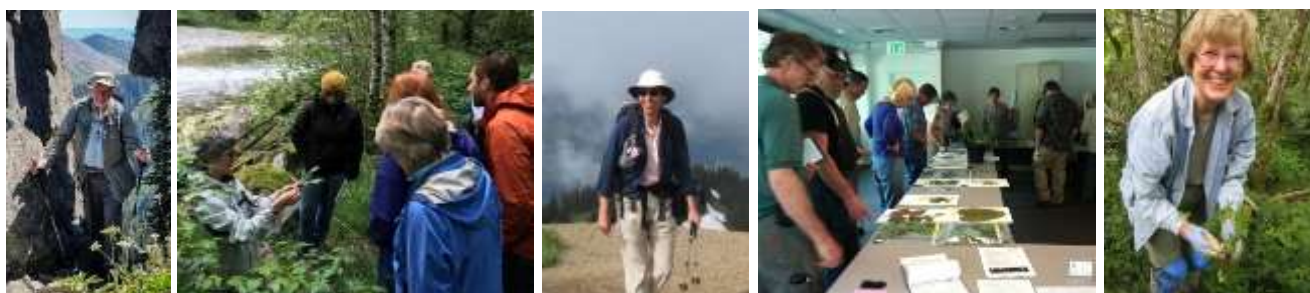




2017 Report of the Pacific Northwest Invasive Plant Council's (PNW IPC) Early Detection Rapid Response (EDRR) Citizen Science Invasive Plant Program Annual report summarizing key accomplishments



Program in Action (Left to Right): Don Hardin, Group hike led by Sasha Shaw, Sandra Vahsholtz, EDRR Training Session in Bellingham WA, and Helen Hepp.

Date: December 22nd, 2017

Written by: Andrew Fraser

PNW Invasive Plant Council

EDRR Program Coordinator

University of Washington, Botanic Gardens

Box 354115

Seattle, WA 98195

Question or Comments pertaining to the PNW IPC EDRR Citizen Science annual report can be sent via e-mail to info@pnw-ipc.org and further information about our program, the EDRR list, and general information about our organization can be found on our website: www.pnw-ipc.org



Mission Statement

To protect the Pacific Northwest's land and waters from ecologically-damaging invasive plants through scientific research, education, policy and an on-the-ground citizen science monitoring and eradication program.

Objectives

Facilitate communication and to promote collection and exchange of information regarding all aspects of invasive plant status, control and management;

Educate and outreach to the general public, land managers and legislators regarding the environmental and economic impacts of invasive plants;

Organize and/or support invasive plant management research and eradication efforts;

Serve in an advisory capacity for the continued needs for funding, research, management and control of invasive plants;

Provide forums where managers, researchers and the general public can share information regarding the impact, control and management of invasive plant species.

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Executive Summary

Invasions of natural ecosystems by nonnative species have been identified by the Chief of the U.S. Department of Agriculture Forest Service as one of the four significant threats to our Nation's forest, grassland and rangeland ecosystems. In 2012, The PNW IPC (Pacific Northwest Invasive Plant Council) developed and implemented an **EDRR (Early Detection Rapid Response) Citizen Science Invasive Plant Program** working in partnership with the WA Department of Agriculture, Washington Invasive Species Council and other local, state and federal agencies, with funding from the National Fish and Wildlife Foundation and the WA Department of Agriculture. Since then, we have partnered with nearly 40 local, state and federal agencies, other non-profits and hundreds of volunteers in an effort to detect and eradicate populations of priority invasive plants from Washington and Oregon State. The PNW IPC EDRR Citizen Science Invasive Plant Program partners with county, state and federal public land managers to educate and train local citizens to identify priority invasive plant species, conduct trail surveys and manually control target species in designated wilderness areas and other public lands in Washington and Oregon.

Programmatic Goals:

- Increase public awareness of invasive plant problems, by involving and training citizens to identify, report and remove invasive plants to support real-time management in WA and OR
- Increase the number of acres surveyed for invasive plants on public lands
- Collect information on changing distributions, abundance, and phenology of invasive plants and distribute information from local (e.g., land managers and county noxious weed controllers) to regional scales (e.g., **EDDMapSWest** an Early Detection & Distribution Mapping system)
- Support county, state and federal agencies efforts to reduce the number of newly emerging plant infestations in WA and OR states, and to reduce the cost and resources spent on invasive plant management
- Decrease threats to biodiversity in the Pacific Northwest

We are very proud of our volunteers and their amazing conservation work! Volunteer participation directly led to the protection of native plant and wildlife habitat and improvement of ecosystem and watershed health. The EDRR program provides meaningful civic engagement and stewardship opportunities for concerned citizens. Programmatic accomplishments have increased dramatically since 2012 as a result of increased outreach efforts, a greater number of training sessions offered and expanding the scope of the geographic survey region. Survey efforts focused on target trails in six national forests (Olympic, Gifford Pinchot, Mt. Hood, Mt. Baker-Snoqualmie, Willamette, and the Okanogan-Wenatchee National Forests), three national parks (Mt. Rainier, Olympic and North Cascades National Park), WA Department of Natural Resources, State and County Parks and other natural areas and other public lands.

In 2017, PNW IPC led 8 free invasive plant trainings to the public. One hundred and sixty-two people attended our training sessions and we recruited 54 new volunteers, bringing the PNW IPC's EDRR volunteer base up to 384 volunteers. A large number (45-50%) of individuals attending a training session were affiliated with county, state and federal agencies who participated in order to "brush up" on their invasive plant identification skills and to learn about relevant issues related to invasive plant management and control. Therefore, training sessions not only served to educate the general public but also served to educate natural resource managers working in invasive plant management. Volunteers contributed 685 hours of service documenting and eradicating populations of invasive plants from national forests, parks, state land and other natural areas in Washington and Oregon states. Volunteers conducted 113 surveys, hiked 373 miles in search of invasive plants while surveying 1,357 acres of public land. Volunteers who focused on eradicating species treated (manual removal and disposal) 620 acres of public land. PNW IPC EDRR volunteers and partner organization, the King County Noxious Weed Program, led 3 group hikes that drew 18 participants who documented and removed priority invasive plants in target conservation areas.

Acknowledgments

First and foremost, the PNW IPC would like to thank the **many volunteer citizen scientists** who have made a significant impact in the effort to locate and eradicate newly emerging populations of EDRR invasive plants in Washington and Oregon State. **We are very proud of you!**

We are extremely grateful for important contributions made by funders that supported the further development and implementation of our program in 2017: the USFS Challenge Cost Share Program and the King County Noxious Weed Program. We especially thank Sasha Shaw (King County Noxious Weed Program) for sharing ideas, EDRR materials and inspiration from the King County Weed Watcher's Program and who came up with the brilliant idea of merging PNW IPC's EDRR citizen science and the King County Weed Watcher's volunteer programs in 2015.

We thank our many partners that have helped make our volunteer EDRR program a huge success (See Table 1 for full list). In particular, we thank individuals who hosted a training session and offered their expert knowledge of invasive plant issues: Carol Chandler, Jennifer DeShong, and Bradley Kriekhaus (Gifford Pinchot National Forest), Sasha Shaw (King County Noxious Weed Control Program), Emily Stevenson (Skamania County Noxious Weed Board), Katie Woolsey (Washington State Department of Natural Resources) Marc Eylar (Kittitas Co. Noxious Weed Board), Bill Wamsley (Lewis County Noxious Weed Control Board), Helen Lau (Okanogan-Wenatchee National Forest), Laurel Baldwin (Whatcom County Noxious Weed Board), Joseph Shea (Skagit Noxious County Weed Board), Janet Coles (Olympic National Park), Jonathane Schmitt (Mt. Baker-Snoqualmie National Forest), David Lebo (Mt. Hood National Forest), Jenny Lippert (Willamette National Forest), Claire Hibler (Northwest Oregon District – Bureau of Land Management) and last but not least Sam Leininger (Clackamas Soil & Water Conservation District & PNW IPC Board). We also offer our thanks to Eve Rickenbaker (Otis Douglas Hyde Herbarium), David Giblin (WTU Herbarium) and Sasha Shaw (King County Noxious Weed Program) for help with tricky plant identification questions.

Section 1: Narrative Summary

Accomplishments and Outcomes 2017

The PNW IPC's action-oriented EDRR Citizen Science Invasive Plant Program aims to increase public awareness of problematic invasive plants and to educate and train volunteers to prevent, detect and control newly emerging invasive plant populations on public lands in Washington and Oregon.

The PNW IPC's EDRR Citizen Science Program has successfully

- 1) Increased public awareness of vital issues related to impacts of invasive species,
- 2) Provided meaningful hands-on experiences for community members to be involved in conservation practices,
- 3) Increased communication and collaboration among private landowners, NGO's, and county, state and federal agencies and
- 4) Trained citizens to survey and monitor thousands of acres (1,357 in 2017) of land, that have led to a measurable decrease (620 acres treated by manual removal in 2017) in the number of newly established populations of invasive plants (Figure 1, Table 3).

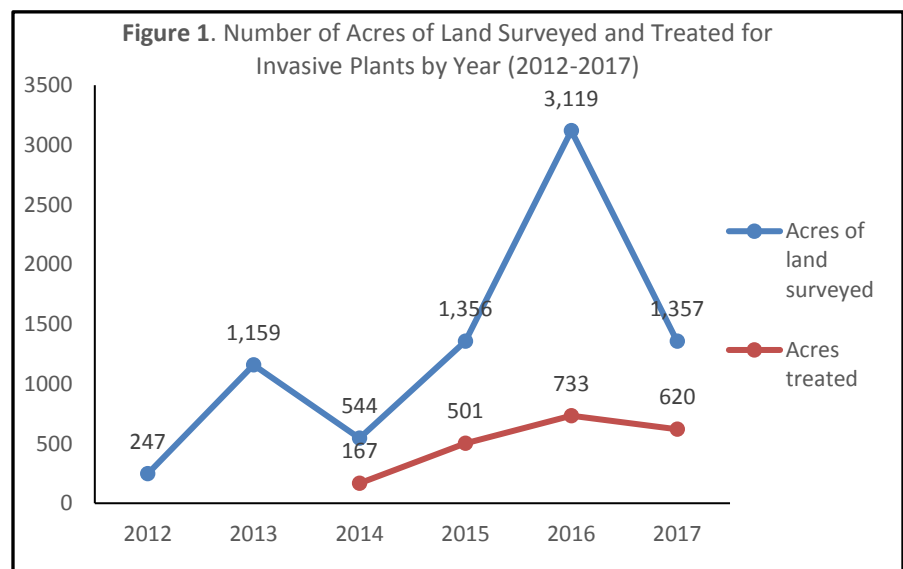
Key long-term benefits of the EDRR Citizen Science Program include:

- 1) Cultivation of lasting stewardship values related to local and national conservation issues,
- 2) Improvement of wildlife habitat as a result removing harmful invasive plants on public lands,
- 3) Protection of ecosystem and watershed health within public lands (e.g., National Forests, National Parks, State and County Lands), and
- 4) Provides a cost effective approach (volunteer driven) to maintain biodiversity and promote ecosystem health.

In 2017, PNW IPC partnered with over 30 organizations (Table 1) and led 8 free invasive plant trainings to the public (Table 2). One hundred and sixty-two people attended our training sessions and 54 signing up as new recruits bringing our volunteer base up to 384 (Table 3). Each year, a large number (45-50%) of individuals attending a training session are affiliated with county, state and federal agencies who participate in order to "brush up" on their invasive plant identification skills and to learn about relevant issues related to invasive plant

management and control. Therefore, the PNW IPC EDRR Citizen Science Invasive Plant training sessions designed to educate the general public, also provided a secondary service of educating natural resource managers and others working in the field of invasive plant management.

EDRR Citizen Science volunteers made significant, measurable impacts in detecting and controlling invasive species in WA over the 2017 field season (Figure 1; Table 3) and our program outcomes have increased



dramatically in key performance categories from year to year (See Figure 1, Table 3). The program has steadily grown as a result of increased outreach efforts and training sessions, the formation of new partnerships (e.g., EDDMapSWest, King County Noxious Weed Program), and expanding the geographic scope of our survey area.

In 2017, EDRR Citizen Scientists focused their survey efforts on target trails identified by land managers in **five National Forests** (Olympic, Gifford Pinchot, Mt. Hood, Mt. Baker-Snoqualmie, and the Willamette National Forests), **two National Parks** (Mt. Rainier and Olympic), **WA Department of Natural Resources** Natural and Conservation Areas and other public lands (e.g., **State and County Parks**) in Washington and Oregon State. The majority of volunteers conducted surveys on National Forest (34%) and National Park (37%) land while WA DNR State Lands and State Parks accounted for 24% of acreage surveyed. **Figure 2** illustrates the percent of total acres covered according to land ownership. The pathway for data flows from our volunteers directly to PNW IPC who verifies reports and sends the findings immediately to land managers in need of the data (Figure 3).

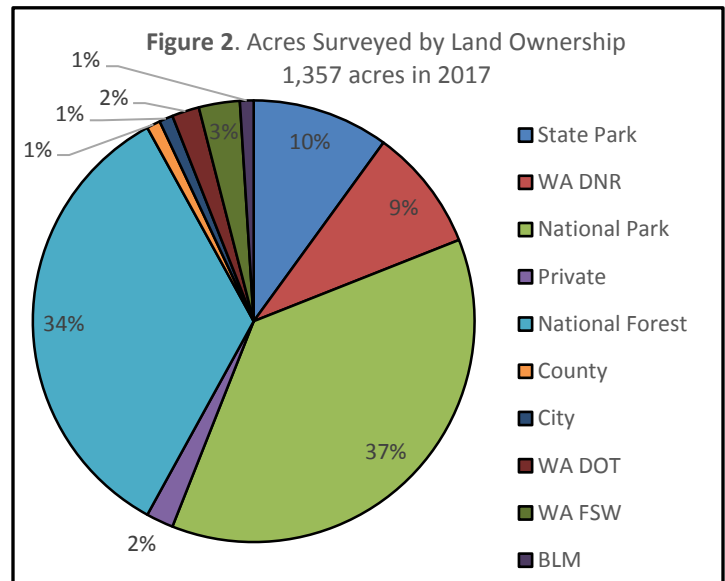
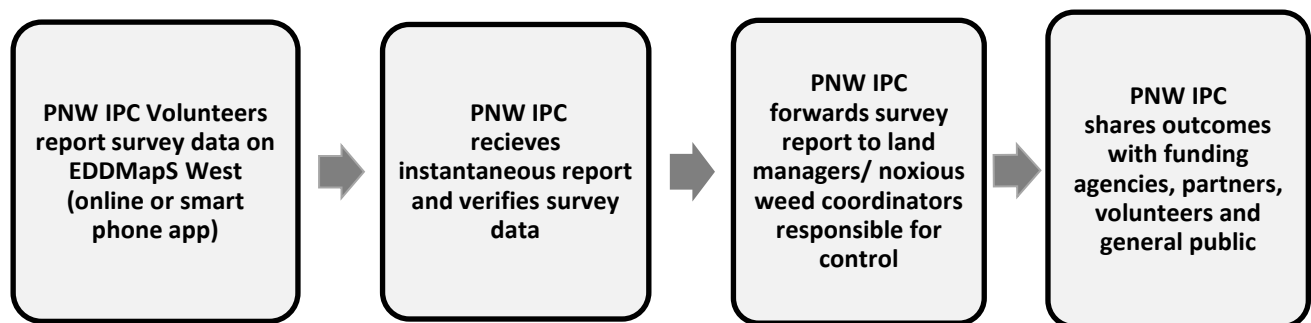
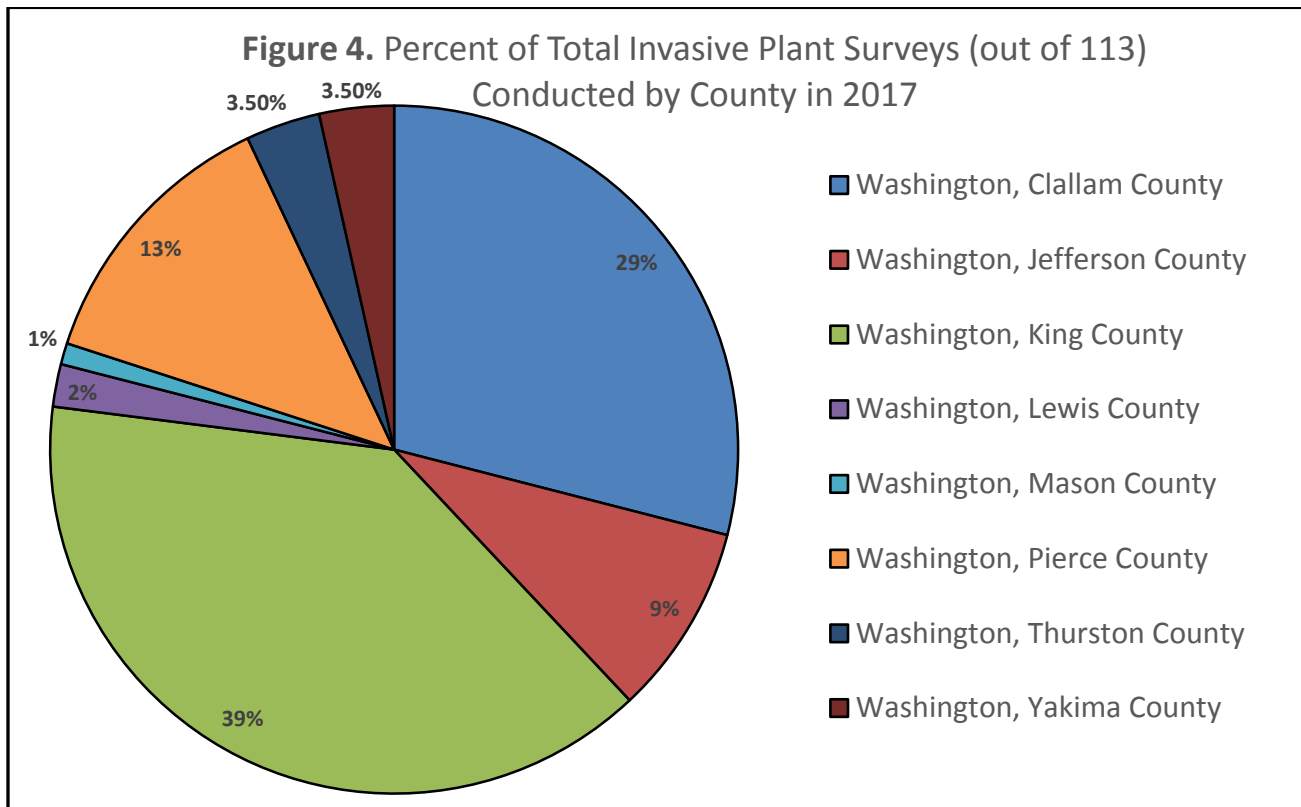


Figure 3. PNW IPC’s pathway for distribution of invasive plant data



PNW IPC Citizen Scientists engaged in significant conservation work contributing 685 hours of service in the effort to document and eradicate invasive plant species from national forests and other public lands in Washington State in 2017 (Table 3). Volunteers conducted a total of 113 surveys, hiked 373 miles in search of invasive plants while surveying 1,357 acres of public land within 8 counties (Figure 4) located in Washington. Similar to last year, King, Clallam and Pierce counties received the highest number of surveys (39%, 29% and 13%, respectively). Data from both positive survey reports (at least one EDRR invasive plant species documented) and negative survey reports (no EDRR invasive plants found) are submitted to land managers. Negative survey reports are considered just as valuable as positive survey reports because managers need to know where invasive species do not occur as well as where invasive species occur in order to guide volunteer survey efforts and management priorities. In many cases, documented infestations were small enough that volunteers were able to manually remove them *in situ* before infestations had a chance to establish and spread. Plant material was carefully bagged and deposited off-site in the city landfill so as not to promote spread. If

infestations were too large or were not appropriate candidates for immediate removal (e.g., plants that are toxic or grow by extensive rhizomes) volunteers performed the survey step and left removal efforts to land managers.



In 2017, PNW IPC EDRR citizen scientist Ann Stevens and partner organization, the King County Noxious Weed Program, led a total of 3 group hikes that drew 18 participants who participated in documenting and removing priority invasive plants in target conservation areas (Table 4). Participants of group hikes included the general public, PNW IPC volunteers and King County Weed Watchers, county and state management agencies.



Images from Left to Right: **Sasha Shaw, King County Noxious Weed Program’s Education Specialist**, holds up a rosette of orange hawkweed (*Hieracium aurantiacum*; Class B Noxious Weed) to show volunteers diagnostic characters (Photo Joe Neumann); **Volunteers** kneel down to examine an infestation of orange hawkweed in King County (Photo Sasha Shaw); **A volunteer** overlooks Pine Lake in the Olympic National Forest in Mason County on a group hike led by PNW IPC volunteer Dan Locke (Photo Dan Locke); **and meadow knapweed** (*Centaurea x moncktonii*; Class B Noxious Weed) found at the Bud Blancher Trailhead on a group hike led by PNW IPC volunteer Crow Vecchio (Photo Crow Vecchio).

EDRR Trainings: Setting Volunteers up for Success

In 2017, the PNW IPC led 8 free trainings session to the public (Table 2). Partner agencies (e.g., County Noxious Weed Coordinators, National Park and Forest Service) co-hosted and participated in training sessions and provided key information regarding local knowledge of problematic species creating a dynamic and interactive discussion of invasive plant issues with participants.

Training sessions are modified each year based on feedback from attendees, PNW IPC volunteers and partner organizations. In 2017, PNW IPC continued to work with partners to create specialized EDRR invasive plant lists to reflect differences in noxious weed distributions and control priorities at local scales. Each partner was asked to pick their top priority species to update the 2016 lists. As before this turned out to be a very difficult task with individual partners suggesting differing priorities for their own area. Appendix A shows the full list (50 species) of noxious weeds species covered in our 2017 training sessions. In each training session, we focused on how to identify, how to report, how to manually remove and examine the species impacts for 19-23 noxious weeds chosen by partners from the master list of 50 species.

Training sessions consisted of 2.5 hour classroom training session that included a PowerPoint Presentation, live plant material in pots and herbarium specimens for participants to examine in order to increase their plant identification skills. In 2017, in partnership with King County Noxious Weed Control, an optional extra 1.5 “weed walk” was offered after the main training session to help build volunteers’ confidence in field surveying and plant identification. A smaller mini walk was implemented as well at the Stevenson, WA training hosted by the Gifford Pinchot National Forest. Weed walks occurred around the training venue taking advantage of adjacent nature spaces and trails.

The PNW IPC developed plant identification booklets for volunteers in order to aid in field identification of plants while conducting a survey. Many of our volunteers were new to plant identification and survey protocol. Trainings were designed to educate a learning botanist as well as participants with extensive plant knowledge. Participants not only learned how to identify priority plants and the surveys survey protocol (see Appendix B for survey form) but they also learned how invasive plants negatively impact the environment and economies as well how to safely eradicate infestations. In our trainings sessions, we also emphasize that when above-ground biomass is removed it is imperative that sites are monitored for years to come to ensure that below-ground biomass and potential seed banks are depleted.

In 2015, we partnered with EDDMapSWest and moved to an on-line reporting system and continued with reporting on EDDMapSWest through 2017. Following training sessions, volunteers had access to the PNW IPC website (<http://www.pnw-ipc.org/edrrlocal.shtml>) which posted resources such as: the priority species list, survey forms, a tutorial of EDDMapSWest reporting, our training PowerPoint, a PDF of the identification booklet, and a list of specific trails in need of a survey in national forests and other public lands. Throughout the season, the PNW IPC assisted volunteers with tricky plant identification and survey protocol question as well has verified reports in a timely manner in order send report outcomes to land managers in need of the data.



Images from Left to Right: Andrew Fraser, leads an EDRR training session in Bellingham, WA at the Whatcom County Noxious Weed Program building (photo: Laurel Baldwin); Training Participants examine live material and herbarium specimens in Bellingham training session; Training Participants study and test their plant ID skills with live samples at an invasive plant training in Seattle, WA located at the Center for Urban Horticulture (photo: Sasha Shaw); Herbarium sheets used as educational tools were generously loaned from the Otis Douglas Hyde Herbarium (University of Washington Botanic Gardens).

Citizens Who Hiked the Extra Mile

We congratulate each and every volunteer who has hiked a trail and turned in a survey report. **Your efforts have made a difference in the protection and preservation of native ecosystems!** In our trainings we ask that individuals who sign up, to conduct at least 1-2 surveys a season. We have a small cadre of enthusiastic volunteers who have **gone above and beyond** what we have asked, dedicating much of their time to documenting and eradicating populations of invasive plants from natural areas in WA and OR. **We would like to give a very special thanks** (in no particular order) to: Ann Stevens, Sandra Vahsholtz, Crow Vecchio, Monty Vanderbilt. Our program is a huge success because of your efforts. You have all hiked the extra mile and we thank you!

The “Sarah Reichard Hike the Extra Mile Award”

In August of 2016, PNW IPC’s Vice President, Dr. Sarah Reichard, passed away while leading a UW Botanic Gardens floristic tour in South Africa, she was 58 years old. Dr. Reichard (**Image to the right: photo by Wendy Gibble**) was instrumental in forming the PNW IPC. She was a tenured professor at the University of Washington in the School of Environmental and Forest Sciences (SEFS), the Director of the UW Botanic Gardens, has mentored hundreds of eager students over the years and has served on countless boards, working groups and advisory committees related to important issues in the realm of invasive plant ecology, management, policy, and education. Her research focused on understanding the biology of invasive plants and using that understanding to develop risk assessment methods to prevent their introduction and spread. She was a passionate scientist who paved the way and created opportunities for woman in science and worked diligently to solve complex problems in the important interdisciplinary field of Conservation Biology. **The creation of this memorial fund was suggested by a PNW IPC EDRR citizen scientist** who made the first contribution to kick-start the “Sarah Reichard Hike the Extra Mile the Award”. The PNW IPC Board enthusiastically embraced this idea. In 2017, the PNW IPC honors three outstanding volunteers: Sandra Vahsholtz, Ann Stevens, and Crow Vecchio who will receive gift cards to acknowledge their outstanding work.



Images from Left to Right: Sandra Vahsholtz surveying a trail in the Olympic National Park, Ann Stevens removing English holly in King County, and Crow Vecchio takes a break from removing invasive plants in Mt.



Rainier National Park. Collectively, these three conservation warriors **conducted 103 surveys, reported 467 new invasive plant records, hiked 363 miles of trail and volunteered 617 hours** of their time searching for, reporting and removing harmful invasive plants from wilderness and other natural areas!

Partnerships Are Key to Programmatic Success

In 2017, PNW IPC partnered with over 30 organizations (Table 1). All partnerships contributed to a successful program but there were two notable partnerships formed in 2015, that continued into 2017. The Upper Snoqualmie-Alpine Lakes Invasive Plant Project is a partnership between King County's Noxious Weed Program, the U.S. Forest Service, Washington State DNR and the Mountains to Sound Greenway Trust. In 2015, PNW IPC joined this partnership and participated in organizing and conducting trainings, data management and reporting of surveys conducted in King County to land managers and King County Noxious Weed partners. The PNW IPC also supported volunteers throughout the season (e.g., provided target trails to survey, help trouble shoot on-line reporting via EDDMapSWest).

EDDMapsWest (our online reporting and mapping platform) developed a survey form specifically for the PNW IPC EDRR program. The partnership between PNW IPC and EDDMapSWest significantly increased the efficiency of reporting and data dissemination to land management partners.

EDDMapSWest is a national Early Detection & Distribution Mapping System and provided instantaneous reporting to PNW IPC and state and county weed coordinators. Volunteers who used online reporting could report either a positive (priority species found) or a negative (no priority species found) report. Positive reports included a record of species occurrence(s), images and other important key information to aid land managers in finding reported infestations (See Appendix B for reporting form).

Once reports were uploaded on EDDMapSWest the PNW IPC would receive an instantaneous message to review incoming reports. The PNW IPC would then review report

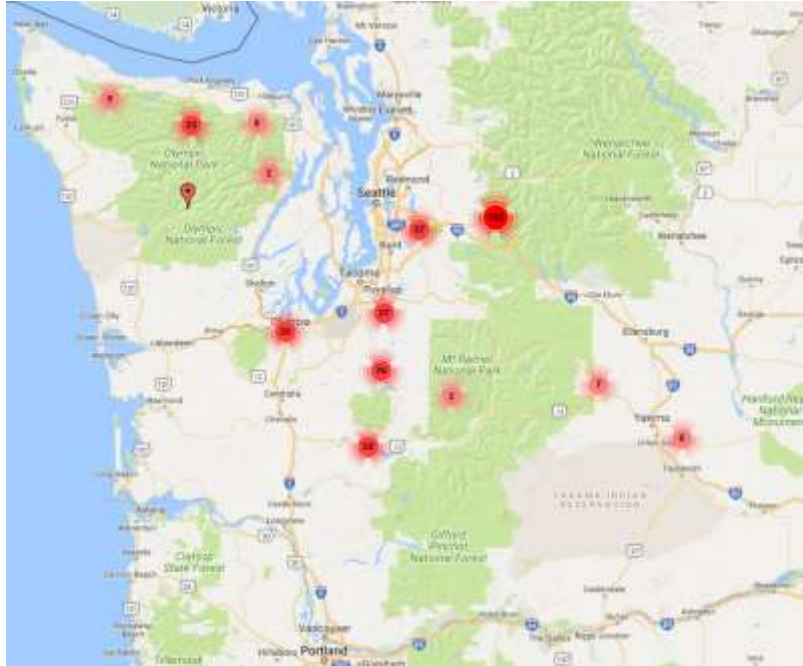


Figure 5. Geographic locations and the number of new invasive plants records volunteers reported in 2017.

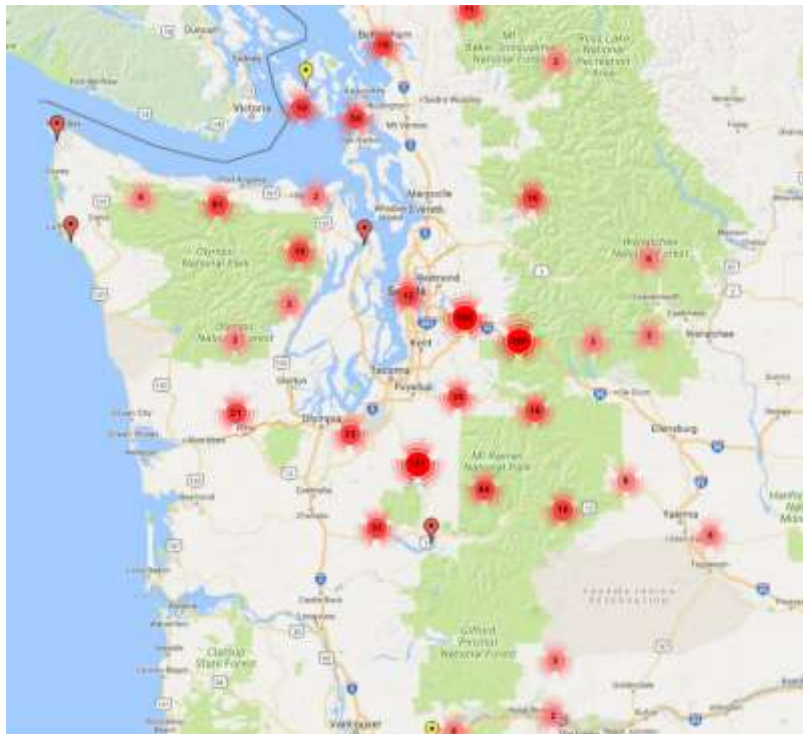


Figure 6. Geographic locations and the number of new invasive plants records volunteers reported between 2015-2017.

details and once the plant identification was verified land managers were forwarded the information in a timely manner (Figure 3).

The map in Figures 5 and 6 was generated by EDDMapSWest and can be accessed (along with plant location data) at <https://www.eddmaps.org/tools/query/> by selecting “PNW IPC survey” under project information at bottom of page. **NOTE:** Locations of negative survey reports from are not included on the map.

Figure 7 (right) shows a screen shot of the PNW IPC logo (circled in red on the EDDMapSWest reporting portal). Volunteers go the EDDMapSWest site: <https://www.eddmaps.org/west/report/> to report a negative (no invasive plants found) or a positive report (invasive plant(s) found). Volunteers, land managers, researchers and the general public can generate distribution maps using EDDMapSWest and import distribution data for species of interest.

Figure 7. Screen shot of EDDMapSWest showing PNW IPC’s logo showing entry point to specialized survey form



Information Sharing, Outreach and Outlets for Programmatic Findings

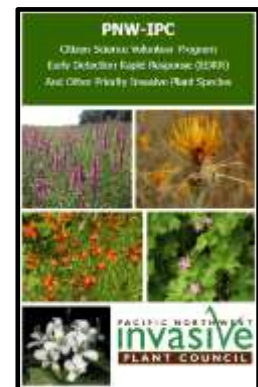
Annual Report

- The PNW IPC shares an annual report with partners, funders, volunteers and the general public sent out via e-mail and posted on the PNW IPC’s website: <http://www.pnw-ipc.org/>

Please pardon our current website, we are in the process of redesigning the website and we hope to have this completed before the 2018 training season!

Plant Identification Booklet

- The PNW IPC developed and distributed a specialized plant identification booklet with target species to all volunteers who sign up to volunteer (Cover Image of booklet on right). PDF: http://www.pnw-ipc.org/docs/2016_ID_Booklet_PNW_IPC.pdf



Raw data of invasive plants documented

- All data can be downloaded from the EDDMapSWest website at: <https://www.eddmaps.org/tools/query/> by selecting “PNW-IPC survey” under project information at bottom of page. The database shows all information related to the survey records (e.g., plant name, location, county occurrence, reporter, land ownership etc.) and can be downloaded in several formats (CSV, KML, GPX, Shapefile).

PNW IPC’s “Invasive Plant Mentors”

- PNW IPC initiated the “Invasive Plant Mentor” group hikes initiative. These are group hikes led by PNW IPC Citizen Scientists who have an excellent working knowledge of plant identification and reporting skills and organize and lead hikes for fellow volunteers interested in increasing their plant ID and reporting skills.

Conferences

- Andrew Fraser presented at the Salmon Recovery Conference in Wenatchee, WA, “***Connecting Citizens with Science: PNW-IPC’s EDRR Volunteer Program***”, April 25th, 2017.
- Andrew Fraser presented at the Innovations in Invasive Species Management Conference, Nashville, TN, Dec 13th-15th. “***PNW-IPC’s EDRR Citizen Science Invasive Plant Program***”, December 15, 2017.

New Partnership in 2017

- In 2017, PNW IPC expanded survey areas to include trails in the **Willamette National Forest**.

Section 2: Challenges, Lessons Learned and Next Steps

Unique 2017 Challenge

The main challenge for EDRR program in 2017 was staff turnover at the PNW-IPC at the start of the year and the resulting learning curve and communication breakdowns as the new Program Coordinator learned the position. At the start of the year, Julie Combs, the previous EDRR Coordinator for the PNW-IPC departed and wasn’t replaced until mid-spring leading to delays in the arrangement of the 2017 workshop schedule. Additional program issues occurred over the 2017 survey season as Andrew Fraser, the new EDRR Program Coordinator, learned more of the duty responsibilities and dealt with internet connectivity issues due to his duty station for another job. These communication challenges resulted in delays in verifying reports and email correspondence between the program, partners, and volunteers caused difficulties for land managers to treat new populations in a timely manner. Since the fall however, communication has improved, with reports being verified in a timely manner and normal communication resumed between the PNW-IPC, its partners, and volunteers. Details and plans for the 2018 season have already begun to ensure a successful survey season and resume work on program projects that were sidelined due to the staff change.

Continued Program Challenges

Survey data from 2015 showed that the primary factors that deter volunteers (besides lack of time) from participating are: lack of confidence with plant identification skills, lack of confidence with filling out field survey or on-line reporting forms or they would like to hike with someone but can’t find a hiking partner. In 2016, PNW IPC made efforts to address some of these issues by:

- reducing the number of plants covered in the training sessions so participants are not overwhelmed
- reducing the number of fields in the data forms without compromising critical data fields
- dedicating more time in training session on reporting protocol and plant ID
- offering group hikes to help reinforce plant ID skills and reporting protocol
- setting up a PNW IPC Facebook account to help connect volunteers with each other and share findings
- sending out bi-weekly emails showcasing hikes in need of a survey

Discussions with program partners in 2017 revealed continued concerns about volunteer confidence and engagement. To address the issue, a new pilot program with an optional post workshop practice survey hike was implemented based off a suggestion from program partner Sasha Shaw of the King County Noxious Weed Control Board. The goal of these post workshop hikes was to provide lesson reinforcement for the material covered in the workshops and help build volunteer confidence in plant ID and filling out the survey forms. These mini hikes were not feasible at all of the training locations but the optional hikes

were organized for the June 6th North Bend, WA and June 23rd Seattle, WA trainings and a spontaneous third mini hike occurred after the June 27th training at Stevenson, WA. Not all of the participants from the main training workshops stayed for the hikes. Those that did attend the hikes voiced appreciation and increased confidence about surveying and plant identification after the hikes.

Moving Forward

For the 2018 survey season, the PNW-IPC is addressing the needs of volunteer training and recruitment through several methods. The first approach is an increase in Group Hikes. In previous years, the PNW-IPC along with program partners King County Weed Watchers, has organized 5-7 group hikes. In 2017, all three group hikes were arranged by the Weed Watchers. For 2018, the PNW-IPC is working to arrange a minimum of 1-2 group hikes per month for each workshop area. The goal is to have the group hikes the same week or as soon as possible after the workshop to help convert workshop participants into active volunteers and build their confidence in plant ID and using the EDDMapS survey system. Discussions with the King County Weed Watchers program about target areas for the two programs for hikes has already begun in order to maximize resources and show a unified message to volunteers.

With normal communication restored for 2018, bi-weekly emails showcasing hikes in need of survey along with plant highlights focusing on a different EDRR species will be sent out during the survey season to encourage volunteers to survey and continued learning on their part.

Workshop Lesson Plan

The current workshop lesson plans may also be overhauled to facilitate workshop attendees learning and encourage their conversion into EDRR volunteers. The current workshops can be overwhelming to volunteers due to large amount of material covered from program history, how to use the EDDMapS system to survey, and EDRR species identification. The existing material will be reorganized to present a more fluid and streamlined structure with the program history section shortened and the number of priority EDRR species covered in each workshop reduced to provide time to focus on each individual species covered to improve volunteer confidence in identifying the species.

The survey section presents an ongoing challenge due to the two difficulties of volunteer confidence of surveying in the field and using an online system to report the data. Potential volunteers come from a wide variety of backgrounds and experiences in plant surveying and computer expertise. One potential solution of this would be to create a fake survey program using cones with pictures or examples of various invasive species as part of the workshop and have potential volunteers conduct a mock survey, filling out a paper survey form. Should the workshop facilities permit it due to either wifi or computer access, this would then be an ideal time to walk them through actually submitting data through the EDDMapS system to reinforce the directions covered earlier in class. A continuation of the optional mini hikes after the trainings should also be continued where feasible with workshop partners

Volunteer Database

The development of a PNW-IPC volunteer database is integral for the future development of the PNW-IPC EDRR program. Currently no such database exists creating challenges for program continuity as staff transition and uncertainty as to who are active or nonnative volunteers, key volunteers, interested parties, and how to best contact them. The development of such a database will ease communications between the PNW-IPC program and volunteers and allow the PNW-IPC to better support and direct volunteer efforts and foster further growth and education for the volunteers.

Website Update

As part of the staff turnover in 2017, the PNW-IPC lost its website admin. This led to assessment of the website and consideration of the needs of the PNW-IPC and the EDRR Program moving into the future. The existing

website was found to be of an outdated design, difficult to update, and in need of updated material. Currently the PNW-IPC is developing ideas and content for the website with the goal of having a new website functioning before the 2018 season.

Smartphone App Update

In 2016, the development of a field reporting smartphone app was identified as an important next step to facilitate field reporting of data and likely to increase participation rate. Due to staff changes at the PNW-IPC, this update was not feasible during the 2017 so the goal is to achieve this update in 2018.

Currently volunteers report the survey data in one of two ways. The most frequently used approach is for volunteers to fill out a paper survey form in the field, taking a photo of the plant(s) and uploading data from a home computer to the EDDMapSWest website. The second approach entails using the EDDMapSWest smartphone APP in the field which easily takes a picture of the plant, records the location while the user is in the field but then volunteers have to return to their home computer to upload the smartphone app information to their PNW IPC EDDMapSWest account. This is a cumbersome process because it essentially requires users to complete two steps in the reporting process. As such, in 2017 only 2 reports came in using the smartphone app. If the PNW-IPC wishes to increase smartphone submissions, a more smooth and streamlined system is required.

The majority of the data PNW-IPC receives, comes from volunteers who are planning to go surveying while hiking or kayaking. The current phone app reporting system discourages new or less confident/dedicated volunteers from reporting. Relatively few people plan to go surveying for EDRR species every time they are recreating outside. By developing a streamline reporting app, trained members of the public who may not otherwise volunteer can use their phones to report EDRR instances when they happen to run across them. This will ideally increase volunteer numbers and help locate EDRR population even sooner.

PNW IPC is currently sourcing funds to work with EDDMapSWest to develop a specialized portal on the current EDDMapSWest smartphone app so users can report in one step and data would be instantaneously sent to PNW IPC for verification and subsequent dissemination to the appropriate land manager(s).

The PNW-IPC is also looking at the possibility of developing a joint smartphone app with the Washington Invasive Species Council (WISC). WISC also partnered with EDDMapSWest to develop a smartphone app to report EDRR species in Washington. As both programs use the same online database to report data, there is rational for fusing the two apps so volunteers in Washington have strong simple message in what app to use to report EDRR and invasive species.

Section 3: PNW IPC's Board Members and EDRR Program Officer

2017 Board Members and EDRR Citizen Science Program Officer

- **President - Steven Manning** - Invasive Plant Control Inc.
- **Treasurer - Lizbeth Seebacher**, - Washington Department of Ecology
- **Secretary - Mandy Tu**, - Hoyt Arboretum (City of Portland Parks & Recreation)
- **Shawna Bautista** - USDA Forest Service
- **Tim Harrington**, - USDA Forest Service
- **Sam Leininger** - Clackamas Soil and Water Conservation District's WeedWise program
- **Bill Brookreson** - Washington Native Plant Society
- **Greg Haubrich** – WA State Dept of Agriculture
- **David Stokes** – University of Washington
- **Dona Pearce** – The Uprooter
- **Special Program Officer – Andrew Fraser**, EDRR Program Coordinator

Table 1. 2017 Funding agencies, funding sources and partners organizations.

Funding Agencies and Funding Sources	
USFS Challenge Cost Share Program	Patagonia bag fees
	King County Noxious Weed Program and King County Weed Watchers Program
	PNW IPC Members and Individual Donations
PNW IPC Partners	
Federal Partners	
Gifford Pinchot National Forest	Mt. Rainier National Park
Mt. Baker-Snoqualmie National Forest	North Cascades National Park
Mt. Hood National Forest	Olympic National Park
Okanogan-Wenatchee National Forest	National Fish and Wildlife Foundation
Olympic National Forest	National Forest Foundation
Willamette National Forest	
State Partners	
Central Washington University	Washington State Department of Agriculture
Oregon State Department of Agriculture	Washington State Department of Natural Resources
Oregon Invasive Species Council	Washington State Noxious Weed Control Board
University of Washington, Botanic Gardens/Otis Hyde Herbarium, Burke Museum and WTU Herbarium	Washington State Parks and Recreation
Washington Invasive Species Council	
County/Municipal Partners	
Clackamas County Soil and Water Conservation District	Klickitat County Noxious Weed Board
Columbia River Gorge Cooperative Weed Management Area	Lewis County Noxious Weed Board
Clallam County Noxious Weed Board	Pierce County Noxious Weed Board
Cowlitz County Noxious Weed Board	Skamania County Noxious Weed Board
Four County Cooperative Weed Management Area	Thurston County Noxious Weed Board
Grays Harbor Noxious Weed Board	Whatcom County Noxious Weed Board
Jefferson County Noxious Weed Board	Yakima County Noxious Weed Board
King County Noxious Weed Control Program	Northwest Trek Wildlife Park Metro Parks Tacoma
Kittitas County Noxious Weed Board	
NGO's and other organizations	
EDDMapSWest	Patagonia
Great Old Broads for Wilderness	PlayCleanGO
Invasive Plant Control	The Mountaineers
Mountain To Sound Greenway	Washington Native Plant Society
Mt. St. Helens Institute	Washington Rare Plant Care and Conservation
Oregon Native Plant Society	

Table 2. Invasive plant training session date, partner who hosted the training, the number of participants and the number of volunteers recruited at trainings in 2017.

Date	Training Co-Sponsor (Program Partner)	Training Location	No. Attendees/ No. volunteer recruits
June 3, 2017	Sasha Shaw, King Co. Noxious Weed Program; Jonathane Schmitt, Mt. Baker-Snoqualmie National Forest	North Bend Ranger Station, North Bend, WA	10/1
June 9, 2017	Laurel Baldwin, Whatcom Co. Noxious Weed Program; Joseph Shea, Skagit Co. Noxious Weed Program	Whatcom Co. Noxious Weed Control Board, Bellingham, WA	41/18
June 12, 2017	Jenny Lippert, Willamette National Forest; Claire Hibler, Northwest Oregon District - BLM	Willamette National Forest, Springfield, OR	18/10
June 23, 2017	Sasha Shaw, King Co. Noxious Weed Program; Katie Woolsey, WA Department of Natural Resources	Center for Urban Horticulture, Seattle, WA	17/7
June 27, 2017	David Lebo, Mt. Hood National Forest; Sam Leininger, Clackamas County Soil & Water Conservation District	Mt. Hood National Forest HQ, Sandy, OR	25/9
June 28, 2017	Jennifer DeShong and Carol Chandler, Gifford Pinchot National Forest; Emily Stevenson, Skamania Co. Noxious Weed Program	Wind River Training Center, Carson, WA	17/3
June 29, 2017	Bradly Kriekhaus and Carol Changler, Gifford Pinchot National Forest; Bill Wamsley, Lewis Co. Noxious Weed Program	Lewis County Courthouse Campus, Chehalis, WA	23/5
June 30, 2017	Helen Lau, Okanogan-Wenatchee National Forest; Marc Eylar, Kittitas Co. Noxious Weed Program	Okanogan-Wenatchee National Forest, Cle Elum District, Cle Elum, WA	11/1

Table 3. Project Accomplishments and outcomes by year and combined results of 2014-2017. Years 2014-2016 are shown to show program development over the years. Table does not include program data from 2012-2013.

Unit & Description	2014	2015	2016	2017	Total (2014-2017)
No. of free trainings offered to public*	5	10	10	8	32
No. of people who attended trainings	72	297	322	162	853
No. of new volunteers recruited from trainings	33	120	105	54	312
No. of volunteer hours	678	1,953	1,787	685	4,418
No. of partnering organizations	18	25	30	30	73
No. of surveys conducted	52	140	204	113	509
No. of positive surveys (Invasive plants found)	34	81	137	84	336
No. of negative surveys (Invasive plants not found)	18	59	67	29	173
No. of new invasive plant records**	55	252	421	509	1237
No. of organized group hikes	3	18	7	3	31
No. people involved in organized group hikes	10	74	44	18	146
Miles of trail surveyed for invasive plants	188	445	642	373	1,648
Acres of land surveyed for invasive plants	544	1,356	3,119	1,357	6,376
Acres treated for invasive plants	167	501	733	620	2,021
<p>*See Table 2 for locations and training schedule **See Figure 5 for map of 2017 <i>positive record</i> locations and Figure 6 for map of records 2015-2017. Note: Records vs. Survey: <i>Records</i> refer to the total number of individual invasive occurrences across all positive survey reports. In contrast, a positive <i>survey</i> report refers to a survey that documented at least one invasive plant occurrence.</p>					

Table 4. 2017 Group hike locations and outcomes led by King County Noxious Weed Program and PNW IPC EDRR volunteers. A total of 18 volunteers participated in 3 group hikes offered.

Land Ownership and Location	Date	Number Volunteers	Outcomes
Mount Baker Snoqualmie National Forest (Middle Fork Trail)	June 11	7	Sasha Shaw and Ali Flisek of King County Noxious Weed Program worked with volunteers to pull 6 bags of Herb Robert from trailhead, picnic area, and along the trail. Volunteers also found a small patch of meadow hawkweed in the parking lot.
Washington State (Iron Horse State Park)	June 14	9	Sasha Shaw and Ann Stevens led volunteers to collect and bag Tansy Ragwort and Herb Robert along the John Wayne Trail
Mt. Baker-Snoqualmie National Forest and Washington DNR (CCC Road-Trail)	July 7	2	Sasha Shaw led volunteers to survey and pull mature Tansy Ragwort along the trail and surveyed a clump of English Holly

Appendix A. 2017 Comprehensive EDRR species list. A subset (19-23) species were covered at each training session depending on regional and local priorities identified by training session program partners.

Plant Family	Scientific Name	Common Name	WA Noxious Weed Class	OR Noxious Weed Class
Wetland Emergent Plants				
Iridaceae	<i>Iris pseudacorus</i>	yellowflag iris	C	B
Lythraceae	<i>Lythrum salicaria</i>	purple loosestrife	B	B
Terrestrial Plants				
Anthriscus	<i>Anthriscus sylvestris</i>	wild chervil/cow parsley	B	Not listed
Apiaceae	<i>Heracleum mantegazzianum</i>	giant hogweed	A	A
Apiaceae	<i>Conium maculatum</i>	poison hemlock	B	B
Aquifoliaceae	<i>Ilex aquifolium</i>	English holly	Monitor	Not listed
Araliaceae	<i>Hedera helix</i>	English ivy	C	B
Asteraceae	<i>Carduus nutans</i>	musk thistle	B	B
Asteraceae	<i>Carthamus lanatus</i>	Woolly Distaff Thistle	Not listed	A
Asteraceae	<i>Centaurea diffusa</i>	diffuse knapweed	B	B
Asteraceae	<i>Centaurea x moncktonii</i>	meadow knapweed	B	B
Asteraceae	<i>Centaurea stoebe</i>	spotted knapweed	B	B
Asteraceae	<i>Centaurea solstitialis</i>	yellow starthistle	B	B
Asteraceae	<i>Chondrilla juncea</i>	rush skeletonweed	B	B
Asteraceae	<i>Hieracium aurantiacum</i>	orange hawkweed	B	A
Asteraceae	<i>Hieracium caespitosum</i>	yellow/meadow hawkweed	B	B
Asteraceae	<i>Hieracium pilosella</i>	mouse-ear hawkweed	B	A
Asteraceae	<i>Hieracium lachenalii</i>	common hawkweed	B	Not listed
Asteraceae	<i>Senecio jacobaea</i>	tansy ragwort	B	B
Balsaminaceae	<i>Impatiens capensis</i>	spotted jewelweed	C	Not listed
Balsaminaceae	<i>Impatiens glandulifera</i>	Policeman's helmet	B	B
Boraginaceae	<i>Anchusa arvensis</i>	annual bugloss	B	Not listed
Boraginaceae	<i>Cynoglossum officinale</i>	houndstongue	B	B
Brassicaceae	<i>Alliaria petiolata</i>	garlic mustard	A	B
Buddlejaceae	<i>Buddleja davidii</i>	butterfly bush	B	B
Ericaceae	<i>Erica lusitanica</i>	Spanish heath	Not listed	B
Euphorbiaceae	<i>Euphorbia esula</i>	leafy spurge	B	B
Fabaceae	<i>Cytisus scoparius</i>	Scotch broom	B	B
Fabaceae	<i>Cytisus striatus</i>	Portuguese Broom	Not listed	B
Geraniaceae	<i>Geranium lucidum</i>	shiny geranium	B	B
Geraniaceae	<i>Geranium robertianum</i>	herb Robert, stinky Bob	B	B
Lamiaceae	<i>Lamium galeobdolon</i>	yellow archangel	B	B
Malvaceae	<i>Abutilon theophrasti</i>	Velvetleaf	B	B
Nyctaginaceae	<i>Mirabilis nyctaginea</i>	wild four o'clock	A	Not listed
Poaceae	<i>Spartina alterniflora</i>	smooth cordgrass	A	A

Appendix A continued. 2017 Comprehensive EDRR species list. A subset (19-23) species were covered at each training session depending on regional and local priorities identified by training session program partners.

Plant Family	Scientific Name	Common Name	WA Noxious Weed Class	OR Noxious Weed Class
Poaceae	<i>Spartina patens</i>	saltmeadow cordgrass	A	A
Poaceae	<i>Spartina densiflora</i>	dense flowered cordgrass	A	A
Poaceae	<i>Brachypodium sylvaticum</i>	false brome	A	B
Polygonaceae	<i>Fallopia x bohémica</i> (syn. <i>Polygonum x bohemicum</i>)	Bohemian knotweed	B	Not listed
Polygonaceae	<i>Fallopia japonica</i> (syn. <i>Polygonum cuspidatum</i>)	Japanese knotweed	B	B
Polygonaceae	<i>Fallopia sachalinensis</i> (syn. <i>Polygonum sachalinensis</i>)	giant knotweed	B	B
Rosaceae	<i>Potentilla recta</i>	sulfur cinquefoil	B	B
Rosaceae	<i>Rubus armeniacus</i>	Himalayan blackberry	C	B
Rosaceae	<i>Rubus laciniatus</i>	Cutleaf Blackberry	C	Not listed
Scrophulariaceae	<i>Linaria dalmatica</i>	Dalmation toadflax	B	B
Scrophulariaceae	<i>Linaria vulgaris</i>	yellow toadflax, butter & eggs	C	B
Solanaceae	<i>Solanum rostratum</i>	Buffalobur	C	B
Thymelaeaceae	<i>Daphne laureola</i>	spurge laurel	B	B

Appendix B. 2017 EDRR field survey data sheet (Adapted from data sheet created by Sasha Shaw at the King County Weed Watcher's Program).

Pacific Northwest Invasive Plant Council's EDRR (Early Detection Rapid Response) Survey Form							
Please return completed form to PNW IPC, University of Washington, Box 354115, Seattle WA 98195 OR e-mail to pnw.ipc.org@gmail.com <u>OR</u> submit field survey information ONLINE at: http://www.eddmaps.org/west/ (use PNW IPC EDRR Survey Form portal on EDDMapSWest page)							
*Land Ownership (e.g., Olympic National Forest, DNR, USFS)		*County (e.g., Clallam)		* Name of area surveying (e.g., The Brothers Wilderness Area)			
*Name of Surveyor(s): <u>list all participants</u>				*Trail or Site Name:			
*Total Miles of Trail Surveyed:		*Survey Date:		Wilderness Area?: Yes or No (circle one)			
Total Area Surveyed: (acres, if known)		Trail Start Point (Lat/Long) GPS <u>or get</u> coordinates from EDDMapSWest:					
*Volunteer Hours: (survey hours = total travel time to and from site + survey time in field + data entry time multiplied by (x) the number of surveyors)				Travel Miles: (driving distance to/from site)			
Survey Notes:							
* Required fields							
*Plant Name (e.g., shiny geranium or <i>Geranium lucidum</i>) [At least one photo required for verification]	*Plant Location Latitude DATUM NAD83 or WGS84 in decimal degrees (e.g., 47.57982)	*Plant Location Longitude (e.g., -122.32482) No GPS? Use "Map it" function on EDDMapSWest	*Plant Growth Stage(s) (circle all stages that apply) Veg, Bud, Flower, Fruit, Releasing Seed	*Total Area of Infestation (record units e.g., sq. ft., acres)	Method if Controlled (e.g., cut flower/fruits, pulled plt.)	*Habitat (e.g., forest, riverbank, roadside)	Notes (e.g., if controlled how much area and/ or # of plants did you treat, is plant dead?, other observations?)
			Veg Bud Flower Fruit Releasing Seed				