Invasive Knotweed Control in King County, Washington

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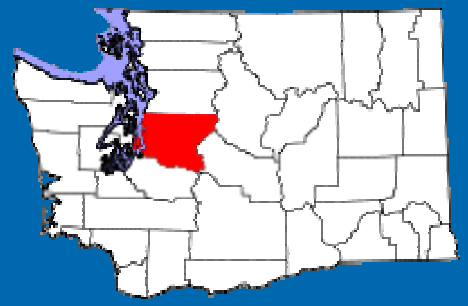
Where is King County Anyways?



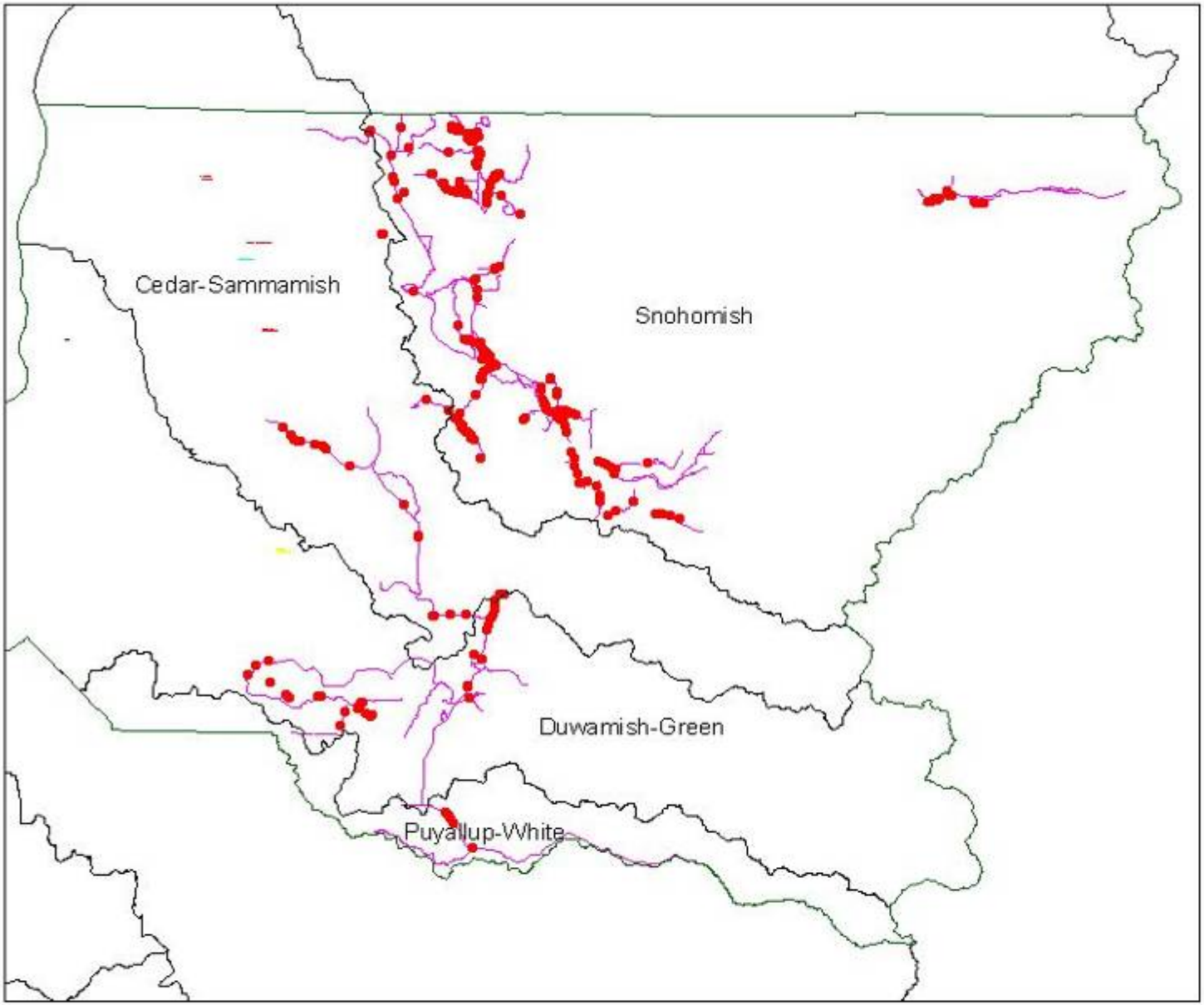
- Located in Western Washington
- Covers 2,100 square miles extending from the crest of the Cascade Range to Puget Sound, including Vashon Island
- 1.8 million people, including Seattle
- About 1,500 farms, most under 50 acres
- 25,000 acres of parks and trails
- 38% of the county is owned by State and Federal Government
- Major rivers include: White, Green, Cedar, Snoqualmie (South, Middle, North), South Fork Skykomish, Sammamish

Knotweed in King County

- Widespread, urban to rural and coastal to foothills; heaviest concentrations found along riparian corridors and road rights-of-way, also in residential gardens, wetlands, and upland areas
- UW Herbarium: most collections made since 2001, a couple of earlier collections in 1973 and 1987
- Four invasive knotweed species occur, at times together
  - ***P. X bohemicum*** is most common, usually male, sometimes female flowers, 2-3 meters tall
  - ***P. cuspidatum*** all female, 1.5 to 2.5 meters tall, fairly widespread
  - ***P. sachalinense***, both female and male specimens (usually female), 5 meters tall, not as common but can be quite dominant in some areas
  - ***P. polystachyum***, bisexual, a few scattered populations, each very dense but not expanding into adjacent areas noticeably quickly
- One long-time King County resident first saw knotweed in the 1960's in North Bend

2001 Survey of Rural King County

- Roads, trails, & levees of east and north King County
  - Snoqualmie Watershed:
    - Heavy infestations along lower river and also upland and roadside, less so on tributaries and in upper watershed
  - Cedar River Watershed:
    - Main river and creeks had sizable infestations, more limited within the Cedar River Watershed
  - Green River Watershed
    - sizable infestations on lower, less on middle and upper watershed
  - Skykomish River:
    - Significant infestations but limited or none on tributaries and upper
  - Greenwater River (on border with Pierce County)
    - None seen
  - Himalayan Knotweed: only a few limited populations found
- Conclusions:
  - Identified riparian areas that had limited knotweed where control might be cost-effective and provide significant habitat improvements



Legend

Kingco.shp
Hydrological WRIA boundaries
Polseccentroids.shp
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Knotweedsurvey2001.shp

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March 6, 2007

2 0 2 4 6 8 10 Miles

King County

2001 Knotweed Survey

King County, Washington

Public Interest and Concern about Knotweed in King County

- More people at workshops and events are aware of knotweed now than 3 years ago
- Growing interest in getting knotweed controlled on public property
  - In other words, we get a lot more complaints than we used to about knotweed!
- Most people who have it want to get rid of it
  - Most who have tried have not been very successful
  - Increasing demand for better control information and for help doing the control

Reasons Landowners Give for Not Controlling Knotweed

- Past efforts were mostly not effective
- Physical control is too difficult
  - Either have to dig too deep or have to cut stems more often than they can manage
- Chemical control is too expensive, too complicated, or simply not acceptable to them for other reasons
  - Don't know where, when, or what to spray
  - Stem-injection guns and aquatic herbicides are expensive
  - Permit and licensing requirements are expensive and/or confusing
  - Lack of spraying experience / scared of the unknown
  - Don't want to use herbicides (at all)
- Worry that knotweed will just re-infest their property from upstream or roadsides after all their hard work (what's the point if everyone doesn't control it!)

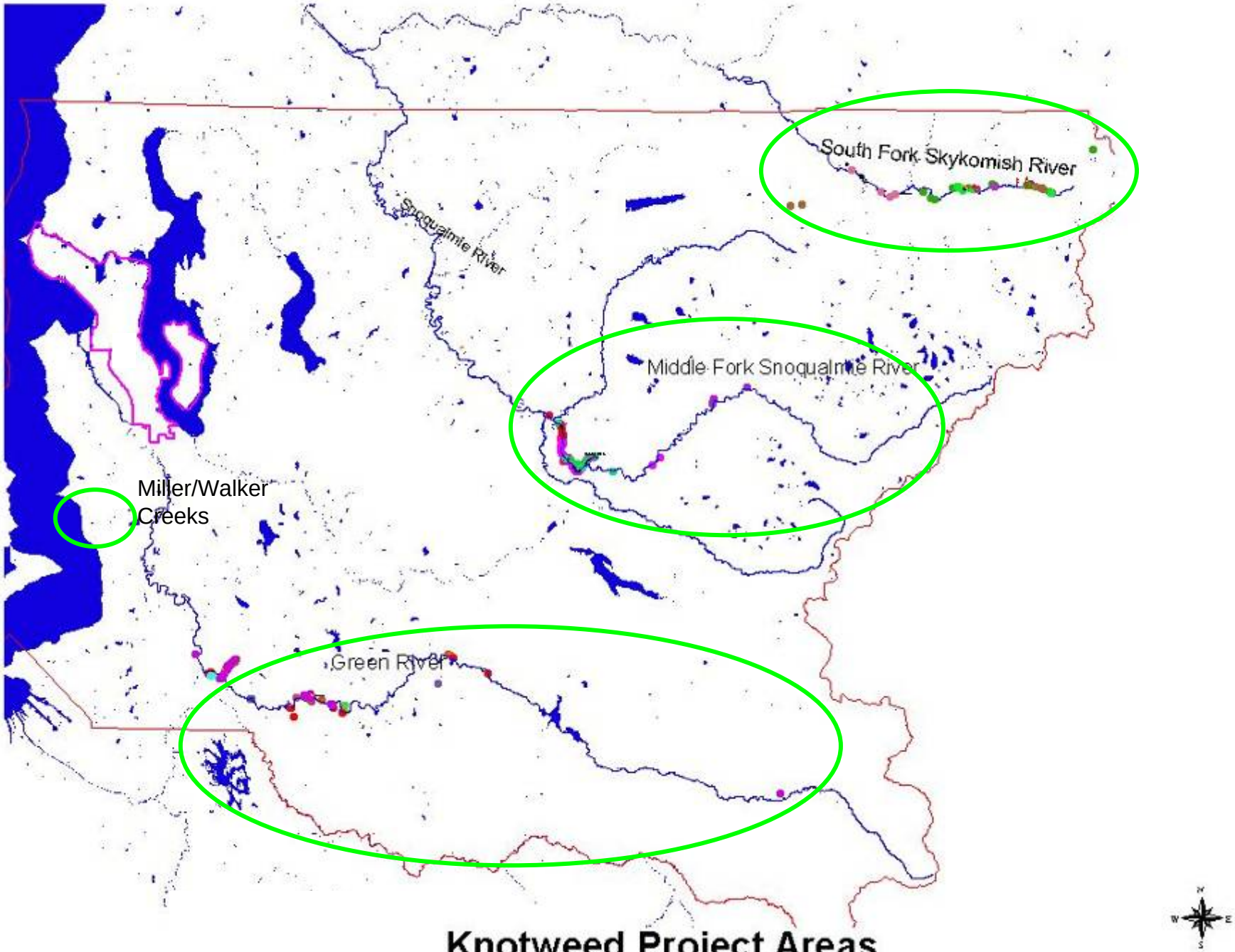
Measuring the Public Interest

- We responded to 100 phone or email inquiries or requests for presentations on knotweed in 2006
  - This was 13% of our total inquiries for the year; an increase of 100% from three years ago
  - 5 presentations or training workshops solely on knotweed; and most others included knotweed as a featured weed
- Knotweed fact sheets distributed in 2006
  - Printed copies: 1,010 distributed at events and by mail
  - Online version: 989 downloads of the online version
- Conclusion
  - Growing concern and more efforts to control but still not as much as there could be given the wide distribution

Knotweed, Knotweed, Everywhere

King County Knotweed Projects

- Share similar strategies
  - Cooperative and inclusive of all stakeholders
    - Need strong community and stakeholder support
  - Comprehensive and top-down
  - Protect and restore fish and wildlife habitat
- Present different challenges
  - Public vs. private ownership
  - Restrictions on methods – EA's/BA's, owner choices
  - Funding limitations (this is pretty universal!)
- Noxious Weed Program projects are only part of the knotweed efforts in the county
  - Cities like Lake Forest Park, Kent, Maple Valley, etc
  - Private landowners



Knotweed Project Areas

Knotweed Projects Overview

- Green River Knotweed CWMA
  - Upper and Middle Green River, lower Soos Creek and Crisp Creek
- South Fork Skykomish Knotweed CWMA
  - Foss River, Tye River, upper South Fork Skykomish, Beckler River
- Middle Fork Snoqualmie
  - 2006 was first season of work
  - Middle Fork Snoqualmie, Roaring Creek
- Miller/Walker Creek Project
  - Knotweed is one of many invasive weeds in this project, started in 2006

2006 Grants and Partner Contributions

Source	Amount	Match	Rivers
USDA-FS FHP	$31,200	$31,200	Green, Mid Fork Snoqualmie
WSDA	$15,000 (+ herb.)		Mid Fork Snoqualmie
USFWS	$6,678	$7,000	Green
Title II/RAC	$7,226	$7,300	SF Sky
CWMA Partners	$10,884		All three
TOTALS	$70,988	$45,500	$116,488

Data Collection Methods

- Surveys
  - Roadside and trailside spot checks
  - Stream-walking
  - River surveys by inflatable rafts and kayaks
- Data – collected with GPS units
  - Knotweed species, area infested, % cover of knotweed, growth stage, habitat type, proximity to river, condition of knotweed, UTM coordinates
  - Treatment method recommendation based on site conditions
  - Gross area=total area of knotweed infested land
  - Cumulative area=sum of the area of knotweed patches

Data Collection: Really Hard Work

Control Methods Used

- Foliar spray
  - From early July to mid-October
  - Backpacks or truck-mounted tank with hose
  - 2 % Aquamaster or AquaNeat (glyphosate) plus 1% Habitat (imazapyr) and 1% Agridex (surfactant)
- Stem-injection
  - From mid-July to late September
  - JK Injection stem-injectors, mostly long needles but short needles later in season
  - 3 ml undiluted Aquamaster or AquaNeat (glyphosate) in every cane with at least ½ inch wide stems (between first two nodes)
- Cut and Spray Combination
  - Did this in 2004 and 2005 but not 2006 because results showed no increase in control over spraying alone
- Covering with Geotextile Fabric
  - One site had this treatment; flooded areas lost fabric and knotweed continued to come up around fabric

Covering Method

Foliar Treatment

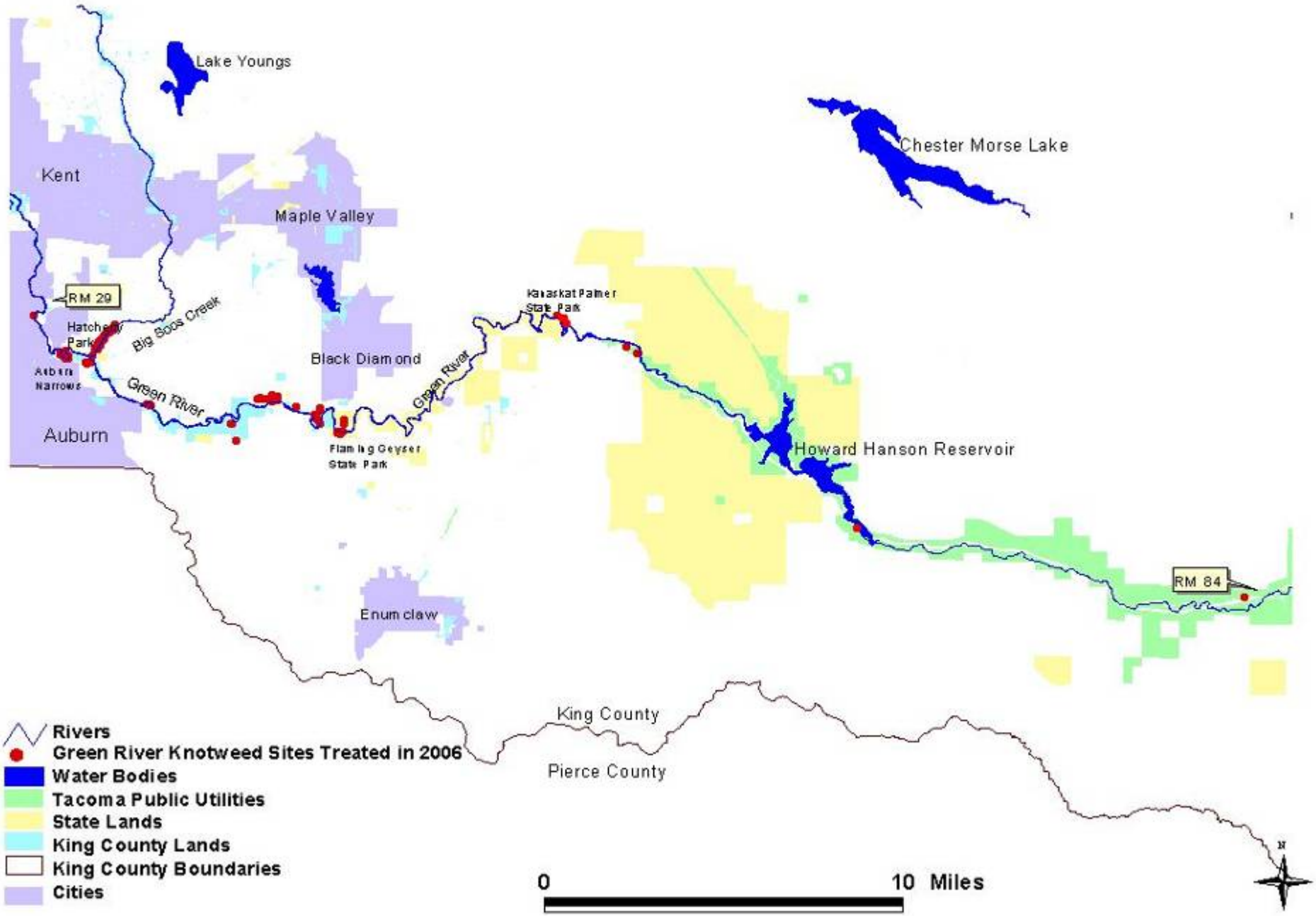
Stem-Injection

Dead knotweed canes following treatment with stem injection gun

Green River Knotweed Project

- Mostly public lands – predominantly state, county and city
- Some private properties
- Fish hatchery
- Most sites treated were within 600 feet of the river, most right on the river
- One large, highly visible site (Neely Mansion) a bit farther off was also treated

Green/Duwamish CWMA Invasive Knotweed Control Project



2006 Green River Surveys

- Intensive river survey of 16.5 river miles
- Remaining 38 river miles spot checked at known sites, road crossings, and select properties
- 2.5 miles of Soos and Crisp Creek surveyed on foot where they flow into the Green River

2006 Control

- All knotweed on the upper 54 miles from the upper watershed to Auburn Narrows controlled
  - 27 sites on the river or < 500 ft from the river were controlled
  - An additional 22 sites located > 500 ft from the water were not controlled due to budget constraints
- Also 13 sites on first couple of miles of Soos and Crisp Creek were treated
  - Additional sites have been reported on Soos Creek but a detailed survey still needs to be done

Results

- Stem-injection still being used along river's edge and where selectivity is especially important
  - Getting about 90-99% effectiveness
- Foliar spray with glyphosate or glyphosate/imazapyr for re-growth, large sites
  - Necessary follow-up to stem injection due to smaller stems on re-growth
  - Results are mixed – 75% to 90%
- Net infested acres reduced in project area
  - From 9.6 acres in 2005 to 6.7 acres in 2006, a 30% reduction
- Density of knotweed has decreased from >75% cover to <25% on all sites treated (most <10%)
- Two sites had no knotweed in 2006; one new site identified

Large Sites are Really Persistent!

Before control, starting to cut

2005, showing re-growth

Neely Mansion Site: 3 years of treatment

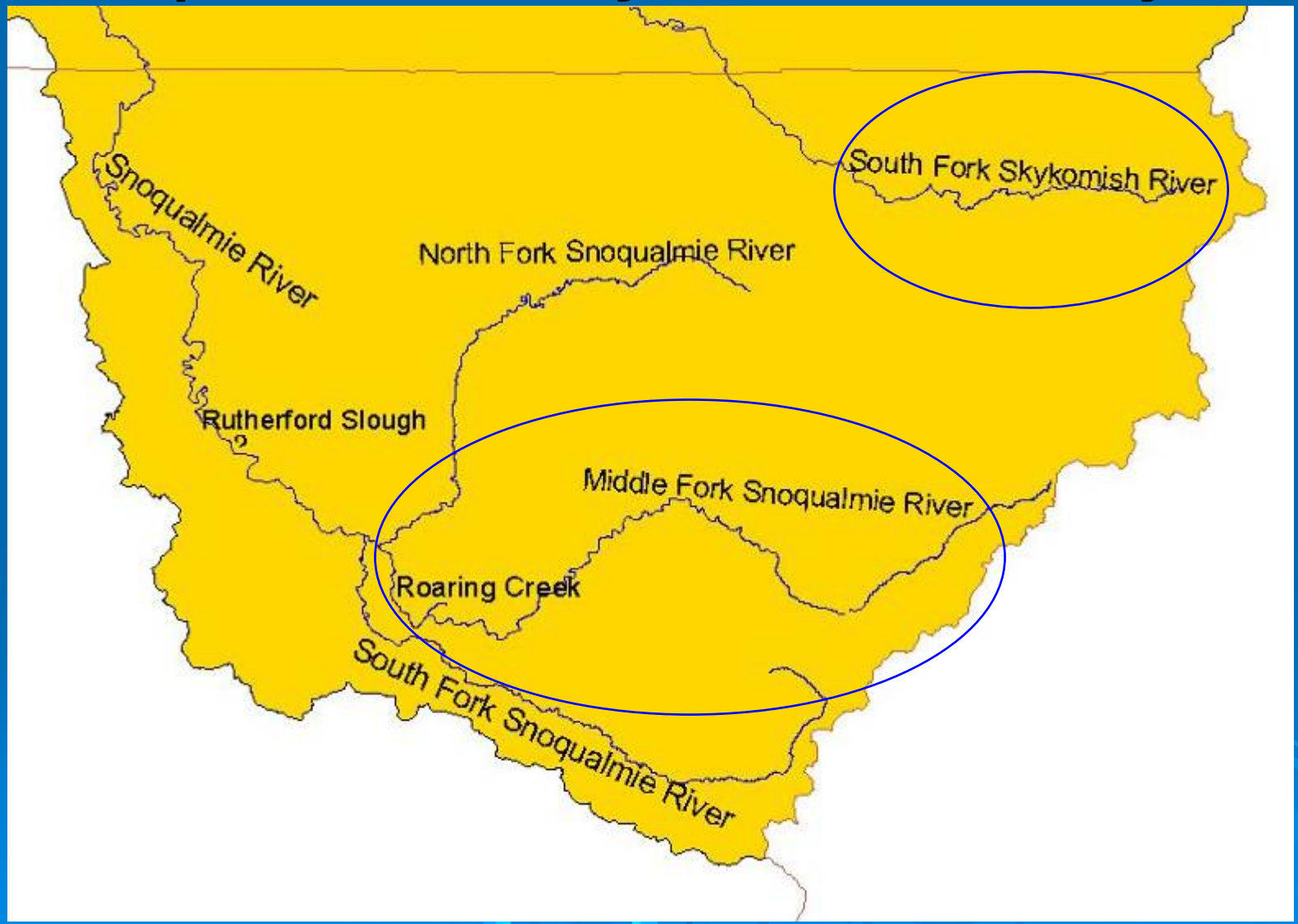
2006, after spraying, still some regrowth

- Above: Flaming Geyser State Park regrowth early 2005
- Left: Same area prior to treatment 2004

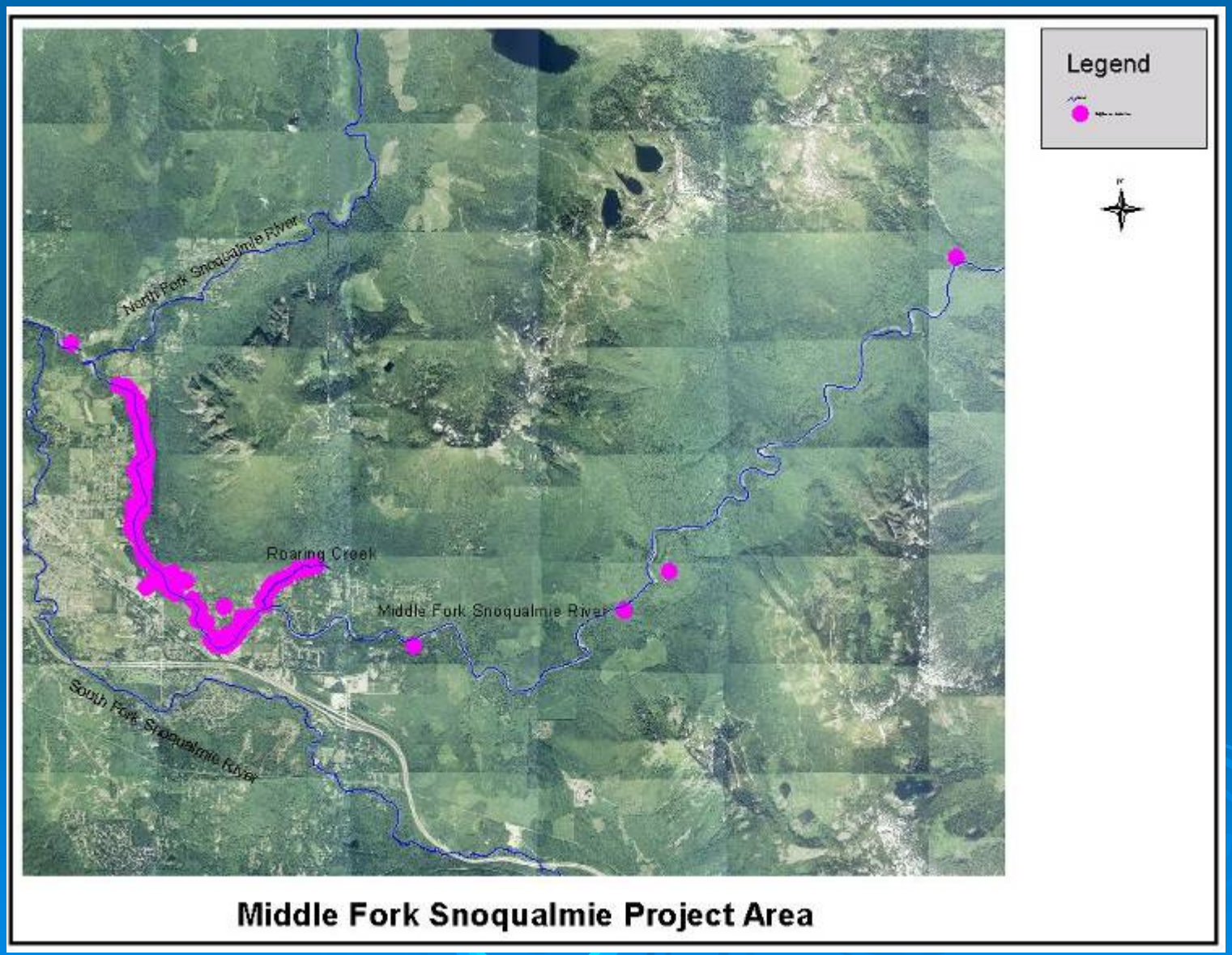
Future Issues on the Green River

- Heading into maintenance phase for upper and middle watershed
  - TPU is controlling their own sites now
  - Some other landowners/managers may also be able to take on follow up monitoring and control
  - Ongoing need for our program to re-survey and respond to new growth
- But, Wait, There's More
  - 2006 floods may mean a resurgence of new sites
  - Still considerable knotweed populations in upland areas of the watershed and on upper parts of some creeks flowing into the river
  - Lower Green River and its watershed remain heavily infested with knotweed

Snoqualmie/Skykomish Projects



Middle Fork Snoqualmie Project



Why the Middle Fork Snoqualmie?

- Complemented and expanded on existing efforts to remove invasives in watershed
  - MidFORC Community Group
  - Mountains to Sound Greenway Trust
  - Cascade Land Conservancy
  - King County Parks
- Middle Fork basin drains 8% of King County (over 110,000 acres) and is the longest river system in the county
- Snoqualmie Valley is one of the highest quality areas in the county for agriculture, forestry and natural resources
- Middle Fork is mostly free-flowing without fill and bank protection and provides high-quality habitat to cutthroat, rainbow trout and whitefish
- High quality salmon runs below Snoqualmie Falls depend on upper river's water quality

Middle Fork Snoqualmie Project

- Initial surveys, grant request, intensive surveys, and control all completed from April to September 2006
  - $39,231 spent in 2006 (not counting our match)
- Rafting survey showed upper limit of knotweed as RM 4.5
- Roadside survey identified a few roadside sites in upper watershed
- All qualified as priority sites

Middle Fork Snoqualmie Summary

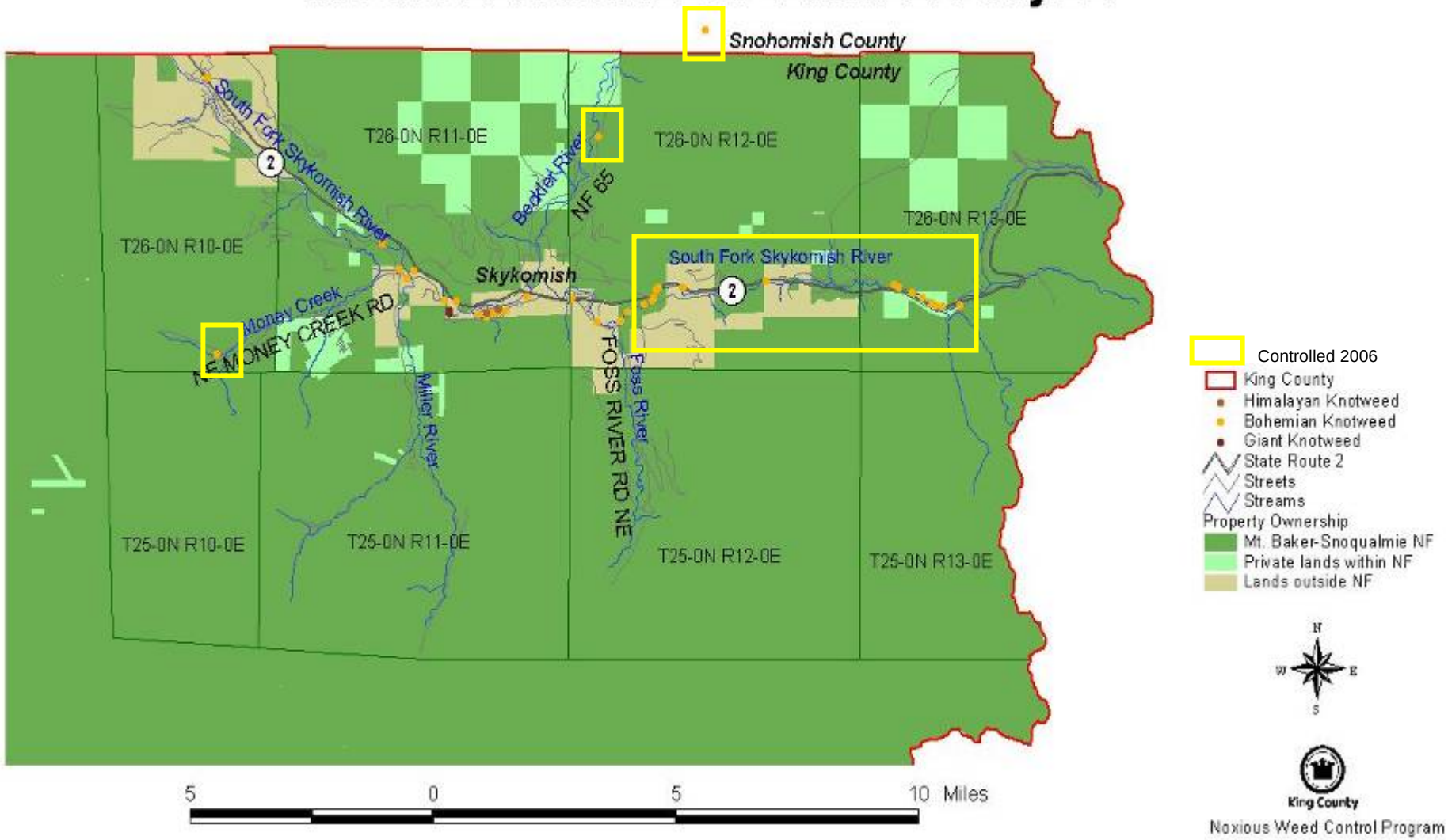
- 5 ½ river miles were controlled (including 1 mile on a tributary Roaring Creek)
- 53 total sites were found on river and 51 were controlled, most on private property
  - 44 sites privately owned, 4 King County, 5 Washington State
- All sites treated by stem-injection with glyphosate, most done with work crews from WCC and Earthcorps
  - 18.5 days with crews of 6 including crew supervisor
- 10.8 net acres treated within 27.5 gross infested acres
  - 0.75 acres not treated due to running out of time and money

Mid Fork Snoqualmie 2006: Before and After Shots

Skykomish River CWMA

- River provides high value habitat for fish and wildlife as well as for recreation and other uses
- Knotweed infestations are widespread downriver of Skykomish but upper reaches are not as bad
- Goal of project is to halt the invasion of knotweed in the upper watershed and to begin to reduce the impact on the river as a whole
- Received $10,000 in Title II funds in 2005 and $7,200 in 2006 (matched equal amounts in both years)
- Project area includes upper reaches of South Fork Skykomish, Foss and Tye Rivers
- Crosses private, forest service, state and BNSF property

Skykomish River, South Fork CWMA
Invasive Knotweed Control Project



Skykomish River CWMA

- Surveyed 21 non-contiguous miles in 2005 and 15 miles in 2006 including a raft survey, stream-walking on smaller tributaries and road surveys
- Project Area: 21.2 gross acres – 9.3 net acres treated 2005, 2.42 net acres treated 2006 (less $$ available)
- Crew time: 6 days of 6 member crews, down from 13 days in 2005 due to decreased funding
- Methods used: stem-injection near river, foliar spray on re-growth and road rights-of-way
  - Contracted with WCC and Earthcorps crews
  - USFS hired contractor to spray ROW sites using glyphosate
  - 2 private landowners adjacent to river began controlling knotweed on their own

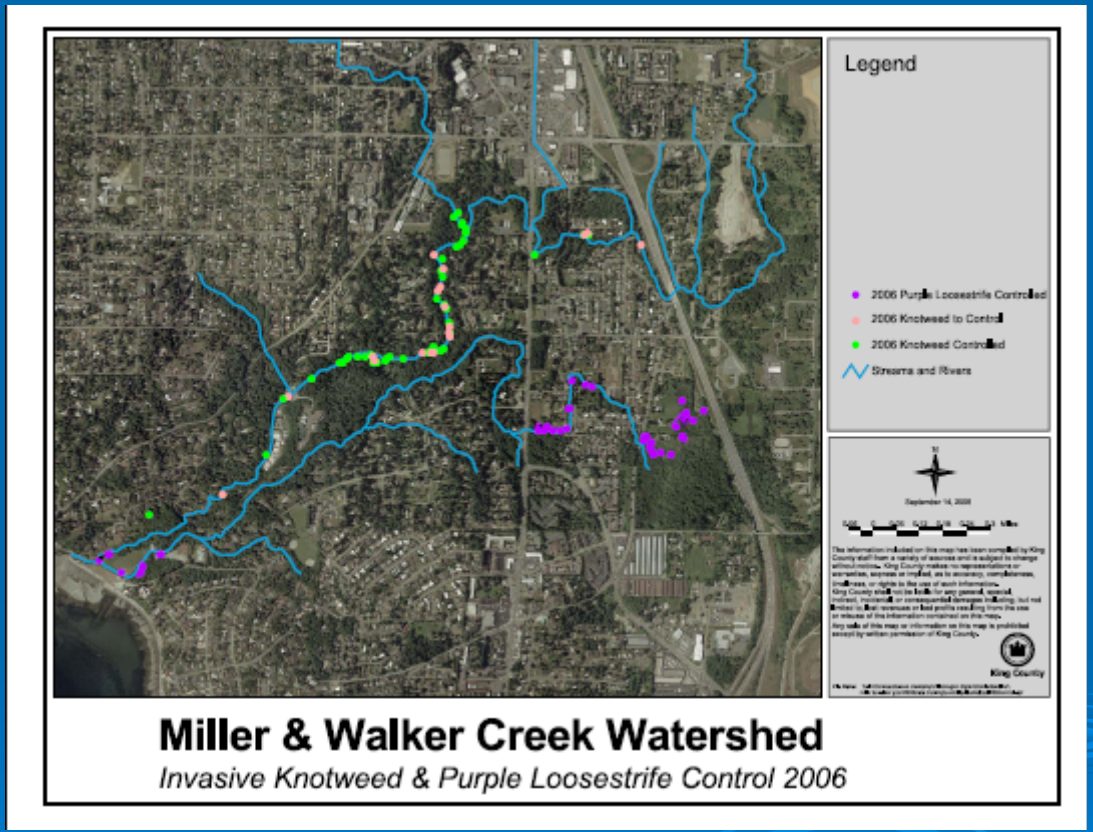
Knotweed infesting a remote area on the upper Skykomish River

Same site after treatment in 2005

Very little knotweed left in 2006, willows and other native species remain

Miller and Walker Creek Project

- Watershed-wide invasive weed control
- Port of Seattle funded ($35,000 grant)
- Knotweed and other weeds
- Relatively high quality urban stream through Burien and Normandy Park
- Strong community support



4,100 sq ft of knotweed controlled over 39 sites, most small and patchy and less than 25% cover, a few denser sites

Future Knotweed Project Priorities

- Continue to foster and develop cooperative partnerships and locate funding sources
- Monitor sites treated in previous years
- Provide follow-up treatment where needed
- Continue rapid response control of new infestations where possible
- Conduct additional surveys
- Continue offering citizen education and technical support

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