Steven Manning
PO Box 50556
Nashville, TN 37205

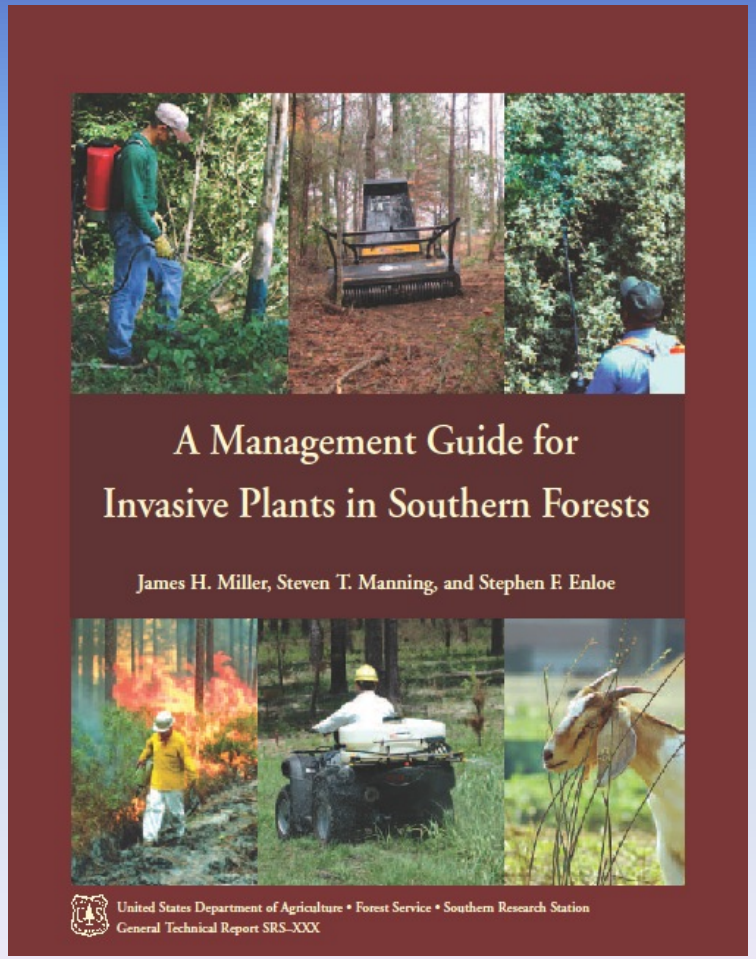
stevemanning@mindspring.com
615-969-1309 (Cell Phone)
www.invasiveplantcontrol.com

How Can We Find a way to implement all of the key characteristics of an invasive species management program During Difficult Economic Times?

- Prevention
- Early Detection
- Rapid Response
- On the Ground Control
- Restoration
- Monitoring and Maintenance


AS YOU CAN CLEARLY SEE IN SLIDE 397...
www.dilbert.com scottadams@aol.com
GAAAAH!
Z
Z
© 2000 United Feature Syndicate, Inc.
"POWERPOINT" POISONING.

Invasive Plant Management Tools

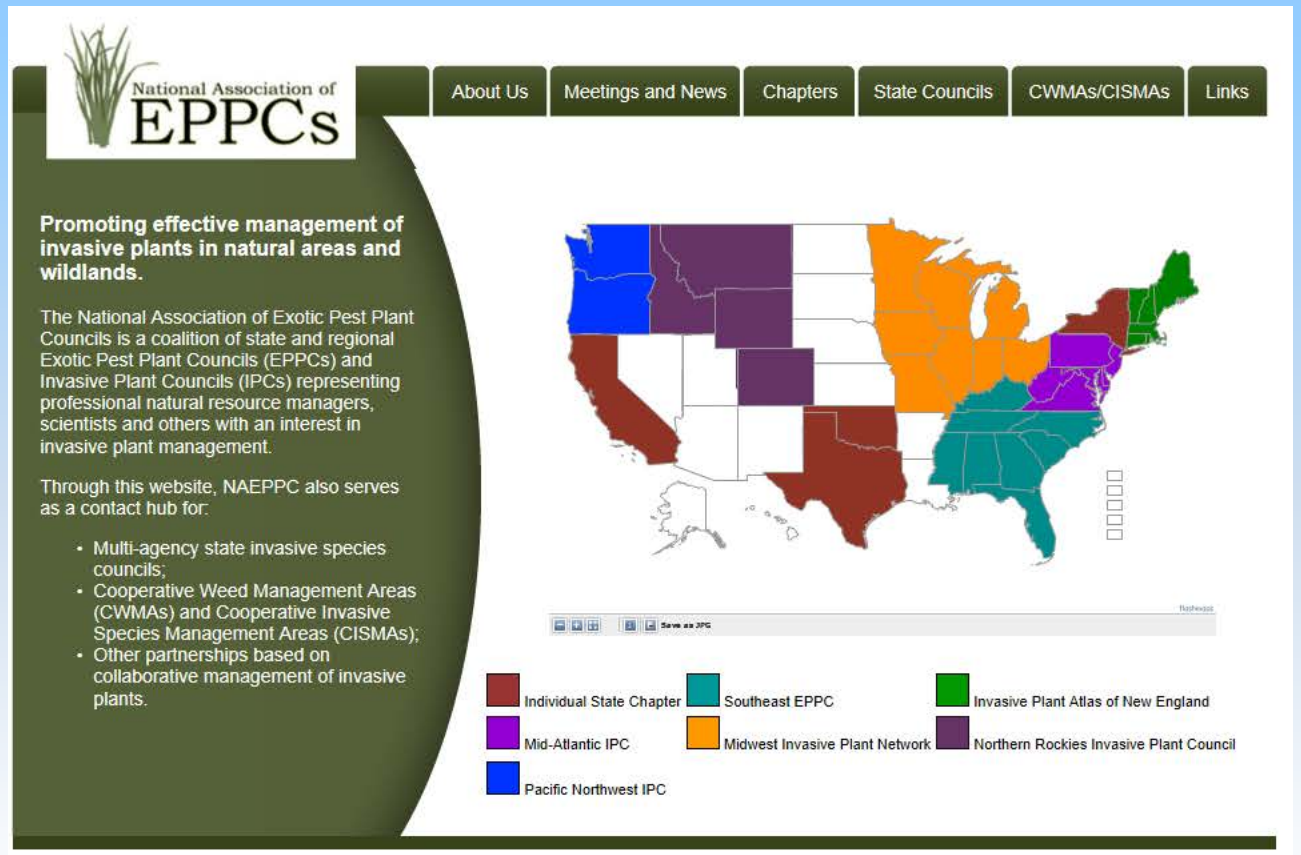


Other Resources

- Exotic Pest Plant Councils
- Invasiveplantcontrol.com
- Ipcconnect.com

Make Use Of Your Friends Organizations

- EPPC's
- IPC's
- Native Plant Societies



Invasive Plant Atlas of New England

Early Detection | IPANE Species | Volunteer | Related Information | Report a Sighting | Data & Distribution Maps

The Invasive Plant Atlas of New England's (IPANE) mission is to create a comprehensive web-accessible database of invasive and potentially invasive plants in New England that will be continually updated by a network of professionals and trained volunteers. The database will facilitate education and research that will lead to a greater understanding of invasive plant ecology and support informed conservation management. An important focus of the project is the early detection of, and rapid response to, new invasions.

Predictive modeling research and results

Invasive plant management

Calendar of Events

Monday, January 28 | Week | Month | Agenda

Showing events after 1/28.
Look for earlier events

Showing events until 2/28. Look for more

Events shown in time zone: Eastern Time | Google Calendar

News

Welcome to IPANE's new blog!

More News from the IPANE Blog

CSREES | New England Wild Flower Society | University of Connecticut | CIESIN Columbia University | USGS | EDDMapS Early Detection & Distribution Mapping System

*www.eddmaps.org/**ipane**/*

Invasive Species Management Concepts

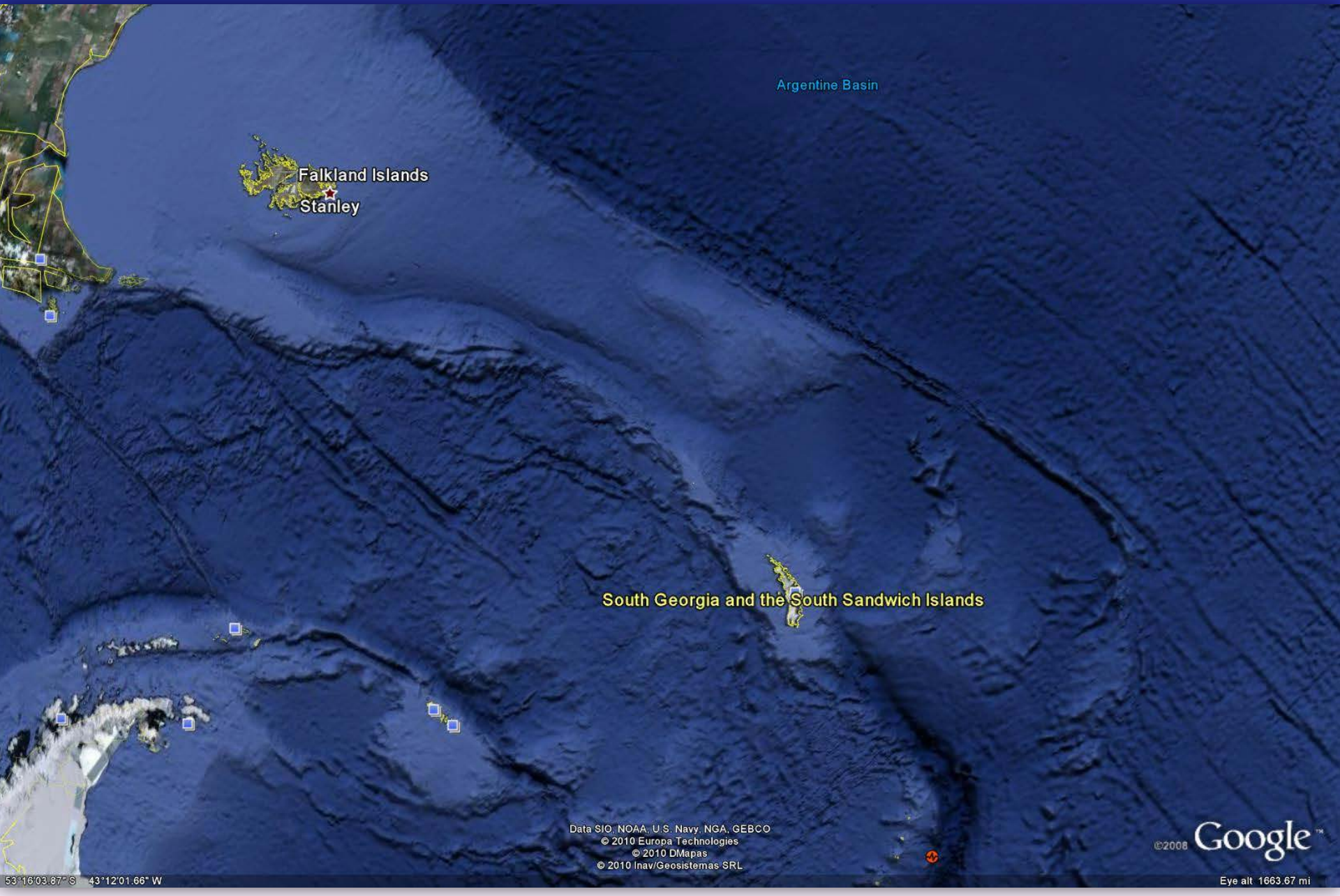
Integrated Pest Management

Control Techniques

Prevention

CISMA's

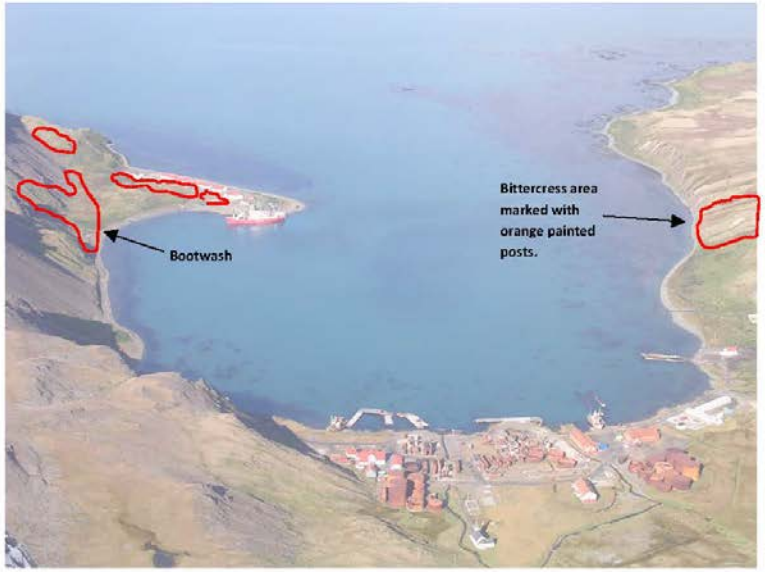
Falkland Islands


Argentine Basin
Falkland Islands
Stanley
South Georgia and the South Sandwich Islands
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2010 Europa Technologies
© 2010 DMapas
© 2010 Inav/Geosistemas SRL
©2008 Google
53°16'03.87" S 43°12'01.66" W
Eye alt 1663.67 mi


Willis Islands
Bird Island
Annenkov Island
King Edward Point
South Georgia and the South Sandwich Islands
Cooper Island
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
© 2010 Europa Technologies
© 2010 Google
Image © 2010 DigitalGlobe


Grytviken
King Edward Point
Image © 2011 DigitalGlobe
© 2011 Google
© 2011 Europa Technologies
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
54°16'56.75" S 36°29'37.71" W elev 46 ft
Imagery Date: 1/25/2007
©2010

Bittercress at King Edward Point and Grytviken



— Bittercress infested areas please stay out. If you require access please discuss with GOs.

Bittercress in flower and with seeds pods. If you see this plant outside of the above areas please mark the site and let the GOs know.

Wednesday, November 24th 2010
Atlanta to Miami and connect to LAN #501 departing 2140

Thursday, November 25th 2010
- Arrive Santiago @ 0605
- Meet & transfer airport-hotel
- Sheraton Santiago 2 nights with Breakfast

Friday, November 26th 2010
- Layover day

Saturday, November 27th, 2010
Santiago-Mount Pleasant on Lan #991 @ 0720-1310
- Transfer hotel-airport in Santiago
- Meeting and transfer Mount Pleasant to Stanley
- Malvina House 2 nights with Hot Breakfast

Sunday, November 28th, 2010 – Layover Day

Monday, November 29th 2010
- Arrange locally and take taxi to port for embarkation on Patrol ship (These arrangements will have to be developed with Mr. Christie, assumptions are made here)

Monday, November 29th, 2010 through Friday, December 3rd, 2010
- Depart Mt Pleasant
- Cruising

Friday, December 3rd, 2010
- Arrive South Georgia

Dec 03 - 10	**Week #1**
Dec 10 - 17	**Week #2**
Dec 17 - 24	**Week #3**
Dec 24 - 31	**Week #4**
Dec 31 - Jan 07	**Week #5**

Sunday, January 9th, 2011 through January 13th, 2011
- Depart South Georgia
- Cruising

Thursday, January 13th
- Arrive Stanley - get taxi at port to get to hotel
- Malvina House 2 nights with Hot Breakfast

Friday, January 14th, 2011
- Layover Day

Saturday, January 15th, 2011
Mount Pleasant-Santiago on Lan #990 @ 1425-2020


Cardamine flexuosa
on South Georgia, South Atlantic


10
11
12
13
14

Cardamine flexuosa
on South Georgia, South Atlantic

Low Funding Solution...

invasive PLANT CONTROL


ONE
WAY

Other Prevention Measures

Cleaning personal field gear

Cleaning office parking lots


Cleaning personal field gear
Management
INVASIVE
Plant
Control
Control of Non-native Plants in Natural Areas of Florida
K. A. Langeland
R. K. Stocker
UNIVERSITY of FLORIDA


Cleaning
personal
field gear


VROLET

Sheilah Kennedy, Owner/Operator
S-K Environmental
Portable Invasive Species Rinse off and Reclaim System
http://s-k-enviro.com
shekennedy@hotmail.com
509-322-6909
219 Rodeo Trail Road
Okanogan, Washington 98840 U.S.A.


MERCURY

Seven Factors that Affect your Choice of Method for Control

I. *What is the Long Term Plan for the Site?*

II. **What is the *Need for Selectivity*?**

III. **What is the *Level of Infestation* ?**

IV. **How will you determine the *Cost of the Project?***

V. **What *Type of Labor* is Suitable?**

VI. **How does *Seasonality* effect mortality?**

VII. **Choice of Methodology *(IPM)***

I. What is the long term plan for the site?

- Understand the Scope of the Project

Amicalola Falls State Park in

invasive PLANT CONTROL

Seven Factors that Affect your Choice of Method for Control

I. What is the *Long Term Plan* for the Site?

II. ***What is the Need for Selectivity?***

III. What is the *Level of Infestation* ?

IV. How will you determine the *Cost of the Project?*

V. What *Type of Labor* is Suitable?

VI. How does *Seasonality* effect mortality?

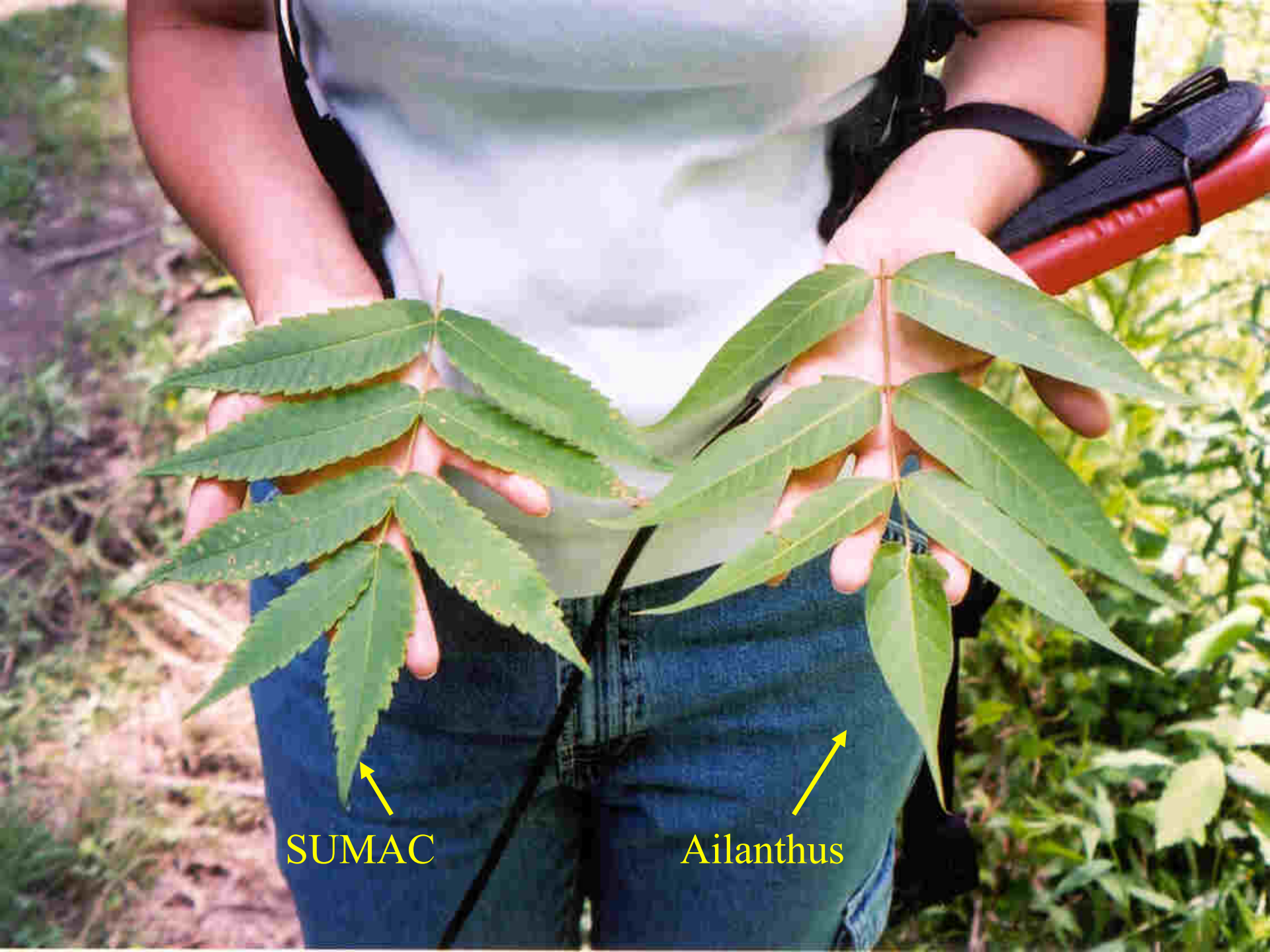
VII. Choice of Methodology *(IPM)*

Nonselective Control

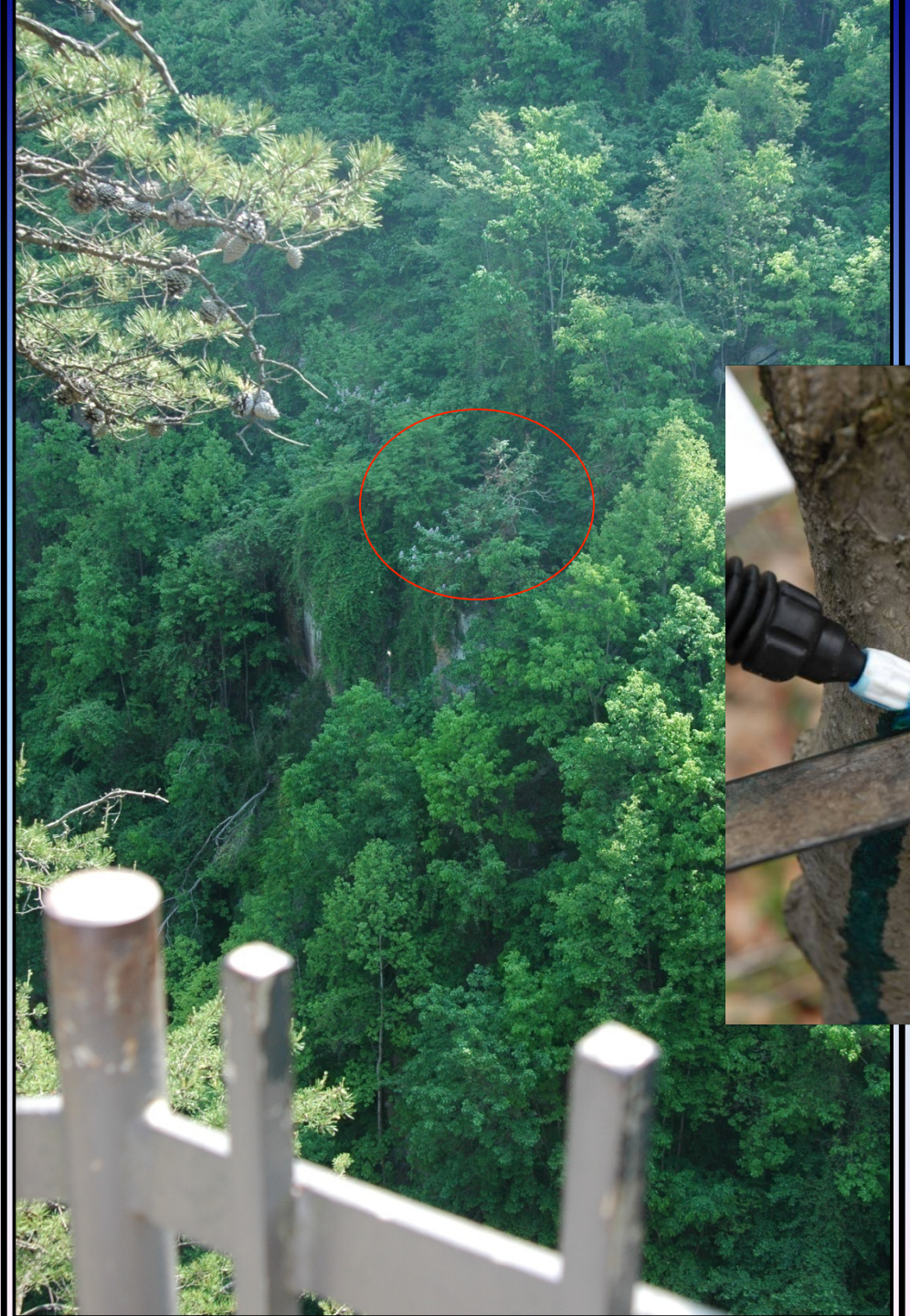
Clearly identify the species for control

Highlight the desirable species

invasive PLANT CONTROL


SUMAC
Ailanthus


Ailanthus????

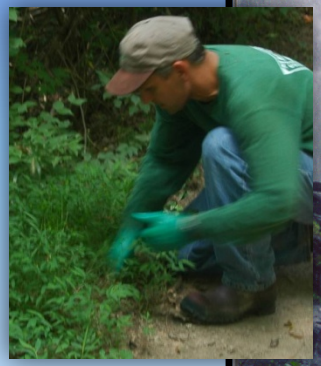


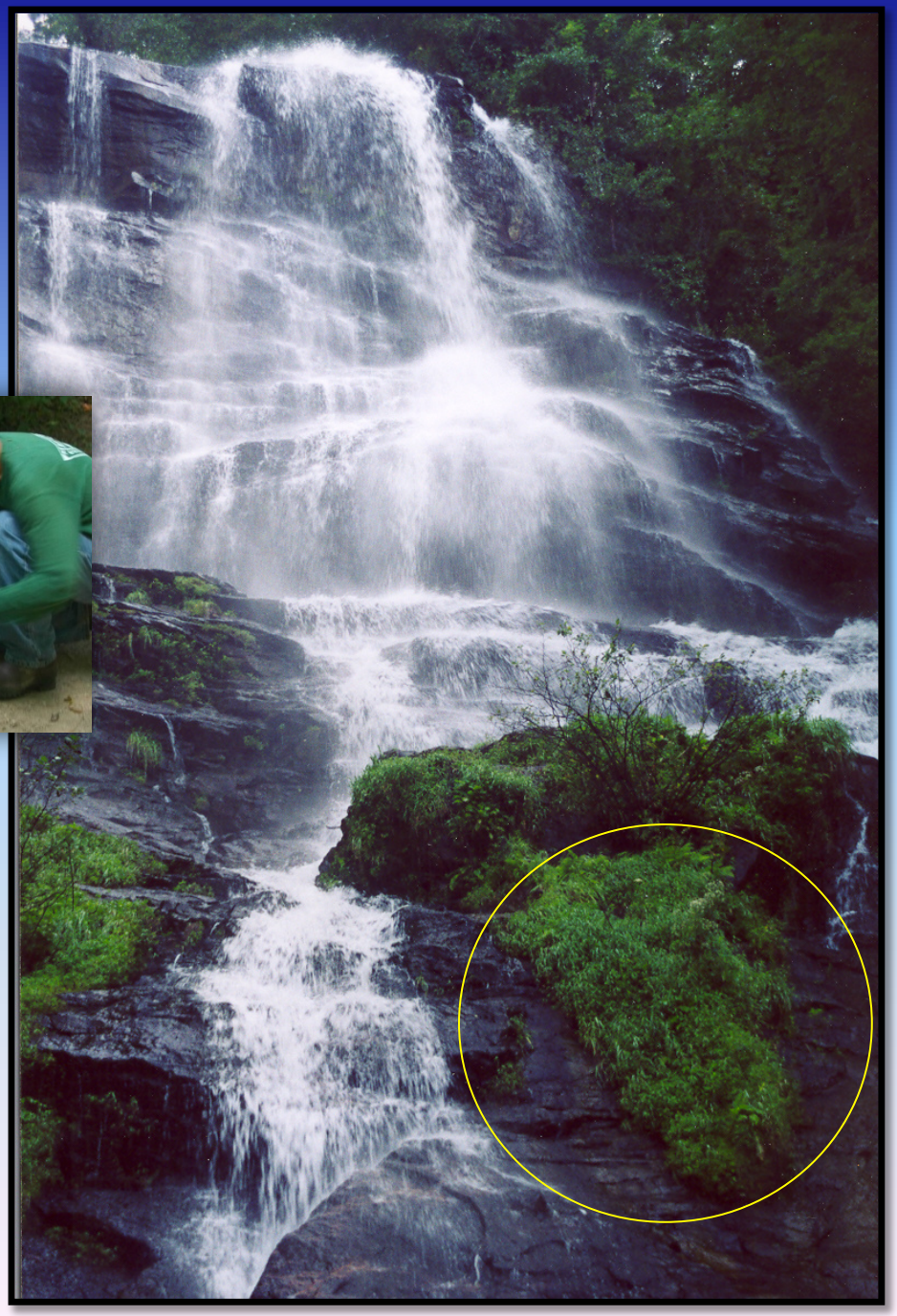
invasive PLANT CONTROL

What herbicides are required?

Arlington County Parks, VA

Lesser Celandine





Arlington County Parks, VA

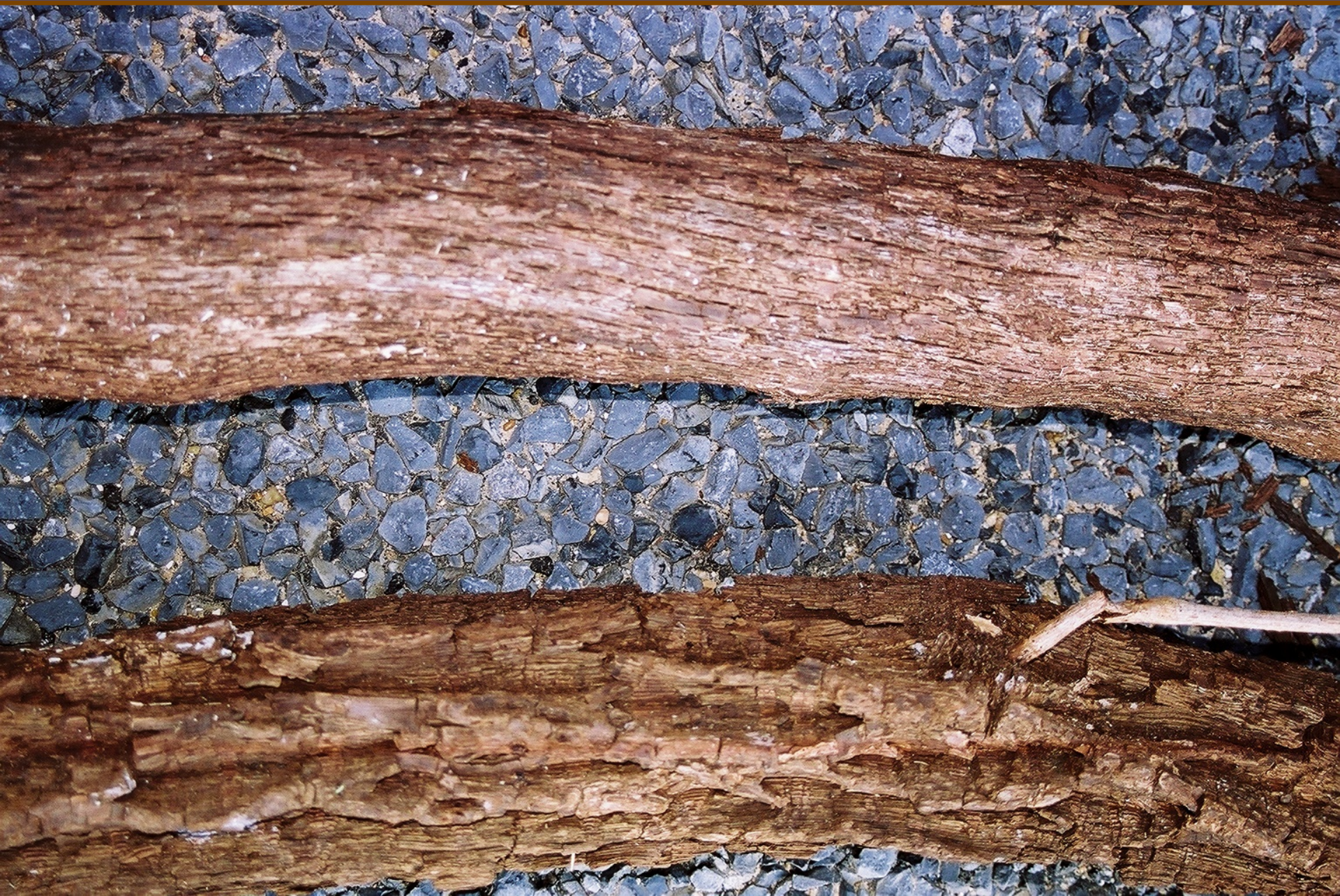
Lesser Celandine

invasive PLANT CONTROL

Test in the Field

Porcelain Berry
Ampelopsis Brevipedunculata

Porcelain Berry
Ampelopsis Brevipedunculata



Which chemicals create more selective control?

Porcelain Berry
Ampelopsis Brevipedunculata

George Washington National Parkway, VA


STIHL

Seven Factors that Affect your Choice of Method for Control

I. What is the Long Term Plan for the Site?

II. What is the *Need for Selectivity*?

III. What is the *Level of Infestation* ?

IV. How will you determine the *Cost of the Project?*

V. What *Type of Labor* is Suitable?

VI. How does *Seasonality* effect mortality?

VII. Choice of Methodology *(IPM)*

III. How does the Level of Infestation affect Method you Choose?

- Level One
- Level Two
- Level Three
- Level Four
- Level Five

OR

- High Intensity
- Medium Intensity
- Low Intensity

invasive PLANT CONTROL

Level 3 infestation of bush honeysuckle

Warner Parks, Nashville, TN

Level 3-4 bush honeysuckle

Warner Parks, Nashville, TN

Level 5 infestation of multistemmed and vine species

Warner Parks, Nashville, TN

Level One Tree of Heaven

Arnold Air Force Base, TN

Level 5 infestation of Malaleuca

Everglades, FL

Level 1 infestation

Everglades, FL

Everglades, FL

Level 1-2

Level 4-5

Intensity for multistemmed species is Level 5 in most parts of the parks understory

Fort Yargo State Park in Georgia

Seven Factors that Affect your Choice of Method for Control

I. What is the Long Term Plan for the Site?

II. **What is the *Need for Selectivity*?**

III. **What is the *Level of Infestation* ?**

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V. **How does *Seasonality* effect mortality?**

VI. **What *Type of Labor* is Suitable?**

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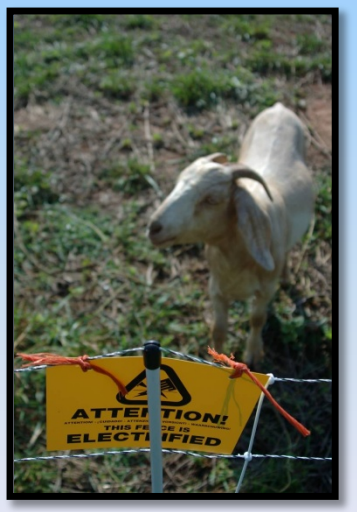
III. What is the *Level of Infestation* ?
IV. How will you determine the *Cost of the Project?*
V. What *Type of Labor* is Suitable?
VI. How does *Seasonality* effect mortality?
VII. Choice of Methodology *(IPM)*

V. Type of Labor Available

Labor Types	Infestation Levels
• Volunteer Labor	**1-2**
• In House Labor	1-**2-3**
• Contract Labor	1-2-**3-4-5**

invasive PLANT CONTROL

Type of Labor



versus →

invasive PLANT CONTROL

Privet
Ligustrum species

invasive PLANT CONTROL

Birmingham Alabama

Privet
Ligustrum species

Seven Factors that Affect your Choice of Method for Control

I. What is the Long Term Plan for the Site?
II. What is the *Need for Selectivity*?
III. What is the *Level of Infestation* ?
IV. How will you determine the *Cost of the Project?*
V. What *Type of Labor* is Suitable?
VI. How does Seasonality effect mortality?
VII. Choice of Methodology *(IPM)*

Proper timing allows for more selective control

Garlic Mustard
Alliaria petiolata

Frick Park, Pittsburgh, PA

Garlic Mustard
Alliaria petiolata

Steven T. Manuel, 615-969-1309
Invasive Plant Control, Inc.

Seven Factors that Affect your Choice of Method for Control

I. What is the Long Term Plan for the Site?
II. What is the *Need for Selectivity*?
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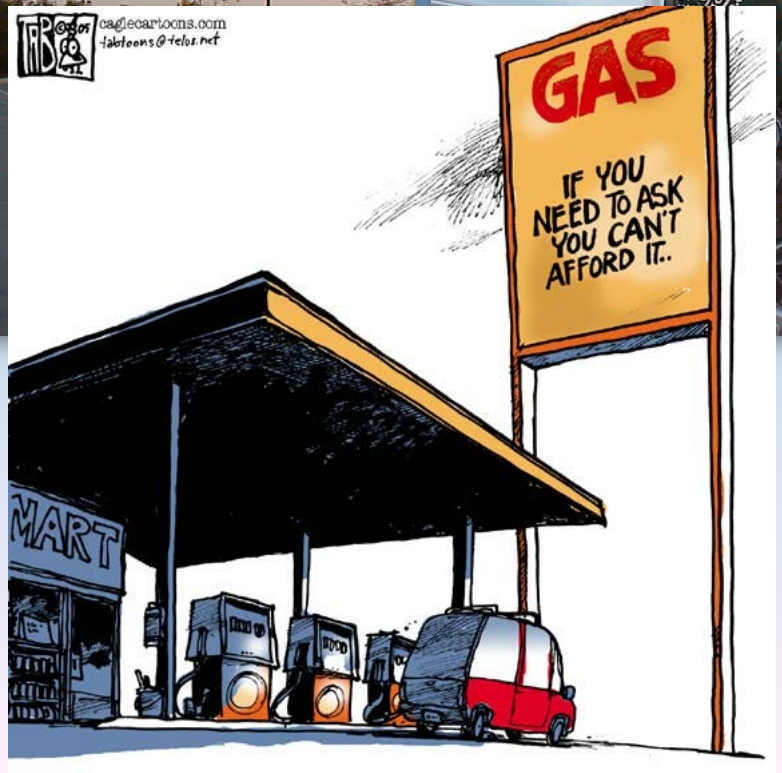
V. What *Type of Labor* is Suitable?
VI. How does Seasonality effect mortality?
VII. Choice of Methodology (IPM)

On the Ground Management:
Equipment

Transit to Site



invasive PLANT CONTROL


TOM'S SHELL
Self Serve
Cash or Credit
Regular
ARM 9
Plus
LEG 9
Premium
First 9 Born

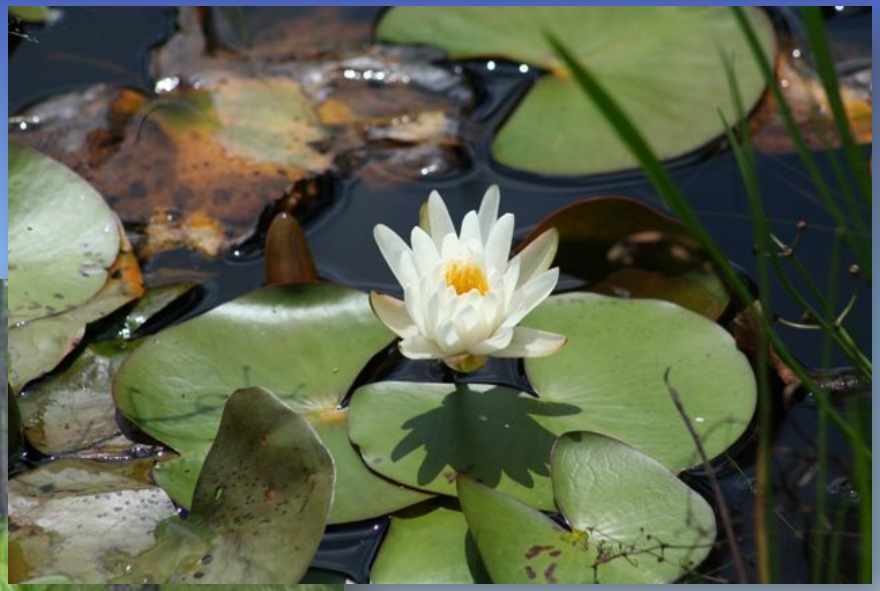

GAS
UNLEADED
LOL 9/10
PLUS
OMG 9/10
PREMIUM
WTF 9/10

Swamp Buggy

invasive PLANT CONTROL

invasive PLANT CONTROL

Okefenokee NWR



invasive PLANT CONTROL


solo
STIHL
SG 20

Selective Mechanical Tools

- Digging Tools
- Girdling Tools
- Mattocks
- Hand Clippers
- Cutting Tools

STIHL
ROLLOMATIC E

invasive PLANT CONTROL

Hedge Clippers

Porcelain Berry
Ampelopsis Brevipedunculata

George Washington
National Parkway, VA


STIHL

invasive PLANT CONTROL

invasive PLANT CONTROL

invasive PLANT CONTROL

Root Jack

invasive PLANT CONTROL

invasive PLANT CONTROL

Position the Talon,

pull the handle...

...and lever out the plant!

The Root Talon is available for $47, plus $5.25 shipping, directly from the manufacturer. Contact:

Lampe Design, LLC
262 South Griggs Street
St. Paul, MN 55105
(612)699-4963
Email: jklampe@worldnet.att.net

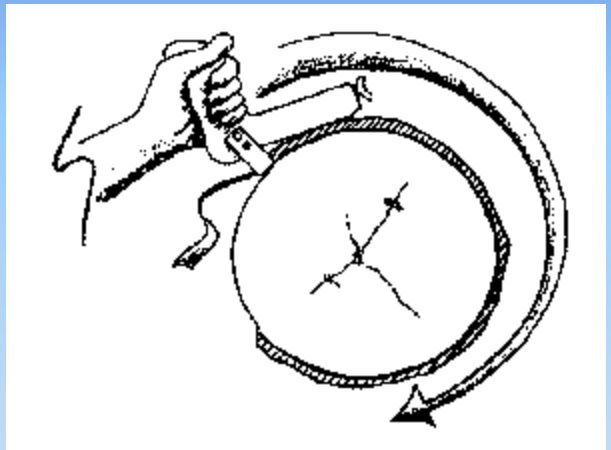
The Cattail Knife

JMC
FOREST MAINTENANCE LTD.

Manufacturer of the tree girdler

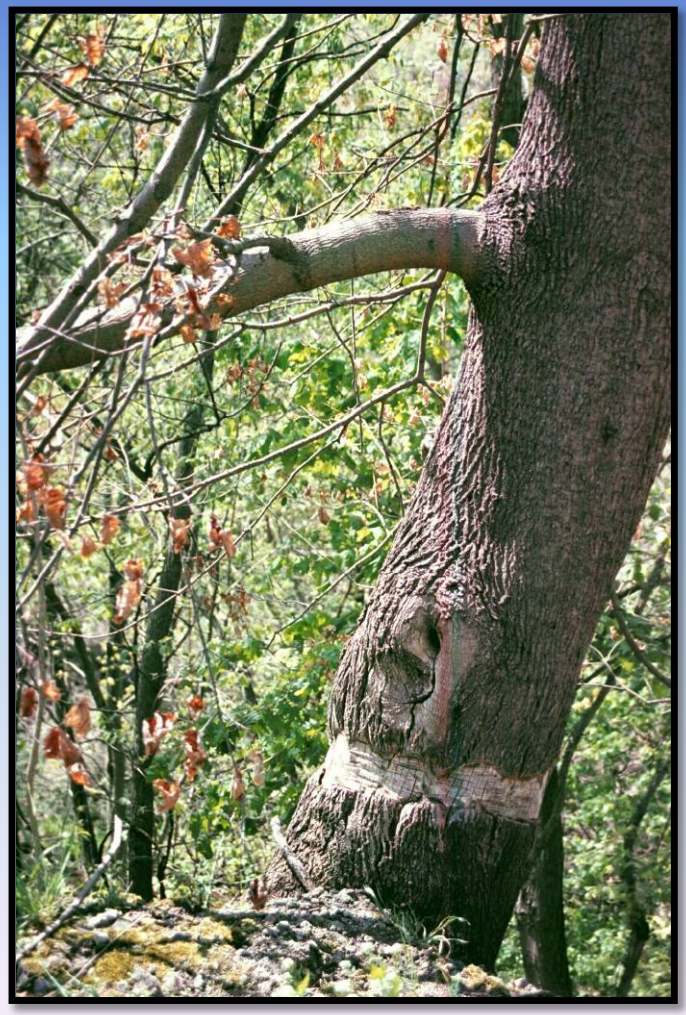
"THE RINGER"

The Alternative to Herbicide Use

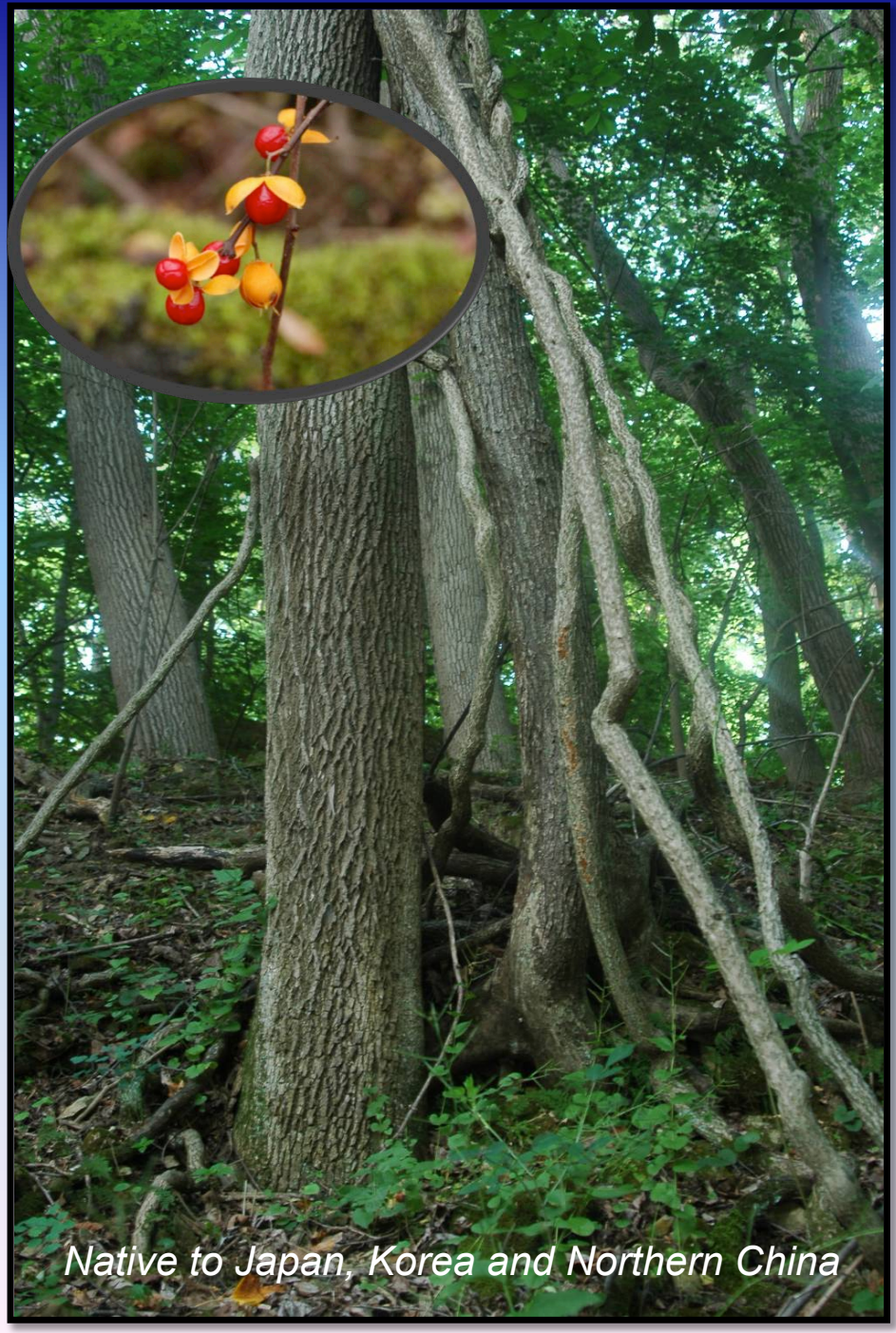


Manufactured by:
J.M.C. FOREST MAINTENANCE LTD.
250-652-2039; fax 250-652-0336
jmcent@jdmicro.com


INVASIVE
Plant
Contro



Cutting vines from the base of trees



Native to Japan, Korea and Northern China

Oriental Bittersweet

Celastrus orbiculatus

invasive PLANT CONTROL

Non Selective Mechanical methods

- Mulching Machines
- String Trimmers
- Fireplows
- Grubbers
  - Require Cutting and Treating resprouts

Mulching Machines


Gyro Trac
PT-100
DANGER


asv

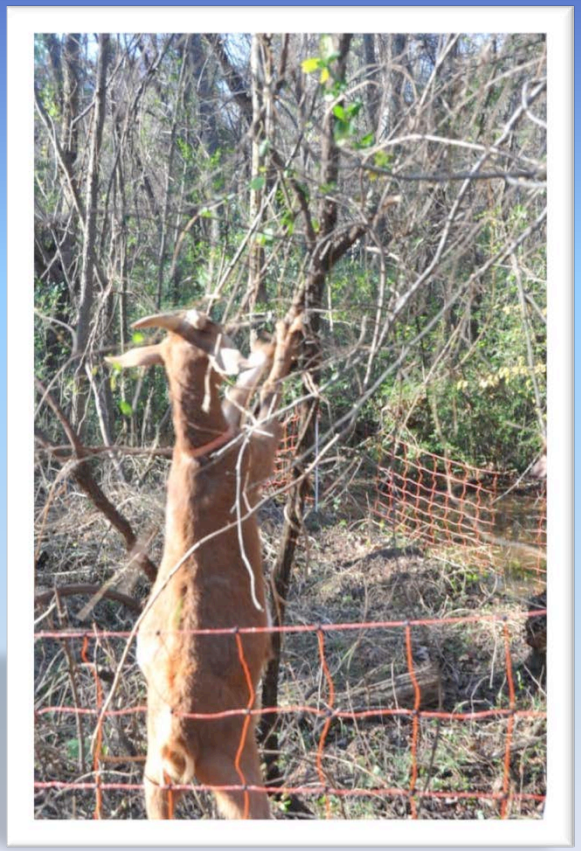

GEHL


JOHN DEERE
250


CAT


BUILDING

Tree terminator



Chapel Hill NC Botanical Gardens

Cultural Control

- Prescribed Burning
- Water Level Manipulation

Non Chemical Weed Control

- Soil Solarization
- Thermal Weed Control
  - Flaming
  - Hot Water
  - Steam
- Overgrazing
- Manual removal
- Harvesting, etc.

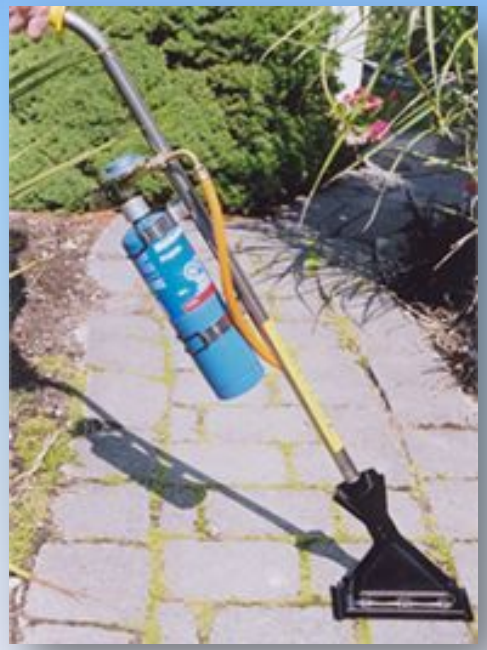
Thermal Vegetation Management Tools and Technology

Carborro, NC


WAIPUNA
WAIPUNA INTERNATIONAL LIMITED
Hot Water
Weed Control

Steam Weed Control

FOREVERGREEN™
CHEMICAL FREE WEED CONTROL



invasive PLANT CONTROL

Red Dragon Vapor Torch Back-Pack Kits:

Red Dragon Row Crop Flamers:

Factors to Consider for Choosing an Ivy Control Methodology

Eric Wold and Jesse Cary-Hobbs
City of Eugene
Parks and Open Space Division

- **Slope**
- **Aspect**
- **Canopy Cover/Type**
- **Quality of remnant native vegetation**
- **Soil type**
- **Accessibility for equipment**
- **Presence of hazards**

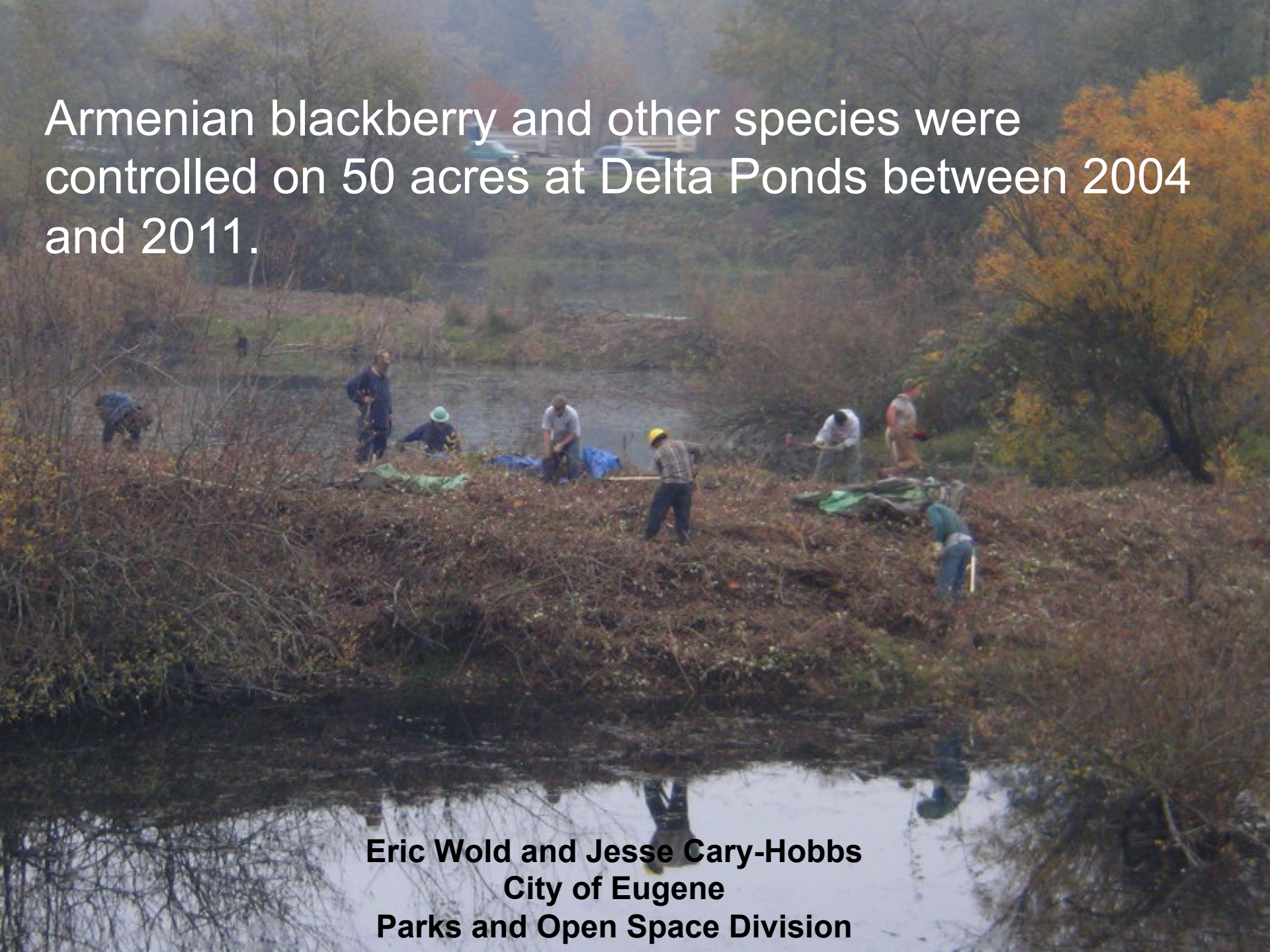
Photos provided by:
Eric Wold and Jesse Cary-Hobbs
City of Eugene Parks and Open Space Division

Eric Wold and Jesse Cary-Hobbs
City of Eugene
Parks and Open Space Division

Ivy Control Estimated Costs

- **Initial Hand Pulling** **~$3,000- 7,000/acre**
- **Follow-up Hand Pulling** **~$500-1,000/acre**

- **Initial Ivy Spraying** **~$500/acre**
- **Follow-up Spraying** **~$300/acre**



Armenian blackberry and other species were controlled on 50 acres at Delta Ponds between 2004 and 2011.

Eric Wold and Jesse Cary-Hobbs
City of Eugene
Parks and Open Space Division

PORTLAND PARKS & RECREATION

Healthy Parks, Healthy Portland

The No Ivy League

Rachel Felice

Stewardship Coordinator

City Nature West

Effects of Hand Ivy Removal

- Before & after photos Governor's Park

Hand Pulling


Invasive
PLANT CONTROL

Johnson Grass in Maryland

Garlic Mustard in Massachusetts

Mechanical control Can Severely increase your costs

EDRR---Chester Creek

Lori and Troy Zaumseil

Organic Weed Management

- Mulching
- Allelopathy
- Plastic Films

Organic Weed Management

- Mulching
- Allelopathy
- Plastic Films

Mulches / Barriers

Other Methods / Tools

Chain

Flooding


Daniel Barringer
Preserve Manager/Invasives Management
Coordinator
Crow's Nest Preserve

GOAT GREEN

www.goatseatweeds.com

Donny Benz benzdonny@yahoo.com
Lani Malmberg ewe4icbenz@aol.com

WORK:
- Weed Management
- Brush Control
- Fire Fuel Load Reduction
- Erosion Mitigation
- Flood Control
- Reclamation
- Re-seeding

Contracts:
- Federal
- State
- County
- City
- Home Owners
- Corporations
- Private
- Local

06/03/2010


07/21/2010


07/22/2010

Low Volume Herbicide Application Tools

- Backpack Sprayers
- Handsprayers
- Wetblade applicators

Herbicide Control

- Use most effective herbicide for the species
- Follow methods prescribed on the label
- Choose optimal time to apply chemicals
- Adhere to label prohibitions
- Remember that some herbicides require up to a month before activity is detectable

invasive PLANT CONTROL

Adjuvants

- Marking Dyes
- Sticker Spreaders
- Surfactants

invasive PLANT CONTROL

Mixing

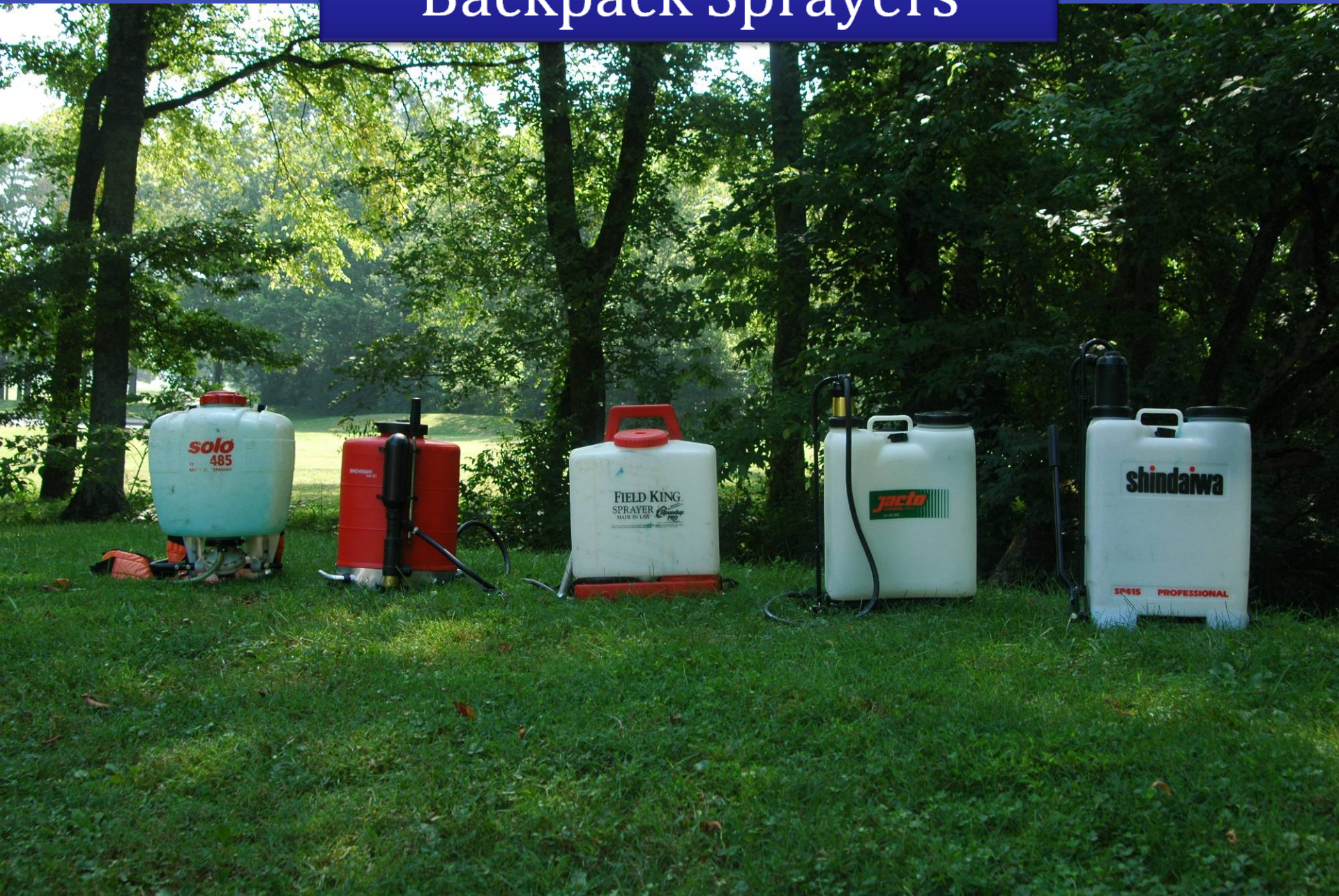
- Always use clean water in mixture
- Mix in a bucket and than add to sprayer
- Mix thoroughly

Cleaning Equipment

- Clean equipment at the end of EVERY workday
- Mix only what you need for the day
- If herbicide mix is leftover, spray remaining amount onto target vegetation prior to departure

invasive PLANT CONTROL

Backpack Sprayers



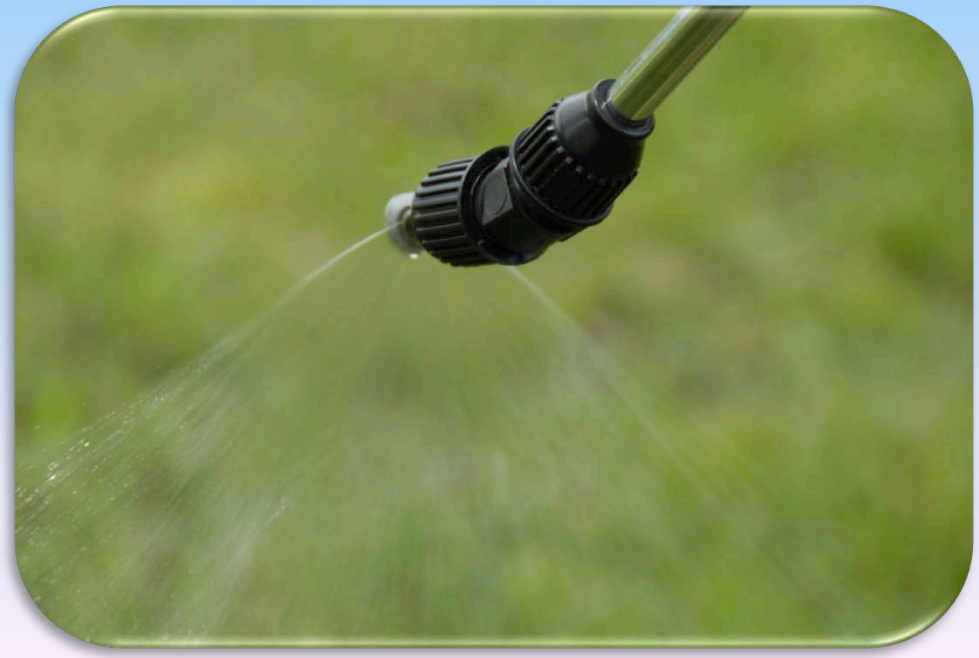

shindaiwa
SP510 • PROFESSIONAL

Backpack Sprayers

- Choose proper model
- Choose appropriate nozzle

invasive PLANT CONTROL

- Choose correct nozzle for application
  - Plastic
  - Brass
  - Stainless steel
  - Visiflow



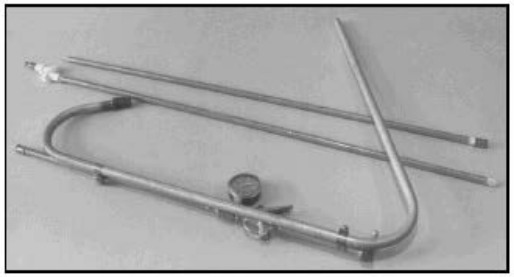
Nozzles

MODEL 4F

Designed to simulate aerial application on brush and sugarcane

Equipped with heavy duty Aluminum back pack frame, padded shoulder straps and 8 inch padded waist belt with quick disconnects (315); removable curved boom support with hand valve, pressure gauge, two 3 ft. extensions, nylon swivel body with KLC-9 flood tip spraying 30 ft. wide at 11 ft. above ground (4FBMCV); equipped with one 5 lb. Aluminum CO2 cylinder (104B), one 3 gallon SS container with industrial disconnects (107BG), twin gauge pressure regulator (NOR-100), air hose with industrial disconnects (407A), spray hose with industrial disconnects (408A).

Optional Spray Boom (601C) 4 nozzle spray boom on 19 inch spacing with dripless screens, 8002VS tips, spray valve and extended handle.



Change Your Model T Sprayer
Into A Model 4F Brush Sprayer

4FBMCV – Removable curved boom for heavy duty aluminum back pack frame (315). Consists of curved boom support, hand valve, pressure gauge and adapter, two 3 ft. extension, nylon swivel with KLC-9 flood tip. Fits back pack #315.

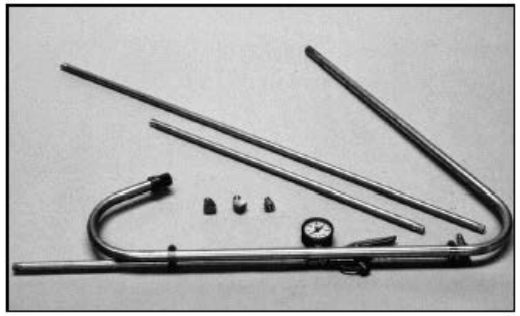
4FCS – Curved boom support only, fits back pack #315.

MODEL TBAC

Ideal for applying insecticide, defoliants & other contact pesticides.

Designed to apply pesticides behind the operator. Similar to Model T4 except equipped with curved boom support for stability of multi nozzle boom. Use 3 ft. extension with 45 degree or 90 degree elbows depending on height of target. Boom can be lowered for application to shorter plants. Now supplied with 601B type boom for extra support (all 1/4" pipe).

MODEL TBMCV



Used to convert Model T to Model TBAC. Consists of curved boom support for aluminum back pack frame (315), hand valve, pressure gauge and adapter, 18" & 36" downpipe (1/4" npt)and a 45 & 90 degree elbow.Used to convert Model T to Model TBAC. Consists of curved boom support for aluminum back pack frame (315), hand valve, pressure gauge and adapter, 18" & 36" downpipe (1/4" npt)and a 45 & 90 degree

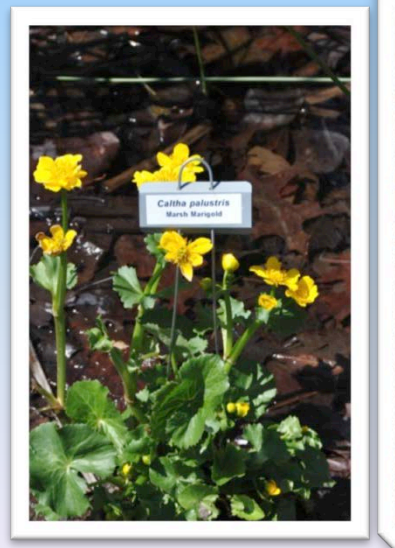

shindaiwa
SP415 PROFESSIONAL


jacto

What herbicides are required?

Arlington County Parks, VA

Lesser Celandine


Caltha palustris
Marsh Marigold

Wild pineapple, Hassel Island, USVI

7 and 14 days after backpack treatment

African Guiena Grass - (Urochloa maxima)

2-weeks after treatment

Basal Sprays

Use of Basal Bark applications with Marking Dyes Can Increase Effectiveness and Selectivity of Treatments

Tree of Heaven
Ailanthus altissima

Tree of Heaven
Ailanthus altissima

Autumn Olive
Elaeagnus umbellata

invasive PLANT CONTROL

Egypt Valley WMA in Southeast Ohio

Autumn Olive
Elaeagnus umbellata

Native of China & Japan

invasive PLANT CONTROL


SPRAYER

Thinvert

Handsprayers

- **Model 1985VI**
- **Pulled because they BREAK**

www.rlflomaster.com

About Root-Lowell

invasive PLANT CONTROL

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GAZON 3A
25%
GLYPHOSATE


HUDSON
SPRAYERS and DUSTERS
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Sprayer
Equipped with Viton®
Equipado de Viton®
Équipé de pièces en Viton®
1/2 Gallon 2 ℓ
Model 99142
H. D. Hudson Manufacturing Company
Hastings, MN 55033 Made in U.S.A.


HUDSON
SPRAYERS and DUSTERS
TEK
Sprayer


TR

Lygodium

Girdle and Treat

Cut and Treat with Chainsaws

- Most expensive option
- Very selective herbicide application

invasive PLANT CONTROL

Cutting and treating is very selective but not for volunteers


STIHL®

invasive PLANT CONTROL

The good:

- Balance and weight of both saws are nearly identical.
- They replaced the rubber bushings on the handle with springs, eliminating the issue with torn bushings over time.
- Access to the air filter on the MS201T requires no tool. The MS200T requires a scrench, screwdriver, coin, etc.
- Redesigned oil tank eliminates air pocket, so tilting the saw to burp it when filling the oil is no longer necessary.
- 201T runs longer on a tank of fuel then the 200T
- Has lever under cover to switch the carb choke from "winter" to "summer" running conditions. I have not run the saw enough in the cold to know if it helps, but I like the idea.

The bad:

- Emissions requirements have made the saw a wimp straight out of the box.
- Removing the spark arrestor, drilling the muffler, and tweaking the carburetor adjustments is necessary match/exceed the power of the old STOCK MS200T. It still has trouble keeping up with my "modified" MS200T.
- Slow throttle response.
- Slower chain speed (Which is fine if the torque was there without modifications).

Overall, Stihl replaced a great, durable climbing saw with a sub-par saw. I doubt this new one will last 8 years like my old 200T.

My suggestion is to buy up any new MS200Ts that might still be laying around. The MS201T is in my truck by default, and I'm going to try to rob Bobby's truck before he destroys all of his 200Ts

The OREGON® PowerNow™ 40V MAX*

Cut and Treat with Chainsaws

Shenandoah National Park, VA


STIHL
STIHL


STIHL
MS 201T
STIHL

invasive
PLANT CONTROL

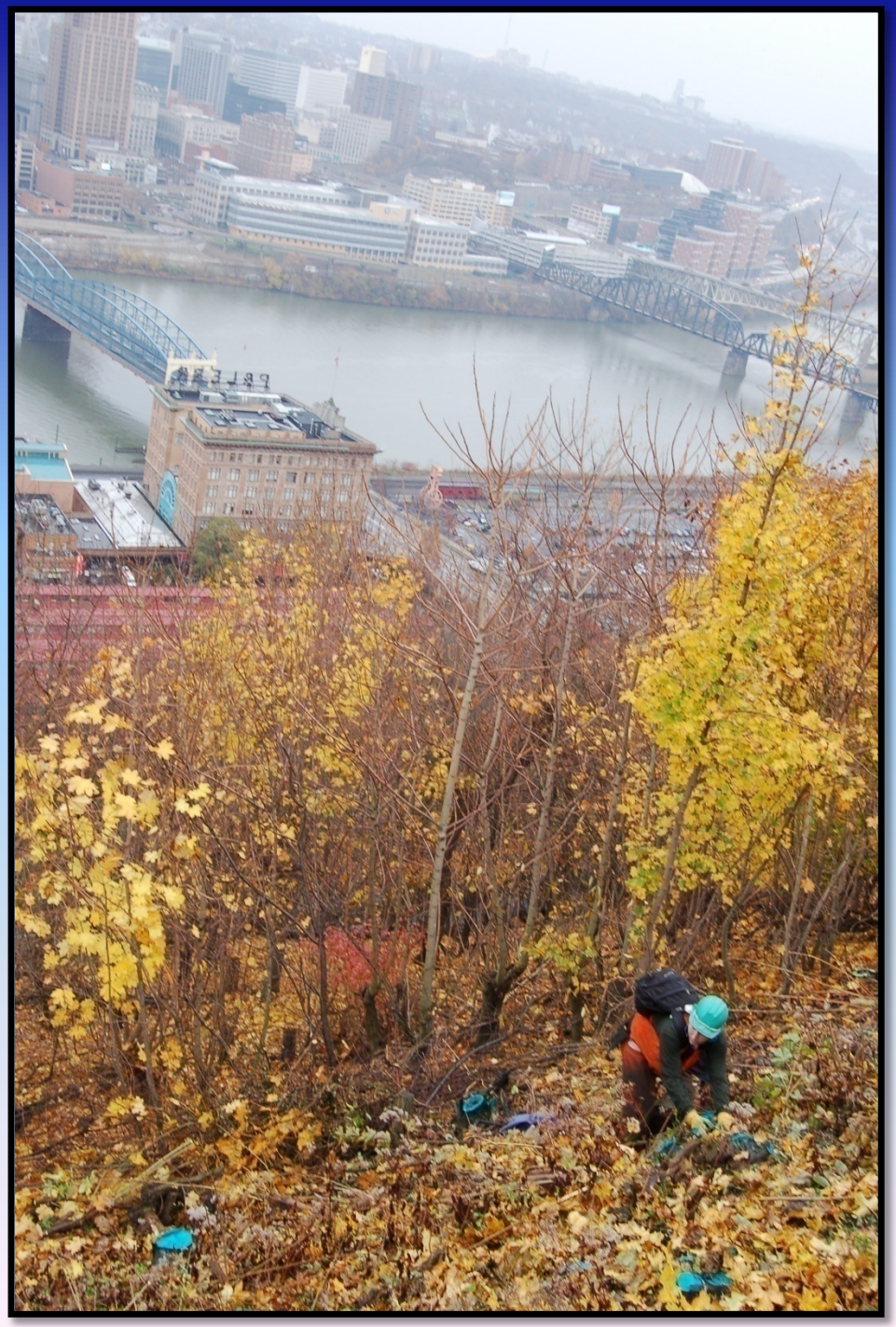
invasive PLANT CONTROL

Australian Pine

Salt Cedar

Genip - (Melicoccus bijugatus)

Bamboo



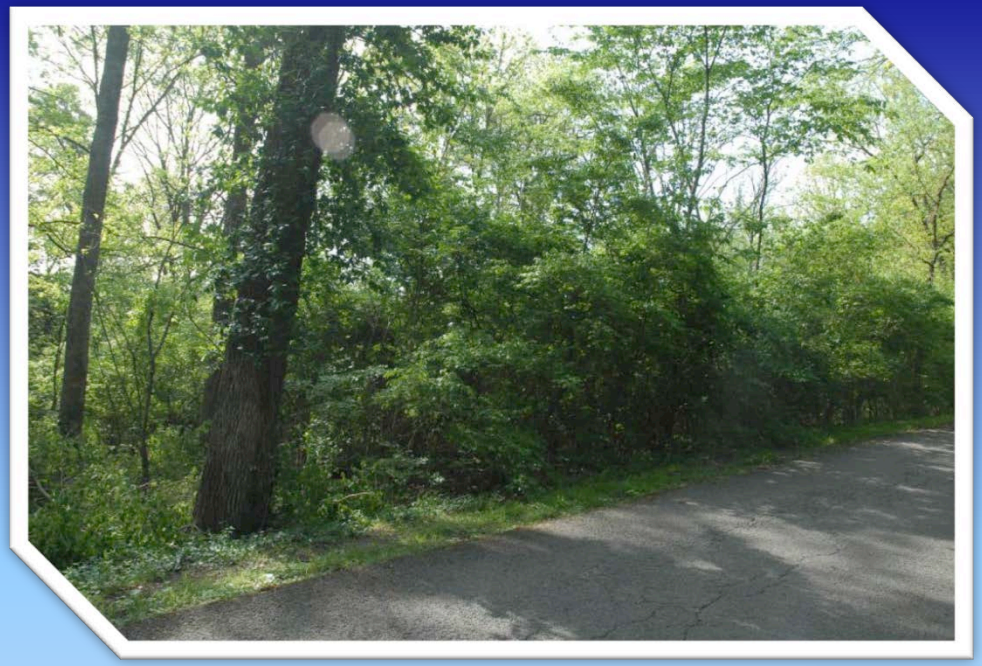
Level of difficulty can also increase time and costs for control

invasive PLANT CONTROL

invasive PLANT CONTROL

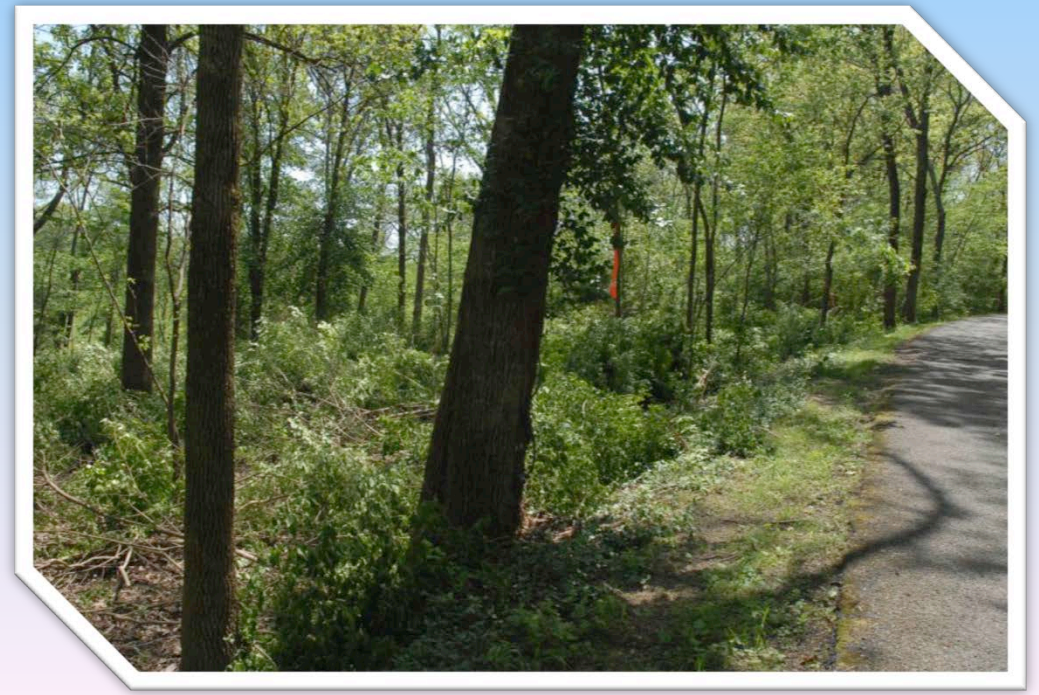

INVASIVE

invasive PLANT CONTROL



Before

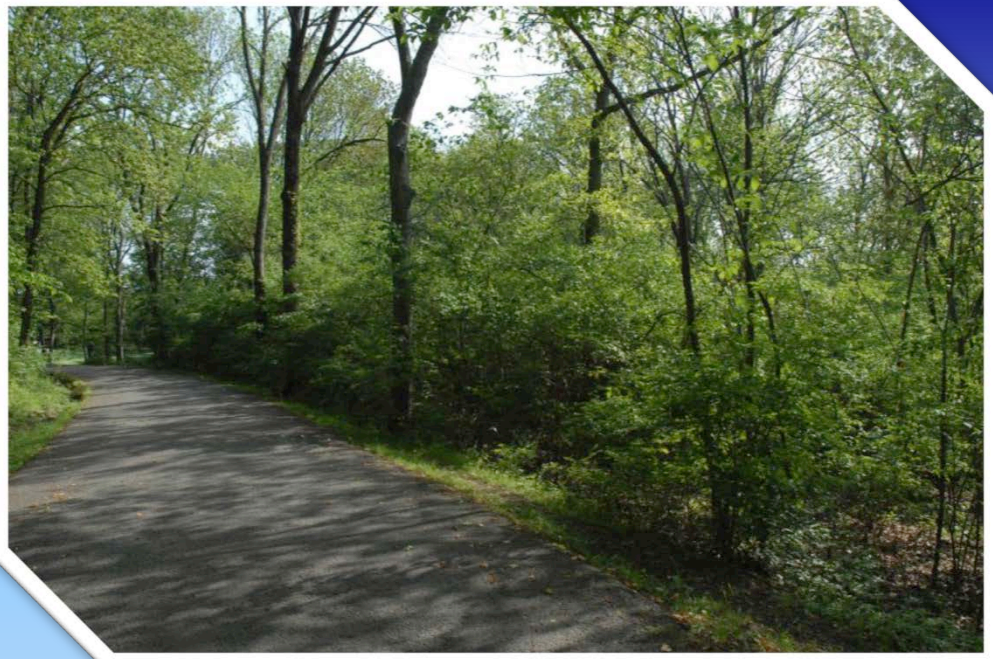
After



Cut and treat using a chainsaw and brushcutter with Round Up Pro at 50%.

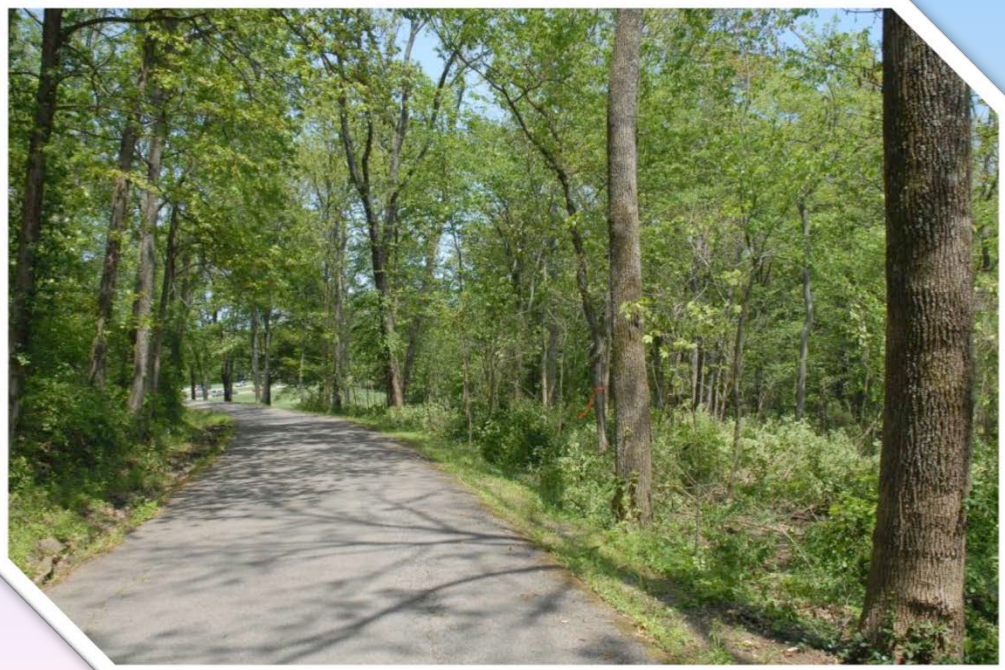
May 7th 2007
9-1:00

invasive PLANT CONTROL



Before

After



Cut and treat using a chainsaw and brushcutter with Round Up Pro at 50%.

May 7th 2007
9-1:00

invasive PLANT CONTROL

Before

After

Cut and treat using a chainsaw and brushcutter with Round Up Pro at 50%.

May 7th 2007
9-1:00

invasive PLANT CONTROL

Cut and Treat with Brushcutters

Brush Cutters are good tools for cutting and treating multi-stemmed species selectively

FS 250 Trimmer

FS 250 Specifications

DISPLACEMENT	40.2 cc (2.45 cu. in.)
ENGINE POWER	1.6 kW (2.15 bhp)
WEIGHT*	6.3 kg (13.9 lbs.)
FUEL CAPACITY	640 cc (21.6 oz.)

Circular Saw Blade, Scratcher Tooth
Steel, for gnarled brushes and thin tree trunks

This steel blade is ideal for cutting and clearing brush, vines and saplings and must be sharpened by a professional. For use with a brushcutter equipped with bicycle handles, double shoulder harness and limit stop.

Circular Saw Blade, Chisel Tooth
Steel, for gnarled brushes and thin tree trunks

This high-performance steel blade is designed for professional use for thinning and clearing of other woody materials and can be sharpened in the field with a round file and guide. For use with a brushcutter equipped with bicycle handles, double shoulder harness and limit stop.

Cut and Treat with Brush Cutters

Arnold AFB, TN

Autumn Olive
Elaeagnus umbellata

Snake Plant - (Sansevieria trifasciata)

Before

South Florida Water Management District, FL

After

South Florida Water Management District, FL

Hack and Squirt

invasive PLANT CONTROL

1. Cold Steel "Bolo" - Best All Around - Good weight, sharpens easily, handle is too large though - need grip tape or something to prevent slippage

invasive PLANT CONTROL

1. Cold Steel "Bolo" - Best All Around - Good weight, sharpens easily, handle is too large though - need grip tape or something to prevent slippage

2. Cold Steel "Panga" - Pretty good, same as #1, a little heavier

3. "Drop Tip Bottle Opener" (referring to slot in blade) - Too big, metal is too hard to file, would need a sharpening wheel or lots of patience

4. Cold Steel "Magnum" - I think this is a replica of an army issue throwing knife (my grandpa has one just like it from WWII). It is weighted pretty good but the shape makes it hard to sharpen (inside the curve)

5. "Straight Tip Bottle Opener" - Would be great if you could sharpen it, same steel as #2. Nice if you like a really long machete. Geovany's favorite.

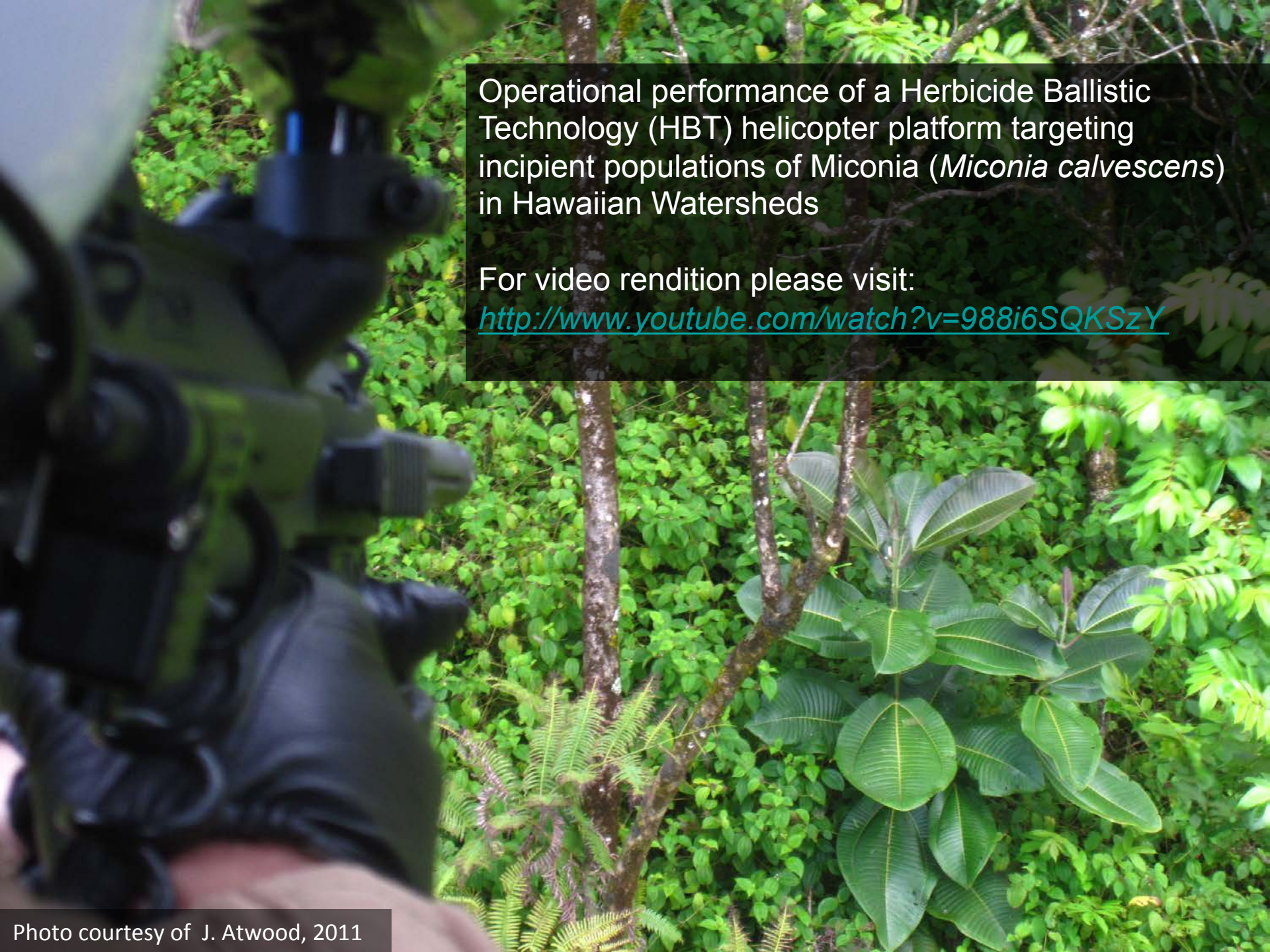
6. Ka-Bar - This company makes great knives, I have some, but this machete is too small. I'd be interested in seeing a bigger model. Expensive?

7. Cold Steel "Kukri" - Also too small and same sharpening problem as #3 (too curved)

invasive PLANT CONTROL

Other Selective Herbicide Application Equipment

Herbicide Ballistic Technology



Operational performance of a Herbicide Ballistic Technology (HBT) helicopter platform targeting incipient populations of Miconia (*Miconia calvescens*) in Hawaiian Watersheds

For video rendition please visit:
http://www.youtube.com/watch?v=988i6SQKSzY

Photo courtesy of J. Atwood, 2011

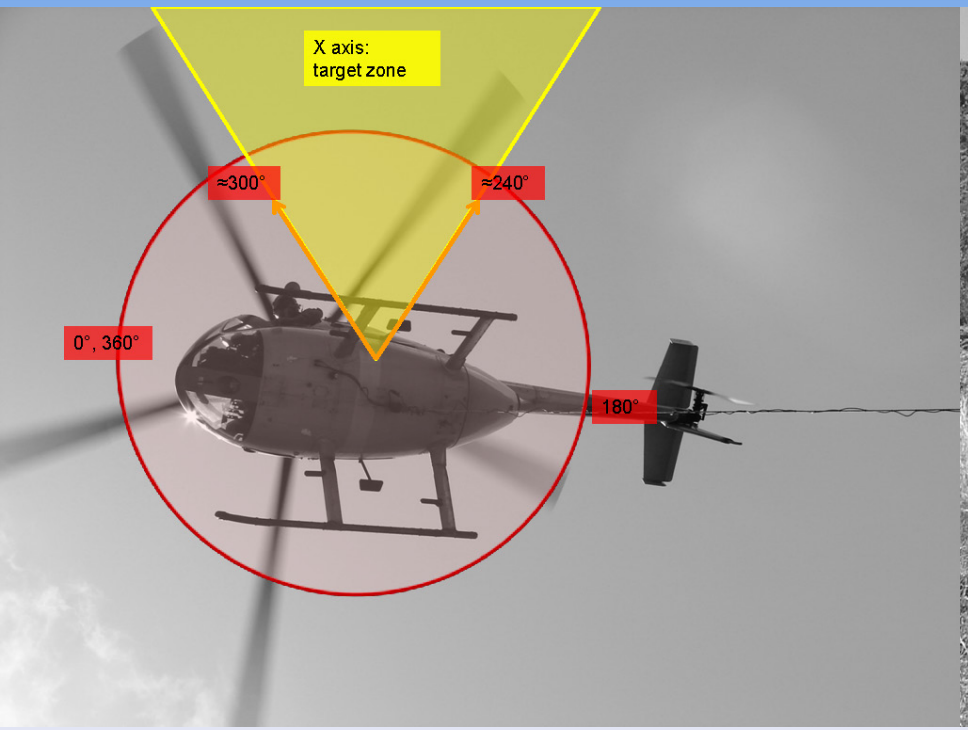
Codename: Hot Mic

Mission: Calibrate helicopter surveillance operations with real-time HBT target reduction capabilities

Operators: Portside pilot/applicator configuration

Batch: G4U200 with Garlon® 4 Ultra (200mg triclopyr per 0.68 caliber projectile)

Performance: 30 m effective range with sub-meter accuracy



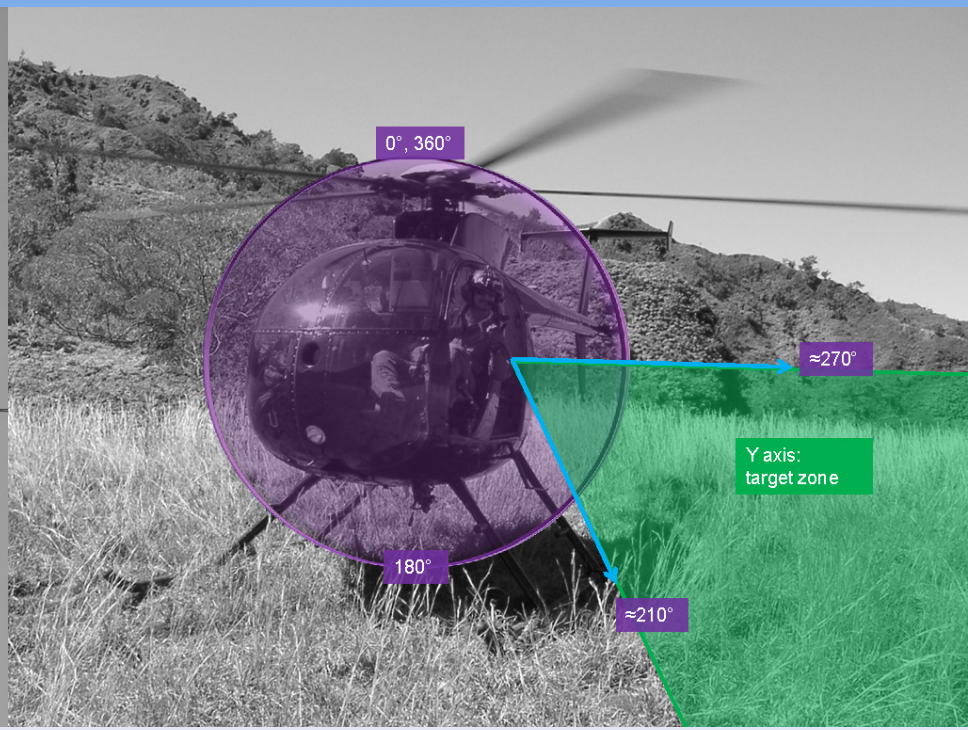


Diagram courtesy of J. Beachy 2009

UNIVERSITY of HAWAI'I®
MĀNOA

James Leary
Assistant Specialist for Invasive Weed Management
Department of Natural Resources and Environmental Management
Maui County Cooperative Extension Service
College of Tropical Agriculture and Human Resources
University of Hawaii at Manoa

phone: 808-352-8774
email: *leary@hawaii.edu*
web: *http://www.ctahr.hawaii.edu/LearyJ/index.html*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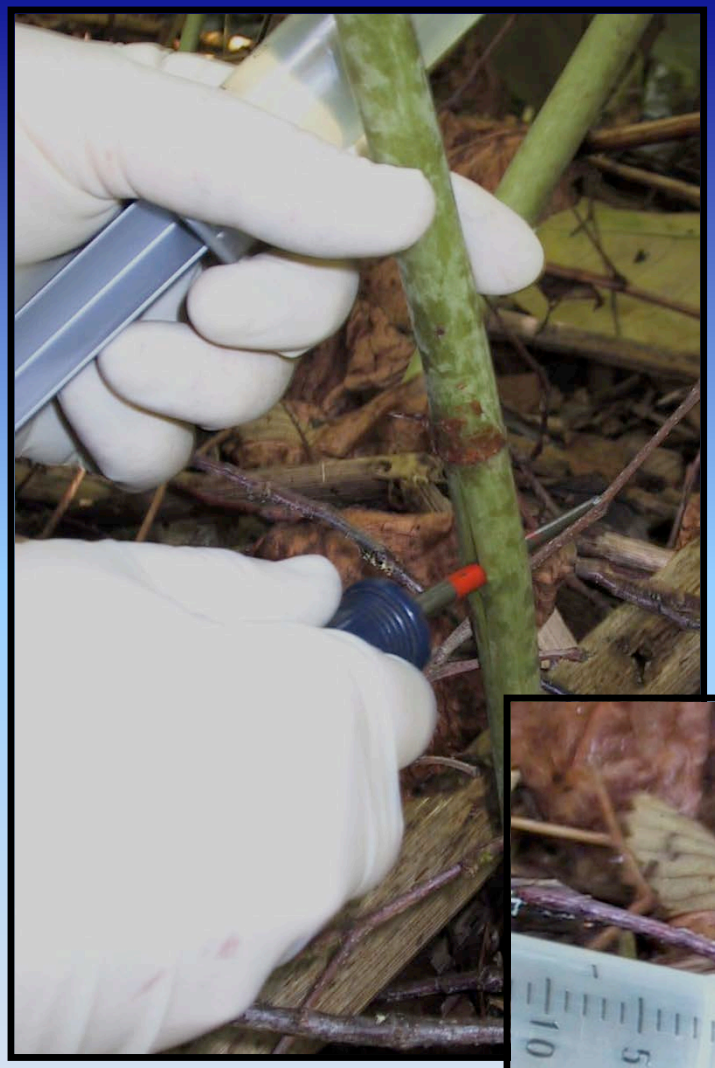
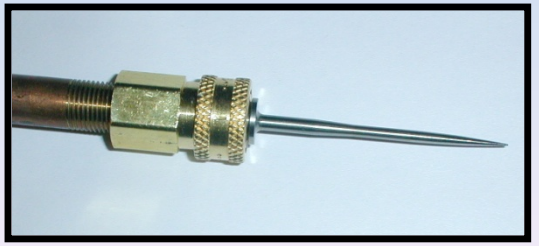
Dalzo


Daiza


Pike

Knotweed injection

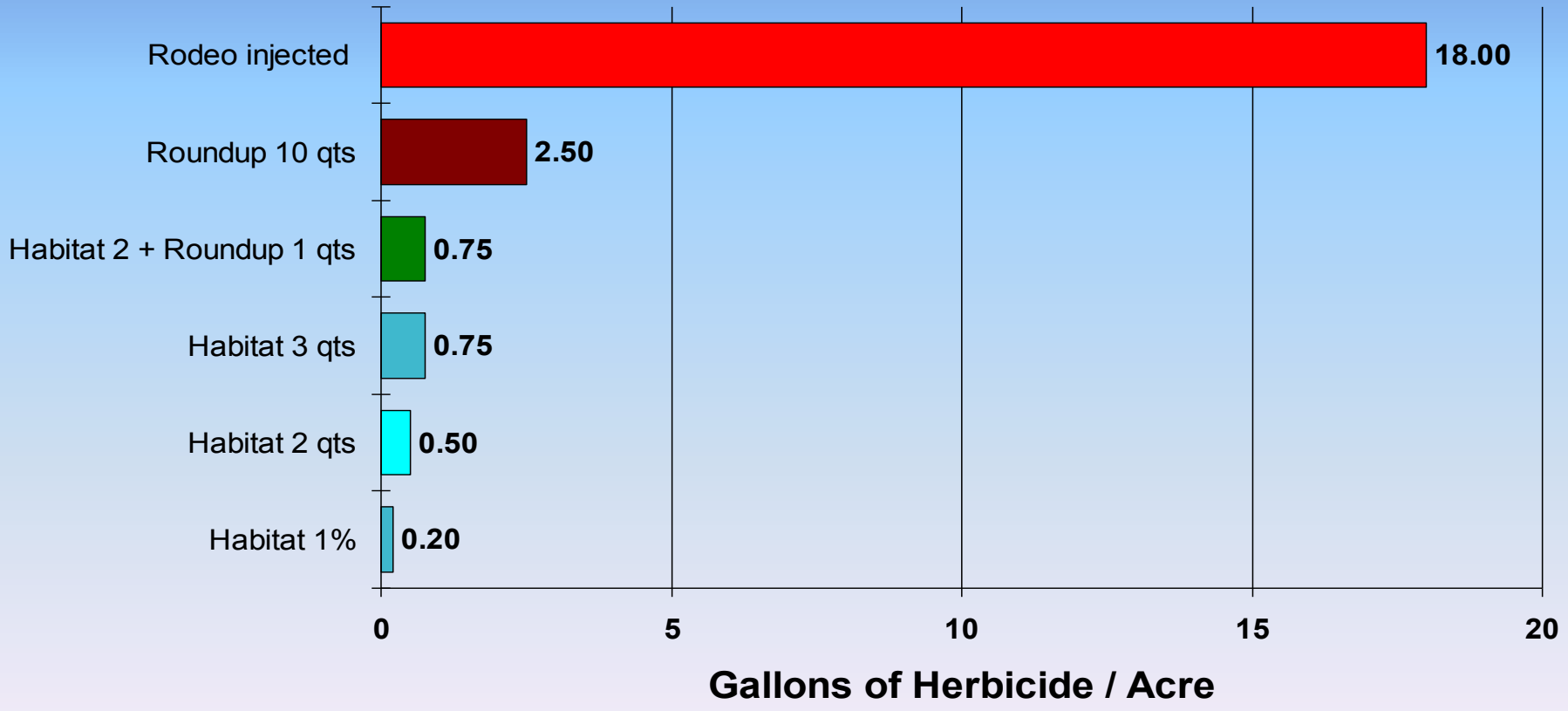





8
B
MARK


invasive
PLANT CONTROL

Application Technique – Japanese Knotweed Control



Inject or Spray?
Japanese Knotweed Control

Treatments	Average # Stems / 100 sq ft	Time to Treat 100 sq ft	Herbicide ml/ Stem	Herbicide used per Acre	% Control
3 qts of Habitat	533	1.9 sec	0.013 mls	3 qts $205	95
1% Habitat Solution	700	27.8 sec	0.0025 mls	25.7 oz $55	95
Rodeo 5 mls/stem injection	617	9,255 sec* (2.57 hrs)	5 mls	349.5 gal $10,485	15

invasive PLANT CONTROL

invasive PLANT CONTROL


WetBlade
Diamond
MOWERS inc

SMUCKER
MANUFACTURING, INC.

SUPER SPONGE WEED WIPER

Herbicide Wand

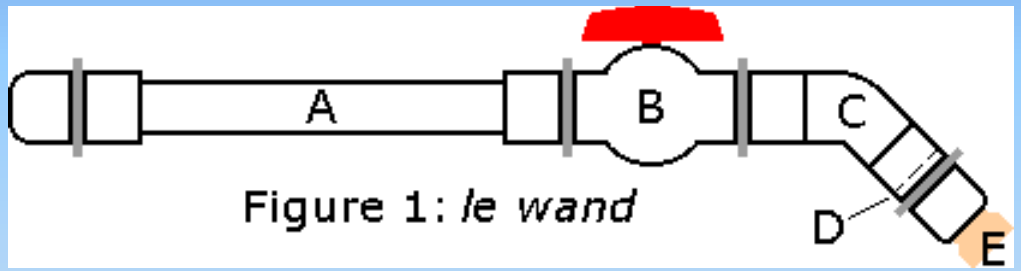
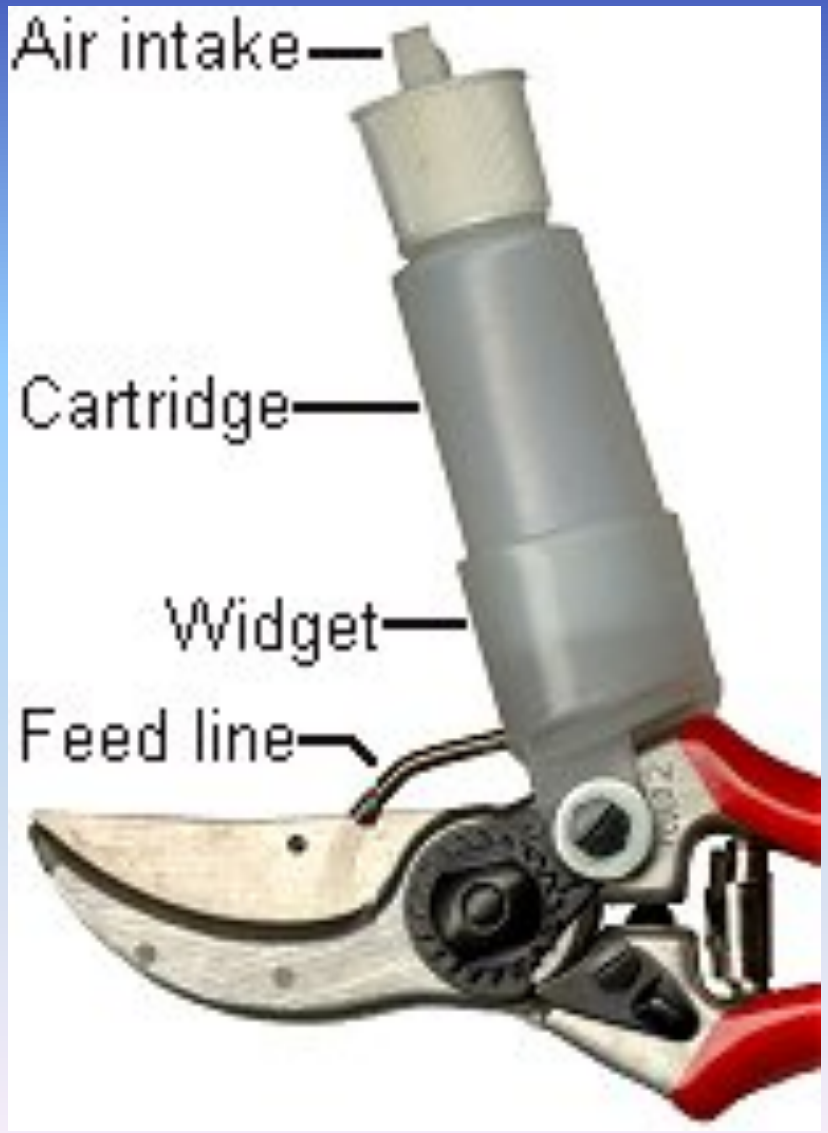


Figure 1: *le wand*

Developed by: Jack McGowan-Stinski (Michigan Field Office)
It costs about $20 to make (and is even cheaper if you already have PVC glue and purple primer).



KlipKleen Shears

A.M. Leonard
call them at 1-800-543-8955
and ask for item #KK1

Kut-N-Kill Hand Pruners

High Volume Herbicide Application Equipment

- ATVs & RTV's
- Tractor Mounted Sprayers
- Utility Skid/Trailer Sprayers
- Helicopter Sprayers
- Roadside and Turf Sprayers
- Fixed Wing Aircraft Sprayers
- Large Fixed Wing Aircraft Applicators


ARCTIC CAT

ATV Sprayer with Hose and Boomless Nozzles

Arnold Air Force Base
Tullahoma, TN


Management
INVASIVE
Plant
Control
Restoration
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C&R
SUPPLY, INC.

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Diesel 4x4


KUBOTA

ONE CHANNEL
PRESS
CONTROLLER
INTELLI-SPRAY
RETRACTABLE
HOSE REELS

Landtamer


HERBICIDE

Hambidge Center
North Georgia

Sometimes lack of diversity makes a project selective

Ocoee River, Ducktown, TN

Gettysburg
National Park, PA

Protect the fragile understory

Chinese Wisteria
Wisteria sinensis

Rock Creek National Park, DC

Often times with invasives, high diversity requires selective methods

Valley Forge
National Park, PA


JOHN DEERE

Chemical treatment over Hill AFB in Ogden, UT

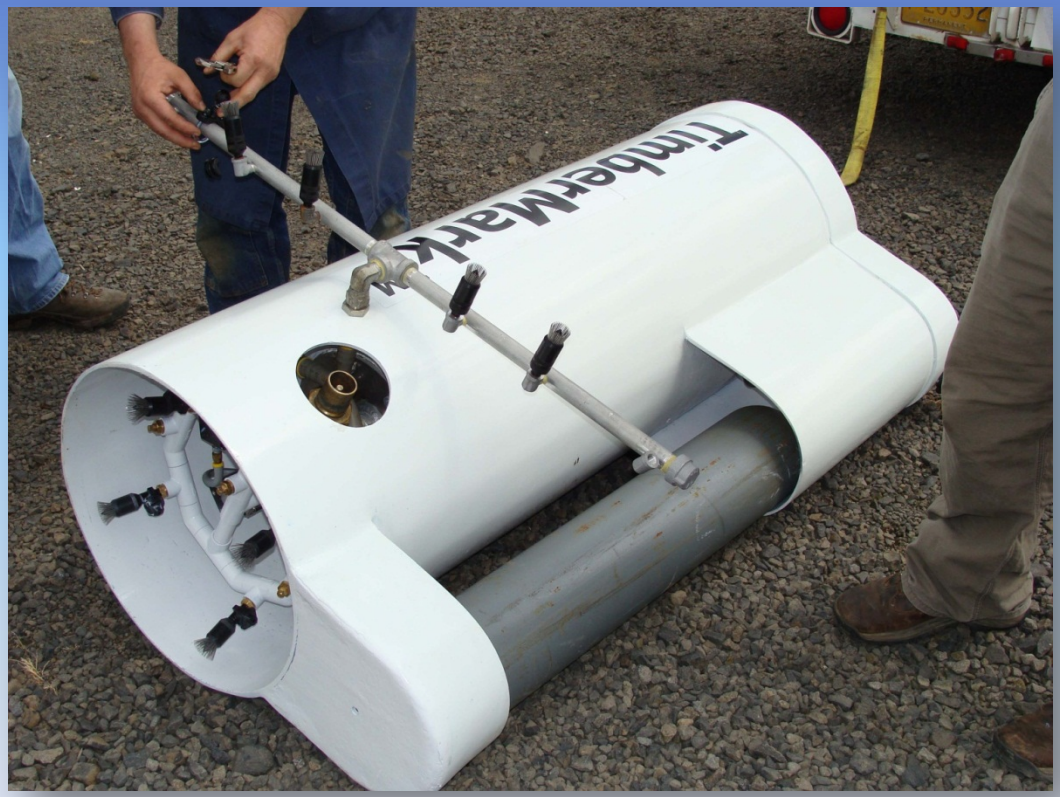
C-130H Modular Aerial Spray Systems

46 hours spray time---2,880,662 acres or 4501 square miles

invasive PLANT CONTROL

invasive PLANT CONTROL

TimberMark™ w/ Air Induction



Beau Long
National DoD Market Development Manager
CPS Timberland
124 Woodbine Terrace
Spartanburg, SC 29301
beau.long@cpsagu.com
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ARE THERE ANY QUESTIONS ABOUT THE CONTENT?
THERE WAS CONTENT?

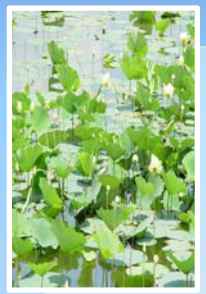
invasive PLANT CONTROL

Steven Manning
PO Box 50556
Nashville, TN 37205

stevemanning@mindspring.com
615-969-1309 (Cell Phone)
www.invasiveplantcontrol.com

Types of Aquatic Plants

Emergent



Floating-leaved

Submersed

Free floating

Algae

Thin and stringy or hair-like (filamentous algae)

- Large and resemble higher plants but without true roots (chara)
- *Caulerpa taxifolia* (above)

Primitive plants
Form floating scums of near-microscopic colonies on pond surfaces
Microscopic (planktonic algae)
Lyngbya (above)


Lingbya

Floating Leaved Plants

Not attached to the bottom

(Water Lettuce)

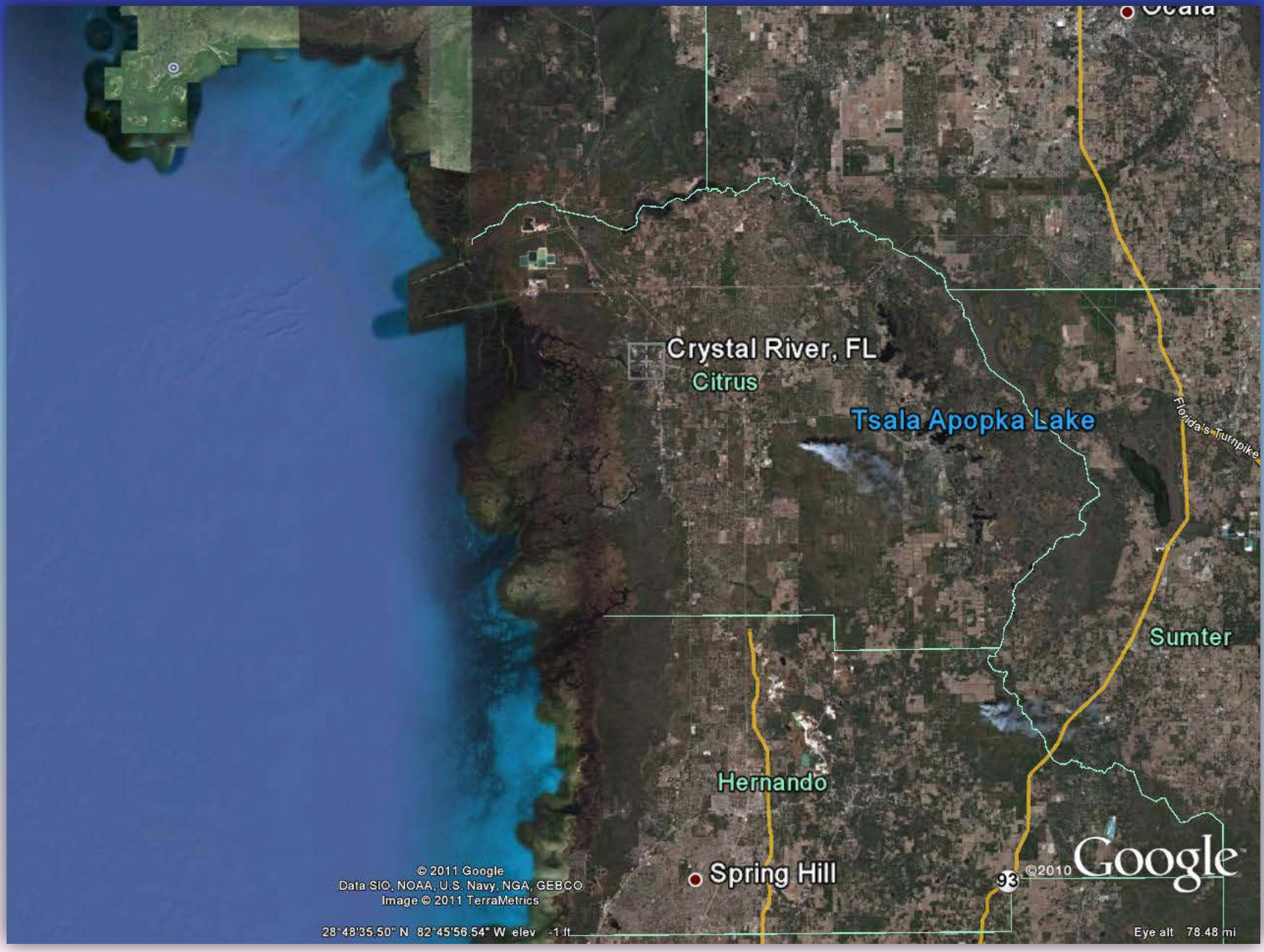
Sizes vary from small (duckweed) to over a foot in diameter (water hyacinth)

Most have roots that hang in the water from the floating green portions

(Salvinia molesta)


North Atlantic Ocean
US Dept of State Geographer
© 2011 Europa Technologies
© 2011 Google
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
37°44'21.42" N 91°49'27.95" W elev 736 ft
©2010 Google
Eye alt 6542.38 mi

Crystal River, FL



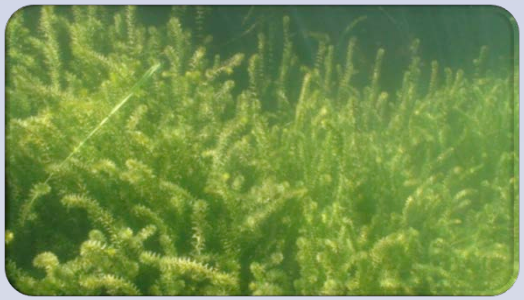
Water Lettuce


Salvinia molesta

Water hyacinth

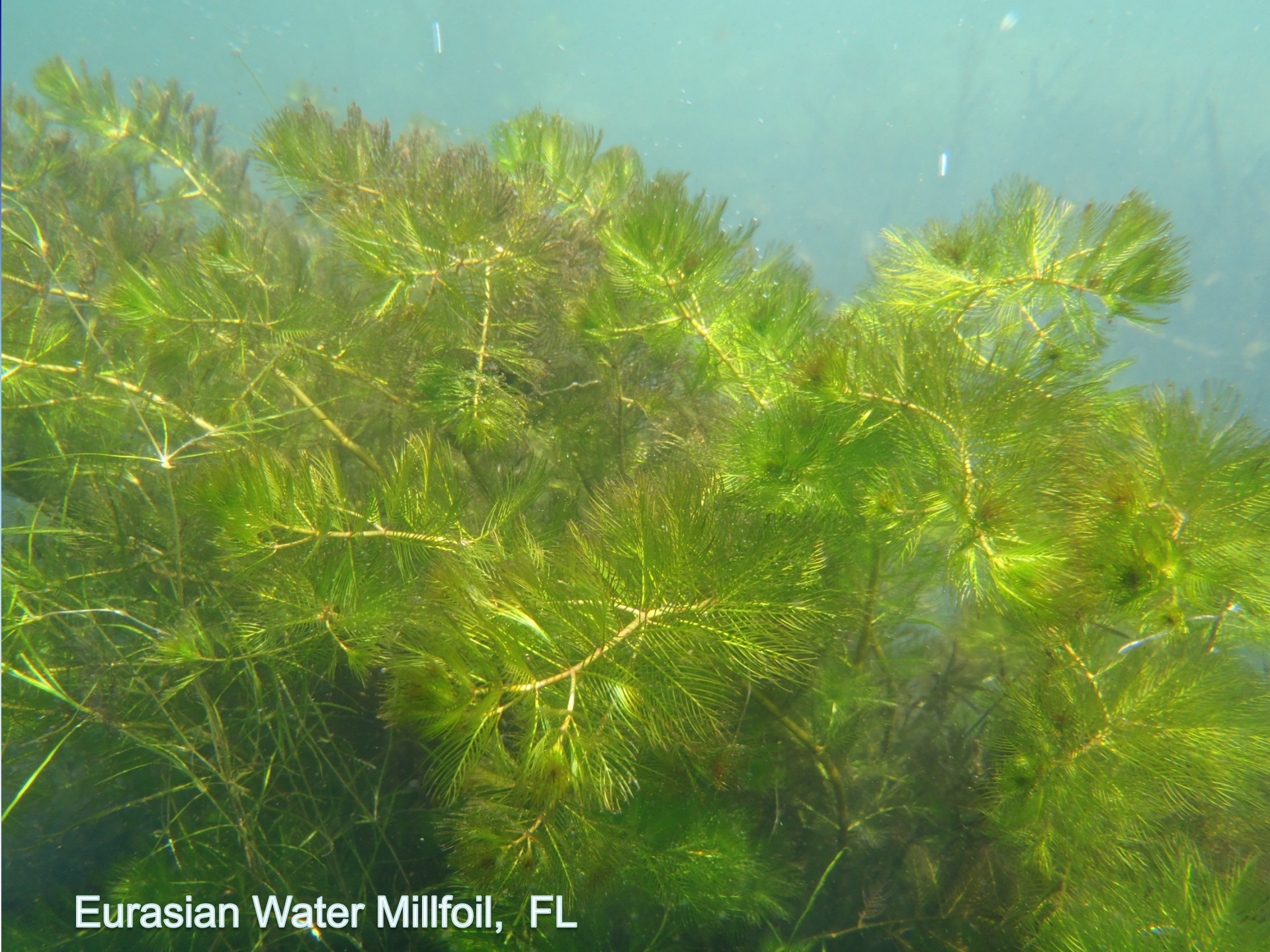
Submersed plants

Spend their entire lifetime beneath the surface of the water

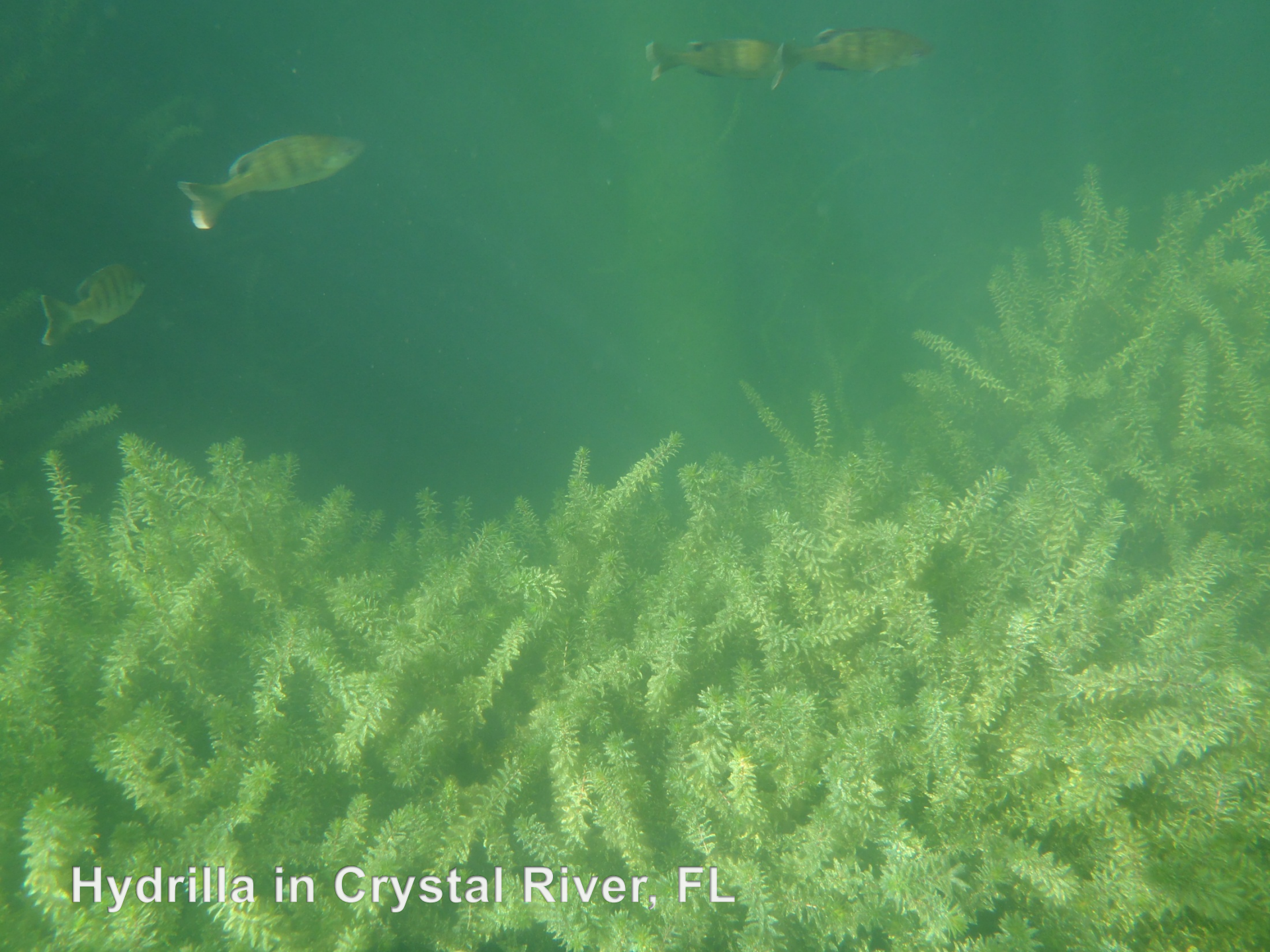


Usually rooted in the mud

Masses of plants may tear loose and float free in the water


Eurasian Water Millfoil, FL

Eurasian Water Millfoil, FL


Hydrilla in Crystal River, FL


Hydrilla in Crystal River, FL

Emergent plants

Rooted in bottom mud and grow above the water

Also grow under strictly terrestrial conditions

Emergent plants are rigid and not dependent on the water for support

Usually infest only the pond margins and other shallow areas

South Florida Water Management District, FL

Aerial spray followed by a ground application

SFWMD

Mechanical

Physical harvesting of vegetation by hand	•Small ponds
Harvesting with specifically engineered equipment	•Lakes

Harvesting

Harvesting mechanically removes surfacing aquatic invasives

Cut plants grow back (sometimes within weeks)

Area may need to be harvested twice or more per growing season.

Underwater mowing machines

Cut plants are removed from the water via a conveyer belt and off-loaded and disposed of properly

Tools for Mechanical Harvesting

- Nets can form windrows
- Sickles to cut brush species
- Hand pull when small
- Booms extended across an incoming creek
- Weed Harvesters

Weed Harvester in NY

Weed Harvester in Brazil


Pondweed
LAKE HOPATCONG
HYDRAULIC OIL ONLY


FOOD GRADE
HYDRAULIC
OIL ONLY
AQUARIUS
SYSTEMS
Aqua Patio


AQUARIUS
SYSTEMS
A Division of D&D Products Inc.
T3

Swamp Devil

Weed Tow Boat

Weed Tow Boat (Aquarius)

Plow is winched back onto the towboat


BEYER BROS.
GMC/VOLVO
TRUCKS
FAIRVIEW, NJ

Rotovation

Rototiller-like blades churn seven to nine inches deep into the bottom, extracting the entire plant

Suitable for larger lakes or rivers with widespread, well-established populations where eradication is not an option.

Very expensive

Used on plants that have buoyant root crowns such as Eurasian water milfoil (*Myriophyllum spicatum*)

Roots must be collected and removed by an attachment to the machine, by harvester, or by hand.

Water Level Manipulation

Raising of water levels to control aquatic vegetation by drowning or lowering to control aquatic vegetation by exposing them to freezing, drying or heat.

- limited to reservoirs with adequate water control structures

Drawdown has been used in lake management for many years to oxidize and consolidate flocculent sediments, to alter fish populations, and for aquatic weed control

Drawdown is usually conducted during winter months so that plants are exposed to both drying and freezing

Drawdown alters the composition of aquatic vegetation, but doesn't always produce desirable changes

Reduced Light Penetration

Special pond dyes, special fabric bottom covers or fertilization

Specially produced dyes block the kind of light that plants need for photosynthesis and are not toxic

- Dyes are only effective in ponds that have little or no flow through them and they are generally effective only in water of 3 feet or greater depth.
- Various materials, including black plastic and specially manufactured bottom covers, have been used prevent rooted aquatic plants from growing

Hand Pulling and Installation of Bottom Barriers

- Limited to lakes or ponds only lightly infested
- Applicable where residents can tolerate no herbicide use such as in a lake used as a municipal drinking water supply.
- Costs for large-scale projects are not economical
- It is especially important to have good visibility for the divers to locate milfoil plants.
- Sometimes diving is only effective in the spring or fall, or during periods between algal blooms. If water clarity is very poor, manual eradication methods may not be suitable for the waterbody.

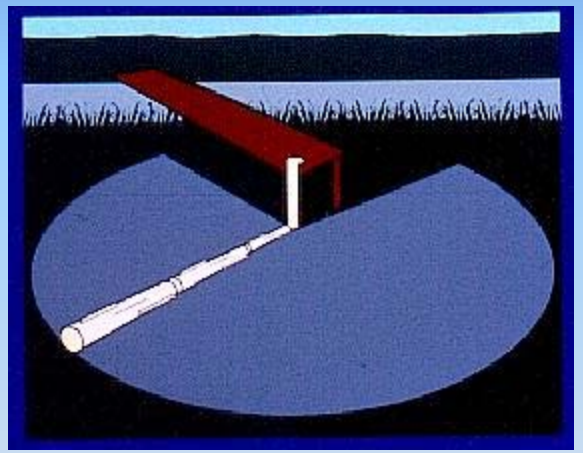
Bottom Screens or Benthic Barriers

- Covers sediment like a blanket, compressing aquatic plants while reducing or blocking light.
- Materials such as burlap, plastics and perforated black Mylar are used
- Bottom screens will control most aquatic plants
- Free floating species will not be controlled
- Eurasian watermilfoil will send out lateral surface shoots

Sediment Agitation

Mechanically disturb the lake bottom to remove aquatic plants prevent regrowth within a well defined area. Sweep, roll, or drag repetitively over the plants and sediments

Attached to a dock or post to work properly and each product requires electricity to operate.



Chemical Control of Aquatics

Herbicides may be directly applied to undesirable vegetation	• high degree of selectivity leaving desirable levels of vegetation
Pre-emergence application of appropriate herbicides can provide early weed control	• promote desirable vegetation without competition during critical early growth stages
Herbicides reduce the need for mechanical control which can increase turbidity and affect fish populations.	
Erosion may be reduced	• promotes the lower growing grass species for cover
Many weeds, especially perennials, that cannot be effectively controlled by other methods are generally susceptible to herbicides.	
Routine use of herbicides under a maintenance program usually reduces the cost of weed control.	

Aquatic Herbicides

Systemic herbicides are capable of killing the entire plant.

Contact herbicides cause the parts of the plant in contact with the herbicide to die back, leaving the roots alive and able to regrow.

Non-selective, broad spectrum herbicides will generally affect all plants that they come in contact with.

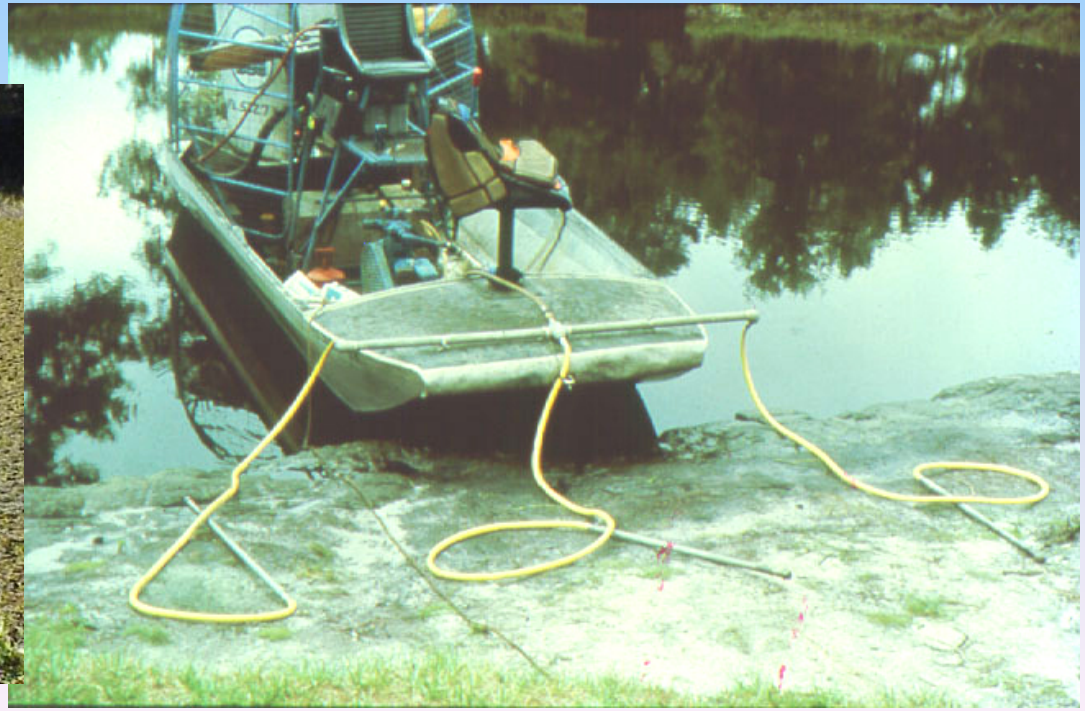
Selective herbicides will affect only some plants

Application in Washington state waters is regulated and has the following restrictions:

- Applicators must be licensed by the Washington State Department of Agriculture.
- Because of a March 2001 court decision (9th Circuit District Court), applicants must obtain coverage
- under a discharge permit called a National Pollutant Elimination System Discharge (NPDES) permit before
- they can legally apply aquatic herbicides to the waters of the state.
- Ecology requires notification and posting before treatment and there are additional mitigations to protect
- rare plants or threatened and endangered species.


NC 3761 P


NC 8674
LOADER



Results

Carfentrazone treated *M. heterophyllum* at: pre-treatment (A) and 37 days after treatment (B).


Watermeal Infested Pond
at Treatment
08/28/2006 12:11


1 Month after Treatment
45 ppb fluridone


At Treatment
08/28/2006 12:11
1 MAT
12 Month after Treatment
45 ppb fluridone

Biological Control of Aquatics

Insects and Plant Pathogens

- high degree of host specificity
- alligatorweed flea beetle (*Agasicles hygrophila*),
- waterhyacinth weevils (*Neochetina eichhorniae* and *N. bruchi*), the waterhyacinth mite (*Orthagalumna terebrantis*), and fungus (*Cercospora rodmanii*)

Herbiverous Fish

- **Grass Carp**
  - Excellent control of submersed plants, filamentous algae, and small floating plants such as duckweeds

  - It is much easier to stock additional grass carp than to remove unwanted fish from the system

Tilapia

- Blue tilapia(*Tilapia aurea)*
- Redbelly tilapia (*T. zilli*)

- Tropical species that can suppress growth of softer aquatic vegetation such as filamentous algae and bladderwort when stocked at high density (300 per acre)

- Both species reproduce rapidly
  - Consume vegetation and small animals that are important food sources for desirable fish populations.

Snails, manatees, etc.

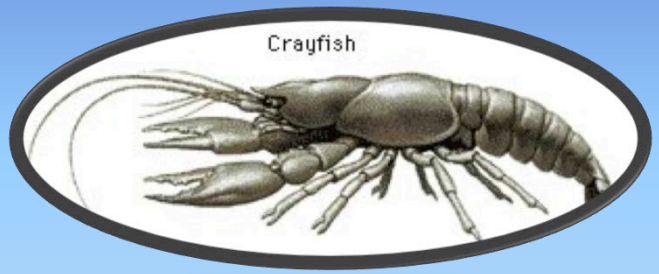
- *Marisa cornuarietis* and *Pomacea australis*
  - Large numbers will control several species of submersed aquatic plants under confined conditions
  - Not currently under consideration as biocontrol agents for aquatic weeds

- Manatees or sea cows (*Trichechus manatus*)
  - Experimentally used, mainly in canals, for aquatic weed control in Florida.
  - Manatees effectively removed submersed and floating plant species.

Marisa cornuarietis

Other Biocontrol…

- Ducks
- Geese
- Crayfish
- Nematodes
- Viruses
- Water buffalo
- *None of the above have proven practical*



invasive PLANT CONTROL

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