Controlling Invasive Knotweeds Using Low-Volume Foam Herbicide

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Overview

- Non-Chemical Control
- Chemical Control
- Focus on: Low Volume Foam Herbicide

Knotweed Colony at Southwood

Knotweed – Grows in Tough Conditions

Photo Credit: Popplewell Associates, York, UK

Knotweed Rhizome Extension

Non-Chemical Control

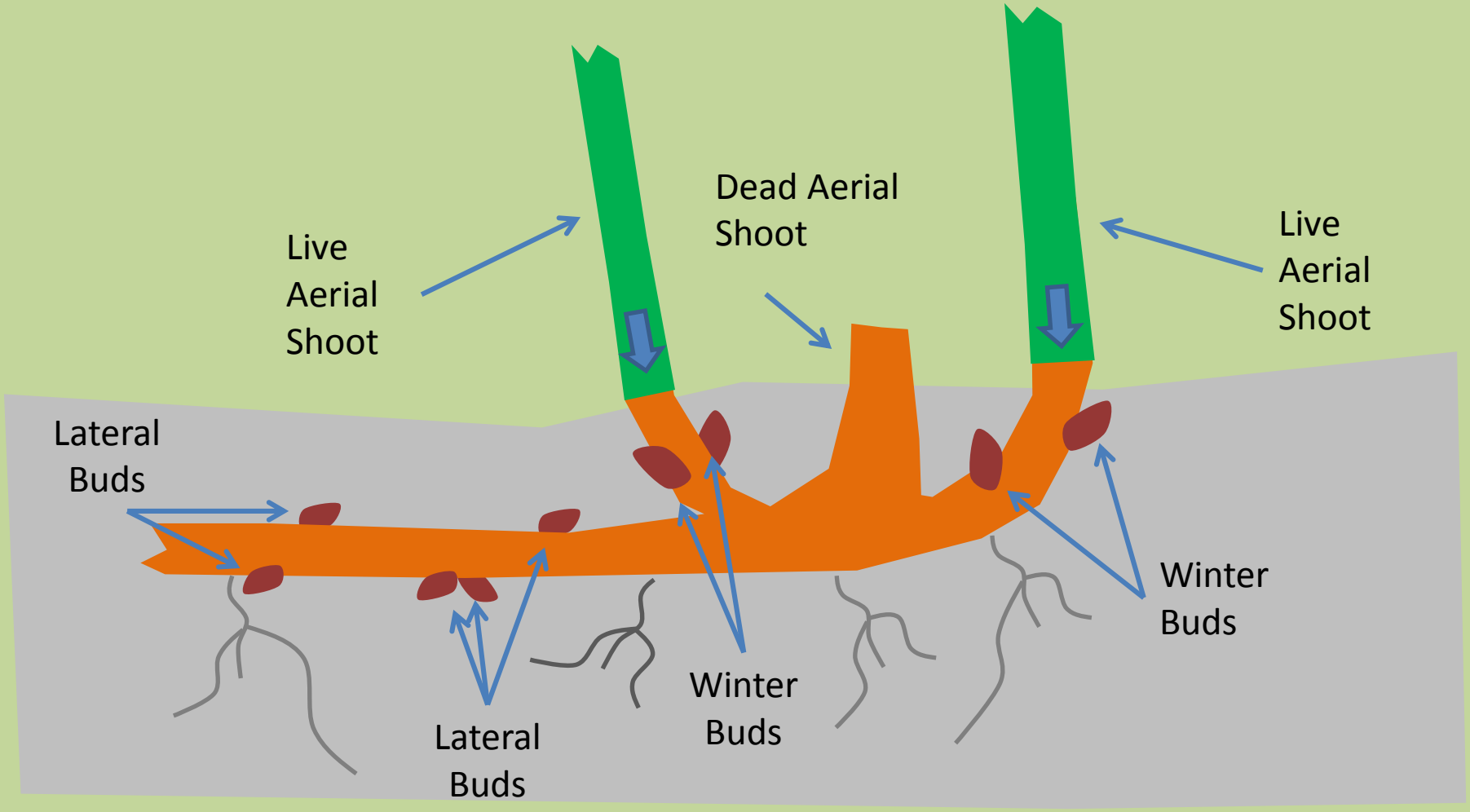
- Not practical except with small infestations
- Danger of vegetative spread
- See King County, Best Management Practices (2008)

Chemical Control

Knotweed Rhizome – Tough to Kill!

Chemical Control: Key Problem

Older parts of rhizomes are weak sinks Bashtanova et al. 2009.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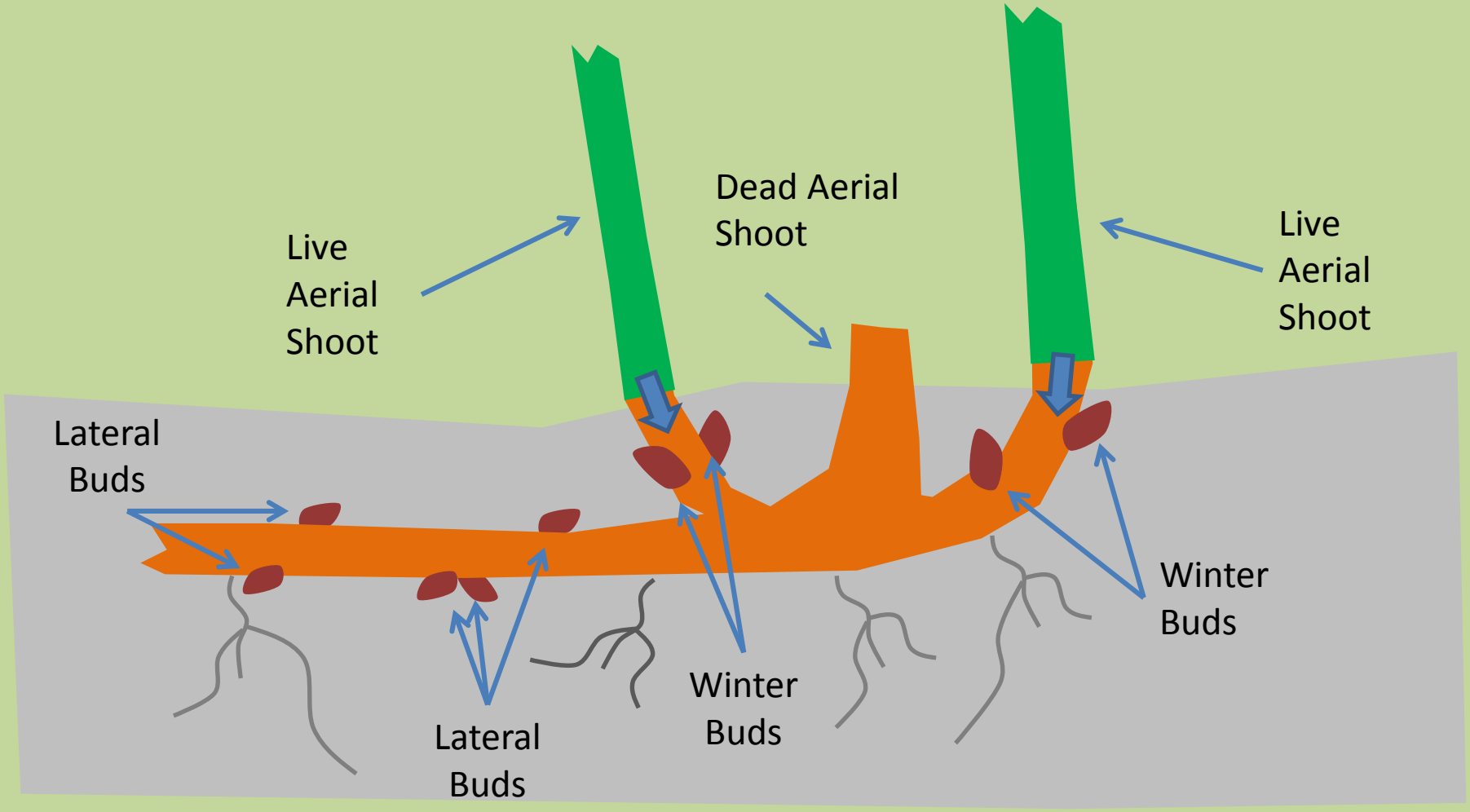
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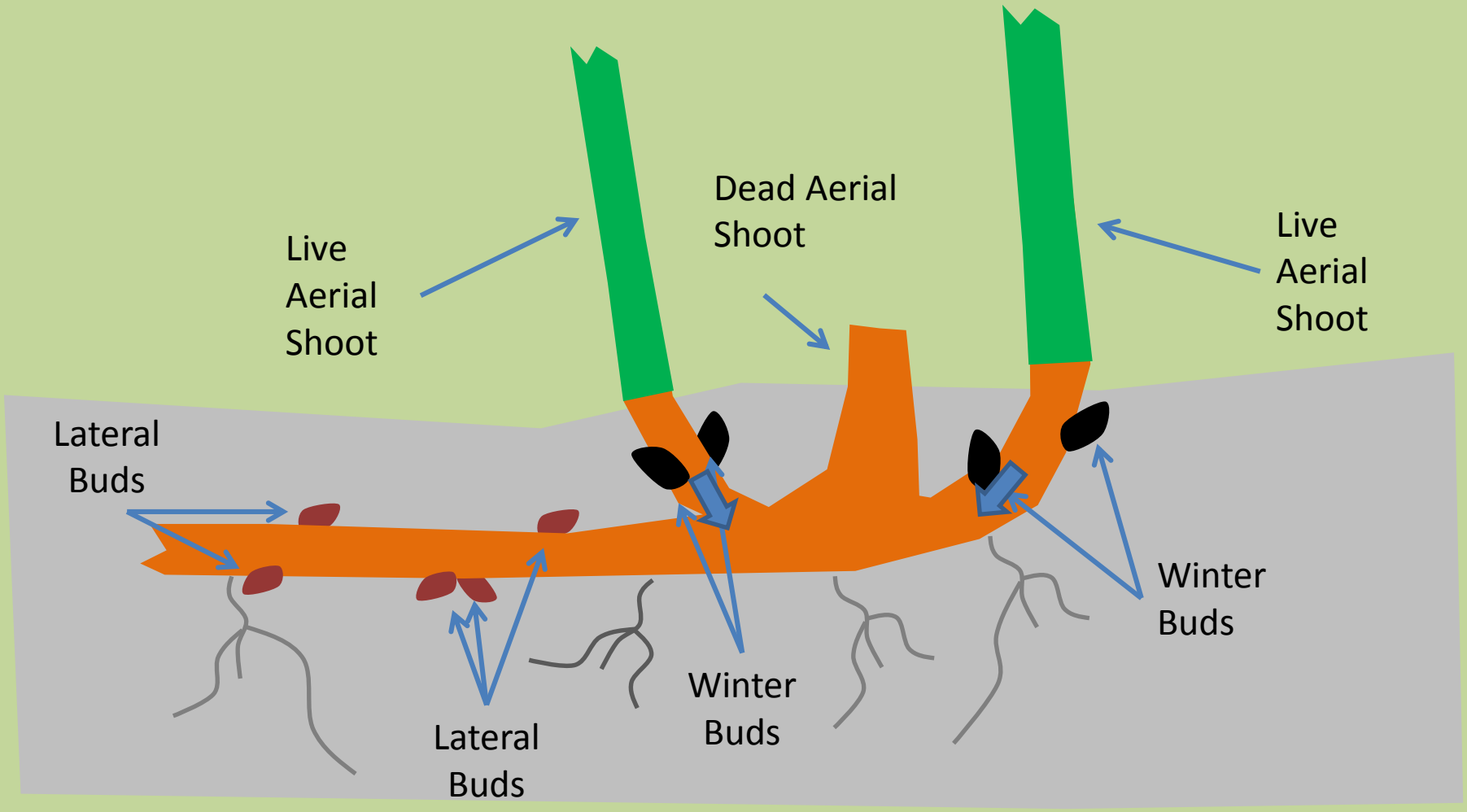
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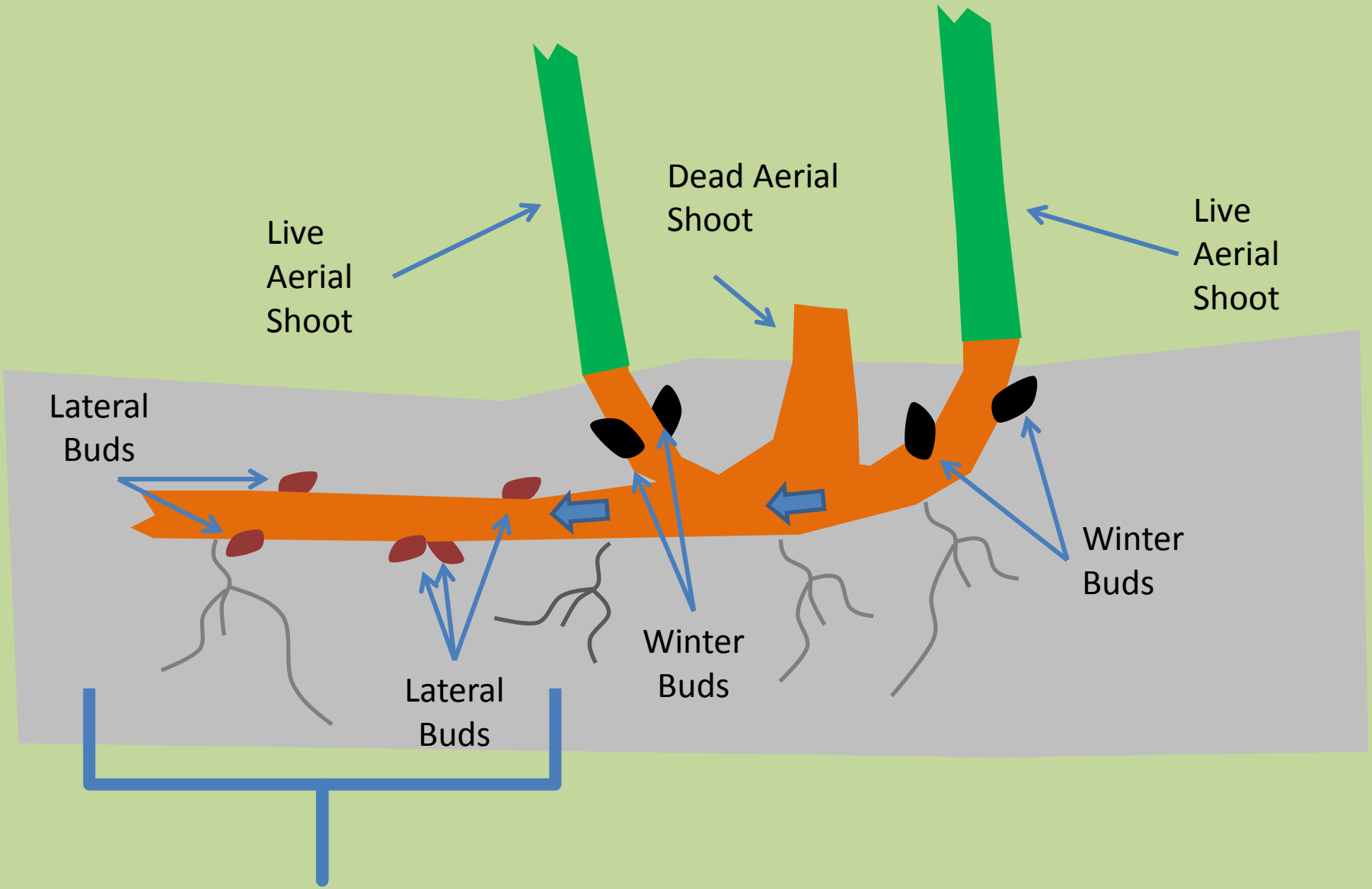


Can herbicide reach the weak sink buds?

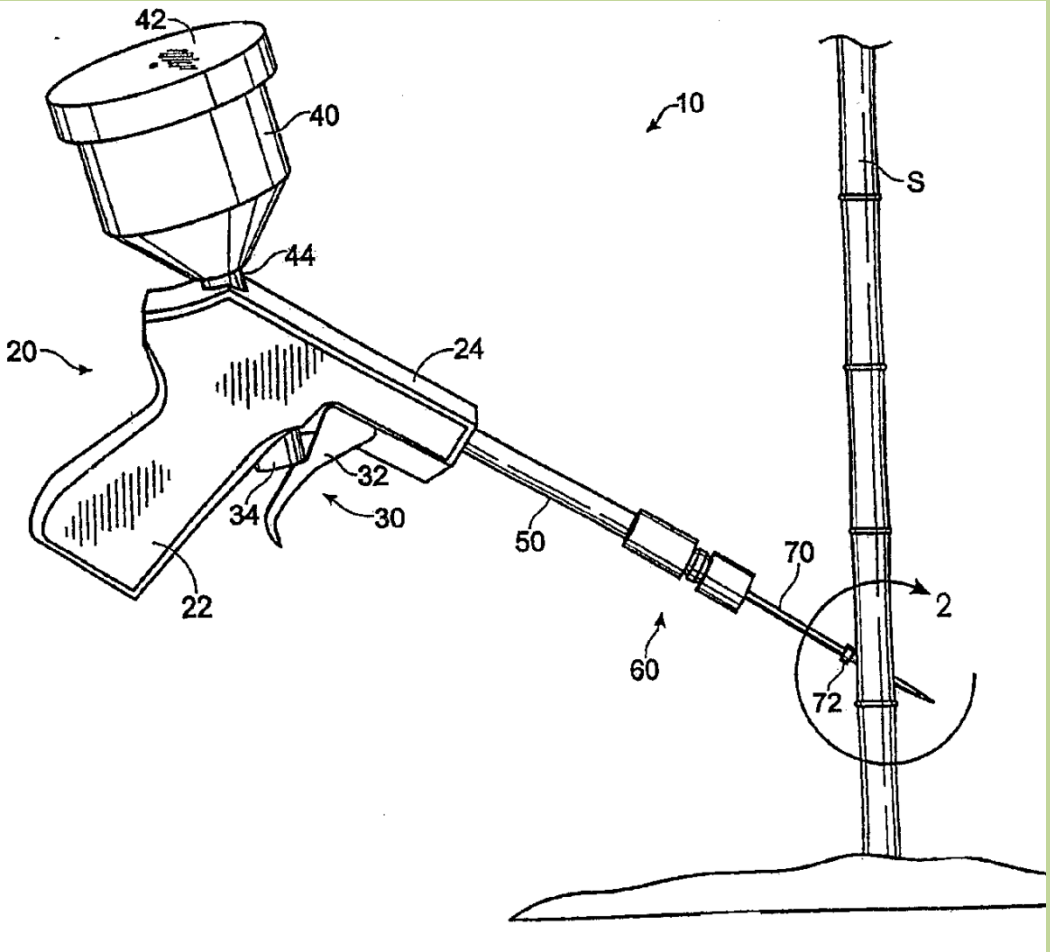
Chemical Control Methods

- Stem injection
- Cut stem
- Foliar

Key Herbicides

- Glyphosate – aquatic label
- Triclopyr – aquatic label; only foliar
- Imazapyr – aquatic label; only foliar

Stem Injection



Stem Injection

- Use hypodermic or special injector
- Inject up to 5 ml into stem
- Between 1st and 2nd node above ground

Stem Injection

- Advantages:
  - Precision
  - No stem disposal
  - Avg control: 91-100 % (Prather + Miller 2009)
- Disadvantages:
  - Time-consuming
  - Identifying treated stems
  - Difficulty in treating small stems
  - Non-target injury: 26% (Miller 2005)
  - And . . .

Biggest Disadvantage of Stem Injection

- Requires *5 ml of herbicide per aerial shoot*
  - Equivalent to cut surface application on 10 to 15 inch woody stem. AquaMaster Label.

- May explain 26% non-target injury found by Miller.

Cut Stem

- Cut stem 5 to 10 inches off ground
- Immediately pour up to 3 ml into hollow of stem

Pouring Herbicide into Cut Stem

Cut Stem

- Advantages:
  - Low cost equipment
  - Control? (Miller did not test)

- Disadvantages:
  - Time-consuming
  - Disposal of green aerial shoots
  - Amount of herbicide used

Foliar

- Advantages
  - Fastest application method
  - Decent control: 81%. (Miller 2005)
  - No disposal issues
  - Less herbicide used

- Disadvantages
  - Off-target harm: ***Avg. injury: 68%***. (Miller 2005)
  - Hard to treat tall plants

Follow-Up Applications

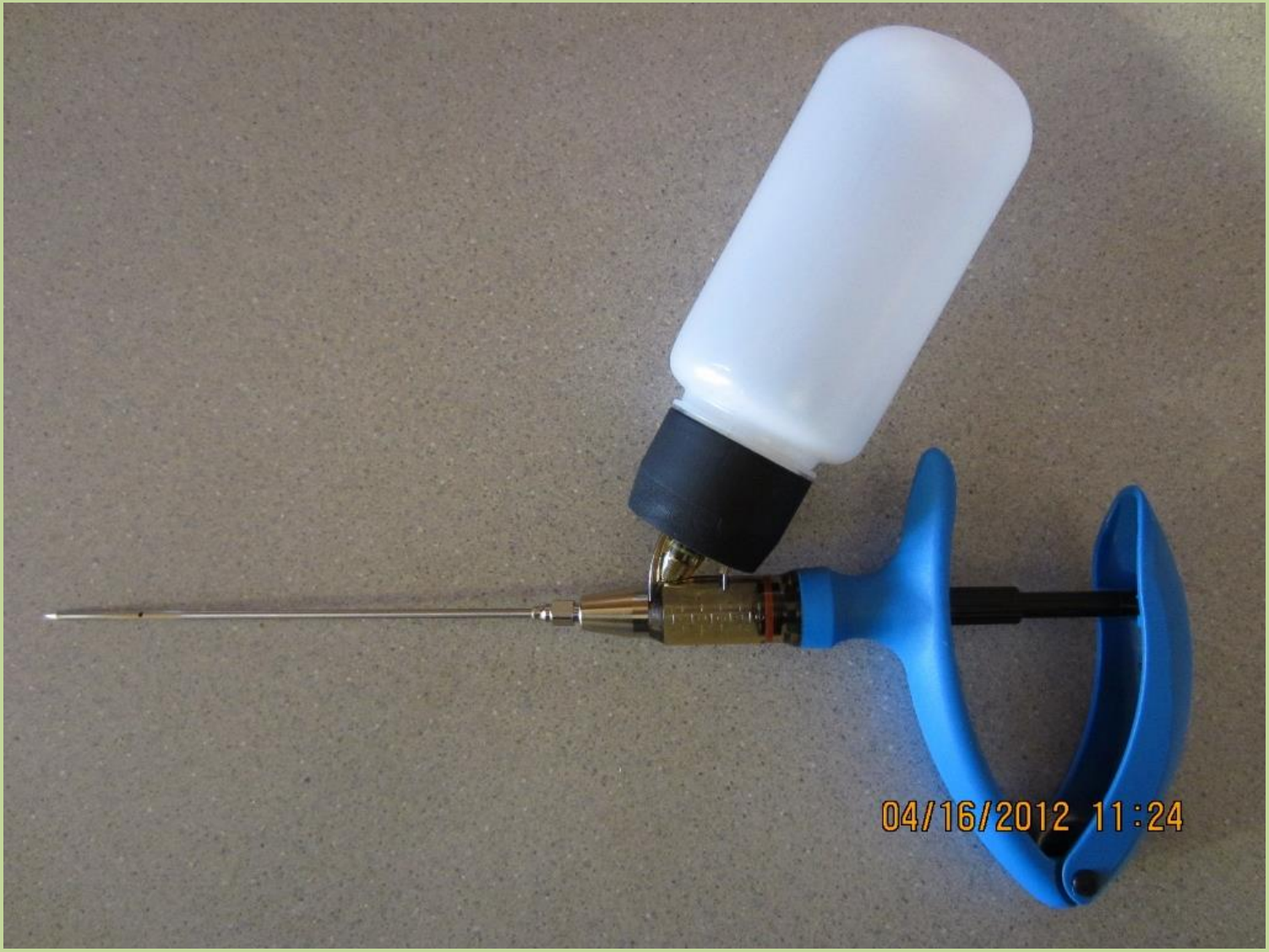
- Washington State Dept. Agriculture:
  - Data show "*significant decrease in knotweed following six years of annual treatments*.
  - However, *knotweed is still present at each monitoring site*." (Statewide Knotweed Control Program; 2010 Progress Report)

How Can Methods Be Improved?

- Reduce repeat applications
- Reduce quantity of herbicide used
- Reduce off-target harm

We Have Been
Trying Several Methods

Rhizome Injection



Injecting into Rhizome through Cut Stem

Rhizome Injection

Needle reaches to below-ground Internode

Herbicide Used

- AquaMaster – glyphosate; 54% a.i.
- Dose at 2ml

Results?

Not very impressive

- I would guess around 70% to 80%

Other New Methods Being Explored

Bend and Treat with Foam Herbicide

Large Foam Herbicide Dispenser with Foliar Nozzle

Treat Regrowth with Low Volume Application of Foam Herbicide


Foam Stream Ejected from
Dispenser – Reduced Drift

What is Low Volume?

- Use more herbicide (about 4% a.i.) and less water volume.
- Cover 10% to 30% of foliage.

Why Low Volume?

"The most consistent application factor that can increase glyphosate efficacy is lower carrier volumes." Young 2006.


Deposits Foam on Leaves –
Virtually No “Fines”

Foam Herbicide Clings to Leaf –
No drops to bead off

Herbicide Spreads on Leaf

Herbicide Slowly Dries on Leaf – increasing absorption

Before: dense knotweed colony

After: Small, isolated knotweed plants

Approximately 11 months after single treatment

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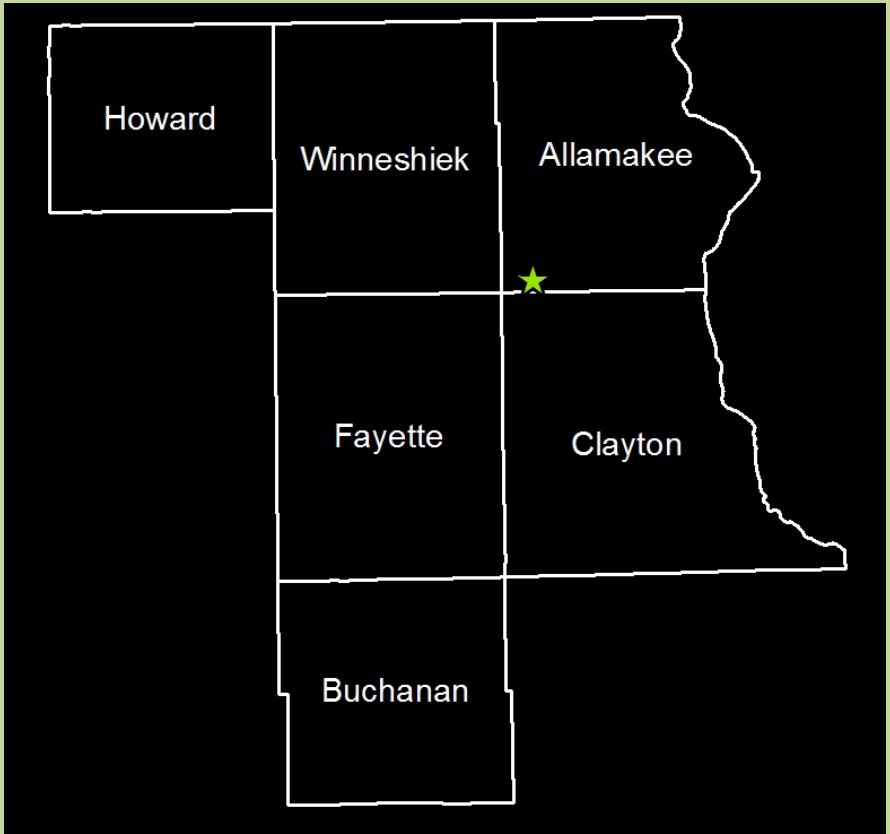

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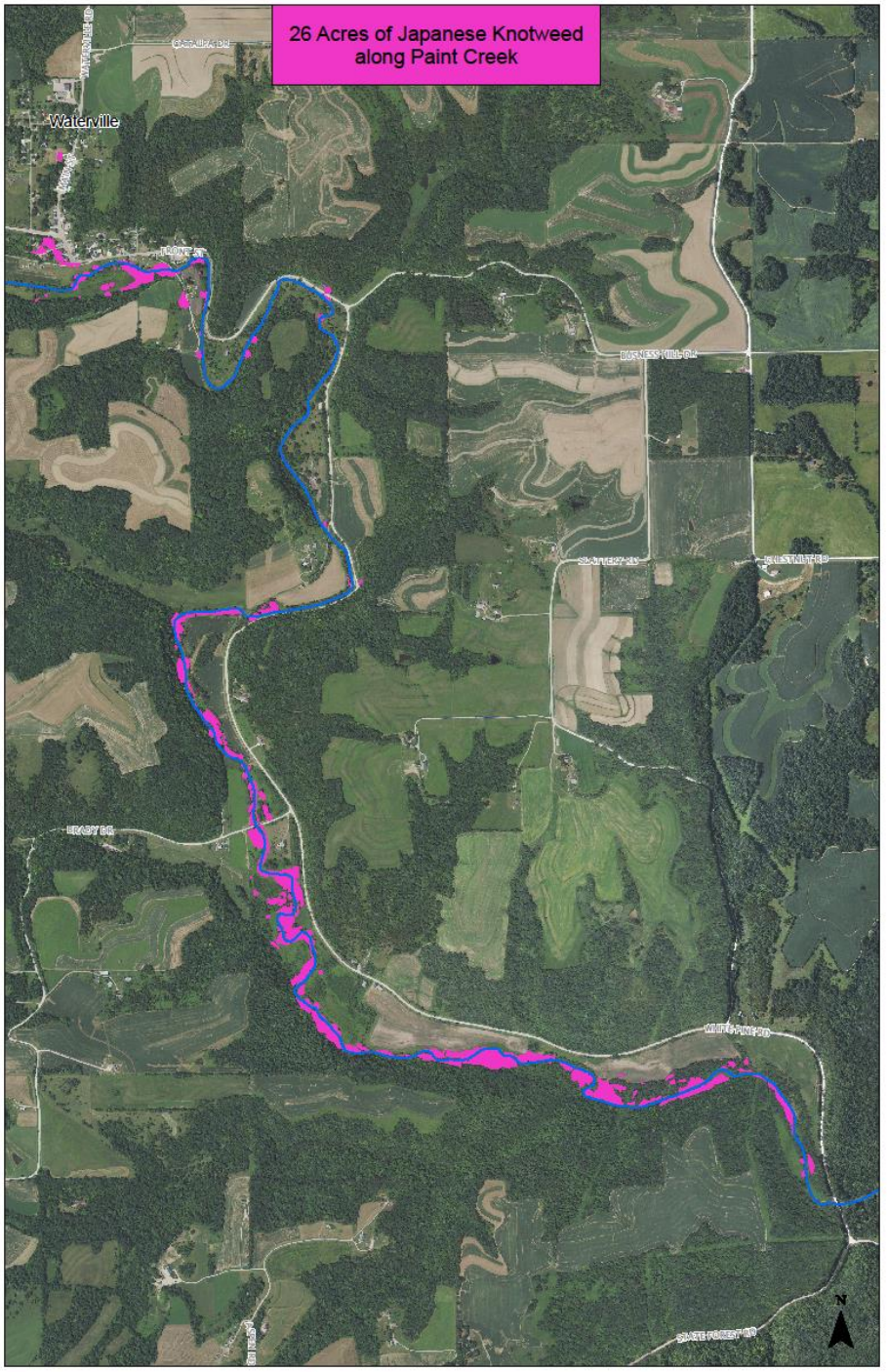
Use on Japanese knotweed along Paint Creek in Northeast Iowa



Report from Richard Kittelson from the Northeast Resource, Conservation and Development Organization:

- “We had an excellent result at the Hardees site, I'd say 80-90% effective. I just foam treated the resprouts on 9/30. The resprouts covered aprox. 10% of the area sprayed last year. It took 1/2 liter of mix.”

- “The west bank that had been 95% stem injected had more resprouts, aprox. 25% of the area. That side took 1 liter of mix to treat.”

Testing By Dr. Timothy Miller at Washington State University

- Late Summer 2014
- Comparing Spray and Foam Herbicide
- Bohemian and Himalayan knotweed
- Herbicides:
  - Rodeo (glyphosate)
  - Habitat (imazapyr)
  - Perspective (aminocyclopyrachlor)
  - Milestone (aminopyralid)

WSU testing (con.)

- Used 1 liter per plot with foam herbicide
- Used 2 liters per plot with spray
- I.e., using ½ as much foam herbicide as spray.
- Plots (I believe are 20 by 20 feet)

- Research is not funded by Green Shoots; we did provide WSU with a dispenser

Early WSU Results – Percent Control Determined by Defoliation

Type	2 WAT	4 WAT
Foam	51% avg.	69% avg.
Spray	46 avg.	66 avg.

Note: Averages across all herbicides used and two species of knotweed.

Why Might Foam Work Better?

- Foam is well suited for low volume applications
  - Less dripping
  - Slower drying of herbicide
  - Foam clings tenaciously to foliage
- More surfactant used
- Key Benefit: Virtually eliminates drift

Green Shoots

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