

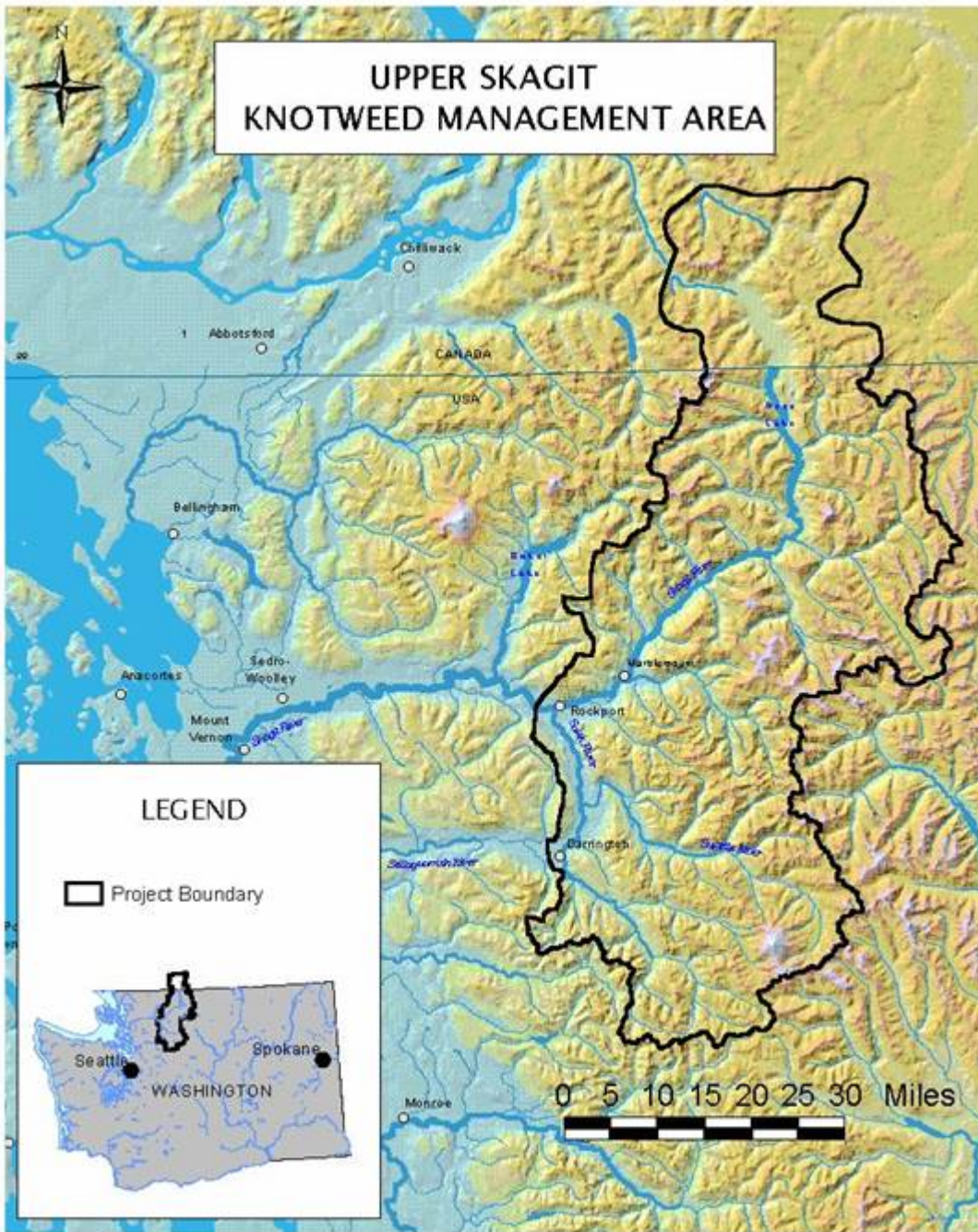
Landscape-Scale Knotweed Control in the Upper Skagit River Basin


March 15, 2007

Melisa Holman

Bob Carey

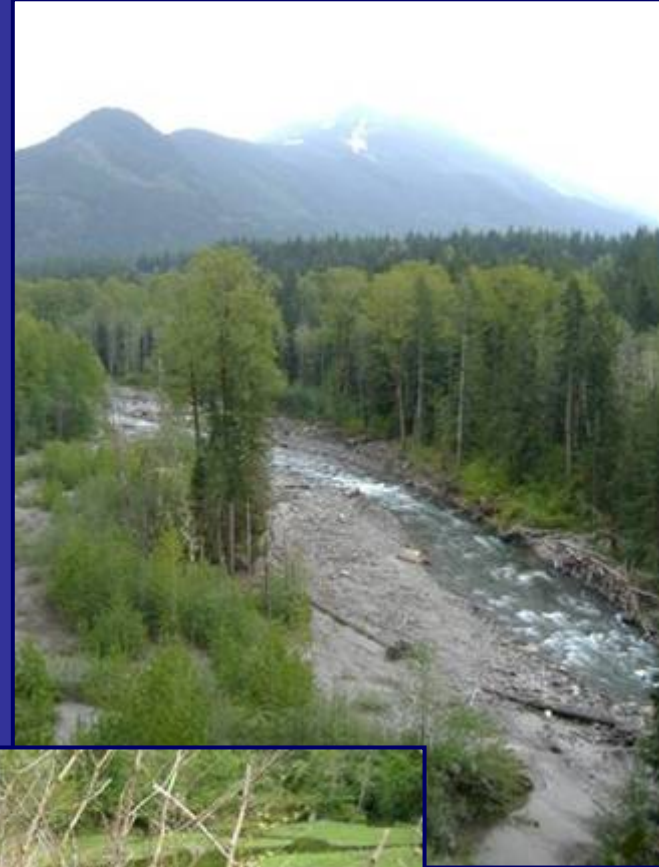
Peter Dunwiddie



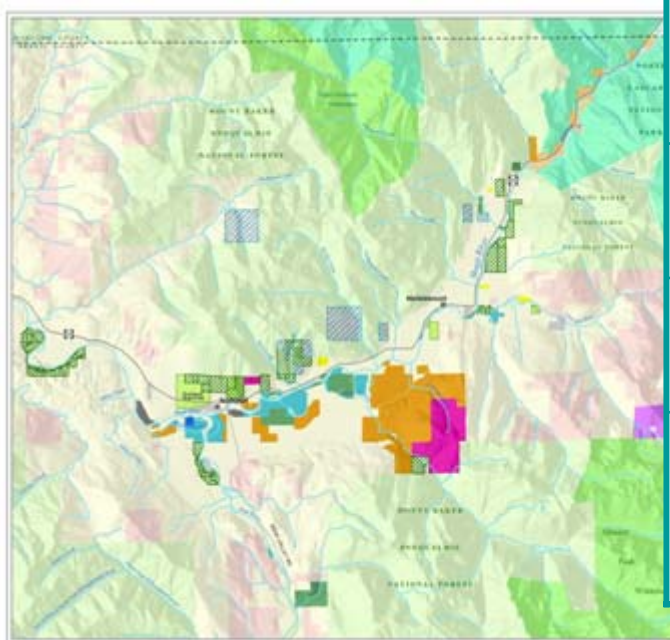
- 
- 1. Elements of a successful landscape-scale invasive plant control program**
 2. Challenges and learning opportunities

Elements of success

- Clearly defined project area
- Realistic program goals
 - Supported by interim objectives
- Reportable measures of control success
- Engaged partnerships of major landowners
- Coordination of partner effort
- Participation of small landowners
- Control strategy that is biologically-based, prioritized and adaptive



Delineation of Project Area



Items to Consider	State of Skagit River Program in 2000
Distribution of the target invasive	Throughout Skagit: more abundant in lower watershed
Extent and condition of priority conservation elements	Upper Skagit focus of past TNC conservation efforts; National Forest; National Park
Location of source populations	Far upriver in North Cascades National Park
Dispersal characteristics	Disperses vegetatively downriver
Assessment of feasibility given current and expected resources	Not enough resources to control in the entire Skagit Basin

Realistic goals...

Components to Define	Upper Skagit Project Definitions
Desired target species	Knotweed
Desired endpoint	Eradication
Project Area	Upper Skagit
Timeframe for goal achievement	Several years (implicit assumption)

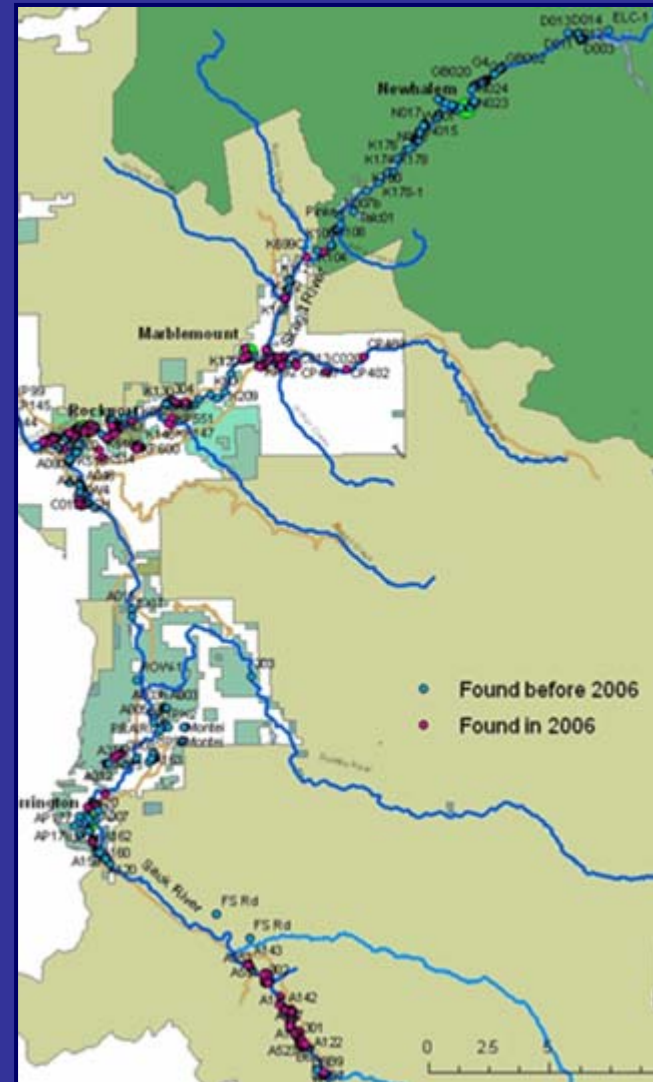


→ 15 years or more

→ SKWG goal = Eradicate invasive knotweeds in the Upper Skagit River Basin.

Realistic goals supported by interim objectives

- *Patch Elimination*
 - 50% patch elimination by 2006
 - 75% patch elimination by 2010
- *Patch Mortality*
 - 50% patch mortality by 2006
 - 55% patch mortality by 2007
 - 75% patch mortality by 2010
- *Knotweed-free River Miles*
 - 75% knotweed free by 2006
 - 90% knotweed free by 2010
- *Patches Eliminated vs. New Patches*
 - 2:1 patches eliminated to new patches by 2006
 - 3:1 patches eliminated to new patches by 2010



Reportable measures of success

Data informing yearly success

- 1080 total patches; 699 patches living (65%)
- 92% of patches monitored
- 82% of living patches treated
- Over 7 solid acres of knotweed treated
- 391 new patches found in 2006
 - 36% of total; 56% of living
- 75 patches newly eliminated
- 74 river miles and 161 road miles surveyed
- 107 cooperating private landowners – 26 new landowner permissions in 2006

→ *Yearly strategic plans based on size and strength of infestation*

→ *Adaptive changes in control regime*

Measures informing progress toward interim objectives

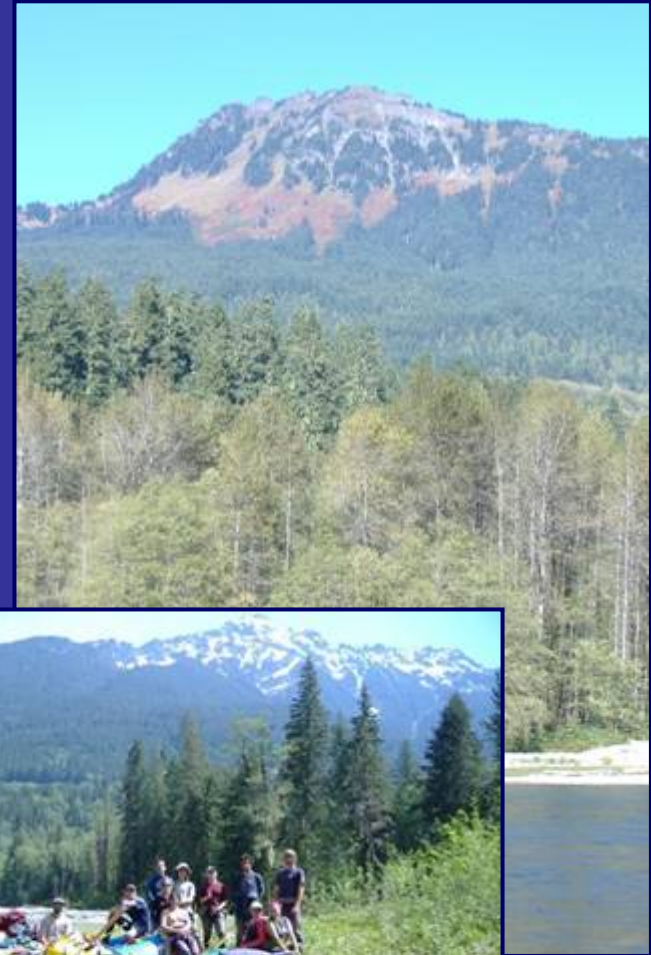
- 57% of patches found before 2006 have been eliminated
- 42% patch mortality
- 16.5% of patches resurrected
- 92% patches treated at least once
- 56% of living patches are new
- 67% of mainstem Upper Skagit River knotweed free

→ *Adaptive management*

→ *Answers to longer-term questions such as the efficacy of specific treatments or effects of patch size on mortality*

Engaged partnerships

- Major landowners across project area
 - 15 in Upper Skagit
- Various forms of engagement
 - Control, outreach
 - Funding
 - Planning
 - Research, expertise



Participation of small landowners

Barriers to Landowner Participation	SKWG Tools
<ul style="list-style-type: none">•Lack of understanding of threat and benefits of treatment	<ul style="list-style-type: none">•<i>Landowner visits</i>•Targeted mailings
<ul style="list-style-type: none">•Too much effort / cost	<ul style="list-style-type: none">•<i>Free treatments</i>
<ul style="list-style-type: none">•Lack of trust•No one else is treating	<ul style="list-style-type: none">•<i>Community liaisons</i>•Community meetings

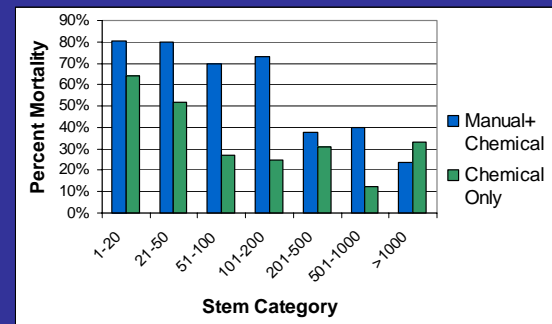


1) Biologically-based, prioritized strategy



Knotweed Biology / Ecological Context	Program Goals and Strategies
<ul style="list-style-type: none">• Ecologically damaging• Rapid rate of dispersal• High quality riverine and riparian systems	<ul style="list-style-type: none">• Goal of eradication
<ul style="list-style-type: none">• Downstream dispersal• Sources at top of watershed	<ul style="list-style-type: none">• <i>Prioritize</i> floodplain and top of watershed
<ul style="list-style-type: none">• Effectiveness of herbicide vs. non-herbicide methods• Availability of aquatically-licensed herbicides• Size of landscape	<ul style="list-style-type: none">• Glyphosate-based treatment strategy

2) Monitoring and adaptive management

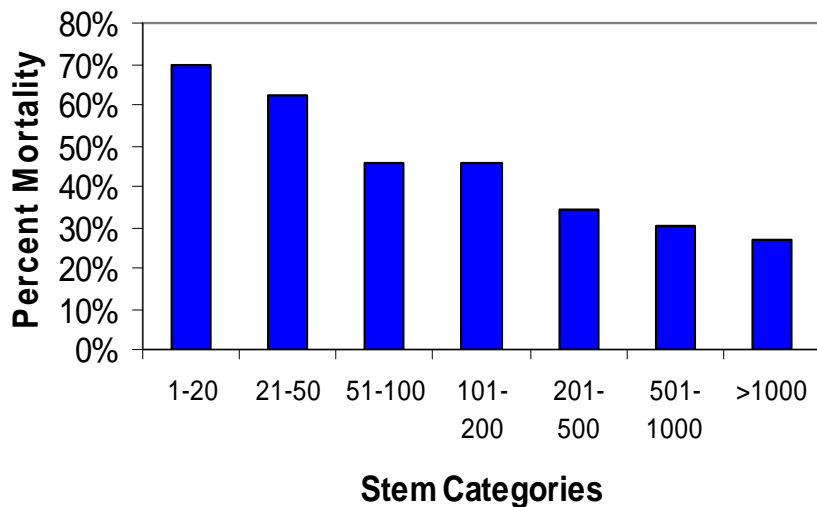


Glyphosate spray	2002	–Best available information – low risk herbicide
Spray + manual – sporadic use	2002	–Test phase
–increased use	2004	–Other program suggests manual + spray comparable to 2 spray treatments
–strategic use (patches > 50 stems)	2006	–Increased mortality for patches > 50-200 stems
Injection – test phase	2004	–New tool –use in inclement weather, lower risk?
–more widespread	2005	–Initial experimental results promising
–reduced use	2006	–Increased mortality doesn't hold after a year
Injection followed by spray	2006	–Used by other programs with apparent success
Glyphosate + imazapyr spray	2006	–Decreasing mortality rates with increasing years of treatment – experimental results show promise
Imazapyr only spray	2007 (proposed)	–Decreasing mortality rates with increasing years of treatment – experimental results show promise –Is glyphosate responsible for epinastic regrowth?
No treatment	2007 (proposed)	–Increased presence of epinastic regrowth – suggested by another program
More rigorous survey methods	2006	–Substantial spread following 2003 flood – Discovery of patches in previously under-surveyed floodplain areas

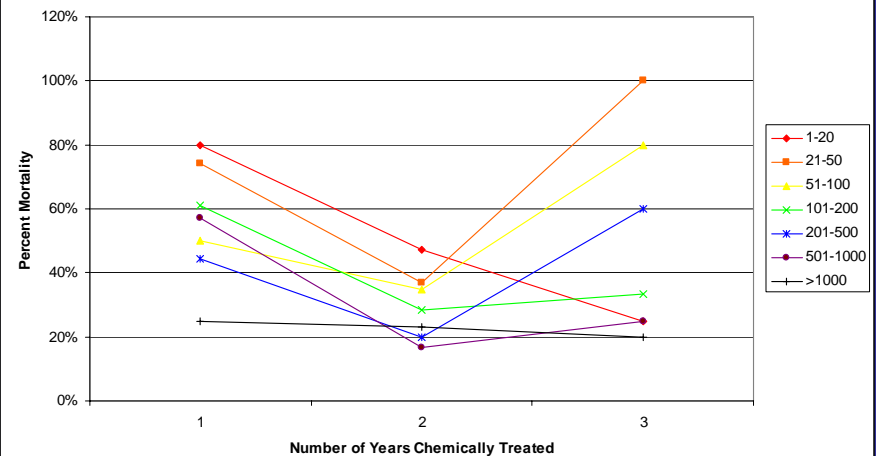
- 
- A scenic landscape view of a mountain valley. In the foreground, there is a dense forest of green trees. A river flows through the valley, winding between the hills. In the background, there are several mountain peaks, some with patches of snow, under a sky filled with white and grey clouds. The overall scene is a natural, mountainous environment.
1. Elements of a successful landscape-scale invasive plant control program
 2. **Challenges and learning opportunities**

KILLING KNOTWEED

- Persistence of some patches
- 42% patch mortality
- Decreasing mortality
- Hard to treat epinastic regrowth
- 16.5% “resurrection” rate



Percent Mortality of Knotweed Patches According to Stem Category and Years Treated



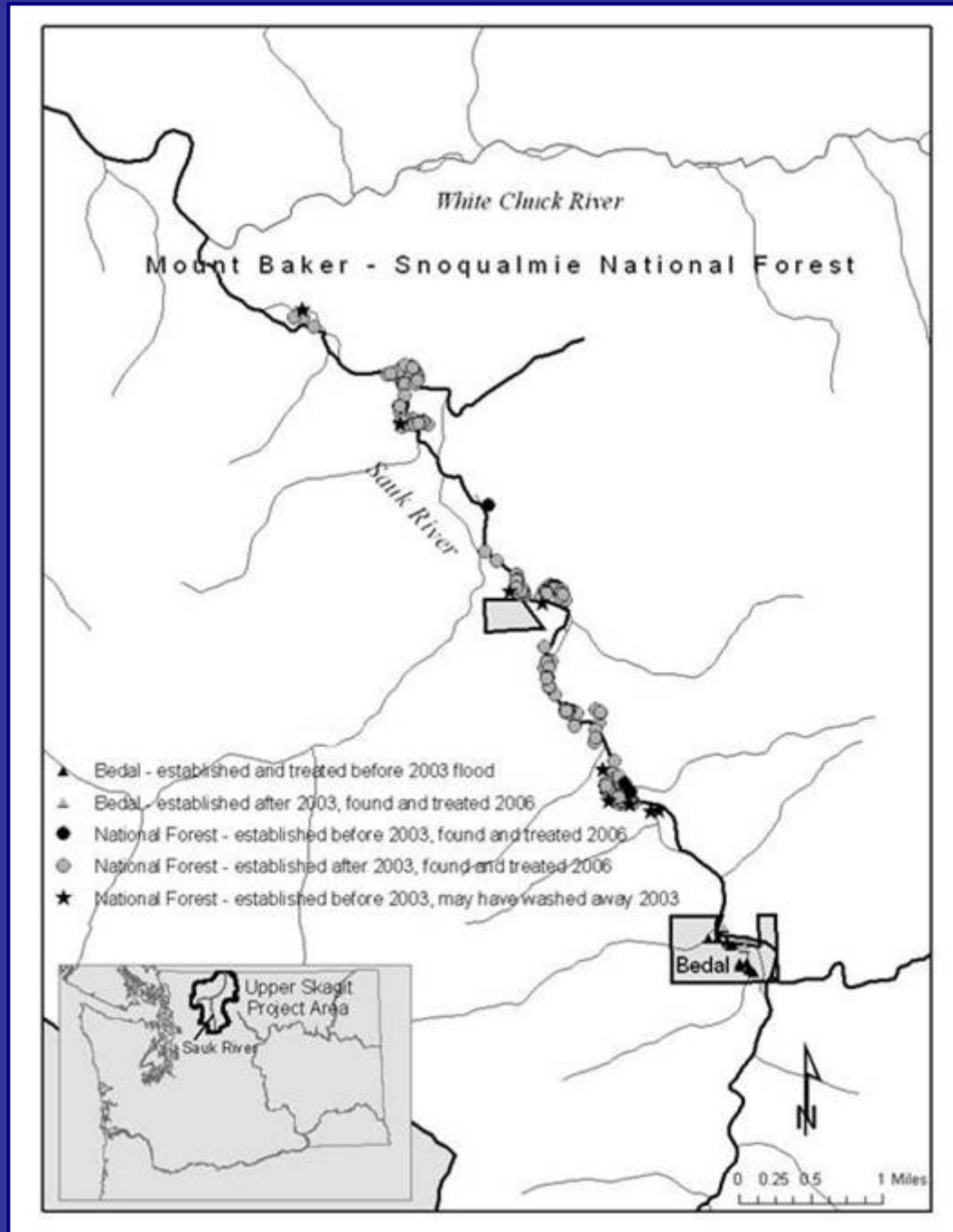
HIGH INFESTATION RATE

- Upper Sauk
 - 20 patches in 2003
 - 200 patches in 2006
- 36% of total patches found in 2006
- New flood in 2006

RESTRICTIONS

- Access to priority areas
- Herbicide-use delays

DECLINING FUNDING



Use of elements to address challenges

- Killing knotweed
 - Biologically-based, adaptive control strategy informed by monitoring
 - Realistic goals and interim objectives
- High infestation rate
 - Prioritized, rigorous survey
 - Partner coordination
- Restrictions
 - Partner coordination and commitment
- Declining funding
 - Partner coordination, dedicated coordinator, institutional support



Conclusion

- **Multiple components for successful landscape-scale program**
- **Every landscape-scale weed control program will have challenges**
- **Having a pre-determined strategy to promote success will provide a framework to better address challenges**

Upper Skagit Knotweed Working Group members

- North Cascades National Park
- Seattle City Light
- Skagit Land Trust
- Skagit County NWCB
- Snohomish County NWCB
- Stilliguamish CWMA
- TNC
- USFS / MBS National Forest
- University of Washington
- Washington Conservation Corps
- Washington Department of Fish and Wildlife
- Washington State Department of Agriculture
- Washington State Department of Natural Resources
- Washington State University
- Whatcom County NWCB

Funders

- Martin-Fabert Foundation
- NFWF
- TNC
- USFS
- USFWS
- WSDA



Thanks!

mholman@tnc.org