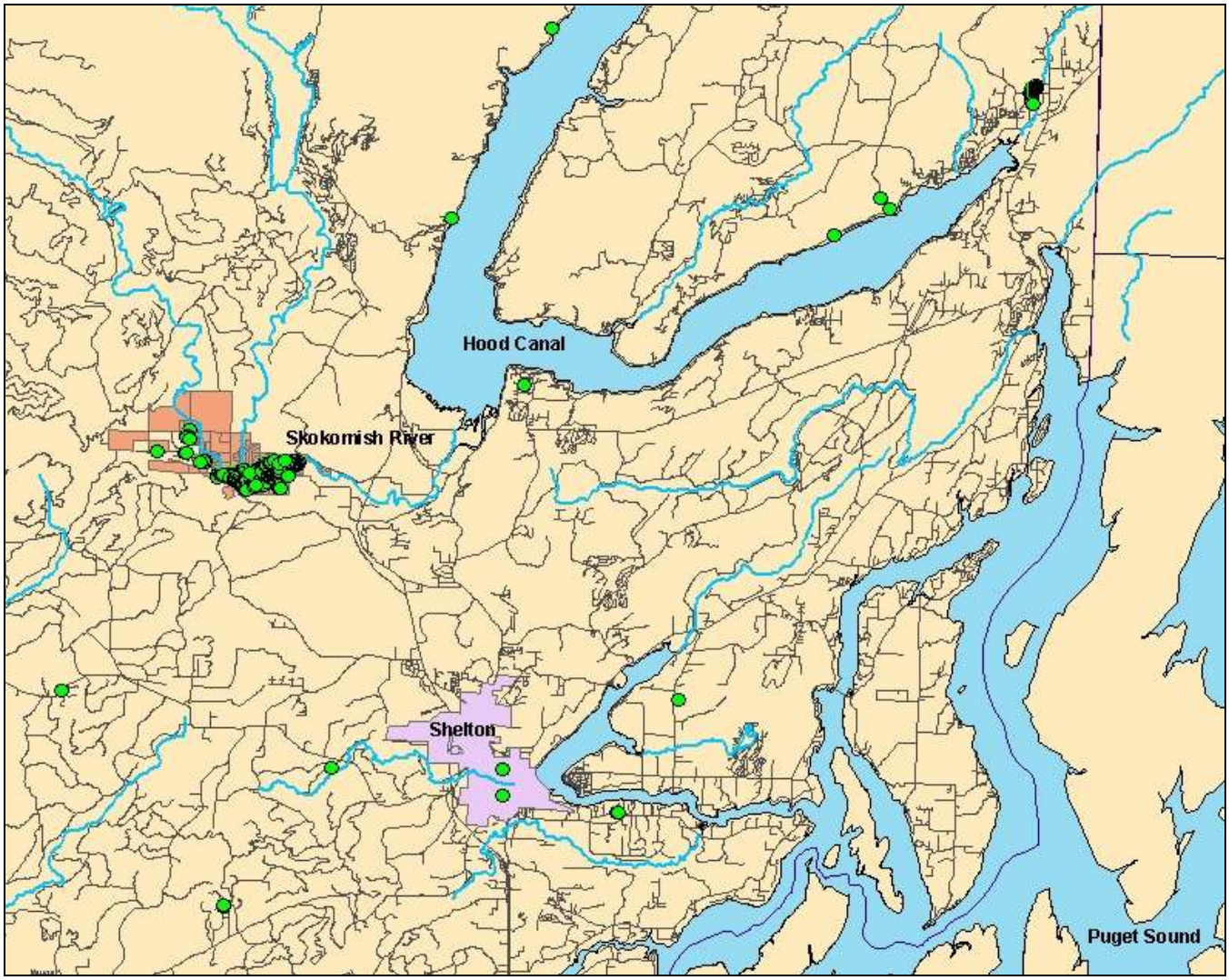
Note: Acres treated" were calculated by adding together the acreage on all of the Pesticide Application Records and may vary depending on whether the applicator recorded the area treated or the whole infested area. The discrepancy between acres treated in different years may be due to different counting 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..

PROJECT ACTIVITIES BY WATERSHED

MASON COUNTY

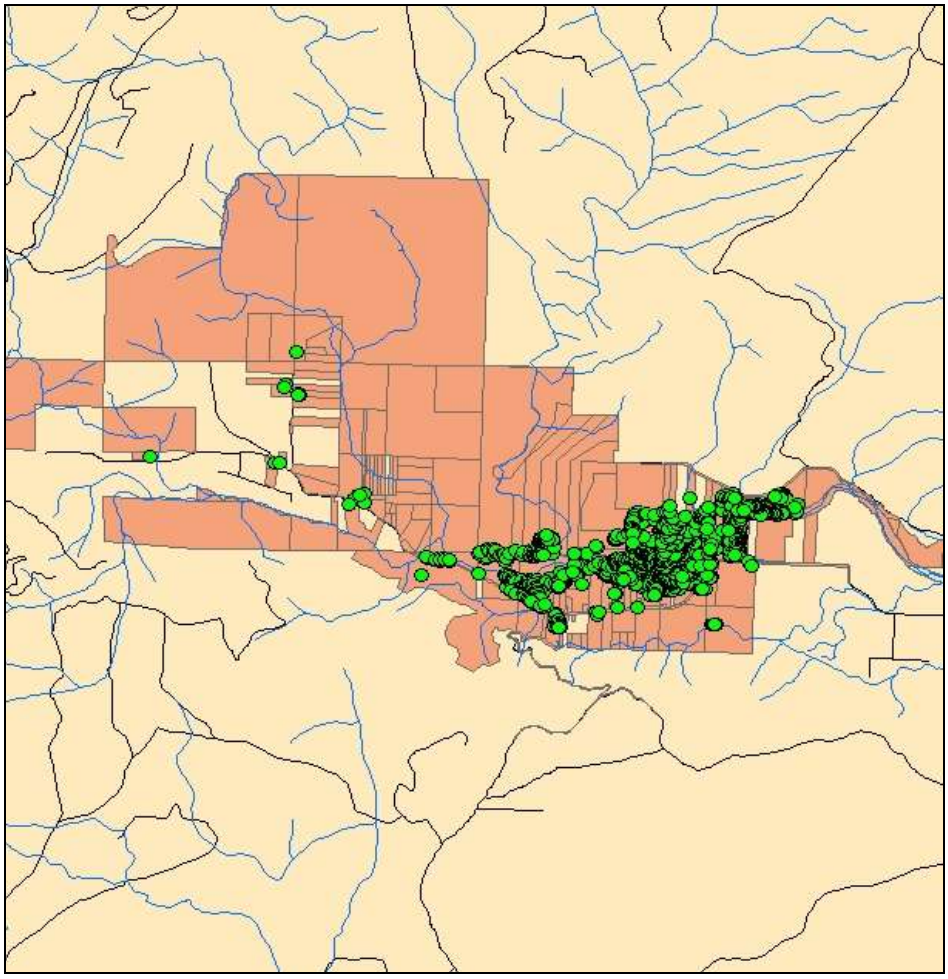


Green indicates sites treated by Mason County Noxious Weed Control Board or Mason Conservation District

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.



Green indicates locations on the Skokomish River treated for knotweed in 2012

2011 was the second year that the Skokomish was treated using SRFB funding. Mason Conversation District and Mason County Noxious Weed Control Board surveyed 2,190 acres and treated 1.97 acres on the Skokomish in 2011.

In **2012** crews focused on taking a systematic top-down approach to treatment, and almost 43 acres were treated. Infestations in the Skokomish River are so bad that all Conservation District efforts were focused on the Skokomish this year, with the exception of conducting some surveys in Eagle Creek.

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

The Mason County NWCB partnered with landowners to treat 18 sites that were mostly upland. These included sites where infrastructure such as driveways and drainfields were threatened by knotweed, riparian restoration sites, and some roadside/private sites. Please see the Mason County map on page 49.

For more information contact Pat Grover at the Mason County Noxious Weed Control Program at 360-427-9670 ext 592 or PatriciaG@co.mason.wa.us

Tahuya River

Crew—Hood Canal Salmon Enhancement Group and volunteers

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 2010he first knotweed survey on the Tahuya found small intermittent patches.. Complete treatments of known knotweed patches were conducted in both **2010** and **2011**. Landowners in general were very willing to give permission and a total of 56 properties were treated.

In **2012** Knotweed on the Tahuya River was treated for a third consecutive year. A few new properties were treated after obtaining landowner agreements. Planting plans on a few properties has been conducted and await plantings. HCSEG staff and volunteers were involved in the 2012 survey and treatments.

Union River

Crew—Hood Canal Salmon Enhancement Group, Mason County WCC, and volunteers

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. In **2011** 89 properties were treated, totaling 2.5 acres. Considering that 55.8 acres were treated in **2010**, there was obviously much 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.

Dewatto River

Crew—Hood Canal Salmon Enhancement Group and volunteers

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 intermittingly 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.

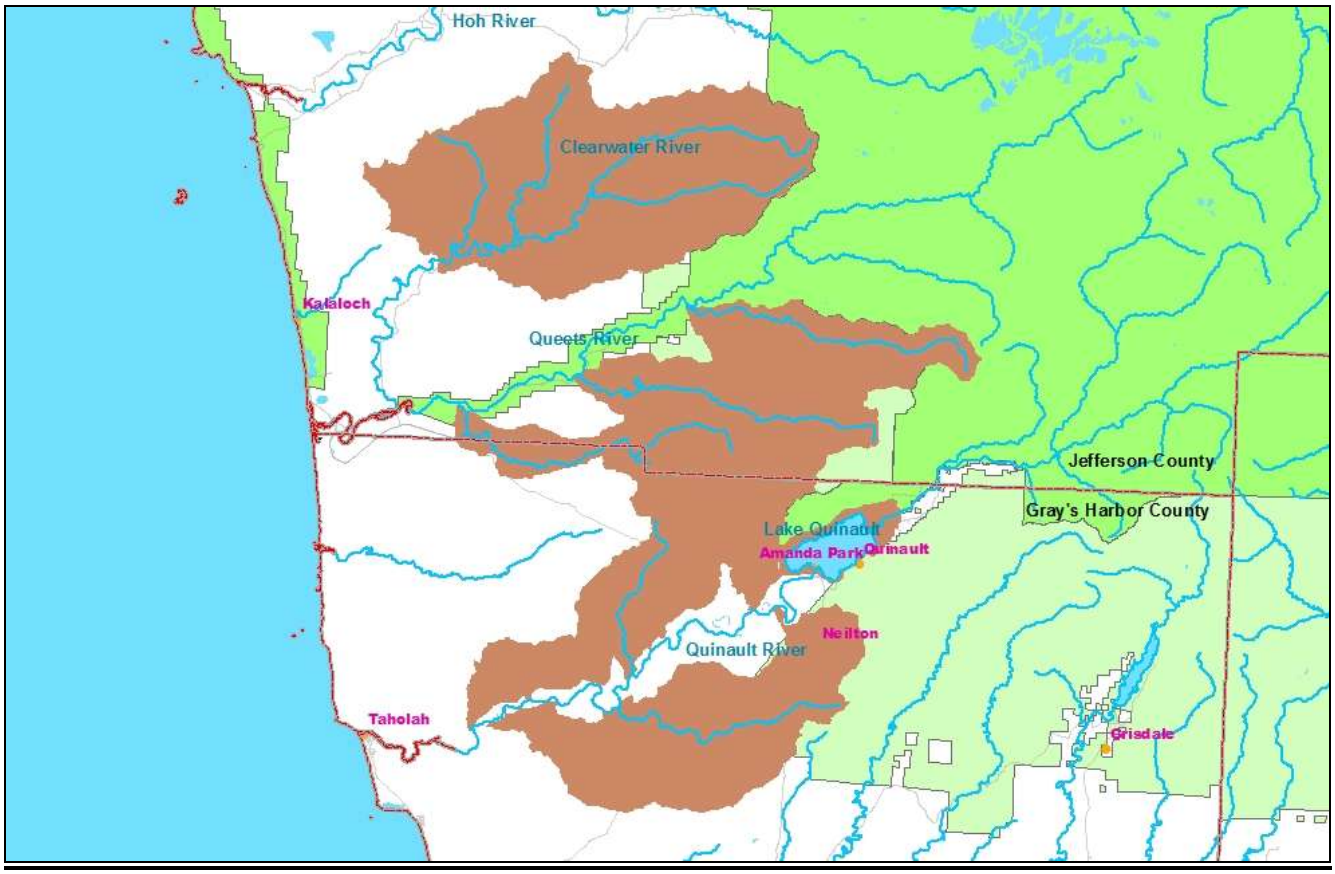
For more information about the Tahuya, Union or Dewatto Rivers please contact Mendy Harlow, 360-275-9722 mendy@hcseg.org or Michelle Myers, **360-275-9722** michelle@pnwsalmoncenter.org

PROJECT ACTIVITIES BY WATERSHED

WEST JEFFERSON COUNTY AND GRAY'S HARBOR COUNTY

Quinault River, Lake Quinault, Queets and Clearwater Rivers

Crew-- The Quinault Indian Nation, Grays Harbor NWCB and the North Cascades EMPT with NPS.



The brown area indicates the Quinault Indian Nation's Project Area. Shape files of treatment are not available. The entire project encompasses 227,774 acres.

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, Lake Quinault and Prairie Creek

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. This grant originally covered work over 8,400 acres, but was amended in **2011** to include the North Shore of Lake Quinault and Amamnda Park, for an additional 3,374 acres.

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. Gray's Harbor County Noxious Weed Control Board helped with landowner contacts and permissions and partnerships were formed with Rayonier Timberlands and USFS. 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 Gray's Harbor NWCB.

Queets-Clearwater Watershed

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 get 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.

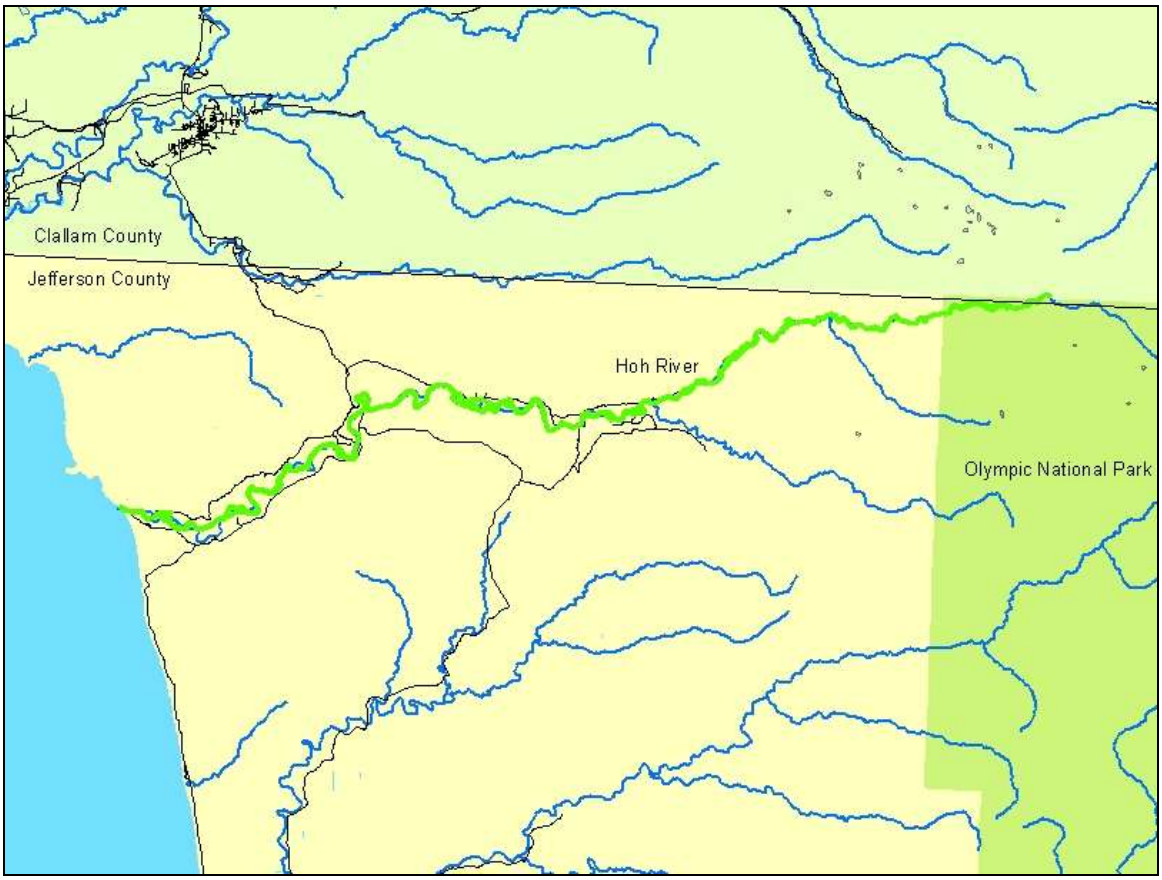
In **2012** crews treated all previously recorded knotweed infestations and completed surveys and treatment along the remaining length of the Queets and Clearwater rivers. The surveys covered 23.95 river miles, and approximately 1040 acres. The total area treated was 2.25 acres.

The Quinaults are aware 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. They were able to treat source populations in towns close to Quinault River tributaries, before they moved downstream. Landowner cooperation and interest in the project has been high in developed parts of the project area—Neilton, Amanda Park, the North Shore and Lake Quinault.

For more information about knotweed treatment on Quinault, Queets and Clearwater Rivers, please contact Bonnie Eyestone, at (360)276-8215 ext 588 or beyestone@quinault.org .

Hoh River

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



Green indicates extent of 2012 surveys and treatments.

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. Funding was provided by the SRFB/RCO through the WRIA 20 LEG, and by Hoh River Trust. Crew was provided under a contract with the Pacific Coast Salmon Coalition (PCSC). Access is provided by private landowners, the U.S. Forest Service, and Department of Natural Resources. **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.

Annual project reports can be accessed at http://www.10000yearsinstitute.org .

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

NA: data not available at the time the report was written.

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

Organization	River or Location	2006 (gal)	2007 (gal)	2008 (gal)	2009 (gal)	2010 (gal)	2011 (gal)	2012 (gal)
Quileute Nation & NCEPMT /NPS	Quillayute, Dickey, Calawah & Bogachiel Rivers	101.5	43.97	43.125	98.63	69.55	118.2	**6.2**
CCNWCB	Big River & Hoko-Ozette Road	65.39	5.14	2.181	5.12	3.174	0.646	**0.460**
CCNWCB	Sekiu River	10.98	0.3	1.767	0.609	2.35	0.475	**0.526**
CCNWCB	Hoko River	2.6	4.23	2.516	1.541	0.56	0.285	**0.15**
CCNWCB	Sekiu, Clallam Bay & Hwy 112	17.9	9.79	3.28	0.605	0.5	0.185	**0.066**
CCNWCB	Clallam River	0	35.09	3.28	2.58	0.93	1.87	**0.2827**
CCNWCB & Merrill and Ring	Pysht River	1.2	0.72	0.005	0.005	0.01	0	**0.014**
CCNWCB & NCEPMT / NPS	Sol Duc River (mid)	14.05	12.725	7.636	1.627	0	0	**0**
CCNWCB	Lake Creek, Lake Pleasant & Beaver	0	27.09	0.82	1.062	0	0	**0.1542**
Quileute Nation	Sol Duc River (lower)	0	9.656	6.67	0.945	1.26	0	**2.1**
CCNWCB	Forks	2.5	4.25	1.662	0.468	0	0	**N/A**
CCNWCB	Valley Creek	2.3	1.52	0.063	0.023	0.01	0	**0**
CCNWCB	Peabody Creek	0	0	0	1.98	0.14	0	**0**
NCEPMT / NPS	Ennis Creek	0	0.68	1.34	1.91	3.641	<1	**0.123**
CCNWCB	Lees Creek	0	0	0	0	0	0.48	**0**
CCNWCB	Bagley Creek	0	0	0	0	0	0.97	**0.328**
Jamestown S'Klallam Tribe	Dungeness River	30	<2	1.5	0	0	0	**0**
JCNWCB & CCNWCB	Snow & Salmon Creek	0.745	0.408	1.33	1.714	0.43	0	**0.001**
JCNWCB	Port Townsend & other Jefferson County sites	0	0	2.212	0.49	1.047	5.96	**0**
East Jefferson WCC Crew	Big Quilcene River	0	0	5.66	18.291	32.37	9.77	**7.33**
East Jefferson WCC Crew	Little Quilcene River	0	0	0	0.6	0.1	0	**0**
JCNWCB, CCNWCB & East Jefferson WCC	Dosewallips &Duckabush Rivers,	1.145	6.375	3.92	0.234	8.503	0.58	**1.543**
JCNWCB & CCNWCB	Fulton Creek	0	0	0	0.5	0.11	0	**0**
MCNWCB	Terrestrial sites	N/A	N/A	N/A	N/A	N/A	N/A	**9.6**
Mason CD & MCNWCB	Skokomish River & others	N/A	N/A	N/A	N/A	17.57	N/A	**143.25**
HCSEG, Mason Co. WCC &Kitsap NWCB	Union, Dewatto & Tahuya Rivers and Big Anderson Creek	N/A	N/A	N/A	25.56	27.16	10.98	**46.69**
Quinault Indian Nation & NCEPMT / NPS	Queets, Clearwater, Prairie Creek, Lake Quinault & Lower Quinault watershed	N/A	N/A	N/A	N/A	12.652	N/A	**31.75**
10,000 Year Institute & NCEPMT / NPS	Hoh River	2.36	1.23	0.643	0.361	1.247	0.88	**0.46**
TOTAL		**260.49**	**169.66**	**92.331**	**165.6**	**186.864**	**152.28**	**250.95**

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

Appendix II: Clallam/Jefferson NWCB landowner agreements

Watershed	Existing Agreements	New Agreements, 2012	Number of Parcels	Note
Big River and Hoko-Ozette Road	11	0	35	Several parcels have changed hands.Most expired agreements have been renewed.
Sekiu River	6	1	10	
Hoko River	8	0	34	A few large land owners each hold several parcels. These include timber companies and Washington State Parks.
Sekiu, Clallam Bay and Highway 112	49	1	68	
Clallam River	11	0	20	
Pysht River	1	0	2	
Sol Duc River	39	0	93	
Lake Creek, Lake Pleasant and Beaver	10	4	25	
Forks	22	0	30	
Elwha River	3	0	4	
Valley Creek	1	0	1	
Peabody Creek	15	0	25	
Ennis Creek	14	0	55	Increase in parcel number due to subdivision of 1 parcel into 7 parts in 2012
Lees Creek	0	0	27	
East Fork Lees Creek	11	0	20	
Morse Creek	0	0	48	
Bagley Creek	24	5	48	
Siebert Creek	0	0	25	
Snow Creek	9	0	10	
Port Townsend	1	0	7	
Lake Leland	5	0	6	
Big Quilcene River	20	0	31	
Little Quilcene River	4	0	4	
Tarboo Creek	0	2	3	
Spencer Creek	1	2	3	
Dosewallips River	19	0	33	
Fulton Creek	1	0	1	
Queets/Clearwater	98	62	150	A few large land owners each hold several parcels. These include timber companies and WA Department of Natural Resources.
Total	**244**	**134**	**818**	

Note that because some of our agreements cover multiple watersheds we have tried not to enlarge the record by counting agreements twice. For example, if Rayonier has parcels in both the Big River and the Hoko River, that agreement has been counted only once.

This table summarized agreements held by Clallam and Jefferson NWCBs. Agreements held by other programs are not included.

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

Clallam County
Cathy Lucero—Noxious Weed Control Coordinator
360-417-2442
clucero@clallam.co.wa.us

Jefferson County
Eve Dixon—Noxious Weed Control Coordinator
360-379-5610 ext 205
edixon@jefferson.wa.us

Mason County
Pat Grover—Noxious Weed Control Coordinator
360-427-9670 ext 592
PatriciaG@co.mason.wa.us

Gray's Harbor County
Nancy Ness—Noxious Weed Control Coordinator
360-482-2265
nancy.ness@wsu.edu

Mason Conservation District
Evan Bauder
360-427-9436 ext 13
evan@masoncd.org

Quileute Tribe
Garrett Rasmussen
360-374-2027
garrett.rasmussen@quileutenation.org

Makah Tribe
Rob McCoy
360-645-3058
makahwildlife@centurytel.net

Lower Elwha Klallam Tribe
Mike McHenry
360-457-4012 ext 14
mike.mchenry@elwha.nsn.us

Jamestown S'Klallam Tribe
Hilton Turnbull
360-681-4603
hturnbull@jamestowntribe.org

Quinault Indian Nation
Bonnie Eyestone
360-276-8215 ext 290
beyestone@quinault.org

North Cascades Exotic Plant Management Team with the National Park Service
Dan Campbell
360-565-3076
dan_campbell@nps.gov

US Forest Service (Olympic Region)
Cheryl Bartlett
360-956-2283
cbartlett@fs.fed.us

10,000Years Institute
Jill Silver
360-385-0715
jsilver@10000yearsinstitute.org

Hood Canal Coordinating Council
Luke Cherney
360-301-9565
lcherney@hccc.wa.gov

Hood Canal Salmon Enhancement Group
Mendy Harlow
360-275-9722
mendy@hcseg.org

Forterra
Elsa Sargent
206.905.6954
esargent@forterra.org

North Olympic Salmon Coalition
Sarah Doyle
360 379-8051
sdoyle@nosc.org

Pacific Coast Salmon Coalition
Carl Chastain
360-374-8873
pacsac@olypen.com

Appendix IV: Sample Poster: Community Knotweed Workshop

GOT KNOTWEED—OR OTHER WEEDS? WANT TO GET RID OF THEM?

Jefferson County Noxious Weed Control Program (with help from Clallam County) is offering a FREE workshop to help you

Knotweed

Knotweed is one of the toughest, nastiest weeds around and it is VERY hard to get rid of. It crowds out native plants, destroys fish and wildlife habitat, interferes with recreation, can ruin your septic or other structures, and can lower land values. Tansy ragwort is toxic to livestock and is common throughout the county. Knapweeds and hawkweeds invade pastures, reducing agricultural production. Fighting weeds without the right equipment can be frustrating. This workshop will give you the knowledge and tools you need.

DATE AND LOCATION:

August 28th 2012, 12:30 to 2:45 pm
Tri-Area Community Center
10 West Valley Road
Chimacum WA 98325

Find out:

- How weeds grow and spread and what their impacts can be
- The life cycles of different weeds and the different methods you can use to control them
- How to implement an Integrated Weed Management (IWM) plan, most effectively using ALL weed control methods
- How to borrow tools and get supplies for controlling knotweed and other noxious weeds on your own land

This is a hands-on workshop with practical weed control tips. Participants will be able to borrow stem injectors or backpack sprayers, and to receive supplies for controlling knotweed or other weeds on their property. Two pesticide licensing credits have been applied for.

Tansy ragwort flowers

Please contact us if you are interested in attending, or if you would like more information:

360-379-5610 ext 205
edixon@co.jefferson.wa.us