The Importance of Invasive Species Inventories, Mapping, and Monitoring

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Seven burning questions that keep land managers up at night

- What is on my landscape?
- Where is it?
- Is it invasive or likely to become invasive?
- Will it be a known invasive, or something else?
- How much of it is out there?
- Should I get rid of it?
- Will I be able to manage or remove it?


BAT BOY BITES SANTA CLAUS
WEEKLY WORLD
NEWS®
December 18, 2001
$1.69 U.S. / $1.99 CANADA
No one is safe!
LEAPING TURTLES INVADE U.S.
Snapping reptiles chomp you where it hurts!


AIIEEEE! You can hear the screams of horror when leaping snappers attack!

UP FRONT CONSIDERATIONS

- Land use goals

UP FRONT CONSIDERATIONS

- Land use goals
- Invasive species management objectives

Land Use Goals

- Should be determined at the outset
- Considerations
  - Habitats, ecosystems, plant communities
  - T & E species and critical habitats
- Desired ecosystems
  - Preserved
  - Restored
  - Created

DEGRADED SYSTEMS

NATURAL SYSTEMS

Natural systems often have rare or imperiled species

Invasive Species Management Objectives

- Land use goals should drive management objectives
- Preserve, restore, or create desired habitat(s)
- Site concerns must be included
- Understand ecology and biology
  - Native and Non-native species
- Consider costs
  - Environmental costs
  - Monetary costs

Pre-mapping questions

- What is the purpose of the of the management?
- What information is essential?
- What information is optional?
- How will data be used?
- What are the boundaries of the search area?
- What techniques will best suit our needs?
- What equipment/expertise is needed?
- Are there known or anticipated target species involved?

CAVEAT

There is usually a compromise between finding every species and searching the entire area

Terminology

- Species
- Non-native species
- Population
- Occurrence

Population vs. Occurrence

- Population: A group of organisms of the same species inhabiting a given area
- Occurrence: A population or group of populations separated from other populations

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Invasive Species

- Pros and Cons of using the term
- Think “Practical”
- Other terms
  - Nonindigenous species
  - Non-native species
  - Alien
  - Exotic
  - Weed

Scientist couple's grim warning:

SPACE PLANTS ARE TAKING OVER THE EARTH!

By ROGER SINCLAIR

Botanists Jan and Peter Wankel claim to have found extraterrestrial plants that take over the minds of small animals and may pose a threat to mankind itself!

Only two of the fern-like white plants have been discovered to date. But the Wankels say there is reason to believe that they may start cropping up all over the planet.

"The proliferation of these plants could be disastrous for wildlife and might possibly have an impact on all mankind," said Jan Wankel, who holds advanced degrees in both botany and biology.

"There is also little doubt that the plants have extraterrestrial origins. They are unlike anything that we have ever seen on Earth. Even stranger, they are impossible to kill and actually thrive on fire."

The Wankels found the strange plants while studying trees and shrubs in a forest west of their home in Berlin, Germany. They realized that the plants were unusual but didn't suspect that they were from another planet until Peter Wankel picked one and literally heard it groan.

"A subsequent study of the surrounding area revealed that animals in the area were behaving quite strangely," continued the expert. "We saw squirrels fighting like dogs and cats and birds kicking eggs out of their own nests.

"We also noticed that both squirrels and birds were feeding on the plants. That's when we began to look into the possibility that there might be a connection. We now suspect that some substance produced by the plants actually took over the animals' minds."

The Wankels took the two plants back to their laboratory and, oddly enough, found that they contained large amounts of ammonia and an LSD-like substance that they have yet to identify. They also noted that the plants continued to grow and produce seeds even after they were uprooted and deprived of water.

To top it off, the plants were unaffected by herbicides and poisons and actually grew stronger when seared by flames from a torch.

The Wankels hope to complete their study and publish a full report by March. Meanwhile they have published several letters in science journals and newspapers warning people about the plants.

"We don't know how these plants got to Earth but it's certainly possible that an extraterrestrial Johnny Appleseed sowed them far and wide," said Peter Wankel.

INTERSTELLAR PODS: Dr. Peter Wankel shows the unearthly plants he believes are taking over the minds of small animals.

ARE THESE THE FIRST of millions of evil plants that will infect the Earth's surface?

'Thinking' pods spreading like wildfire!

THE WANKELS examine the E.T. plants.

Mr. Ed needs a new grave

Two disc jockeys from Tulsa, Okla., have launched a fund-raising drive to upgrade the pathetic grave of TV's beloved horse, Mr. Ed, who died 10 years ago.

Train hits teen — he walks away

A Queens, New York, teen who was hit by a Long Island Railroad train simply got up and walked home.

The 15-year-old boy sustained minor injuries. He told his mother he'd been hurt but didn't tell her how, until she called for an ambulance.

We are not looking for plants from outer space.

“Weeds” vs. “Weedy”

- Weeds
  - Usually associated with agriculture or gardening
  - Too much baggage
  - Native or non-native
- Weedy
  - Good descriptive adjective

Toxicodendron radicans Poison Ivy

Invasive – no; a native species

Weedy – yes

Weed - depends with whom you speak!

"Weeds, as a class, have much in common with criminals. When not engaged in their nefarious activities both may have admirable qualities; a thief may be an affectionate husband and father outside business hours; an aggressive weed in one environment may be a charming wild flower in another."

Weeds and Aliens (1961)
Editor's Preface to Sir Edward Salisbury's book

Inventory / Survey

- Inventory implies exhaustive cataloguing of entire base, often over time
- Survey implies a sampling of a representative portion of base or at a single point in time
- Often used interchangeably
- Species observed
- Useful in creating maps
- Latitude and longitude recorded
  - Point data; polygon data; plot data

Inventory / Survey

- Decide data presentation at the outset
- Results usually presented as:
  - Reports
  - Databases
  - Spread sheets
  - Tables
  - Maps

The importance of correct identification

- Can’t build a good management program on bad information
- You get what you pay for
- Can make all the difference in early detection

?

Asian Long horned Beetle
Anoplophora glabripennis

Japanese stilt-grass (Invasive non-native) or white grass (native)

Kinds of Inventories (Surveys)

- Exploratory
- Reconnaissance
- Extensive
- Intensive

Exploratory

- Used when next to nothing is known about what invasives are present
- Usually used for large bases
- Good for searching large areas in least amount of time
- Low cost
- Data: species, location, abundance

Reconnaissance

- Used when species, their general location and abundance known
- Useful in locating small patches of known or novel invaders
- Helpful in defining occurrence boundaries
- Should be conducted periodically
- Data: new species, tighter infestation boundaries

Extensive

- Done after Exploratory or Reconnaissance Survey
- Collects more detailed data on IS
- Collect minimal data on native vegetation and ecosystems
- Can be expensive

Intensive

- Useful for obtaining data for scientific research
- Usually small, intensively studied area
- Characterizes plant communities
- Collects data on all vegetation
- Data: floristic composition, phenology, basic ecological information, more
- Useful in developing predictive models

Useful for gathering scientific data

Documentation

- Field Data
  - Locality
  - GPS coordinates
  - Abundance data
- Photographs
- Herbarium specimens

invasive PLANT CONTROL

Assistance with identifications

- State Botanists and Entomologists
- University Herbaria and Museums
- State Heritage Programs
  - http://natureserve.org/vistitlocal/index.jsp
- Index Herbariorum
  - http://sciweb.nybg.org/science2/IndexHerbariorum.asp

Oriental bittersweet ?X? American bittersweet

invasive PLANT CONTROL

Data Management

- Use pre-established standards for data gathered during survey or inventory
  - You “can’t” do it over
- NAWMA Data Standards
  - Basic information
    - What, where, how much
  - Facilitates data exchange and usage
- Make data user friendly

Parris Island Marine Recruit Depot Invasive Species List

December 2001

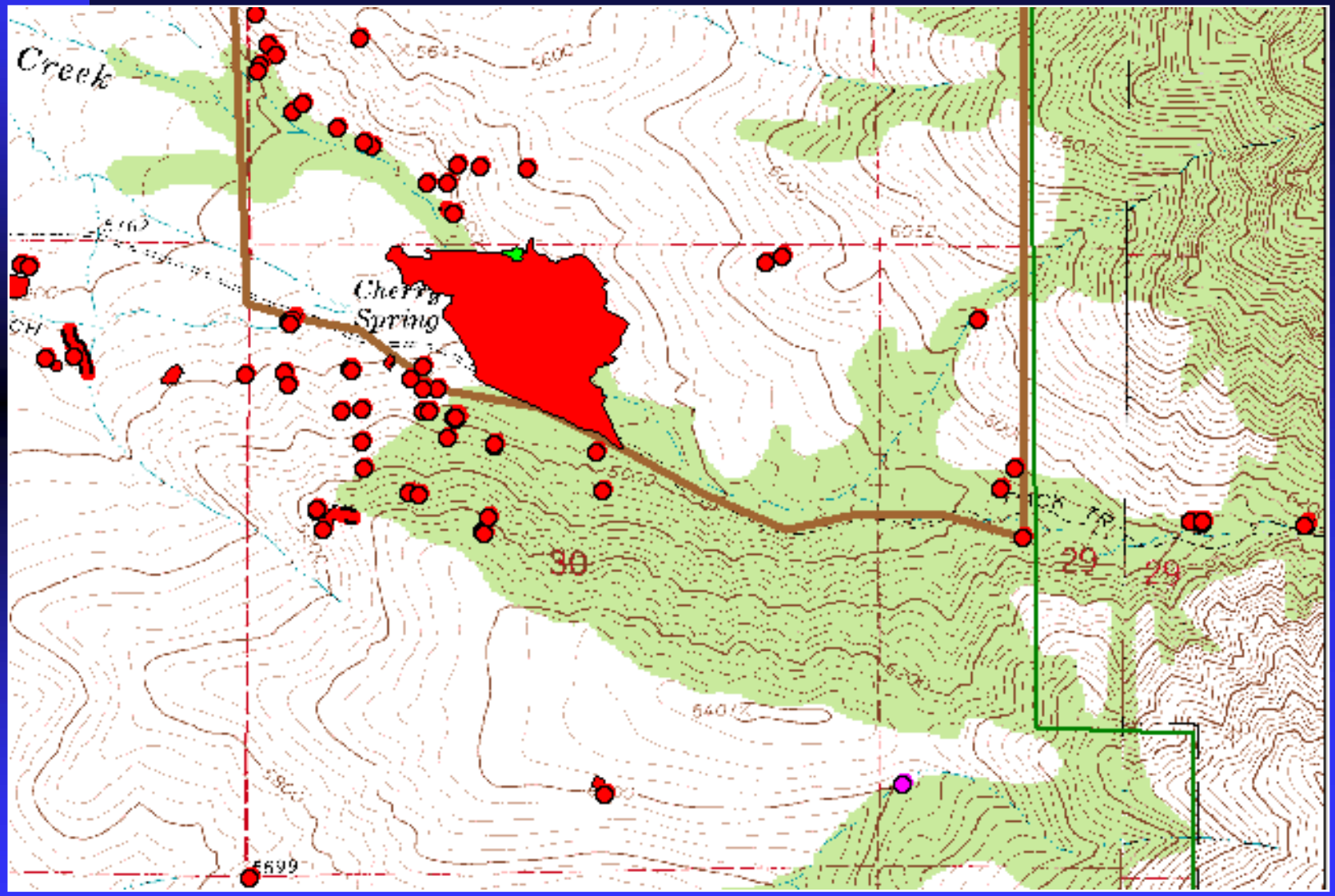
Created by:
Invasive Plant Control, Inc.
PO Box 40987
Nashville, TN 37204
800-449-6339

Make sure data are presented in a useful, "user-friendly format!

Mapping

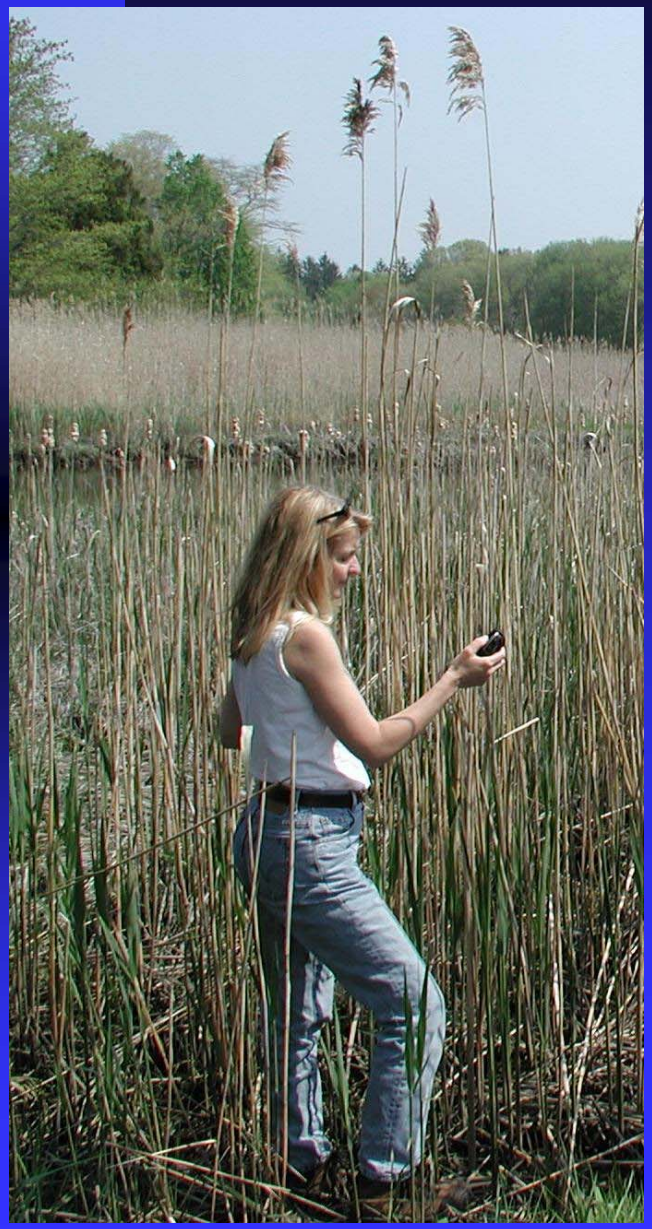
- Covers data gathering, data recording, and data presentation
  - Species
  - Occurrences
  - Patches
  - Metapopulations (group of patches)
  - Infestation (incursion)

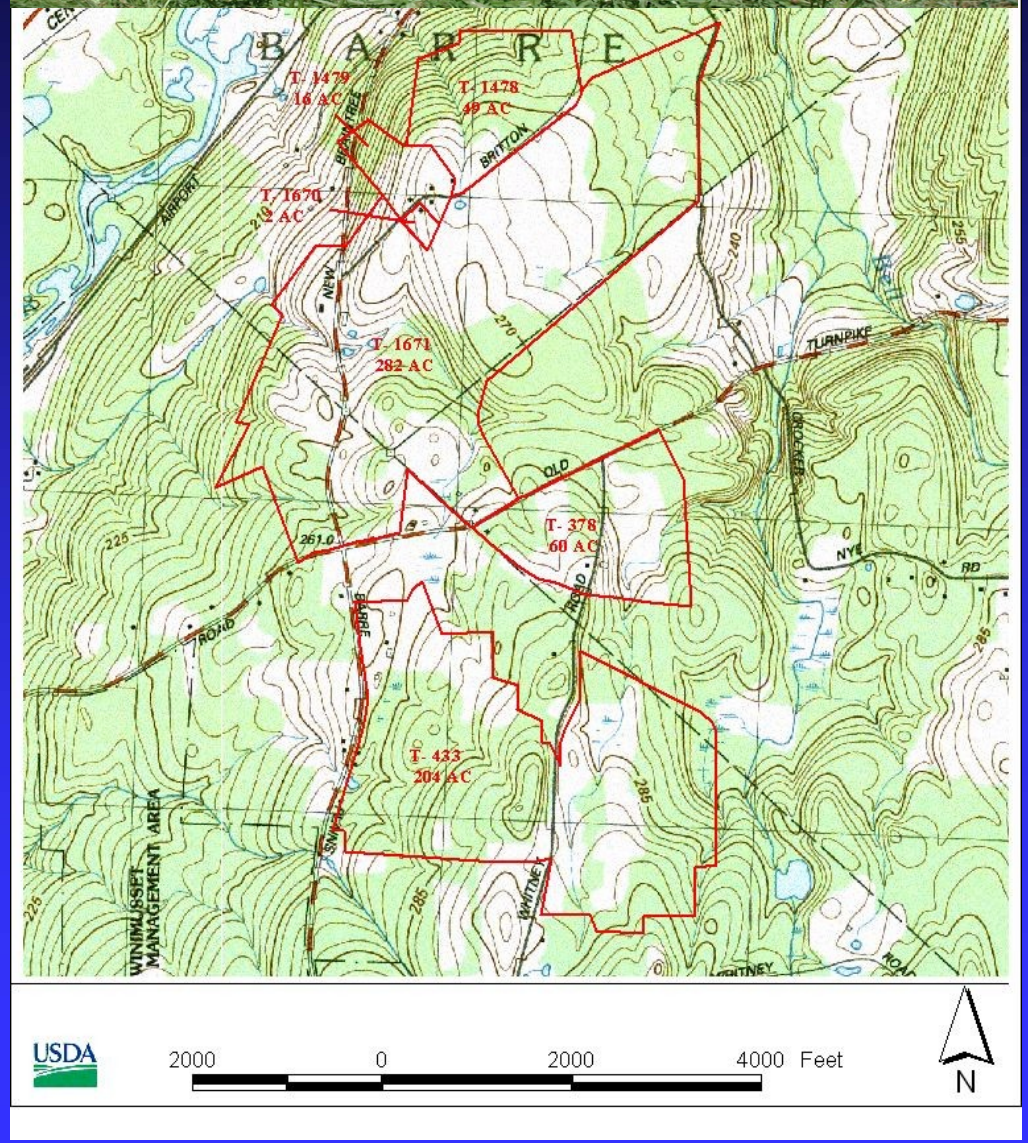
19	Hypericu	gentianoides	(L.) B. S. P.				Clusiaceae			Summit of Hemlock Hill	42-SE
20	Nuttallan	canadensis	(L.) D. A. Sutton				Plantaginaceae			Summit of Hemlock Hill	42-SE
21	Mollugo	verticillata	L.				Molluginaceae			Valley Road near South Street	38-SW
22	Calysteg	sepium	(L.) R. Br.	ssp.	sepium		Convolvulaceae			North side of Hemlock Hill Roa	36-SW
23	Leonurus	cardiaca	L.				Lamiaceae			Southwest rim of Old Stone Q	45-SW
24	Melampy	lineare	Desr.				Orobanchaceae			Southwest of rim of Old Stone	45-SE
25	Lactuca	canadensis	L.				Asteraceae			Southwest of rim of Old Stone	45-SE
26	Diervilla	lonicera	P. Mill.				Caprifoliaceae			Southwest of rim of Old Stone	45-SE
27	Ampelop	brevipedunculata	(Maxim.) Trautv.				Vitaceae			Southwest of rim of Old Stone	45-SE
28	Tetradium	daniellii	(Benn.) T. G. Hartley				Rutaceae			Old Stone Quarry at bas	45-SE
29	Persicari	maculosa	S. F. Gray				Polygonaceae			Southwest rim of Old Stone Q	45-SE
30	Deschan	flexuosa	(L.) Trin.				Poaceae			Southwest rim of Old Stone Q	45-SE
31	Fallopia	convolvulus	(L.) A. Löve				Polygonaceae			Southwest rim of Old Stone Q	45-SE
32	Hieraciur	lachenalii	K. C. Gmel.				Asteraceae			Southwest rim of Old Stone Q	45-SE
33	Allium	pulchellum	Don.				Alliaceae			Southwest rim of Old Stone Q	45-SE
34	Humulus	japonicus	Sieb. & Zucc.				Cannabaceae			along access road at west enc	45-NW
35	Eragrost	pectinacea	(Michx.) Nees				Poaceae			along access road at west enc	45-NW
36	Eragrost	cilianensis	(All.) E. Mosher				Poaceae			along access road at west enc	45-NW
37	Daucus	carota	L.				Apiaceae			along access road at west enc	45-NW
38	Portulac	oleracea	L.				Portulacaceae			along access road at west enc	45-NW
39	Erigeron	canadensis	L.				Asteraceae			along access road at west enc	45-NW
40	Setaria	faberii	Herrm.				Poaceae			along access road at west enc	45-NW
41	Sicyos	angulatus	L.				Cucurbitaceae			along access road at west enc	45-NW
42	Fagopyru	esculentum	Moench				Polygonaceae			along access road at west enc	45-NW
43	Aethusa	cynapium	L.				Apiaceae			along access road at west enc	45-NW
44	Lactuca	serriola	L.				Asteraceae			along access road at west enc	45-NW
45	Pueraria	montana	(Lour.) Merr.	var.	lobata	(Willd) Maese	Fabaceae			behind main garage	1-SW
46	Setaria	pumila	(Poir.) Roeme	ssp.	pumila		Poaceae			behind main garage	1-SW
47	Persicari	maculosa	S. F. Gray				Rosaceae			behind main garage	1-SW
48	Cardamii	hirsuta	L.				Brassicaceae			southwest side of driveway to	1-SE
49	Leersia	virginica	Willd.				Poaceae			east side of Willow Path	5-NE
50	Hieraciur	sabaudum	Michx.				Asteraceae			east side of Willow Path	5-NE
51	Acalypha	rhomboidea	Raf.				Euphorbiaceae			east side of Willow Path	5-NE
52	Cinna	arundinacea	L.				Poaceae			west side of Willow Path near	5- NE
53	Persicari	maculosa	S. F. Gray				Polygonaceae			Central Woods	18-SE
54	Solanum	ptcanthium	Dunal				Solanaceae			Central Woods	18-SE
55	Ambrosi	artemisiifolia	L.				Asteraceae			Central Woods	18-SE

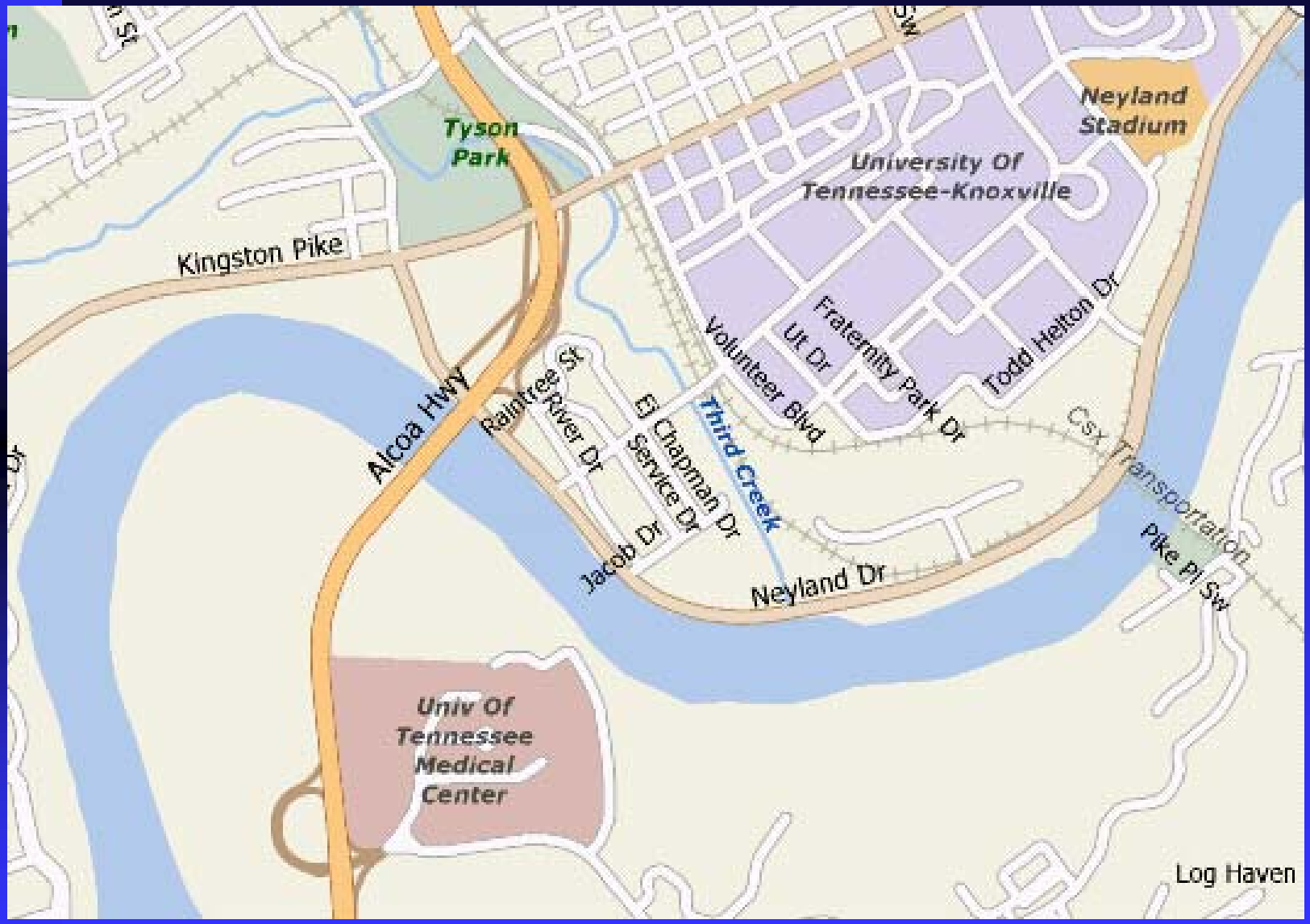


Courtesy of K. Edvarchuk

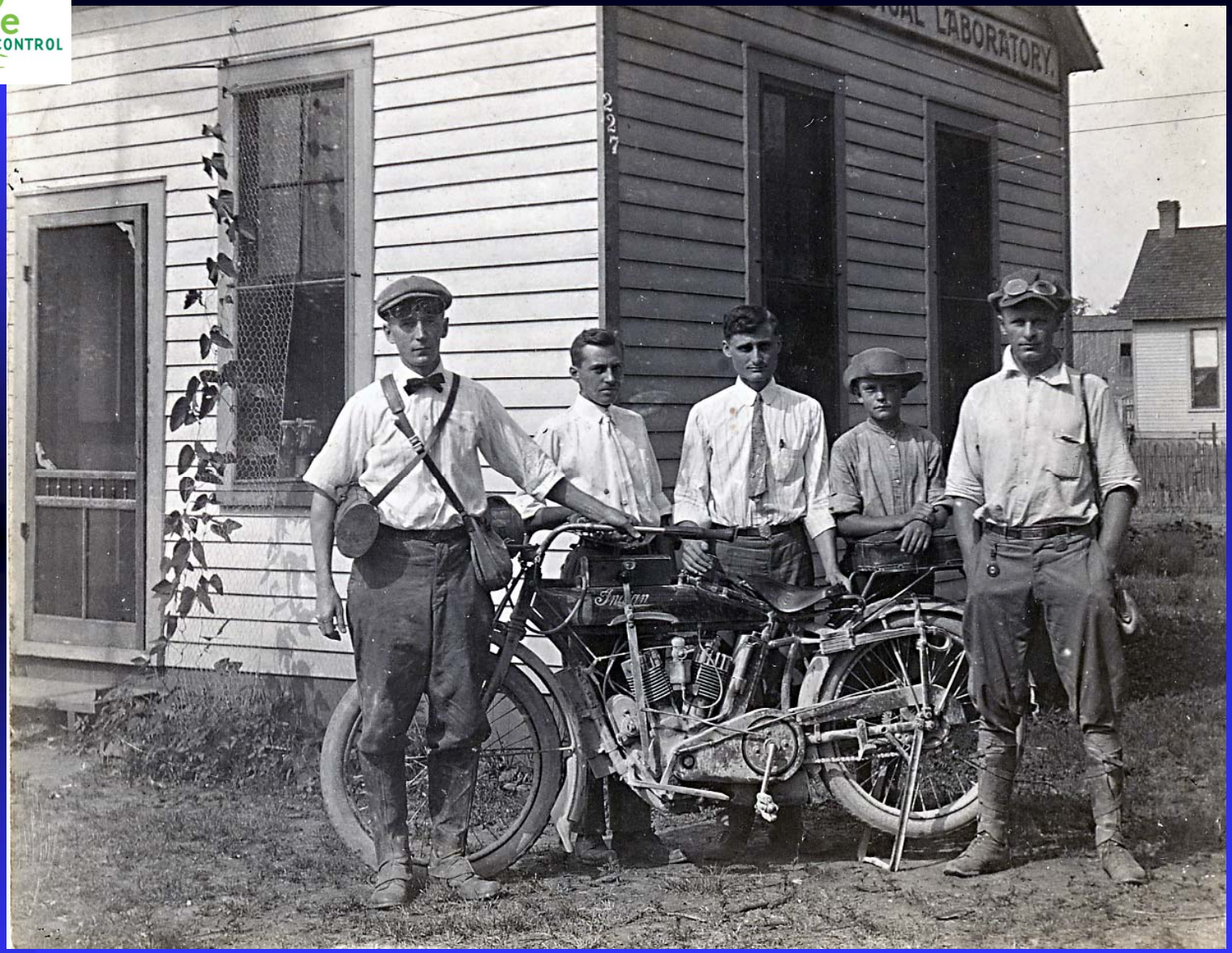
invasive PLANT CONTROL






Tyson Park
Neyland Stadium
University Of Tennessee-Knoxville
Kingston Pike
Volunteer Blvd
Ut Dr
Fraternity Park Dr
Todd Helton Dr
Alcoa Hwy
Raintree Sr
River Dr
Ej Chapman Dr
Service Dr
Jacob Dr
Third Creek
Csx Transportation
Neyland Dr
Pike Pl Sw
Univ Of Tennessee Medical Center
Log Haven


Third Creek
© 2008 Tele Atlas
Image U.S. Geological Survey
©2008 Google
35°56'36.64" N 83°56'02.06" W
Mar 2002
Eye alt 1.61 km



George G. Ainslie
1886 - 1930

Courtesy of E. Ainslie

Japanese stilt-grass ***Microstegium vimineum*** **9 OCT 1919**

Monitoring

- Site revisits to update information
- Detects changes
- Detects progress (or lack thereof) to meeting management objectives
- Detect effectiveness; meeting goals
- Often conducted at regular time intervals or sites; useful for EDRR
- Can monitor species, habitats, ecosystems, etc.

Monitoring tools or techniques

- Inventories
- Reports
- Photographs or photo-plots
- Data from established permanent plots or transects

DECISION PROCESS

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DEFINE LAND USE GOALS

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DEFINE MANAGEMENT OBJECTIVE
TO ACHIEVE LAND USE GOALS

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SELECT INVENTORY/SURVEY METHODS

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MAP INVASIVE SPECIES DISTRIBUTIONS

SELECT MONITORING METHODS

DECISION PROCESS

A POINT TO REMEMBER…

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Be prepared for stochastic events

Japanese stilt-grass (*Microstegium vimineum*)
Jockey Hollow, Morristown National Historic Park, New Jersey

Northern Red Salamander *Pseudotriton ruber*

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