Upper Snoqualmie Invasive Weeds

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King County Noxious Weed Program

Agenda

- Project Overview and History
- Results – What's Been Found
- Identifying the Target Invasive Species and Other Weeds Found in the Project Area
- Survey Procedures

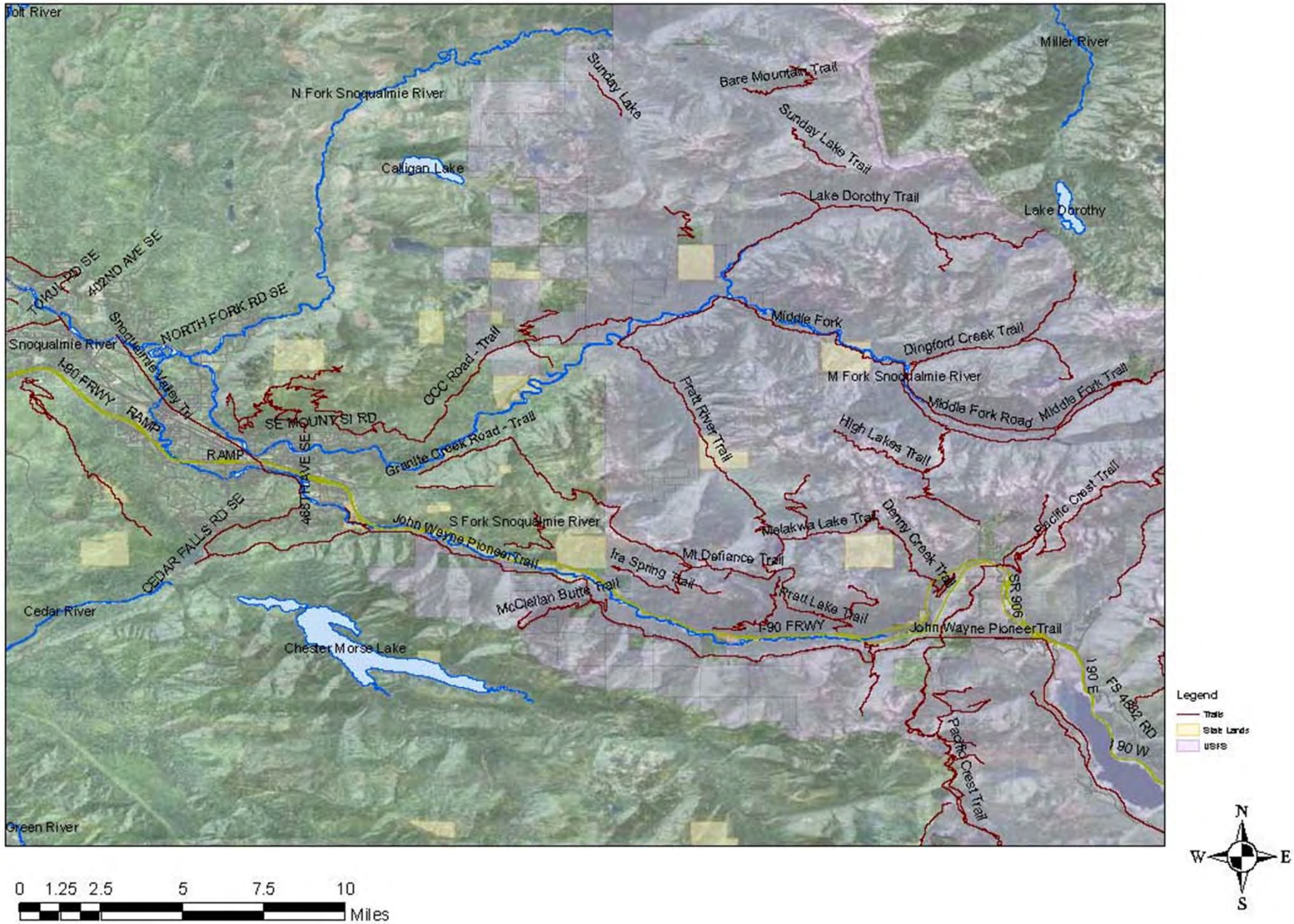
Upper Snoqualmie Invasive Weed Control Partnership

- Mark Boyar and friends - MidFORC
- Mountains to Sound Greenway
  - Survey and control work by staff
  - WCC crew time
  - Volunteer work parties
- US Forest Service
  - Laura Potash and Sarah Callaghan
  - Contractors
- WA DNR
  - Kelly Heintz, et al
- King County Noxious Weed Program
  - Volunteer training/coordinating and outreach
  - Knotweed control projects
  - Survey and control of regulated noxious weeds
- Weed Watcher Volunteers
  - Surveying and controlling weeds on trails
- Friends of the Trail
  - Tracking yard waste dump sites with weeds

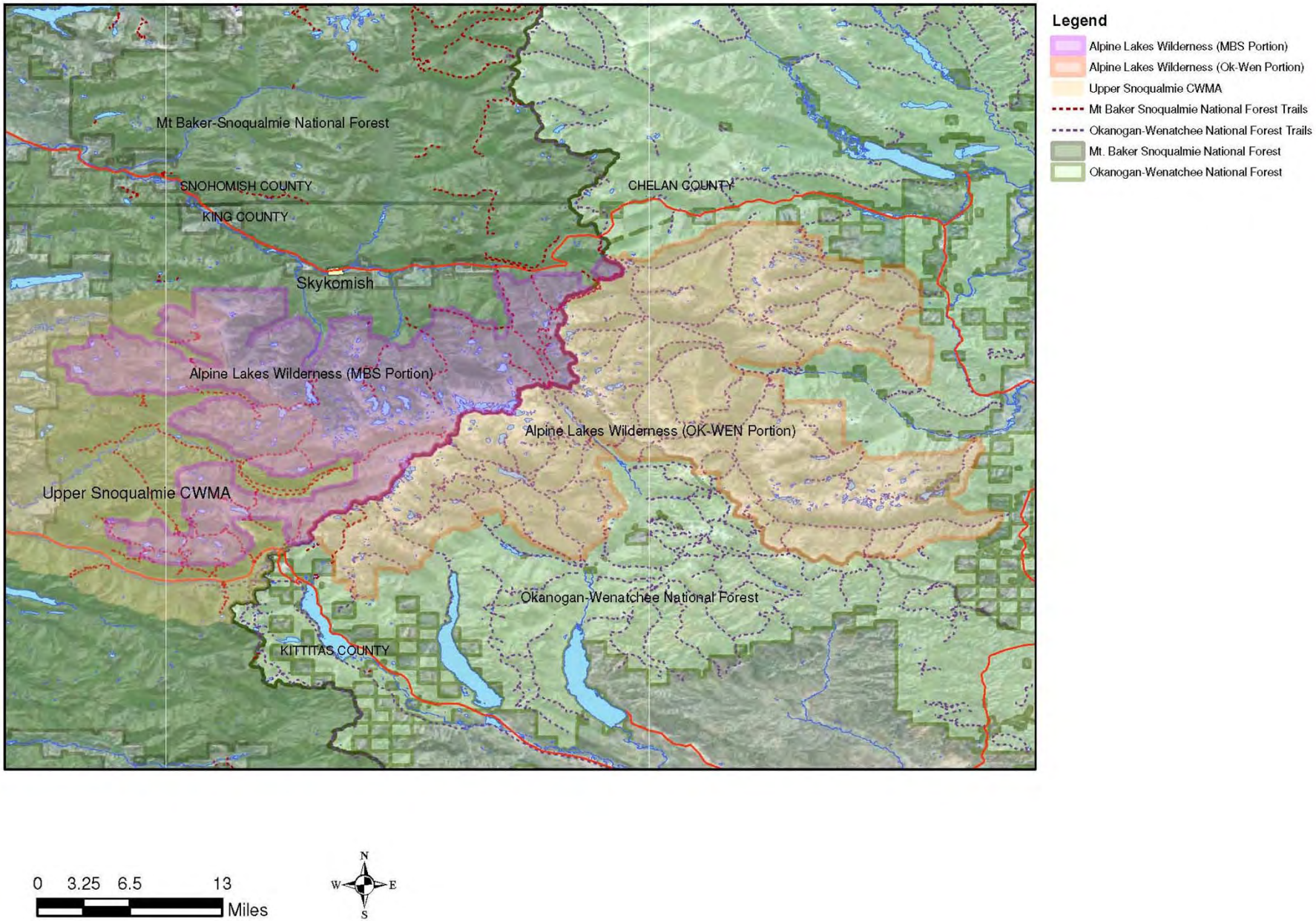
Survey History

- Started with the Middle Fork Snoqualmie Valley
  - 2006-2008
- Added the South Fork Snoqualmie area
  - 2009-2010
- Going East and West – Snoqualmie Pass area (Kittitas County) and Issaquah Alps area
  - 2010 and beyond
- Partnership with Mountaineers for the Alpine Lakes Wilderness

Upper Snoqualmie Cooperative Weed Management Area

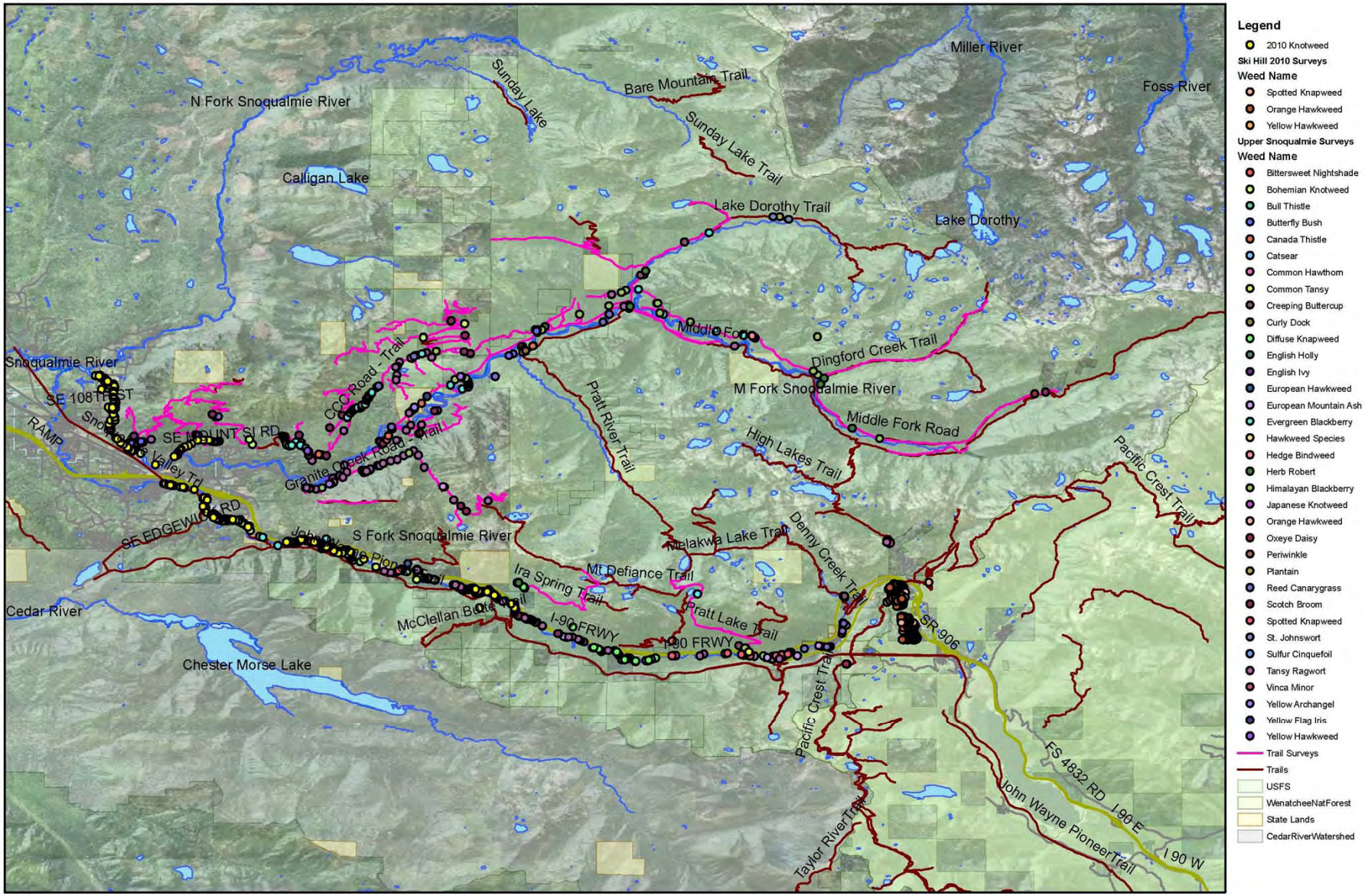


Alpine Lakes Wilderness Invasive Plant Control Project



Results To Date

Upper Snoqualmie Cooperative Weed Management Area



Non-Native Plant Species Found

Lesser Burdock	*Arctium minus*
Butterfly Bush	*Buddleia davidii*
Hedge Bindweed	*Calystegia sepium*
Spotted Knapweed	*Centaurea stoebe*
Canada Thistle	*Cirsium arvense*
Bull Thistle	*Cirsium vulgare*
Common Hawthorn	*Crataegus monogyna*
Smooth Hawksbeard	*Crepis capillaris*
Scotch Broom	*Cytisus scoparius*
Orchard Grass	*Dactylis glomerata*
Queen Anne's Lace	*Daucus carota*
Common Foxglove	*Digitalis purpurea*
Herb Robert	*Geranium robertianum*
English Ivy	*Hedera helix*
Orange Hawkweed	*Hieracium aurantiacum*
Yellow Hawkweed	*Hieracium caespitosum*
Common Velvet-Grass	*Holcus lanatus*
Common St. Johnswort	*Hypericum perforatum*
Hairy Cat's Ear	*Hypochaeris radicata*
English Holly	*Ilex aquifolium*
Yellow Flag Iris	*Iris pseudacorus*
Prickly Lettuce	*Lactuca serriola*
Yellow archangel	*Lamiastrum galeobdolon*
Nipplewort	*Lapsana communis*
Oxeye Daisy	*Leucanthemum vulgare*
Bird's-foot Trefoil	*Lotus corniculatus*
Black Medic	*Medicago lupulina*

White Sweet-Clover	*Melilotus alba*
Wall Lettuce	*Mycelis muralis*
Common Yellow Oxalis	*Oxalis corniculata*
Reed Canary Grass	*Phalaris arundinacea*
Timothy Grass	*Phleum pratense*
English Plantain	*Plantago lanceolata*
Common Plantain	*Plantago major*
Bohemian Knotweed	*Polygonum bohemicum*
Sulfur Cinquefoil	*Potentilla recta*
Self Heal	*Prunella vulgaris*
Meadow Buttercup	*Ranunculus acris*
Creeping Buttercup	*Ranunculus repens*
Rhubarb	*Rheum species*
Himalayan Blackberry	*Rubus armeniacus*
Evergreen Blackberry	*Rubus laciniatus*
Curly Dock	*Rumex crispus*
Tansy Ragwort	*Senecio jacobaea*
Woodland Ragwort	*Senecio sylvatica*
Bittersweet Nightshade	*Solanum dulcamara*
Prickly Sow-Thistle	*Sonchus asper*
European Mountain Ash	*Sorbus aucuparia*
Comfrey	*Symphytum officinale*
Common Tansy	*Tanacetum vulgare*
Common Dandelion	*Taraxacum officinale*
Red Clover	*Trifolium pratense*
White Clover	*Trifolium repens*
Common Periwinkle	*Vinca minor*

Priority Species for Mapping and Control

(in approx. descending order of area infested)

COMMON NAME	LATIN NAME	1st YEAR RECORDED
Himalayan Blackberry	*Rubus armeniacus*	2005
Evergreen Blackberry	*Rubus laciniatus*	2005
Scotch Broom	*Cytisus scoparius*	2006
Tansy Ragwort	*Senecio jacobaea*	2005
Spotted Knapweed	*Centaurea stoebe*	2006
Butterfly Bush	*Buddleia davidii*	2005
Bohemian Knotweed	*Polygonum bohemicum*	2005
Orange Hawkweed	*Hieracium aurantiacum*	2010
English Holly	*Ilex aquifolium*	2006
English Ivy	*Hedera helix*	2006
Yellow Hawkweed	*Hieracium caespitosum*	2006
Yellow Archangel	*Lamiastrum galeobdolon*	2006
Hedge Bindweed	*Calystegia sepium*	2005
Bittersweet Nightshade	*Solanum dulcamara*	2005
European Mountain Ash	*Sorbus aucuparia*	2005
Common Periwinkle	*Vinca minor*	2005
Yellow Flag Iris	*Iris pseudacorus*	2006
Common Hawthorn	*Crataegus monogyna*	2009
Sulfur Cinquefoil	*Potentilla recta*	2009
Spotted Jewelweed	*Impatiens capensis*	2011?

Invasive Plant Species in the Upper Snoqualmie Basin (a.k.a. The Weeds)

Weed Priorities

- Within the wilderness: goal is to locate and remove all non-native plants
- Leading into the wilderness emphasis is on species with the highest potential impact and new invaders
- Washington State Noxious Weeds
  - e.g. tansy ragwort, knapweed, knotweed, blackberry, butterfly bush, English ivy, oxeye daisy
- Other non-native species that invade native plant habitats
  - e.g. bittersweet nightshade, jewelweed, periwinkle, foxglove
- Less important
  - Species that have less impact and are already common near the wilderness

Priorities by National Forest

Mt. Baker Snoqualmie	Okanogan-Wenatchee
Bull Thistle	Bull Thistle
Canada Thistle	Canada Thistle
Hawkweeds	Hawkweeds
Spotted Knapweed	Spotted Knapweed
Sulfur Cinquefoil	Sulfur Cinquefoil
Tansy Ragwort	Tansy Ragwort
Absinth Wormwood	Absinth Wormwood
Evergreen Blackberry, Cutleaf Blackberry	Evergreen Blackberry, Cutleaf Blackberry
Oxeye Daisy	Oxeye Daisy
Scotch Broom	Scotch Broom
Common Tansy	Common Tansy
Himalayan Blackberry	Himalayan Blackberry
English Holly	Cat's Ear
Herb Robert	Diffuse Knapweed
Bittersweet Nightshade	St. Johnswort
Butterfly Bush	Houndstongue
Common Comfrey	Meadow Knapweed
Common Periwinkle	Brown Knapweed
English Ivy	Chicory
Knotweed	Common Groundsel
Policeman's Helmet	Curly Dock
Yellow Archangel	Foxglove
	Musk Thistle
	Russian Knapweed
	Woodland Ragwort

Thistles

Canada Thistle (*Cirsium arvense*)

Bull Thistle (Cirsium vulgare)

Large spines on stems, leaves and under the flower head

Identifying Thistles at Rosette Stage

Canada

Bull

Musk Thistle (*Carduus nutans*)

Native Thistles

Knapweeds

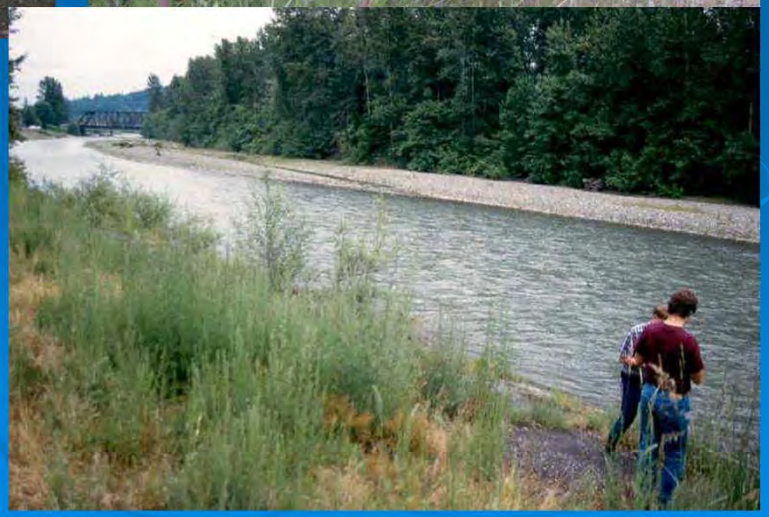
Spotted Knapweed (*Centaurea stoebe*)

Class B Noxious Weed

- Grows 3 - 5 feet tall, perennial
- Pink to purple flowers
- Dark fringe on bracts

Spotted Knapweed

Spotted Knapweed Habitat



Diffuse Knapweed (*Centaurea diffusa*)

Class B Noxious Weed

- Biennial: can be annual or short lived perennial
- Bracts are spine-tipped

Diffuse Knapweed Habitat

Meadow Knapweed
(*Centaurea jacea* x *nigra*)

Class B Noxious Weed

Hawkweeds

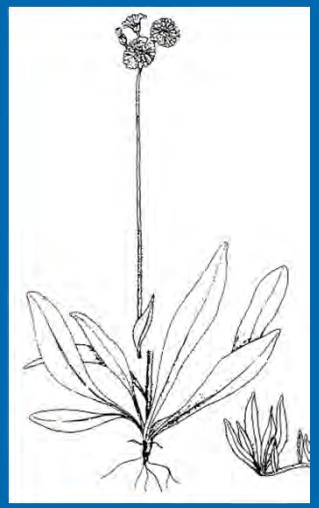
Hawkweeds (*Hieracium* spp.)

- Among the most troublesome weeds in the PNW
- First species arrived about 50 yrs ago and now there are over 14 species of invasive hawkweeds in the PNW
- Grow well in disturbed areas with soils that are well-drained, coarse-textured, low in organic matter
- Road shoulders are perfect habitat and seeds disperse with traffic and mowers

Orange and yellow hawkweed in meadows at Snoqualmie Pass

Hawkweeds in Western WA

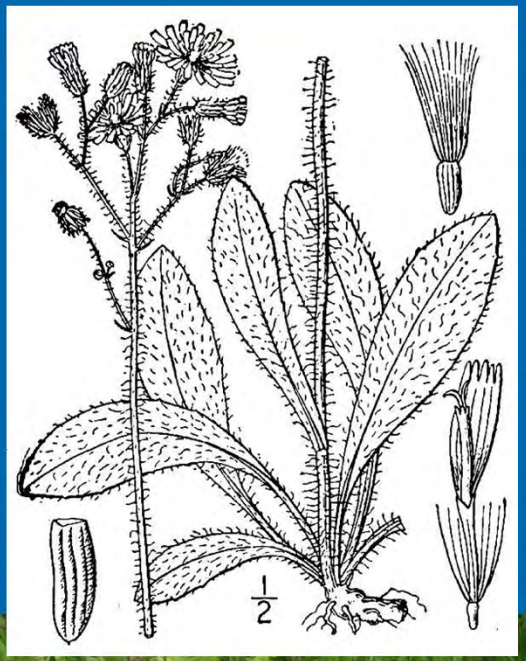
- GROUP 1 – Leaves mostly basal without obvious teeth
  - **Mouseear Hawkweed** (*H. pilosella);* Class B
  - **Orange Hawkweed** (*H. aurantiacum*); Class B
  - **Yellow Hawkweed** (*H. caespitosum*); Class B
  - **Tall Hawkweed** (*H. piloselloides*); Class C
  - **Yellow Devil Hawkweed** (*H. floribundum*); Class A



- GROUP 2 – Has leaves on stems, leaves toothed, flower heads often in looser cluster
  - **European Hawkweed** (*H. sabaudum*); Class A
  - **Common Hawkweed** (*H. lachenalii*); Class C

Hawkweed Group 1 – Key ID Characters

- Stems and leaves have stiff hairs
- Spatula shaped leaves, no teeth
- Often have stolons
- Small flowers, in tight clusters near tops of stems, buds and bracts covered with black hairs



Orange and Yellow Hawkweed

Class B Noxious Weeds

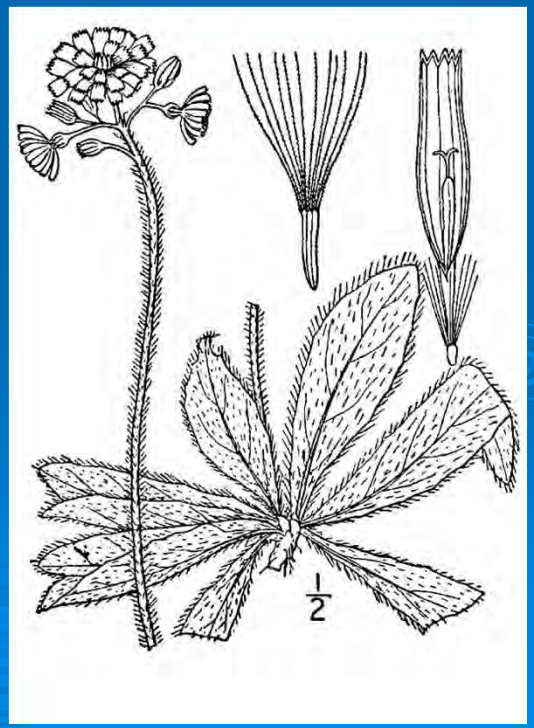
Orange and yellow hawkweed have escaped gardens to invade mountain meadows in the Cascades

Class B Noxious Weed

Orange Hawkweed

(*Hieracium aurantiacum*)

- Flowers orange, in tight clusters
- Stems leafless with black hairs
- From a few inches to 2 feet tall
- Reproduces by seed and runners
- Bolts: May-June
- Flowers: Late May to Sep/Oct
- Seeds: Late June to Fall



Orange Hawkweed Up Close

Orange Hawkweed

Class B Noxious Weed

Yellow Hawkweed

(*Hieracium caespitosum*)

Flowers: Yellow, in tight clusters

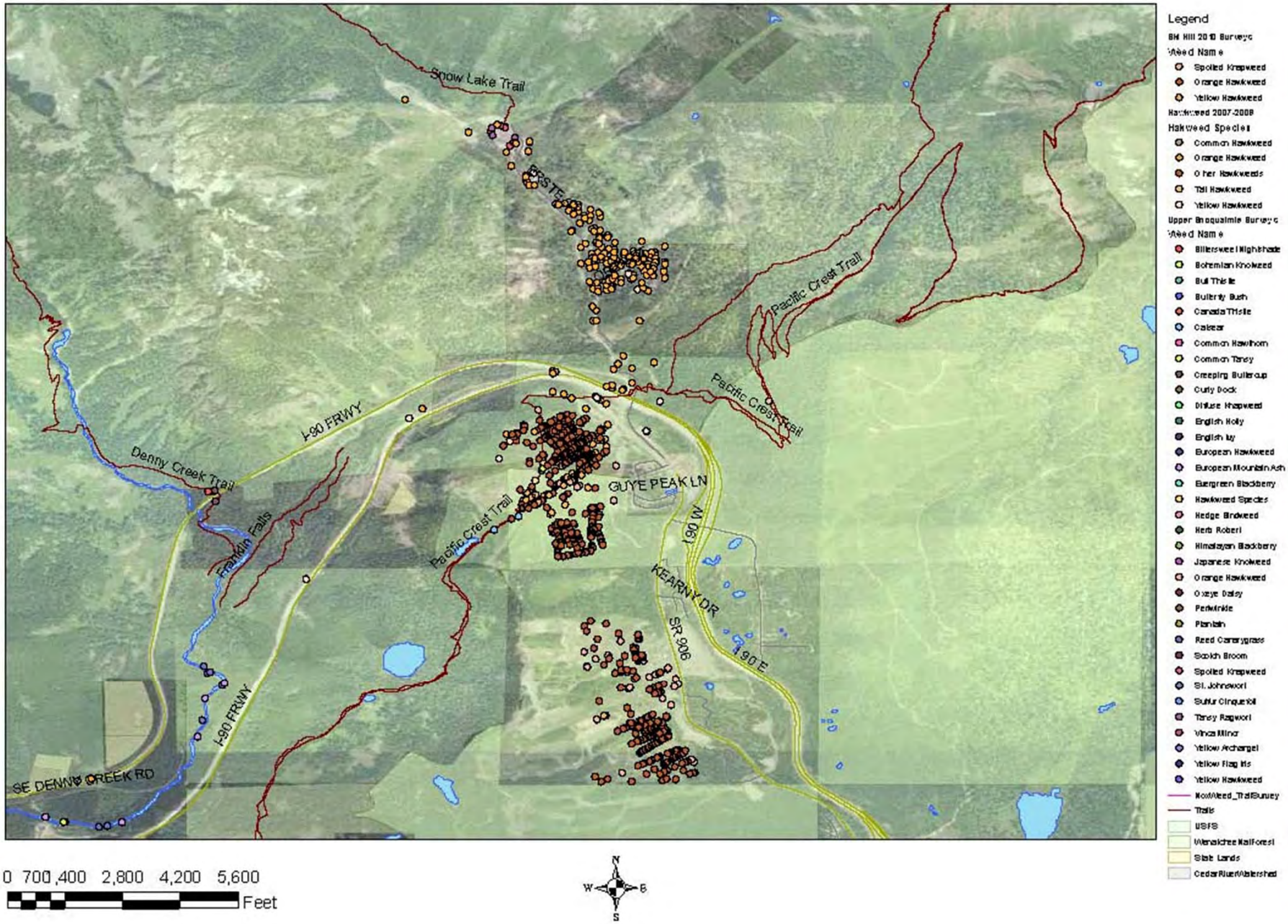
Leaves: Hairy on top and bottom, glandular and stellate hairs

Roots: stoloniferous, rhizomatous

Yellow Hawkweed Up Close

Yellow Hawkweed Rosette

Snoqualmie Pass Weeds



Snoqualmie Pass

Orange and yellow hawkweed infestations on ski hill

Hawkweeds GROUP 2 – Flowers yellow Leaves on stem, toothed

- No basal leaves at flowering; heads small, numerous, hairy; stem leaves about 50, crowded at base, plants 1 to 4 ft tall
  - **European (*H. sabaudum*)**
- Basal leaves persistent, leaf base tapered, heads large, 4-12, hairy, stem leaves 4-7, plants ½ to 2 ½ ft tall
  - **Common (*H. lachenalii*)**

Hawkweeds GROUP 2 - European and Common Hawkweed

Class A Noxious Weed

European Hawkweed

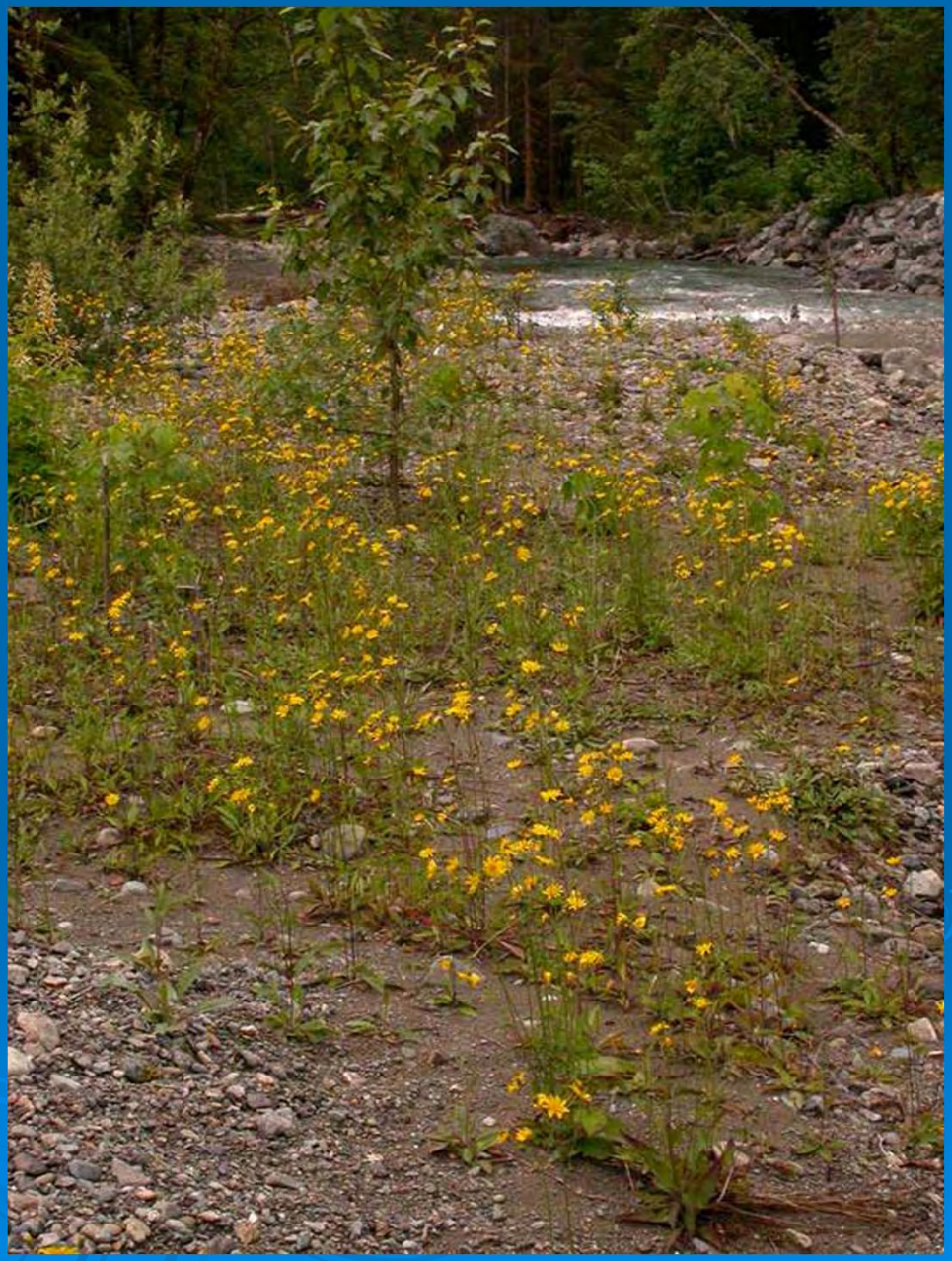
Class A Noxious Weed

European Hawkweed (*Hieracium sabaudum*)

- Lots of stem leaves crowded at base, becoming smaller upwards
- Yellow flower heads small, numerous, hairy, in open, flat-topped cluster (candelabra-shape)
- Lower stem and lower leaf surface with long, firm, bulbous based hairs
- Plants 1 to 4 ft tall
- Flowers late July to September

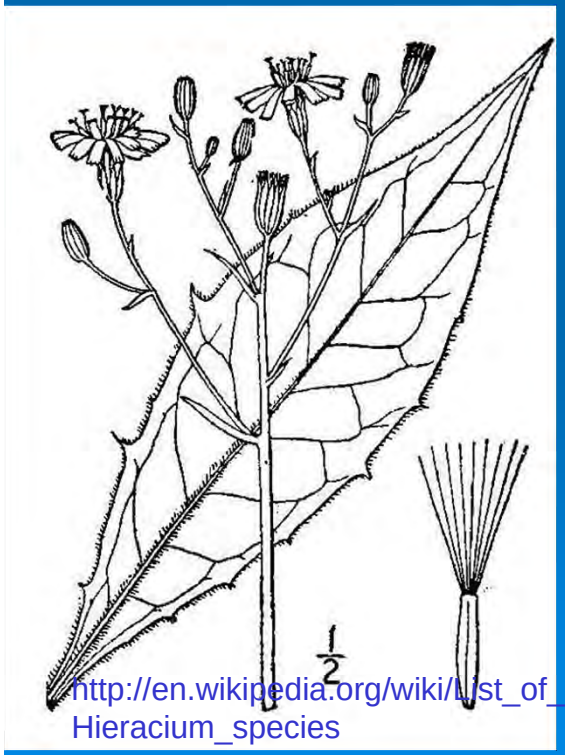
Common Hawkweed

Class C Noxious Weed



Common Hawkweed (*Hieracium lachenalii*)

- Basal leaves coarsely toothed, tapered at base
- 4-7 stem leaves, also toothed, upper ones smaller, sessile
- Flowers yellow, 4-12 heads, open flat or round topped cluster
- Up to 2 ½ ft tall
- Flowers May to July



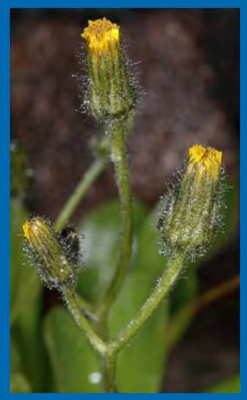
http://en.wikipedia.org/wiki/List_of_Hieracium_species

Common Hawkweed

Common Hawkweed

Native Hawkweed Look-alike: White Hawkweed

Less Common Native Hawkweeds



H. scouleri
photos Ben Legler

H. gracile, H. triste
photos G. D. Carr; P. Slichter

H. umbellatum
photos Rich Old

More Hawkweed Look-alikes

Hawksbeard (*Crepis capillaris*)

Cat's Ear (*Hypochaeris radicata*)

A Quick Look at Some More Weeds

Class B Noxious Weed

Sulfur Cinquefoil (*Potentilla recta)*

Class B Noxious Weed

Dalmatian Toadflax (*Linaria dalmatica*)

- Leaves bluish-green, waxy coating, heart-shaped, clasp stem
- Flowers yellow tinged with orange, like snapdragon flowers

- Bolts: April-June
- Flowers: May-Sept
- Seeds: Aug-Sept

Scotch Broom (*Cytisus scoparius*)

Class B Noxious Weed

Tansy Ragwort (*Senecio jacobaea*)

First year rosettes have round-lobed leaves, reddish stems

Flowers June to October.

Flowering stems are 1-6 ft tall with clusters of yellow, daisy flowers

Common Tansy (Tanacetum vulgare)

Button-like flowers are clustered at top of plant

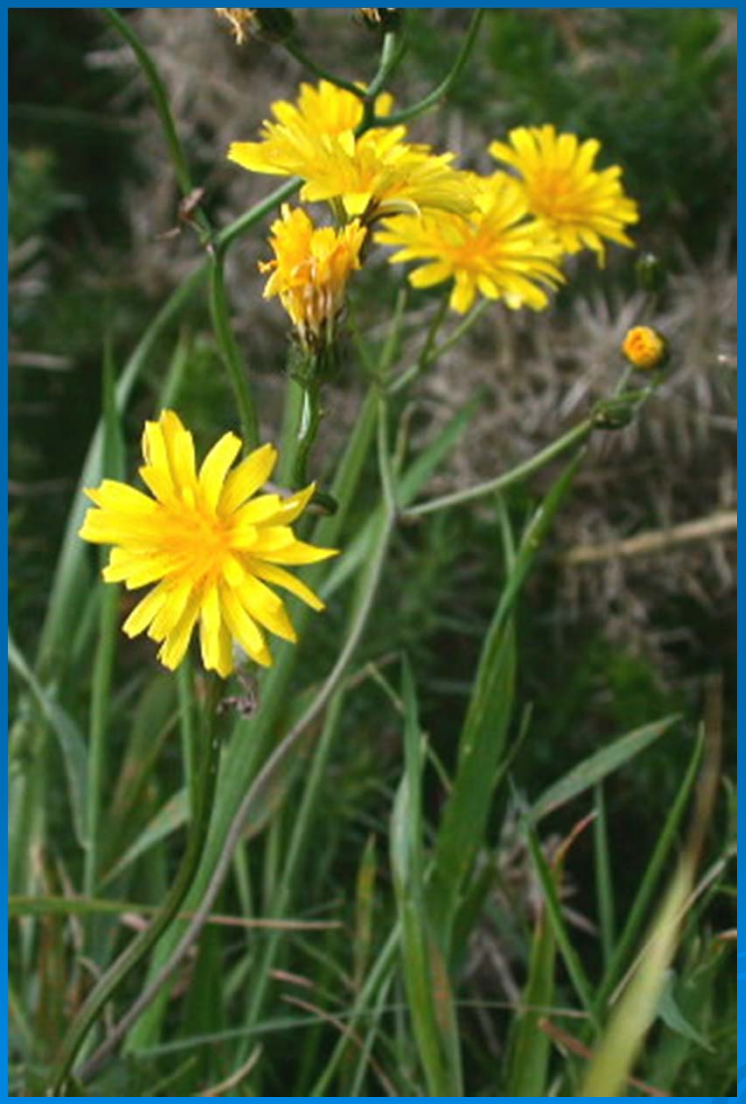
Leaves are fern-like with sharply toothed edges and a strong odor

St. Johnswort (*Hypericum perforatum*)

Cat's Ear or False Dandelion (*Hypochaeris radicata*)

Creeping Buttercup (*Ranunculus repens*)

Hawksbeard (*Crepis capillaris*)



Nipplewort (*Lapsana communis*)

Nipplewort
(*Lapsana communis*)

Wall Lettuce (*Lactuca muralis*)

Prickly Lettuce (Lactuca serriola)

Woodland Groundsel (*Senecio sylvaticus*)

Yellow Flag Iris (*Iris pseudacorus*)

Yellow Archangel
Lamiastrum galeobdolon (a.k.a. *Lamium*)

Small yellow mint-type flowers in leaf axils

Slivery markings on leaves of this popular garden plant make it easy to spot invading into shady forests

Yellow archangel can completely take over the
understory of even very shady forests.

Yellow Archangel by Middle Fork Road

Started from roadside yard waste dump sites and now spreading into woods

Absinth Wormwood (*Artemisia absinthium*)

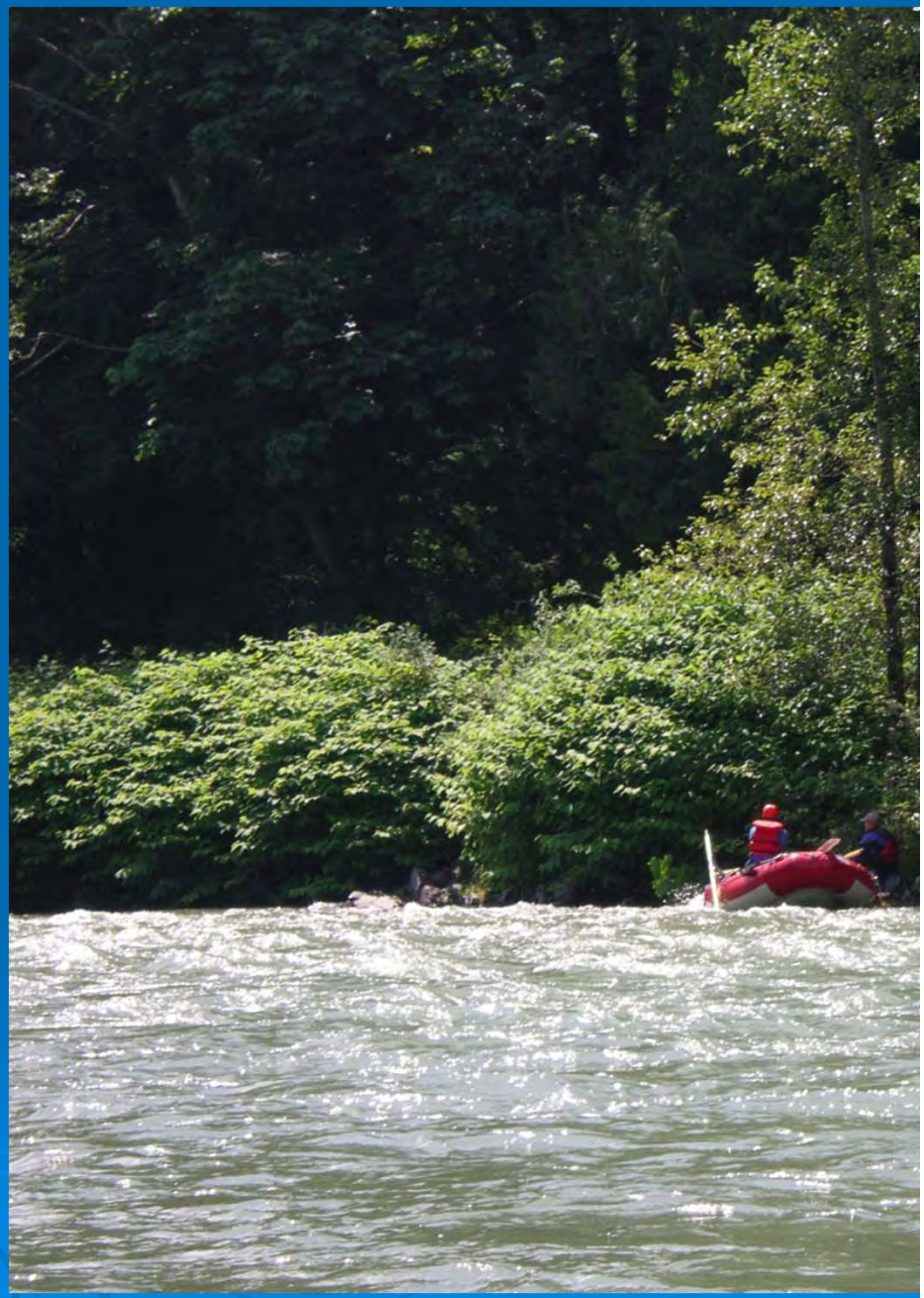
- Herbaceous, perennial plant, up to 5 ft. tall
- Leaves alternate, gray-green, 1-4 in. long
- Gives off a strong sage-like scent when crushed
- Pale yellow, tubular flowers in drooping heads in the axils of the leaves

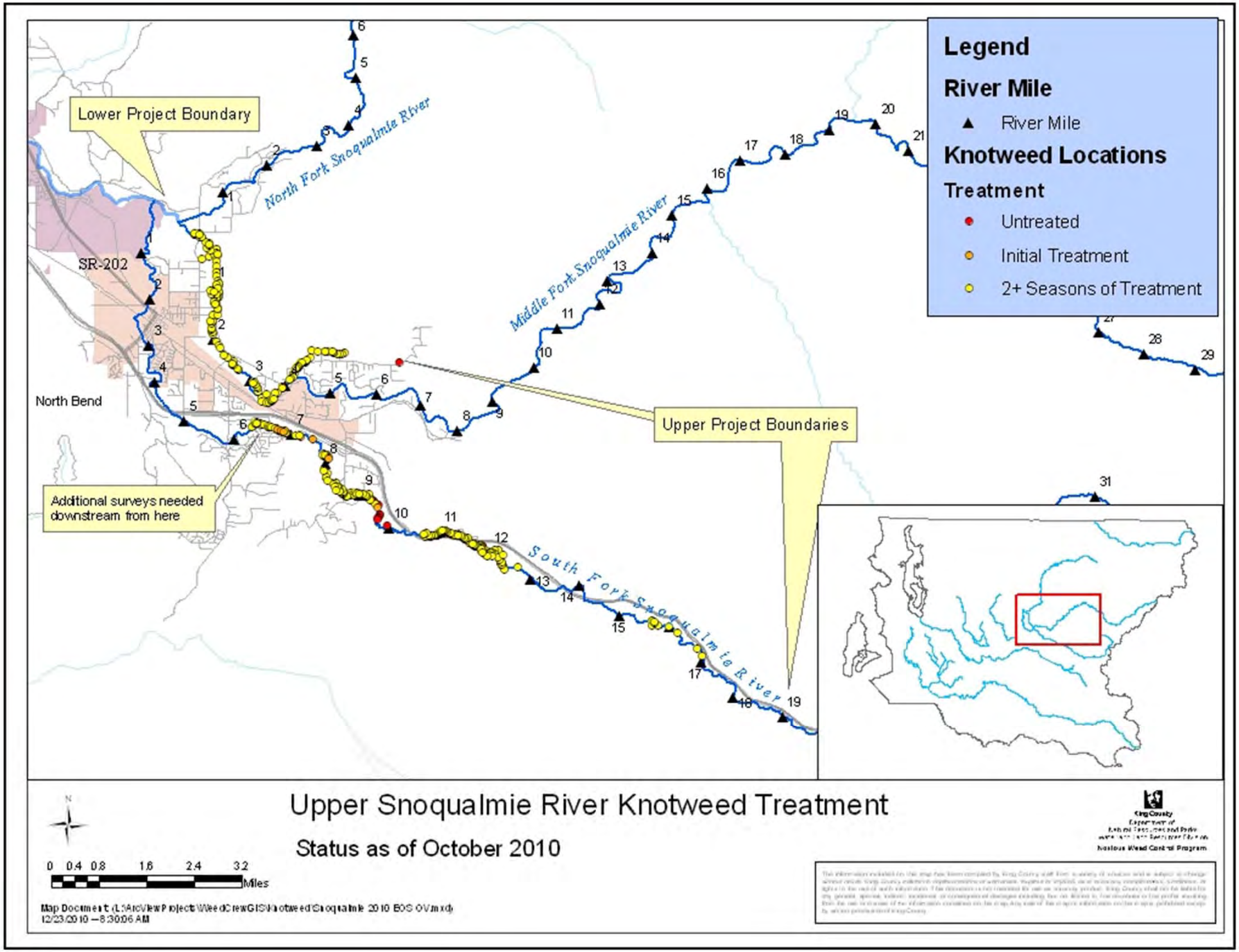
Himalayan Blackberry
(*Rubus armeniacus, R. discolor*)

Evergreen Blackberry
(*Rubus laciniatus*)

Native Look-Alike: Trailing Blackberry (*Rubus ursinus*)

Bohemian Knotweed
(*Polygonum bohemicum*)




Legend
River Mile
River Mile
Knotweed Locations
Treatment
Untreated
Initial Treatment
2+ Seasons of Treatment
Lower Project Boundary
Upper Project Boundaries
Additional surveys needed downstream from here
North Fork Snoqualmie River
Middle Fork Snoqualmie River
South Fork Snoqualmie River
SR-202
North Bend
Upper Snoqualmie River Knotweed Treatment
Status as of October 2010
0 0.4 0.8 1.6 2.4 3.2
Miles
Map Document: (L:\ArcView Projects\WeedCrewGIS\knotweed\Snoqualmie 2010 BOS OV.mxd)
12/23/2010 -- 8:30:06 AM
King County
Noxious Weed Control Program

English Holly (*Ilex aquifolium*)

Holly seedling at 1300ft

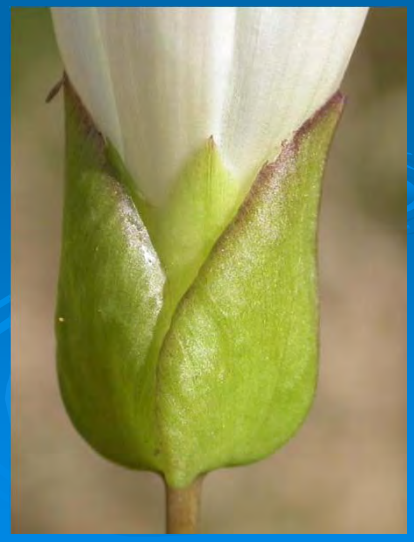
Large holly bush by Middle Fork Snoqualmie

English or Atlantic Ivy (*Hedera hibernica, H. helix*)

Ivy leaves are evergreen, lobed, dull green, with light veins

European Mountain-ash (*Sorbus aucuparia*)

Hedge Bindweed
(*Calystegia sepium*)



Oxeye Daisy (*Leucanthemum vulgare*)

Queen Anne's Lace (*Daucus carota*)

Butterfly Bush (*Buddleia davidii*)

Can grow 5 to 8 feet in a single season

Leaves gray green above and white and fuzzy on the underside, finely toothed on margins

Butterfly Bush (*Buddleia davidii*)

Herb Robert (a.k.a. Stinky Bob) (*Geranium robertianum*)

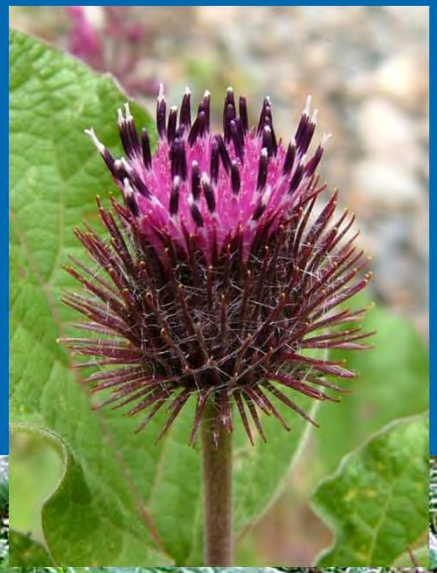
Foxglove (*Digitalis purpurea*)

Bittersweet Nightshade (*Solanum dulcamara*)

Periwinkle (*Vinca minor*)

Periwinkle in the Middle Fork

Burdock (*Arctium minus*)



Spotted Jewelweed (*Impatiens capensis*)

- **Stems** to 6 feet tall,succulent, hairless, hollow when larger
- **Leaves** scalloped on edges
- **Flowers** – orange-yellow, petals/sepals form a tube with spur at the base, spots on sides of tube, on petals at opening, 1-3 flowers from leaf axils
- **Blooming Time** – June to October
- **Habitat** – Moist ground, stream banks, ravines
- **Origin** – Native to eastern U.S.; introduced on west coast (some disagreement in the literature, but Peter Zika's research is convincing on this issue)
- **Native look-alike**: Spurless Jewelweed (*Impatiens ecalarata*)

Native Look-alike: Spurless Jewelweed (*Impatiens ecalcarata*)

Spotted Jewelweed (*Impatiens capensis*)

Spotted Jewelweed (*Impatiens capensis*)

http://www.cas.vanderbilt.edu/bioimages/species/imca.htm (c) 2002 Steven J. Baskauf

Spotted Jewelweed vs. Policeman's Helmet
(*Impatiens capensis*) (*Impatiens glandulifera*)

Spotted Jewelweed on the left, Policeman's Helmet on the right

Spotted
Jewelweed

Curly Dock (*Rumex crispus*)

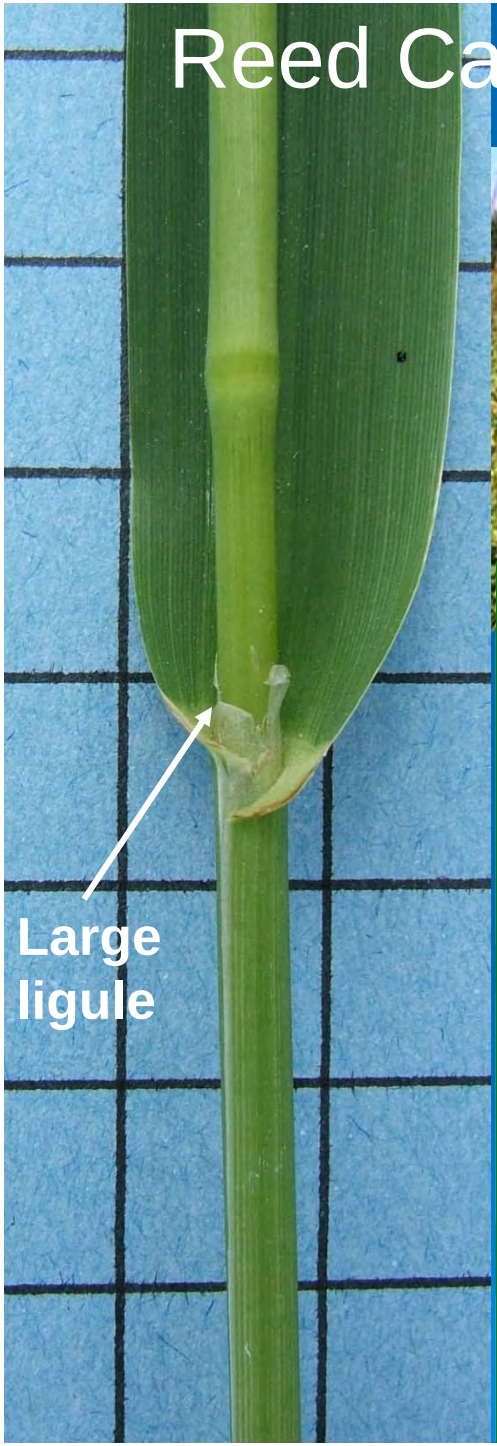
Reddish or greenish flowers in a long, slender, branching cluster at the top of a stem bearing leaves with very wavy margins

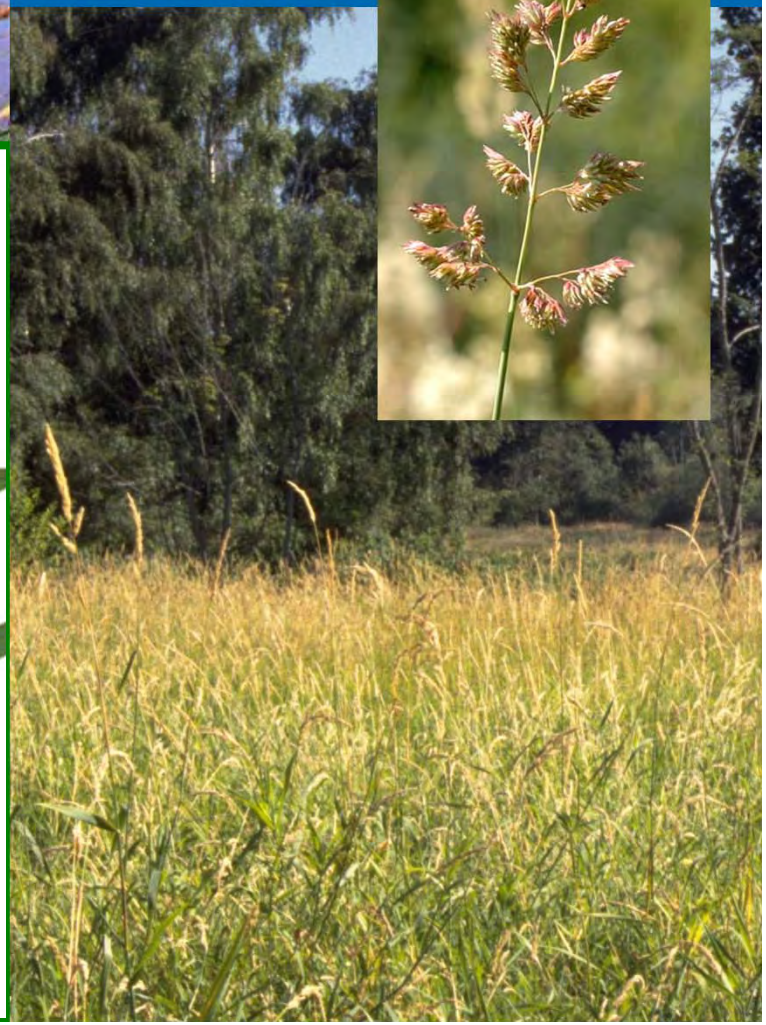
Broadleaf Dock (*Rumex obtusifolius*)

New foliage emerges from the crown, tightly rolled and erect.

Can grow 3 to 4 feet tall and wide

Reed Canarygrass (*Phalaris arundinacea*)

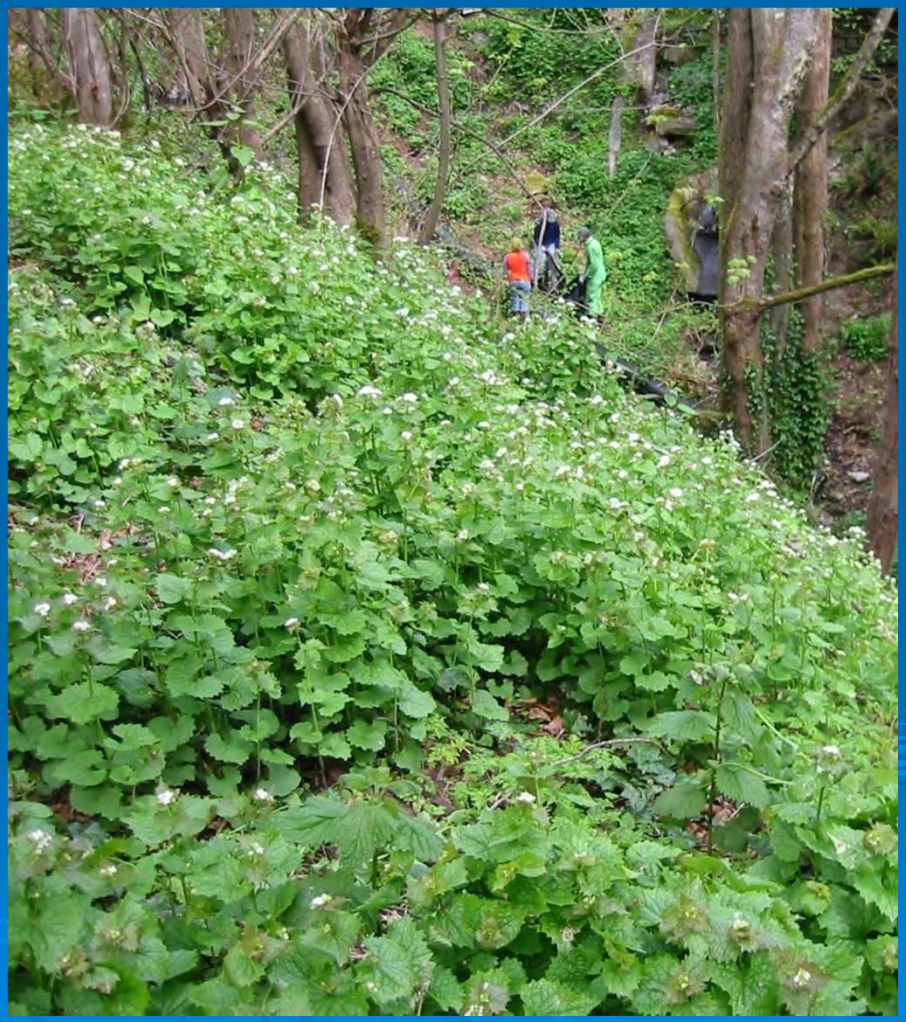




An Early Detection Species: Not Here but Close

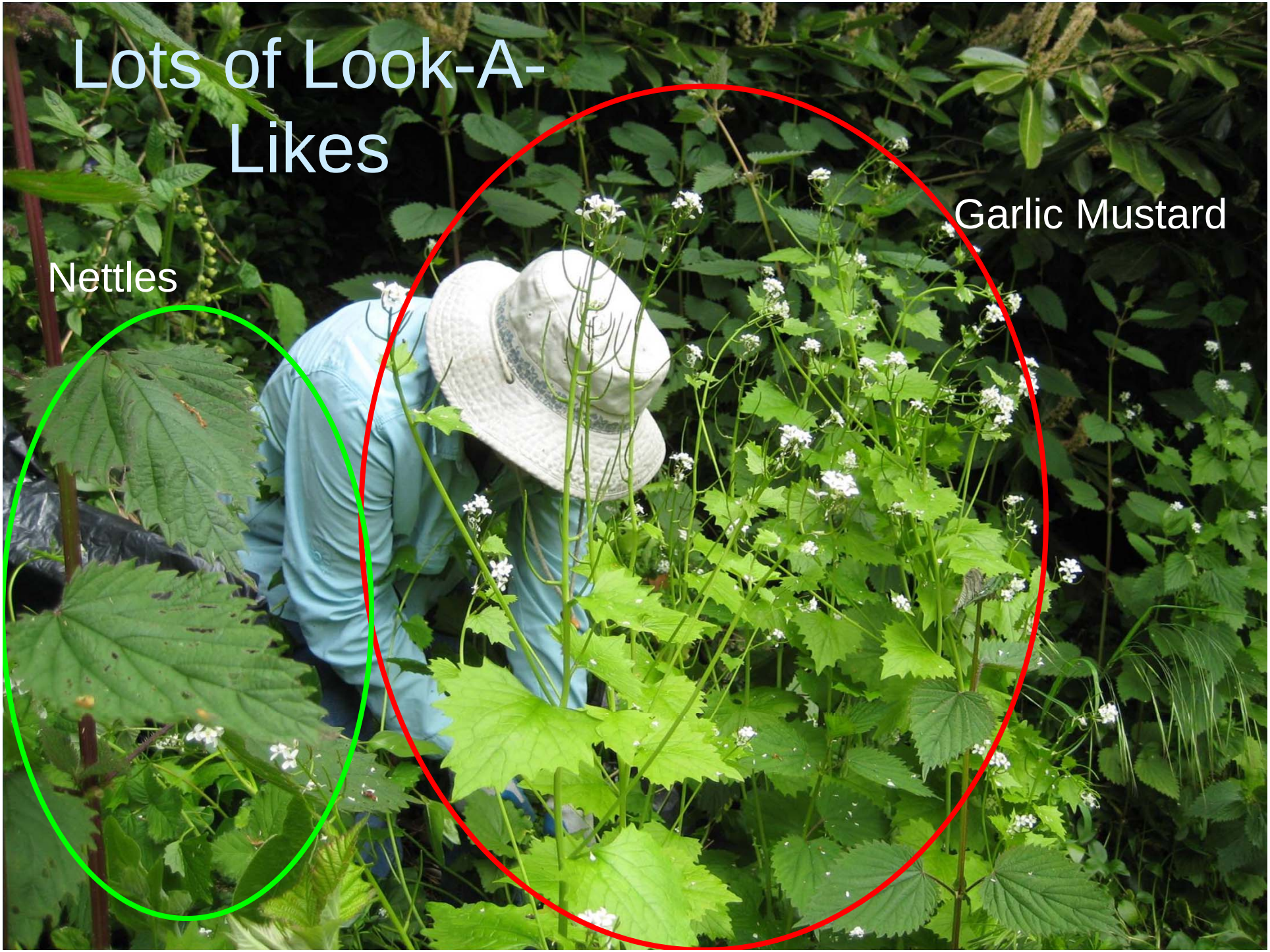
Garlic Mustard (*Alliaria petiolata*)
Threatening to invade – present in North Bend and other parts of King County and spreads easily by seed on boots and vehicles

A single garlic mustard seed can populate a large area in a very short time!!



Class A Noxious Weed

Garlic Mustard (*Alliaria petiolata*)


Lots of Look-A-Likes
Garlic Mustard
Nettles

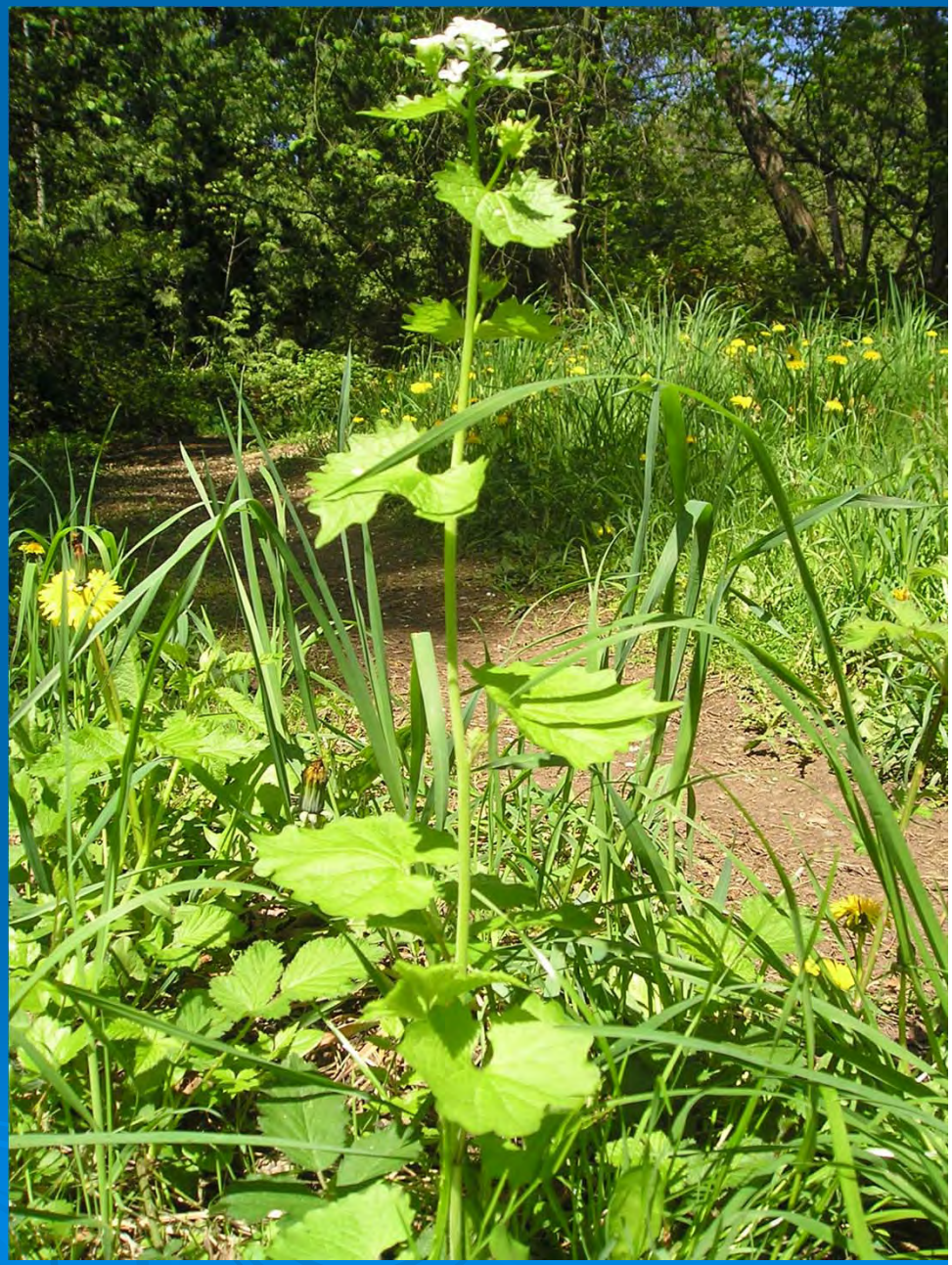
Garlic Mustard Top Look- Alike: Money Plant (*Lunaria annua*)

White-Flowered Money Plant

Garlic Mustard Money Plant

Garlic Mustard Look- Alike: Nipplewort (*Lapsana communis*)

Garlic Mustard (*Alliaria petiolata*)



Survey Procedures

Weed Watcher Schedule

- June training
  - Weed ID
  - Survey methods
  - Field safety
  - Practice survey
  - Choose trails

- July – October
  - Trails surveyed by volunteers
  - Data entered online or forms sent to KCNWCP and consolidated into maps – should be sent in as you do the surveys
  - Weeds controlled by MTSGT, USFS, KCNWCP and some of the Weed Watchers

Main Target Areas for Weed Surveys

- Roadsides
  - About 10-20 ft in on both sides
  - Farther in where disturbance or weed infestations were observed
  - Active and abandoned roads
- Trails and trailheads
  - Both sides as far as you can see, about 15 feet or so
- Other Disturbed Sites
  - Quarries, cut banks, logging landings
  - Camping sites, pullouts, parking areas
- Open talus fields, stream crossings
- River by raft and river bars on foot
- Follow your instincts
  - Some sites are off trail and hard to find

MTSGT WCC Individual Placement Kelley Calhoun Surveying Weeds

Weed Watcher Survey Methods

- Visit assigned trail at least once during the summer
- Look for non-native plants on both sides of the trail and around parking areas, campgrounds, and other open areas
  - Approximately 10-20 feet in from trail in general
- Fill out a survey form and check list of species observed
- If in the Wilderness or if species priority for the area, then get location with GPS (or mark on a map) and collect data on the population on the survey form
  - If unsure of the ID, take photo and log the location
- If Wilderness or priority species and you can't control the weeds, attach flagging and contact weed watcher coordinator as soon as possible

Survey Form

- Fill out one form for each trail or area surveyed
  - One form can cover more than one survey date
- Description of area surveyed, directions, notes
  - This will help us find the area to control the weeds and to map the surveyed area on GIS
- Miles, hours and expenses
  - Very important for grants and reporting
- Weed check list
  - Mark off what you find on the trail
  - Add any additional non-native plant species found
  - Take photos of any you are unsure of (also known species if you have the time and interest – we can always use more pictures of weeds!)

Survey Form, cont.

- Fill out as many rows as needed each day you survey
- Running list of weed sites in order found
  - GPS point
    - Best method, use lat/long in decimal degrees
  - Distance from start or an obvious landmark
    - Use landmarks that can be seen on an aerial or map
    - Can use distance from last weed site but this isn’t as good as distance from start

Data Collected on Survey Form

- **Way Point** – the number of the point if you are giving us a GPS file
- **Lat and Long** – from a GPS or smart phone, use decimal degrees
- **Weed Code** – first three letters of both genus and species
- **Weed Area** – area of patch in square feet
  - For linear patches, helpful to put length x width in Notes field
  - Note: Infestations or patches are defined as stopping if there are no more of that species within 100 feet of the outer most plant or based on terrain and other observations (e.g. divided by a river)
- **Percent Cover** – the percent of the infested area covered by weed species (as seen from a bird's eye view)
- **Growth Stage** – use the most advanced stage of the population
- **Habitat** – this is the type of site, e.g. trail, road, river, wetland, etc.
- **Control Date** – either date controlled or date the control was observed
- **Method** – this is the control method (pulled, dug up, sprayed, injected)
- **Notes** – location, distance from trail or river, photo taken, weed flagged, etc.

Enter Data Online

- www.kingcounty.gov/weeds
  - Navigate to Weed Watchers
- Direct link: http://green.kingcounty.gov/weedwatcher

Survey Ticket = summary of your survey

Weed Watcher in King County

Page 1 of 2

Log Off

Trail Site Survey Ticket

General survey information (ticket) about the trail site surveyed.

- (•) Add Trail Site Survey Ticket
- ( ) Find Trail Site Survey Ticket

Trail Site Survey Ticket Form

Trail Site: * Select ... Adopt-A-Trail

Survey Date: *

Surveyed By: * Select ...

Start and Stop Points

Start Latitude: decimal degrees

Start Longitude: decimal degrees

End Latitude: decimal degrees

End Longitude: decimal degrees

Description of Area Surveyed (start and stop point): *

Distance Surveyed: * miles

Distance Controlled: miles

Travel Miles: miles

Volunteer Hours: * hours *(survey, travel, data entry)*

Expenses (non gas): $ *(non gas expenses only)*

Expense Description:

Survey Notes:

Check here if you did NOT find any weeds: ☐

Submit Ticket | Cancel

List of Trail Site Survey Tickets

http://green.kingcounty.gov/weedwatcher/trail-survey-ticket.aspx

5/31/2012

Survey Weed Data = details on the weeds

Weed Watcher in King County

Page 1 of 2

Log Off

Trail Site Survey Weed Data

Pick a Ticket: Middle Fork Road-to-Trail - 05/11/2012 (Boyar, Mark)

Trail Site Survey Ticket

Trail Site: Middle Fork Road-to-Trail — Map Name:

Survey Date: 5/11/2012 — Travel Miles: 120

Volunteer Hours: 12

Surveyed Miles: 3.5 — Controlled Miles: 3.5

Expenses (non gas): — Surveyed By: Boyar, Mark

Survey Desc: Main purpose was to hit the handful of herb Robert sites early. I pulled all visible plants. Most are at sprout stage under leaf debris. Should return 3-4 weeks later

Survey Weed Data Form

Pick a Weed: * OTHER (Other)

Survey Date: * 5/11/2012

Latitude: decimal degrees

Longitude: decimal degrees

Weed Location Description: *

Size of Infestation (square feet): * sq ft

Percent Cover: * %

Growth Stage: Select ...

Habitat: Select ...

Control Date:

Control Method: Select ...

Area Controlled: sq ft

Monitor Date:

Monitor Status: Select ...

Notes:

Add Survey Data | Cancel

List of Survey Weed Data Entries

Ticket Name	Weed Priority	Survey Date	Weed Name	Size of Infestation (sq ft)	Percent Cover (%)	Growth Stage	Habitat	Control Date	Control Method	Area Controlled (sq ft)	Monitor Date	Monitor Status	Surveyed By	Edited By	
Middle Fork Road-to-Trail - 05/11/2012 (Boyar, Mark)	Low	05/11/2012	GERROB - Herb Robert	1000	2	Vegetative	Conifer Forest	05/11/2012	Pulled	1000			Boyar, Mark	Boyar, Mark	Edit
Middle															

http://green.kingcounty.gov/weedwatcher/trail-survey-data.aspx?st=

5/31/2012

Weeds Watchers in the Woods

Weed Watchers on the River

Well Worth Protecting

Resources and Contact Info

- Project Website:
  - www.kingcounty.gov/weeds
    - Follow links to: Upper Snoqualmie Weed Watchers
- Contact:
  - Sasha Shaw, King County Noxious Weed Program
    206-263-6468
    sasha.shaw@kingcounty.gov
  - Sarah Callaghan, USFS Invasive Plant Specialist
    425-783-6042, Cell 425-367-3127
    sacallaghan@fs.fed.us
  - Mark Boyar
    mboyar@q.com