Middle Fork

Snoqualmie River

2006

WSDA

Knotweed Control Grant Final Report

King County

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Project Description

The Middle Fork Snoqualmie Cooperative Weed Management Area (CWMA) is located along the Middle Fork Snoqualmie River in King County, Washington, in the Snoqualmie/Skykomish Watershed (WRIA 7). The CWMA was established in April 2006 in response to the impacts of "Japanese" or invasive knotweeds (*Polygonum cuspidatum, P. sachalinense, P. X bohemicum*) along the mainstem of the Middle Fork Snoqualmie and its major tributaries. The Middle Fork Snoqualmie CWMA's objective is to develop a coordinated approach for controlling invasive knotweeds in the watershed.

In 2006, the Middle Fork Snoqualmie CWMA received funding from the Washington State Department of Agriculture (WSDA) and the United States Department of Agriculture—Forest Service, Forest Health Protection Program (USDA-FS, FHP) to begin a coordinated knotweed control project along the Middle Fork Snoqualmie River and its tributaries. The knotweeds targeted in this CWMA, are highly invasive plants that are presenting an enormous challenge to land managers and restoration groups trying to remove them. The focus of this project was to work in coordination with the surveys and control efforts already underway by Mountains to Sound Greenway staff, begin control of infestations where Mountains to Sound Greenway jurisdiction left off, gather data through intensive surveys, and undertake rapid response control work on high priority infestations. Priority actions funded by this project included surveys to determine the extent of knotweed in the watershed, community education and outreach, and rapid response control by work crews and volunteers on identified high priority infestations.

In particular, control efforts were made to halt invasions of this weed within riparian areas of the watershed which are resulting in displacement of native riparian vegetation and impaired riparian ecosystem functioning. Working in coordination with all landowners was essential to a successful outcome and was a priority in planning this project. Invasive knotweeds are less widely distributed on the Middle Fork Snoqualmie River than neighboring rivers and therefore the benefits from early detection and control are commensurately higher.

The Middle Fork basin drains an area of over 110,000 acres (or about 8% of King County) and flows 74 miles from its headwaters high in the Cascade Mountains to the confluence with the North and South Forks of the river near Mt. Si at North Bend, and is part of the larger Snohomish River system which extends to Snohomish County and ultimately, Puget Sound. This biologically rich valley is one of the most ecologically intact valleys remaining in King County and is the longest system in King County. A large percentage of land within the basin is in public ownership and the remainder in commercial forest production and private ownership.

The Middle Fork of the Snoqualmie River is mostly free-flowing, and unobstructed by dams, levees, or revetments—exceptions include the concrete bridge and associated fill and bank protection—and flows through braided channels, backwaters, and beaver ponds as it passes the Natural Area. Although anadromous salmon do not spawn or rear above Snoqualmie Falls, the Middle Fork supports a valuable non-anadromous recreational

fishery of cutthroat and rainbow trout, as well as whitefish. Moreover, the survival of anadromous salmon species in the lower watershed depends to a large degree upon the condition of the upper Snoqualmie system. Upstream tributaries to this river system are designated Class AA (to be managed for extraordinary water quality) by the Washington State Department of Ecology. These headwater reaches provide contiguous habitat connections for migrating wildlife as well as outstanding habitat for a number of non-anadromous fish.

Invasive weeds are a serious problem in the Middle Fork Snoqualmie Valley. The river corridor is especially impacted because the Middle Fork road closely follows the river. Infestations of Japanese knotweed are spreading there due to illegal yard waste dumping, rapid development at the edge of the valley and increased public use. In addition, a history of unmanaged off-road vehicle use has disturbed riverbanks and introduced weeds.

Partners for the Middle Fork Snoqualmie CWMA have been drawn from the extensive pool of diverse stakeholders, and more partners will inevitably be determined as the project develops. Several partnerships with entities that have large landholdings along the riparian corridor will be of key importance to the success of the effort. This project brings together diverse groups of people working toward a common goal of improving riparian ecosystem health through knotweed control. Major partners include: numerous private landowners, municipalities (e.g. King County Parks, King County Roads), state agencies (Washington State Department of Natural Resources, Washington State Department of Fish & Wildlife, Washington State Department of Transportation), Federal agencies (United States Forest Service), community-based restoration groups (Mountains to Sound Greenway, Cascade Land Conservancy, Middle Fork Outdoor Recreation Coalition (MidFORC), American Whitewater, Washington Native Plant Society, EarthCorps, and Washington Conservation Corps (WCC)). KCNWCP, Mountains to Sound Greenway, United States Forest Service (Mount Baker-Snoqualmie National Forest) and Cascade Land Conservancy are currently actively participating in project development and planning.

Project Results

As of September 30th 2006, $39,231.20 was spent on the Middle Fork Snoqualmie Invasive Knotweed CWMA project. $15,000.00 was provided by WSDA and $24,231.20 was provided by the USDA-FS Forest Health Protection grant. Five and a half river miles (RM) were controlled during the 2006 season, which includes four and a half RM on the Middle Fork Snoqualmie mainstem and one RM on Roaring Creek, a major tributary of the mainstem. Detailed results and accomplishments are described in the following sections.

King County Noxious Weed Control Program (KCNWCP) as the lead entity for the Middle Fork Snoqualmie CWMA was responsible for developing the scope for the invasive knotweed control project, conducting surveys, scheduling control efforts and conducting rapid response control activities. Extensive surveys in the Middle Fork

Snoqualmie watershed began in late April 2006 to identify priority infestations for control/eradication.

An intensive rafting survey revealed that the Middle Fork Snoqualmie River was free of knotweed infestations from river mile 22 until the confluence of Roaring Creek at river mile 4.5. Roaring Creek is significantly infested with knotweed for the first mile and seems to have originated from an infestation of knotweed at the Mt Si Trailhead.

Surveys

KCNWCP completed surveying 21.5 contiguous miles of the Middle Fork Snoqualmie River (from river mile 22 to the 428thth Avenue SE Bridge just upstream of the confluence of the Middle, North and South Forks of the Snoqualmie River) and 1 river mile of Roaring Creek. Surveys along the Middle Fork Snoqualmie River were conducted from roadside inspections and river rafting. Surveys conducted from river mile 22 to the 428thth Avenue SE Bridge (RM .5) identified 45 priority knotweed infestations along the Middle Fork Snoqualmie River. Surveys along Roaring Creek found an additional 8 priority sites that met the rapid response requirements of this CWMA.

Data was collected using GPS equipment. Recorded data documented: the knotweed species, growth stage of knotweed, area infested, percent cover of infestation, habitat type, proximity to riparian corridor, condition of knotweed, and UTM coordinates. Recommendations for treatment methods were also provided based on site conditions. An infestation or a site is defined as a parcel, or in the case of large publicly owned lands, distinct locations within a parcel separated by a barrier (road, stream), differences in land-use, or 0.5 mile distance. Within each site or infestation, there may be many discreet patches of knotweed which may change over time. The area of an infestation is defined either as the "gross area" referring to the total area of knotweed infested land or the "cumulative area" which is the sum of the area of the knotweed patches.

In late May 2006, KCNWCP staff, Mountains to Sound Greenway staff, Cascade Land Conservancy, King County Parks, and a MidFORC volunteer met to discuss/plan invasive plant control on the Middle Fork Snoqualmie River. KCNWCP staff had spent two days prior to the meeting conducting roadside surveys to get a broad understanding of how much knotweed infested the area. Mountains to Sound Greenway staff knew of 3 infestations along roadsides in the upper watershed and those sites were on their agenda for control. KCNWCP assumed control responsibilities further downstream where property ownership became an issue, and on lands outside of MTSG jurisdiction.

Along the mainstem of the Middle Fork Snoqualmie River River, 45 parcels with knotweed infestations were identified and selected for treatment because they were within 200 feet from the river or were on a roadside ditch that had a hydrological connection to the river. Parcels typically had numerous scattered patches along the river corridor, however each parcel was considered one site. In addition to the mainstem, eight parcels along Roaring Creek were identified as high priority sites and designated for treatment.

Table 1. Middle Fork Snoqualmie CWMA 2006 Survey Results by Sub-watershed

Stream Name	Miles Surveyed	Number of Sites (Parcels)	Priority Sites 2006	Survey Method
Middle Fork Snoqualmie River	21.5	45	45	Site visit, road side surveys, river rafting
Roaring Creek	1	8	8	Road surveys, streamwalking
Total	**22.5**	**53**	**53**	

Knotweed Control Action Plan

Evaluating site conditions such as land-use, proximity to water, exposure of herbicide to the public, risk of collateral damage to native vegetation, and landowner preference was necessary to determine the preferred treatment method. Knotweed stem injection with glyphosate was the selected treatment method for all sites during this first year of control activities. The grant funding provided by WSDA was primarily used for hiring contractors to perform the control work and the project manager's salary. EarthCorps and WCC were hired to perform the stem injection. Two National Pollutant Discharge Elimination System (NPDES) permits were acquired for the priority knotweed control area to ensure compliance with Federal Clean Water Act requirements. The first permit was acquired on June 12th 2006 and the second on August 2nd 2006, for the use of glyphosate, imazapyr and triclopyr on the Middle Fork Snoqualmie River and Roaring Creek, respectively.

Private Landowner Outreach

Once the priority control sites were identified, KCNWCP began contacting private landowners along the Middle Fork Snoqualmie River and Roaring Creek to seek their support and consent for knotweed treatment on their property. Fifty landowners were initially contacted through mail about the knotweed project and the majority agreed with the goals of the CWMA and responded favorably to KCNWCP's request for consent to have the knotweed on their properties controlled. Of those 50 landowners, four did not have knotweed on their property, four did not respond to our request and one refused assistance.

Sasha Shaw, King County Education Specialist, and Monica Walker, Project Manager, conducted a total of three outreach events for landowners, control crews and volunteers in the Snoqualmie/Skykomish watershed. A six page handout was created detailing knotweed biology and control options, and an online knotweed biology and control slide show was created

Contractor Crew Training and Control Implementation

KCNWCP provided training for knotweed stem injection on July 17, 2006 for contractor crews. Crew leaders were then responsible for any subsequent staff trainings and KCNWCP provided quality control and assurance as well as site orientation and logistics.

The methodology for knotweed stem injection was to inject each cane between the lowest two nodes using a 3 ml dose of undiluted AquaNeat/AquaMaster, an aquatic formulation of glyphosate, as directed by the herbicide label. The amount of herbicide injected directly into the knotweed canes was reduced from the 5 ml dose used in 2004 on other knotweed control projects, to 3 ml per cane. This decision was based on research developed by Washington State University and The Nature Conservancy. After injection, each cane was marked with either degradable survey paint or a marking stick to help the applicator distinguish treated versus untreated canes. Stem injection is a labor-intensive control method but the low risk of drift, mobility into groundwater, or collateral damage encouraged our project to use it as the preferred method on sites directly adjacent to river corridors. In addition, there was one pesticide-sensitive landowner who chose the injection method because of the low risk of drift.

EarthCorps and WCC Crews spent 18.5 days conducting knotweed control work along the riparian corridor of Middle Fork Snoqualmie River and Roaring Creek. Crews were typically made up of six crew members, including the crew supervisor. Funding for control work on the Middle Fork Snoqualmie River was provided by the Washington State Department of Agriculture and the USFS – Forest Health Protection Program. Five days of crew time was provided by WSDA grant funding, with the remaining 13.5 days funded by the USDA-FS FHP grant. In addition, Mountains to Sound Greenway staff performed surveys and control of knotweed infestations in the upper watershed. Knotweed infestations treated by Mountains to Sound Greenway staff and volunteers amounted to approximately 500 square feet scattered between three isolated patches in the upper watershed.

Before and after photos of SE 114th Levy

Of the 53 sites selected for treatment along the Middle Fork Snoqualmie River and Roaring Creek, control was achieved on 51 sites. Private landowners own 44 of the 53 priority sites. Of the remaining nine sites, King County owns four properties and Washington State owns the remaining five. Table 2 below summarizes the results of knotweed treatment by property owner, describing the gross infested area and the net area

of knotweed treated. The percent mortality is not known at this time as data has yet to be collected and analyzed.

The initial goals of the project were overwhelmingly met in terms of surveys, education and outreach, planning and coordination, and selecting and treating 51 sites. In total, 10.8 net acres of invasive knotweed was treated in 2006 within 27.47 gross infested acres. Due to the project running out of time and money, three quarters of an acre of invasive knotweed was not treated in 2006. WSDA provided funds for control of two net acres, and the remaining 8.77 net acres were treated with USDA-FS FHP funding.

KCNWCP will begin the monitoring phase of this project in May 2007. The last day of control was September 8, 2006, and effects are just beginning to show at this time. Efficacy will be assessed in early spring 2007.

Table 2. Invasive Knotweed Species Control along Middle Fork Snoqualmie River and Roaring Creek* in 2006

Ownership	Gross Knotweed Area Infested[1] in 2006 (sq ft)	Net Knotweed Infested Area[2] in 2006 (sq ft)	Net Knotweed Area Treated[3] in 2006 (sq ft)
King County Lands	264,471	158,513	127,150
Washington State Lands	292,206	111,408	111,408
Privately Owned Lands	640,907	232,670	231,693
Total in Sq ft	1,197,584	502,591	470,251
Total in Acres	27.47	11.54	10.8

**Locations treated occur within Middle Fork Snoqualmie riparian zone or adjacent to streams which hydrologically connect to the Middle Fork Snoqualmie River*

Gross Knotweed Area Infested[1]: Aggregate of infested sites selected for treatment in landscape

Net Knotweed Infested Area[2]: Aggregate of individual patches in landscape

Net Knotweed Area Treated[3]: Aggregate of infested sites treated in landscape

Discussion

Coordination of control efforts was complicated due to land ownership issues. Although the landowners were excited about this project, each wanted to be on site during control, or needed to be home to allow the crews access to the infestations. Crews would often work faster than anticipated so would arrive at the next site before the landowner had been notified. However, no significant problems arose during the course of the project which resulted in either a change of objectives or timelines.

Any changes for the Middle Fork Snoqualmie River CWMA project objectives in 2007 will be largely dependant upon information collected from monitoring the 2006 control work. The preventative strategy used in 2006 could be applied to infestations in other non-riparian sites within the watershed. These infestations which, although not a significant short-term risk to the river mainstem or tributaries, do present a longer term threat as knotweed fragments may still be moved within the watershed by road

maintenance or other activities. Similar projects in other watersheds in King County have shown that subsequent years control efforts usually incorporate mostly foliar treatments. KCNWCP will assume that will be the case on this river as well.

Successful control of knotweed in the current project area could also allow for an expanded knotweed control effort on sites further from the river, or elsewhere in the watershed. There are scattered parks and some greenspaces that would benefit from knotweed removal and as a preventative measure it would be useful to create a buffer area thereby excluding knotweed from returning to the Middle Fork Snoqualmie River.

North Island area before and after photos

Conclusion

The 2006 Middle Fork Snoqualmie CWMA Invasive Knotweed Control Project achieved an incredibly successful season and all priority activities outlined in this project's scope were accomplished. The 2006 season began with some initial surveys to determine a baseline of knotweed in the watershed and applying for funding to control knotweed infestations found during those initial surveys. Once funding was secured, KCNWCP conducted more intensive surveys to determine the full extent of the knotweed in the project area, offered education and outreach opportunities to the public, and began project planning and scheduling with crews and landowners. Ultimately, 51 priority sites were controlled during the 2006 season. This project will continue to provide substantial long-term environmental benefits to the Middle Fork Snoqualmie riparian ecosystem. To be effective over time, this project needs to continue as a long term strategic knotweed control program. A significant outcome of the project has been the development of the capacity of the CWMA to implement this long-term strategy. Dependant on additional funding, monitoring and follow-up of sites treated in 2006, treating the two sites not controlled in 2006, providing rapid-response control of new infestations and continued public outreach are the priorities for 2007.