Webster Creek and Walsh Lake Riparian Habitat Restoration Project As-Built Document

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Background

Webster Creek originates in the northwestern corner of the Cedar River Municipal Watershed (CRMW) at about 2,500 feet above sea level (asl). It flows in a southerly direction, terminating in Walsh Lake at about 760 feet asl. Walsh Lake is a 68-acre lake with a diverse aquatic and riparian plant community surrounded native second-growth forest. Over 120 native aquatic and riparian plant species were identified in the lake and its adjacent wetlands during a 2005 survey (Herrera 2005).

Webster Creek is a unique stream in the CRMW in that in the late 1990s and early 2000s it supported a population of spawning kokanee salmon (*Oncorhynchus nerka*), although none have been seen since 2005 (Barnett et al. 2008). Walsh Lake, Webster Creek, and their riparian areas support over 50 fish and wildlife species, many of which are listed in Seattle's Cedar River Watershed Habitat Conservation Plan.

In 2004 a dense patch of Bohemian knotweed *(Polygonum* x *bohemica*, a hybrid between Japanese (*P. cuspidate*) and giant knotweed (*P. sachalinense)* was found adjacent to Webster Creek and in 2008 a second large patch was found near Walsh Lake close to the mouth of the creek. In addition there were several large dense thickets of both Himalayan (*Rubus armeniacus)* and Evergreen (*Rubus laciniatus*) blackberry, plus scattered blackberry plants throughout the riparian area of both the creek and the lake. The dominant trees in the riparian area surrounding Webster Creek are red alder (*Alnus rubra*), black cottonwood (*Populus balsamifera*), and bigleaf maple (*Acer macrophyllum*). Scattered Sitka spruce (*Picea sitchensis*) and western redcedar (*Thuja plicata*) occur near the 10 Road, and large stumps of these two species indicate they were once more prevalent throughout the riparian area. Native understory is dominated by salmonberry (*Rubus spectabilis*), vine maple (*Acer circinatum*), and red elderberry (*Sambucus racemosa*).

Project Objective

The project objective was to improve wildlife habitat along the creek and lake by removing invasive species and re-establishing a diverse native riparian plant community.

Relation to Other Projects

This project complements a number of habitat restoration and invasive plant species eradication and control projects in the area (Figure 1).

1. Eurasian milfoil (*Myriophyllum spicatum)* and white water lily (*Nymphaea odorata)* control in Walsh Lake began in 2005 (Herrera Environmental 2005). We have had zero detections of milfoil since 2011.

2. A major restoration project that re-structured the outlet of Walsh Lake into Rock Creek was completed in 2012. The outlet had been diverted into a ditch since the early 1900s to protect municipal water quality. This project restored the original outlet into Rock Creek as well as restoring a large surrounding riparian area. For a description of this project see: http://www.seattle.gov/util/EnvironmentConservation/OurWatersheds/Habitat_Conservation_Plan/ManagingtheWatershed/DownstreamHabitat/WalshLakeRestoration/index.htm

3. There was an extensive knotweed infestation along the decommissioned 16 Road and in the Rock Creek Wetland that we started controlling in 2004. Restoration of wetland habitat in the Rock Creek Wetland has been ongoing since 2004 (Nickelson 2012). Restoration includes eradicating Bohemian knotweed, large thickets of Himalayan and Evergreen blackberry, and large dense mats of bittersweet nightshade (*Solanum dulcamara*) as well as planting a variety of native tree and shrub species.

4. The road along the southwest portion of Walsh Lake had extensive knotweed infestations, some of which were within the riparian area. We covered all of these knotweed patches with geotextile fabric in 2005 and 2006. It took five full days of SPU staff and contractor crews to place over 25,000 ft^2 of fabric along these roads, at a contractor cost of $6,300. SPU staff maintained the fabric on all these knotweed patches several times a year through 2011, repairing tears and pulling or covering all knotweed plants found. The fabric was removed in 2011, and knotweed plants re-grew vigorously. Because the fabric treatment was unsuccessful, this site was then included in the knotweed herbicide treatment. This treatment has been successful, with knotweed virtually eradicated here by 2014. See knotweed reports online at: http://www.seattle.gov/util/EnvironmentConservation/OurWatersheds/Habitat_Conservation_Plan/ManagingtheWatershed/StreamRiparianHabitatRestoration/Metrics/index.htm .

5. Restoration of riparian habitat surrounding the 14 Lakes ponds has been ongoing since 2005 (Nickelson 2012). Downed wood was added to the ponds and riparian areas to enhance amphibian habitat (Barnett 2005), and canopy gaps were created around existing big-leaf maple trees to provide sufficient light so that they could persist in the conifer-dominated forest. Riparian habitat restoration includes removal of large thickets of Himalayan and evergreen blackberry and planting a variety of native tree and shrub species.

6. In 2001 a conifer underplanting project using western redcedar and Sitka spruce was implemented west of Webster Creek, downstream of the 10 Road (Chapin 2010). It was conducted as an experiment to evaluate different underplanting treatments (understory clearing, tilling, and the use of browse control).

7. A 2010 conifer underplanting project was located on the broad floodplain further west of Webster Creek and downstream of the 10 Road, ranging from about 180 to 450 feet away from the stream. Western redcedar were planted in 12 30-foot diameter circular areas cleared of understory. The objective of this project was to evaluate different strategies of browse control, as well as increase the abundance of cedar on the Webster Creek floodplain.

8. Conifer underplanting projects closer to Webster Creek, on both sides of the creek were installed in 2012 and 2014. These planting plots also consisted of circular areas cleared of understory. The goal was to further augment existing conifers on the Webster Creek floodplain, particularly closer to the stream and further downstream than the previous projects. Western redcedar and Sitka spruce were planted in ten planting circles in 2012. Those two species, plus Douglas-fir and black cottonwood, were planted in 20 additional cleared planting circles in 2014.

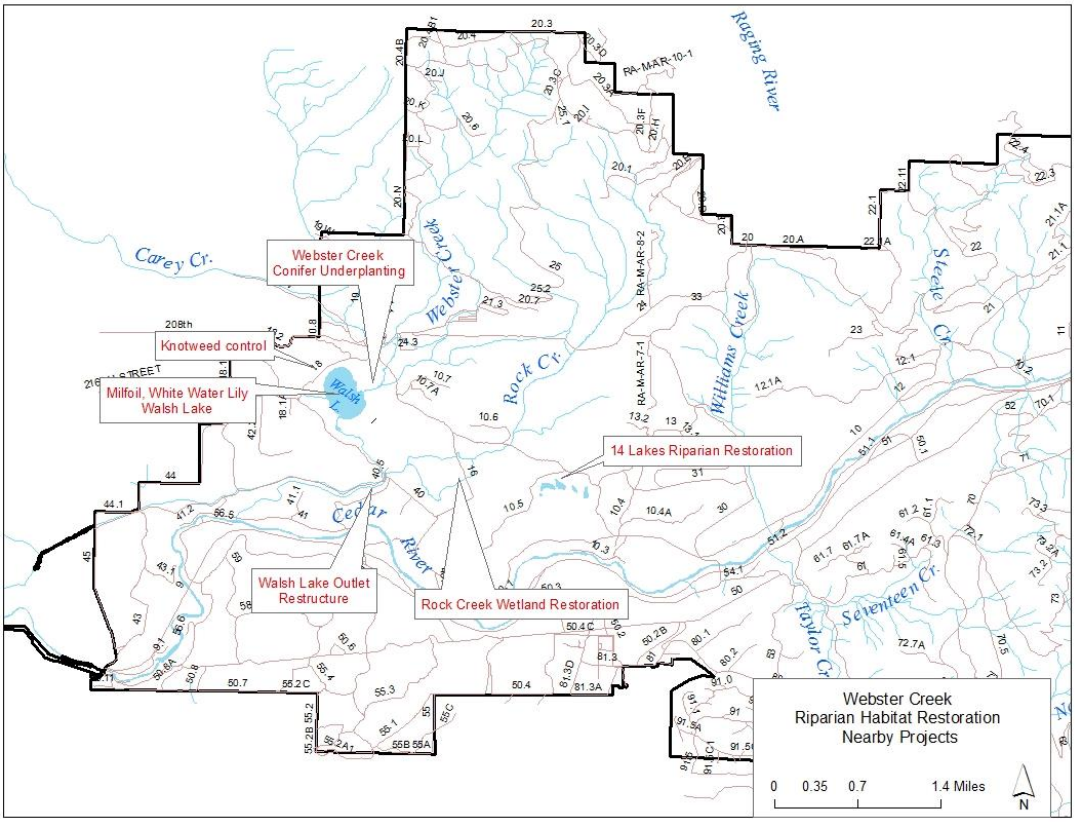

Figure 1. Restoration and invasive species control projects near Webster Creek

Cultural Resources

Because the area around Walsh Lake was predicted to have a high probability of cultural resources, all work crews are instructed to pay close attention to any potential artifacts they may uncover. As an additional precaution, only hand-tools are used for ground-disturbing activities on the site. Because this area was heavily disturbed in the past, including clearcut logging and numerous flooding events, however, it was considered unlikely that any artifacts would be found. Restoration work from 2005 through 2014 revealed no cultural artifacts.

Treatments

The treatment area is the riparian zone of Webster Creek extending from Walsh Lake upstream approximately 3,800 feet to where the creek passes under the Kerriston Road, or approximately three acres. The project included invasive species control and eradication and planting native trees and shrubs.

1. **Knotweed Control**

In 2004 we covered the knotweed patch on Webster Creek with 780 ft^2 of geotextile fabric in an attempt to starve the roots and kill the plants. The fabric was maintained multiple times per year for seven years. In spring of 2011 a contractor crew removed the fabric on this patch. This covering treatment appeared to be largely successful, with only occasion small stems found and pulled in the intervening years.

Staff covered the patch adjacent to Walsh Lake (1,140 ft^2) in 2008. Farther upstream (at 2550, 3300, 3340, 3580, and 3775 feet from Walsh Lake) we found and covered or pulled several small knotweed patches in 2004, 2006, 2008, and 2009. All of these patches are maintained at least once per year. Most have not had any new growth for several years.

2. Blackberry, Holly, Nightshade Removal

Blackberry thickets can be manually eradicated with persistent effort over several years. Once the original large root masses are grubbed out and removed, then seedlings growing from the seed bank in the soil need to be removed as they appear. This generally takes five to eight years, with decreasing effort over time, as the seed bank is depleted and competition from native plants increases. Likewise, large roots of both holly and nightshade can be grubbed out and small seedlings hand-pulled. SPU uses contractor crews from various companies, generally consisting of four to six people, to do this type of restoration work.

During summer and fall of 2007 contractor crews spent 11 days grubbing out four of the large blackberry thickets along Webster Creek (BK Patch 1, Trail Patch, Lakes Patches 1 and 2; Figure 2), an area of over 8,800 ft^2. In March, 2008, a crew spent 2.5 days re-grubbing invasive blackberry from the four patches grubbed in 2007, plus did the initial removal of the 5th patch (Lake Patch 3, 1,200 ft^2). In June 2008, crews spent an additional 2 days re-grubbing invasive blackberry from all of these patches plus grubbed out one large holly tree adjacent to Lake Patch #3. In 2009, crews spent 3.5 days re-grubbing these five patches, plus grubbed out several large mats of nightshade adjacent the Walsh Lake and individual blackberry plants scattered along Webster Creek.

In 2010, it only took crews 2.5 days to re-grub all the patches of both blackberry and nightshade. In 2011 only about two hours of crew time was needed to clear the patches. In 2012 a new blackberry thicket was found (BK Patch 2, 1,500 ft^2), and it took a crew about six hours to grub out this patch, plus clear the five original patches, and all individual plants scattered along the creek. In 2014 contractors spent 1 day re-grubbing the two blackberry patches near the knotweed patch (BK patches 1 and 2), plus isolated individual blackberry plants.

Annual contractor cost has decreased from almost $14,000 in 2007 for initial grubbing and planting to an average of approximately $600 per year 2011-2014 to maintain the patches (Figure 3).

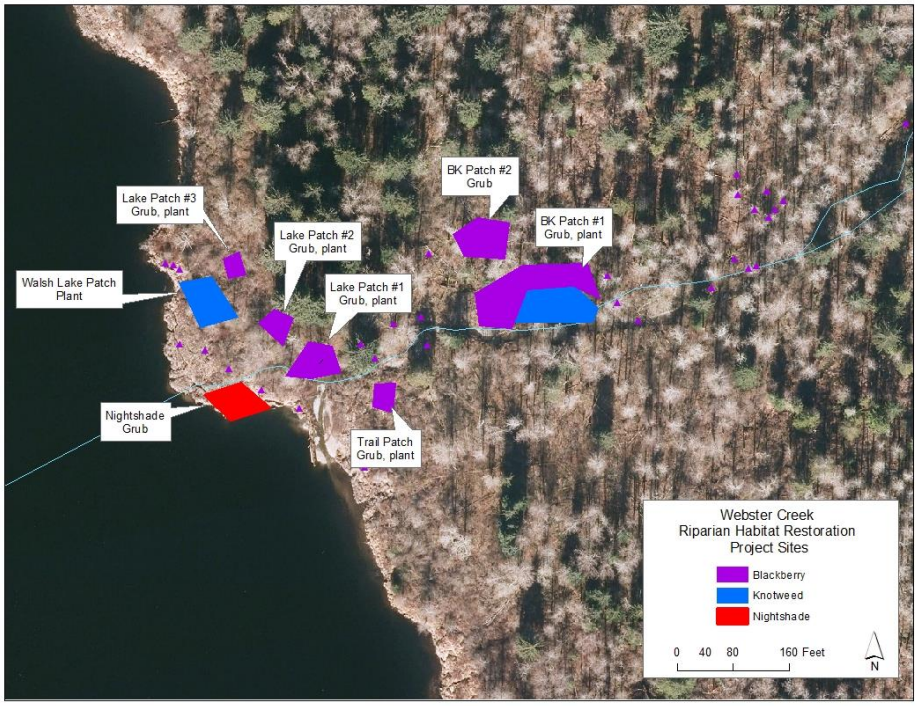

Figure 2. Location of restoration patches and invasive species along Webster Creek

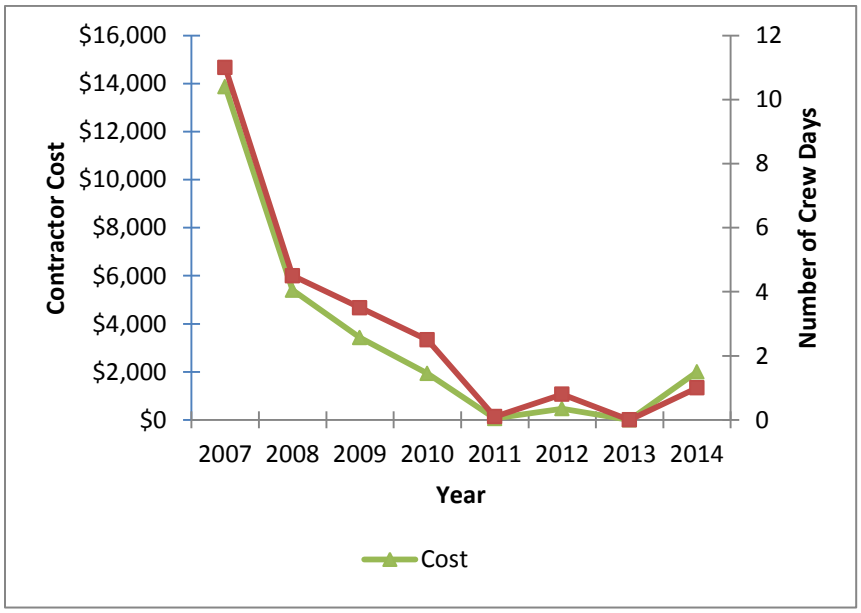

Figure 3. Contractor cost and number of crew days per year

3. Planting Native Species

In the fall of 2007, a contractor crew spent 2 days planting 242 native trees and shrubs in four of the grubbed blackberry patches (Table 2). In spring of 2008 a crew spent 0.5 day planting an additional 150 trees and shrubs in the four patches planted in 2007, plus planted in Lake Patch 3. A mixture of

grass and forb seeds were spread at all the patches in the fall of 2008 to help stabilize any remaining loose soil and provide increased competition for young blackberry seedlings. In spring of 2009 staff planted an additional 22 trees at four of the original sites (the Trail Patch, and Lake Patches 1, 2, and 3), plus around the knotweed patch near Walsh Lake, to help shade out the knotweed over the long term.

Table 2. Number of native trees and shrubs, by species, planted at six patches, 2007 - 2009

Species Common Name	Knotweed, BK #1		Trail			Lake #1			Lake #2			Lake #3		Walsh Lake
	Oct 07	Mar 08	Oct 07	Mar 08	May 09	Oct 07	Mar 08	May 09	Oct 07	Mar 08	May 09	Mar 08	May 09	May 09
Sitka Spruce	31		7		6	7		6			3		5	7
Western Redcedar	31		8	5		17	15			5		20		
Red Alder			2			10								
Sitka Willow			6			14			6					
Nootka rose		13	6	10		16	12		11	7		10		
Vine Maple		12		10			13			8		10		
Western Serviceberry			3			16			3					
Redtwig Dogwood			6			11			6					
Thimbleberry			6			0								
Red Elderberry			3			0								
TOTAL	**62**	**25**	**47**	**25**	**6**	**91**	**40**	**6**	**26**	**20**	**3**	**40**	**5**	**7**

Monitoring

All knotweed patches are currently monitored once a year, with any small knotweed plants removed by hand. The six patches where the blackberry was removed and native plants installed are monitored periodically for reappearance of blackberry and native plant survival. Number and density of blackberry re-growth dictates the frequency of re-grubbing required. Since 2011, it has been every other year.

The most recent planted stock survival data was collected in early spring of 2012. Because the data were collected prior to leaf out, it was impossible to identify some of the shrubs to species. Survival rates varied by patch and species planted. A large portion of the knotweed patch was scoured by winter flooding in 2010 and 2011, so virtually no planted stock survived in that patch. When that patch is not considered and the remaining patches are combined, there was an overall 51% survival rate of all trees and shrubs planted. Species with the highest survival rates were Sitka spruce at 78%, Nootka rose at 73%, red alder at 67%, Red Elderberry at 67%, and Sitka willow at

50%. Most surviving plants were healthy and many planted in 2007 and 2008 had already grown quite large, although height was not measured.

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