

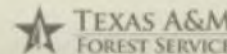
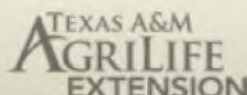


# Invasive Species and the Managed Landscape

January 20, 2017  
Grow Green

**Hans Landel, Ph.D.**  
Invasive Species Program Coordinator  
Lady Bird Johnson Wildflower Center

PARTNERS



# TODAY

- **General Concepts and Background**
  - What Is an Invasive Species?
  - How Do Invasive Species Spread?
- **Invasives and Horticulture**
- **Tools for Assessing Invasiveness of a Landscape Plant**
- **LBJ Wildflower Center Invasives Program**
  - The Invaders of Texas Citizen Scientist Program
  - The Sentinel Pest Network
  - TIPPC



# What Is an Invasive Species?

## The Federal Definition

*a species that is non-native (or alien) to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health.*  
(Executive Order 13112, 1999)



# What Is an Invasive Species?

## Are All Non-native Species Invasive?

### Not All Exotics Are Invasive

- 98% U.S. agricultural crops are non-native
- **Remember:** *Must Cause Harm*

### How Exotics Become Invasive

- Become *naturalized*
- Spread (more on this later)

### “How” Example: Ornamental Plants



1: <http://static6.businessinsider.com/image/4d6fea5fcadcbb2f40260000/wheat-and-corn-prices-are-surg-ing-after-one-of-the-most-critical-crop-reports-of-the-year.jpg>

2: <http://www.hatchettcreek.com/wp-content/uploads/2015/07/Ligustrum-Japonica.jpg>

3: <http://freedomlouisiana.org/wp-content/uploads/privet.jpg>

# What Is an Invasive Species?

## Other terms:

Exotic

Non-native

Introduced

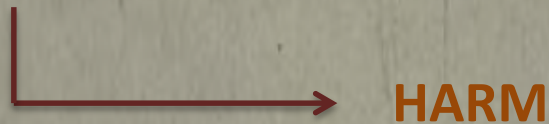
ALIEN

“Weed”

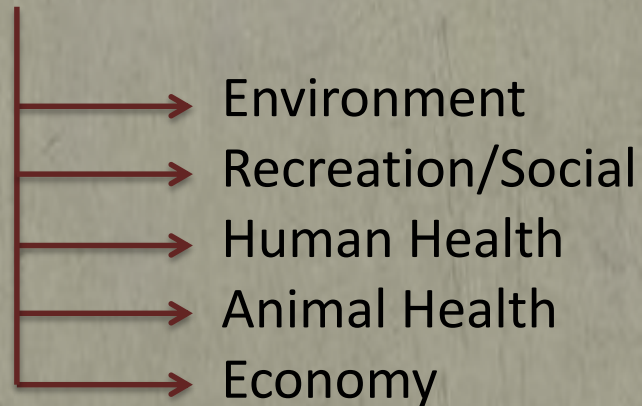
# Why Do We Battle Invasive Species?

## *Recall*

Invasive species



**HARM**



# Invasive Species: Harm

## Environmental

- **Genetic & Individual Impacts:**
  - Hybridize with native species
  - Changes in morphology
  - Changes in behavior
- **Community Impacts:**
  - Species composition
  - Lower biodiversity
  - Species interactions
  - Extinction
- **Population Impacts:**
  - Competition
  - Predation
  - Nutrition
  - Physical
  - Diseases
- **Impacts on Ecosystem Function:**
  - Fire regimes
  - Soil health
  - Hydrology
  - Erosion
  - Aquatic nutrients

# Invasive Species: Harm

## Economic

- Invasives management and control
- Damage repair
- Maintenance costs
- Agricultural, fisheries, forest losses
- Tourism losses
- Losses in ecosystem functions

## Human Health

- Allergies
- Injury/disease
- Pesticide and herbicide application

## Social/Recreational

- Sport fishing & boating
- Aesthetics & Outdoor activities







# Emerald Ash Borer Damage

---



June 2006  
Credit: D. Herms

(Ohio)



August 2009  
Credit: D. Herms

# Chinese Privet (*Ligustrum sinense*)

Competes for  
pollinators

Replaces natives

Competes for  
seed dispersers

Changes soil  
chemistry and  
nutrient cycling

Negative impacts  
on mycorrhizal  
fungi community

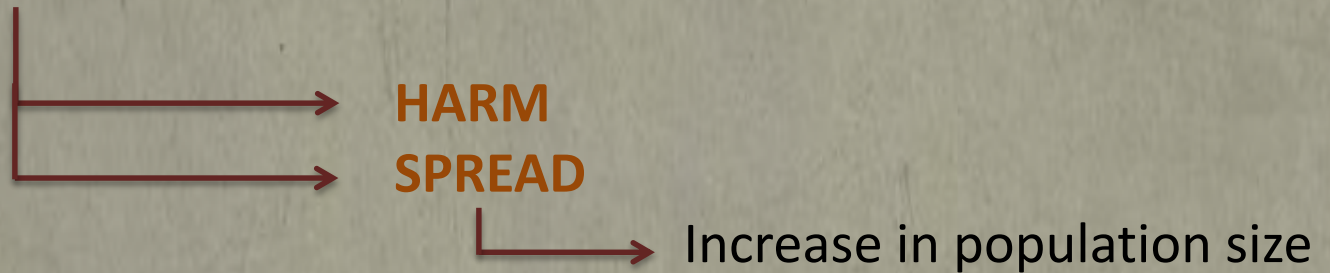
Impacts on  
stream  
communities

Soil arthropod  
community

# Why Do We Battle Invasive Species?

## *Recall*

Invasive species



# How Invasive Species Spread

- **Natural Dispersal**
  - **Production of offspring**
    - Wind- or water-borne seeds or larvae
    - Animal-borne seeds or larvae
  - **Movement of adults**
    - Swim, fly, walk/run, etc.
  - **But.... can't always explain expansion**



# How Invasive Species Spread

- **Natural Dispersal**
  - Production of offspring
    - Wind- or water-borne seeds or larvae
    - Animal-borne seeds or larvae
  - Movement of adults
    - Swim, fly, walk/run
  - Can't always explain expansion



- **With Human Assistance**

# How Invasive Species Spread

## With Human Assistance

- **Accidental**

- Produce
- Nursery stocks
- Ship ballasts
- Packing materials & shipping containers
- Recreational travelers
- Hay
- Flowers
- Mowing practices
- Vehicles
- Firewood
- Boots and gear



# How Invasive Species Spread

## With Human Assistance

- **Purposeful**

- Ornamental planting
- Erosion control
- Wildlife value
- Agriculture/Sport
- Pets/Aquariums
- Biological Controls



<sup>1</sup>Aelwyn Fliker 2007

<sup>2</sup><http://io9.com/5833022/10-of-the-worlds-worst-invasive-species>

<sup>3</sup>[http://www.eddmaps.org/ipane/ipanespecies/shrubs/Rosa\\_multiflora.htm](http://www.eddmaps.org/ipane/ipanespecies/shrubs/Rosa_multiflora.htm)

<sup>4</sup>Leslie J. Mehrhoff, University of Connecticut, Bugwood.org



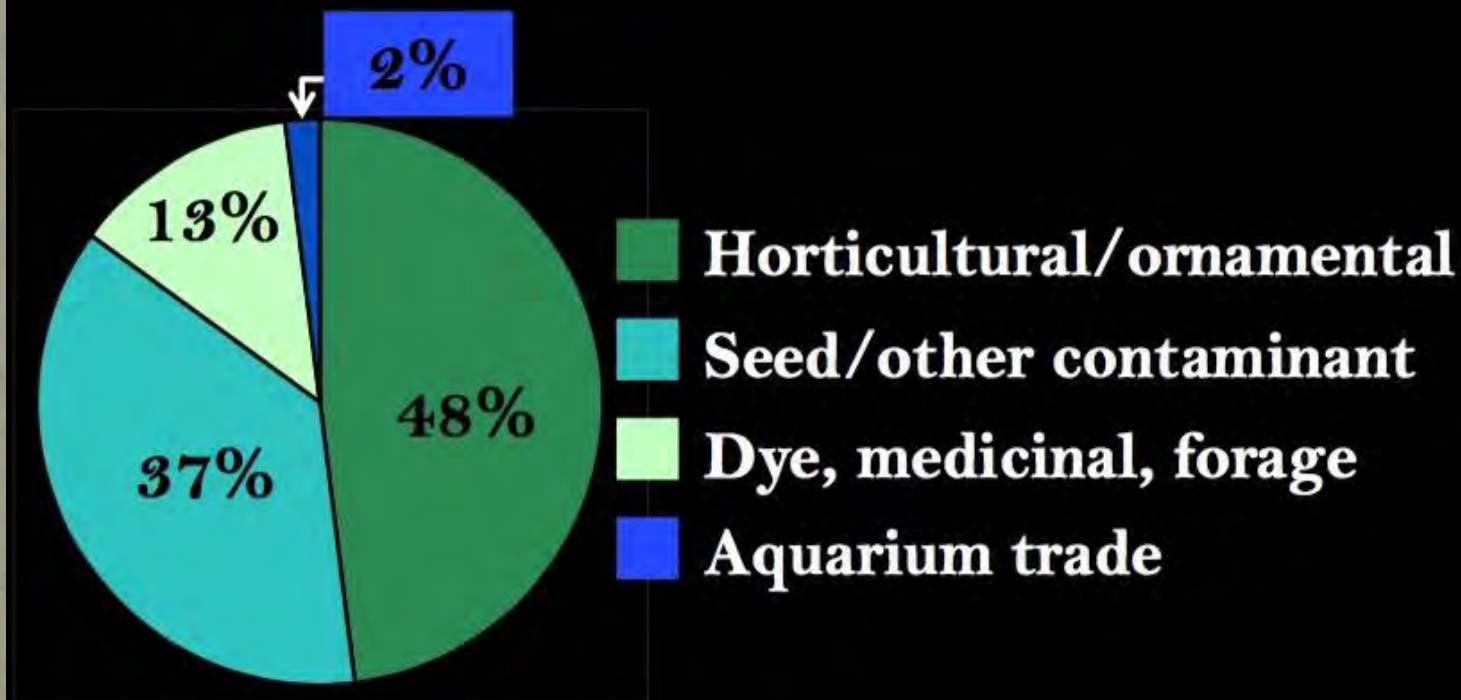
# Characteristics of a Useful Landscape Plant

- Easy to propagate
  - Lots of seeds
  - Good seed viability
  - High germination success
  - Asexual propagation
  - Grows fast
- Easy to Grow and Care For
  - Hardy
  - Grows fast
  - Few/no pests, diseases
  - Habitat generalist
  - Water-wise
- Beauty/Interest
  - Good color
  - Bright berries

***Characteristics  
of Invasiveness!***

# Routes of Introduction of Invasive Plants

## Pathways into CA



**Bell 2007**

# Invasive Species: Contradictions



# Invasive Species: Contradictions



Georgia Wildlife Federation

The screenshot displays the Lowe's website interface. At the top, there is a navigation bar with the Lowe's logo, a location indicator for Austin, and a search bar. Below this, a breadcrumb trail reads: Home / Outdoors / Garden Center / Garden Plants & Flowers / Shrubs. The main content area is split into two product listings.

**Top Listing:** 3 Gal. Curly Leaf Ligustrum Recurvifolia. Price: \$38.98 /each. Features include: Fast growing landscape shrub, Wavy evergreen glossy foliage, and Not guaranteed to be in bloom on arrival.

**Bottom Listing:** 2-Gallon White Green Ligustrum Foundation/Hedge Shrub (L7467). Price: \$11.98. Features include: 5-star rating (1 Review) and a note that the item is unavailable for purchase online.

# Invasive Species: Contradictions



A screenshot of a retail website's search results page for "NANDINA". The page features a navigation bar with a search bar, "My Account", and "Cart | 0 Items". Below the navigation, there's a banner for "Thousands of Items Available for Buy Online and Pick Up in Store." The main content area shows "Showing Results for 'NANDINA'" with "12 Items Found". There are filters for "Brand", "Price", "Review Rating", and "Sort by: Best Match". A sidebar on the left includes a "Department" filter set to "Outdoors" and a "Price" filter. The main product grid displays four items, each with a "Compare" button and a small image of the plant. The items are: "Southern Living Plant Collection 2.5 Qt. Lemon Lime Nandina", "Southern Living Plant Collection 2.5 Qt. Obsession Nandina", "Southern Living Plant Collection 2.5 Qt. Flirt Nandina", and "Southern Living Plant Collection 2.5 Qt. Blush Pink Nandina".

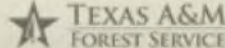
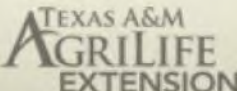
Keep Austin Beautiful

**TEXASINVASIVES.ORG**

HELLO INVASIVE SPECIES.  
GOODBYE TEXAS.

# Tools

PARTNERS



# How to Stop Species from Spreading?

## Prevent Transport

- **WE** aid the spread of invasives
- **WE** can help prevent the spread of invasives
  - Clean, Drain, Dry
  - Don't Move Firewood
  - Remove seeds from boots, clothes
  - Plant Natives



**INVASIVE SPECIES  
HIDE IN YOUR BOAT**

**CLEAN** your boat, trailer and gear by removing all plants, animals and foreign objects.

**DRAIN** all water from the boat, including the motor, bilge, livewells and bait buckets.

**DRY** the boat and trailer for a week or more. If unable to let it dry for a week, wash it with a high-pressure washer and hot (140-degree), soapy water.

**STATE LAW  
REQUIRES THAT YOU DRAIN  
ALL WATER BEFORE APPROACHING  
OR LEAVING THIS LAKE**

[www.texasinvasives.org](http://www.texasinvasives.org)  
To report a violation, call 1 (800) 792-4263.

**TEXAS  
PAINTS  
A  
MESSAGE**  
Life's better outside!

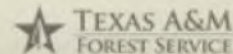
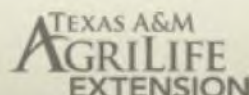
# Texasinvasives.org

- A partnership between the Texas Forest Service, USDA-APHIS, Texas Parks and Wildlife Department, and others.
- Designed to present a coordinated approach to address invasive species throughout Texas.

## Goals

- **Facilitate communication** among the state's invasive species stakeholders
- **Implement a coordinated response** to address invasive species issues on a statewide level
- Provide a venue for **sharing information** about key invasive strategies
- Create **public awareness** of the problems posed by invasive species in Texas

### PARTNERS





# Texasinvasives.org

## Invasives Database

- Illustrated Descriptions
- Ecological Information
- Distribution & Habitat
- Biology & Spread
- History of Introduction
- Ecological Threats
- Control & Management
- Native Look-a-likes
- Native Alternatives
- References

The screenshot shows the homepage of TexasInvasives.org. At the top left is the logo for TexasInvasives.org with the tagline "HELLO INVASIVE SPECIES. GOODBYE TEXAS." To the right of the logo are navigation links: ABOUT | WIRE | SIGHT | CONTACT | TESTIMONIALS. Below the logo is a dark navigation bar with buttons for INVASIVES 101, TAKE ACTION, CITIZEN SCIENTISTS, PROFESSIONALS, and RESOURCES. A red circle highlights the "INVASIVES DATABASE" button with a "GO" arrow. The main content area features a large green banner with the text "HELLO ZEBRA MUSSELS. GOODBYE TEXAS LAKES." and a paragraph describing the impact of zebra mussels. Below the banner is a "SPOTLIGHT" section with the text "Invasive Species News and Events" and a "MORE" button. To the right of the spotlight is a "DO YOUR PART TO STOP THE SPREAD!" section with an image of zebra mussels. At the bottom, there are three "ALERT" cards for Giant Salvinia, Emerald Ash Borer, and Zebra Mussel, each with an illustration and scientific name.

# Horticultural Code of Practice

## **All Users**

- Dispose of plant waste responsibly
- Know exactly what you are growing and buying
- Take advice on the best control techniques
- Control invasive non-native plants safely
- Be aware of relevant legislation

## **Suppliers and retailers**

- Know what you are supplying or selling; label plants clearly and accurately
- Provide substitutes for invasive plants
- Provide advice on disposal

## **Buyers and Importers**

- Beware of hitch-hiking pests on plants and in soil

Department for Environment, Food and Rural Affairs (UK)

2011

# Weed Risk Assessment

Assessments of a plant's potential to be invasive

- **USDA-APHIS**

[https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease-programs/pests-and-diseases/sa\\_weeds/sa\\_noxious\\_weeds\\_program/ct\\_riskassessments](https://www.aphis.usda.gov/aphis/ourfocus/planthealth/plant-pest-and-disease-programs/pests-and-diseases/sa_weeds/sa_noxious_weeds_program/ct_riskassessments)

- **States**

- Texas

<http://www.texasinvasives.org/professionals/assessment.php>



## Weed Risk Assessment for *Ligustrum sinense* Lour. (Oleaceae) – Chinese privet

United States  
 Department of  
 Agriculture

Animal and Plant  
 Health Inspection  
 Service

September 18, 2012

Version 1



Infestation of *L. sinense* (source: John D. Byrd, Mississippi State University, Bugwood.org).

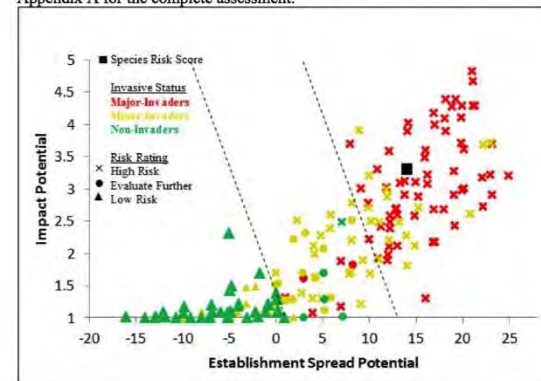
### Agency Contact:

Plant Epidemiology and Risk Analysis Laboratory  
 Center for Plant Health Science and Technology

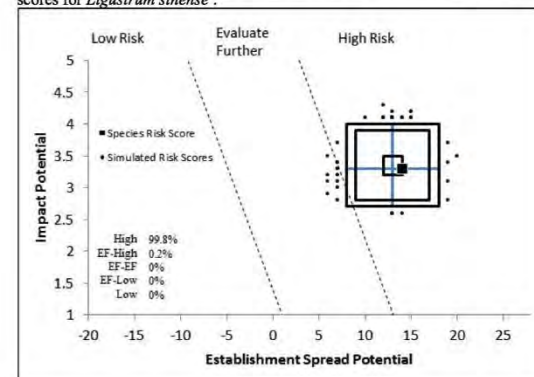
Plant Protection and Quarantine  
 Animal and Plant Health Inspection Service  
 United States Department of Agriculture  
 1730 Varsity Drive, Suite 300  
 Raleigh, NC 27606

### Weed Risk Assessment for *Ligustrum sinense*

**Figure 2.** *Ligustrum sinense* risk score (black box) relative to the risk scores of species used to develop and validate the PPQ WRA model (other symbols). See Appendix A for the complete assessment.



**Figure 3.** Monte Carlo simulation results (N=5,000) for uncertainty around the risk scores for *Ligustrum sinense*<sup>a</sup>.



<sup>a</sup>The blue "+" symbol represents the medians of the simulated outcomes. The smallest box contains 50 percent of the outcomes, the second 95 percent, and the largest 99 percent.

# PROFESSIONALS

[WELCOME PROFESSIONALS](#)

[TIPPC](#)

[STATE CONFERENCE](#)

[ABSTRACT DATABASE](#)

[CONTROL & MANAGEMENT](#)

**[INVASIVE PLANT INVENTORY](#)**

[CWMAS & CISMAS](#)



## PROFESSIONALS

In this section we provide information for stakeholders who have a professional interest in invasive species in Texas. It contains information about the Texas Invasive Plant & Pest council (TIPPC), the statewide Invasive Species Conference, abstracts from past conferences and Species Assessments.

### WHO ARE THE PROFESSIONALS?

Land management specialists from local, state, and federal agencies, including municipal, regional, state and federal parks.

Environmental organizations such as The Nature Conservancy, Native Plant Society, Audubon, Land Conservancies, Land Trusts, etc.

**SUPPORT TIPPC**

Donate to support the Texas  
Invasive Plant & Pest Council

[Donate](#)





[Plant Health](#) / [Pests and Diseases](#) / [Programs](#) / [Weeds](#) / [Noxious Weeds Program](#)

<b>Our Focus</b>
<a href="#">Program Overview</a>
<a href="#">Pests and Diseases</a>
<a href="#">Import into the U.S.</a>
<a href="#">Export from the U.S.</a>
<a href="#">International</a>
<a href="#">Manuals</a>

# Noxious Weeds Program Risk Assessments

Last Modified: Dec 9, 2016



PPQ conducts weed risk assessments (WRA) as part of its process for safeguarding U.S. agriculture and natural resources from weeds and invasive plants. A weed risk assessment is a science-based evaluation of the potential of a plant species to establish, spread, and cause harm in the United States. PPQ may initiate an assessment for any number of reasons, including: evaluation of commodity import requests, detection of a new weed in the United States, and petitions for listing from stakeholders.

Below is a list of the available WRAs that PPQ has conducted. They are provided for interested stakeholders and may be useful in setting local policies or for informing resource managers. While most of the risk assessments were prepared by PPQ using our current weed risk assessment process [see Guidelines document below], others

## PROMOTING NONINVASIVE PLANTS FOR CALIFORNIA



- About Us
- Invasive Plants & Alternatives
- PlantRight's Projects
- How to Help
- Resources

Email:

Password: \*

Log in

[Create new account](#)

[Request new password](#)



### Invasives Where You Live



**Which plants**  
are invasive in  
your area of  
California? [Find  
out here](#)

### Retail Nursery Partners

California Retail Nurseries:

**Join us today!**



Or, [find a PlantRight Partner](#) near you

### Invasives 101

Get the facts on invasive plants  
**Continuing Education**

[Impacts](#) | [Research](#) | [Spread the word](#)



# Invasive Plant Atlas

of the United States



[Home](#) | [About](#)

Google™ Custom Search

- [Home](#)
- [Aquatics](#)
- [Grasses](#)
- [Herbs/Forbs](#)
- [Shrubs/Subshrubs](#)
- [Trees](#)
- [Vines](#)
- [All Species](#)
- [Images](#)
- [Parks](#)
- [Sources](#)



Invasive Plant Atlas Logo

Contribute Plant  
 Distribution Data to  
**EDDMapS**  
 Early Detection & Distribution Mapping System

Contribute Pictures  
 of Invasive Plants to  
**BUGWOOD**  
 Image Database System

Non-native invasive species are organisms that have been introduced by humans either purposely or by accident and that have become serious environmental pests. One reason for their success as pests is that they are typically introduced without the array of associated natural controls (herbivores, parasites, pathogens, predators) that occur in their native range. In addition to the great loss of biodiversity, habitat degradation and other ecological consequences, invasive species cause huge economic damages valued in billions of dollars annually and some pose a human health threat.

Invasive alien plants threaten native species and habitats by competing for critical and often limited resources like sunlight, water, nutrients, soil and space. They succeed through vigorous growth, prolific reproductive capabilities and by causing changes that favor their growth and spread. Invasive plant species displace and alter native plant communities, impede forest regeneration and natural succession, change soil chemistry, alter hydrologic conditions, alter fire regimes, cause genetic changes in native plant relatives through hybridization and some serve as agents for the transmission of harmful plant pathogens.

The Invasive Plant Atlas of the United States is a collaborative project between the National Park Service, the University of Georgia Center for Invasive Species and Ecosystem Health, the Invasive Plant Atlas of New England and the Lady Bird Johnson Wildflower Center. The purpose of the Atlas is to assist users with identification, early detection, prevention, and management of invasive plants. The focus is on non-native invasive plant species impacting natural areas, excluding agricultural and other heavily developed and managed lands. Four main components are species information, images, distribution maps, and early detection reporting procedures. The Invasive Plant Atlas is one step in the effort to combat invasive species, preserve our natural landscapes and the native plants, animals, and other creatures that inhabit them.

## Invasive Species News

The People Have Spoken: Using Forest and Firewood National Polling Data to Promote Forest Health

APHIS Adds Forty-four Counties in Georgia to the Emerald Ash Borer Regulated Area

Spread by trade and climate, bugs butcher America's forests

Executive Order -- Safeguarding the Nation from the Impacts of Invasive Species

Invasive Insects Cost the World How Much?!

Thoughts from the International Congress of Entomology 2016

No-Till Agriculture Results in Greater Soil Microbe Biomass

Pollinators Threatened by Invasive Plants

Whole Foods is selling invasive lionfish in Florida

The usefulness, value and utility of BugwoodImages is demonstrated in the April 2016 Issue of "IPM Insights", the Newsletter of the Northeastern (USA) IPM Center

[More News](#)



# Texas Parks and Wildlife Prohibited Aquatic & Exotic Species

## TITLE 31. NATURAL RESOURCES AND CONSERVATION. Part 2. TEXAS PARKS AND WILDLIFE DEPARTMENT. Chapter 57. FISHERIES. SUBCHAPTER A. HARMFUL OR POTENTIALLY HARMFUL FISH, SHELLFISH, AND AQUATIC PLANTS

§57.111. Definitions.

*N= 19 species*

### *Botanical Name - Common Name*

*Alternanthera philoxeroides* - **alligatorweed**

*Limnophila sessiflora* - **ambulia**

*Schinus terebinthifolius* - **Brazilian peppertree**

*Ottelia alismoides* - **duck-lettuce**

*Landolita punctata* - **giant or dotted duckweed**

*Myriophyllum spicatum* - **Eurasian watermilfoil**

*Sparganium erectum* - **exotic bur-reed**

*Monochoria vaginalis* - **heartshaped false pickerelweed**

*Hydrilla verticillata* - **hydrilla**

*Lagarosiphon major* - **lagarosiphon**

*Monochoria hastata* - **narrowleaf false pickerelweed**

*Melaleuca quinquenervia* - **paperbark**

*Lythrum salicaria* - **purple loosestrife**

### *Botanical Name - Common Name*

*Salvinia* sp. - **salvinia**

*Panicum repens* - **torpedograss**

*Eichhornia crassipes* and *azurea* - **floating and rooted**

**Waterhyacinths**

*Pistia stratiotes* - **waterlettuce**

*Ipomoea aquatica* - **water spinach**

*Solanum tampicense* - **wetland nightshade**

# Texas Department of Agriculture Plant List

## TITLE 4.AGRICULTURE. Part 1. TEXAS DEPARTMENT OF AGRICULTURE. Chapter 19. QUARANTINES AND NOXIOUS PLANTS

§19.300.Noxious Plant List.

*N= 35 species*

*Botanical Name - Common Name*

*Alternanthera philoxeroides* - **alligatorweed**

*Cardiospermum halicacabum* - balloonvine

*Schinus terebinthifolius* - **Brazilian peppertree**

*Orobanche ramosa* - broomrape

*Alhagi camelorum* - camelthorn

*Triadica sebiferum* - Chinese tallow tree

*Cyperus entrerianus* - deeprooted sedge

*Carthamus lanatus* - distaff thistle

*Myriophyllum spicatum* - **Eurasian watermilfoil**

*Spirodela oligorrhiza* - **giant duckweed**

*Arundo donax* - giant reed

*Calystegia sepium* - hedge bindweed

*Hydrilla verticillata* - **hydrilla**

*Botanical Name - Common Name*

*Rottboellia cochinchinensis* - itchgrass

*Cuscuta japonica* - Japanese dodder

*Pueraria montana* var. *lobata* - kudzu

*Lagarosiphon major* - **lagarosiphon**

*Melaleuca quinquenervia* - **paperbark**

*Lythrum salicaria* - **purple loosestrife**

*Eichhornia azurea* - **rooted waterhyacinth**

*Tamarix* spp. - salt cedar

*Salvinia* spp. - **salvinia**

*Nassella trichotoma* - serrated tussock

*Panicum repens* - **torpedograss**

*Solanum viarum* - tropical soda apple

*Ipomoea aquatica* - **water spinach**

*Cryptocoryne beckettii* - water trumpet

*Eichhornia crassipes* - **waterhyacinth**

*Pistia stratiotes* - **waterlettuce**

**CHINABERRY** - *Melia azedarach*

**JAPANESE CLIMBING FERN** - *Lygodium japonicum*

# City of Austin Top 25 Invasive Plant Species

- **Herbaceous**
  - **Giant reed**
  - King Ranch Bluestem
  - Malta star-thistle
  - Bermudagrass
  - Japanese netvein hollyfern
  - Golden bamboo
  - Bastard cabbage
  - Johnsongrass
- **Vines**
  - Japanese honeysuckle
  - Catclawvine
  - **Kudzu**
- **Woody**
  - Tree of heaven
  - Paper mulberry
  - Chinese parasoltree
  - Glossy privet
  - **Chinaberry tree**
  - Heavenly (sacred) bamboo
  - Chinese pistache
  - Scarlet firethorn
  - **Salt cedar**
  - **Chinese tallow tree**
- **Aquatic**
  - Elephant ears
  - **Common water hyacinth\***
  - **Hydrilla\***

# Texasinvasives.org

## Invasives Database

- Illustrated Descriptions
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- **Native Alternatives**
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# Texasinvasives.org

ABOUT | WIRE | SPOTLIGHT | CONTACT | ESPAÑOL

**TEXASINVASIVES.ORG** HELLO INVASIVE SPECIES. GOODBYE TEXAS.

INVASIVES 101 TAKE ACTION CITIZEN SCIENTISTS PROFESSIONALS RESOURCES

**INVASIVES DATABASE** GO

## INVASIVES DATABASE

- INVASIVES DATABASE
- INVASIVE PLANTS
- INVASIVE ANIMALS
- INVASIVE INSECTS
- INVASIVE PATHOGENS
- INVADERS OBSERVATIONS
- MAP INVASIVES
- COUNTY COMPARISONS

**KEEP INFORMED**  
 Sign up for the iWire to get breaking, events and the species spotlight.

**NANDINA DOMESTICA**  
**HEAVENLY BAMBOO**  
 Synonym(s):  
 Family: Berberidaceae (Barberry Family)  
 Duration and Habit: Perennial Strub

[Go Back](#) | [Printer Friendly Fact Sheet](#)

- Federal Noxious Weed
- TDA Noxious Weed
- TPWD Prohibited Exotic Species
- Invasive Plant Atlas of the US


NOTE: ● means species is on that list.



Photographer: Forest & Kim Starr  
 Source: USGS

**DESCRIPTION**  
 Evergreen erect shrub in the barberry family (Berberidaceae) that grows to a height of 6-10 feet and width of 3 to 5 feet (Other cultivars including dwarf nandina are shorter in height). The plant has multiple bushy cane-like stems that resemble bamboo. The alternate leaves are bi-pinnately compound dividing into many 1 to 2-inch, pointed, oval leaflets. Young foliage is often pinkish, and then turns to soft light green. The foliage can be tinged red in winter. Early summer terminal clusters of tiny white-to-pink flowers. Each flower is 1/4 to 1/2 inch across, appearing in loose, erect, 6 to 12 inch clusters at the end of the branches. If plants are grouped, shiny red spherical berries, 1/3 inch in diameter, follow the flowers in fall and winter. Single plants seldom fruit heavily.

**Ecological Threat:** Nandina has naturalized and invaded habitats. It colonizes by spreading underground root sprouts and by animal-dispersed seeds. It can persist as a seedling for several years before maturing. It can displace native species and disrupt plant communities. Berries are can be toxic to cats and some grazing animals.



**RESEMBLES/ALTERNATIVES**

- [Leucophyllum frutescens](#) (Texas barometer bush)
- [Malpighia glabra](#) (wild crapemyrtle)
- [Salvia greggii](#) (autumn sage)
- [Plumbago scandens](#) (doctorbush)

**MANAGEMENT**

**Manual-** It is difficult to remove manually because even the smallest piece of root will re-sprout.

**Chemical-** It can be effectively controlled using any of several readily available general use herbicides such as glyphosate or triclopyr. For tall plants, cut stems then apply herbicide. Collect and destroy fruit. Repeat applications may be necessary to reduce densities. Follow label and state requirements. Managers should evaluate the specific circumstances of each infestation, seek professional advice and guidance if necessary, and use the herbicide in a manner that is consistent with the product label and

# Emerald Ash Borer

*Agrilus planipennis*

Order: Coleoptera (Beetle)

Family: Buprestidae (Metallic wood boring beetle)



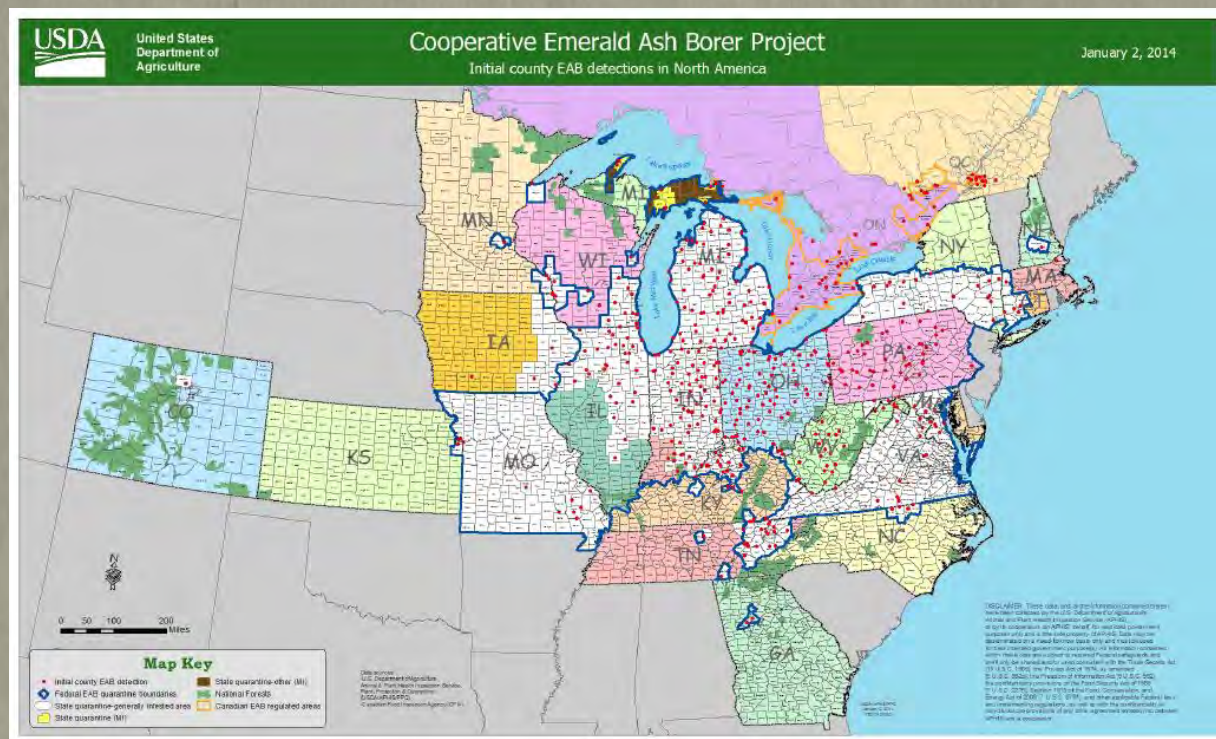
# Emerald Ash Borer

## Introduction and Distribution

**Native Range:** Eastern Russia, Northern China, Japan and Korea

**Primary Transmission:** Wood material shipping, firewood, infested nursery stock

**First Detection:** Michigan 2002



# Emerald Ash Borer

## Biology: Host Trees

- Attacks Ash trees (*Fraxinus* sp.)
  - 17 species of ash in North America
  - 9 ash species in Texas
    - Green Ash
    - Texas Ash
    - White Ash





# Emerald Ash Borer

## Damages

- Urban forests
  - 1/3 of urban trees nationally are susceptible
  - Compensatory value \$669 billion.
- Agricultural
  - Timber industry
  - Maple syrup
  - Nursery production
- Recreational tourism



# Emerald Ash Borer

## Biology: Life Cycle

Biology: Life Cycle

Egg



Larva



Adult



Pupa



# Emerald Ash Borer

## Biology: Life Cycle

### Larvae:

- Creamy-white
- Flattened, 10 bell-shaped segments
- Small appendages at end of body



# Emerald Ash Borer

## Biology: Life Cycle

### Adult:

- Bright, metallic green
- ½" long, flattened back
- Surface of abdomen, coppery-red



UGA1241011



UGA2159016

# Emerald Ash Borer

## Signs and Symptoms

- **Canopy die-back**
- D-shaped exit holes
- Epicormic shoots (sprouts from roots and trunk with abnormally large leaves)
- Vertically split bark over s-shaped feeding galleries
- Increased woodpecker activities



# Emerald Ash Borer

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UGA1439002

# Emerald Ash Borer

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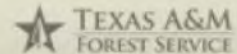
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HELLO INVASIVE SPECIES.  
GOODBYE TEXAS.

# Take Action!

## *The Sentinel Pest Network*

PARTNERS



# Sentinel Pest Network

## Training Citizen Scientists to Detect & Report Invasive Pests

- Trains citizens to identify and report pests that threaten the natural biodiversity of the state.
- *Participants will:*
  - *Learn to identify species*
  - *Work with state and local partners to report observations*
  - *Educate and engage citizen scientists in early detection and monitoring*
  - *Participate in outreach campaigns to disseminate information to the public*

**YOU!!!**



# Sentinel Pest Network: Background

Serves as a **sentinel network**

- increase the probability of early detection of pests of high regulatory significance

**What are “pests of high regulatory significance”?**

- From the APHIS PPQ (Plant Protection and Quarantine):
  - plant pests that can create an economic impact on the nation’s natural resources and agriculture

# The “Dirty Dozen” Pest List



COMMON NAME	SCIENTIFIC NAME
Asian Longhorned Beetle	<i>Anoplophora glabripennis</i>
Brown Fir Longhorned Beetle	<i>Callidiellum villosulum</i>
Cactus Moth	<i>Cactoblastis cactorum</i>
Emerald Ash Borer	<i>Agrilus planipennis</i>
Gypsy Moth	<i>Lymantria dispar</i>
Sirex Woodwasp	<i>Sirex noctilio</i>
Cogongrass	<i>Imperata cylindrica</i>
Giant Hogweed	<i>Heracleum mantegazzianum</i>
Onionweed	<i>Asphodelus fistulosus</i>
Tropical Soda Apple	<i>Solanum viarum</i>
Tropical Spiderwort	<i>Commelina benghalensis</i>
Giant African Land Snail	<i>Lissachatina fulica</i>

# Report It!

## Early Detection and Rapid Response (EDRR)

### Report online on [Texasinvasives.org](http://Texasinvasives.org)

#### REPORT IT

We need your help to stop the spread of invasive species! Please report any new sightings of the following key invasive species. If possible, take a picture of the plant or pest and record its GPS location.



#### GIANT AFRICAN LAND SNAIL

*Lissachatina fulica*

A large terrestrial snail that can reach up to 8 inches in length and nearly 5 inches in diameter. The brownish shell covers at least half the length of the snail. Damages native plants and crops. Scientists consider the giant African snail to be one...

REPORT IT



#### ZEBRA MUSSELS

*Dreissena polymorpha*

The zebra mussel is a highly invasive, small freshwater mussel that multiplies rapidly and can cause serious environmental and economic damage. Their larvae are microscopic, and the adults are usually less than 1 1/2 inches long. Zebra mussels are...

REPORT IT

**DOES NOT REQUIRE LOGIN!**

#### REPORT FORM

If you have spotted *Lissachatina fulica* (Giant African Land Snail), use this report form to send an email to the appropriate authorities. All fields marked with an asterisk (\*) are required.

Your Name\*

Email\*

Location of Observation

Enter Latitude and Longitude and navigate to the point where you observed the species. Latitude and Longitude

City, State, Zip, Location, Lat

Did You Collect a Specimen?

Yes or No.

Host Plant

Comments: Describe the sighting.

Image Upload\*

Please upload a photo of the specimen or the site where the specimen was seen. Image file must be a .jpg, .gif or .png format.

Choose File no file selected

Does **not** require an Invaders of Texas Citizen Scientist login account!

# Texas Invaders phone app

## Reporting a Species for the Sentinel Pest Network



**DOES NOT REQUIRE LOGIN!**

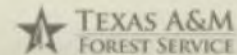
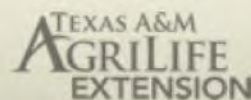
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# Take Action!

## *The Invaders of Texas Citizen Scientist Program*

PARTNERS



# Invaders of Texas Program

*The more trained eyes watching for invasive species,  
the better our chances of lessening or avoiding damage  
to our native landscape.*



# Invaders of Texas

## Detect and Report Invasive Species

- Innovative campaign whereby volunteer "citizen scientists" are trained to detect and report invasive species in their communities
- 11-years
- Texas-wide
- Data collected systematically and reported nationally.
- Data available to the public, and to local, state, and federal resource managers to facilitate their management efforts.

**YOU!**



# Invaders of Texas Data Data Collection

**INVADERS DATASHEET**

Observation ID: \_\_\_\_\_ (leave blank until assigned by system during data entry)

Satellite: \_\_\_\_\_ (your satellite)

Collector: \_\_\_\_\_ (your name)

Species Name or Code: \_\_\_\_\_ (e.g. AIAL or *Alarthus altissima*)

Date: \_\_\_\_\_ (use the format yyyy/mm/dd)

Time Spent\* (circle one): 5 15 30 45 60 90 120 180 240 360

\*Total time spent on an observation in minutes. If first or last observation for day, include time needed to travel to or from site.

**GPS Coordinates (in decimal degrees)**

Latitude: \_\_\_\_\_ (e.g. 32.74452, positive indicates Northern hemisphere)

Longitude: \_\_\_\_\_ (e.g. -097.67281, negative indicates Western longitude)

**Disturbance (circle one):**  
Fire Flood Graded Cleared Brush Grazed Cropland Roadside Other None

<b>Patch Type (check one):</b> <input type="checkbox"/> Point (one or few plants) <input type="checkbox"/> Linear (plants extending along a line) <input type="checkbox"/> Polygon (of non-linear shape)	<b>Abundance (check one):</b> <input type="checkbox"/> Rare (hard to find, other plants more common) <input type="checkbox"/> Common (one of the common plants in area)
---	---

**Notes:** Include a description of the location plus any other notes.

**Images -** For verification purposes, take several close up digital images of the species and record the file names of the images below so you can refer to them during image upload.

Species Image (Close up View)	

**Consent:** I (We), the undersigned, give consent to volunteers from the Invaders of Texas Citizen Science program to conduct surveys of invasive species on property that we own or manage and to use site specific information in the preparation of reports including sharing data and publication of survey results on the www.texasinvasives.org website.

Landowner or Authorized Agent: \_\_\_\_\_ Date: \_\_\_\_\_

Texas Invasives

texasinvasives.org/observations/insert.php

Wildflower Center NPIN Maintenance Outlook Web Access UT Direct Texas Invasives PlantWise Oak Wilt craigslist

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ABOUT US | HWRE | SPOTLIGHT | CONTACT

INVADERS 101 TAKE ACTION CITIZEN SCIENTISTS PROFESSIONALS RESOURCES

**INVADERS DATABASE**  
GO

## CITIZEN SCIENTISTS

WELCOME CITIZEN SCIENTISTS  
BECOME A CITIZEN SCIENTIST  
TOOLKIT  
SATELLITES  
WORKSHOPS  
ONLINE TRAINING  
REPORTS & REPORT

### Invaders of Texas

STEP 1: UPLOAD IMAGE

Click the Choose File button to select the image file you wish to upload. Once species observation is complete, you will be able to upload the file name.

Choose... Upload

**STEP 2: OBSERVATION INFORMATION**

Fill out the form below. All your data collections should be as a guide. When you are satisfied with your data enter the "Insert Observation" button.

**ADD OBSERVATION DATA**

Species:

Collection Date: 2010-03-24 eg. 2005-12-28

Collection Time: 5 min

GPS Coordinates: Please enter GPS coordinates as Lat, Long decimal degrees. Contact Us if you need help setting your GPS receiver. If you don't have a GPS receiver, you can find your coordinates on a Google Map by using the Choose Location feature. The Negative indicates Western longitude.

Choose Location

Latitude: \_\_\_\_\_ in decimal degrees (e.g. 32.74452)

Longitude: \_\_\_\_\_ in decimal degrees (e.g. -97.67281)

Disturbance:

Patch Type:

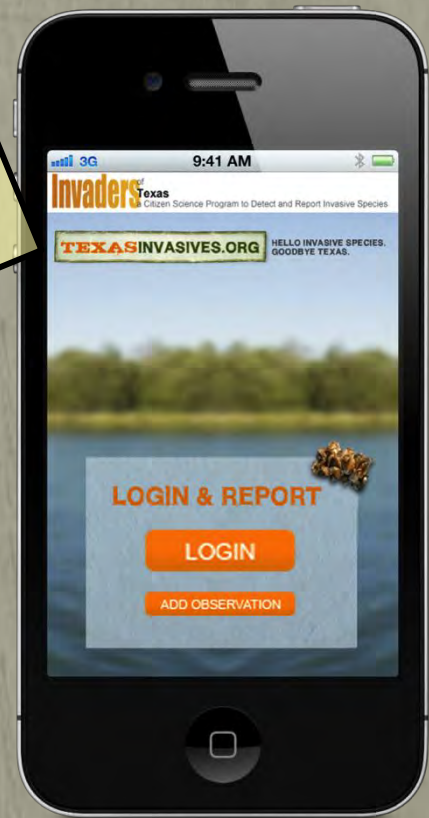
Abundance:

Notes: Please include location details so that we may verify your GPS coordinates plus any other information about the species observation that is relevant.

Insert Observation or Reset Form

PRINT

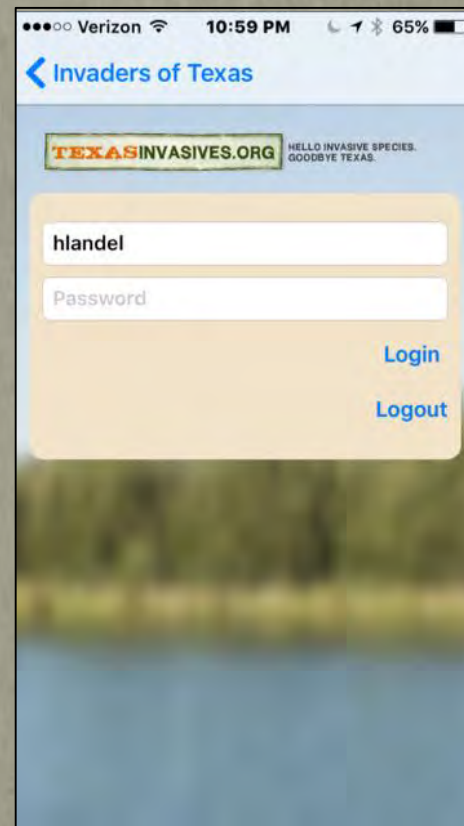
REQUIRES LOGIN!



# “Texas Invaders” phone app

Submitting observations

**REQUIRES LOGIN!**



# Invaders of Texas Data

## Contribution – Data Mapping

Interactive and searchable by Species or Satellite and linked to individual records.

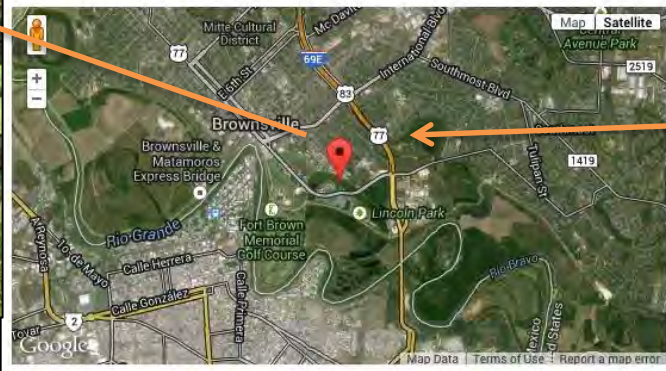


### SPECIES OBSERVATION #13431

#### *Arundo donax* - Giant reed

SPECIES DATA	COLLECTION DATA	VALIDATION
USDA Code: ARD04 Patch Type: Polygon Abundance: Common Disturbance: Other	Collector: Michael Murphrey Satellite: Pineywoods Invaders Date: 2011-01-29 Time: 5.0 minutes Location Error:	Validated: Yes Date: 2011-02-09 By: Travis Gallo

**Collection Notes:** Scattered Patches all the way around the Lake Brown Resaca/Lake. East of University Blvd. on the Uni. of Texas-Brownsville Campus. Mainly south of the Education and Business Departments.



**MAP INVASIVES**

Map Satellites BECOME A CITIZEN SCIENTIST

Arundo donax - 826

**826 Observations Found**

View site record #13431

Michael Murphrey  
Pineywoods Invaders  
2011-01-29  
Species: *Arundo donax*  
Validated: Yes

Map data ©2014 Google, INEGI | Terms of Use

# Public Awareness Campaigns

The **iWire** monthly email newsletter

- Important updates
- Invasive species spotlights
- News from TX and beyond
- Citizen Scientist of the Month (person, group or project)
- Workshop Schedules

## Citizen Scientists of the Month Friends of West Bouldin Creek Greenbelt

The December Citizen Scientists of the Month are the Friends of West Bouldin Creek Greenbelt and the West Bouldin Creek Neighborhood Association in Austin. The partnership was nominated by restoration team members, who remove invasive species in the West Bouldin Creek Greenbelt.



## New Rules to Prevent Zebra Mussel Spread in Texas

In the state's ongoing effort to combat the spread of invasive zebra mussels, the Texas Parks and Wildlife Department has created new rules to halt the spread of the species. Effective December 10th, all boats operating on public water in 17 Northeast Texas counties must be drained after use or face legal consequences. [Read More.](#)

The Texas Parks and Wildlife Commission is inviting public comments on a proposal to add 30 additional counties to the recently-implemented rules preventing zebra mussel spread. [Read More.](#)

Comments on potential additions can be made in writing to Ken Kurzawski, TPWD Inland Fisheries, 4200 Smith School Road, Austin, TX 78744, by emailing [ken.kurzawski@tpwd.texas.gov](mailto:ken.kurzawski@tpwd.texas.gov), or in person at any of the two following public hearings.

- Tuesday, January 7 in Austin at TPWD Headquarters, Commissioners Meeting Room - 4200 Smith School Road.
- Thursday, January 9 in Waco at the McLennan County Courthouse, Commissioners Courtroom - 1st Floor, 501 Washington Ave.

Visit [www.texasinvasive.org/zebramussels](http://www.texasinvasive.org/zebramussels) for detailed information on zebra mussel prevention.



1 IN



### CLEAN

Clean your boat vessel with good practices to remove all debris, mud and vegetation.

### DRAIN

Empty all water from bilge and live wells. Dry your boat, trailer and equipment.

### DRY

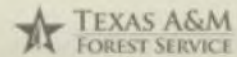
Do not store your boat in areas that are not well ventilated. If possible, store your boat in a well-ventilated area.

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# Summary

PARTNERS



# Invasive Species in Texas

## Summary

**Invasive Species** are a **Cause for Concern** because:

- Introduced species cause economic, environmental, or human health damages
- Spreading widely and quickly

**Many Invasive Plants Originated from Horticulture**

- Several are still being sold

**Control the spread:**

- Plant with native species
- Know your species

**Keep an eye out for important pests**

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GOODBYE TEXAS.

# Thank you!

**Hans Landel, Ph.D.**  
Invasive Species Coordinator  
Lady Bird Johnson Wildflower Center  
(512) 232-0107  
hlandel@wildflower.org

PARTNERS

