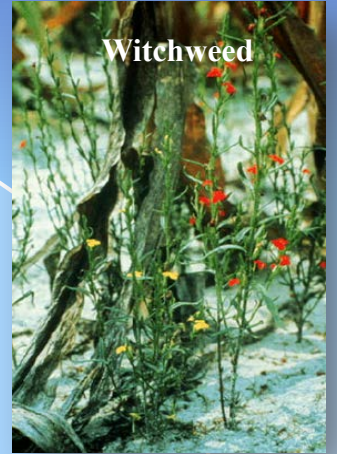


# Invasive Species – Coming To America

*New Strategies for Developing EDRR Capacity  
at all Levels of the Landscape*



**Randy G. Westbrooks, Ph.D.**  
IVS Prevention Specialist  
Whiteville, N.C. USA



# Randy G. Westbrook

U.S. Federal IVS Prevention Specialist – 1979-2012

Whiteville, North Carolina USA

**EDRR Programs –  
Second Line of Defense**



**Ports of Entry –  
First Line of Defense**



# Developing a Landscape Approach to EDRR The Landscape Approach to EDRR Eradication Program 1957 - EDRR 1.0

## Political Land Units

- Countries
- States
- Counties
- Cities/Towns



## Biomes, Roads, Rivers

- Corridors for Spread of IVS

## Individual Land Units

### Public Land Units

- Parks
- Forests
- Refuges
- Lakes, Streams

### Private Lands

- Farms, Ranches, Preserves
- *Your Backyard or Patio!*



*Where do you fit in this picture?*

# A Biological Tsunami – Coming to America....

- **Oceanic Tsunamis**

- Unpredictable
  - Indian Ocean – 2004
  - Japan – 2011



Time Scale – Seconds, Minutes, Hours

1 2 3 4 5 6 7 8 9 10

- **Biological Invasions**

- Predictable
- Global in Scope – 500+ Years
- Modes of Spread
  - Intentional Introductions
  - Incidental/Accidental Spread
- Common Denominators
  - Global Trade and Travel - *People*



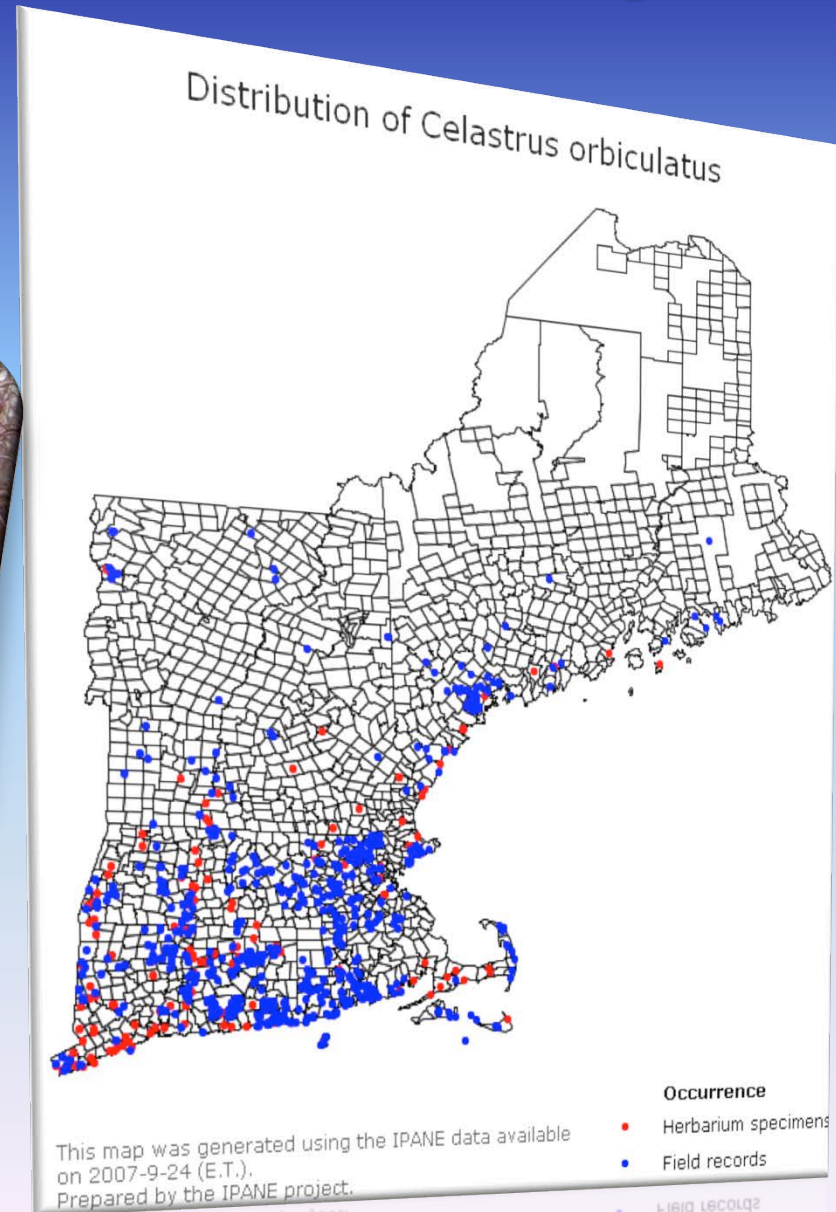
Time Scale – Years, Decades, Centuries

1 2 3 4 5 6 7 8 9 10

# Oriental Bittersweet in Hindsight.....



1860s – Ornamental Plant  
– from East Asia



# *Arundo donax* as a Biofuels Crop in N.C.?



## *Arundo - A Serious Invader in California*



# America the Beautiful...

*What will America Look Like in 2113?*



1776 - Farms and Cities - Islands in a Sea of Wilderness.....

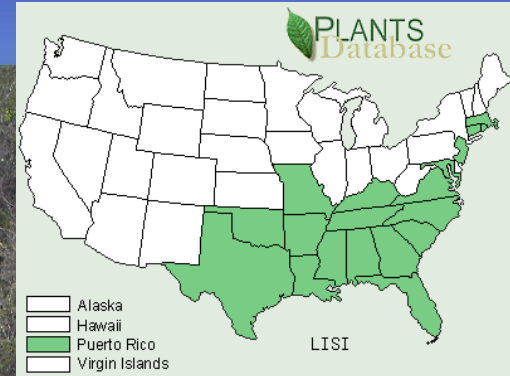
2013 - Natural Areas - Islands in a Sea of Disturbance - *From Sea to Shining Sea*

*What will Greenwich Land Trust  
Properties look like in 2076?*





# Chinese Privet 'Lane' in Chadbourn, North Carolina



# First New England Invasive Plant Summit

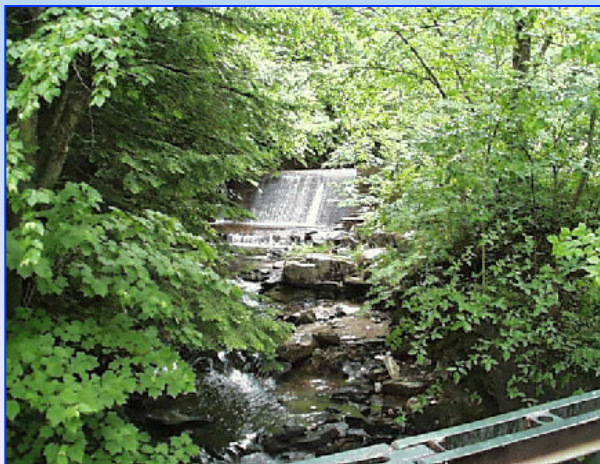
June, 1999



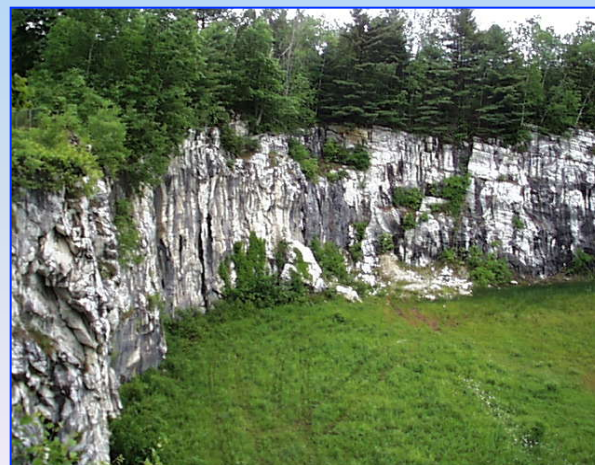
Connecticut River Valley Partners.....



Silvio O. Conte NWR, Turners Falls, MA



Pristine Natural Areas to Protect.....

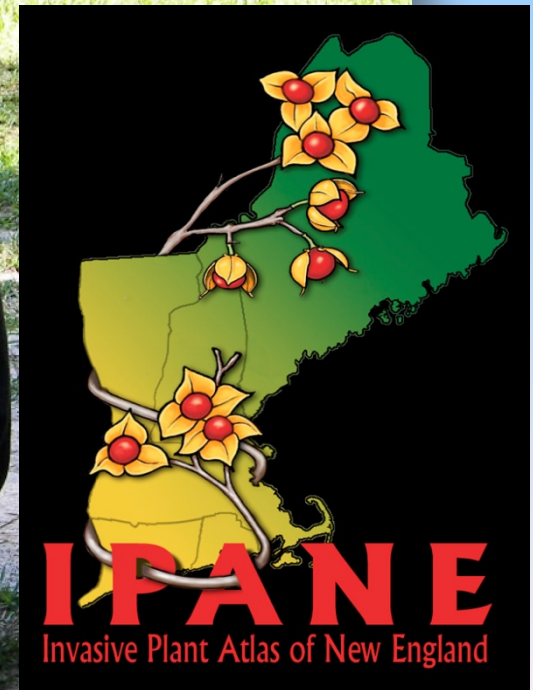


Disturbed Areas to Manage.....

# All Wrapped Up.....



# On Assignment: *Invasive Plant Atlas of the Universe*



# Weeds of the World - Facts

32,459

32,459 - Documented Weeds in the World

- ~1,000 - Documented Introduced Weeds in the USA

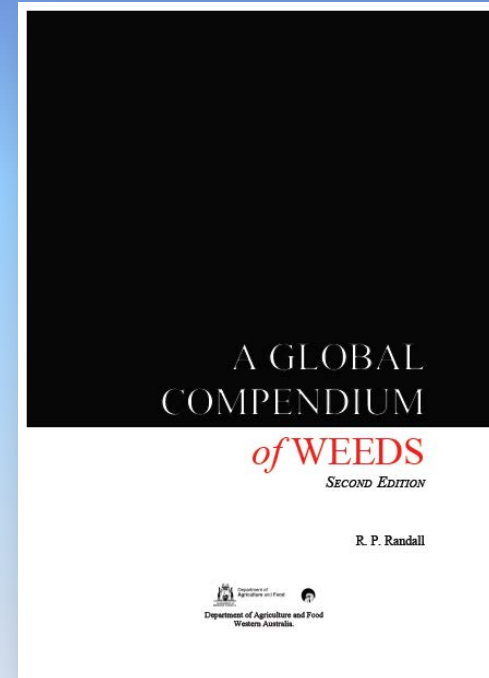


**Crested Floating Heart in Lake Marion, South Carolina**

*Partnerships Now..... Weeds Won't Wait!*

# Rod Randall, Weed Geographer

## Western Australia Dept. of Ag.



[http://www.agric.wa.gov.au/objtwr/imported\\_assets/content/pw/weed/global-compendium-weeds.pdf](http://www.agric.wa.gov.au/objtwr/imported_assets/content/pw/weed/global-compendium-weeds.pdf)

# Invasive Species in America

*How are IVS Impacting your Lands and Waters?*

## ■ Introduced Invasive Species

- 50,000 Introduced Plants/ Animals

## ■ Native Invasive Species

- Remove Top Predators
- Disrupt Local Environment

## ■ Impacts on Human Health

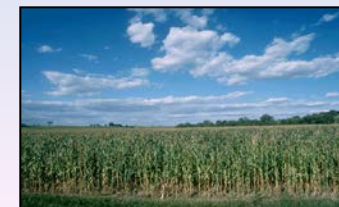
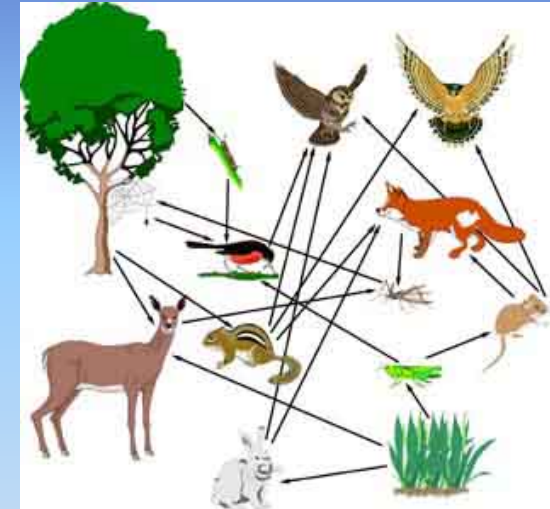
- Spread of Disease; Injury, Stings

## ■ Ecological Impacts

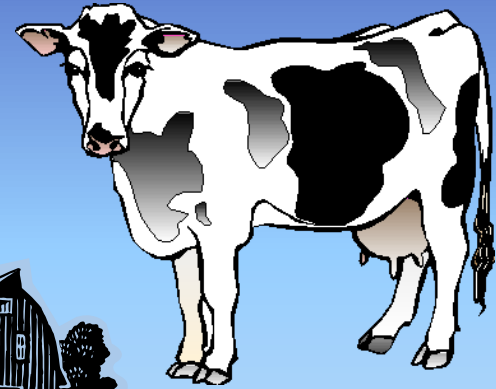
- Outcompete / Hybridize with Natives
- Destroy Habitat (Gypsy Moth)
- Alter Ecosystems (*Melaleuca* in FL)
- Alter Fire Cycles (Cheatgrass in the West)
- #2 Threat to Endangered Species (400/958 spp.)

## ■ Economic Impacts

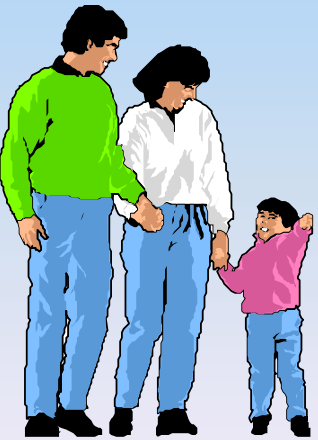
- Food and Fiber Production
- Increased Losses and Control Costs (\$150 Billion)



# Root of the Problem....



..... Only a small percentage of the U.S. population is now involved with agriculture and land management.....





# Invasive Species

*Where do they Fit in our Priorities?*

- Crop Protection (Early 1900s)
  - Threats to Food and Fiber Production
    - Foot and Mouth Disease, Medfly, Gypsy Moth, etc.
- Environmental Protection (1950s)
  - Threats to Human Health
    - Chemical Pollution, Hazardous Waste, Infectious Diseases, etc.
- Biological Protection
  - Threats to Natural Resources (Biosecurity)
    - Invaders of Natural Areas

# Four Major Types of Invasive Species...



Zebra Mussel

Aquatic Nuisance Species



Forests

Invasive Plants



Natural Areas



Brown Tree Snake

Injurious Wildlife

Have you tangled with any of these critters?



Crop Weeds



Asian Longhorned Beetle

Insects and Diseases



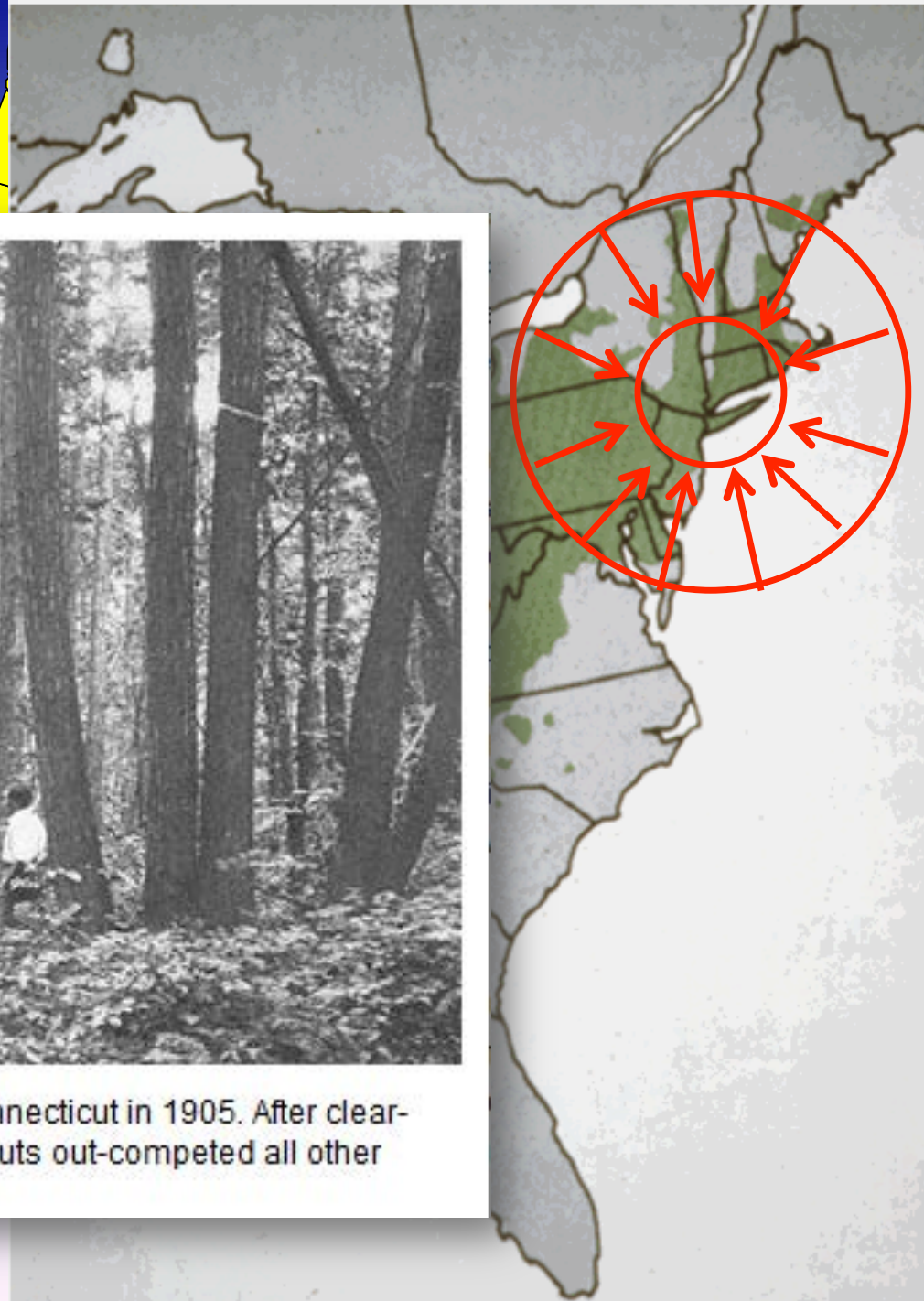
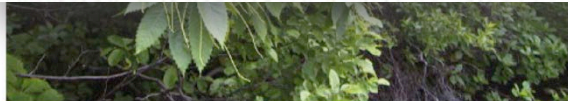
Rangelands

~1,300 Free Living Invasive Plants

# Chestnut Blight (*Cryphonectria parasitica*)

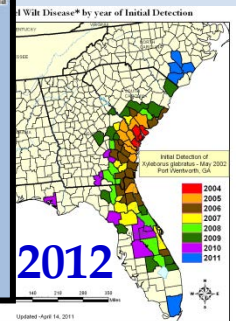


**Fig. 10.** Pure stand of American chestnut trees in Connecticut in 1905. After clear-cutting (90 years prior to this photograph), the chestnuts out-competed all other woody species and grew back as a monoculture.



# Laurel Wilt Disease in the Southeast

- 2002 – Red Ambrosia Beetle (*Xyleborus glabratus*) Captured in



- 2013 – What native species are at risk on your lands?

# Invasive Plants of the Southeast

*Local EDRR Opportunities... ..*

1876



Kudzu

1947



Hydrilla

1852



Chinese Privet



## Prescriptive Public Welfare Laws

- Clean Water Act
- Clean Air Act

## Federal/State Plant Protection Laws

- U.S. Plant Protection Act of 2000
- State Plant Regulatory Laws



# Biological Pollution vs Chemical Pollution



**Pest Free  
Production**



**First Line  
of Defense**

**EDRR - Second Line of  
Defense**

**Detection,  
Containment, &  
Eradication**



**Preclearance**

**Exclusion  
(Prohibited Lists)**

**Control**

**Third Line of Defense**



**Other  
Countries**

**Traditional Crop  
Protection Strategies**

**USA**



# Evolution of EDRR in the U.S. - 1957-2013

## EDRR 1.0 - Single Agency-Led Weed Eradication Programs

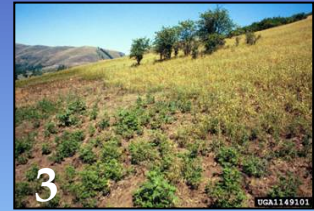
- Large Weed Eradication Programs - 1957
  - 1) USDA Witchweed Eradication Program (Carolinas) - 432,000 Acres (1956-2012)
  - 2) Goatsrue (Utah) - 39,000 Acres (1981-1996)
  - 3) Common Crupina (Idaho, Oregon, Washington) - 30,000 Acres (1981-1991)
- Small Weed Eradication Projects - Late 1980s
  - 4) Branched Broomrape (TX) - 1,000 Acres (1986-1995)
  - 5) Catclaw Mimosa (FL) - 500 Acres (1986-1992)
- Micro- Weed Eradication Projects - Early 1990s
  - 6) Japanese Dodder (SC) - 2 Acres (1991-1995)
  - 7) Small Broomrape (VA, NC, SC, GA) - 2 Acres Each - (1991-1995)
  - 8) Giant Salvinia (SC) - 1 Acre - (1995-1996)
  - 9) Tropical Soda Apple (Southeast) - 5-10 Acres - (1994-2000)

## EDRR 2.0 - Interagency IVS Partnerships

- 10) State IVS Councils - Late 1990s
- 11) NC Giant Salvinia Task Force (2002-2012)
- 12) Beach Vitex Task Force (2003-2012)

## EDRR 3.0 - Landscape EDRR Systems

- 13) Lake Waccamaw State Park - 2012





# U.S. National Invasive Species Initiatives - 1990

## ■ Federal Interagency Coordination

### ■ FICMNEW (1990)

- 1995 - National Weed Summits (CO, FL, NM)
  - BLM Survey - Spreading at 4,600 Acres/Day
- 1997 - National Invasive Plant Strategy
- 1998 - Pulling Together Challenge Grant Weed Management Program
- 1998 - Weed Fact Book

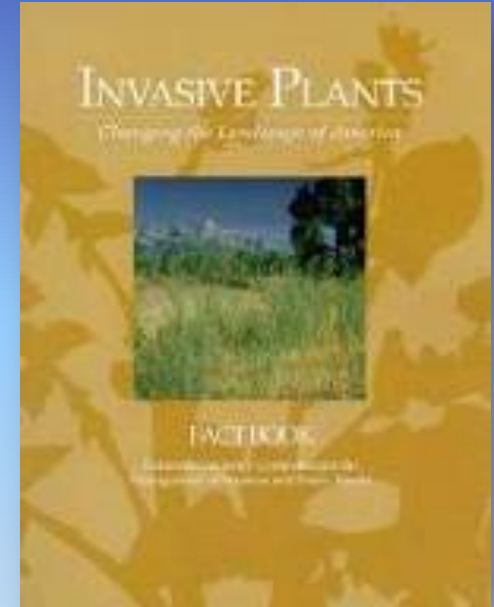
### ■ ANS Task Force (1990)

### ■ Invasive Terrestrial Animals & Pathogens Committee (ITAP - 2004)

## ■ National Oversight and Coordination

### ■ Dan Simberloff, Bruce Babbitt, Don Schmitz (1994-2000)

- Presidential Executive Order 13112 (1999)
- National Invasive Species Council (2001)
- National Invasive Species Management Plan (2001)
  - **67 Major Objectives**
    - 1. Build New Capacity - Local, State, and Regional Partnerships
    - 2. Early Detection and Rapid Response (EDRR)
    - 3. Outreach and Education



# Threat of Witchweed to Grain Crops

## *EDRR 1.0 – To Protect our Crops*

- USDA-Carolinas WW Program - 1957-2011  
= \$250 Million+ (Total)  
= \$800,000/Year (Now)
- Nebraska = 49.2 Million Acres
- Nebraska Farmlands = 45.6 Million Acres
- 2010 Acres in Corn = 9.2 Million Acres
- 2010 Corn Production = 1.5 Billion Bushels  
= \$9.165 Billion (March 2012 Prices)  
= 12% of National Corn Crop  
(12.358 Billion Bushels)
- Witchweed Threat to NE Corn  
= 10% Loss = 150 Million Bushels/Year  
= \$916,500,000/Year



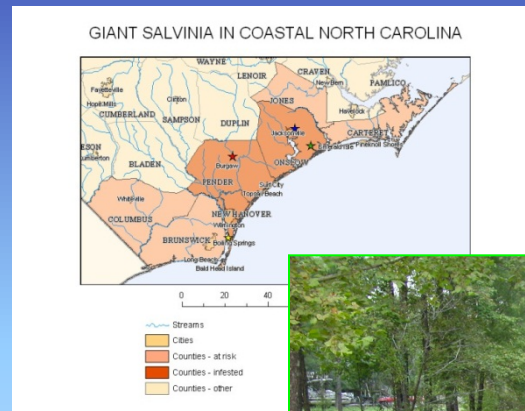
**Mustard Seeds**

**Tobacco Seeds**

# N.C. Giant Salvinia Task Force

*EDRR 2.0 – To Protect Our Waterways.....*

- Giant Salvinia (*Salvinia molesta*)
- Origin - Brazil
- Spread - Water Garden Plants
- Concerns
  - Total Covers Water Surface
  - Doubles Biomass in 2-10 days
  - Small Fragments Viable
    - Spores are non-viable
- Regulatory Status
  - Federal Noxious Weed
  - State Noxious Weed in N.C. & S.C.



2002



2006

# Beach Vitex Task Force

*EDRR 2.0 – To Protect Natural Resources and Property Values... ..*

**Debordieu Beach**



- SC, NC - Sea Turtle Network
- SC Native Plant Society
- SC-EPPC, NC-EPPC
- SC Nursery & Landscape Association
- Clemson, NCSU, USC
- SCDNR, NCDENR
- USDA FS, USGS, FWS

**Pawleys Island**



# Wavyleaf Basketgrass – EDRR Opportunity in MD-VA

*Oplismenus hirtellus* (L.) P. Beauv. Subspecies *undulatifolius* (Ard.) Roem. & Schult.

## ■ Description

- Shade tolerant, low-growing, Perennial Grass
- 20-30 cm tall

## ■ Characteristics of Invasiveness

- Spreads Rapidly Through Wooded Areas
- Crowds Out Native Herbaceous Plants
- Prevents Regeneration of Native Hardwood Trees

## ■ Control Recommendations

- New Infestations
  - Sanitation of Equipment and Personal Effects
  - Early Detection and Rapid Response
- Physical Control by Hand Removal
- Chemical Control
  - Early Season – Envoy Plus (Grass Inhibitor)
  - Late Season – Roundup (General Weed Killer)

## ■ Regulatory Status

- List as State Noxious Weed in Surrounding States



Japanese Stiltgrass

# Crested Floating Heart – EDRR Opportunity in South Carolina

*Nymphoides cristata* (Roxb.) O. Ktze.

## EDRR Categories

- Non-Regulated, Early Detection

## Origin

- Asia

## Introduction

- Water Garden Trade

## Impact

- Crowds out Native Plants

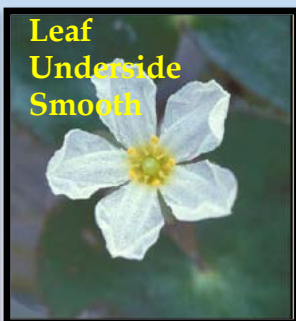


Water Snowflake  
(*N. indica*)



Leaf  
Underside  
Rough

Big Floating  
Heart  
(*N. Aquatica*)



Leaf  
Underside  
Smooth

Little Floating  
Heart (*N. cordata*)



Crested Floating in  
Lake Marion, S.C.



# Seven Steps for Building EDRR Capacity on Lands that you Own or Manage

## *Getting Started – Next Steps...*

### **I. Get Organized**

- *Identify and Engage Stakeholders*
- *Develop an EDRR Work Plan*

### **II. Put More Eyes on the Ground**

- *Develop an Early Detection Network*

### **III. Look Around**

- *Survey Natural and Managed Resources*

### **IV. Report and Manage Your Field Data**

- *Submit Field Data to U-GA EDDMapS with I-Phone/Android Phone Apps*
- *Manage Field Data and Projects with IPC Online Smart Tools*
  - *IPC Connect, IPC Connect, IPC Prevent*

### **V. Tell Somebody**

- *Report Suspected/Confirmed New State Records to State/Federal Officials*

### **VI. Assess the Problem**

- *Conduct Rapid Assessments of New Species*

### **VII. Take Action – Weeds Won't Wait (Control and Eradicate New Infestations)**

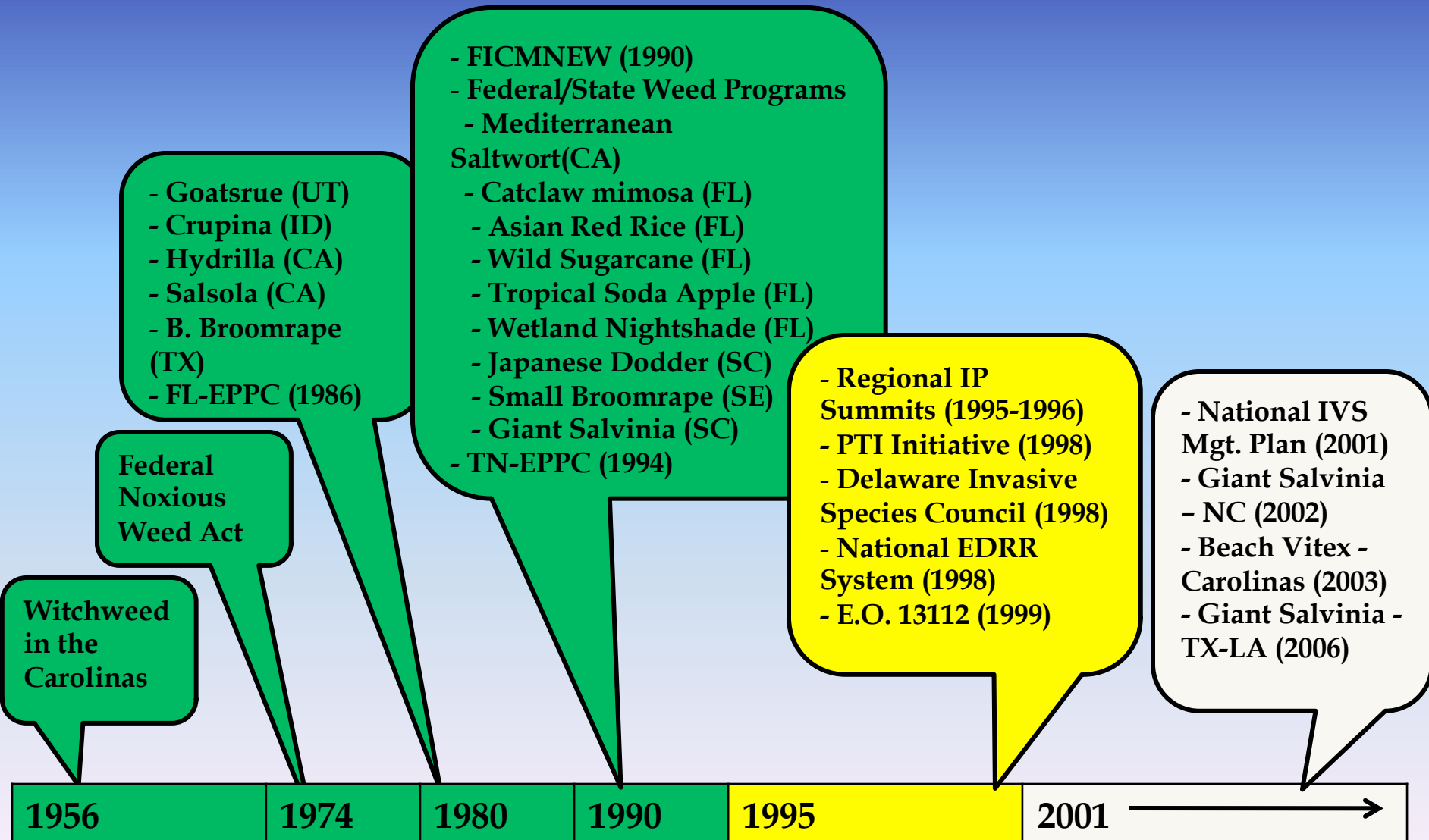
- *Make a Plan - Contain and Eradicate Incipient Infestations*

### **Approaches to EDRR Development:**

- In-house Program
  - Volunteers
  - Dedicated Staff
- Out-Source (e.g., IPC)

# The Landscape Approach to EDRR

*Why it Matters.....*





# The Landscape Approach to EDRR

## Political Land Units

- Countries
- States
- Counties
- Cities/Towns

## Biomes, Roads, Rivers

- Corridors for Spread of IVS

## Individual Land Units

### Public Land Units

- Parks
- Forests
- Refuges
- Lakes, Streams

### Private Lands

- Farms, Ranches, Preserves
- *Your Backyard or Patio!*



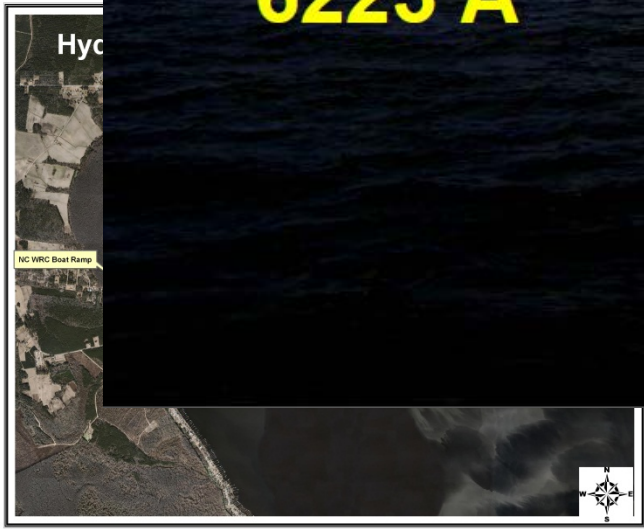
*Where do you fit in this picture?*

# Hydrilla Eradication – Lake Waccamaw, NC – 2012

*EDRR 3.0 – To Protect All Public and Private Lands and Waterways*



**2017 -  
6223 A**

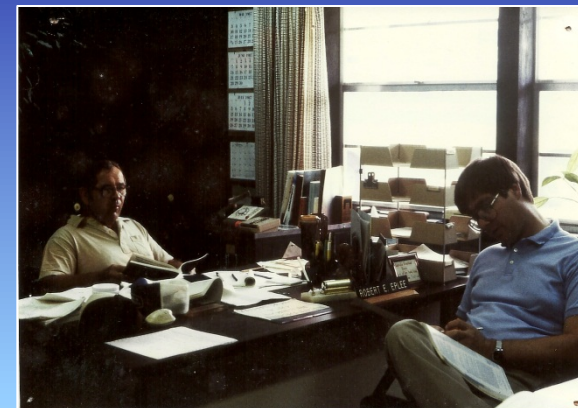


**Cost €\$450,000/Year for 10-15 Years**

# Training the Next Generation of IVS Managers

## 2013 IPC Invasive Species Management Training Programs

- **Online College Courses – IPC and Southeastern Community College**
  - Introduction to Invasive Species
  - Overview of IVS Management Strategies
  - Overview of IVS Management Programs
  - Invasive Plant Survey Methods
  - Invasive Plant Control Methods
  - State Pesticide License Exam Preparation
- **IPC Short Courses**
  - Online Webinars
  - Onsite Workshops, Conferences, Training Sessions



**Dr. Bob Eplee and  
Randy Westbrook**  
USDA APHIS -  
Summer, 1987



**Jonathan Short**  
Lake Waccamaw State  
Park  
(2011 Graduate)



**Marcia Fox**  
DE Forestry  
Commission  
(Student)



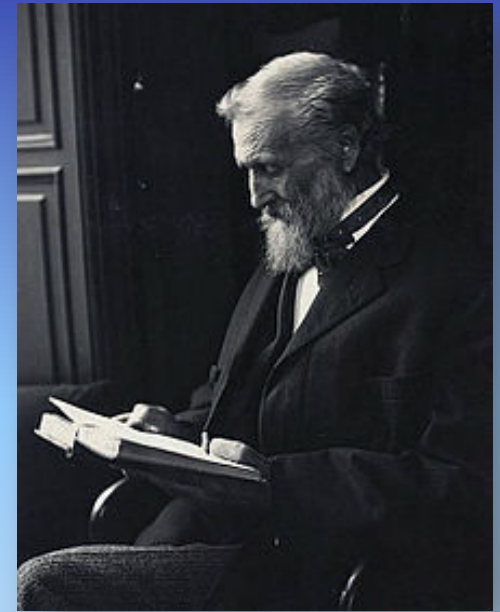
**Kendall  
Sommers**  
DE State Parks  
(Student)

# Why develop EDRR Capacity on your Lands?

- EDRR does not restrict trade and movement of species that may or may not become invasive.
- EDRR addresses only species that have established free living, self perpetuating populations.
- EDRR has minimal and short term impacts on the invaded habitat.
- EDRR aims to restore the invaded habitat to a natural and productive balance.
- EDRR will minimize IVS control costs increases.....

# The Landscape Approach to EDRR

- Patience.....
- Persistence.....
- Commitment to Protecting Natural and Managed Resources for Future Generations.....
- 119 Million Acres – Natural State
  - (5% of 2.379 Billion Acres)
- EDRR Capacity at all Levels of the Landscape
  - Greenwich Land Trust

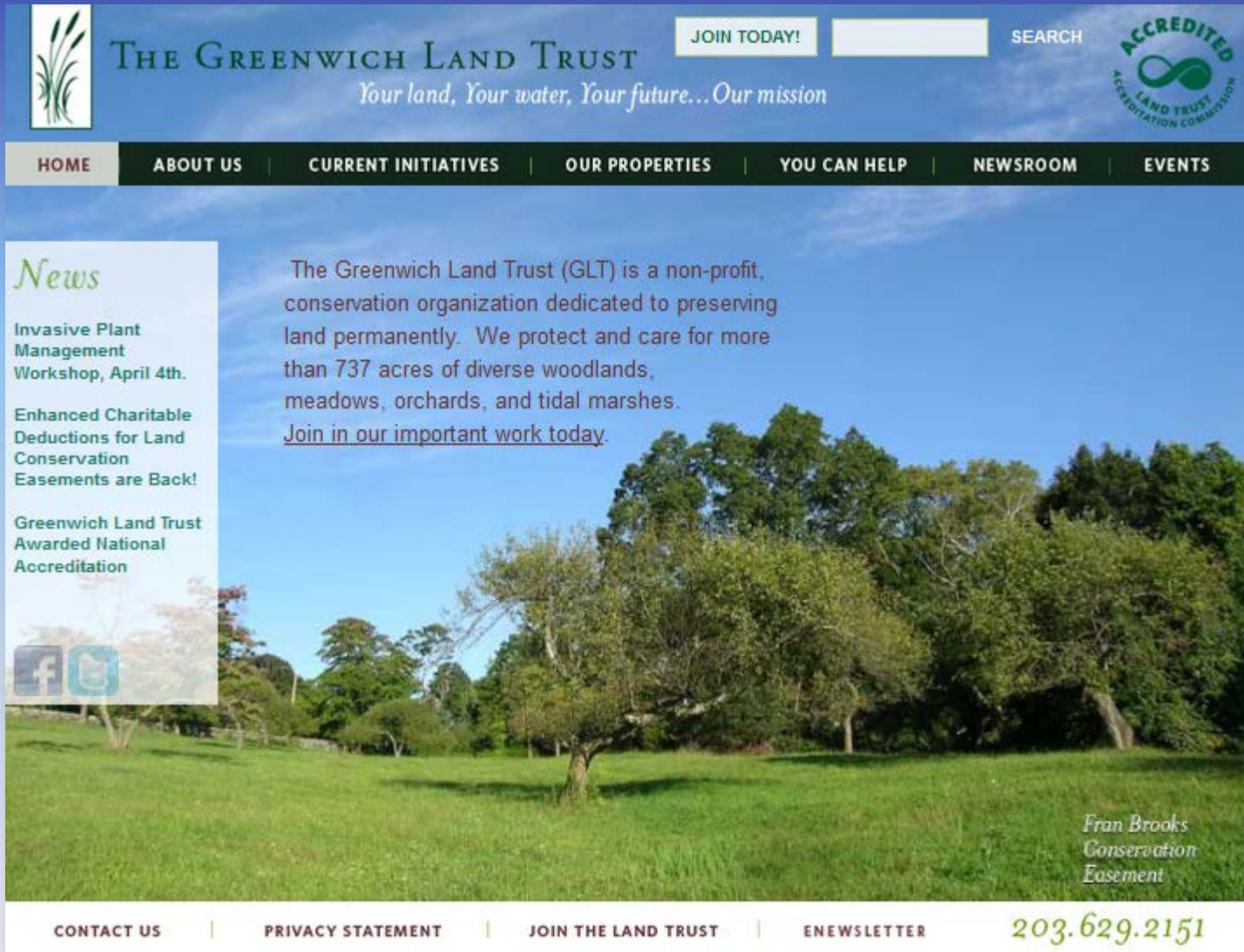



John Muir, Naturalist




Doug Tallamy, U-DE

# Your Land, Your Water, Your Future....



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*Your land, Your water, Your future... Our mission*

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## News

**Invasive Plant Management Workshop, April 4th.**

**Enhanced Charitable Deductions for Land Conservation Easements are Back!**

**Greenwich Land Trust Awarded National Accreditation**

The Greenwich Land Trust (GLT) is a non-profit, conservation organization dedicated to preserving land permanently. We protect and care for more than 737 acres of diverse woodlands, meadows, orchards, and tidal marshes. [Join in our important work today.](#)

*Fran Brooks  
Conservation  
Easement*

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*EDRR Pilot Project:*



# Greenwich Land Trust EDRR Initiative - 2076





# IPC Winter-Spring 2013 EDRR/Prevention Webinar Series

## - EDRR Webinar Series

- 1- Introduction and Overview (3-5-13)
- 2 - Strategies for Partnership Development (3-12-13)
- 3 - Early Detection and Reporting (3-26-13)
- 4 - **Rapid Assessment (4-9-13)**
- 5 - Rapid Response (4-23-13)

## - IVS Prevention Webinar Series

- 8 - **Authority for Quarantine Significant Pests at Ports of Entry - Decision-Making Tools (4-11-13)**
- 9 - Series Summary - *Foreign Pest Exclusion as a Major Element of a National IVS Prevention Strategy (4-25-13)*

## - Webinar Schedule

- <http://www.ipcwebsolutions.com/index.htm>
- **Recorded Webinars -**  
<http://www.ipcwebsolutions.com/outreach.htm>



IPC Coastal Plain Field Station  
Whiteville, North Carolina





32,459



Crested Floating Heart (*Nymphoides cristata*)  
in Lake Marion, South Carolina

Partnerships Now..... Weeds Won't Wait!