



The latest on the emergent noxious  
weed Garden Loosestrife  
(*Lysimachia vulgaris*) in King County

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# Talk outline

- Garden loosestrife identification
- Garden loosestrife distribution and impacts
- Un-successful control methods
- Our in-situ herbicide study
- Suggestions



# Garden Loosestrife *Lysimachia vulgaris*

Class B Noxious Weed in WA state, regulated in King County



**2-10 foot tall perennial of wetlands and shorelines**

Native to Eurasia

**Flowers:** showy yellow primrose-like flowers clustered at top of stem (terminal pannicle)

Each flower: 5 sepals, 5 petals

Flowers in July to September

**Leaves:** opposite or whorled (in threes or fours), leaves usually have small orange or black glands visible with magnification





Produces extensive red **rhizomes** that will reach out up to 10 feet into the adjacent open water



**Stems** have soft hairs and are round, occasionally flattened (fasciated)



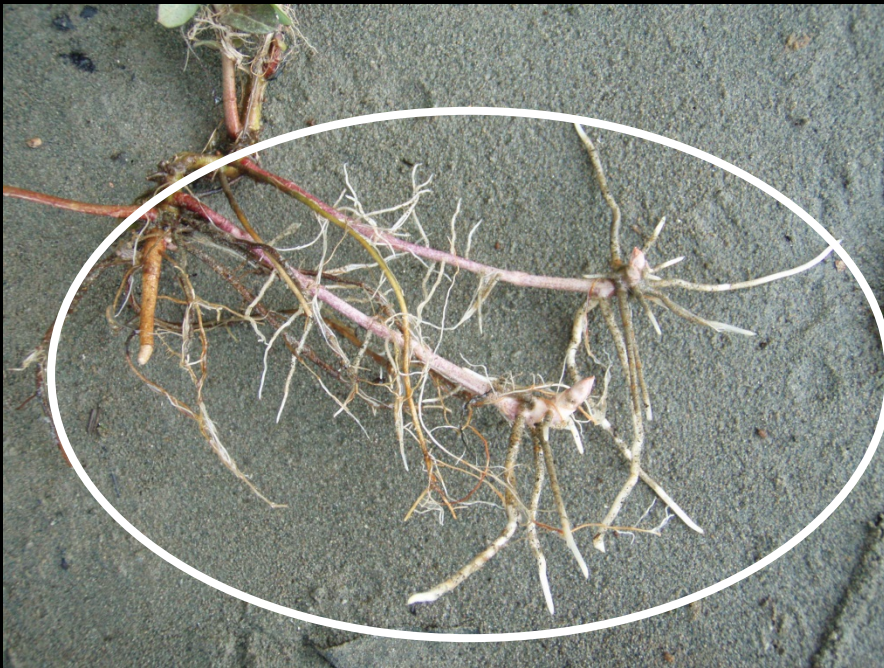
*garden loosestrife*



# Reproduces by both rhizome...

- Rhizome pieces as short as 1 and 2 cm in length can produce shoots.

-Kelsey Taylor, (2017), *Competitive Interactions and Rhizome Reproductive Capacity of an Invasive Plant, Garden Loosestrife (Lysimachia vulgaris L.)*, Unpublished Masters Thesis, University of Washington, Seattle, WA.





...and by seed.

- Seeds average 82% viability when exposed to summer temperatures

-Kevin Dillon 2012, Senior research project on seed viability, School of Environmental and Forestry Science, University of Washington



Garden loosestrife seeds



# How tall does it get in King County?

garden loosestrife

10'  
Shade



Karen is actual size

Flora of China	2-4 ft
University of Wisconsin	to 3.3 ft
Connecticut Botanical Society	2-4 ft
England	2-4 ft
Germany	1.4-4.9 ft
Australia	to 4.9 ft
Flora of Europe	to 4 ft

6'6"  
Full sun





# what garden loosestrife isn't:

purple loosestrife (*Lythrum salicaria*),

- a different Order and Family
- Square stem
- Purple/magenta flowers



yellow loosestrife (*Lysimachia punctata*), Same Genus

- Star-shaped flowers occur all along the stem only (never in a terminal cluster like *L. vulgaris*)





*L. vulgaris* (garden) and *L. punctata* (yellow) together



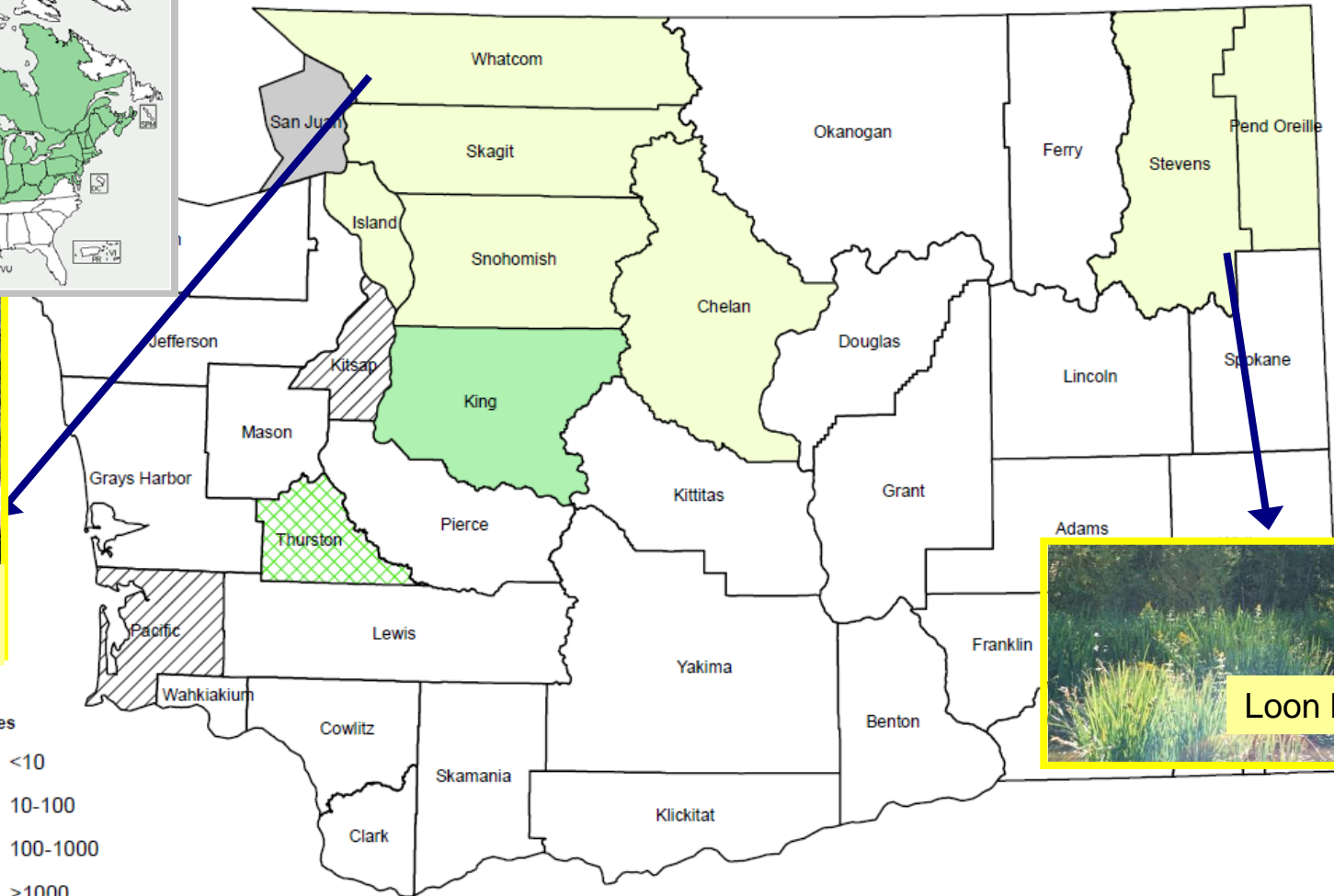
garden loosestrife



# Garden loosestrife distribution in Washington

## Garden Loosestrife (*Lysimachia vulgaris*) Distribution 2016

Updated: 4/22/2016



Lake  
Whatcom



Loon Lake

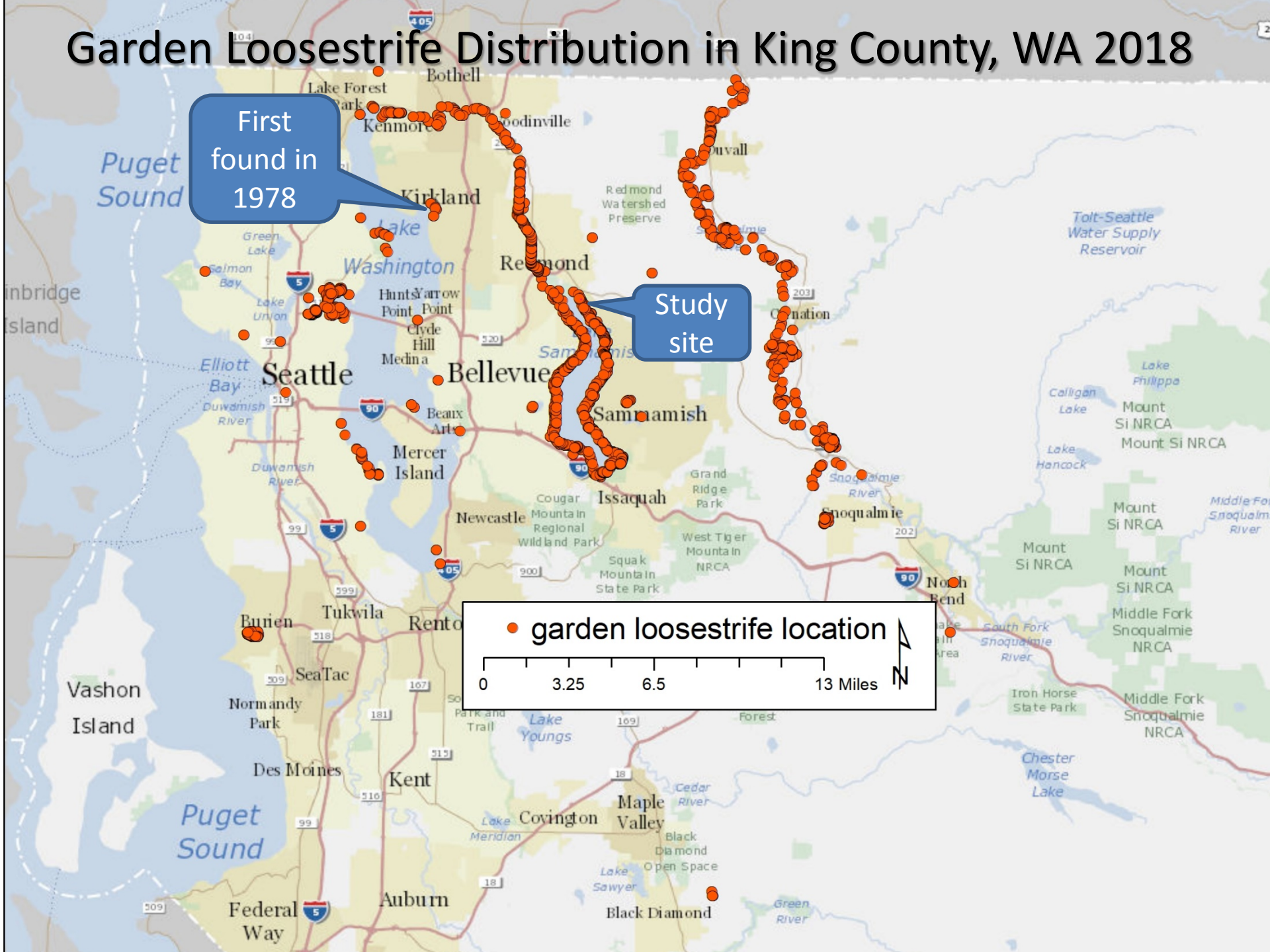
- Legend**
- Infested Acres**
- <10
  - 10-100
  - 100-1000
  - >1000
  - No known infestations
  - Present but extent unknown
  - Eradicated
  - No data or insufficient data

No warranty is made by WSDA as to the accuracy, reliability, or completeness of this data for individual or aggregate use with other data. Data was compiled from county noxious weed control board staff, WSU Cooperative Extension and other sources. This product may be updated without notification. Information use only. Not for legal use. (Greg Haubrich - WSDA)





# Garden Loosestrife Distribution in King County, WA 2018





# Garden loosestrife Impacts

Ecological – displaces native plants and animals; interferes with wetland food web and habitat; clogs small streams

Economic – clogs irrigation systems & water control structures; dominates wet pastures



*garden loosestrife*



# Garden Loosestrife - Impacts

Outcompetes other plants, even tough ones

garden loosestrife



Along a shoreline in flower



With purple loosestrife



With common cattail



Even Himalayan blackberry



# Why so aggressive in King County? Could it be polyploid?

- Polyploidy = inheriting more than the usual 2 copies of DNA ( $2n =$  normal vs.  $3n =$  polyploid)
- Polyploid plants = potentially more genetically diverse and able to grow more aggressively
- Rhizomes were collected from three sites in the county in June 2011 (Lake Sammamish, Rutherford Slough, Lake Burien)
- Analyzed by Brenda Grewell at USDA-ARS University of California, Davis
- All samples came back as  $2n$  – **not polyploid**





# Control - what doesn't work so well

Manual: Really only feasible for individuals or pioneering stands; could dig out as much root as possible; this plant doesn't pull well (breaks off from long rhizomes leaving lots of root behind).

Mechanical: Repeated mowing may keep it contained and slow dispersal by seed, but won't kill it. Plant fragments will root if left behind.



garden loosetrife





# Control - Cultural

- Weed fabric or tarp recommended to suppress plants on sensitive shorelines, but won't kill mature plants.
- Potentially useful in small area without moving water
- Requires careful monitoring, high maintenance



*garden loosestrife*





# Cultural: Tarp over garden loosestrife plants at Oxbow Farm



- Heavy opaque tarp
- Stake down corners well
- Lay debris (wood) over top
- Check in July and September for :
  - Tarp integrity
  - Sneaky plants



Plants growing through rip in tarp





# Control – Biocontrol?

*garden loosestrife*





# Control – **fortuitous herbivory**

- A insect has been found eating *some* garden loosestrife plants
- Identified as a sawfly (*Monostegia abdominalis*) –Chris Looney, WSDA
- Insect is non-native, but not intentionally released = not biocontrol
- Unknown impact - plants still flower and set seed even if skeletonized
- Actual biocontrol development unlikely until the plant becomes a “problem” in more places





# Control – Chemical (herbicide)

- Needs to be systemic – to get at those rhizomes
- Needs to be an aquatic –approved herbicide
- Have tried many herbicides over the years:
  - Triclopyr –seems to act too fast, plants return
  - Glyphosate- not complete kill
  - Imazapyr – works pretty well, acts very slowly, off target damage
  - Imazamox?
  - Combinations of herbicides?

*garden loosestrife*





# Greenhouse study

- Conducted by **Tim Miller\*** at **WSU Extension Mt. Vernon**
- Rhizomes collected and potted-up May 2014
- Grown for 6 weeks in greenhouse
- Treated with both single and combinations of herbicides
- Herbicide allowed to be active for one month, then defoliation rated and plants clipped
- After two months, regrowth measured

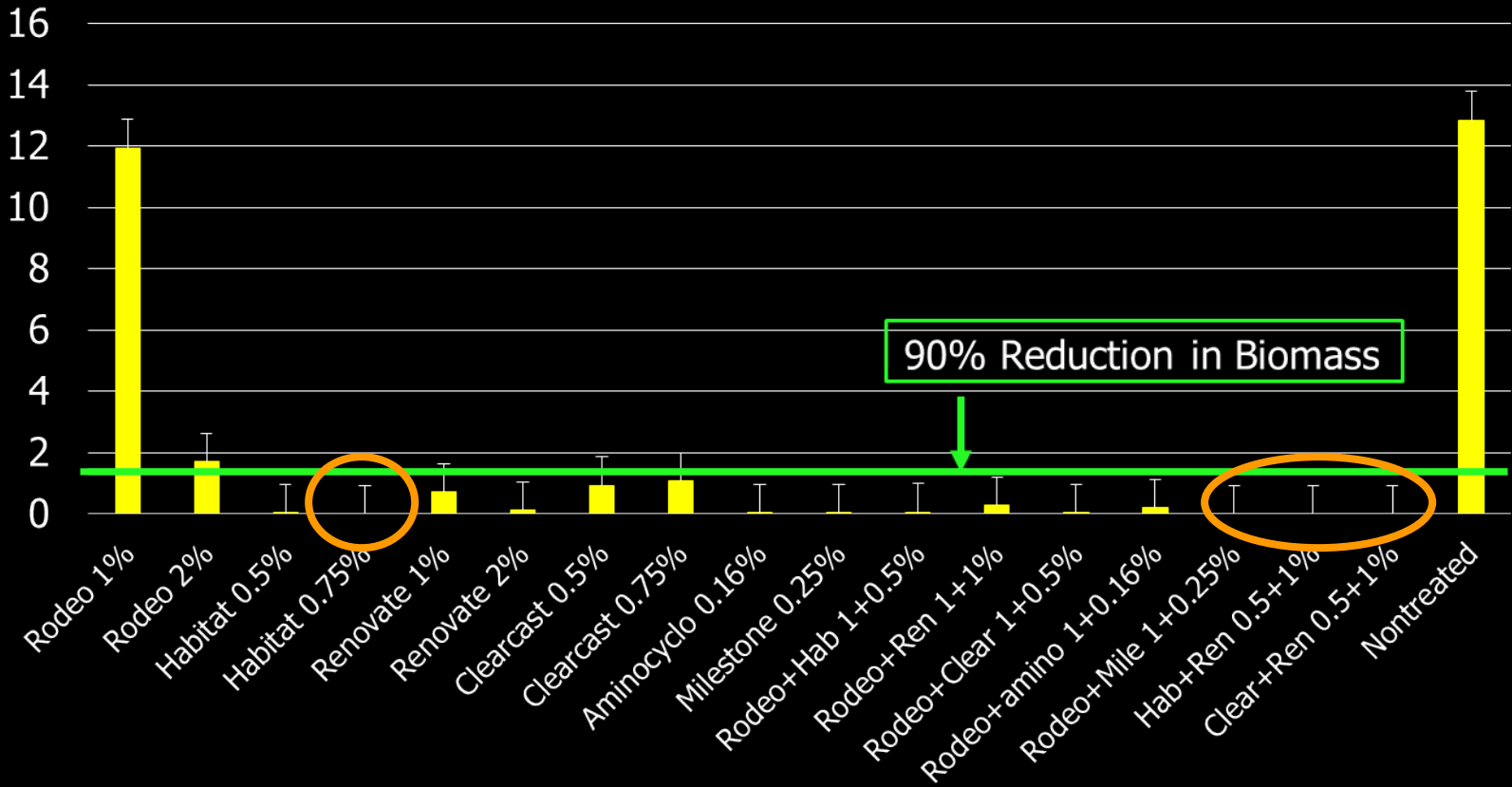
*\*twmiller@wsu.edu*





# Garden Loosestrife Regrowth 2 Months After Treatment

Biomass (g)





# Greenhouse study results

- Imazapyr at 0.75%
- Imazapyr at 0.5% + Triclopyr at 1%
- Imazamox at 0.5% + Triclopyr at 1%
- Glyphosate at 1% + aminopyralid\* at 0.25%

\*not aquatic-approved,  
don't exceed label rate





# Field Study Methods

- Lake Sammamish shoreline study site
  - “pristine” garden loosestrife plants in 400m section of shoreline
  - 30 - 3m x 3m study plots set up, min. 2m between plots
    - Garden loosestrife stems/plot
    - Average & maximum stem height
    - Phenological state at time of treatment
    - List of other plants growing in plot and site conditions





# Field Study Methods

garden loosestrife

- Focus on imazamox in effort to reduce un-intended harm to other plants such as willow (that seem particularly sensitive to imazapyr)
- Foliar spray herbicide treatments\*:

Treatment	Imazamox	Triclopyr TEA	Glyphosate	Surfactant (Agri-dex)
T-1	3%	0.5%	-	1%
T-2	2%		1%	1%
T-3	4%		1%	1%
T-4	4%			1%
C (control)	No herbicide	No herbicide	No herbicide	No herbicide

Pre-flower

\*percent = volume chemical/volume total mix including water

flowering



- Two treatment dates:
  - Early treatment – June 22 (all plants pre-flower stage)
  - Late treatment – August 10 (all plants flowering stage)





# Results were measured 12 months later (7/19/18)

- Counted garden loosestrife stems,
- Some missing or disturbed plots (vandalism, big trees fallen over)
- Un-even sample site, very few replicates
- Data analysis help from Tim Miller\* (he squeeze some results from our very messy data) \*WSU extension Mt. Vernon



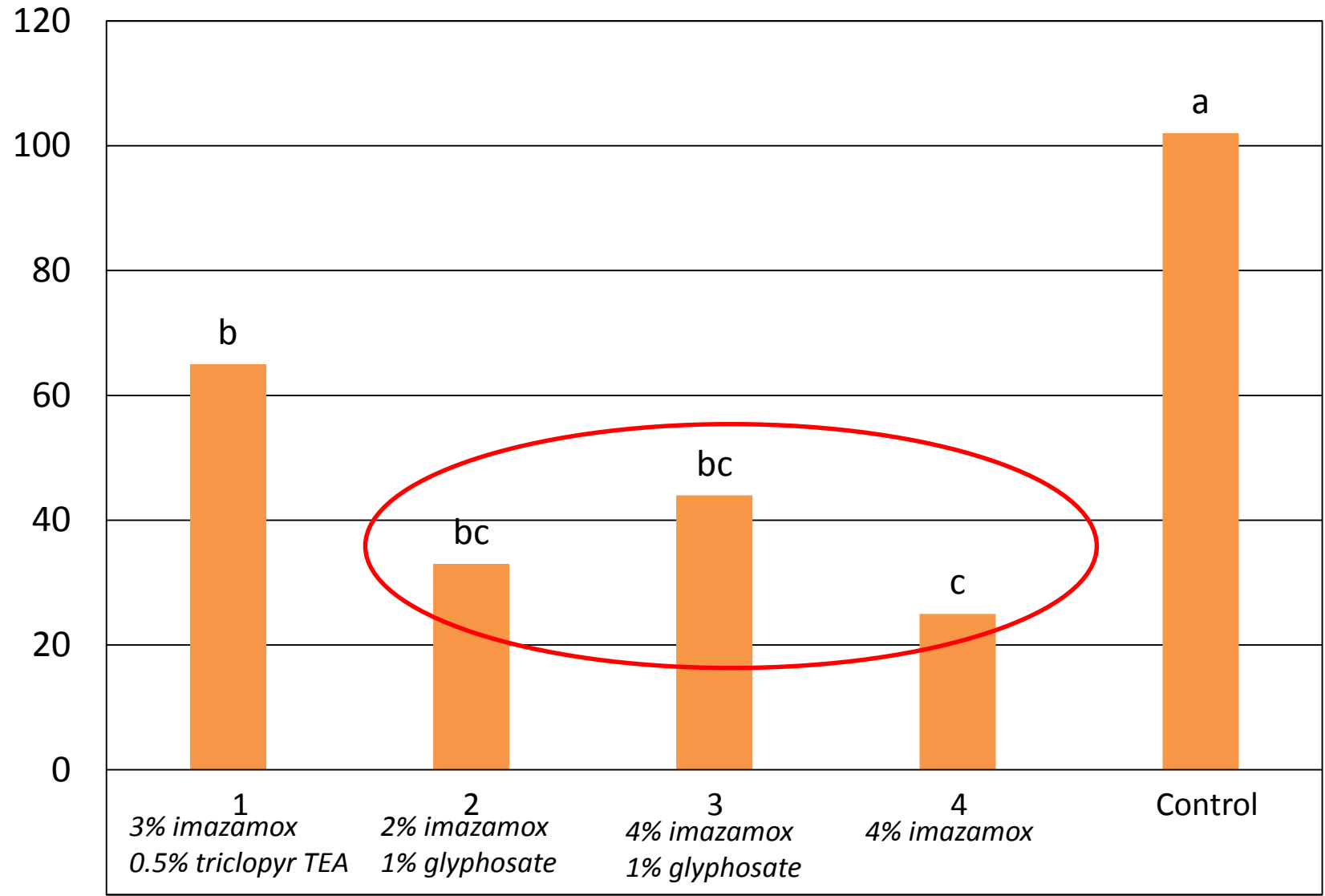
A "control" study plot



A herbicide study plot

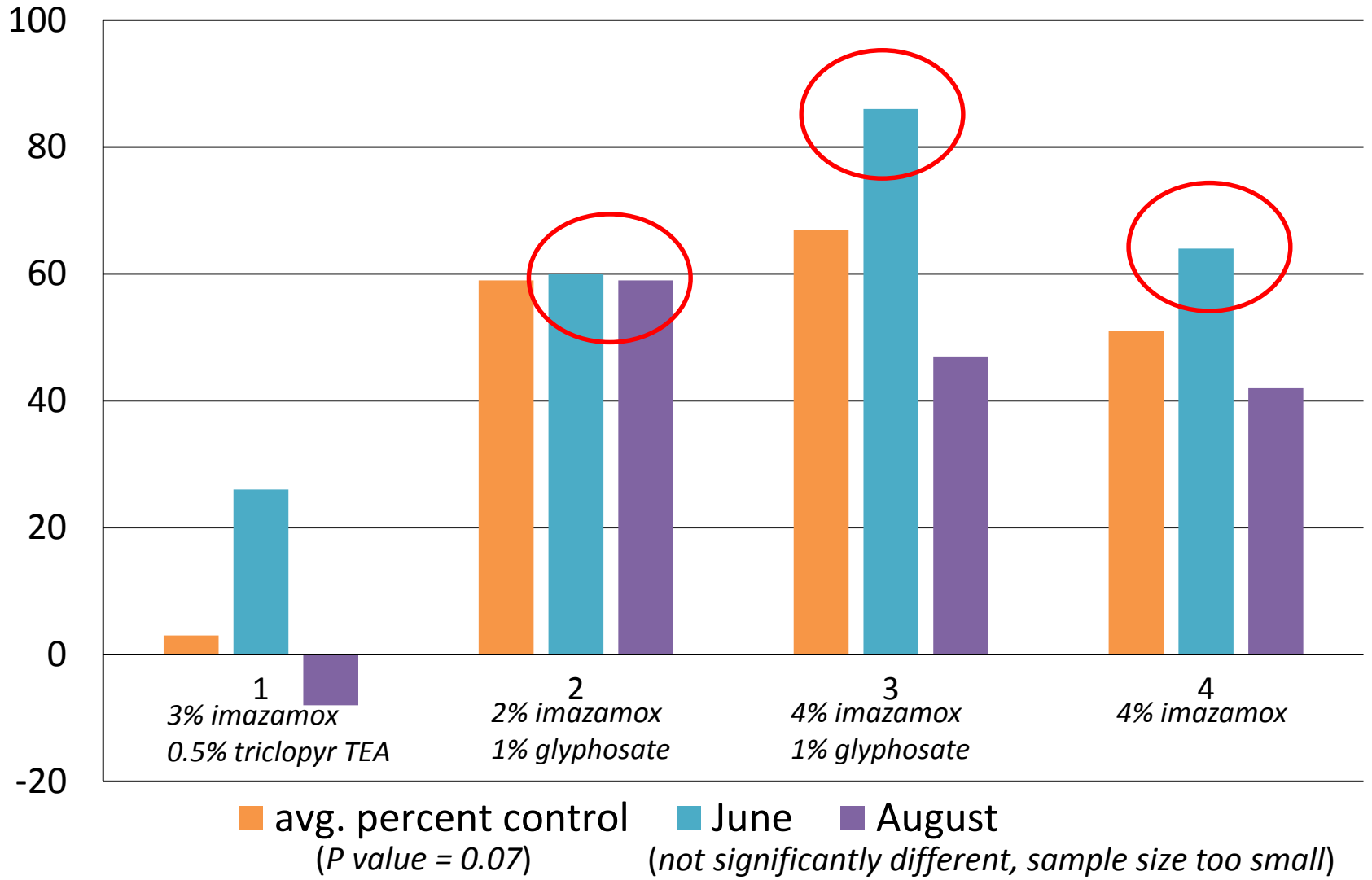


# Average stem height (cm) 1 year after treatment





# Percent control- 1-year after treatment





# Results Summary

- Best
  - Treatment 3 (4% imazamox + 1% glyphosate) in June
- Second best
  - Treatment 2 (2% imazamox + 1% glyphosate) in June and August
  - Treatment 4 (4% imazamox) in August
- Third best
  - Treatment 3 (4% imazamox + 1% glyphosate) in August \*
  - Treatment 4 (4% imazamox) in June
- Triclopyr TEA hindered imazamox effectiveness
- 23% of study plots = some off-target damage to woody plants

\* suspect poor data from one of these study plots as a result of plot damage

# Overall treatment recommendations

- Still no perfect treatment
- Very small areas= long term tarping or deep, persistent digging
- 1% imazapyr (where no woody native spp.)- late summer
- 4% imazamox (w or wo/1% glyphosate) (where woody native spp.)
  - early summer (pre-flower) to avoid insect pollinators
  - Late summer (flowering) also effective
- Try aminopyralid in sites where allowed
- Persistence (go back annually, don't let it seed)



# Suggestions for future studies

- Many more replicates
- Avoid informal beaches
- Potted plant study (with mature plants)
- More herbicide combinations
- Try different surfactants

Persistence pays off

August 2003

Flowering garden loosestrife



Garden Loosestrife at Rutherford Slough (Fall City, WA)

- Herbicide treatment almost every year since 2003
  - Glyphosate or triclopyr 2003-2010
  - Imazapyr 2012 and 2013
  - Glyphosate + triclopyr 2014

August 2014





# Thank You

Jennifer Andreas  
Kelsie Crawford  
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Katie Messick  
Tim Miller  
Kelsey Taylor

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