



Crews from the Quileute Tribe Natural Resources and Clallam County Noxious Weed Control Board survey for knotweed on the Quillayute River.

2016 Olympic Invasives Working Group

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



A patch of knotweed found growing on a beach near Clallam Bay.

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December 2016

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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 the Olympic Peninsula from impacts caused by invasive knotweeds and other exotic plants that are just beginning to invade.

Project Overview

The Olympic Invasives Working Group (OIWG) is a loose-knit consortium of governments, tribes, non-profits and private landowners, working together since 2005 to eliminate knotweed and other invasive weeds in riparian habitat. The group meets twice a year for the purpose of sharing information and strategically planning for knotweed control across jurisdictional boundaries. Clallam County Noxious Weed Control Board (CCNWCB), as the de facto group leader, coordinates the meetings and supports the work of other group members by acquiring Landowner Agreements, distributing herbicide, coordinating projects and in some cases supplying an aquatic applicator. CCNWCB's role is to "fill in the gaps" by controlling invasives in areas not otherwise covered and educates the community about knotweed impacts and control. Most partners use independent funding sources.

2016 Overview

Multiple entities are involved in controlling invasive knotweeds. Most are now adding control of other invasives to their work plans. Details of work by all groups who responded to requests for data can be found in the body of this report. Weed Boards continued to coordinate and support the work of other entities in their own counties.

In Clallam County, we focused on areas that had not been monitored for several years, where sufficient landowner agreements were still in force, and where we had strong partnerships that allowed us to pool resources. We also prioritized specific requests for assistance from both private landowners and other partners. The Quilleute Tribe and CCNWCB did a float survey and treatment of most of the Sol Duc River, from the Klahowya campground to the junction with the Quillayute River. The Quilleute Tribe, along with CCNWCB and the North Cascades Exotic Plant Management Team with Olympic National Park (NCEMPT) made significant progress on knotweed along the Quillayute River. The Quilleute Tribe treated portions of the Bogachiel River, and along with CCNWCB, the lower portion of the Dickey River. The North Olympic Salmon Coalition with the Jamestown S'Klallam Tribe continued with their on-going, multi year project of invasives treatments, and revegetation on the Dungeness River. We assisted with knotweed treatments there as crew resources allowed. The Lower Elwha Tribe in conjunction with Olympic National Park continued their invasives treatment and restoration post dam removal in the Elwha River watershed. The East Jefferson Washington Conservation Corps (EJWCC) treated sites along the Hoko River. The Makah surveyed and treated knotweed along Big River and Hoko-Ozette Road.

In Jefferson County, Hood Canal Salmon Enhancement Group (HCSEG) treated for knotweed along the Dosewallips and Big Quilcene River, and surveyed parcels for landowners on the Little Quilcene River. The DNR-WCC treated small sites in and around Dosewallips State Park.

In Mason County HCSEG worked on the Union, Tahuya, and Dewatto Rivers. The Mason County NWCB controlled knotweed on several streams and miscellaneous other county sites. The Mason Conservation District began treatments of Goldsborough and Mill Creeks and once again worked within the Skokomish watershed.

In West Jefferson and Grays Harbor Counties, the 10,000 Years Institute worked on the Hoh River and surrounding areas. The Quinault Indian Nation worked along the Quinault River, Lake Quinault, and upland areas within the QIR. NCEMPT worked in and around the Quinault River as well.

2016 Project Activities Summary-per County

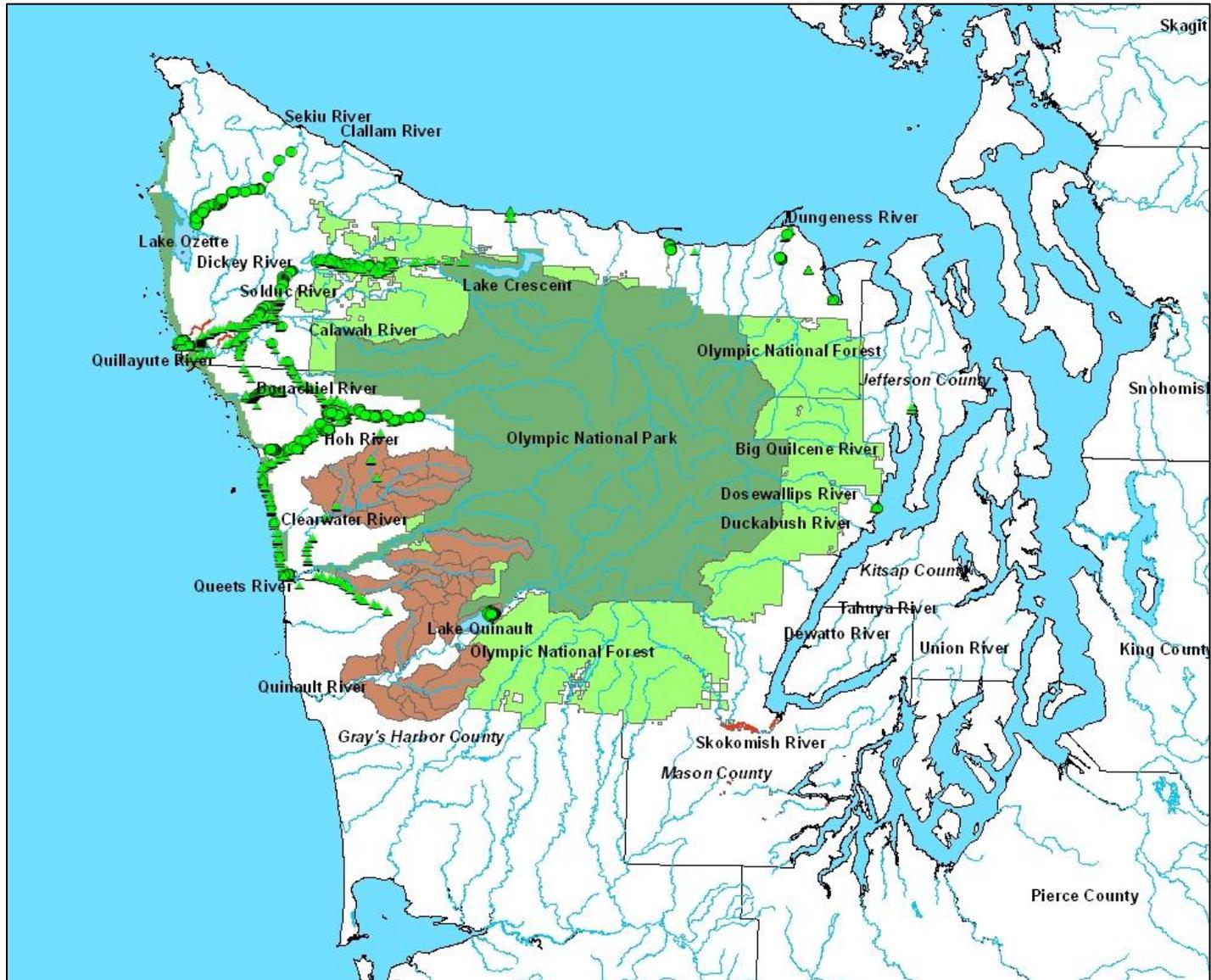
(see Table I with watershed details by county, starting on page 55)

- In Clallam-5 entities on 5 waterways, managed more than 233 landowner agreements and obtained 38 new agreements. Knotweed was treated across over 540 acres on 43 river miles.
- In Jefferson-5 entities on 4 waterways managed over 244 landowner agreements and obtained 5 new agreements. Knotweed was treated across more than 61 acres on 38 river miles.
- In Mason-3 entities on 13 waterways, managed more than 337 landowner agreements and obtained 36 new agreements. Knotweed was treated on over 905 acres on 27 river miles.
- In Grays Harbor-2 entities managed 95 landowner agreements and treated knotweed on 1801 acres on 30 river miles.
- ***These groups reported concurrently treating multiple invasive species encompassing more than 150 additional solid acres!***

Conclusions and Recommendations

Where knotweed treatments have occurred, populations are greatly reduced. Increased awareness of other invasive plant impacts has expanded early intervention efforts in many watersheds. This has generated considerable momentum that can be sustained with modest funding investments. WSDA funding has been vital to the weed board's ability to perform a central role in these concerted and widespread noxious weed control activities.

OVERVIEW MAP OF THE OLYMPIC PENINSULA



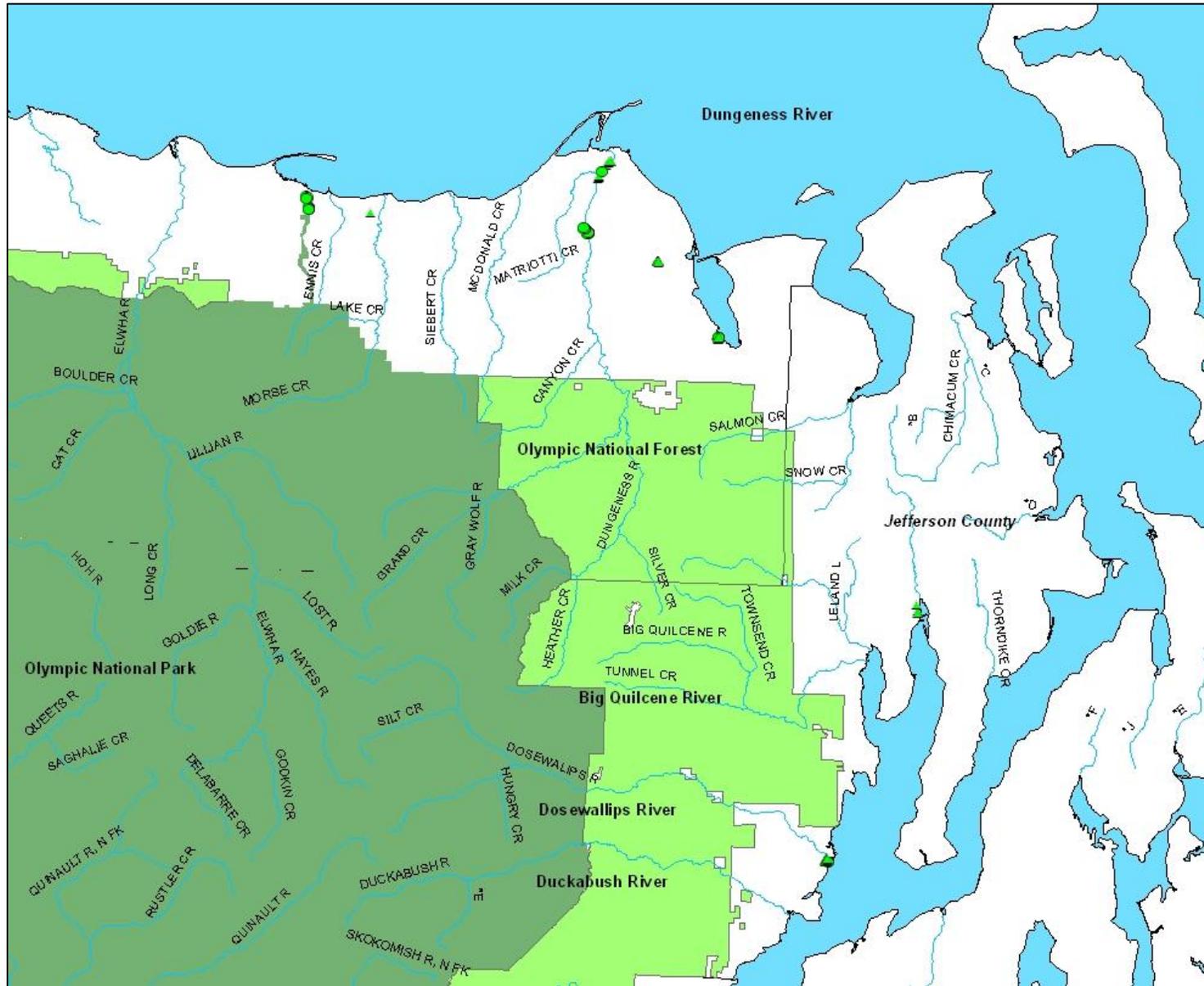
Green circles indicate 2065 knotweed treatments, triangles indicate additional invasive species treatments. Brown polygons indicate the Quinault Indian Nation project area.

OVERVIEW MAP OF WEST CLALLAM COUNTY



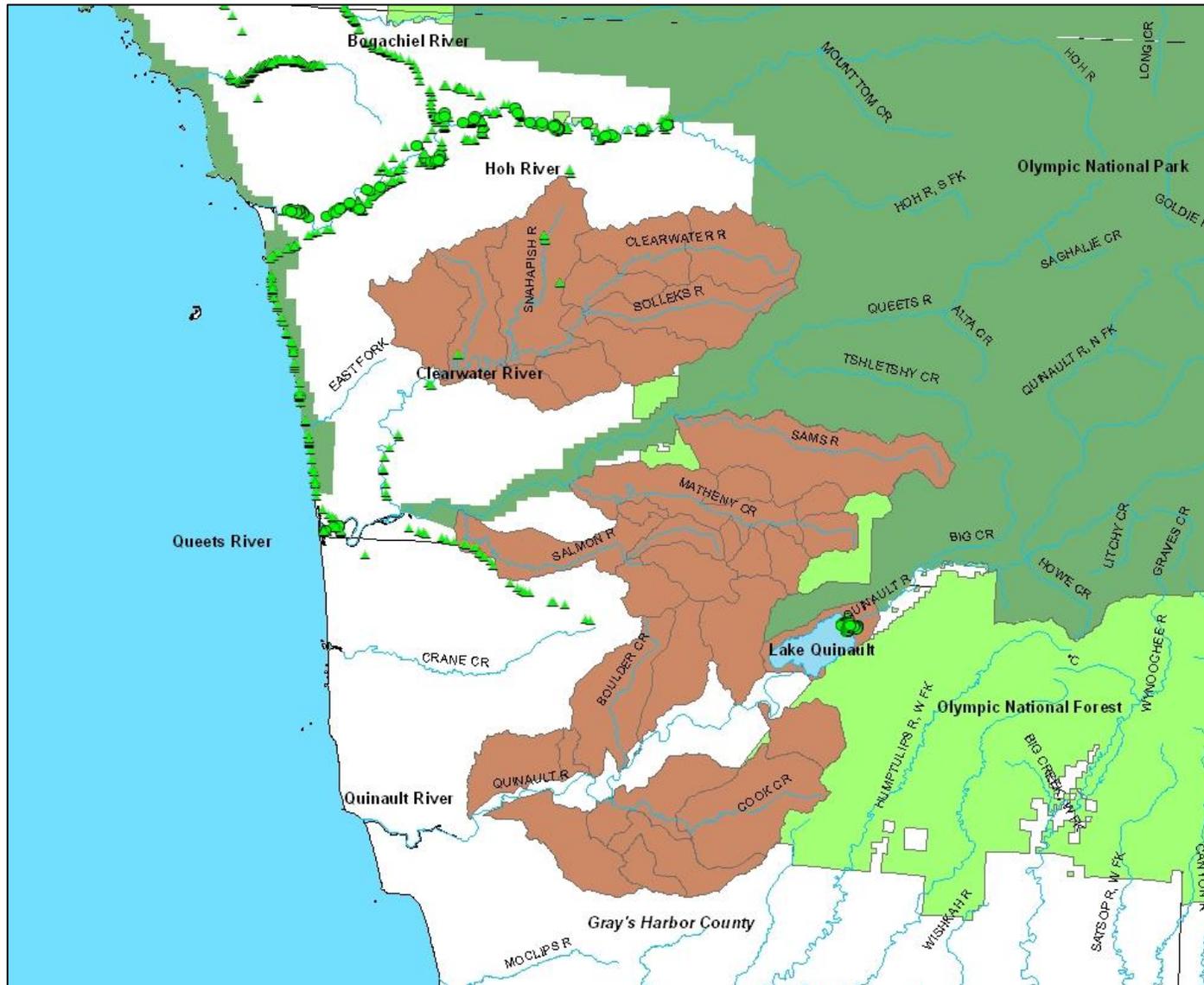
Green circles indicate 2016 knotweed treatments, triangles indicate additional invasive species treatments.

OVERVIEW MAP OF EAST CLALLAM COUNTY AND EAST JEFFERSON COUNTY



Green circles indicate 2016 knotweed treatments, triangles indicate additional invasive species treatments.

OVERVIEW MAP OF GRAYS HARBOR COUNTY AND WEST JEFFERSON COUNTY



***Green circles indicate 2016 knotweed treatments, triangles indicate additional invasive species treatments.
Brown polygons indicate the Quinault Indian Nation project area.***

PROJECT DESCRIPTION

Project Goal

The goal of this project is to protect the natural resources, ecosystem functions and land values throughout the Olympic Peninsula from the negative impacts of invasive knotweed. Projects focus 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 Invasives Working Group (OIWG) is a loose-knit consortium of governments, tribes, non-profits and private landowners, working together since 2005 to eliminate knotweed and other invasives in riparian habitat. The group generally 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 in many ways including acquiring Landowner Agreements, distributing herbicide, coordinating projects, and in some cases supplying an aquatic applicator. CCNWCB's role is to "fill in the gaps" by controlling invasives 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 continues to expand in all four Peninsula Counties. This report attempts to give a broad overview of work occurring across the entire Olympic Peninsula as information is provided. Because there is no other repository, we have tried to collect as much information about these projects as possible. A brief summary giving historic perspective is included, as available, to show the changes and progress this group has made over time.

2016 Overview

Throughout the Olympic Peninsula many entities have gotten involved with controlling invasive knotweeds. As awareness grows, so does concern about other aggressive plant species newly invading sensitive riparian areas. In response, many are incorporating a multi-species control strategy to their work plans. Details of work by all groups who responded to requests for data can be found in the body of this report. Clallam and Jefferson County Weed Boards continued to coordinate and support the work of other entities in their own counties.

The Washington Department of Natural Resources provided ten days of Washington Conservation Corps (WCC) time in Clallam, primarily for riparian weed control, including knotweed. Having crews able available to supplement the work of the many different entities in our county involved in controlling invasives is a great benefit. This year's crew was led by an excellent returning crew leader.

In Clallam County, we focused on areas that had not been monitored for several years, where sufficient landowner agreements were still in force, and where we had strong partnerships that allowed us to pool resources. We also prioritized specific requests for assistance from both private landowners and other partners. CCNWCB and DNR-WCC treated multiple scattered sites across the county. The Makah surveyed and treated knotweed along Big River and Hoko-Ozette Road. The East Jefferson WCC treated knotweed on the Hoko River near Highway 112. The CCNWCB treated knotweed along Peabody Creek in Port Angeles. The North Olympic Salmon Coalition with the Jamestown S'Klallam Tribe continued to their multi-year project of invasives treatments, and revegetation on the Dungeness River. We assisted with knotweed treatments there as crew resources allowed. The Lower Elwha Tribe in conjunction with Olympic National Park continued their invasives treatment and restoration post dam removal in the Elwha River watershed.

In Jefferson County, Hood Canal Salmon Enhancement Group (HCSEG) treated for knotweed along the Dosewallips and Big Quilcene River, and surveyed parcels for landowners on the Little Quilcene River. The DNR-WCC treated small sites in and around Dosewallips State Park.

In Mason County HCSEG worked on the Union, Tahuya, and Dewatto Rivers. The Mason County NWCB controlled knotweed on several streams and miscellaneous other county sites. The Mason Conservation District began treatments of Goldsborough and Mill Creeks and once again worked within the Skokomish watershed.

In West Jefferson and Grays Harbor Counties, the 10,000 Years Institute worked on the Hoh River and surrounding areas. The Quinault Indian Nation worked along the Quinault River, Lake Quinault, and upland areas within the QIR. NCEMPT worked in and around the Quinault River as well.

An incredibly diverse mix of entities across the Peninsula has become part of the solution to stop noxious weed invasions. (See the 2016 Project Activity Summary by County for details of work groups who supplied their information.) Clallam and Jefferson County Weed Boards continue to coordinate and support the work of other agencies in their own counties. The Clallam County Weed Board managed and planned work for a DNR funded Washington Conservation Corps crew for 10 days. The CNWCB coordinated two working group meetings offering a total of 10 license credits. Collaboration and communication between all four counties weed boards and their respective partners will be vital to the future progress and success of the Working Group.

2016 PROJECT ACTIVITIES

Landowner Contacts and Agreements-(as reported to CCNWCB)

Each landowner was contacted, in person, by letter/email, or phone call prior to this season's treatments.

In Clallam

- Clallam County Noxious Weed Control Board (CCNWCB) and Jefferson County Noxious Weed Control Board (JCNWCB) managed **233 Landowner Agreements**, including **38 new** landowner agreements.
- North Olympic Salmon Coalition (NOSC) managed **23** landowner agreements, including **6** new landowner agreements (on the Dungeness River).
- Quileute Tribe-Natural Resources (QNR)-number of landowner agreements is not available.

In Jefferson

- JCNWCB-(combined with Clallam-see above)
- Hood Canal Salmon Enhancement Group (HCSEG)-managed **92 Landowner Agreements**, including **4 new** landowner agreements.
- 10,000 Years Institute-managed **127 Landowner Agreements**, including **1 new** agreement.

In Mason

- Mason County Noxious Weed Control Board (MCNWCB)-managed **146 Landowner Agreements**, including **31 new** landowner agreements.
- HCSEG-managed **164 Landowner Agreements**, including **5 new** landowner agreements.
- Mason County Conservation District-managed at least **27 Landowner Agreements**.

In Kitsap

- HCSEG- managed **33 Landowner Agreements**, including **26 new** agreements.

In Grays Harbor

- Specific information regarding Grays Harbor NWCB landowner contact activities is not available.
- Quinault Indian Nation (QIN) reported managing **95 landowner agreements** (combined Jefferson and Grays Harbor Counties).

Survey and Treatment:

This list summarizes knotweed work accomplished in 2016 and reported to CCNWCB by members of the Olympic Invasives Working Group (OIWG). It may not be a comprehensive list of activities of all OIWG partners.

It is ordered geographically starting in south-west Clallam County with the Quillayute River system and, working clockwise around the Peninsula, ending in the Hoh River system. The Project Activities by Watershed is similarly ordered. See specific watershed narrative and/or summary in Table I for more information.

- Surveyed and/or treated along **19.7 miles** of the Big River [Makah Tribe].
- Re-treated along **1.95 miles** of the Quillayute River [Quileute Tribe, CCNWCB, NCEPMT]
- Re-treated along **11.96 miles (77 acres)** of the Bogachiel River [Quileute Tribe].
- Re-treated along **7.5 miles (74 acres)** of the Dickey River [Quileute Tribe, CCNWCB].
- Treated along **1.5 miles (9.14 acres)** of the Hoko River [EJWCC].
- Re-treated along **28.81 miles (221.1 acres)** of the Sol Duc River [CCNWCB, Quileute Tribe].
- Surveyed and/or treated along **0.43 miles (2.61 acres)** of Peabody Creek [CCNWCB].
- Re-treated **8 acres** near Bell Creek [DNR-WCC].
- Treated **3.16 miles (32.77 acres)** of the Dungeness River [CCNWCB, EJWCC]
- Treated **4.2 acres** on other sites in Clallam County [DNR-WCC].
- Re-treated **2.6 miles (34 acres)** of the Big Quilcene River, [HCSEG].
- Surveyed **2** parcels on the Little Quilcene River [HCSEG].
- Surveyed and treated **8.3 miles (219.7 acres)** of the Dosewallips River [HCSEG, DNR-WCC].
- Surveyed and treated **3.45 miles (38.94 acres)** of the Union River [HCSEG, MCNWCB].
- Surveyed and treated **5.73 miles (62.51 acres)** of the Tahuya River [HCSEG].
- Surveyed and treated **0.74 miles (5.38 acres)** of the Dewatto River [HCSEG].
- Treated **8 parcels** in Allyn and **2 parcels** in Belfair [MCNWCB].
- Re-treated **0.58 miles (4.5 acres)** on Finch Creek and **1.1 miles (10 acres)** on Sherwood Creek [MCNWCB].
- Surveyed and treated **12.4 miles (850 acres)** of the Skokomish River [Mason Conservation District].
- Treated **1.17 miles** of Goldsborough and Mill Creeks [Mason Conservation District].
- Treated **1.5 miles (3.4 acres)** on Stimson Creek and **0.4 miles (4 acres)** on Coulter Creek [MCNWCB].
- Treated **12 parcels (3.3 acres)** in North Bay, Oakland Bay, and Spencer Lake [MCNWCB].
- Surveyed and treated **2 parcels (10.8 acres)** in Shelton [MCNWCB].
- Surveyed and treated at least **49.5 acres** along US Hwy 101 and 300 [MCNWCB].

- Re-treated **0.77 miles (9 acres)** along Big Anderson Creek [HCSEG].
- Surveyed **7.86 acres** along Big Beef Creek [HCSEG].
- Surveyed and/or treated 30.4 miles of the Quinault River [QIN, NCEPMT]. **QIN project area encompasses over 200,000 acres.**
- Monitored and re-treated **27 miles (3750 acres)** on the Hoh River and associated tributaries [10,000 Years Institute].
- In Clallam and Jefferson Counties—treated land owned by **10 public entities** including US Forest Service, Olympic National Park, **4 state agencies** (WA State Parks, WA Department of Natural Resources, WA Department of Fish and Wildlife, WA State Department of Transportation), and **4 local governments**, City of Port Angeles, the Port of Port Angeles, Jefferson and Clallam Counties [CCNWCB and JCNWCB].

Data Management and Documentation:

- CCNWCB maintained the **Knotweed Projects Database for Clallam and Jefferson County Noxious Weed Control Boards.**
- Clallam and Jefferson County NWCBs separately applied for NPDES permitting and any reporting done under different NPDES coverage was done separately.

Outreach and Training:

- Clallam County NWCB loaned equipment and supplies to previous workshop attendees who trained in safe herbicide use and were treating their own knotweed infestations away from water.
- Clallam County NWCB was given the use of a six-man Washington Conservation Corps crew, funded by the Washington Department of Natural Resources, for approximately 10 days. The DNR-WCC crew was available to assist with invasive plant control in riparian areas. Unlike the “knotweed only” focus of our crews who were funded with knotweed dollars, this crew was able to use an all invasive approach, especially for early or pioneer infestations of additional non-native plants known to be problematic. We greatly benefited from a returning crew leader who had knowledge and experience with specific projects from last year.



Fall OIWG attendees at the Jamestown S’Klallam Tribal campus listen to an informative presentation.

- The CCNWCB continued to coordinate meetings of the Olympic Working Group. Meetings may be held in various locations around the Peninsula to encourage participation from those who would not be willing or able to travel. These meetings are a forum for exchanging information and ideas, networking and pooling resources. They also help us identify future needs, data gaps, obstacles and solutions to problems. The meetings help licensed applicators accrue required education credits with topics that best serve their needs thus encouraging a higher professional standard. Meetings have expanded, attracting a more diverse audience every year. As a function of this group interaction, we have identified the need to control additional invasive plant species of special concern. Therefore, depending on the member’s need, we include information about the threats of other invasives and control measures, while encouraging a multi-species strategy.



OIWG Meeting-From top left clockwise: Dr. Andy MacKinnon discusses forest ecology; Pete Allen demonstrates techniques for preventing tick bites; Richard Knoth presents the use of drones in forestry and agriculture; Dr. Tim Miller discusses underlying concepts of toxicity versus risk that can help shape conversation with the public regarding thoughtful use of herbicides to control invasive plant species.

Our spring meeting was held at the Port Angeles Public Library, while the fall meeting was again hosted by the Jamestown S’Klallam Tribe at the beautiful Cedar Room situated on Sequim Bay. Well over 180 participants attended the two meetings including representatives from 5 Native American Tribes, 6 Federal agencies, 6 State agencies, 1 State University, 7 counties, and 11 non-profits. A total of ten pesticide credits were offered for the over 40 applicators who attended both meetings. Workshop evaluations, turned in by nearly two thirds of attendees, highly rated the overall program and felt future workshops would be valuable.

- Staff updated **Clallam County Weed Control Board’s website**, including several pages on knotweed—the minutes of meetings of the Olympic Invasives Working Group and many of the presentations from those meetings.
- CCNWCB staff highlighted our knotweed program and distributed information at **20 educational events**.

2016 Project Activities Summary-per County

(see Table 1 with watershed details by county, starting on page 55)

- **In Clallam-5** entities on **5** waterways, managed more than **233** landowner agreements and obtained **38** new agreements. Knotweed was treated across over **540** acres on **43** river miles.
- **In Jefferson-5** entities on **4** waterways managed over **244** landowner agreements and obtained **5** new agreements. Knotweed was treated across more than **61** acres on **38** river miles.
- **In Mason-3** entities on **13** waterways, managed more than **337** landowner agreements and obtained **36** new agreements. Knotweed was treated on over **905** acres on **27** river miles.
- **In Grays Harbor-2** entity managed **95** landowner agreements and treated knotweed on **1801** acres on **30** river miles.
- **These groups reported concurrently treating multiple invasive species encompassing more than 150 additional solid acres!**

2016 PROJECT PROCEDURES

1. Surveys and Monitoring

CCNWC surveys, monitoring and treatments took place on from June 14th through August 12th. Surveys were conducted by foot and by boat. Other entities had different treatment seasons.

2. Project Teams

Teams were typically comprised of 2-6 people and always included a licensed aquatic applicator.

- **The Quileute Nation crew**, led by Garrett Rasmussen (licensed aquatic applicator), worked on the Quillayute, Sol Duc, Bogachiel, and Dickey Rivers, and Wisen Creek (a tributary of the Sol Duc).
- **The Clallam County NWCB crew**, consisting of Cathy Lucero (licensed aquatic applicator), Peter Butler (licensed aquatic applicator), Rachael Owen (licensed aquatic applicator), Chandra Johnson (licensed aquatic applicator), and Evan Sivesind (licensed aquatic applicator) worked on the Quillayute, Sol Duc, Dickey, and Bogachiel Rivers and Peabody Creek.
- **The Department of Natural Resources WCC crew (DNR-WCC)**, led by Peter Allen (licensed aquatic applicator), treated knotweed on the Dungeness and Dosewallips Rivers. This crew treated multiple other invasives in additional watersheds. In previous years known as Puget Sound Corps (PSC).
- **The East Jefferson WCC crew** led by Owen French (licensed aquatic applicator), worked on the Hoko and Dungeness Rivers.
- **The Hood Canal Salmon Enhancement Group WCC crew (HCSEG-WCC)** led by Alex Papiez (licensed aquatic applicator) surveyed and/or treated on the Big and Little Quilcene, Dosewallips, Union, Tahuya, and Dewatto Rivers, and Big Anderson and Big Beef Creeks.
- **Mason Conservation District** used an in house crew lead by Brayden Raber and Mitch Redfern (licensed aquatic applicator), treated knotweed on the Skokomish River and Mill and Goldsborough Creeks.
- **Mason County NWCB crew** consisting of Pat Grover (licensed aquatic applicator) and Connor Cordray (licensed aquatic applicator) treated knotweed on Coulter, Finch, Stimson and Sherwood Creeks, in Allyn, Belfair, North Bay, Oakland Bay, Lake Isabella, Spencer Lake, and Shelton, and various sites along highways.
- **Total Vegetation Management and Brittland Company crews** led by Caroline Martorano, Quinault Indian Nation staff (licensed aquatic applicator worked on the Quinault River system.
- A crew, led by Jill Silver of **10,000 Years Institute** (licensed aquatic applicator) worked on the Hoh River and along surrounding roads and highways.
- **The North Cascades Exotic Plant Management Team with the National Park Service**, led by Sophie Wilhoit and Collin McAvinchey (licensed aquatic applicators) worked on knotweed populations within the Olympic National Park and on the Quillayute 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)*. A single infestation of Himalayan knotweed was reported on a highway site near the Sol Duc river, No Himalayan knotweed was reported this year in Jefferson Counties. Depending on the funding source and project focus, crews treated early infestations of over 20 other invasives species such as giant hogweed, butterfly bush, reed canarygrass, herb Robert, Canada thistle, poison hemlock, and yellow archangel.

4. Data Collection & Equipment

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

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

- We converted waypoints collected during surveys into shapefiles, and added them as layers to the county parcel map.
- We instructed the crews to turn on the track logs in their devices. Office staff downloaded the track logs and was able to determine where crew had been and had NOT found knotweed—a “null survey”.
- We have tracked herbicide use in watersheds from year to year. In previous years, herbicide use has been used as a proxy for change in biomass to help measure treatment efficacy. Due to changes in treatment, this is no longer as directly comparable in many cases. This method of measuring effectiveness is only used when we have the necessary treatment details to make a comparison. Herbicide quantity and active ingredient, when available, is included in the section “Project Activities by Watershed”. Overall use will no longer be tracked in an appendix as in previous years.
- All survey and treatment data collected by Clallam County NWCB was added to a knotweed database. This database facilitates tracking of landowner contacts, agreement expiration, treatments, site status and monitoring. Beginning in 2014, treatments of additional invasive plants were included as a separate infestation record.
- We sent out a form to encourage uniform data collection (see Appendix II) and to meet the request of WSDA which issued re-defined reporting standards in 2014. There continues to be some reporting inconsistencies by us and our partners which we will attempt to address in future forums and crew training.

Definitions-per WSDA protocol as of 2016, for all Clallam County NWCB records,

Examined acres-includes area searched and treated. Area was determined by the following formula: $\text{acres} = \text{length (of river corridor) in feet} \times \text{width in feet of area searched} / 43560$ (square feet in acre). Unless known to be otherwise, it was assumed that crews searched a minimum of a 50 foot corridor along the river.

Treated acres-includes the gross area where plants were actually treated; does not include area searched in which plants were not found. Acres were determined from the length X width as above-taken from GPS track logs, waypoints, and spray records.

Solid acres-based on the average calibration of individual back pack sprayers which in 2016 averaged around 40 gallons/acre, we assumed that each gallon of mixed product would treat approximately 1000 sq feet. $(\text{Gallons of solution used per treatment} \times 1000) / 43560$ was the formula we used to calculate this total.

Protected River Miles-was calculated by measuring the length of track logs in GIS.

5. Landowner Contacts and Agreement Management

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

6. Permits

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

7. Treatment, Equipment, and Rate- **NOTE:** Additional herbicides, rates and methods used to control other invasive species besides knotweed are beyond the scope of this report.

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.

(As of 2016, Mason County NWCB continues to use this method for specialized applications, as time and resources allow)

Equipment-JK Injection Systems injection guns.

Application rate- Between 3 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 for knotweed control in 2016)

Equipment-foam paint brush. .

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

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

8. Records

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

OBSERVATIONS AND CONCLUSIONS

- NPDES permission may need to be obtained earlier in the year, especially for those rivers where in-stream access is essential.
- Updated Hunt GPS chips, which now include Jefferson County landowner information are available from a Missoula based company and purchased through Garmin for about \$30 (for updates). These maps were an inexpensive and simple way to provide a lot of parcel information (such as outlines and ownership) to crews in the field.
- Treatment resulting from the collaboration between CCNWCB, Quileute Tribe, and the North Cascades Exotic Plant Management Team (for the National Park Service) in the Quillayute watershed was the highlight of our season!
- Unexpected rainy weather during the prime treatment season disrupted some of our planned treatments.
- Most partners are moving towards 1% imazapyr as their preferred treatment as knotweed infestations are reduced. One county is experimenting with the use of triclopyr for knotweed in a grass dominated site. The CCNWCB continues to see good results from 1% imazapyr/1% surfactant which was used for all our treatments except where crews came upon knotweed when doing non-knotweed specific control work and one special consideration site where we injected.
- A number of landowner permissions are expiring and we need to plan and budget for obtaining new agreements for next year's priority waterways.
- Track logs from the GPS units provide extremely valuable information about where crews went and where they missed.
- Continuity with WCC crew leads greatly improved effectiveness.
- There are still inconsistencies in reported accomplishments between entities- another review of data collection and protocols to renew consensus among partners may be needed.
- We should depend on dimension, density and habit information (as was previously collected with GPS data dictionaries), to document progress. We created a new form that captures this information. The form was approved for use by the WSDA. (See Appendix II)-It is still highly advisable to count stems and general height, to measure progress over time.
- OIWG meetings are meant to encourage communication and cohesiveness among partners. Because the Olympic Peninsula is a relatively small place where partnerships can be constantly reconfigured, we need to allow enough time and effort to maintain these vital relationships.
- We continue to incorporate Peninsula-wide knotweed activities into this report 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. Although much more difficult, we encourage an all-species approach, where feasible. Information about additional invasives treatment is being collected and gradually added to the OIWG report to show this effort and pragmatic shift. (See Table I)
- In Clallam County we are pursuing an updated policy that allows limited herbicide use only for the control of noxious weeds and other invasive plants of special concern. Prevention and early intervention will always be the preferred strategy.
- The NPDES end-of-year online reporting was simplified, requiring only some specific species to be called out.
- The tenacious nature of knotweed and its ability to re-appear after successful treatments requires a much longer monitoring and follow-up cycle than any other species to date. This fact needs to be accounted for and integrated into our overall-long term strategy.
- The State's knotweed program continues to be indispensable. In addition to providing base funding, it has helped us provide permitting and technical advice to jump start other programs. The Olympic Invasives Working Group continues to draw a diverse membership and MANY other groups now participate in knotweed control Peninsula wide. The Weed Boards are invested in supporting these groups and interested residents county wide. In many cases this WSDA funding is being used to leverage other grants.

RECOMMENDATIONS

- 2017 project priorities- In west Clallam County, the highest priority continues to be the Quillayute River system. Though good progress was made in 2016 due to the collaboration between the Quileute Tribe, Olympic National Park and Clallam County Noxious Weed Control Board, the Quillayute River continues to be one of the heaviest infested waterways. Follow-up on 2016 treatments on the Sol Duc River would be ideal. A float survey of the Hoko River is needed. Survey and treat sites in the Sekiu-Clallam Bay region, including Charlie Creek. In mid Clallam County, permissions for Peabody, Ennis, south Bagley and East Fork Lees Creeks need to be updated to allow for 2017 treatments. It is likely that NOSC will need some additional assistance for knotweed control on the Dungeness. Get permission and treat knotweed sites in Sekiu/Clallam Bay area. Collaborate with and assist Makah with treatments where appropriate.
- Prioritize sites in Jefferson County and coordinate treatments for the upcoming season.
- Plan pre-season communication with other project managers. Look for more cross boundary project opportunities.
- Discuss reporting protocols. Update *data request form* to normalize data received from partners.
- Update Best Management Practice documents. Consult with other knotweed control programs and WSDA before publication.
- Perform Early Detection and Intervention in conjunction with knotweed treatments where there is sufficient time and resources.
- Continue to incorporate information about other invasives in our working group meetings.
- Continue updating the CCNWCB web page to include information highlighting work by partners, including contact information.
- Encourage more training by Ecology for inexperienced WCC crews who are increasingly utilized for invasive control work. Focus on more training for crew leads.
- Continue to engage and encourage timber companies to increase their involvement in monitoring, prevention and treatment of terrestrial sites, especially rock sources.
- Seek contracting standards that take invasives issues into account.
- Increase outreach with hunters, fishers and other recreationists for knotweed detection.
- Continue efforts to effect a change in Clallam County Road Department policy to increase prevention activities, reduce the spread of noxious weeds by mowers, and to develop additional tools to control noxious weeds on roadsides. Routine maintenance activities on roadsides are a major vector for the spread of knotweed and other invasive species.
- Encourage planners to include weed inventory in pre-project check list.
- Further simplify NPDES reporting by requiring only total herbicide usage per watershed.
- Increase the duration of landowner permission agreements from four years to ten to accommodate the long monitoring cycle that is needed for this species. It is clear that several or longer monitoring cycles will be necessary to identify early stage re-emerging knotweed infestations. Ensure that weed boards, which have broad jurisdiction and long term focus, can afford to stay involved.

PARTICIPATING GROUPS

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

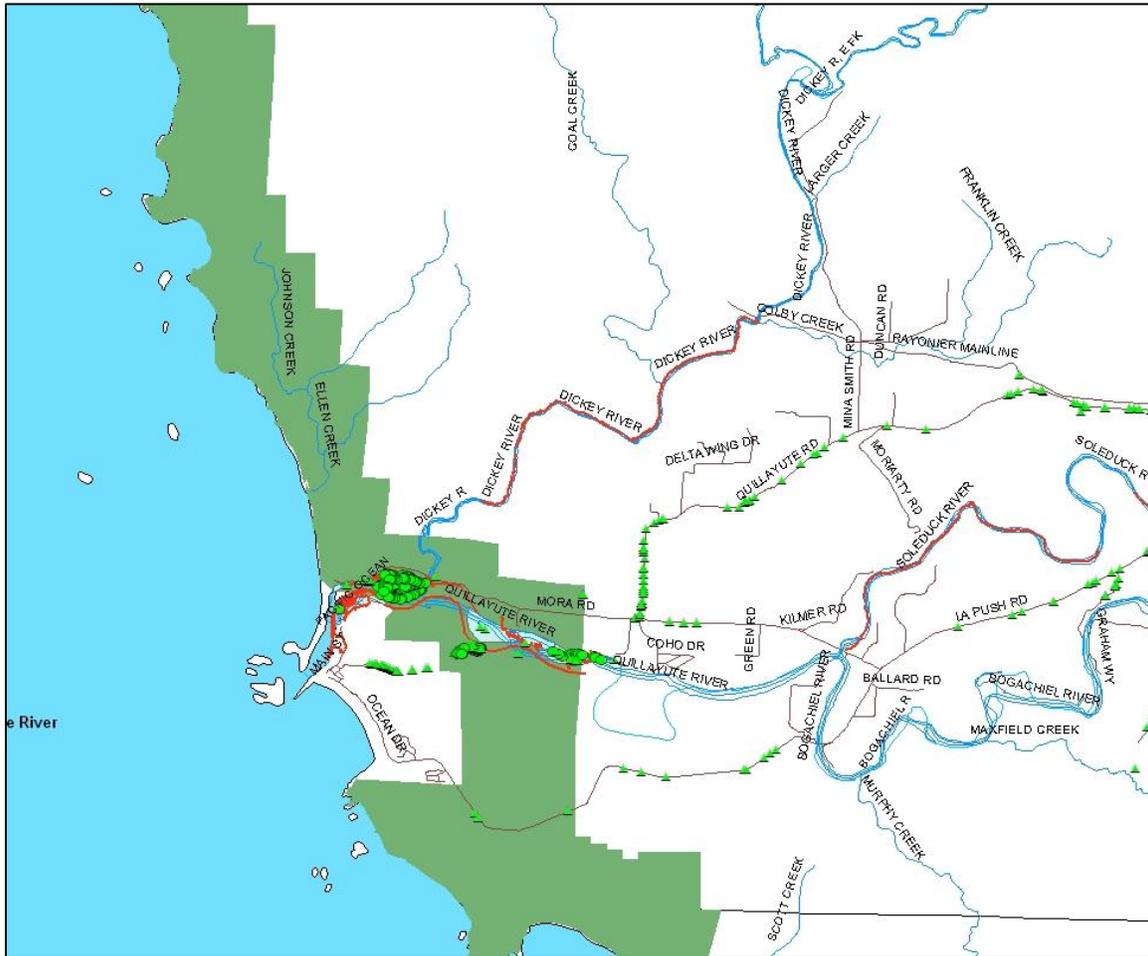
Washington State University
Jamestown S'Klallam Tribe
The Lower Elwha Klallam Tribe
The Makah Nation
The Quileute Nation
The Quinault Indian Nation
10,000 Years Institute
Hoh River Trust
North Olympic Land Trust
Hood Canal Coordinating Council
Hood Canal Salmon Enhancement Group
North Olympic Salmon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

FUNDING

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

PROJECT ACTIVITIES BY WATERSHED

CLALLAM COUNTY



Quillayute River System: Red lines are partial record of 2016 knotweed surveys and treatments on the Dickey and Quillayute rivers. Light blue polygons represent areas worked by NCEPMT. Green circles indicate knotweed treatments; green triangles treatments of additional invasive species.

Quillayute River System

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

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

Dickey River

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

Knotweed treatment on the Dickey River began in 2002 and has been continued each year since. Work had been undertaken mainly by the Quileute Tribe's Natural Resources division (QNR); the North Cascades Exotic Plant Management Team (The North Cascades EPMT) with the National Park Service has treated patches within Olympic National Park. Additionally, Lauren Urgensen, a University of Washington Graduate student studying knotweed impacts and control, established plots along the Dickey as part of her study from 2006 to 2008. In 2012 crews noted that tansy ragwort coming in after knotweed treatments is a big problem on this waterway. In 2013 7.5 miles (75 acres) were surveyed and treated on the Dickey River. Almost all the treated acreage on the Dickey is owned by Washington Department of Natural Resources (DNR) or Rayonier, a large timber company, making landowner permissions easy to obtain. In 2014, QNR Crews examined 7.63 river miles, but the area treated was much reduced, and utilized about one third that of the previous year. The NCEMPT reported treating 0.65 acres for the Dickey/Quillayute Rivers; it was not clearly defined if this meant solid acres by the definition used by the rest of the reporting groups. In 2015, QNR, CCNWCB, and NCEMPT crews surveyed 7.07 river miles and treated 3.8 acres of knotweed from the east/west fork to the confluence with the Quillayute River. Herbicide use was similar to what has been used the past three years. NCEMPT crews did control work on the Dickey as well, but did not submit specific information on their activities for this report.

In 2016- QNR crews surveyed and treated 74 acres along the Dickey River. Knotweed covered 3.25 solid acres along the river. Note herbicide usage decline in table below.

Herbicide use-Dickey River (gallons)										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Acres Treated	140	50	95	101	NA	56	75	46	3.8	74
Total Herbicide	12.65	0.165	18	7.21	NA	2.91	4.31	2.44	2.88	1.2

Calawah River

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

In 2006 the Quileute Tribe surveyed the Calawah, recording 344 sites, all downstream from the North Fork-South Fork confluence. The Calawah was treated by the Quileutes each year from 2007 through 2013. Most of the knotweed on the Calawah is giant knotweed and has responded well to treatment. As with the Dickey, almost all land on the Calawah is owned by DNR or Rayonier. Given the excellent response to previous treatment and tight funding, this river was not treated in 2014 or 2015. (*For additional history of treatment in this areas, see previous reports*).

In 2016- given the excellent response to previous treatment and tight funding, this river was not treated.

Herbicide use-Calawah River (gallons)										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Acres Treated	202	100+	110	127	NA	65	64	0	0	0
Total Herbicide	11.12	2.31	1.59	0.24	NA	0.15	0.18	0	0	0

Bogachiel River

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

In 2006 the Quileute Tribe surveyed the Bogachiel, recording 1,336 sites. Knotweed infestation on the Bogachiel was so extensive it was not attempted immediately and attention was focused on the Dickey. Treatment began in 2008 and continued in 2009. Clallam County supplied a crew for 8 or 9 days, helping the Quileutes and supplying

some grant match. In 2010 the remaining stretch was treated. In 2011 the entire river was re-treated. Knotweed populations were much reduced. In 2012 and 2013 the Quileute Tribe surveyed and retreated 13 river miles (131 acres) on the Bogachiel River. Herbicide use increased as more of the river was thoroughly treated. In 2014 QNR surveyed and treated another 13 miles but in a greatly expanded area, thus increasing the overall amount of herbicide used. As with the Dickey, almost all land on the Calawah is owned by DNR or Rayonier. Due to limited funding, no treatment was performed on the Bogachiel River in 2015.

In 2016- QNR crews surveyed and treated for knotweed along 11.96 miles of the Bogachiel River. Surveys and treatments covered 77 acres of the Bogachiel River from the 101 bridge downstream to Wilson's boat launch.

Herbicide use- Bogachiel River (gallons)										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Acres Treated	4.1	900+	693	725	NA	131	131	343	0	77
Total Herbicide	0.65	33.88	77.34	62.1	NA	3.12	5.43	8.38	0	0.80

Quillayute River

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

The Quileute Tribe treated knotweed on the Quillayute River in 2008 and 2009. Clallam County crews spent approximately 3 days in 2009 treating in and around a county park on the Quillayute. In 2010 The North Cascades EPMT with the National Park Service treated 0.94 acres of knotweed on the Quillayute, within the Olympic National Park. In 2011 the Quileutes treated the right bank of the Quillayute from the mouth of the Sol Duc River to the Olympic National Park; as well as the tribal property on the left bank and the North Cascades EPMT with the National Park Service treated knotweed within National Park boundaries. In 2013 the North Cascades EPMT with the National Park Service once again treated knotweed within National Park boundaries, on the Quillayute mainstem and at Lake Ozette (see map above), using approximately 0.12 gallons imazapyr and 0.2 gallons glyphosate. Due to limited funding and resources, no treatments were reported on this river in 2014 except by the NCEPMT which combined the reported information with Dickey River totals. That figure was only reported once, in the Dickey River section. In 2015, crews from QNR, CCNWCB, and NCEPMT surveyed and treated 2.9 miles of the main stem of the Quillayute River from the Richwine bar to the river mouth. Collaboration between these three entities resulted in considerable work being accomplished.

In 2016- crews from QNR, CCNWCB, and NCEPMT treated nearly all 5.5 miles of the Quillayute River. A once heavily infested river, the 193 acres which were surveyed and treated for knotweed this year contained the worst remaining infestations in Clallam County. It was only through this multi-agency collaboration that we were able to pool enough resources to complete work in this area. -see table below for herbicide usage. We will work to secure the few outstanding landowner permissions in time for treatment next season. Follow-up next year will be a priority

Herbicide use-Quillayute River (gallons)										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Acres Treated	N/A	170	40	.5	NA	0	0.2	0	5	193*
Total Herbicide	N/A	6.77	1.7	0.64	NA	0	0.14	0	1.91	14.4

*Treated acreage was not reported in 2016. Surveyed acres are included instead.

Sol Duc River and tributaries

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

Upper Sol Duc

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

In 2014 the NCEPMT reported treating 0.005 acres of Himalayan knotweed on the Sol Duc. (Soleduck is ONP's spelling.)

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-Dimmel 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, using 2.13 gallons of AquaNeat. In 2013 no knotweed was found at the Snider Work Center, and no treatments took place on the mid Sol Duc. In 2014, minimal amounts of knotweed re-growth were treated by CCNWCB at the Snider Work Center. In 2015, the CCNWCB and the Quileute tribe conducted a float survey of the mid Sol Duc from approximately the Snider Work Center to approximately river mile 20.8. Due to low river volume, subsequent floats for treatment were not possible. Minimal amounts of knotweed (several canes in all) were treated by CCNWCB at the Snider Work Center. However, overland access to most sites noted during the survey was remarkably difficult. Further, most sites consisted of only a few stems. Therefore, subsequent treatments this season targeted three sections, identified as having the largest patches of knotweed. The crew was unfortunately only able to access two of the three. The area of this survey is planned for treatment in the 2016 season.

In 2016- QNR and the CCNWCB conducted a float survey and treatment of (most) of the mid- and lower- Sol Duc River, covering 28.81 miles from the Klahowya campground to the junction with the Quillayute River. Over 221 acres were surveyed, with 1.2 gallons of glyphosate and 0.63 gallons of imazapyr used to treat knotweed. Knotweed on the Sol Duc River continues to decrease. QNR also surveyed and treated knotweed along 3 acres of Wisen Creek (herbicide amounts included in Sol Duc totals).

Lower Sol Duc

In 2006 the Quileute Tribe surveyed the lower section of the river (from Whitcomb-Dimmel to the confluence with the Bogachiel). They recorded 447 sites. Almost half the sites had canes taller than six feet and some consisted of thousands of canes. More than half of the sites recorded in the lower Sol Duc were identified as giant knotweed, in contrast to the mid-section, which was virtually all Bohemian. The Quileute Natural Resource Crew and/or CCNWCB retreated as able from 2007 to 2010. No treatments occurred in 2011 and 2012. In 2013 the Quileutes surveyed and treated 155 acres on the lower Sol Duc. No treatments occurred on the lower Sol Duc River in 2014 or 2015.

In 2016- QNR and CCNWCB conducted a float survey of the lower Sol Duc River down to the confluence with the Bogachiel River, treating all knotweed that was encountered. Treated acreage and herbicide totals were combined with that on the mid Sol Duc and presented above.

Herbicide Use, Lower Sol Duc River (gallons)										
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Acres Treated	17	45	30	35	0	0	155	0	0	221^
Total Herbicide	9.656	6.67	0.945	1.26	0	0	1.09	0	0	1.83

[^]Includes treatments on mid- and lower Sol Duc.

Lake Creek and Lake Pleasant

In 2012 the CCNWCB performed a full survey and treatment was carried out on all parcels where permission had been received. Infestations were very light in most cases. On Lake Pleasant itself, Weed Board crew treated a very large terrestrial knotweed infestation for the first time and retreated some smaller areas. It was determined that this area would be a good candidate for skipping treatment in 2013. In 2014 no treatment took place on Lake Creek or Lake Pleasant. In 2015, CCNWCB crew treated a single terrestrial knotweed infestation within a one acre area near Lake Pleasant. *For additional history of treatment in these areas, see previous reports.*

Lake Creek and Lake Pleasant were not treated in **2016**.

Forks

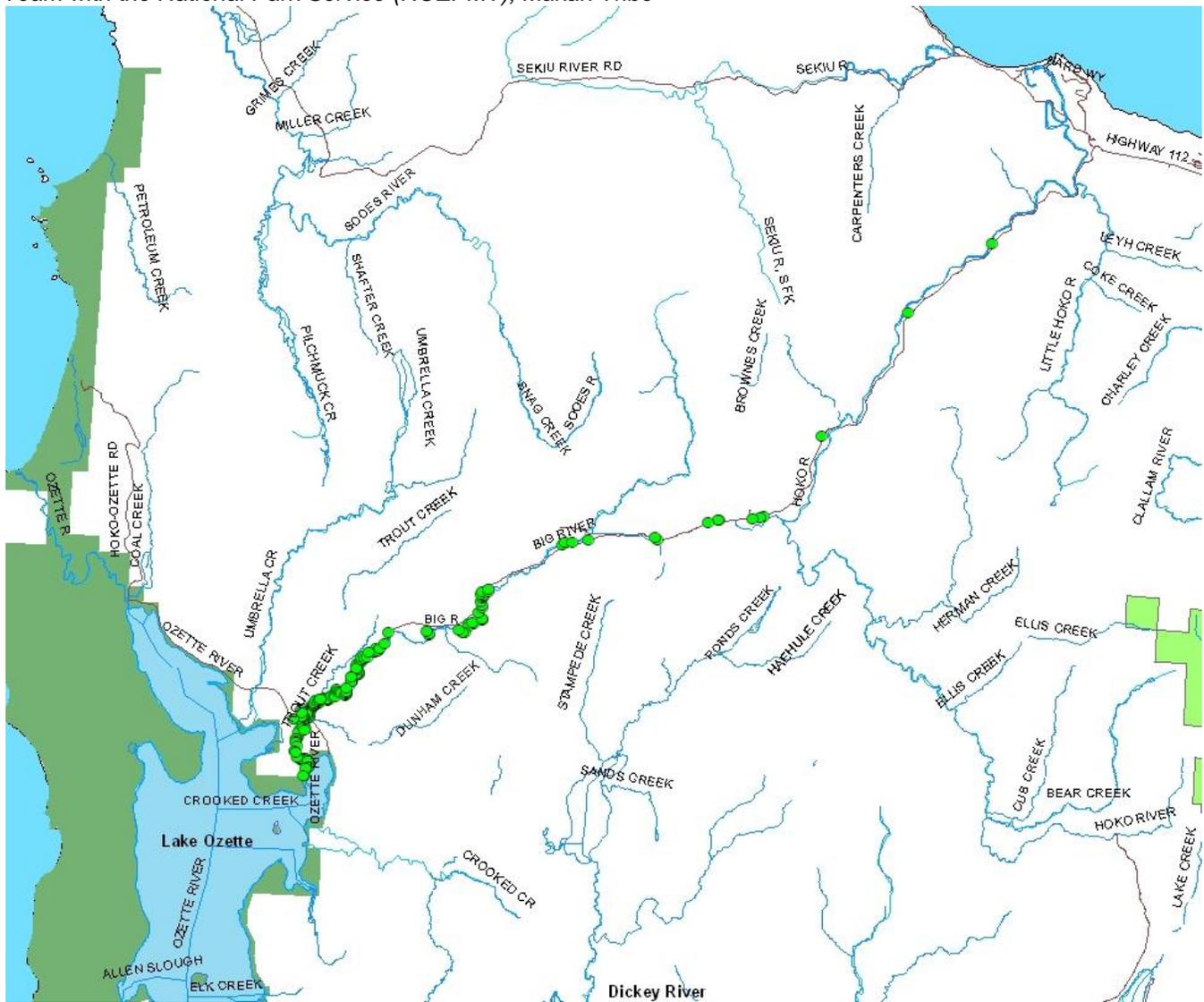
Knotweed has been observed in the city of Forks for several years and it is of concern because Forks is close to both the Calawah and the Bogachiel. One tributary to the Bogachiel passes through Forks and close to some of the knotweed sites. The Calawah and Bogachiel are major waterways in the Quillayute 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 QNR. No treatment took place in Forks in 2010 through 2012, although the Pacific Salmon Coalition, based in Forks, may have taken on some of these areas but did not report treatments. In 2013 the QNR crew treated 3 acres in Forks and Beaver, all privately owned. They used one gallon of AquaNeat. In 2014, we think that the Pacific Salmon Coalition performed some treatment, but none were directly reported to us. One site along Hwy 101 near the Sol Duc River was treated per landowner request.

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

Big River and Hoko-Ozette Road-

Crew—Clallam County Noxious Weed Control Board (CCNWCB), North Cascades Exotic Plant Management Team with the National Park Service (NCEPMT), Makah Tribe



Big River: Green circles indicate surveys and treatments of knotweed infestations in 2016.

In 2011 CCNWCB treated only high-priority-sites. In 2012 the CCNWCB thoroughly surveyed and treated four miles of the Big River, upstream from the National Park boundary. This covered all of the historically heavily infested areas. Most of the knotweed consisted of individual stems or scattered clumps, but the density was drastically reduced from past years. In 2013, NCEPMT treated within ONP boundaries at the mouth of the river. In 2014, CCNWCB treated the lower 4.6 miles of the river. Crew treated four private roadside sites along the Hoko-Ozette Rd. and a site by the Makah Fish Hatchery all of which were reported by the Makah Nation. NCEPMT reported treating minor infestations within ONP boundaries. In 2015, one knotweed infestation was treated at the specific request of a landowner along Hoko-Ozette Rd. Makah Tribe staff treated knotweed along Hoko-Ozette Rd (not owned by Clallam County); specific information was not available. *For a more detailed history of treatment in these areas, see previous reports.*

In 2016- the Makah surveyed and treated along the lower 8.24 miles of the Big River, as well as an additional 11.44 miles of the Hoko-Ozette Road from Highway 112 until it reaches the Big River.

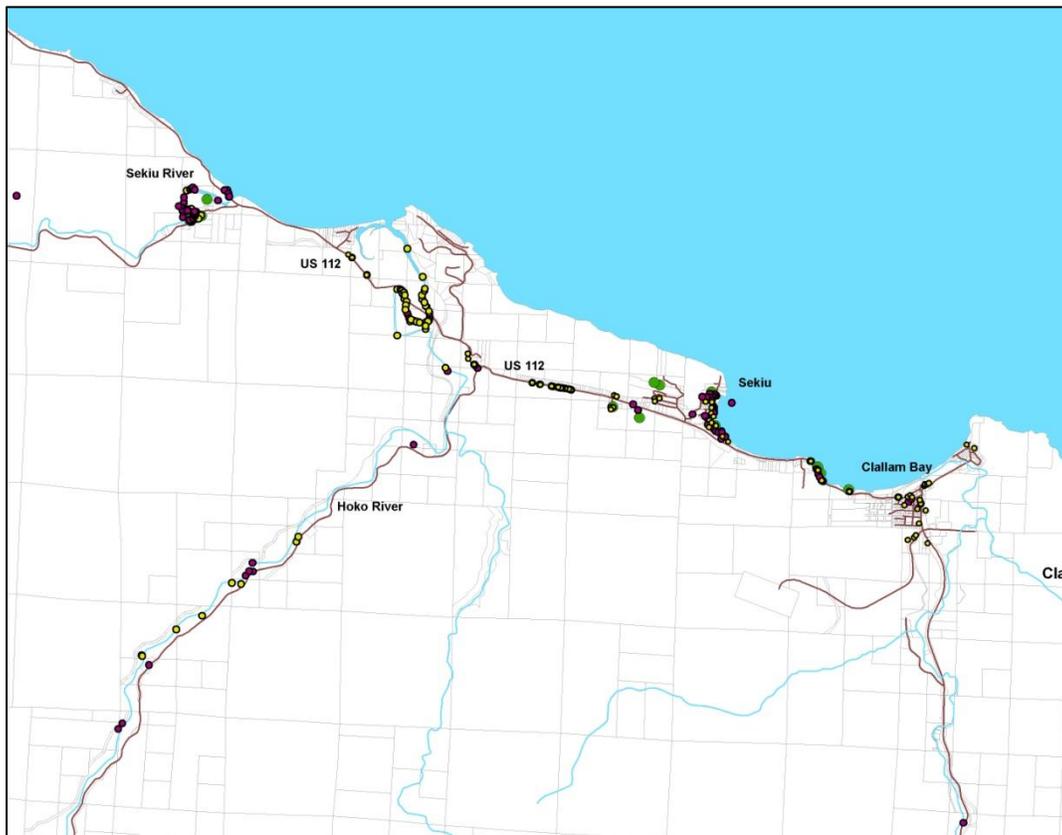
Herbicide Use-Big River and Hoko-Ozette Road (gallons)											
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Inspected/Known Parcels			30/42 (est)	39/43	24/34	12/34	15/34	3/34	21/34	1/34	n/a
Acres Treated	60	28	57	57	22	10.4	25	3	10.01	0.1	n/a
AquaNeat injected	65.39	1.24	0	3.5	0.3	0.496	0.04			0.19	n/a
AquaNeat sprayed		3.3	1.876	1.3	2.28	0.12	0			0	n/a
Habitat or Polaris (imazapyr) sprayed	0	0.6	0.305	0.32	0.594	0.03	0.42	.07	.26	0	n/a
Total Herbicide	65.39	5.14	2.181	5.12	3.174	0.646	0.46	.07	.26	0.19	n/a

Hoko River

In 2012 crews surveyed and treated all known knotweed on the Hoko, including some sites on the upper Hoko that had not been surveyed or treated in more than three years because of difficult and remote access.

Because of the small amount of re-growth discovered in 2012, this river was skipped in both 2013 and 2014. Because of difficult access in the lower reaches due to tidal influence, this river would be a good candidate for float surveys and we will endeavor to partner with the Makah Tribe or local landowners to make that a reality. No treatment was performed on the Hoko River in 2015. *For additional history of treatment in this area, see previous reports.*

In 2016- The EJWCC crew treated knotweed along 1.5 miles of the Hoko River upstream from the 112 bridge, concentrated on multiple parcels owned by one private landowner. Crew gallons of AquaNeat. Knotweed was found on the right and left banks of the Hoko a little upstream of the 112 bridge, as well as along the oxbow in the vicinity.



Sekiu River, top left; Hoko River, center; towns of Sekiu and Clallam Bay; and Hwy 112, right: Purple indicates knotweed sites identified in original 2006 surveys/treatments. Yellow indicates 2012-13 treatments. Green indicates 2014 knotweed treatments. Little remains of the original infestations.

Sekiu River
Crew—CCNWCB

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

Knotweed control on the Sekiu River began in 2006 and has continued each year since. Work has been performed by the Makah Tribe and/or Clallam County Noxious Weed Control Board. In 2010 control was made mandatory and one previously reluctant landowner then allowed us to treat rather than do it himself. In 2011 a small crew surveyed and re-treated on the Sekiu River, focusing on sites that had been treated just one or two years, as opposed to 4 or 5 years. In 2012 a 4 person crew surveyed and treated all knotweed sites on the Sekiu River. Very few plants remained on most parcels. Two parcels that had belonged to a reluctant landowner were sold to a landowner who is very supportive of knotweed control efforts. We spent the majority of time treating extensive knotweed infestations on those two 5-acre parcels. The parcels are across the road from the river, but the largest portion of the infestation is in a swampy swale where the river backs up when it floods (reported by an adjacent land owner). In 2013 a two-person crew focused their attention on those two 5-acre parcels with heavy infestation, but incomplete treatment. Thousands of stems were still present, but herbicide use on those parcels decreased from 0.48 gallons (injected or sprayed) to 0.065 gallons (all sprayed). A couple of sites on the Sekiu River were not completed in 2013 because a crew injury made access difficult.

In 2014 a 2-man crew utilized a canoe to assess difficult to reach sites, while another 2-man crew tackled easily assessed terrestrial ones. In all cases, sites were greatly diminished. A new owner of one parcel where knotweed had been documented in the past was reputedly interested in having crew treat, but did not respond to early letter requests because he feared we were charging for the service; the parcel was never accessible through a locked gate. We will try again next year. In general this river is a good candidate for a rest year. No work was performed on the Sekiu River in 2015.

In 2016- several properties were treated by the Makah where knotweed re-growth was observed.

Herbicide Use-Sekiu River (gallons)											
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Inspected/ Known Parcels	N/A		1/11	10/11	10/11	10/11	10/11	9/13	13/14	0/14	0/14
Acres Treated	N/A	1.78	2	16	8.5	1.17	5.9	2.79	1.68	0	0
AquaNeat injected	0	0.1	1.7	0	2.125	0.25	0.25	0		0	0
AquaNeat sprayed	0	0.18	0.06	0.487	0.18	0.18	0	0		0	0
Habitat or Polaris (imazapyr) sprayed	0	0.02	0.007	0.122	0.045	0.045	0.276	0.125		0	0
Total Herbicide	11	0.3	1.767	0.609	2.35	0.475	0.526	0.125	0.032	0	0

Highway 112, Clallam Bay, and Sekiu Crew—CCNWCB



Highway 112, Clallam Bay, and Sekiu. Green circles indicate knotweed treatments in 2015, green triangles additional weed treatments.

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

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

By 2004 there were large stands of knotweed in both Clallam Bay and Sekiu and along Highway 112. Many of the infestations were in or close to water (Straits of Juan de Fuca). CCNWCB treated knotweed in Clallam Bay and Sekiu and on the coastal bluff between the two towns each year from 2006 to 2012. These areas were skipped in 2013.

In 2014 we solicited a number of new permissions for sites including the Sekiu airport (per a Makah Tribe staff sighting) several private properties along 112 (per WSDOT sighting) and along the waterfront which is generally resort property. One resort manager asked that we delay treatment until tourists were gone for the season. One landowner agreement came back after the treatment season, but will be treated next year. In Clallam Bay, at the library, a small amount of knotweed, (10 stems), was dug. The library site, once massive, was successfully treated in previous years. Now it is consistently mowed, and plants were less than 1 inch tall. In general, treatments throughout this area have been tremendously successful. Little remains of the original infestations and very little herbicide was needed to check re-growth. In 2015, knotweed was treated on four parcels on Highway 112 in and around Sekiu and Clallam Bay, including one new infestation. Two additional new infestations were found but not treated as permission had not yet been obtained. Owner permissions were obtained for three of the treated sites as well as one site that was not treated.

In 2016- No knotweed sites were reported treated on west Highway 112 or in Clallam Bay and Sekiu. Some sites treated in 2015 had visible knotweed re-growth in **2016**, while no knotweed was observed at other treated sites. Knotweed sites in this area should be monitored and treated if necessary in **2017**. It is particularly important to gain access to a large knotweed site adjacent to the Sekiu airport.

Herbicide Use-Highway 112, Clallam Bay and Sekiu (gallons)											
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Parcels Inspected/Known Parcels			55/67 (est)	67/68	18/68	2/68	2/68	0/68	73/73		73/73
Acres Treated		25	45	26	3.25	1.8	2	0	3.31	1.1	0
Aqua Neat injected		3.5	1.945	0	0	0.16	0			0	0
Aqua Neat sprayed		6.06	1.224	0.45	0.4	0.02	0			0	0
Habitat or Polaris (imazapyr) sprayed		0.23	0.29	0.155	0.1	0.005	0.066			0.04	0
Total Herbicide	17.9	9.79	3.459	0.605	0.5	0.185	0.066	0	.074	0.04	0

Note: A site near the Sekiu airport and several along Hwy 112 were added in 2014. Much of the herbicide use in that year accounted for in those locations.

Clallam River Crew—CCNWCB

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

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

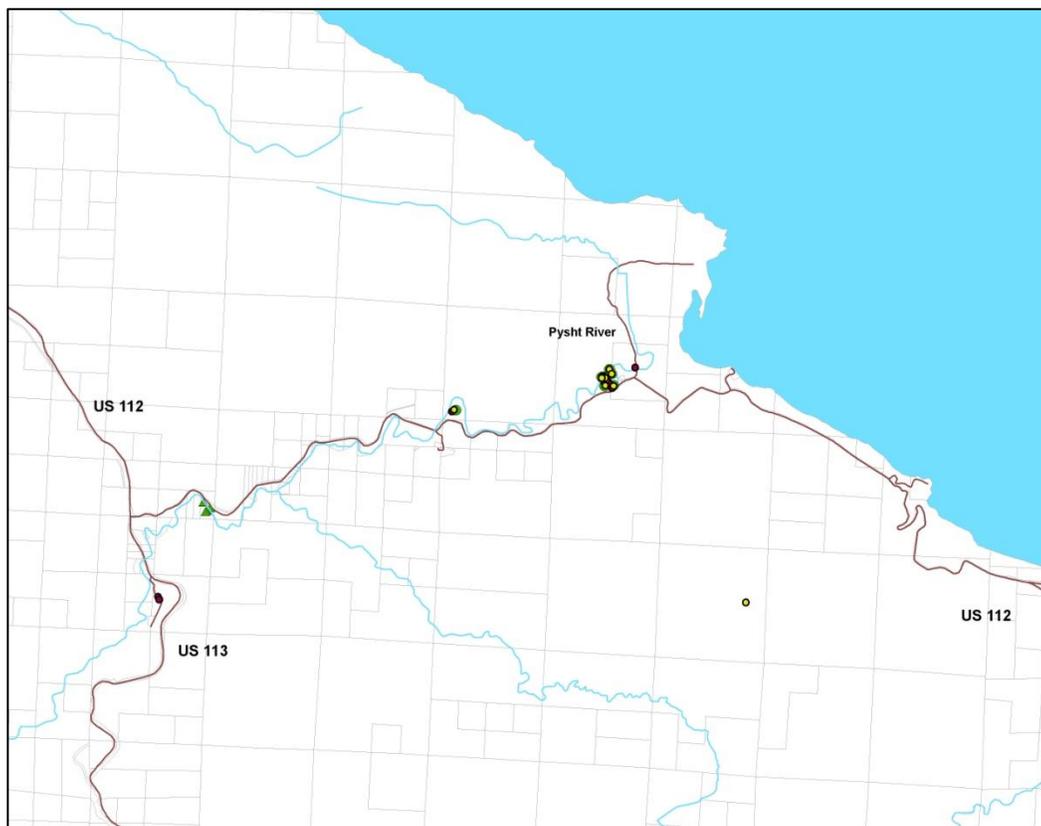
In 2006 the Makah Tribe surveyed the lower portion of the Clallam River. In 2007 funding from a NFWF grant with the Clallam Conservation District became available for the Lower Elwha Klallam Tribe to treat knotweed with help from CCNWCB. Treatment continued each year. In 2010, knotweed control was made mandatory on the Clallam River, to encourage reluctant landowners to allow us to treat. There is still one parcel where the owners do not want us to treat, however, they are aware that they are responsible for treatments. The CCNWCB inspects for compliance. In 2011 and 2012 we re-treated all parcels on the Clallam River. For the most part knotweed infestations were drastically reduced. However, it was apparent that the owners of the upstream infestation had been cutting knotweed and throwing it in the river channel. We removed cut canes and advised the landowner of proper treatment methods. We also found a handful of dense patches that were located farther away from the

river channel in the flood plain, or that were obscured by dense vegetation and had been missed in past years. In 2013 use was reduced considerably yet again, by about 75%. We discovered and treated a tiny pioneer patch of yellow archangel; yellow archangel was seen nowhere else in the river corridor.

Due to low infestation levels noted during treatment in 2013, this river was not treated in 2014-2016. (For additional history, see previous reports)

Pysht River

Crew—CCNWCB-knotweed, Clallam PSC



Pysht River: Purple indicates knotweed sites identified in original 2006 surveys/treatments. Yellow indicates 2012-13 treatments. Green circles indicate 2014 knotweed treatments. Green triangles indicate other weed treatments.

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. The Pysht River Estuary will be the subject of an extensive restoration project in partnership with the Lower Elwha Klallam, Merrill and Ring, Clallam County, North Olympic Salmon Coalition and other partners next year.

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

In 2006 Merrill and Ring hired a crew who treated their knotweed sites with help from CCNWCB. The crew noticed good results from the previous year's treatments. By 2006 only 50 to 100 canes remained; they were about 3 feet tall. Treatment continued each year through 2010. No treatment was done in 2011 on the Pysht

because of reduced funding, but we did receive a renewed agreement to work with Merrill and Ring and their subsidiary companies through 2016. In 2012 Merrill and Ring staff conducted knotweed surveys, and a CCNWCB crew member treated those locations. Knotweed infestations on these parcels were reduced to a handful of clumps and scattered stems. In 2013 the Clallam PSC visited the Pysht River, treated other weeds, but did not find knotweed. A private contractor reported treating some small amounts of knotweed on terrestrial sites on behalf of the company.

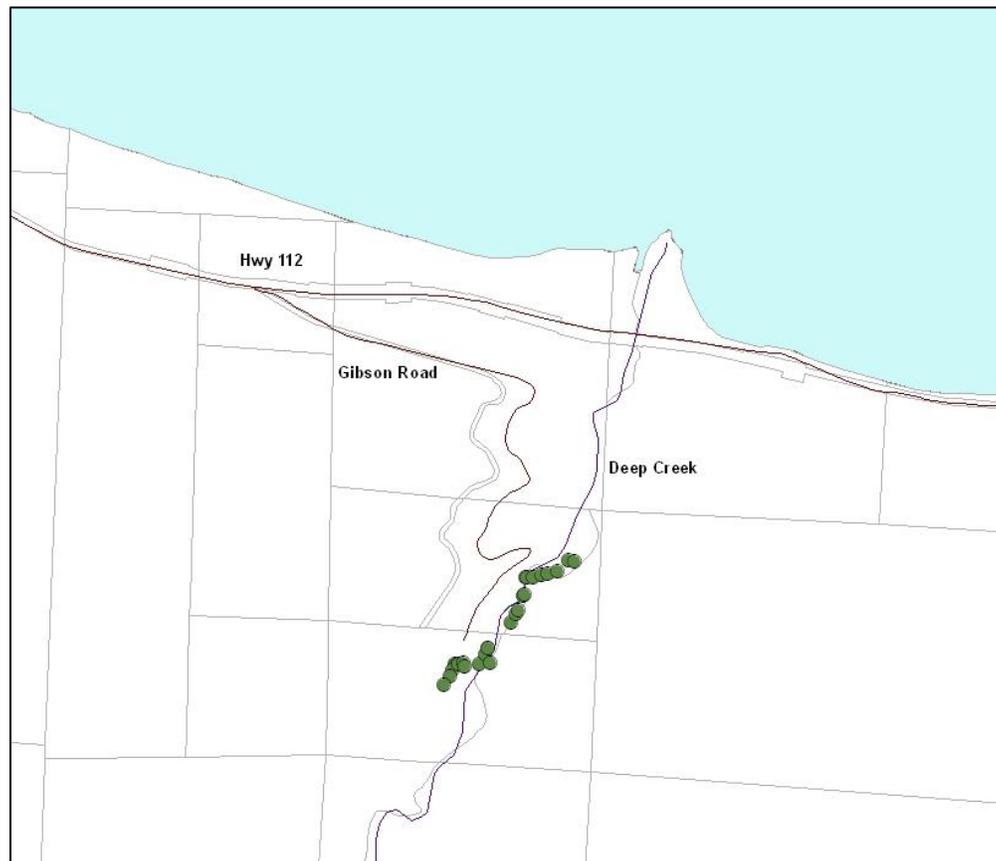
In 2014 Merrill and Ring again requested treatment assistance from CCNWCB. M&R staff had already surveyed and identified sites for treatment. In total, only 185 small stems remained but a relatively new infestation of burdock was identified and treated by the CCNWCB at the same time. The only other landowner with knotweed continues to control their own manually. Merrill and Ring has been an exemplary steward working to combat knotweed on their far flung county-wide holdings!

A DNR funded Puget Sound Corps, treated 6 upstream acres held by the North Olympic Land Trust as part of additional restoration efforts taking place within the waterway. They treated a variety of species including reed Canarygrass, herb Robert, Canada thistle, and holly. Separately, the CCNWCB treated one of the only perennial sowthistle sites in Clallam County, at Pillar Point, within Pysht River estuary.

In 2015, A DNR funded Puget Sound Corps, treated 6 upstream acres held by the North Olympic Land Trust as part of additional restoration efforts taking place within the waterway.

No knotweed work was performed on the Pysht River in **2016** due to low infestation levels after treatments in previous years.

Deep Creek Crew—Clallam PSC



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

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

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

There was not any knotweed work performed on Deep Creek from 2014 to **2016**.

Herbicide Use-Deep Creek (gallons)				
	2013	2014	2015	2016
Acres Treated	0.5	0	0	0
Polaris (imazapyr) sprayed	0.033	0	0	0
Total Herbicide:	0.033	0	0	0

Salt Creek

Crews—Clallam PSC

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

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

In 2014-2016- No work was performed on Salt Creek. We are still seeking permission from one landowner who would not give permission to treat knotweed on their property.

Herbicide Use,-Salt Creek (gal)				
	2013	2014	2015	2016
Acres Treated	1	0	0	0
Polaris (imazapyr) sprayed	0.015	0	0	0
Total Herbicide	0.015	0	0	0

Elwha River

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

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

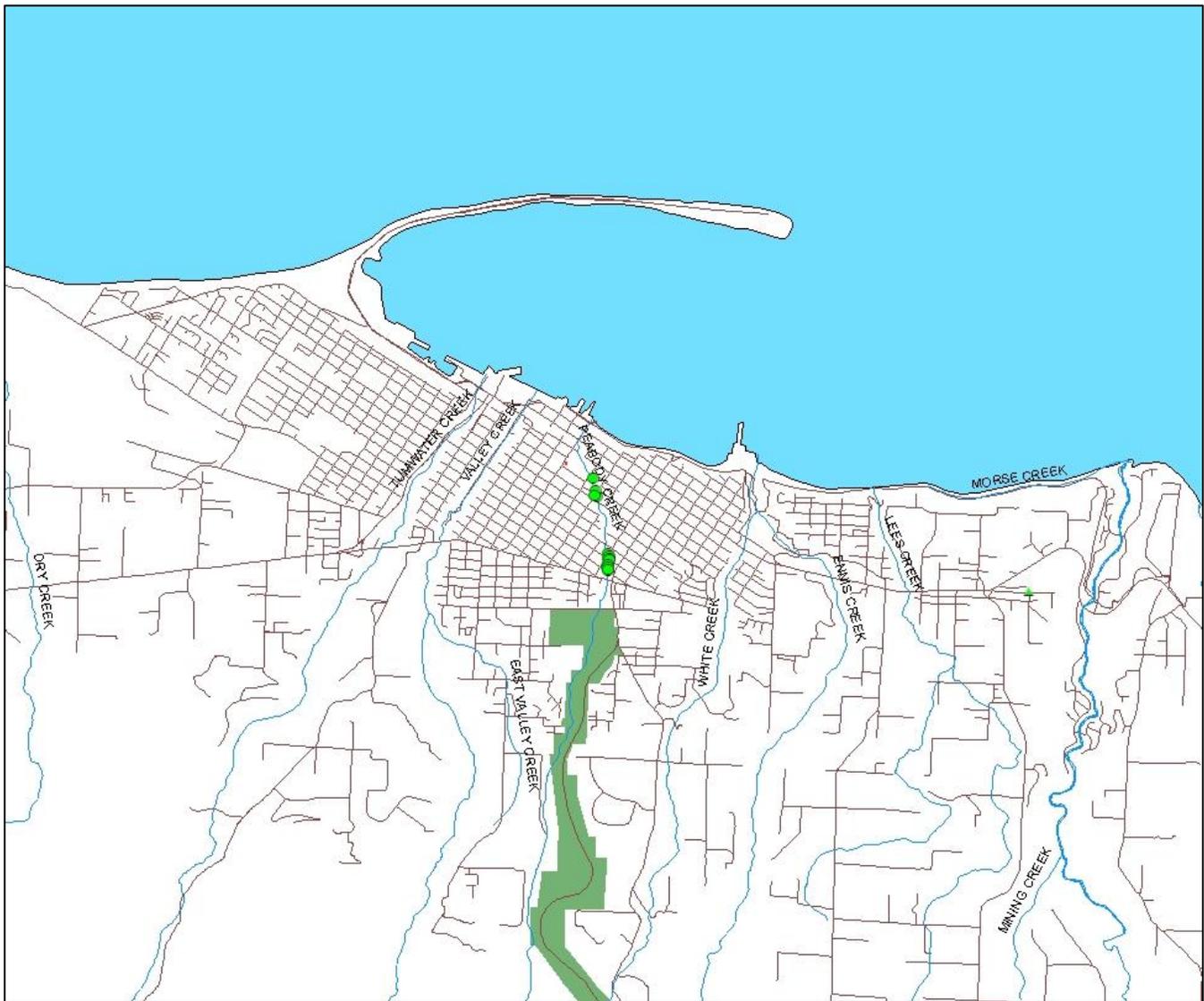
In 2012 and 2013 Lower Elwha Tribal crews, a Washington Conservation Corps, and North Cascades EPMT crew conducted noxious weed treatments throughout the season. Knotweed infestations of the Elwha have been very light in the last few years. We do not have 2014 information specific to knotweed and other invasives activities from these crews but there has been extensive work conducted in areas above both dams which have now been fully removed. In 2015 a few knotweed patches were treated in early fall though the year was mostly spent monitoring. A rest year for treatment is planned for **2016**. Reed canarygrass continues to be a problem after the dam removal; 2015 was the first year (after four years of treatment) that reed canarygrass infestations were reduced.

In 2016- Reed canarygrass continues to be the biggest problem on the Elwha River following the removal of the Glines Canyon and Lake Aldwell dams, though progress is being made. Small amounts of knotweed were seen. However, as plants were still small from the previous year's treatments, it was decided to allow plants to grow untreated and treat next year when greater leaf area will be present. Herb Robert, reed canarygrass, and thistles are still main problems, though other plants are starting to move in. Other invasive species observed include cheatgrass coming in at the former Lake Aldwell and at Ediz Hook, old man's beard (*Clematis vitalba*), and yellow flag iris and purple loosestrife in the estuary.

**For more information contact Kim Williams, Revegetation Field Supervisor kim.williams@Elwha.org
Lower Elwha Tribe Fisheries Biologist Mike.McHenry@elwha.nsn.us or Josh Chenoweth Olympic National Park
Restoration Botanist joshua_chenoweth@nps.gov**

Port Angeles Area Streams

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



Port Angeles area streams: Green circles indicate 2016 knotweed treatments performed by the CCNWCB.

Valley Creek

Crews— Clallam PSC

Valley Creek is a small stream which empties into the Port Angeles Harbor. Salmon and steelhead have probably been extinct from the creek since the late 1940's, when the final sections of the approximately 2,000-foot culvert at the mouth were installed. Recent surveys of fish in this system revealed numerous resident cutthroat trout up to 11 inches in length. The section of the creek by Valley Street has been severely infested with knotweed for decades and treatment has been ongoing up until 2010. No treatment took place in 2011 (due to bridge construction blockages). In 2012 we conducted a survey with a Streamkeeper team. In 2013 full treatments were planned but only one site with a small amount of re-growth was treated. At the same time, the only known purple loosestrife site in and around Port Angeles was treated (total of 15 plants) before it could become a major problem. In 2014 the Clallam PSC surveyed and treated 1.4 miles for multiple invasive species including purple loosestrife, teasel, herb Robert and others. Knotweed was their top priority. We attempted to obtain permission from two landowners on adjacent properties with a clump of knotweed on each, but have thus far unsuccessful.

Due to limited PSC time and funding as well as poor weather conditions, no treatment was performed on Valley Creek in 2015.

In 2016- the DNR-WCC crew surveyed portions of Valley Creek in anticipation of treatments during the **2017** field season.

Peabody Creek

Crews— *CCNWCB*

Peabody Creek is a small urban stream, draining a watershed of 2.6 square miles, with its headwaters in the northern part of the Olympic National Park. Some logging has occurred in the upper watershed but good stands of mature timber still remain. The 4.8 mile long stream flows through heavily urbanized areas of Port Angeles. Sewage was historically discharged directly into Peabody Creek and large quantities of stormwater are still directed into it. Coho and possibly chum salmon were observed historically but are thought to be extirpated. Currently only cutthroat trout are known to utilize Peabody Creek. In 2009 we received permission to treat from 4 landowners whose property covered about ½ mile of the creek, within the City of Port Angeles. In 2010 these sites were re-treated and we surveyed further upstream, finding large stands of knotweed. In 2011 no treatment took place because funding uncertainties made advance planning difficult. Additionally, this creek which is severely degraded was not a high priority for restoration for a variety of reasons. In 2013, renewed interest in this creek led its inclusion as a site for citizen-science and volunteer restoration efforts. We treated small amounts of knotweed re-growth within in the first ½ mile of the river where we able to renew permissions. In 2014, due to limited resources, only one site, owned by the city of Port Angeles, which had been heavily infested and highly disturbed by piping, was treated. In 2015, volunteers associated with the Feiro Marine Life Center controlled invasives conducive to manual control as part of a broader restoration effort. There were no knotweed treatments in the lower portions of the creek.

In 2016- The CCNWCB surveyed 2.61 acres along 0.43 miles of Peabody Creek from E 5th St. downstream to Peabody St., and from E 8th St. upstream to E Lauridsen Blvd. in Port Angeles. Crew treated on 1.16 acres along Peabody Creek between Peabody St. and E 5h St with 1% imazapyr. As knotweed patches south of 8th St. were not treated in **2016**, this area should be targeted for treatment in the near future.

Ennis Creek

Crews— *CCNWCB, NCEPMT*

Because the headwaters of Ennis Creek are at 6000' in 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 storm water 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 EPMT with the National Park Service. In 2011 The North Cascades EPMT with the National Park Service treated within their jurisdiction near Lake Dawn, but the lower reaches were not treated. In 2012 an almost complete treatment was carried out in the lower part of Ennis Creek. In 2013 most known sites were re-treated, excepting the old Rayonier mill site (because of company concerns about ongoing litigation over historic pollution clean-up). The North Cascades EPMT with the National Park Service treated knotweed on Ennis Creek, near Lake Dawn, within Olympic National Park. 0.233 gallons of herbicide were used. In 2014, CCNWCB crew only managed to treat the lower portion of the creek between US 101 and Golfcourse Rd, approximately 2/3 of a mile, where re-growth continued to be light. We did not have sufficient resources to complete more upstream surveys. The NCEPMT reported treating 0.001 acres of knotweed upstream within ONP boundaries this year. The upper reaches and mouth are good candidates for treatment in 2015. Due to light infestations levels observed in 2014, 2015 was designated as a rest year for Ennis Creek. Several knotweed sites within city limits should be monitored in **2016**.

Due to time and funding constraints, no work on Ennis Creek was performed in **2016**. However, one landowner

contacted the weed board requesting treatment and reported small patch of knotweed upstream on public property. This should be an area of follow-up next year.

Lees Creek

Crews— *CCNWCB, Clallam PSC*

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. One half gallon of Aqua Neat was sprayed or injected on the Lees Creek during 2011. No treatment or surveys took place in 2012. In 2013 we received a significant number of new landowner permissions for both Lees Creek and the East Fork of Lees Creek, which had never been surveyed. Six sites on Lees Creek and 3 sites on the East Fork were treated, using a total of 0.2 gallons of herbicide (imazapyr). Yellow archangel was also treated on the East Fork. In 2014, several new permissions were obtained, but in general, re-growth was light. Due to limited and late reception of funding, no treatment was performed on Lees Creek in 2015.

No work was performed on Lees Creek in **2016**. East Fork Lees Creek remains a high priority for survey in **2017** if funding and time allows.

Morse Creek and Waterfront Trail

Crews— *CCNWCB*

While no knotweed has been found directly on Morse Creek itself, several patches of knotweed have been found in adjacent areas along the Port Angeles section of the Olympic Discovery Trail-a.k.a. the Waterfront Trail. Crew surveyed four shoreline miles of this trail and treated 8 infestations for about a total of 300 stems, some tumbling from a high bluff above the trail. Infestations of yellow archangel here and along Morse Creek itself were also treated. Yellow archangel is a high priority in Clallam County because of its very limited distribution to date.

These infestations were not treated in 2015 or **2016**. The top of the bluff should be investigated in **2017**.

Bagley Creek

Crews— *CCNWCB*

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

Knotweed had been observed previously near the mouth, but surveys and treatment did not occur in the creek until 2011. In 2011 a survey and two treatments were completed along the lower 3/4 mile of the creek, and a partial survey was completed further upstream. Slightly less than a gallon of AquaNeat was sprayed or injected on Bagley Creek during these treatments. In 2012 crews identified the source of the knotweed infestation on Bagley Creek about ¼ mile south of highway 101. Permission was obtained from all but two landowners in the source area, and treatments were carried out in those locations. In 2013 a PSC crew re-treated knotweed on the lower ¾ mile. One other site, north of the highway was also treated but the source area, south of the highway, was not. The crew took a point marking a site where Bagley Creek crosses Bagley Creek Road, but they did not treat it. Very small amounts of herbicide were used—0.015 gallons of imazapyr and 0.023 gallons of glyphosate. In 2014, because of the uncertainty of work completed in 2013, crew retreated north of US 101. However, due to crew time constraints, Bagley Creek south of US 101 was not revisited.

No treatment was performed on Bagley Creek in 2015 or **2016** due to low infestation levels. Bagley Creek, especially south of US 101, would be a good candidate for survey and treatment in **2017**.

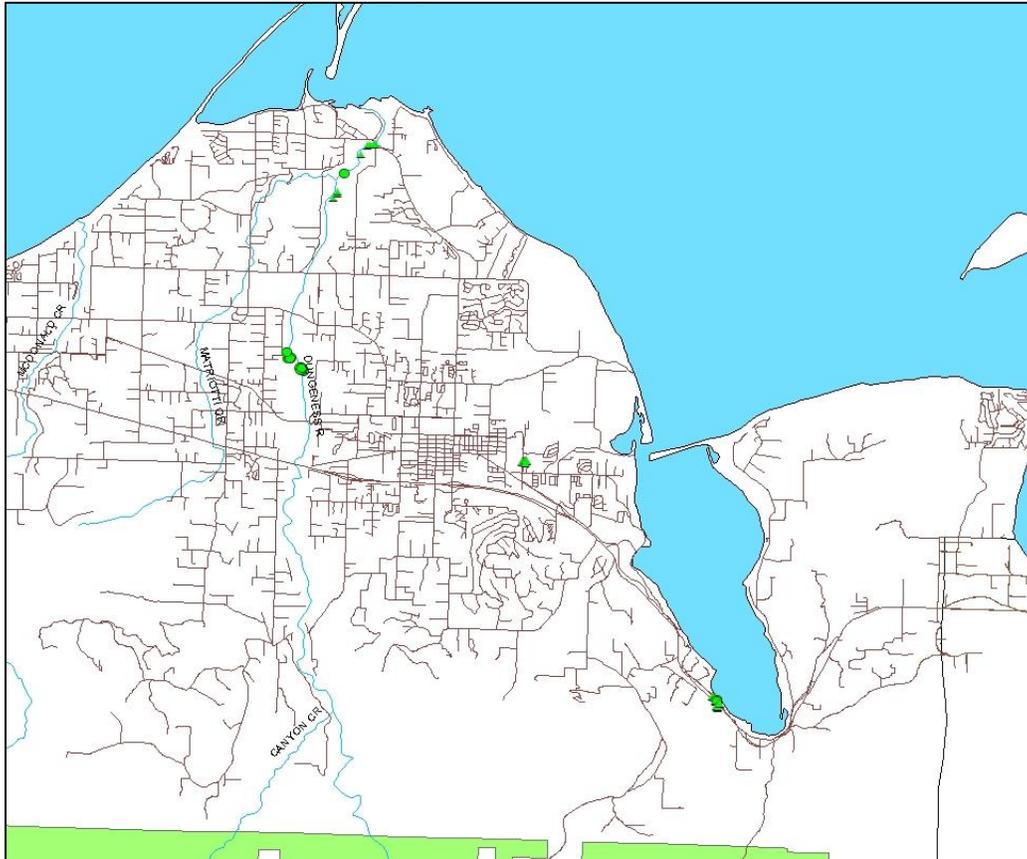
Herbicide use, Port Angeles Area (gallons)				
Waterway	2013	2014	2015	2016
Valley Creek	0.015	0.010	0	0
Peabody Creek	0.056	0.050	0	0.031
Ennis Creek	0.075	0.010	0	0
Lees Creek	0.0010	0.220	0	0
East Fork Lees Creek	0.001	0.000	0	0
Morse and Waterfront	N/A	0.070	0	0
Bagley Creek	0.038	0.0013	0	0
Total	0.186	0.3613	0	0.031

Note: Herbicide use for other noxious weeds is not included in this total.

For more information regarding Port Angeles area streams, contact Cathy Lucero, Clallam County Noxious Weed Control Coordinator at 360-417-2442 or CLucero@co.clallam.wa.us

Dungeness River and surrounding watershed

Crews—East Jefferson WCC—under North Olympic Salmon Coalition and Jamestown S’Klallam Tribe, DNR-WCC



Dungeness River and associated creeks: Green circles indicate knotweed treatments in 2016 by DNR-WCC. Green triangles represent treatment of other invasive species.

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

In 2013 the Clallam PSC crew treated knotweed at 2 different Clallam County parks on the Dungeness—Mary Lukes Wheeler and The Railroad Bridge Park. Several other species were treated at Mary Lukes Wheeler, and at the Railroad Bridge Park large amounts of butterfly bush were treated by the cut-stump method. About 100 knotweed canes were found at Mary Lukes Wheeler and 52 at Railroad Bridge. Herbicide amount had to be extrapolated based on these figures and we estimate about 0.1 gallons of glyphosate was used in total on knotweed. This crew also treated a WDFW site in a critical wetland area near Three Crabs Road, close to Meadowbrook Creek, where knotweed has been present for some time. Other species—Canada thistle, Scotch broom, blackberry, poison hemlock and teasel—were also treated. Although the crew was specifically instructed to use imazapyr or glyphosate, it appears that was not the case. Approximately 0.02 gallons of triclopyr were used (as estimated from their spray record).

In 2014, NOSC, through highly successful landowner outreach, had continued butterfly bush treatments upstream. Unfortunately, all DNR funded crews were pulled mid-season for fire in eastern Washington and NOSC requested additional assistance from the Clallam PSC to treat knotweed identified on parcels downstream.

Because of limited crew time, we were only able to offer one additional day. During this time they treated knotweed spanning 7 acres on 11 parcels. This crew treated other noxious weeds on an additional 33.5 acres downstream near the mouth of the river. Knotweed has been seen in this location in the past, but was not found there this year. Other species were treated-including those mentioned above. The PSC also returned to the high value habitat area surrounding Meadowbrook Creek treating small amounts of knotweed within 1 acre there, as well as other noxious weeds encompassing an additional 8.25 acres. In 2015, NOSC, Jefferson County WCC crews, and Jamestown S’Klallam Tribe worked with 28 landowners and surveyed 150 acres for invasives (largely butterfly bush but also knotweed, poison hemlock, Scotch broom). Additional help was provided by CCNWCB who spent one day working on knotweed downstream of the US 101 bridge. In total, 27.3 acres were treated for invasive species. Efficiency was boosted by having trained crews and sufficient, varied equipment needed to treat multiple species depending on their densities and size. Use of EZ-Ject lance helped with butterfly bush in particular. Revegetation is planned for the winter of 2015-16.

In 2016- Knotweed, Scotch broom, and Himalayan blackberry was treated along two miles of the Dungeness River by the East Jefferson WCC crew lead by Owen French, under the guidance of NOSC. Crew treated with glyphosate applied using backpack sprayers and EZ-Ject lance on over 25 acres from 21 treated parcels. Another 1.16 miles were surveyed and treated along the Dungeness River dike and the adjacent flood plain by a WCC crew lead by Pete Allen. Knotweed, poison hemlock, Canada thistle, Scotch broom, and everlasting peavine were treated along the dike using Vastlan and/or Transline. Pete Allen’s WCC crew also treated knotweed, Scotch broom, Himalayan blackberry, and butterfly bush on six private parcels on the Dungeness River just north of Highway 101. Just over 29 acres were examined for invasive weeds, with weeds treated with 0.18 gallons of imazapyr at a 1% rate.

Bell Creek

Bell Creek is approximately 3.8 miles long and drains 8.9 miles of low elevation watershed. It flows from Happy Valley, through the eastern portion of Sequim, into Washington Harbor at the entrance to Sequim Bay. It has been heavily influenced by irrigation runoff since the initiation of irrigation in the Sequim-Dungeness Valley. We had been aware for some time of a patch of knotweed on an industrial site on Bell Creek in Sequim and in 2013 the PSC treated it, using 0.02 gallons of glyphosate. In 2014, although monitored, no knotweed was seen on this site. The Clallam PSC again performed additional invasive control work on this waterway in 2015 which was not included in this report.

In 2016- A WCC crew lead by Pete Allen treated 8 acres of WDFW property adjacent to Bell Creek on Rhodefer Rd. in Sequim. Though the worst infestation was teasel, poison hemlock, canada thistle, bull thistle, and Himalayan blackberry were treated as well. In total, 1.92 gallons of Vastlan and 0.02 gallons of Transline was used to treat invasive weeds.

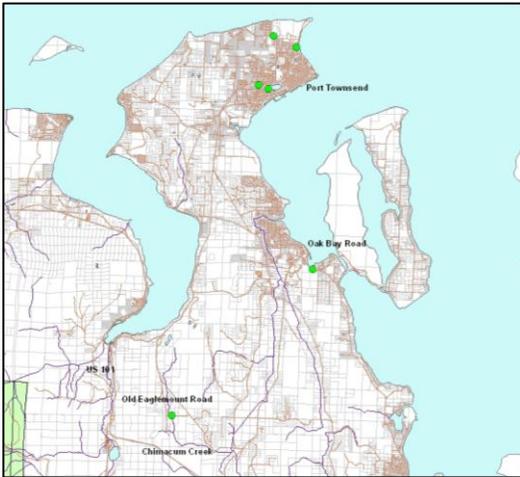
Herbicide Use, Dungeness River and Surrounding Area (gal)				
	2013	2014	2015	2016
Acres Treated	0.5	8.0	27.3	40.27
Herbicide	0.12	.425	N/A	2.11*
Total Herbicide:	0.14	.425	N/A	2.11*

**Herbicide totals for 2016 include Dungeness dike and Bell Creek portions only. Herbicide totals were not furnished by NOSC.*

For more information about control efforts on the Dungeness River, please contact Hilton Turnbull at (360) 681-4603, hturnbull@jamestowntribe.org or Sarah Doyle at (360) 379-8051, sdoyle@nosc.org

PROJECT ACTIVITIES BY WATERSHED—CONTINUED

EAST JEFFERSON COUNTY



Port Townsend area: Bright green indicates 2013 knotweed treatments by CCNWCB and JCNWCB.

Port Townsend Area:

In 2014- All sites shown on the map are very small infestations. None of these areas were treated due to staffing shortages at the Jefferson County Noxious Weed Control Board. *For additional history of treatment in this areas, see previous reports.*

In 2015- No information concerning knotweed treatments in the Port Townsend area in 2015 was provided to CCNWCB for this report. As a new NWCB director was hired for Jefferson County in 2015, surveys and treatments in the future are likely to resume.

In 2016- The JCNWCB worked with County and public entities to generate a list of high priority noxious weeds sites that they might need assistance with. The JCNWCB hired a WCC crew to treat knotweed in Irondale Beach and Hicks County parks. Knotweed was treated with a foliar application of 0.37 gallons of glyphosate. The total area treated for knotweed in the two parks was 0.70 acres.

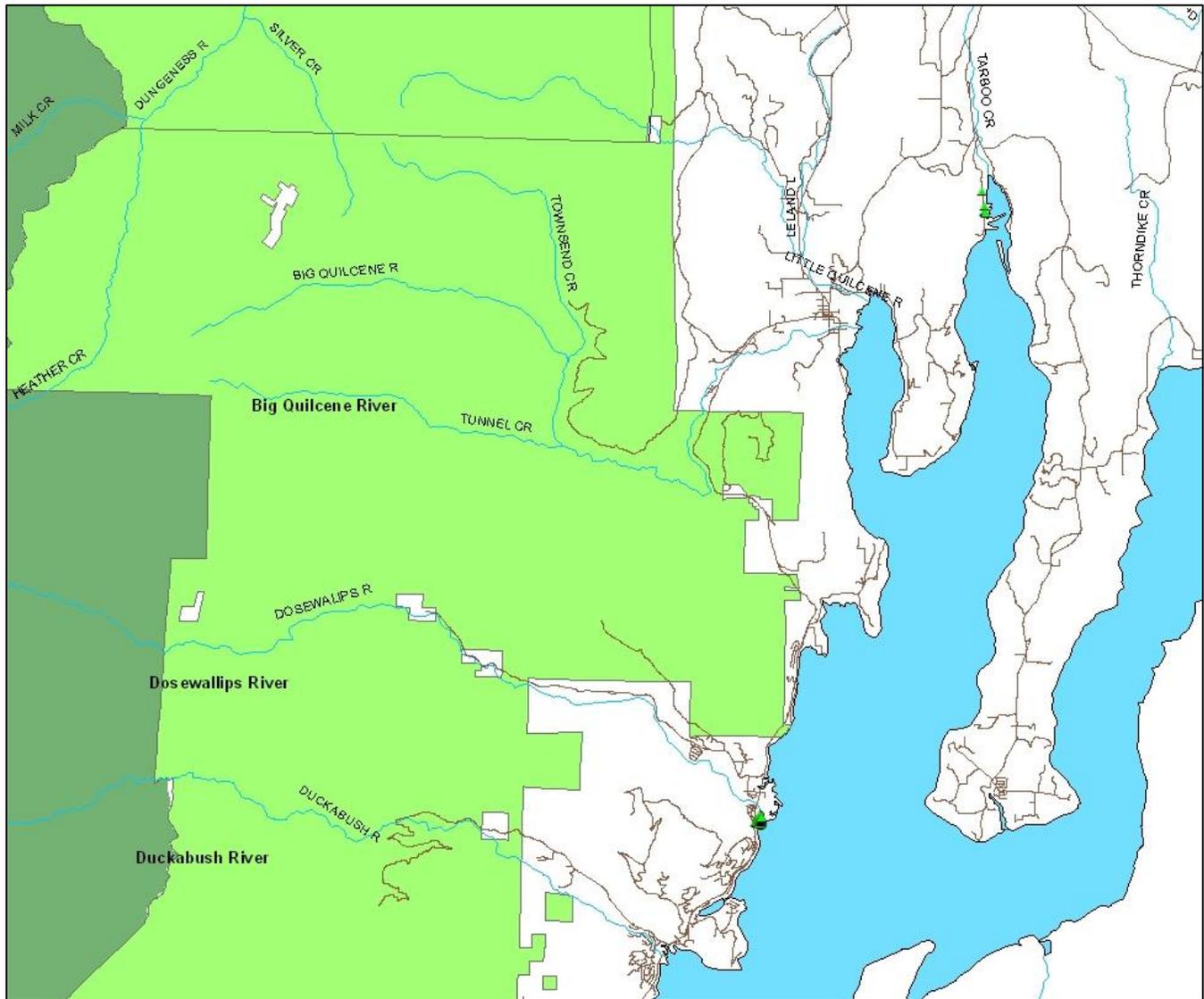
- **Kah Tai Lagoon Park** in Port Townsend. A highly visible knotweed infestation of approximately 0.75 acres had been present at an entrance to the park for many years. Its location adjacent to the lagoon makes it likely that winter flood events could move plant parts off site. This site was treated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

Herbicide Use, Port Townsend Area (gallons)						
	2011	2012	2013	2014	2015	2016
Port Townsend (several sites)	0.15	0	0.014	0	0	0
Old Eaglemount Road	0.004	0	0.0008	0	0	0
Oak Bay	1.125	0	0.01	0	0	0
Additional Jefferson County sites	0	0	0	0	0	0.37
Total	1.279	0	0.0248	0	0	0.37

For more information regarding control in the Port Townsend area, contact Joost Besjin, Jefferson County Noxious Weed Control Coordinator at 360-379-5610 ext. 205 or NoxiousWeeds@co.jefferson.wa.us

Quilcene Area:

Crew—East Jefferson WCC (EJWCC), CCNWCB, and HCSEG



Quilcene area: Green circles indicate knotweed treatments, green triangles treatment of additional invasives during course of knotweed work by DNR-WCC. Knotweed work performed by HCSEG on Big and Little Quilcene and Dosewallips Rivers not shown.

Big Quilcene River

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

In 2008 JCNWCB and the Hood Canal Coordinating Council surveyed the river to determine how far upstream the infestation went. The furthest upstream knotweed found on the Big Quilcene mainstem was a little upstream from the Fish Hatchery. Dense populations were found half a mile downstream from the Hatchery and they continued intermittently to the mouth. Knotweed on the Big Quilcene was treated by a Clallam County crew in 2008 and 2009. In 2010 the East Jefferson WCC crew, jointly funded by North Olympic Salmon Coalition, Hood Canal Coordinating Council and the Hood Canal Salmon Enhancement Group (HCSEG), spent 19 days treating knotweed on the Big Quilcene. Good progress was made. In 2011 the WCC crew re-treated all sites on the Big Quilcene. JCNWCB assisted with landowner contacts. In addition to treatment, landowners were given the option of having native plants installed on their property. In 2012, knotweed was retreated in all known sites with the assistance from East Jefferson WCC crew, HCSEG volunteers and HCSEG Americorps members.

The East Jefferson WCC crew, funded by HCSEG did all Big Quilcene treatments in 2013 and 2014. HCSEG's report states that "in 2013 all previously treated knotweed sites were treated, including some new parcels. Knotweed re-growth is not evident in the upper reaches of the river near Hwy 101, but remains consistent in the mid and lower reaches. The Big Quilcene River has a combination of all three types of knotweed including giant knotweed. A few properties showed resilience to previous years' herbicide treatments. It was noted that seeds were found on some plants on this river, which may explain the lack of response to previous treatment." In 2014 the East Jefferson WCC reported that no knotweed was evident in the upper and middle reaches of the river, treatments focused on the lower reaches. HCSEG offered native re-vegetation to a few property owners in the upper and middle reaches of the river in 2014. In 2015 the East Jefferson WCC and HCSEG continued knotweed treatments on the Big Quilcene River. Total herbicide continued to decline, with 3.63 gallons of glyphosate sprayed. One additional parcel was planted with native species by HCSEG, bringing the total since 2012 to nine.

In 2016- HCSEG and its WCC crew treated all previously treated knotweed sites along 2.6 miles of the Big Quilcene River. In all, approximately 1.5 gallons of glyphosate was applied to 25 parcels out of 53 surveyed. Knotweed continues to be reduced in abundance, though at a slower rate than in the first couple of years of treatment. Maintenance of previous plantings is planned for the winter of 2016-17.

Herbicide Use, Big Quilcene River (gallons)									
	2008	2009	2010	2011	2012	2013	2014	2015	2016
Acreage Treated	13	55.75	42.75	4.06	NA	5 (est)	6 (est)	240	34
AquaNeat injected	2.06	0	0	0	0	0			0
AquaNeat sprayed	3.6	18.291	31.43	9.77	7.33	9.92	4.339	3.63	1.49
Polaris AQ sprayed	0	0	0.94	0	0	0		N/A	0
Total Herbicide	5.66	18.291	24.1	9.77	7.33	9.92	4.339	3.63	1.49

"Acreage Treated" in 2008-2014 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. In 2015, 'Acreage Treated' is included as reported by HCSEG. 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. Data on acres actually treated was not supplied in 2013 and 2014.

Town of Quilcene

In 2013, The Jefferson PSC crew re-treated a site where a private landowner had been battling knotweed on her farm for years. The Jefferson PSC and the Weed Boards worked on several small sites along East Quilcene Road, which runs alongside the Little Quilcene River and Quilcene Bay. Most significantly, the Jefferson PSC began treating a medium stand of knotweed at the Herb Beck Marina in Quilcene. In 2014, CCNWCB crew treated knotweed at small sites in and around Quilcene. However, there were insufficient resources in 2014 to treat at Lake Leland and Tarboo Creek. There were no treatments reported for this area in 2015. The Herb Beck Marina is a potential candidate surveys and treatment in 2016 or 2017.

Lake Leland

The Lake Leland County Park is a popular fishing destination. Four distinct knotweed patches have been observed around the south end of the lake divided between County road right-of-way and private property. Permission was obtained from private landowners, and all sites were treated or re-treated in 2011. No treatment

took place in 2012. In 2013 the Jefferson PSC treated large amounts of reed canarygrass on Lake Leland and Leland Creek. We hope, but lack proper documentation, that they treated knotweed there as well.

In 2014 and 2015 there was no report of treatments around Lake Leland. JCNWCB did no treatments due to a staffing shortage.

Tarboo Creek

Tarboo Creek, which drains into Dabob Bay, is a small but significant stream. 2,700 acres near its mouth are now protected by many different groups and agencies including Jefferson Land Trust, WDNR and the Northwest Watershed Institute (NWI). The lower portion of Tarboo Creek is virtually undeveloped and it includes both conifer and deciduous forests and supports protected species such as bald eagle, northern spotted owl and marbled murrelet. Knotweed was treated in 2011, 2012, and 2013 in a joint effort between JCNWCB and NWI. No treatments were performed in 2014 due to a staffing shortage at JCNWCB. In 2015, HCSEG surveyed and treated for knotweed along Tarboo Creek, applying 2.8 ounces of imazapyr in one acre.

No work was reported on Tarboo Creek in **2016**.

Little Quilcene River

The Little Quilcene River drains a basin of approximately 40 square miles. Its headwaters originate above 4,400 feet on the north slopes of Mount Townsend and its runoff is derived from both rainfall and snowmelt. The upper watershed is within the Olympic National Forest and is steeply dissected with high gradient, confined stream channels. The lower valley and the flood plain have been developed for domestic and agricultural use and timber harvest. The lower 0.8 miles have been diked and the banks armored to protect property in the floodplain. The Little Quilcene River discharges to Quilcene Bay approximately one mile north of the mouth of the Big Quilcene. The estuary supports populations of Chinook, pink, chum, steelhead, Coho, sturgeon and cutthroat. However, the dike system, put in place nearly 100 years ago, has disturbed tidal function in the estuary. Sediment washed downstream has caused the formation of a “delta cone”—a build-up of sediment in the estuary that can bury the salt marsh—important to young salmon because it offers food and protection from predators. The Hood Canal Salmon Enhancement Group (HCSEG) owns land near the mouth of the Little Quilcene and has mounted a large restoration effort in the estuary. 35,000 cubic yards of soil have been removed and the shoreline has been moved back 400 feet. In 2009 HCSEG noticed knotweed growing near the mouth and asked JCNWCB for help in removing it. In 2010 the East Jefferson WCC crew sprayed the remaining knotweed near the mouth of the Little Quilcene River. Only a small amount remained. In 2013 and 2014 the East Jefferson WCC crew treated a couple of small patches near the mouth of the Little Quilcene River. CCNWCB also treated one small patch upstream. In 2015, HCSEG surveyed one parcel for knotweed for a landowner but did not find knotweed and no treatment was performed.

In 2016- HCSEG conducted a survey on the lower reaches of the Little Quilcene River. A little over two acres was surveyed on two parcels. No knotweed was found. The Little Quilcene River continues to be in good shape.

Herbicide Use, Quilcene Area (gallons)						
Waterway	2011	2012	2013	2014	2015	2016
Quilcene Town	0.56	0	0.325	0.003	0	0
Tarboo Creek	1.96	2.25	0.03	0.00	0.02	0
Herb Beck Marina--Quilcene	0	0	0.34	0.05	0	0
Little Quilcene River	N/A	N/A	0.09	0.017	0	0
Total	2.52	2.25	0.782	0.0700	0.02	0

Note that 2011 and 2012 treatments were solely glyphosate. In 2013 the Weed Boards used imazapyr at 1%. There was a 90% in overall use between 2013 and 2014, when imazapyr was again used.

Dosewallips/Duckabush and vicinity

Crews—CCNWCB, DNR-WCC, and the East Jefferson WCC

Spencer Creek

Spencer Creek is a comparatively short waterway that flows into Jackson Cove in the northwest section of the Hood Canal. We have treated a severe infestation upstream on Spencer Creek since 2008. In 2011 a large infestation was discovered at the mouth and treated. When treating we also found and treated a large infestation of giant hogweed, a class A noxious weed. In 2012 we re-treated the upstream site and discovered more large downstream stands of knotweed. The CCNWB and JCNWCB treated all affected parcels except one where permission was lacking. In 2013 the Jefferson PSC re-treated Spencer Creek from US 101 to the mouth, except for the one above mentioned parcel. Poor documentation by the crew made it difficult to determine herbicide decreases were because of reduced amount of plants or whether they failed to search in all permissioned sites. In 2014, the CCNWCB treated 1.7 miles of the river for knotweed. They also found and treated trace amounts of yellow archangel and giant hogweed. Herbicide totals in the table below only include knotweed totals.

Due to low infestation levels, no treatments were performed on Spencer Creek in 2015 or **2016**.

Herbicide Use, Spencer Creek (gal)						
	2011	2012	2013	2014	2015	2016
Herbicide use	1.69	3.29	0.32	0.19	0	0

Dosewallips River

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

In 2006 Jefferson County Noxious Weed Control Board (JCNWCB) surveyed the Dosewallips. CCNWCB provided training, herbicide and equipment. Treatment took place from 2007 through 2009, using a combined JCNWCB/CCNWCB crew. In 2010 the East Jefferson WCC (EJWCC) crew began additional surveys along the left, more accessible bank of the Dosewallips, finding more sites than previously, and more upstream sites. Re-treatments took place in 2011 and 2012. Drier conditions in 2012 allowed surveying and treatment on the right bank. In 2013 the EJWCC crew, surveyed and treated along both banks of the river mainstem. Knotweed infestation along the river consisted of smaller patches in the upper reaches and slightly larger patches toward the lower river, several new owner consents were obtained. Very little or no knotweed remained above the lower two miles of the river. CCNWCB crews also worked on the Dosewallips especially on the upper reaches where there are private landowner in-holdings in the Olympic National Forest. Both CCNWCB and two PSCs treated extensive herb Robert infestations in the upper reaches of the Dosewallips along with knotweed. Additionally, the two PSCs began treating severe butterfly bush and Scotch broom infestations on private land near the mouth of the river. In 2014, CCNWCB, PSC, and EJWCC continued their knotweed control efforts along some 13 miles of the Dosewallips. The DNR funded-PSC expanded on work done near the river mouth to include several gravel bars and the south bank, plus re-worked areas from the previous year; several patches of knotweed were thus discovered. Herbicide use for non-knotweed treatments is not included in the following table. In 2015, HCSEG and EJWCC continued knotweed treatments along 12.5 miles of the Dosewallips River. A new channel formed near engineered log jams and was treated for knotweed. Three new land owner agreements were secured in 2015, bringing the total permissioned parcels to 77.

In 2016- HCSEG and its WCC crew surveyed 8.3 miles of the Dosewallips River. Knotweed was treated with 1% imazapyr on 15 of 79 parcels surveyed. A new side channel developed adjacent to an engineered logjam in 2015, which introduced new knotweed infestations. These areas were treated in 2015 and again in 2016. Treatments continue to be very effective on this river, with regrowth occurring at a limited number of infestations. A WCC crew led by Pete Allen and directed by the CCNWCB, treated knotweed and other species of concern in Dosewallips state park. Crew surveyed six acres for invasive species and treated tansy ragwort, herb Robert, reed canarygrass, and Canada thistle in addition to knotweed.

Herbicide Use-Dosewallips River (gallons)											
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Acres Treated	2	5	7.75	5.5	14.05	0.3	0.57*	5 (est)	1.3	5718 [#]	27.1
AquaNeat injected	0.77	3.175	0.8	0	0	0	0.031	0			0
AquaNeat sprayed	0.375	3.2	3.12	0.234	8.48	0.58	1.443	1.56	.007	0.795	0
Polaris AQ sprayed	0	0	0	0	0.02	0	0.02	0.003	.03		0.13
Total Herbicide	1.145	6.375	3.92	0.234	8.5	0.58	1.494	1.56	0.037	0.795	0.13

**Acres Treated in 2015 is as reported, and appears to be the total acres for parcels which received treatment.*

Duckabush River

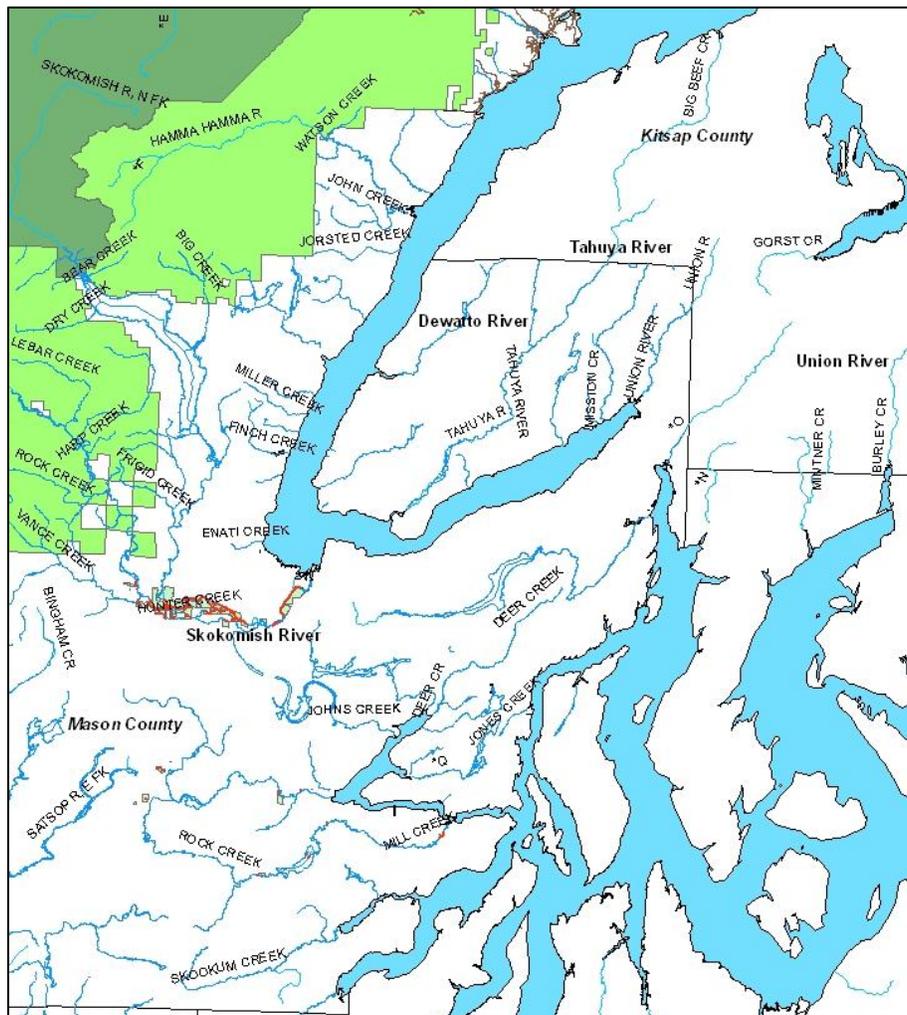
The Duckabush is one of the major waterways in Jefferson County. It originates near Mount Duckabush, within Olympic National Park, flowing into the Hood Canal south of the town of Brinnon. It is 24.5 miles long with over 50 tributaries contributing an additional 94 stream miles. The watershed covers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

In 2006 windshield and foot surveys were conducted on the Duckabush River. No knotweed plants were found. In 2007 a landowner off channel notified us of knotweed on his property, which we treated. This site was re-treated in 2008, 2010 and 2012. In 2012, HCSEG funded another complete survey of the river. No knotweed was found. In 2013 the CCNWCB/JCNWCB crew re-treated the small off channel patch of about 10 plants near the mouth. Despite re-treatments over many years, this patch remains inexplicably undiminished. Due to low levels of infestation, no knotweed treatments occurred on the Duckabush River in 2014-**2016**, though other invasive plants were treated within NFS lands.

Herbicide Use, Duckabush off-channel site (gallons)					
2011	2012	2013	2014	2015	2016
0	0.01	0.0008	0	0	0

PROJECT ACTIVITIES BY WATERSHED—CONTINUED

MASON COUNTY



Mason and Kitsap Counties. Turquoise polygons indicate parcels surveyed by MCD on Skokomish River and Goldsborough and Mill Creeks. Pink polygons represent parcels surveyed and treated by MCNWCB. Knotweed work performed by HCSEG not shown.

Tahuya River

Crew— Hood Canal Salmon Enhancement Group and East Jefferson WCC

The Tahuya River is the largest stream on the Kitsap Peninsula, draining 45 square miles of land. The mainstem is 21 miles long with an additional 65 miles of tributaries. The numerous tributaries are an important factor in the Tahuya's ability to produce large numbers of coho salmon. In 2010 the first knotweed survey on the Tahuya found small intermittent patches. Access to the river is difficult, due to large undeveloped parcels and its remoteness. Complete treatments of known (98 properties) knotweed patches were conducted in 2010, 2011, 2012, and 2013. Knotweed surveys and treatments continued on the Tahuya River mainstem in 2014 for the fifth consecutive year. Remaining infestations are small isolated patches. Because of multiple years of treatment and little re-growth during 2013, it was decided not to treat the lower river parcels this season. Knotweed re-growth in the upper reaches continued to decline from previous year treatments. 0.3 gallons of glyphosate were used on the Tahuya River in 2014 compared with 8.3 gallons in 2013. Native re-vegetation planting efforts occurred on four large properties utilizing only Sitka Spruce and Western Red Cedar. Planting plans have been established for additional properties during the 2014-15 winter months in addition to maintenance of existing plantings.

Treatment of knotweed on the Tahuya River in 2015 focused on mid-upper regions. Knotweed treatments covered 4.35 miles of the river, applying 0.69 gallons of glyphosate. Ten parcels were re-planted on the Tahuya from 2012 to 2015.

In 2016- HCSEG surveyed over 62 acres along 5.73 miles of the Tahuya River. Knotweed on 47 parcels was treated using 8 gallons of 1% imazapyr. In the winter of 2016-17, HCSEG staff plans to inspect plantings made in previous years and determine maintenance needs. Possible sites for future plantings will be assessed as well.

Union River

Crew—*East Jefferson WCC, Mason County NWCB and Mason PSC, HCSEG-WCC*

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 (permission on 99 parcels). Two landowners with whom HCSEG has not gained permission are now working with the Mason County NWCB.

Knotweed surveys and treatment continued along the river mainstem and tributaries for the sixth consecutive year in 2014. Knotweed re-growth is sparse and continues to decline. Crews have noted other noxious weeds such as giant hogweed, spotted jewelweed and policeman's helmet encroaching into areas where knotweed has been controlled or eliminated. Native plant re-vegetation efforts continued and were maintained on 11 properties along the upper and lower reaches of the river and tributaries. Planted vegetation focused on native coniferous trees, and includes deciduous trees and shrubs along the river's riparian zone for erosion control and habitat complexity. In 2015, HCSEG and JCWCC treated 4.32 miles of the Union River. Crews applied 3.48 gallons of glyphosate, down from 10 in 2014. Although headway is being made, a few landowner holdouts are inhibiting progress. One new parcel received plantings in 2015, bringing the total since 2012 to 12.

In 2016- HCSEG and its WCC crew surveyed for knotweed along 3.45 miles of the Union River. Treatments began using glyphosate, and later on switched to imazapyr after observing less than expected results from previous treatments. Knotweed was treated on 36 of 88 parcels surveyed. Knotweed infestation continues to decline, though at a slower rate than was observed after the first two years of treatments. HCSEG was able to get permission from a landowner with a known knotweed infestation that had never before granted access to their property. This development will contribute to future success on this river. Unfortunately, one large landowner continues to decline treatment on their property. Native plantings occurred on several properties in early 2016, including new plantings as well as maintenance of previous plantings.

Dewatto River

Crew—*East Jefferson WCC*

The Dewatto River enters Hood Canal about 5.5 miles north of the Great Bend of Hood Canal, draining about 23 square miles. The mainstem is 8.7 miles in length with about 30 miles of tributaries. Several wetlands are present near the mouth, providing quality rearing habitat for juvenile salmonids. Although logging was historically the dominant land use and much of the watershed is still managed for timber production, the estuary remains relatively undisturbed. Knotweed survey and control on the Dewatto River began in 2009 and has continued each year since. Access is relatively easy in the lower reaches as the main road runs along the river. In the upper reaches there is a fairly large gap between the road and the river, often separated by wetlands or thick woods, making access more challenging. Knotweed in the Dewatto River is found in smaller patches spread intermittently throughout the river. All known knotweed patches were treated in 2009, 2010, 2011, 2012 and 2013. In 2013 only 0.123 gallons of herbicide were used to treat knotweed on the Dewatto. Because previous year's treatments showed very little re-growth it was decided to delay treatments until 2015. In 2015, After taking 2014 as a rest year, treatments along the Dewatto River resumed. Infestations were treated with 0.285 gallons of glyphosate along 1.12 miles of the Dewatto. Most knotweed patches observed in 2015 were in the upper reaches of the river, though one patch was treated approximately 0.5 miles from the mouth.

In 2016- HCSEG continued its treatments on the Dewatto River. At this point, knotweed is mainly restricted to smaller patches interspersed throughout the river. Crew surveyed 0.75 miles of the river, applying a total of 0.02 gallons of imazapyr. Treatment of the entire river took a single day. Most parcels with knotweed belong to timber companies, who have all given access.

For more information about the Tahuya, Union or Dewatto Rivers please contact Tamara Coles, 360-275-3575 ext. 24 tamara@pnwsalmoncenter.org or Michelle Myers, 360-275-9722 michelle@pnwsalmoncenter.org

Skokomish River

Crew—*Mason County Conservation District*

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

In 2013 the Conservation District treated knotweed on 29 parcels in the Skokomish Valley, which is a large area with a high level of infestation. To improve efficiencies MCD adopted a new method of documenting knotweed infestation and treatment which will make it difficult to compare this and future treatments with past years. There was a huge reduction in herbicide use, from 143.25 (2012), to 16.84. Some of the reduction is due to efficacy of previous years, but also because of foliar application instead of injections. The MCD also contracted with the Squaxin Island Tribe to treat knotweed in the Skookum Creek Watershed. There they surveyed 38 parcels, 2.79 miles of stream, and 39.34 acres and treated 20 parcels and 1.05 acres. In 2014 the MCD reported assisting 20 landowners on 24 parcels in the Skokomish Valley. No other details were provided.

In 2015- Mason Conservation District continued knotweed treatments on the Skokomish River. Knotweed was treated along 8.7 miles of the Skokomish, with 943 acres searched. Fourteen new permissions were signed, bringing the total for the watershed to 109. Due to the amount of regrowth observed, repeat treatments were performed using imazapyr (though initial treatments were still done with glyphosate).

In 2016- Mason Conservation District continued knotweed treatments on the Skokomish River. Knotweed was treated along 12.4 miles of the upper portion of the Skokomish, searching 850 acres in the process. One hundred and twenty five parcels were treated for knotweed out of 130 parcels surveyed. MCD reported good results utilizing their plan of glyphosate applications in the first year of treatment, followed by imazapyr in years two and four. Treatments are skipped in the third year in order to allow for sufficient top growth for treatment in the fourth year. MCD plans on focusing efforts on the lower portions of the Skokomish River next season.

For more information about the Skokomish River please contact Mitch Redfern at the Mason Conservation District, 360-427-9436 ext 115 or mitch@masoncd.org

Other Mason County Sites

Crew—MCNWCB, MCD, and the Mason PSC

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

In 2014 MCNWCB, with the help of a DNR-funded PSC crew was able to treat a combined 10.52 acres of knotweed (3.94 solid acres) on 39 parcels along 1.74 miles of river. Knotweed was treated around Allyn, Finch and Sherwood Creeks, Union River, Lake Isabella and North Bay as well as some upland sites. All treated sites are shown on the watershed overview map above. With the help of the PSC, the MCNWCB directed the treatment of well over 120 acres of a variety of other noxious weeds growing in riparian areas. Herbicide totals for 2014 were not available.

In 2015 MCNWCB staff treated knotweed along 3.7 miles of Coulter, Finch, Stimson, and Sherwood Creeks. In addition, they treated various terrestrial and aquatic sites in Allyn, Belfair, Shelton and North Bay, and off US Highways 101, 106, and 300. MCD finished their survey and assessment of Goldsborough and Mill Creeks, with plans to begin knotweed treatments in **2016**.

In 2016- MCD began treatments on Goldsborough and Mill Creeks after completing surveys in 2015. Treatments were made along 1.17 river miles. As 2016 marked the first year of treatments, dense stands were encountered and treated with glyphosate. Treatments were performed on 23 private parcels out of 27 landowner permissions held. Crew also treated giant hogweed when encountered. Mason County Noxious Weed Control Board, along with a WCC crew, treated 3.58 miles of Coulter, Finch, Sherwood, and Stimson Creeks. In addition to knotweed, crew treated giant hogweed, butterbur (Finch Creek), and policeman’s helmet (Sherwood Creek). Additional aquatic and terrestrial sites were also treated in Allyn, Belfair, Shelton, Lake Isabella, North Bay, Oakland Bay, Spencer Lake, Union River, and along Highways 101 and 300. In all, MCNWCB treated 76 parcels for knotweed and other invasive weeds using foliar applications and stem injections. MCNWCB reported continued success obtaining permissions, including permissions for properties that had been sought for many years. Persistent effort and community outreach continues to pay off when it comes to acquiring landowner permissions.

Herbicide Use, Mason County, 2013 (gal)			Herbicide Use, Mason County, 2015 (gal)		Herbicide Use, Mason County, 2016 (gal)	
	Glyphosate injected	Glyphosate and/or imazapyr sprayed	Glyphosate injected	Glyphosate and/or imazapyr sprayed	Glyphosate injected	Glyphosate and/or imazapyr sprayed
Skokomish River	0	16.84	N/A	N/A	n/a	n/a
Tahuya River	0	8.3	N/A	0.69	0	0.08
Union River	5.69	8.55	N/A	3.48	0	1.40
Dewatto River	0	0.123	N/A	0.29	0	0.02
Finch Creek	2.06	0.03	N/A	1.49	0.4	0.2
Stimson Creek	3	1.15	N/A	0.10	0.8	0.07
Sherwood Creek	3.23	0	N/A	2.58	0.8	0.49
Other riparian sites	1.32	0.85	N/A	0.58	1.5	1.13*
Terrestrial sites	1.54	1.33	N/A	4.67	2.2	0.59
Total	16.84	37.173	N/A	13.88	5.7	3.98

**Herbicide totals for 2016 do not include Mill and Goldsborough Creeks, which were not provided.*

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

PROJECT ACTIVITIES BY WATERSHED—CONTINUED

KITSAP COUNTY

Big Anderson Creek

Crew- HCSEG and WCC

In 2015- HCSEG and EJWCC treated knotweed along 1.2 miles of Big Anderson Creek in Kitsap County. In all, 4.85 gallons of glyphosate were applied on 13 treated parcels, down considerably from the over 22 gallons that were applied in 2014.

In 2016- For the fourth consecutive year, HCSEG, along with its WCC crew, treated knotweed along Big Anderson Creek. Knotweed was treated along a 0.77 mile stretch of the river with a foliar spray of 6% glyphosate. A total of 4.36 gallons of glyphosate was applied in 2016 to 10 parcels.

Big Beef Creek

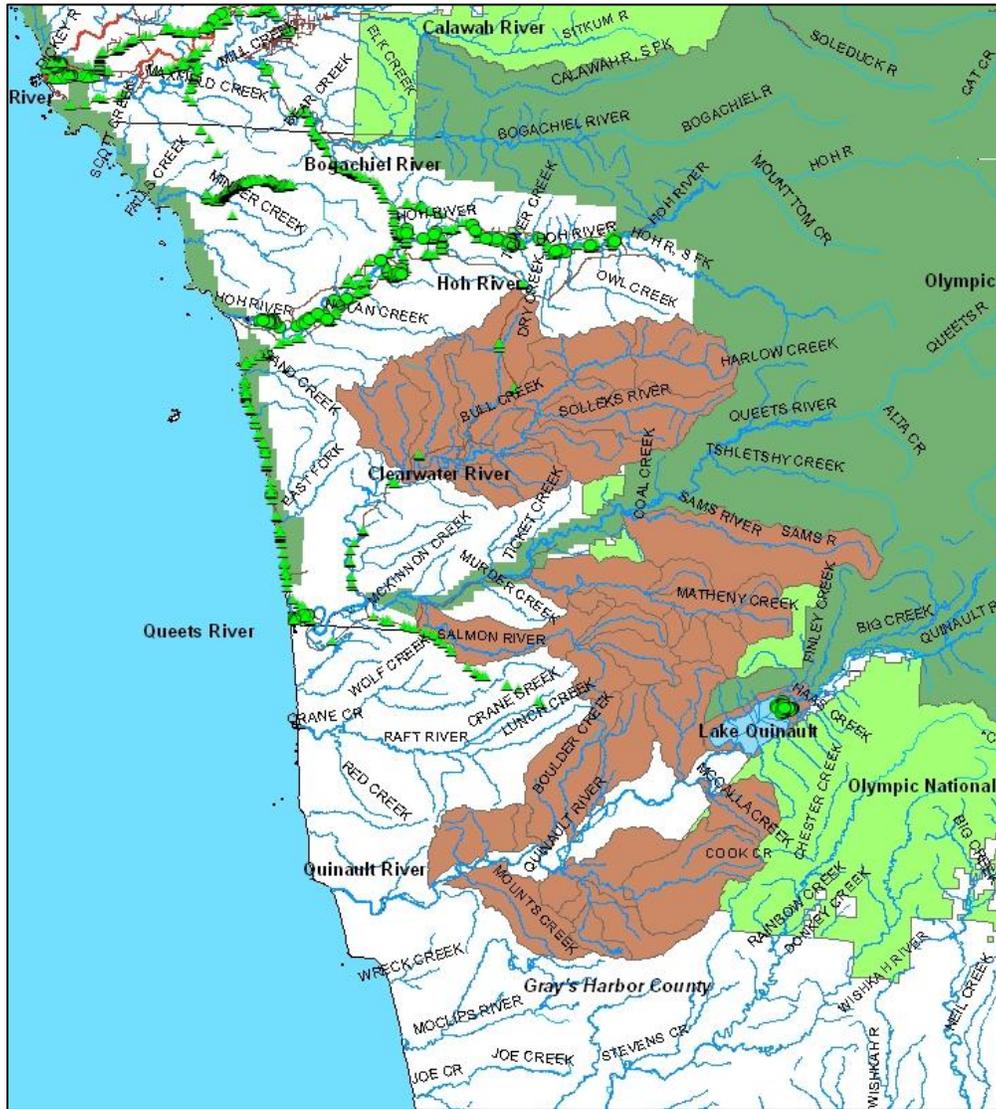
Crew- HCSEG and WCC

In late 2015, knotweed was discovered by HCSEG near a restoration project on the lower segment of the creek. The entire creek was subsequently surveyed, which located several patches of knotweed. **In 2016**, a database of landowners was created and permissions sought, resulting in 26 permissions gained. Additionally, individual properties were surveyed, for a total of 7.86 surveyed acres in 2016.

For more information about Big Anderson and Big Beef Creeks, please contact Tamara Coles, 360-275-3575 ext. 24 tamara@pnwsalmoncenter.org or Michelle Myers, 360-275-9722 michelle@pnwsalmoncenter.org

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

Quinault River, Lake Quinault, Queets and Clearwater Rivers



Quinault Indian Nation. Brown polygons indicate the Quinault Indian Nation project area. Green circles and triangles indicate knotweed and other invasive species, respectively, treated by 10,000 Institute and NCEPMT.

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

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

Crew—Total Vegetation Management and Brittlund Company crews, led by Caroline Martorano, Quinault Indian Nation staff, NCEPMT

The Quinault River is 69 miles long and originates in the Olympic National Park. It flows into and out of Lake Quinault and empties into the Pacific Ocean at Taholah. The Quinault River has healthy stocks of sockeye and also supports Chinook, chum and Coho. The upper reaches offer spawning and rearing habitat for federally-listed bull trout. Prairie Creek is located near the outfall from Lake Quinault and is a source of knotweed infestation in the lower Quinault River.

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

In 2011 the upper Quinault River, above the lake, was surveyed and treated by the NCEPMT with NPS and by Grays Harbor NWCB. In 2012 the Lower Quinault Tributaries were treated for the first time, by the QIN crew. In 2013 the Quinaults did a first-year treatment of the Lower Quinault floodplain. They surveyed over 1,000 acres. Dense stands of knotweed on over 43 acres were treated. The Lower Quinault tributaries were also treated, for a second year. Over 12,000 acres were searched for knotweed. Re-vegetation was begun—conifers were planted on some of the Lower Quinault Tributaries. Knotweed in the town of Neilton was re-treated by the QIN crew. The North Cascades EPMT with the National Park Service treated knotweed on the upper river, above Lake Quinault. In 2014, Brittlund Company treated invasive species on Quinault Reservation in Joe Creek, Boulder Creek, 10 o'clock Creek, South Boulder Creek, harvest units, roads, pits and part of the upper river above Lake Quinault. Total Vegetation Management treated knotweed and reed canarygrass in Prairie Creek, Neilton, boat launches and the Lower Quinault floodplain from Lake Quinault downstream 8 river miles. The Lake Quinault area was treated by 10,000 Years Institute. 10,000 Years Institute also was instrumental with most of the project areas. In 2015, total Vegetation Management treated invasives along 4 miles of the lower Quinault River, applying 27.8 gallons ai of imazapyr on 390 acres. Brittlund Company applied 1.9 gallons ai of imazapyr on 162 parcels, treating over 1100 acres of Lake Quinault, the lower Quinault River, tributaries, and upland areas of QIN.

In 2016- QIN, along with Total Vegetation Management, Brittlund Company, and EPMT, treated 30.4 miles of riverbank in the Quinault River watershed, surveying 200,000 acres. Crews used 43.76 gallons of imazapyr to treat knotweed on over 1800 acres in 260 parcels. All project areas are reported to be improving, though 20 heavily infested miles of the lower Quinault River remain to be treated.

Queets-Clearwater Watershed

Crew—Brittlund Company & Total Vegetation Management, led by Jill Silver of 10,000 Years Institute

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

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

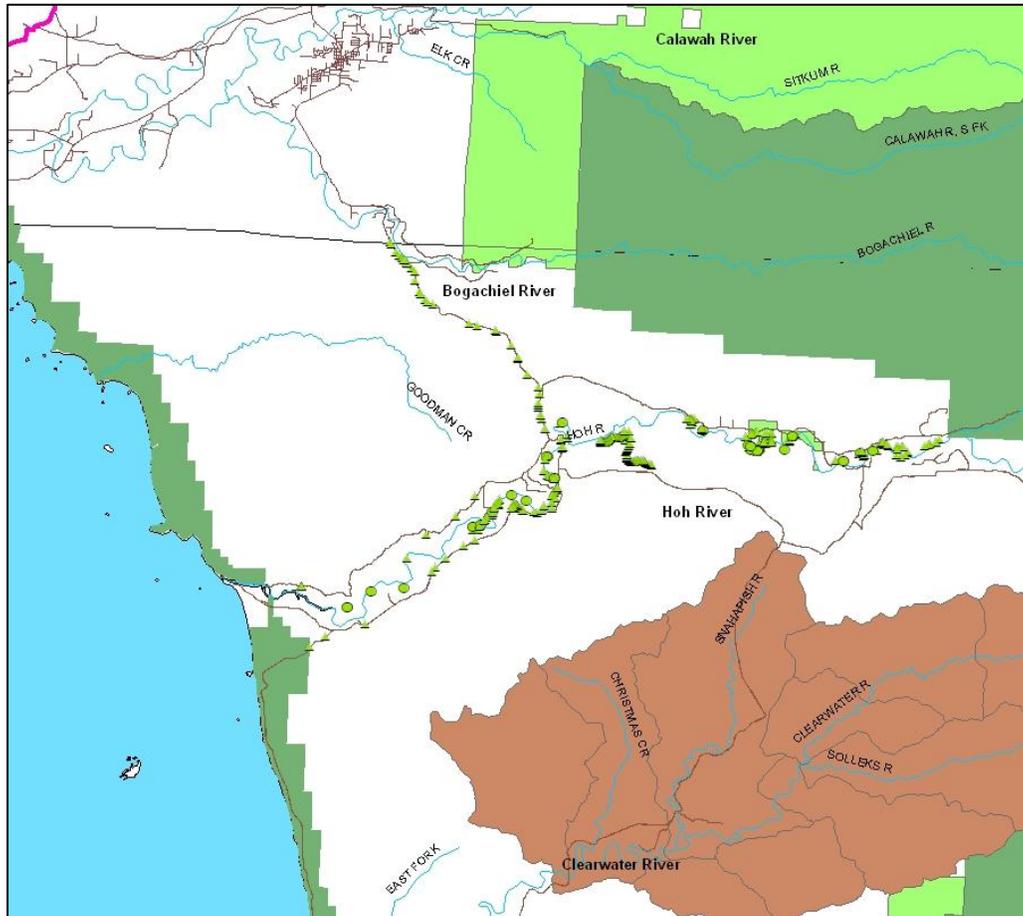
was 2.25 acres. In 2013 known sites on the Queets and Clearwater were re-treated and other invasive plant species were GPS'ed. Significant decrease in knotweed was noted on the Clearwater River upstream from the town of Clearwater. In 2014, Brittlund Company and 10,000 Years Institute treated the invasive species mapped in 2013 in addition to the little remaining knotweed. Total Vegetation Management and 10,000 Years Institute treated knotweed and reed canarygrass at the mouth of the Queets. In 2015, 10,000 Years Institute treated invasives along 33 miles of the Queets and Clearwater Rivers. In total, only 0.85 gallons of imazapyr was applied on 17.35 acres of treated area.

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

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

Hoh River

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



Hoh River. Green circles indicate 2015 knotweed treatments; green triangles indicate other invasive species, The brown polygon denotes a portion of Quinault Indian Nation project areas.

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 (ONP, river mile 29.75). 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 downstream of ONP have been conducted since 2003 by 10,000 Years Institute in partnership with the Hoh Tribe, Hoh River Trust, and ONP. Knotweed plant density, biomass, and distribution has been greatly reduced; most remaining plants are now less than 3' in height above-ground, with an unknown size of rhizomes below-ground. Other species have emerged as a significant focus in an Early Detection/Rapid Response program, including reed canarygrass, herb Robert, Canada thistle, Scotch broom, tansy ragwort, European blackberry, everlasting peavine (2 highway sites) and jewelweed (1 site).

In 2015 - 10,000 Years Institute and crew from the regional fisheries enhancement group Pacific Coast Salmon Coalition surveyed and re-treated the Hoh River mainstem, side channels, gravel bars and willow thickets, alder floodplains, and conifer terraces from river mile 29 to river mile 0.5, covering 2800 acres. Knotweed along the Hoh River is reduced from approximately 125 sites in 2014 to fewer than 40 in 2015, and treatment occurred on a total of only 0.06 acres. Size of plants and area covered were also reduced, except in three locations where substrate was deeply scoured due to river erosion and viable rhizomes were uncovered to a depth to which they could sprout, and where beavers were active, injuring or digging out knotweed rhizomes or plants – enabling the

remaining rhizomes to sprout. Native riparian species predominate throughout the river corridor, except where channel migration, sediment deposition and scour leave open silt, sand, gravel, and cobble, which are ideal places for non-native species to invade.

Under ED/RR and SRFB funding, fieldwork began on the Hoh River and tributaries in mid- June with effectiveness monitoring, identifying areas needing attention. We conducted 2 days of drift boat surveys from RM 24 to RM 0.5 at the end of July – revisiting treated sites and finding new single plants in others. Upper reaches were inaccessible via boat due to channel changes and huge in-river log jams. Other weather-related issues of note were unusual summer wind events which knocked out the tops and branches of alder and cottonwood trees in full leaf, increasing the difficulty of surveying in some floodplains.

Reed canarygrass inventories and seed-collecting was conducted for the fourth year in Elk Creek, an important coho and steelhead spawning and rearing tributary in the middle of the watershed. Surveys and treatment continued as weather permitted through early October; gridding river bars, riparian thickets, and floodplain complexes and forests within the river’s floodplain Funding was provided by the SRFB and WSDA for knotweed and reed canarygrass, and the SRFB for other focal species.

After four years of treatment and removing seeds to reduce new plant growth, reed canarygrass was reduced in both infested area and number of sites. Overall, the number of reed canarygrass sites was reduced from 319 in 2014 to 193 in 2015. The program attributes the reduction of sites and area to the collection of seeds in addition to chemical treatments. A significant increase in Canada thistle, herb Robert, and Scotch broom was observed in 2015 due to seeds deposited by river channel migration and high flows. Scotch broom was inventoried, cut and wiped along Highway 101, and pulled or cut and wiped in the river corridor (Aquaneat). Herb Robert was pulled, bagged and removed, or sprayed with Aquaneat at 1%. Revegetation using native grass seed is planned for spring of 2016 in these sites. Herbicide use for non-knotweed treatments is not included in the following table.

In 2016- 10,000 Years Institute’s crews conducted surveys between July and the end of October, treating invasive knotweed and other species along the Hoh River’s 30 mile mainstem, side channels, gravel bars and willow thickets, alder floodplains, and conifer terraces. Knotweed work was conducted with funding from WSDA. Scotch broom, reed canarygrass, herb Robert, Canada thistle, European blackberry, everlasting peavine, hedge bindweed, a few sites of English holly and ivy and one hydrangea were controlled though the Washington Coast Restoration Initiative (WCRI) Pulling Together in Restoration project. A two-day float trip was conducted in early October with three local river guides. Crews floated and surveyed banks and bars from RM 30 to RM 16, mapping and treating 28 small knotweed sites.

A total of 117 knotweed sites were mapped and treated, with a total of 576 stems. Five large clumps totaling 426 stems were found on two gravel bars in the lower Hoh River which had not been surveyed in the past 4 years. Of the remaining 150 stems and 112 sites, most were single-stemmed plants under 3 feet in height. Infestations were treated with 1% Polaris (aquatic imazapyr). Reed canarygrass sites were down by 90%. Crew located a single blooming hydrangea in the Hoh Oxbow (a confined canyon reach), which likely originated at a residential garden at RM 29.5 which had been captured by the river.

Reed canarygrass was significantly reduced, validating seed collection and treatment methods in the previous three years. Canada thistle has spread into large patches covering acres of river bars, and comprised a large degree of treatment activities. Herb Robert continues to spread, and was treated with glyphosate, which will be followed with re-vegetation of native grass seed mixes in low flow winter months. Scotch broom has exploded in the lower river, where crews applied cut stump treatment (using laboratory wash bottles) on over 40 acres, releasing suppressed native willow and alder.

Herbicide Use, Hoh River (gallons)									
	2008	2009	2010	2011	2012	2013	2014	2015	2016
Acres Treated	1093	1000	NA	0.16	0.14	0.11	3.82	0.06	0.7*
AquaMaster or AquaNeat Injected	0.0151	0.188	0.25	0.13	0	0	0	0	0
AquaMaster or AquaNeat Sprayed	0.5645	0.13	0.78	0.73	0.37	0	0.153	0	0
Polaris AQ or Habitat Sprayed	0.06382	0.043	0.206	0.02	0.09	0.145	0.745	0.07	0.234
Total Herbicide	0.64342	0.361	1.247	0.88	0.46	0.145	0.898	0.07	0.234

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 .

Table 1: Work by County-by Watershed

This table includes information gathered from multiple agencies working on knotweed projects across the Olympic Peninsula. Not all entities known to control knotweed and other invasive plants submitted information. Information submitted by different agencies was not always comprehensive; this is shown as N/A or not available. The table is organized in the following order Clallam, Jefferson, Mason and Grays Harbor, by watershed, in generally the same order as narratives earlier in this report-clockwise, starting in west Clallam County. (This order is a historic reflection of where work first occurred). Multiple agencies may have worked within the same watershed. Distinct information is shown per individual organization and then summed at the end of the County section to which it applies. An explanation of agency acronyms can be found at the end of the table along with definitions of terms used in the header column. Additional invasives that were controlled during the course of a project are shown when known, but not added to the knotweed totals. Instead, work on other invasives by the same organization is shown separately, directly below the knotweed information.

The information in the following table was generally provided by the agency represented. Some information had to be extrapolated to the best of our ability because no agency calculated information in exactly the same way, or provide all information. Definitions for each heading are provided as notes after the table. Partners were provided with a form and definitions to help standardize calculations. We received three forms from partners, others reported in a slightly different form, verbally, or presented some end of season information at the working group meeting.

	Watershed/ Waterway	River /Shore Miles	Acres Protected	Acres Treated	Solid Acres	Parcels Treated/ Survey	# of Landowner Permissions	# Landowners Assisted	# New Agreements	Species/misc notes
Clallam County Waterways-Starting West Clallam clockwise to East Clallam										
	QNR, NCEPMT, CCNWCB Quillayute River	1.95	193.75	193.75	33.32	DNR, Rayonier land	2 ^s	1	1	knotweed
	QNR, CCNWCB Bogachiel River	11.96	77	77	2.08	2/2	2 ^s	2	2	knotweed
	QNR, CCNWCB Dickey River	7.5	74	74	3.25	DNR, Rayonier land	n/a	n/a	n/a	knotweed
	Makah Big River and Hoko-Ozette Rd	19.7					10			
	Makah Reservation									
	EJWCC Hoko River	1.5	9.14	5	0.034	3/11	8	3	0	knotweed
	Sekiu River						4			
	Sekiu, Clallam Bay and Highway 112						6			
	Clallam River						11			

	Watershed/ Waterway	River /Shore Miles	Acres Protected	Acres Treated	Solid Acres	Parcels Treated/ Survey	# of Landowner Permissions	# Landowners Assisted	# New Agreements	Species/misc notes
	Pysht River						2			
QNR, CCNWCB	Sol Duc River	28.81	221.1	221.1	2.09	8/381	30 ^s	n/a	30	knotweed
	Lake Creek, Lake Pleasant and Beaver Forks						8			
	Deep Creek						5			
	Nordstrom Creek						5			
	Salt Creek						18			
Lower Elwha	Elwha River	n/a	n/a	n/a	n/a	n/a	1	n/a	n/a	No data provided.
	Valley Creek						2			
CCNWCB	Peabody Creek	0.43	2.61	1.16	0.072	3/18	3	1	0	knotweed
	Ennis Creek						4			
	Lees Creek						20			
	East Fork Lees Creek						9			
	Morse Creek and adjacent Straits of Juan de Fuca						26			
	Bagley Creek						28			
	Siebert Creek						14			
DNR-WCC	Bell Creek	n/a	15.23	8	4.30	1/1	6	1	0	teasel, poison hemlock, Canada thistle, bull thistle, blackberry
EJWCC, DNR-WCC	Dungeness River	3.16	61.67	32.77	n/a	34/40	35	28	6	knotweed, butterfly bush, Scotch broom, blackberry, poison hemlock, Canada thistle, peavine
	Meadowbrook Creek									
DNR-WCC	Misc Clallam County	n/a	5	4.2	1.59	2/2	8	1	0	Knotweed, everlasting peavine,

	Watershed/ Waterway	River /Shore Miles	Acres Protected	Acres Treated	Solid Acres	Parcels Treated/ Survey	# of Landowner Permissions	# Landowners Assisted	# New Agreements	Species/misc notes
										English ivy, spurge laurel, butterfly bush, blackberry
Clallam Co. Totals	5 entities/5 waterways	43.04	659.5	540	44.65		233	35	38	
Jefferson County Waterways-Starting East Jefferson clockwise to West Jefferson										
	Snow Creek							3		
	Port Townsend									
	Lake Leland							2		
HCSEG	Big Quilcene River	2.6	48.9	34	0.59	25/53	32	14	3	knotweed
HCSEG	Little Quilcene River	n/a	2.09	0	0	0/2	1	1	0	
	Quilcene and vicinity							7		
	Chimacum and Irondale							5		
	Tarboo Creek							3		
	Spencer Creek							3		
HCSEG, DNR-WCC	Dosewallips River	8.3	219.7	27.1	0.53	15/79	59	8	1	knotweed, tansy ragwort, herb Robert, reed canarygrass, Canada thistle
	Duckabush River							2		
	Queets/Clearwater River									
10KI	Hoh River & tribs	27	3750	0.7	0.54	23/na	127	18	1	Scotch broom, reed canarygrass, herb Robert, Canada thistle, peavine, blackberry, tansy ragwort, foxglove, hydrangea
Jefferson Co. Totals	5 entities/4 waterways	37.9	4020.69	61.80	1.07		244	41	5	

	Watershed/ Waterway	River /Shore Miles	Acres Protected	Acres Treated	Solid Acres	Parcels Treated/ Survey	# of Landowner Permissions	# Landowners Assisted	# New Agreements	Species/misc notes
Mason County Waterways										
HCSEG, MCNWCB	Union River	3.45	38.94	11.49	0.68*	37/89	83	37	1	knotweed
HCSEG	Tahuya River	5.73	62.51	8	0.184	47/102	78	43	4	knotweed
HCSEG	Dewatto River	0.74	5.38	2.5	0.046	1/3	4	1	0	knotweed
	Liliwaup Creek									
	Hood Canal waterfront									
MCNWCB	Allyn (Misc. terrestrial sites)	n/a	5.2	1.6	0.15*	8/8	9	6	3	knotweed
MCNWCB	Finch Creek	0.58	37.1	4.5	0.069*	13/41	28	12	2	P. japonicum, giant hogweed
MCNWCB	Sherwood Creek	1.1	48.8	10	0.28*	17/61	25	14	1	policeman's helmet, knotweed
MCD	Skokomish River	12.4	850	850^		125/130				
MCD	Goldsboroug h/Mill Creek	1.17				23/NA	27	20		knotweed, giant hogweed
MCNWCB	Belfair (Misc. terrestrial/aq uatic)	n/a	5.5	0.35	0.014*	2/2	6	2	2	knotweed
MCNWCB	Stimson Creek	1.5	64	3.4	0.04*	6/6	11	5	0	knotweed
MCNWCB	Coulter Creek	0.4	26.1	4	0.17*	8/8	22	6	10	knotweed
MCNWCB	North Bay	n/a	5	1.9	0.11*	5/5	10	5	5	knotweed
MCNWCB	Oakland Bay	n/a	23	6	0.23*	2/2	5	2	1	knotweed
MCNWCB	Spencer Lake	n/a	13	0.8	0.09*	5/5	8	5	5	
MCNWCB	Shelton (Misc. terrestrial/aquat ic)	n/a	10.8	0.03	n/a	2/2	8	2	2	knotweed
MCNWCB	Hwy 101 (Misc)	n/a	1.4	0.07	0.0069*	3/3	5	2	0	knotweed
	Hwy 106 (Misc.)									
MCNWCB	Hwy 300 (Misc. terrestrial/aquat ic)	0.17	48.1	0.75	0.14*	4/4	3	1	0	knotweed, butterfly bush
MCNWCB	Lake Isabella	n/a	0	0	0	0	5	0	0	

	Watershed/ Waterway	River /Shore Miles	Acres Protected	Acres Treated	Solid Acres	Parcels Treated/ Survey	# of Landowner Permissions	# Landowners Assisted	# New Agreements	Species/misc notes
Mason Co. Totals	3 entities/13 waterways	27.24	1244.83	905.39	2.21		337	163	36	
Grays Harbor County Waterways										
QIN, NCEPMT	Lake Quinault, Lower Quinault River, Tributaries, upland QIR	30.4	200,000	1801.4	100.5	260/260	95	95		knotweed, gorse
Grays Harbor co.	2 entities/1 waterways	30.4	200,000	1801.4	100.5	260/260	95	95		knotweed, gorse
Kitsap County Waterways										
HCSEG	Big Anderson Creek	0.77	13.9	9	1.71	10/18	7	7	0	knotweed
HCSEG	Big Beef Creek	n/a	7.86	0	0	0/4	26	4	26	

*Solid acres calculations made for foliar applications only; injection treatments not included.

^Treated acres not reported; treated acres therefore reported as equivalent to protected acres.

§Incomplete; some data not reported.

AGENCY ACRONYMS USED IN TABLE:

10KI-10,000 Years Institute

CCNWCB-Clallam County Noxious Weed Control Board

DNR-PSC-Clallam based Puget Sound Corps, Mason based Puget Sound Corps

DNR-WCC-Department of Natural Resources Washington Conservation Corps

EJWCC-East Jefferson Washington Conservation Corps

GHNWCB-Grays Harbor Noxious Weed Control Board

HCSEG-Hood Canal Salmon Enhancement Group

LEK-WCC-Lower Elwha Tribe based Washington Conservation Corps

MCD-Mason Conservation District

MCNWCB-Mason County Noxious Weed Control Board

NCEPMT-North Cascades Exotic Plant Management Team

ONP-WCC-Olympic National Park based Washington Conservation Corps

PCSC-Pacific Coast Salmon Coalition

QIN-Quinault Indian Nation

QNR-Quileute Indian Tribe-Natural Resources

TNC-The Nature Conservancy

TERM DEFINITIONS:

Olympic Invasives Working Group Report, 2016

Agency: name of organization that performed the work-may not be the same agency that managed the project

Watershed/Waterway: Riparian area where treatments occurred. Some areas were combined if there was not detailed information broken out.

River/Shore miles: One mile of river-includes both banks, (**not** counted as separate miles like road shoulders). Data was estimated from track logs, measuring in GIS, or other information as available.

Area Protected: Ideally, length of river searched, times average width of the area actually searched. It is an indicator of the area that had to be canvassed while looking for knotweed that was interspersed. CCNWCB used a 50 foot width when there was no information to the contrary. When an entity reported only total acres of a parcel, we assumed a 50 foot width unless there was information to the contrary. Other entities calculated and reported this total differently.

Area Treated: This indicated the area of plants treated without lumping them together. Some entities included anything protected (surveyed), as treated area. Some only reported total parcel area, which may or may not have been surveyed or was only partially treated. Weed boards report treated area as the area encompassed (either estimated by paces, visual or GPS measured) by the farthest extent of the target species. If the infestation is distinctly patchy, the patches are instead summed up within a site and reported.

Solid Acres: Area of treated plants if they are all lumped together. WSDA has directed the Weed Boards to estimate this total based on the average calibrated gallons of mix/acre. For example, if backpack sprayers are calibrated to deliver 43 gallons/acre-this is approximately 1000 sq feet treated/gallon of mix. The formula would then be gallons of mix X 1000 sq feet/43,560 sq feet =solid acres. This was sometimes estimated from the rate and total gallons of herbicide used, and then plugged into the above formula assuming one gallon of mix equaled 1000 square feet treated.

Parcels Treated/Parcels Survey: This information was not uniformly supplied. The intent is to give a sense of how many parcels actually had plants to treat, how many had to be surveyed to find infestations. For weed boards it was calculated from number of distinct parcels where crew recorded GPS waypoints. GPS Track logs can provide a count of the number of parcels surveyed.

Total # of Permissioned Parcels: The total number of parcels encompassed by Land Owner Agreements within a project area. This figure gives a sense of how much area is involved and is connected to how many landowners had to participate.

Landowners Assisted: The number of landowners on whose land you actually worked during the season. Because permissions typically are given for four years, this number may differ from the total number of landowners from whom you have acquired permission. As knotweed projects mature or as time allows, crews may not go to every property for which they have permission.

Species Treated: For the most part, the projects in the table are knotweed focused. However, it is important to start showing the increasing complexity of projects that consider multiple species and the frequency with which they are now occurring around the Peninsula. Early infestations of additional invasives were sometimes treated in the course of treating knotweed. The Puget Sound Corps crews working under the auspices of Clallam be tasked with control of multiple species impacting riparian corridors either during the course of knotweed treatments or otherwise. **Please note** that Clallam County NWCB has only reported additional weed species work that was in the same vicinity or contiguous with knotweed projects.

Appendix I: 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 and Jefferson County

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

Jefferson County

Joost Besjin- Noxious Weed Control Coordinator
360-417-2442
clucero@clallam.co.wa.us

Mason County

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

Grays Harbor County

Nancy Ness- Noxious Weed Control Coordinator
360-482-2265
nancy.ness@wsu.edu

Mason Conservation District

Mitch Redfern
360-427-9436 ext 115
mitch@masoncd.org

Quileute Tribe

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

Makah Tribe

Rob McCoy
360-645-3058
rob.mccoy@makah.com

Lower Elwha Klallam Tribe

Kim Williams
360-457-4012
kim.williams@elwha.org

Jamestown S'Klallam Tribe

Hilton Turnbull
360-681-4603
hturnbull@jamestowntribe.org

Quinault Indian Nation

Caroline Martorano
360-276-8215
CMartorano@quinault.org

North Cascades Exotic Plant Management Team with the National Park Service

Sophie Wilhoit
360-565-3076
sophie_wilhoit@nps.gov

Olympic National Park

Joshua Chenoweth
360-565-3079
joshua_chenoweth@nps.gov

US Forest Service (Olympic Region)

Cheryl Bartlett
360-956-2283
cbartlett@fs.fed.us

10,000 Years Institute

Jill Silver
360-385-0715
jsilver@10000yearsinstitute.org

Hood Canal Coordinating Council

Staff
360-394-0046
rlawlis@hccc.wa.gov

Hood Canal Salmon Enhancement Group

Michelle Myers
360-275-9722 ext. 22
michelle@pnwsalmoncenter.org

Forterra

Kurt Schlimme
206-905-6954
kschlimme@forterra.org

Center for Natural Lands Management

Patrick Dunn
360-956-9713
pdunn@cnlm.org

North Olympic Salmon Coalition

Sarah Doyle
360 379-8051
sdoyle@nosco.org

Pacific Coast Salmon Coalition

Carl Chastain
360-374-8873
pacsac@olympen.com

Appendix II-WSDA Approved Report Form

2016 Washington Conservation Corps Herbicide/Manual Treatment Data Form

Project ID #:

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

Name of Entity/Person for whom Treatment was applied:

Clallam County Weed Board

Street Address: *306996 Hwy 101* City: *Brinnon* State: *WA* Zip: *98320*

Address or Exact Location of Site: *Doseywallips State Park*
PIN#:

General Activity Fields

County (circle one)	WRIA (circle one)	Project Name (from project list)	Owner (circle one)	Workforce**
Clallam <u>Jefferson</u>	Mason 14 15 16 <u>17</u> 18 19	<i>Doseywallips River/state Park</i>	Private Non-Profit <u>Public</u>	<i>WCC</i>

**Workforce: County Name, WCC Crew Name, County Weed Board

Crew Members Present: *Theodore Lasky, Michael Ervin, Briana Spencer, Jamie Becker, Alexis*

Site/Inventory Fields

Start Date	Stop Date	Acres examined for weeds	Treatment Site (circle one)	Total Manual Infested Area Treated: (DO NOT lump plants together)
<i>8/15/16</i>	<i>8/15/16</i>	<i>6</i>	Road edge/ROW <u>Riparian</u> Forest Other	<i>.4</i> ACRES
Weeds Treated (Just the PLANTS code is OK)	Infested Area Treated (DO NOT lump plants together)	% of area examined for weeds infested with this species (lump plants together - use cover classes 1 - 9 listed below)	Manual/Herbicide	
<i>Knotweed</i>	<i>.1</i> acres	<i>2</i>	<i>H</i>	
<i>Tansy ragwort</i>	<i>.2</i> acres	<i>6</i>	<i>M/H</i>	
<i>Herb robert</i>	<i>.1</i> acres	<i>4</i>	<i>M/H</i>	
<i>Reed canarygrass</i>	<i>.2</i> acres	<i>7</i>	<i>H</i>	
<i>Canada thistle</i>	<i>.2</i> acres	<i>5</i>	<i>H</i>	

~~more on reverse~~

7 Cover Classes: 1 = Trace, 2 = 1 - 3%, 3 = 3 - 5%, 4 = 5 - 10%, 5 = 10 - 25%, 6 = 25 - 50%, 7 = 50 - 75%, 8 = 75 - 95%, 9 = 95 - 100%

Note: Cover classes are meant to be approximations only.

Herbicide Application

All Licensed Applicators: Name and License # Theodore Lasky 91829

Firm Name: _____ Phone # _____

Firm Address _____ City: _____ State: _____ Zip: _____

Application Date	Time Start	Time Stop	Temp (F)	Wind Speed (MPH)	Wind Direction	Cloud Cover	Remarks - Weather forecast
8/15/16	1100	1600	72	1-3	NE	0	

Application Area (acres)	Total Volume of Mix Applied (gal)	Diluent	Special comment
1.1	18	Water	

Product Name	EPA Registration #	Amount of herbicide used (oz)	Herbicide Applied/Acre or other measure	Concentration Applied
Polaris	228-534	12	10.9 oz/ac	0.5%
Liberate	34704-04008	12	10.9	0.5%
Blazon	N/A	12	10.9	0.5%

Was this application made as a result of a permit? **Yes No**
 If yes, Permit # _____

WA State NPDES Acres:	Bankfull Acres: FS ONLY	Acres Treated within 150' of Water-FS ONLY

Notes: Weed

	Treated acres	% Cover	m/h
Scotch broom	0.1	2	m/h
Everlasting Peavine	0.1	1	H
Mullein	0.1	2	H

NARRATIVE (SUMMARY)

Example from this year:

Quileute Tribe— “Due to limited time and funding we were only able to re-treat the Dickey and Bogachiel Rivers this year. The Dickey River was re-treated from the east/west for k down to the park boundary. Treatment on the Bogachiel River occurred between the HW 101 Bridge to approximately one mile up river of the HW 110 Bridge. Acres searched on the Bogachiel were calculated using GIS in off channel areas.

Other information (fill in the blanks)

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

2. Any specific success story?

3. Any breakthrough treatment?

4. Progress made?

5. Recommendations for next year?

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

7. What partners did you work with?

8. Where was your funding from?

9. Did you sponsor any educational events?

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