

Snoqualmie River Garden Loosestrife Eradication Project Final Report



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Project Summary

In 2007, the King County Noxious Weed Control Program (KCNWCP) received an early infestation grant from the Washington Department of Ecology to attempt eradication of the class B noxious weed garden loosestrife (*Lysimachia vulgaris*) from the Snoqualmie River. We had found scattered patches of garden loosestrife on the river in surveys in 2005 and 2006 and operated under the assumption that the source of these plants was the large garden loosestrife infestation on Rutherford Slough in Fall City, which we had been working to control since 2002. With a hired contractor, we surveyed the river twice each summer between 2007 and 2010 and controlled garden loosestrife using aquatic formulations of triclopyr TEA. We chose to use triclopyr based on our previous experience using triclopyr and glyphosate to control garden loosestrife in nearby Rutherford Slough. We encountered a number of difficulties during the project. Legal issues prevented us from working in the lowest six miles of the river that run through Snohomish County. Our earlier optimism about control efficacy proved excessive as the years advanced, with triclopyr evidently preventing seed production and reducing plant vigor in most cases but not killing the plants or completely preventing spread through vegetative means. Although we have not seen a significant increase in population along the river banks during the project, nor have we seen a noticeable decrease. In addition, we have found new infestations in six different off-channel locations, at least one of which was not present when the project began. It is likely however that that this project has substantially reduced the spread of garden loosestrife during the project period. We believe the garden loosestrife population in King County is much more aggressive, much larger and much more productive than the species as described in the literature in other areas of the world. Perhaps because of the relative non-aggressiveness of this species in other areas, no work has been published on its control. As this project winds to a close, we are planning to study garden loosestrife further in hopes of finding more effective means of controlling its continued spread. In the meantime, we are working with the Washington State Department of Natural Resources to continue annual control efforts on the Snoqualmie River, and we will continue working with private landowners on control in off-channel habitats.

Background

The lower Snoqualmie River runs through agricultural land speckled with oxbows, sloughs and other backwaters, all of which are important fish and wildlife habitat, and all of which could be severely impacted by infestations of garden loosestrife. When the KCNWCP first began working on the garden loosestrife infestation at Rutherford Slough, it covered 11 acres in a monoculture. By 2004 this population had been significantly reduced and few mature flowering plants were returning each year. However, that year we received the first report of garden loosestrife on the Snoqualmie River bank, seven miles downstream at the Tolt Bridge boat launch. In 2005 and 2006, we surveyed 33 miles of the Snoqualmie River from Plum Landing below Snoqualmie Falls downstream to Duvall and found garden loosestrife scattered along the river downstream of Fall City. At that time we believed we had a good idea of how to control

garden loosestrife, so it made sense to launch a comprehensive eradication project, and with so few patches on the river, it seemed critical that we launch a coordinated effort to attempt eradication before the plants had the opportunity to spread further or become entrenched. We applied for an early infestation grant from the Washington Department of Ecology in 2006 and began control work on the river in 2007.

History of the project area

The original project area as specified in the grant agreement included 36 river miles from Fall City to the confluence of the Snoqualmie River with the Skykomish River in Snohomish County. During our first year of complete surveys in 2007 we surveyed the entire area, finding a few scattered patches of garden loosestrife mainly on gravel bars downstream (north) of the King/Snohomish county line. However, for legal reasons it proved to be prohibitively complicated to reach an agreement with Snohomish County that would allow the KCNWCP or its contractors the ability to conduct herbicide applications in Snohomish County. We attempted to overcome these difficulties in 2008, but we were unable to resolve the problem. So, starting in 2008, the downstream limit of the project area became the King/Snohomish county line, four miles downstream of Duvall and six miles short of the confluence.

At the same time, in 2007, we found a few scattered patches of garden loosestrife in the lower two miles of the Raging River, which enters the Snoqualmie River at Fall City. With the permission of the Department of Ecology, we expanded our project area to include these upstream patches on the Raging River. We also made the decision in 2008 to offer to control the garden loosestrife in off-channel areas on private property, starting with Rutherford Slough, where the landowners had invested considerable resources over the previous six years to significantly reduce the infestation there. In 2008 we also added a wetland on the Carnation Golf Course to the project. In 2009 we added an unnamed slough just north of Rutherford Slough, several more wetlands and ponds

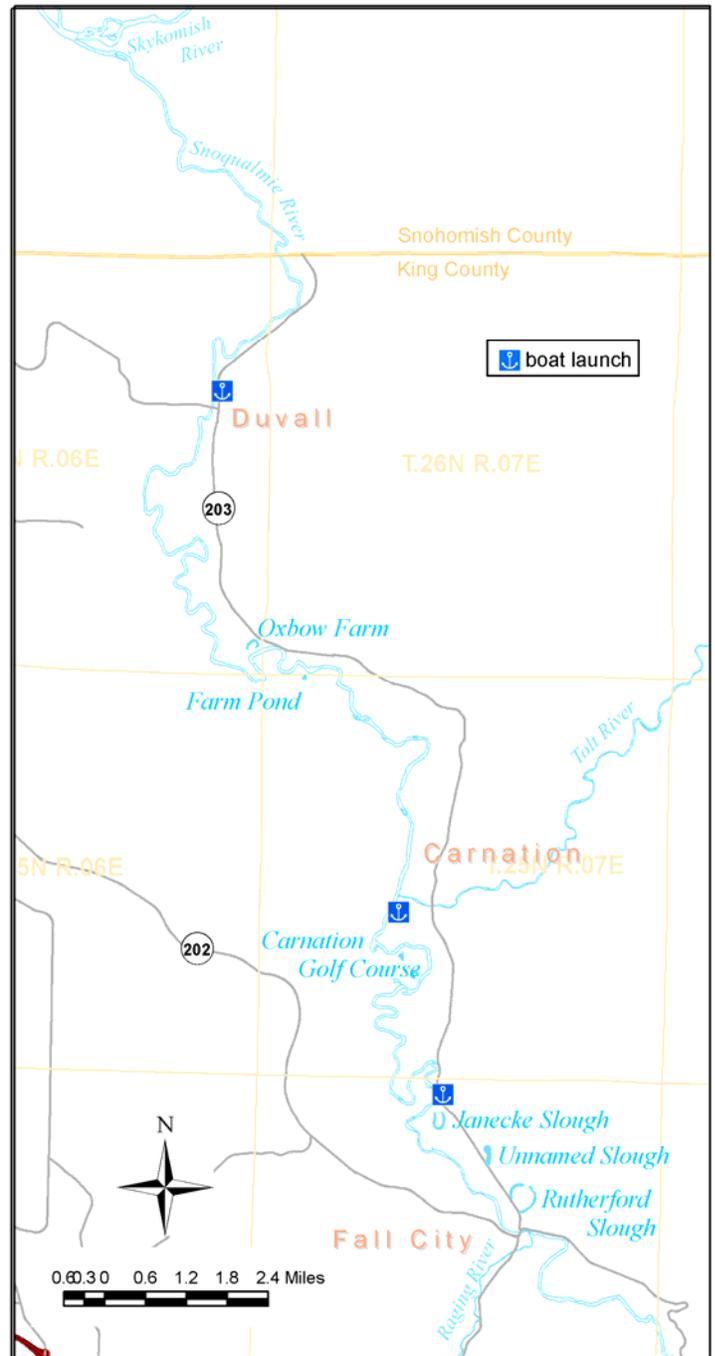


Figure 1: Map of Project Area

on the Carnation Golf Course, and a private farm pond north of Carnation. In 2010 we added Janecke Slough near Fall City and Oxbow Lake on Oxbow Farm north of Stillwater. During the project period, we also became aware of three other infestations in the larger watershed, including a dense population on a damp abandoned industrial property east of the Raging River, a small infestation on Lake Alice, which is also in the Raging River watershed, and another small infestation in a wetland on a tributary stream to the Middle Fork Snoqualmie River in North Bend, above Snoqualmie Falls. We worked with all these landowners to control these infestations and at minimum prevented seed production each year after we found them. By 2010 the project area included 30 miles of the Snoqualmie River, two miles of the Raging River and all known off-channel infestations in the watershed below Fall City.

King County’s garden loosestrife population idiosyncrasies

Garden loosestrife (*Lysimachia vulgaris*) is a class B noxious weed, which means that landowners are required to prevent its spread anywhere that it grows in Washington state. It is a perennial rhizomatous plant in the Primulaceae, with clusters of attractive five-petalled yellow flowers atop a tall stem – but just how tall is an interesting question. Descriptions from garden loosestrife’s native range (including the Flora of China and the Flora of Pakistan and a variety of other websites from Asian and European countries) put the height of the plants between 60 and 120 cm (~2 to 5 feet) tall. The Flora of North America puts all populations other than ours



Over six feet tall



"Seedlings"

in the same range, but since we submitted examples of our population, the species description extends the height range parenthetically to 250 cm (8.2 feet). The tallest plant we have directly measured in King County was nine feet tall, but in full shade plants often appear at least that tall if not taller. Most of our plants tend to be about six feet tall. We also frequently find fasciated stems, often as huge plants with massive flower clusters, and our plants seem to thrive in full shade, unlike the garden loosestrife in other places. Finally we suspect that all, or at least most, of the plants in our population have spread from vegetative reproduction instead of

from seed. Although control reports from earlier in the decade talked about seedlings sprouting after herbicide application, in 2009 and 2010 we looked at several dozen supposed seedlings and found they were all growing vegetatively, from rhizomes, stolon fragments or stems that had fallen over and rooted at leaf nodes.

Surveys and Control

Surveys

Our goal was to survey the entire project area twice during each year of the project, the first to locate, map and spray all plants and second as follow up to treat any new or skipped plants. Although we did not quite achieve this every year, we did at minimum thoroughly survey the entire area once and follow up on at least some of the area. Scheduling and access issues prevented complete second surveys in the first two years of the project.

River surveys were conducted by airboat, and control was done using a backpack sprayer (Table 2, page 7). On each survey day, one Aquatechnex (contractor) employee and one KCNWCP employee took the airboat slowly along the riverbank, stopping whenever they spotted garden loosestrife. KCNWCP staff recorded the location and other data (Table 1) on the plants using a Trimble GeoXM GPS unit, while Aquatechnex staff sprayed the plants, either from the boat or from shore, being careful to approach the plants as closely as possible and spot spray to minimize overspray and collateral damage to surrounding vegetation. Since the majority of the shoreline in the project area is steep and vegetated with other invasive species (particularly Himalayan blackberry (*Rubus armeniacus*), invasive knotweeds (*Polygonum x bohemicum* and other knotweeds), reed



Table 1: Data Collected	
Field	Description
WeedCode	Six letter code based on Latin name (LYSVUL for <i>Lysimachia vulgaris</i>)
Surveyor	KCNWCP staff collecting the data
WeedArea	Estimated area occupied by the weeds in square feet
CoverClass	Percent cover of the weeds within the WeedArea, expressed as a range (1 = <10%, 2 = 11% to 25%, 3 = 26% to 50%, 4 = 51% to 75%, and 5 = 76% to 100%)
Habitat	Description of habitat, e.g.: shoreline, wetland
GrowthStg	Most advanced growth stage exhibited by the weeds: vegetative, pre-flower (budding), flowering, seed-set, or senescent (dying back)
Control	Category of control done on the plants (usually "chemical" in this project)
Notes	Descriptive information about the infestation, such as more precise location information, number of fasciated stems, plants collected from the location, etc.
SurveyDate	Date of survey

canarygrass (*Phalaris arundinaceae*), and old man's beard (*Clematis vitalba*), and since all spraying was done in calm weather, there was no damage done to desirable or cultivated vegetation. Table 3 (Page 8) summarizes our survey results. For detailed maps and tables, see Appendix A.

We also controlled other regulated weeds on the banks and gravel bars of the river when the opportunity arose and the work did not significantly impact our ability to achieve garden loosestrife control in the project area in a timely manner. Other weeds controlled included purple loosestrife (*Lythrum salicaria*), spotted knapweed (*Centaurea stoebe*) and tansy ragwort (*Senecio jacobaea*). We were generally able to control all purple loosestrife we encountered with the exception of one very large patch in a wet meadow within the river channel. The spotted knapweed was concentrated on two gravel bars several miles apart near Fall City and Carnation, and the tansy ragwort was widely scattered near the tops of the river banks. We generally only controlled outlying individuals of these species, such as on gravel bars, since stopping to spray all of these weeds would have significantly delayed the completion of our primary survey goals each season.

Off-channel habitat surveys were conducted on foot or by canoe by KCNWCP staff, and either controlled by us at the time or later by KCNWCP's retained herbicide application contractor, Woodland Resource Services Inc. Typically, KCNWCP staff did the control on the Raging River and on the Carnation Golf Course, while control on Rutherford Slough and on the unnamed slough was done by Woodland because the area and the terrain required use of equipment we do not have. See the timeline below for more detail.



Raging River 2007

Garden loosestrife control methods

The Rutherford Slough infestation served as a trial area for control of garden loosestrife using herbicide. In 2003 the KCNWCP, working with the landowners and a contractor, applied glyphosate at 1.5%. Although it did not appear particularly effective during that growing season, by the beginning of 2004 we observed reported a 70% reduction in mature flowering plants. In 2004 we increased the application rate to 2% and reported increased efficacy within the same growing season, with brown-out occurring within three weeks. While this method seemed to work well, it also created a dead zone that quickly filled up, apparently with seedlings from the seed bank. Once a broad-leaf selective herbicide became available for aquatic use (triclopyr TEA), it was deemed to be the better choice. At a different infestation on Lake Burien in south

King County, the KCNWCP applied a 1.5% solution of triclopyr, which was newly approved for aquatic use in 2004, and found good control within a few weeks. Subsequently, triclopyr at 1.5% became the favored treatment for garden loosestrife since it allowed native monocots to survive and provide competition to further suppress re-infestation.

In 2007 and 2008, all garden loosestrife plants in the project area were treated with 1.5% triclopyr based on these prior findings. However, we quickly noticed that this treatment did not seem to kill the plants outright, but rather killed the top growth and left the underground structures intact to regrow. In 2009 Aquatechnex used 0.75% triclopyr on the hypothesis that 1.5% was too “hot” and the plant was shutting down before the triclopyr could translocate to the ends of the roots and rhizomes. In 2010, with no noticeable difference, we decided to change the concentration on each day of control. We sprayed 1.5% (the maximum label rate), 1%, 0.75% and 0.5% on consecutive days during our July treatment. Results will be monitored in 2011 and treatment adjusted accordingly. All off-channel sites that we had permission to treat were sprayed with 1.5% triclopyr except in the case of experimental treatments, described below.

date	location	method	chemical	rate
7/27/2007	Snoqualmie River	chemical	triclopyr	1.50%
7/30/2007	Snoqualmie River	chemical	triclopyr	1.50%
7/31/2007	Snoqualmie River	chemical	triclopyr	1.50%
8/6/2007	Snoqualmie River	chemical	triclopyr	1.50%
8/10/2007	Raging River	cut plants	n/a	n/a
9/12/2007	Snoqualmie River	chemical	triclopyr	1.50%
9/25/2007	Snoqualmie River	chemical	triclopyr	1.50%
7/28/2008	Snoqualmie River	chemical	triclopyr	1.50%
7/29/2008	Snoqualmie River	chemical	triclopyr	1.50%
8/4/2008	Snoqualmie River	chemical	triclopyr	1.50%
8/5/2008	Raging River	chemical	triclopyr	1.50%
8/6/2008	Raging River	chemical	triclopyr	1.50%
8/8/2008	Snoqualmie River	chemical	triclopyr	1.50%
8/13/2008	Snoqualmie River	chemical	triclopyr	1.50%
8/14/2008	Snoqualmie River	chemical	triclopyr	1.50%
8/18-21/08	Rutherford Slough	chemical	triclopyr	1.50%
9/11/2008	Snoqualmie River	chemical	triclopyr	1.50%
7/2/2009	Unnamed slough	chemical	imazapyr	3.00%
7/27/2009	Snoqualmie River	chemical	triclopyr	0.75%
7/28/2009	Snoqualmie River	chemical	triclopyr	0.75%
7/30/2009	Snoqualmie River	chemical	triclopyr	0.75%
7/31/2009	Snoqualmie River	chemical	triclopyr	0.75%
8/6/2009	Raging River	chemical	triclopyr	1.50%
8/7/2009	Farm Pond	chemical	triclopyr	1.50%
8/13/2009	Carnation Golf Course	chemical	triclopyr	1.50%
8/26/2009	Snoqualmie River	chemical	triclopyr	0.75%
8/27-28/09	Snoqualmie River	chemical	triclopyr	0.75%
8/31/2009	Snoqualmie River	chemical	triclopyr	0.75%
9/8/2009	Rutherford Slough	chemical	glyphosate	6.00%
6/30/2010	Rutherford Slough	dug plants	n/a	n/a
7/26/2010	Snoqualmie River	chemical	triclopyr	1.50%
7/27/2010	Snoqualmie River	chemical	triclopyr	1.00%
7/28/2010	Snoqualmie River	chemical	triclopyr	0.75%
7/29/2010	Snoqualmie River	chemical	triclopyr	0.50%
8/5/2010	Raging River	chemical	triclopyr	1.50%
8/6/2010	Carnation Golf Course	chemical	triclopyr	1.50%
8/23/2010	Rutherford Slough	chemical	triclopyr	1.50%
9/2/2010	Janecke Slough	chem injection	glyphosate	1ml/stem
9/20/2010	Snoqualmie River	chemical	triclopyr	1.50%
9/21/2010	Snoqualmie River	chemical	triclopyr	1.50%
9/21/2010	Snoqualmie River	cut plants	n/a	n/a

Table 3: Summary of Survey Results				
	2007	2008	2009	2010
Snoqualmie River				
Total river miles surveyed	27	30	30	30
Total river sites found	116	132	204	165
Average patch size	129 ft ²	78 ft ²	59 ft ²	31 ft ²
Smallest patch size	5 ft ²	5 ft ²	one plant	one plant
Largest patch size	3000 ft ²	8000 ft ²	2500 ft ²	500 ft ²
Total area found on river	.57 acre	.55 acre	.30 acre	.12 acre
Total off-channel sites known	1	3	5	6
Total area found off-channel			1.63 acres	2.49 acres
Raging River				
Total river miles surveyed	2	2	2	2
Total sites found	17	15	9	10
Median patch size	33 ft ²	24 ft ²		20 ft ²
Smallest patch size	One plant	One plant	One plant	One plant
Largest patch size	600 ft ²	900 ft ²	500 ft ²	500 ft ²
Total area found	.03 acre	.04 acre	.03 acre	0.02 acre
Total area in the Snoqualmie Valley			1.96 acres	2.63 acres



New growth from rhizomes of sprayed plants



Unnamed Slough, August 2008

Experimental control

A few logistical difficulties and our increasing skepticism about the efficacy of triclopyr encouraged us to try different control treatments during the project. When we happened upon the major garden loosestrife in the unnamed slough north of Fall City in 2008, the slough was completely impassable due to low water, deep muck and large amounts of woody debris. After a canoe survey in June 2009 when the water was high, we contracted with Woodland Resource Services to apply imazapyr while there was still enough water in the

slough to float a boat. We decided to try imazapyr since, of all the herbicides available for use on emergent aquatic weeds in Washington, it generally has the greatest efficacy on early growth stages. Later that season it appeared to have had some effect, but a canoe survey in June of 2010 showed an actual increase in the population from 2009. Since the slough remains impassable during later growth stages of garden loosestrife, and since we are not sure about the best way to control it, we chose not to attempt control of this population in 2010.

Rutherford Slough received annual doses of triclopyr from 2004 to 2008 with little noticeable additional decrease in the population from 2006 forward. Therefore, in 2009 we chose to switch to a glyphosate application in the southern arm of the slough where native woody shrubs dominate the shoreline, although we continued to apply the broad-leaf selective triclopyr to the northern arm of the slough where cattails and other native monocots are the principal competitors with garden loosestrife. In 2010, we found garden loosestrife growing vigorously in the brown-outs created by glyphosate, so we returned to triclopyr application for that season.

In 2010, we experimented with injecting glyphosate into cut stems. We located a patch of garden loosestrife with 29 stems all around one quarter inch at the base and injected one milliliter of concentrated glyphosate into each stem. For this purpose, we used a special injection gun with a short, thick needle that creates a cavity in the pith of the cut stem and then injects the herbicide into the cavity. This garden loosestrife patch was



isolated, so we will be able to see if the injection method can kill the entire plant. One month after injection the plants showed no signs of new growth. Although this method may prove successful, its use will be limited since it is rare to find a patch of garden loosestrife where all the stems are big enough to be injected.



Setting up meter plots

In 2010, we also set up three manual control plots at another site in south King County. Through careful digging, we manually cleared one-meter plots. One plot was in sand and intermixed with common spike-rush (*Eleocharis palustris*), one was a monoculture in muck, and one was among cattails in muck and one foot of water. In each case we cleared all roots and rhizomes from within the plot and a bit beyond. One month later showed no regeneration within the plots. Clearing the plot among cattails was labor intensive and probably not as thorough as the other plots. However, if this effort proves successful it may have applications for small populations where excavating is feasible.

Future Research

Plans are underway for further research into the biology and control of King County's garden loosestrife population. In 2010 Tim Miller of the WSU Mount Vernon Research and Extension Unit attempted to establish herbicide control trial plots at a private pond near Carnation. However, the

landowner pulled out of the project before it could be started. The KCNWCP is currently looking for a suitable location to continue the project. Dr. Miller had planned to do spring treatments of the following combinations of herbicides:

1. Glyphosate (2.5%) + Imazapyr (0.75%)
2. Glyphosate (2.5%) + Triclopyr (1.5%)
3. Imazapyr (0.75%) + Triclopyr (1.5%)

If a suitable location can be found, this will be done in early summer 2011.

In addition, the KCNWCP is attempting to determine the viability of seeds of our garden loosestrife population. A few seeds sown in pots in fall 2009 failed to germinate. In 2010, the KCNWCP collected a larger number of seeds and will conduct more controlled germination trials. Results may help inform control efforts in the future. For example, if germination is successful, we can be sure that manual control efforts (cutting and discarding plants before they can set seed) will help prevent spread. However, if seeds do not seem to be viable, we will know that complete removal of all vegetative parts, including roots, rhizomes and stolons, will be necessary to prevent spread.

Communication and Outreach

Snoqualmie River

The KCNWCP worked hard to make sure that every possible stakeholder was informed about the project. In 2007 we researched possible stakeholder groups other than adjacent landowners and sent informational letters to six groups, including the cities of Duvall and Carnation, Sno-Valley Tilth, Sno-Sky Agricultural Alliance, the Wild Fish Conservancy and Stewardship Partners. Of these, only the City of Duvall (also a river-front landowner) and Stewardship Partners indicated an ongoing interest in the project. Stewardship Partners suggested we hold a public meeting for valley residents, so in June 2007 we held a public meeting in Carnation. The meeting was attended by Stewardship Partners and two interested property owners, and although it was small, it seemed valuable to those who attended. We also got feedback from organic farmers along the river who were uncomfortable with the proposed use of herbicide. We therefore secured a statement from the Washington State Department of Agriculture Organic Food Program promising that our project would have no effect on the organic status of any farm. All of the organic farms except one decided to grant us permission to spray along the river. In most cases the loosestrife is near the waterline at the bottom of a steep bank that is topped with a tangle of thick vegetation screening the farms from the river, and a buffer distance of well over 25 feet was easily maintained. This explanation along with the statement from the WSDA Organic Food Program was enough to reassure almost all landowners.

There are about 218 parcels of land adjacent to the Snoqualmie River in the project area with about 97 different property owners, including private individuals, corporations, non-profit organizations and public agencies. Since control operations are complex and time consuming, we chose to get permission to treat the garden loosestrife from all landowners regardless of whether or not we had found plants by their property, thus allowing us to spray wherever we found it. On May 15th in each year of the project, we sent a letter to every property owner explaining the project and requesting their permission to conduct garden loosestrife control on or adjacent to their property along the river (see example in Appendix B). For each property owner with known garden loosestrife patches on or adjacent to their property, we also included maps showing the location of the weeds. We requested that the property owner sign a waiver allowing the KCNWCP to spray an approved aquatic herbicide on the garden loosestrife. In 2007 and 2008 we attempted to follow up with phone calls or e-mail each property owner who had not responded by the end of June. If we were unsuccessful in reaching the property owner by any means, a second letter was sent explaining that the state weed law (RCW 17.10) allowed us to do this weed control, and we would treat any garden loosestrife found along the river adjacent to their property unless we heard otherwise. A third letter each year was sent in the week before our first treatment alerting all landowners to the treatment schedule. Finally, we sent a report letter in the fall of each year with our findings. Examples of these letters can be found in Appendix B. In 2007 we had three landowners request that we not spray on their property, in 2008 we had two, and by 2009 there was only one who continued to deny us permission to spray. Unfortunately we found garden loosestrife on that property in 2009. We worked with the landowner to attempt other control methods, but the plants are inaccessible from the landward side, so in the end we cut these plants. Ultimately, the majority of the garden loosestrife along the river is at or below the ordinary high water mark, making it the legal responsibility not of the

adjacent landowners, but of the Washington State Department of Natural Resources, which has asserted ownership of the Snoqualmie River as a water of the state.

Raging River and off-channel habitats

In 2008, we contacted all property owners along the lower two miles of the Raging River. Of the 43 property owners on this part of the river, all but 13 have a levee easement which entitles King County to conduct vegetation maintenance activities on the river banks. Therefore, although we informed all of the landowners of our project, we requested permission to spray from only those 13 owners with no levee vegetation maintenance agreement. We were able to get permission from all of these owners, and all garden loosestrife was controlled each year. Other letters were sent as on the Snoqualmie River.

Since the garden loosestrife in off-channel habitats was all on private property, we worked much more directly with each of those landowners to gain control of these infestations each year. We were able to spray, or work with a contractor to spray, the infestations on Rutherford Slough and the Carnation Golf Course starting in 2008 (prior to that year the owners of Rutherford Slough were themselves hiring contractors) and the unnamed slough and farm pond in 2009. We injected the patch on Janecke Slough in 2010, and Oxbow Farm cut the garden loosestrife on their property in 2010.

Project Budget

The table below details the costs associated with this project in each of the four years since it began. The original grant agreement was for five years, 2007 to 2011. However, since the actual cost of the project has exceeded the total cost of the project as defined in the grant agreement, the Department of Ecology and KCNWCP agreed to close the grant one year early. The project itself will continue into the foreseeable future.

The original projected cost of the project was \$53,600. Since the Aquatic Weed Management Fund usually pays 87.5% of the total project cost for Early Infestation grants, we requested \$46,900 to provide for the expected cost of contractor services for the project period, with King County's expected share coming to \$6,700. The actual project cost total to date is \$74,946.02.

Budget	2007	2008	2009	2010	totals
Staff hours					
project administration	340	234	140	148	862
primary project area fieldwork	52	98	103	87	340
off-channel habitats fieldwork		30	58	92	180
total fieldwork	52	128	161	179	520
total hours	392	362	301	327	1382
Staff salary*					
project administration	\$8,727.80	\$6,156.54	\$3,862.60	\$4,164.72	\$22,911.66
primary project area fieldwork	\$1,895.66	\$1,953.47	\$2,980.58	\$2,980.58	\$9,810.29
off-channel habitats fieldwork	\$0.00	\$664.65	\$664.65	\$1,395.26	\$2,724.56
total fieldwork	\$1,895.66	\$2,618.12	\$3,645.23	\$4,375.84	\$12,534.85
total cost					\$35,446.51
Contractors					
primary project area	\$3,911.36	\$5,434.00	\$6,351.00	\$4,566.00	\$20,262.36
off-channel habitats		\$6,786.00	\$7,471.00	\$4,980.15	\$19,237.15
total contractor costs	\$3,911.36	\$12,220.00	\$13,822.00	\$9,546.15	\$39,499.51
Total Project Cost					\$74,946.02

*note: these numbers do not include benefits and overhead, which average about 83%

Next Steps

Our work with garden loosestrife in the Snoqualmie River basin is far from done. Our plans for the immediate future include the following:

- Continue to research garden loosestrife control methods
- Continue to research the physiology of King County’s garden loosestrife population, including possible chromosome and DNA analyses
- Work with the Washington State Department of Natural Resources to maintain control along the Snoqualmie River
- Work with public and private landowners to maintain control in off-channel habitat areas
- Continue to survey potential infestation sites

Project Timeline

2007

4/04/07	Grant awarded.
5/15/07	Sent letters to all landowners adjacent to the river within the project area and to other potential stakeholders.
5/29/07	Aquatechnex Inc. chosen as contractor.
6/11/07	Public meeting held in Carnation.
6/29/07	Final grant agreement signed.
6/15/07– 7/20/07	Sent follow-up letters and/or made phone calls to all landowners who did not respond to the initial letter.
7/20/07	Letter with control work schedule sent to all landowners.
7/27/07	Final contract with Aquatechnex signed.
7/27/07	KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches south (upstream) from the Tolt River boat launch as far as the blockage in the river just north of the Neal Road boat launch.
7/30/07	KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches between the Tolt River boat launch and NE 124 th St.
7/31/07	KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches between NE 124 th St. and the King/Snohomish County line.
8/06/07	KCNWCP staff found garden loosestrife on the Raging River.
8/10/07	KCNWCP staff survey lower two miles of the Raging River and cut all garden loosestrife plants found. Aquatechnex sprayed the only known patch of garden loosestrife upstream of the blockage by the Neal Road boat launch.

- 9/12/07 KCNWCP staff and Aquatechnex checked the area between NE 138th St. and one river mile north of the King/Snohomish County line. Ten new garden loosestrife patches were located and sprayed, and seven previously located patches were resprayed. The remaining 25 patches in this river stretch showed good control.
- 9/25/07 KCNWCP staff and Aquatechnex check the area between the Tolt River boat launch and 262nd Ave. NE. Nine new garden loosestrife patches were located and sprayed, and eight previously located patches were resprayed. The remaining 18 patches in this river stretch showed good control.
- 10/22/07 Landowner season report letter sent.
- 1/24/08 Sent 2007 progress report to Ecology.

2008

- 5/15/08 Initial landowner letters sent.
- 7/16/08 KCNWCP staff survey the garden loosestrife infestation on Rutherford Slough.
- 6/15/08–
7/23/08 Sent follow-up letters and/or made phone calls to all landowners who did not respond to the initial letter.
- 7/23/08 Letter with control work schedule sent to all landowners.
- 7/28/08 KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches on the west river bank southward (upstream) from the Duvall boat launch for about 9.5 miles.
- 7/29/08 KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches from the Duvall boat launch north to the King County line and continued the survey through Snohomish County to the river mouth.
- 8/04/08 KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches from Carnation southward for about 5.5 miles.
- 8/05/08 KCNWCP staff surveyed and sprayed garden loosestrife patches on the lower .75 miles of the Raging River.
- 8/06/08 KCNWCP staff surveyed and sprayed garden loosestrife patches on the next 1.25 miles of the Raging River.
- 8/08/08 KCNWCP staff surveyed and sprayed a large patch of garden loosestrife in forested wetland on the border between the Carnation Golf Course and Seattle Audubon's Carnation Marsh. We also located a large new infestation on an unnamed slough north of Fall City along SR 203.
- 8/13/08 KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches from Duvall to Carnation on the east river bank.
- 8/14/08 KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches between the Neal Road boat launch and the mouth of the Raging River.
- 8/18-21/08 KCNWCP contractor sprayed the garden loosestrife infestation on Rutherford Slough.

- 9/11/08 KCNWCP staff and Aquatechnex re-checked the area between Duvall and Carnation and between the Neal Road boat launch and the mouth of the Raging River.
- 11/07/08 Landowner season report letter sent.
- 11/26/08 Sent 2008 progress report to Ecology.

2009

- 5/15/09 Initial landowner letters sent.
- 6/08/09 KCNWCP staff surveyed unnamed slough north of Fall City.
- 7/02/09 KCNWCP contractor sprayed unnamed slough using imazapyr.
- 7/10/09 KCNWCP staff surveyed Rutherford Slough.
- 7/15/09 Second letter sent to 53 landowners.
- 7/23/09 Letter with control work schedule sent to all landowners.
- 7/27/09 KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches on both banks south from the Tolt River boat launch to the log jam just north of Neal Road.
- 7/28/09 KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches on both sides of the river from the Duvall boat launch north to the King County line, and south on the west bank for 8 miles.
- 7/30/09 KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches from the Tolt River boat launch north on both sides to the point we left off on the 28th.
- 7/31/09 KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches on the remaining stretch of the east bank south of Duvall, then south from the Neal Road boat launch to the mouth of the Raging River on both sides.
- 8/06/09 KCNWCP staff surveyed and sprayed garden loosestrife patches on the lower two miles of the Raging River.
- 8/07/09 KCNWCP staff surveyed and sprayed garden loosestrife around a farm pond near Carnation.
- 8/13/09 KCNWCP staff surveyed and sprayed a large patch of garden loosestrife in forested wetland on the border between the Carnation Golf Course and Seattle Audubon's Carnation Marsh, and surveyed and sprayed five other patches in wetlands and water features on the golf course.
- 8/26/09 KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches on both banks south from the Tolt River boat launch to the log jam just north of Neal Road.
- 8/27-28/09 KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches between Carnation and Duvall.

- 8/31/09 KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches north from Duvall to the county line and south from the Neal Road boat launch to the mouth of the Raging River
- 9/08/09 KCNWCP contractor sprayed the garden loosestrife infestation on Rutherford Slough.
- 12/14/09 Landowner season report letter sent.
- 12/23/09 Sent 2009 progress report to Ecology.

2010

- 5/15/10 Initial landowner letters sent.
- 6/09/10 KCNWCP staff surveyed Rutherford Slough.
- 6/16/10 KCNWCP staff surveyed unnamed slough north of Fall City.
- 6/30/10 KCNWCP staff surveyed Rutherford Slough, conducted manual control trials in southeast quadrant.
- 7/01/10 Second letter sent to 53 landowners.
- 7/21/10 Letter with control work schedule sent to all landowners.
- 7/26/10 KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches on both banks north from Duvall to the county line and south about 3.5 miles from Duvall. Sprayed with triclopyr TEA 1.5%
- 7/27/10 KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches on both sides of the river from the Tolt River boat launch to yesterday's stopping point except the west bank for three miles north of the boat launch. Sprayed with triclopyr TEA 1%.
- 7/28/10 KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches from the Tolt River boat launch north to the point we left off on the 27th and south to the pilings north of Neal Road on the west bank and back downstream two miles on the east bank. Sprayed with triclopyr TEA 0.75%.
- 7/29/10 KCNWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches on the remaining stretch of the east bank south of Carnation, then south from the Neal Road boat launch to approximately 1.5 miles upstream of the mouth of the Raging River on both sides. Sprayed with triclopyr TEA 0.5%.
- 7/30/10 KCNWCP staff surveyed several sloughs in the Stillwater Wildlife Area and found no garden loosestrife.
- 8/04/10 KCNWCP staff surveyed Oxbow Farm and found new infestation.
- 8/05/10 KCNWCP staff surveyed and sprayed garden loosestrife on the Raging River.
- 8/23/10 KCNWCP staff surveyed and sprayed garden loosestrife patches on the Carnation Golf Course.
- 8/23/10 KCNWCP contractor sprayed the garden loosestrife infestation on Rutherford

Slough.

- 8/24/10 KNCWCP staff led a tour of the middle Snoqualmie River garden loosestrife for WDNR and WDFW staff.
- 9/02/10 KNCWCP staff experimentally injected the garden loosestrife patch on Janecke Slough with glyphosate. We also surveyed Green Slough adjacent to the Carnation Golf Course and found no garden loosestrife.
- 9/20/10 KNCWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches north from Duvall to the county line and south from Duvall to NE 124th St. Water level was high, many patches were submerged. Sprayed with 1.5% Triclopyr TEA.
- 9/21/10 KNCWCP staff and Aquatechnex surveyed and sprayed garden loosestrife patches in the rest of the project area. Water level went up further overnight and very little garden loosestrife was not submerged. Water was high enough that pilings north of Neal Road were not blocking passage. Sprayed with 1.5% Triclopyr TEA.
- 12/20/10 Sent final report first draft to Ecology.

Appendices and Acknowledgements

Appendix A: Maps and Survey Data

Appendix B: Examples of letters

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