



King County
Small Habitat Restoration Program
Annual Report 2015

Enhancing streams and wetlands for community, fish, and wildlife

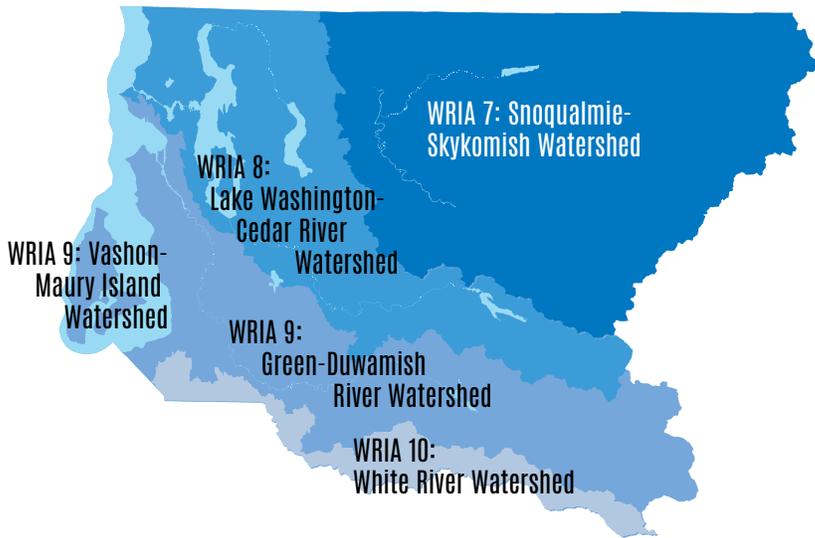


King County

Department of Natural Resources and Parks
Water and Land Resources Division

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KING COUNTY



PROJECT PARTNERS



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2015 Program Summary and Accomplishments

In 2015 the Small Habitat Restoration Program (SHRP) worked with 17 private property owners. The program constructed and maintained 33 habitat projects to enhance and restore streams, wetlands, and riparian buffers throughout King County.

PROGRAM HIGHLIGHTS:

20 new construction or planting projects

13 projects maintained and monitored

5,620 linear feet of streambank restored

17.31 acres of riparian buffer enhanced

2,100 linear feet of nearshore or marine shoreline restored

38 pieces of large woody debris installed; and

18,873 native trees and shrubs planted

In 2015, grant funding for SHRP totaled over \$142,000. Forging new partnerships and strengthening relationships with grant agencies and private landowners maximizes public funding.

Spotlight projects within King County's Watershed Resource Inventory Areas (WRIAs) showcase successful collaborations with private property owners, homeowner associations, community groups, and public agencies. These projects may involve local community outreach, site planning and preparation, native plantings, placing wood in streams, and invasive weed control.



SPOTLIGHT PROJECTS INCLUDE:

WRIA 7: Snoqualmie-Skykomish Watershed

Tang Tolt River Riparian Restoration Project

Project Manager Cindy Young continued a large scale effort to restore fish and wildlife habitat in the floodplain of the Tolt River.

WRIA 8: Lake Washington-Cedar River Watershed

Cottage Lake Creek Enhancements 2015-2017

Project manager Laura Hartema worked with two property owners along Cottage Lake Creek to enhance stream buffers for fish and wildlife.

WRIA 9: Green-Duwamish Watershed

Foothills Trail Stonequarry Creek Buffer Enhancement

Project Manager Cody Toal worked to remove invasive species and restore the degraded riparian buffer of Stonequarry Creek, a tributary of Newaukum Creek.

WRIA 9: Vashon-Maury Island

Scott Judd Creek Habitat Enhancement

Project Manager Paul Adler implemented a project to enhance fish and aquatic habitat by placing woody debris at the mouth of Judd Creek.

Project Spotlight: WRIA 7 Snoqualmie-Skykomish Watershed

Tang Tolt River Riparian Restoration Project

The Tang Tolt River project is part of a large scale effort to restore high quality salmon habitat, especially fall Chinook salmon spawning and juvenile rearing habitat, within the Tolt River Natural Area. Numerous funding sources have contributed to the acquisition and restoration of this natural area including the King County Conservation Futures program, The King County Flood Control District, King Conservation District, and the Salmon Recovery Funding Board.

In 2015, the Tang Tolt River Riparian Restoration project was implemented on three parcels along 200 linear feet of riverbank. Invasive blackberry was removed and 400 trees and 450 shrubs were installed, including Sitka Spruce, Western red cedar, Douglas fir, big leaf maple, Oregon ash, snowberry, thimbleberry and salmonberry.

The Tolt River provides essential habitat for about one-fifth of the spawning Chinook that return to the Snoqualmie River. The Tolt River Natural Area was identified in the 2004 King County Comprehensive Plan as a part of a wildlife habitat corridor which provides habitat for a variety of birds and mammals.



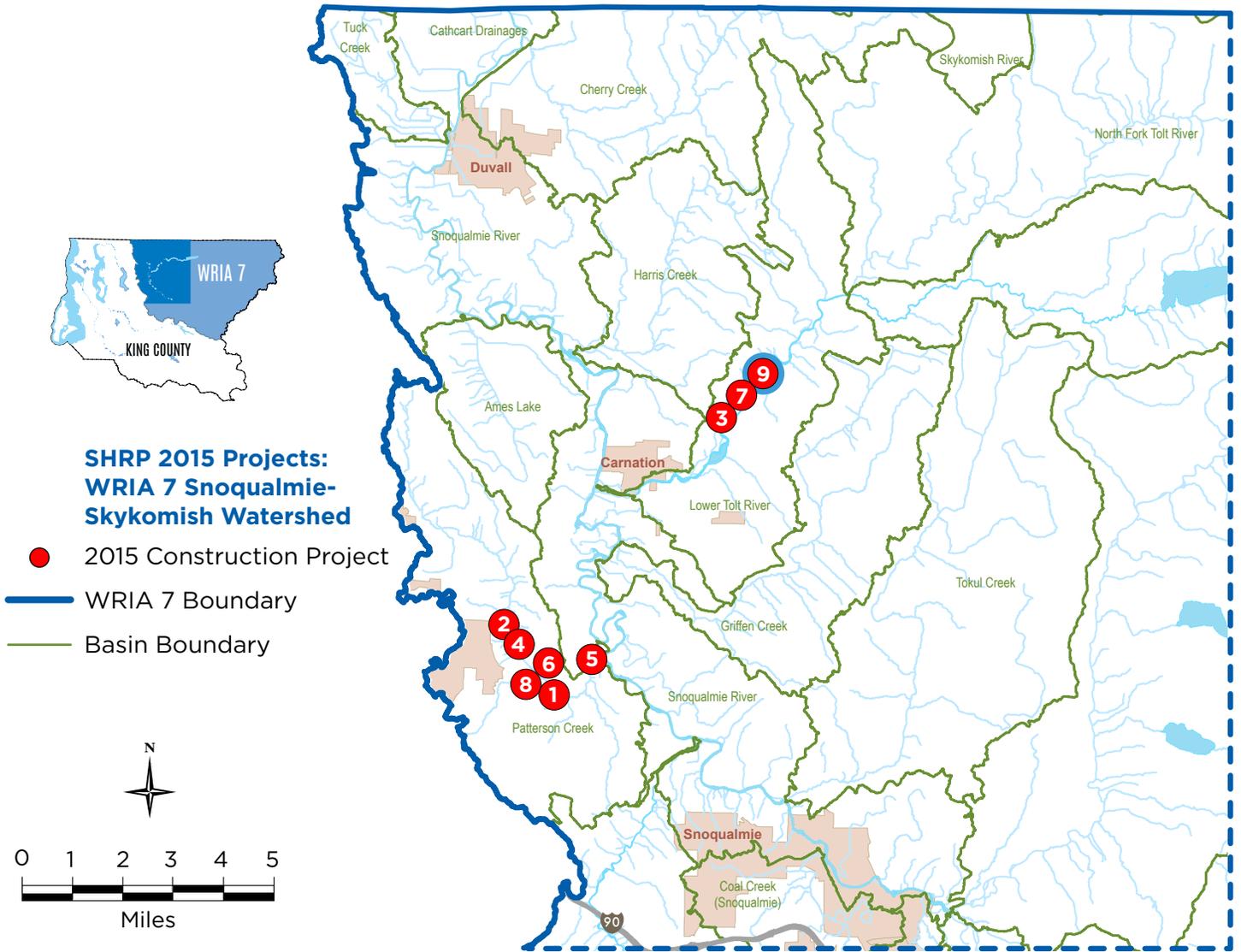
*Tang Tolt River Riparian Restoration project-**BEFORE***



Augering holes at Tang Tolt River



*Tang Tolt River
Riparian Restoration project-**AFTER***



	Project Name	Property Ownership	Trees Planted	Shrubs Planted	Streambank Restoration Linear Ft	Riparian Buffer Restoration Sq Ft
1	Aldarra East Patterson Creek Restoration	Private	2,000	0	0	12,500
2	Crittenden Patterson Riparian Planting	Private	300	0	0	2,500
3	Tolt Properties Heintz/Mernikas/Valenta Tolt River Restoration	Public	500	0	0	22,500
4	Lee Patterson Riparian Planting	Private	300	0	0	1,500
5	Mike Lein Patterson Creek Restoration	Private	50	0	0	0
6	Montaine Patterson Creek Restoration	Private	525	0	0	52,500
7	Moran/Wait Tolt River Restoration	Public	1,000	0	0	50,000
8	Storybook Patterson Creek Restoration	Private	25	0	0	500
9	Tang Tolt River Riparian Restoration	Public	400	450	200	20,000
	Total		5,100	450	200	162,000

Project Spotlight: WRIA 8 Lake Washington-Cedar River Watershed

Cottage Lake Creek Enhancements 2015-2017

Project manager Laura Hartema worked with the Loihle and Cobb families to enhance the Cottage Lake Creek buffer for fish and wildlife. Blackberries and other invasive plants were removed, and 283 trees and 495 shrubs were planted along 350 feet (0.5 acre) of stream. These projects were partially funded by a King Conservation District grant.

The Loihle and Cobb projects were identified during a 2015 public outreach effort, an extension of a larger outreach that began in 2008. In 2015, letters were sent to 100 private properties along Cottage Lake Creek to gauge interest in enhancing streamside habitat. About 25% of owners responded with a desire to participate in the SHRP program. The Loihle and Cobb plantings were the first two projects initiated. A King County Flood Control District Cooperative Watershed Management grant, awarded to SHRP in 2015, will fund the next suite of Cottage Lake Creek enhancement projects to be completed by 2017.



Cobb property on Cottage Lake Creek

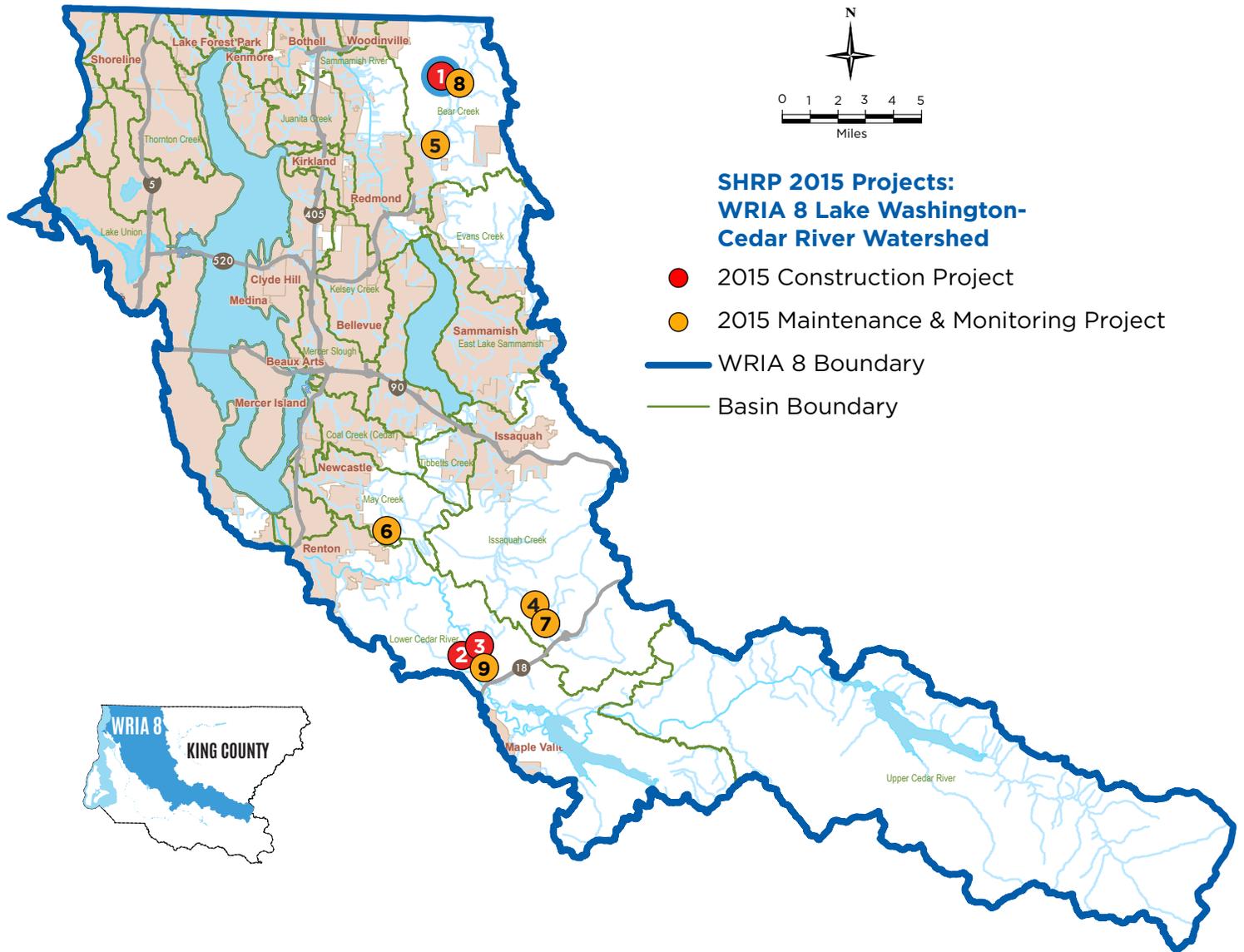


Loihle downslope planting in 2015



Loihle property after planting in 2015





	Project Name	Property Ownership	Trees Planted	Shrubs Planted	Streambank Restoration Linear Ft	Riparian Buffer Restoration Sq Ft
1	Cottage Lake Creek SHRP 2015-2017	Private	283	495	350	21,100
2	Huselton Cedar River Phase 2	Public	1,475	0	0	0
3	Mourey Cedar River SHRP	Public	250	125	0	0
	Total		2,008	620	350	21,100

- 4 Ellis Middle Issaquah Bank Stabilization
- 5 Craig Bear Creek Enhancement
- 6 Coalfield Park Buffer Enhancement
- 7 Issaquah Creek Bonomi Buffer Enhancement
- 8 Cottage Lake Creek Enhancements Upstream of Avondale
- 9 Huselton and Dean Cedar River Planting Phase 1

Project Spotlight 1: WRIA 9 Green-Duwamish River Watershed

Foothills Trail Stonequarry Creek Buffer Enhancement

Stonequarry Creek is a small tributary to Newaukum Creek with high water temperatures due to lack of riparian shade. Elevated water temperatures in both creeks adversely affect critical spawning habitat for Chinook, steelhead, and coho salmon. The riparian buffers along Stonequarry Creek are mostly cleared, degraded, and dominated by reed canarygrass (RCG) and invasive blackberry.

In 2015, invasive blackberries and reed canarygrass was controlled and 938 trees and shrubs were planted in the riparian buffer. The plants were flagged, brush blankets were added around each plant and then wood mulch was applied. These techniques will help keep the RCG down and also help the plants retain moisture during the hot and dry summers. The Stonequarry Creek project enhanced a quarter mile long reach of stream encompassing 1.2 acres of riparian buffer. The project site is on King County Parks property and was funded by a King Conservation District water quality grant.



Putting down brush blankets near Stonequarry Creek



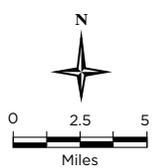
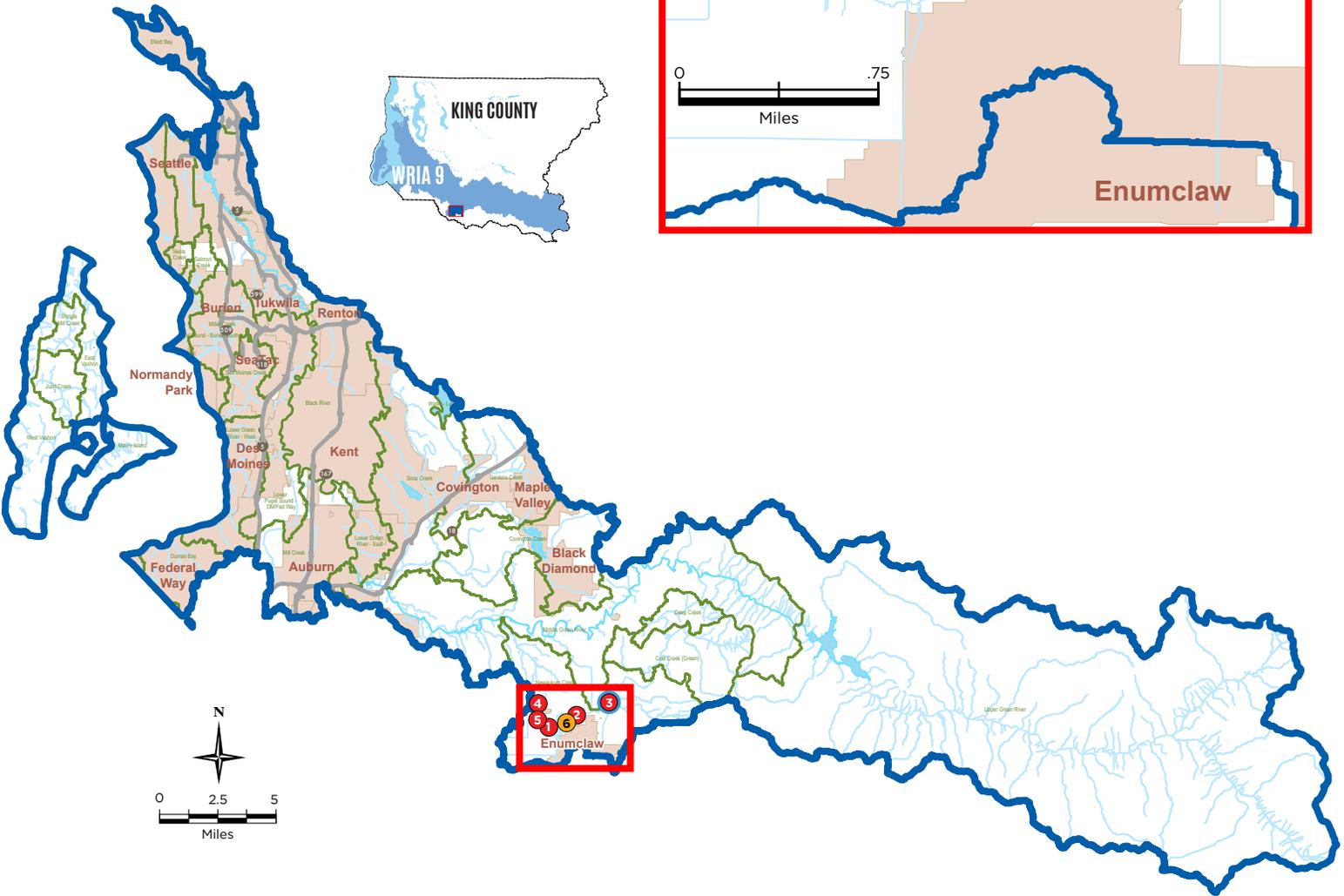
Newly planted buffer with flagged plants



Buffer after plants have been mulched

**SHRP 2015 Projects:
WRIA 9 Green/
Duwamish River Watershed**

- 2015 Construction Project
- 2015 Maintenance & Monitoring Project
- WRIA 9 Boundary
- Basin Boundary



	Project Name	Property Ownership	Trees Planted	Shrubs Planted	Streambank Restoration Linear Ft	Riparian Buffer Restoration Sq Ft
1	Big Springs Natural Area Buffer Enhancement	Public	2,180	2,097	2,000	430,000
2	Collard Newaukum Buffer Enhancement	Private	30	20	200	5,000
3	Foothills Trail Stonequarry Creek Buffer Planting	Public	604	334	1,170	52,000
4	Walker Newaukum Buffer Enhancement	Private	50	0	600	30,000
5	Zech Newaukum Buffer Enhancement	Private	0	160	600	45,000
	Total		2,864	2,611	4,570	562,000

6 Magnusson Newaukum Creek Habitat Enhancement

Project Spotlight 2: WRIA 9 Vashon-Maury Island

Scott Judd Creek Habitat Enhancement

The Scott property, located at the mouth of Judd Creek, was acquired for open space and habitat enhancement. In 2014, SHRP received an \$80,000 Cooperative Watershed Management Grant from the King County Flood Control District. The goal of the project was to enhance fish and aquatic habitat by placing large woody debris (LWD) into Judd Creek stream and estuary.

In 2015, 33 logs with root balls were placed along 550 feet of the lower reach of Judd Creek. Five habitat logs were towed with motor boats from the Jensen Point boat ramp across Quartermaster Harbor and installed in the estuary. A future phase of the project will place more habitat logs in the estuary.

Judd Creek is the largest watershed on Vashon and is home to wild coho, chum salmon and searun cutthroat trout. The lower reach is listed as critical steelhead habitat, and juvenile Chinook from other watersheds use the estuary for rearing habitat. The woody debris placed in the creek improves fish habitat by providing structure, cover and hydraulic complexity. In the estuary, they will provide structure, cover, and substrate for marine organisms and spawning forage fish that are an important and limited food prey for salmon.



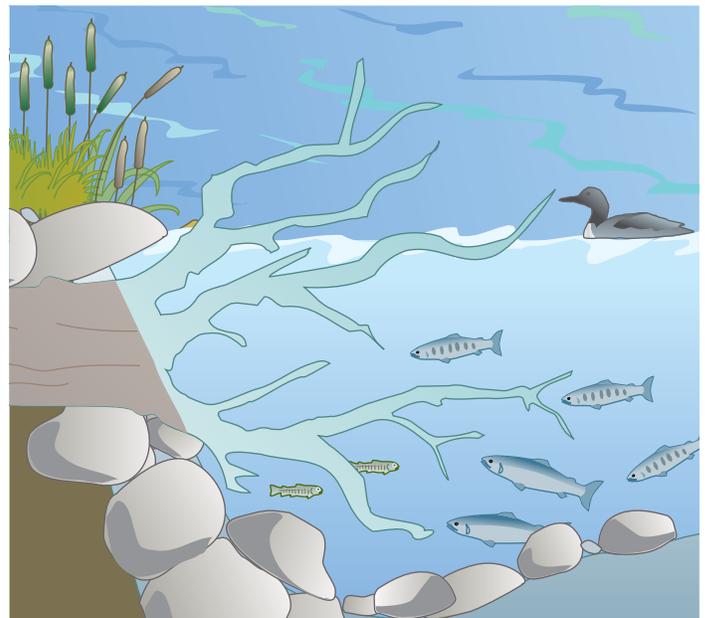
Scott property, Judd Creek stream reach, LWD placement



Scott property, Judd Creek stream reach LWD

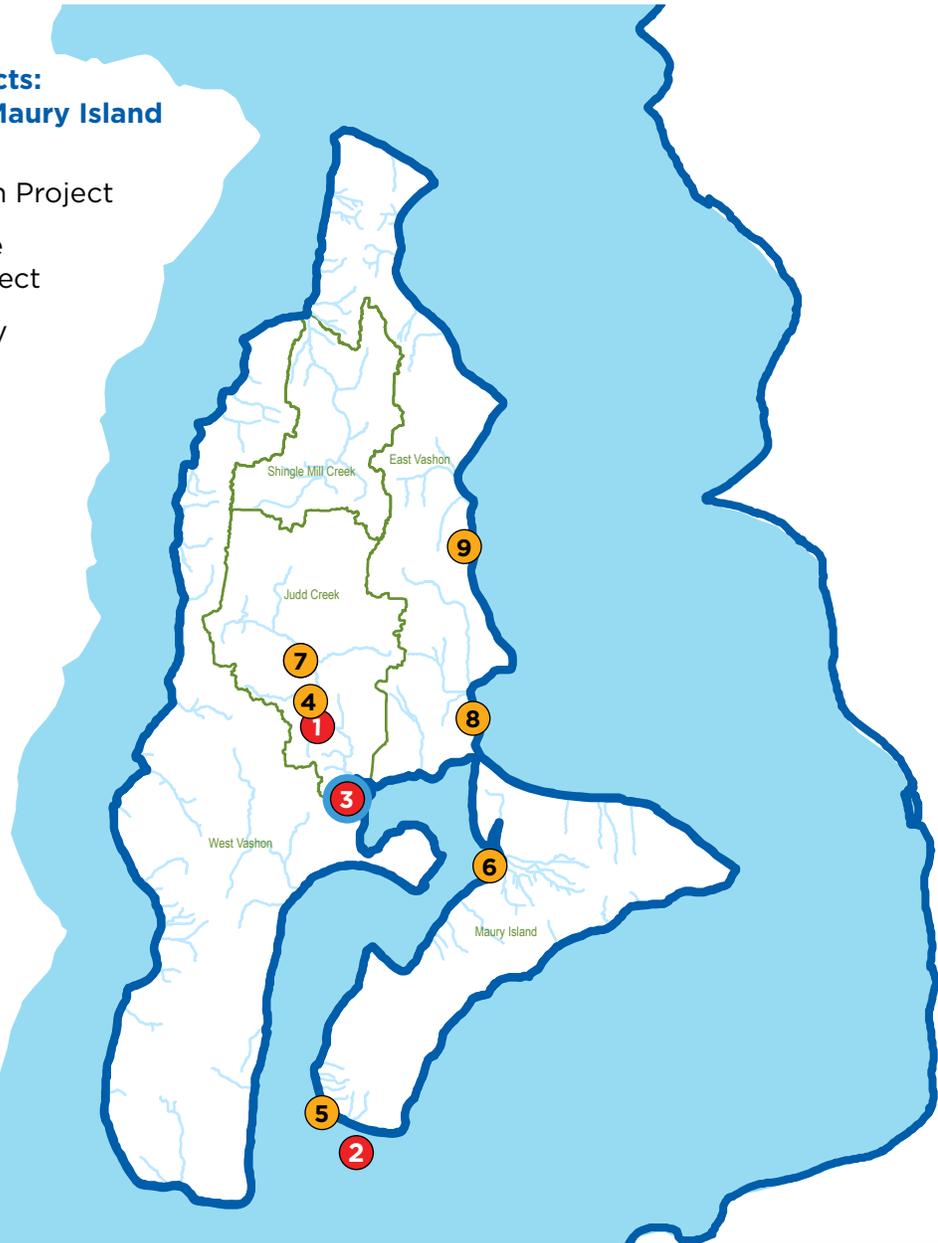
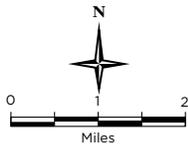


Scott property, Judd Creek, estuary reach test run



SHRP 2015 Projects: WRIA9 Vashon/Maury Island Watershed

- 2015 Construction Project
- 2015 Maintenance & Monitoring Project
- WRIA 9 Boundary
- Basin Boundary



Project Name	Property Ownership	Trees Planted	Shrubs Planted	Streambank Resoration Linear Ft	Riparian Buffer Restoration Sq Ft	Large Wood Installed	Marine Shoreline Restored linear feet
1 Anderson and Eagleson Judd Creek Habitat Enhancement	Public	115	555	500	9,000	0	0
2 Piner Point Natural Area Restoration	Private	4,435	115	0	0	0	2,000
3 Scott Judd Creek Habitat Enhancement	Private	0	0	0	0	38	100
Total		4,550	670	500	9,000	38	2,100

- 4** Palmer Judd Creek Buffer Enhancement
- 5** Manzanita and Northilla Ivy Removal
- 6** Raabs Lagoon Estuary Enhancement
- 7** Singer Judd Creek Pond Enhancement
- 8** Ellis Creek Natural Area
- 9** Timmons Point Heyer Enhancement

Willow pole diameter affects survival and growth in wetlands dominated by reed canarygrass (*Phalaris arundinacea*): Year 3

AUTHORS¹:

Laura Hartema², ecologist. Managed monitoring, data collection and analysis.

Paul Adler, ecologist. Developed concept and assisted with experimental design.

Cody Toal, ecologist. Implemented study.

Josh Latterell, PhD. senior ecologist. Assisted with experimental design and analysis.

This memo describes one of the controlled experiments being conducted by the ERES Monitoring and Maintenance Program to improve the performance and cost-effectiveness of King County restoration projects.

BACKGROUND:

One type of problem we often encounter in wetland restoration or enhancement projects is a proliferation of reed canarygrass (*Phalaris arundinacea*). Many projects use plastic sheeting, herbicide, or wood mulch to combat reed canarygrass, but these treatments are costly and are not always effective. King County has been implementing projects in which willow poles are planted without site preparation or maintenance. Willow poles are used because they can survive high water tables and aggressive competitors, but willow poles can come in a variety of diameters and the cost-effectiveness of different sizes is unknown.

Accordingly, we sought answers to the following questions:

- How does survival and cover of Sitka willow (*Salix sitchensis*) poles planted in reed canarygrass differ between size classes?
- What size willow is the most cost-effective for establishing woody cover in reed canarygrass?
- Can we achieve extensive native willow cover without site preparation or maintenance (i.e., when reed canarygrass control is not a project goal)?

STUDY SITE:

The study site is located in a field along Newaukum Creek, a tributary to the Green River, in Enumclaw, WA. A project location map is excluded to protect the private property owners.

- A monoculture of reed canarygrass dominates the site. A few other emergents exist in patches outside of the study plots: sedges, soft rush, and buttercup.
- All willow poles were installed in pre-existing reed canarygrass in full sun.
- Topography is flat and the study area is close to the water table. Flooding is seasonal.
- Silty loam soils have been undisturbed by grading, compaction, mowing or grazing for at least five years prior to planting.
- No site prep or maintenance was used on this project. No mulch. No landscape fabric. No herbicide treatment. No watering.

¹Suggested Citation: Hartema, L, P. Adler, C. Toal, and Latterell, J.J. 2015. Willow stake diameter affects survival and growth in wetlands dominated by reed canarygrass (*Phalaris arundinacea*): Year 3. King County Water and Land Resources Division. Seattle, WA.

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Size Class A: small-diameter stock



Size Class B: medium-diameter stock



Size Class C: large-diameter stock

FIGURE 4: Photos of Each Treatment, 2015 (Year 3)

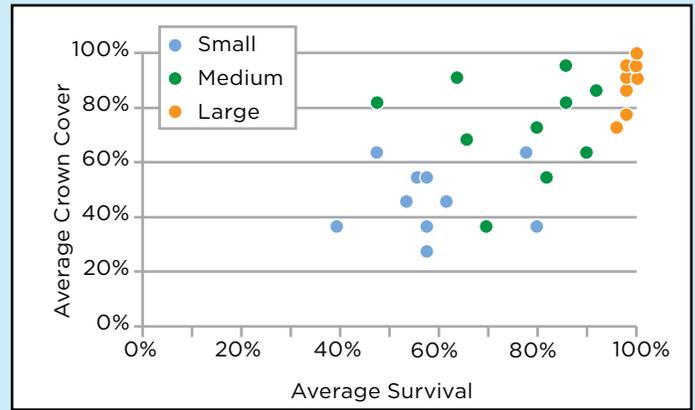


FIGURE 5: Cover vs Survival, Year 3

COST EFFECTIVENESS:

- The medium-sized stock was the most cost-effective, based on the cover-per-dollar ratio (Figure 6). Cost-benefit is dependent on price paid for materials. Current (2015) pricing is listed in Table 1.

Diameter class	Cost per stake	% cover
Small	\$2.03	46
Medium	\$2.11	73
Large	\$4.22	90

Table 1: Cost and cover by size class

- The largest stock cost twice that of the smallest stock, but provided 31% higher survival and 44% greater cover by Year 3 (2015).
- Note that differences in labor costs among diameter classes were not calculated.
 - The larger stock took only slightly more time to install on this site in loose, moist soils.
 - However, hauling the larger poles by hand may increase labor costs by up to 50% because they are difficult to handle and transport from the delivery spot to installation site. The actual difference in costs will be related to the distance of hand transport, and the level of difficulty presented by the soils (i.e. compaction, gravels, dense grass).

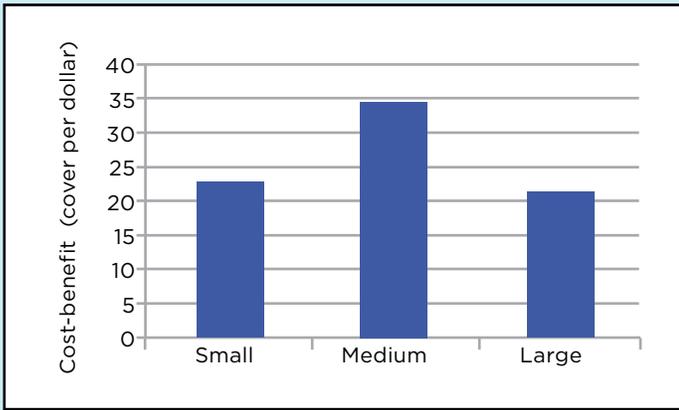


FIGURE 6: Cost-benefit by size class, 2015, Year 3

WHAT'S THE TAKE-AWAY?

- If cost-effectiveness is the most important factor in your project, the medium-diameter stakes are the best choice.
- If establishing cover at the fastest rate is the priority, the large diameter stakes are the best choice.
- The large stakes showed the highest survival and cover in Year 3. Large had twice the cover as the small stakes.
- Small-diameter stakes are the cheapest, but are neither high-performing, nor cost-effective.
- Good results can be achieved by planting medium to large-diameter willow poles in reed canarygrass wetlands even with no site preparation or maintenance of any kind.
 - This project demonstrates how we can achieve extensive woody cover in a short amount of time, using the best available plant stock when reed canarygrass control is not a project goal.
- Future data will help us set realistic woody cover performance targets for reed canarygrass dominated project sites.

NEXT STEPS:

- If funding allows, we will continue to monitor woody cover in Year 5 to see if survival and cover trends remain similar to what was observed by Year 3.
- We plan to evaluate the influence of canopy cover on reed canarygrass cover in Year 5, to see if it declines as many would expect.
- Replicate this study at other sites and in other years to expand the scope of inference.



Planting in mulched soil



Maintaining the plants



Crew mulching in rain

Our Mission:

“Enhancing streams and wetlands for community, fish, and wildlife”

The Small Habitat Restoration Program (SHRP) works with local property owners and public agencies to design, permit, and construct habitat enhancement projects at no cost to the property owner.

www.kingcounty.gov/shrp

Mason Bowles, program manager

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