



# Aquatic Invasive Species Management and Control in Texas

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# Zebra Mussels in Texas



# Historical Perspective

- Zebra Mussels are native to the Black and Caspian Sea drainages
- First discovered in North America in 1988 in Lake St. Clair
- Introduced in ballast water of ocean-going ships from the Black Sea
- Zebra mussels have spread through the eastern and central U.S. and as far west as California

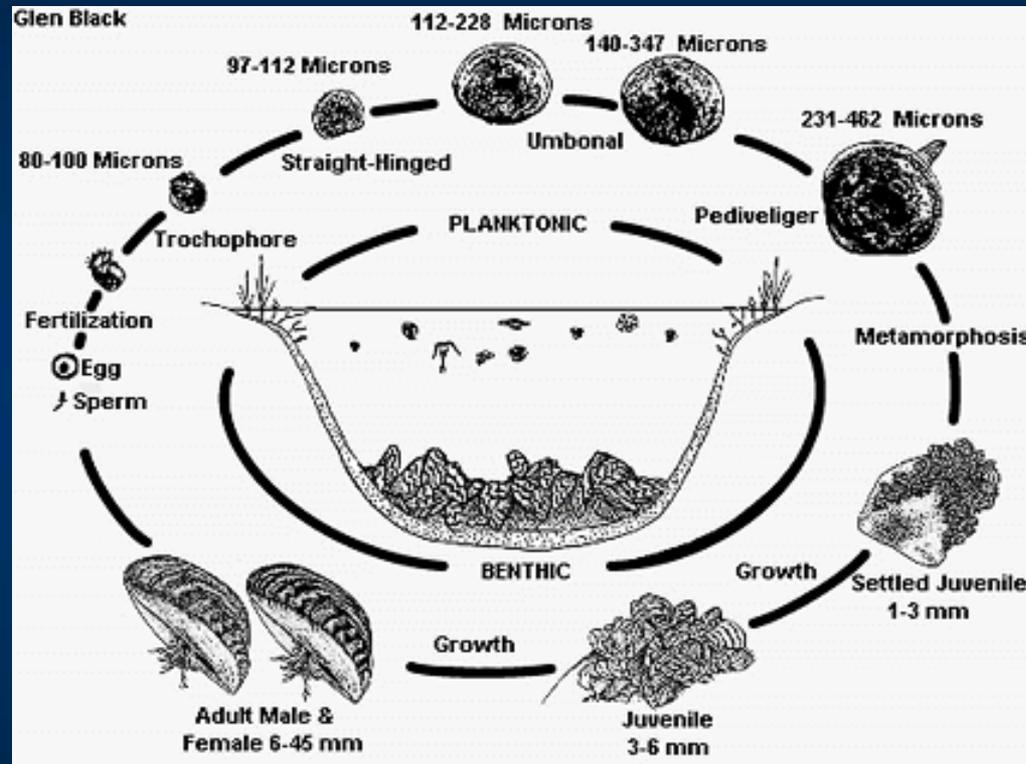
# Byssal Threads



**A one inch mussel may have up to 600 byssal threads holding it in place.**

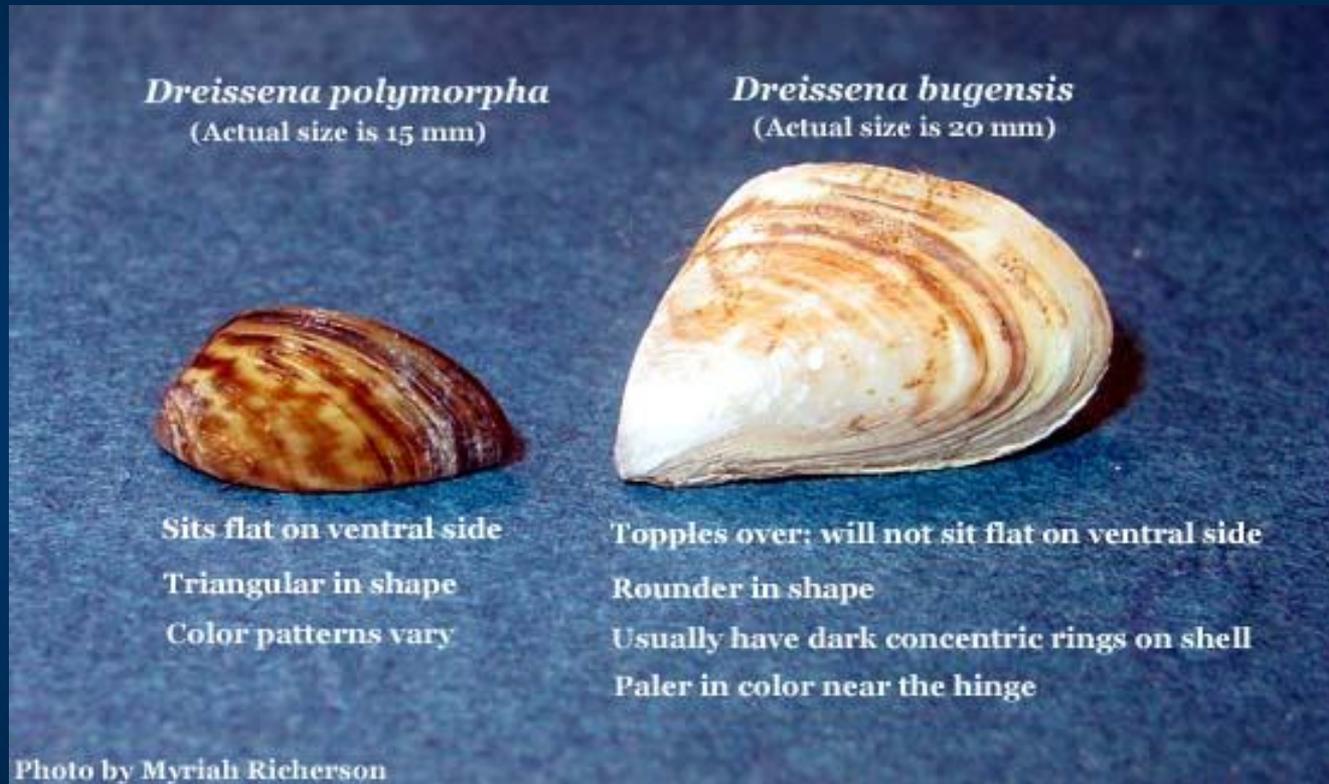
From UACOE website

# Life Cycle



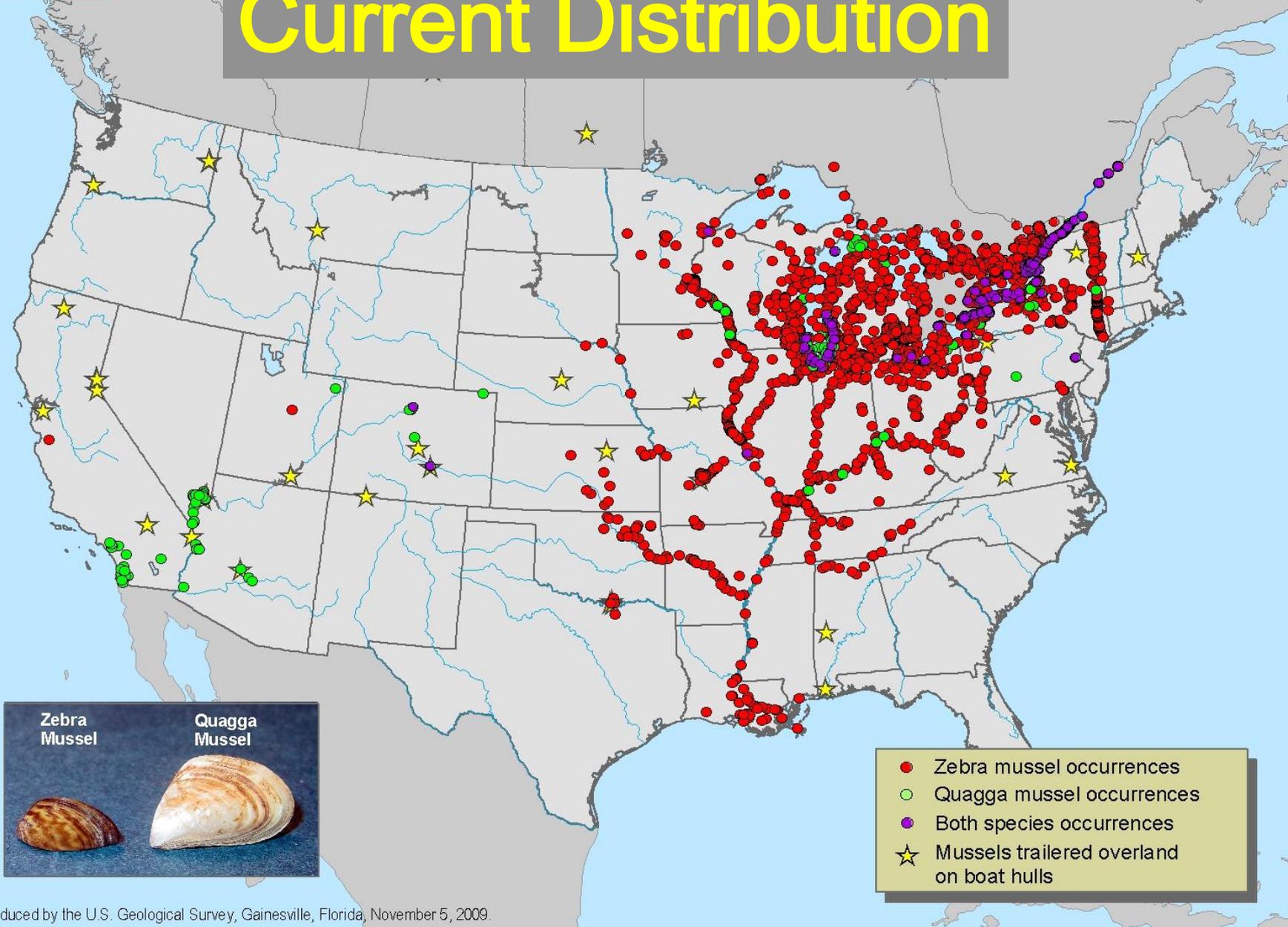
From UACOE website

# Quagga versus Zebra



From USGS website

# Current Distribution



# Ecological Impacts

- Increased water clarity
- Decreased productivity
- Changes in fish community
- Increased vegetation
- Biomagnification of pollutants
- Native mussels



# Recreational Impacts

- Boats and motors
  - Foul hulls; Plug water systems
- Colonize hard structures (docks, piers, buoys, bridges, etc.) and beaches



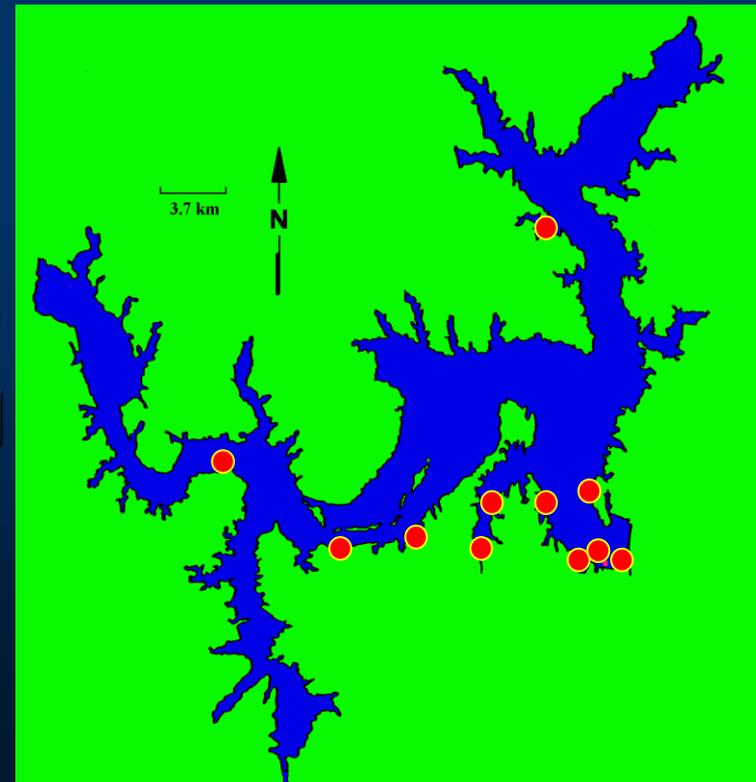
# Economic Impacts

- Cleaning of clogged intake structures and pipelines
- Increased pumping expenses
- Increased maintenance and repairs



# Lake Texoma

- First documented case in 2006 on a boat from Minnesota
- Four additional boats from out-of-state have been intercepted and sanitized
- In April 2009, first live specimen found in TX waters
- Range and density continued to increase (red dots)



# Lake Texoma



# Lake Lavon

- In July, zebra mussels were found near the North Texas Municipal Water District (NTMWD) intake structure on Lake Texoma
- In August, staff found three specimens downstream of the NTMWD outfall area on West Prong Sister Grove Creek
- Subsequent surveys in 2009 found no additional mussels
- Surveys in 2010 have found additional mussels in Sister Grove Creek

# Possible range in the Trinity River Basin

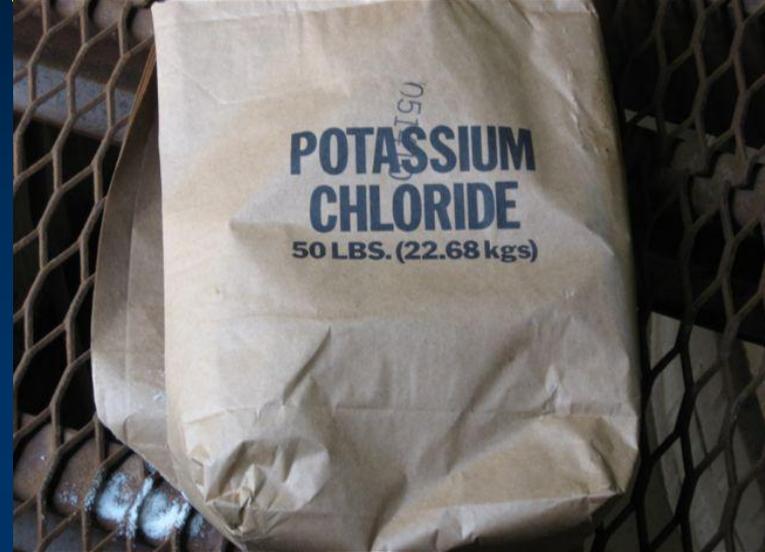


# TPWD Response

- Treat Sister Grove Creek (KCl or Chelated Copper)
- Monitoring in lakes Texoma, Lavon, Ray Hubbard, Granbury, Whitney and Waco
- Staff watch for zebra mussels any time they visit a water body
- Developing a Prevention and Response Plan
- Interbasin water transfers



# TPWD Response



# TPWD Response



# **Other Invasive Animals**

# Apple snail

## *Pomacea insularum*



# Suckermouth Catfish

- **Family: Loricariidae**
- **Origin: South America**
- **Affected TX water bodies/regions: Central and south TX**
- **Ecosystem impacts: Dietary overlap; Shore line degradation; Increased turbidity**

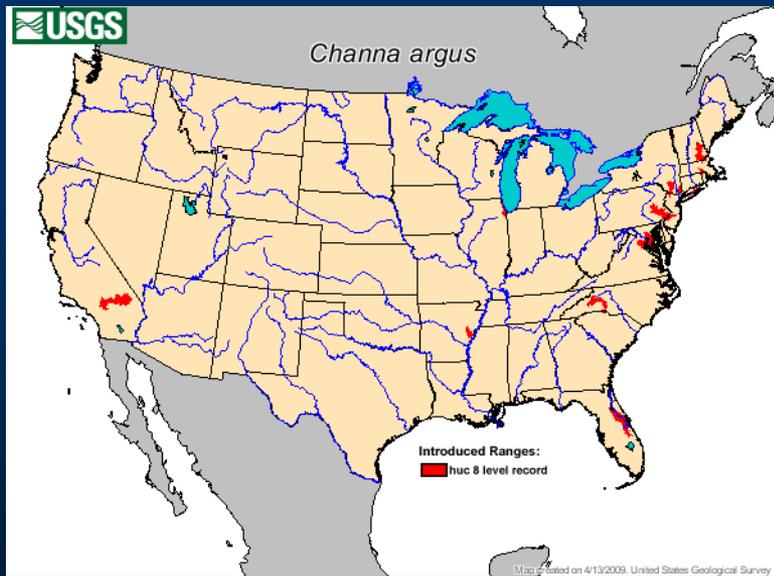
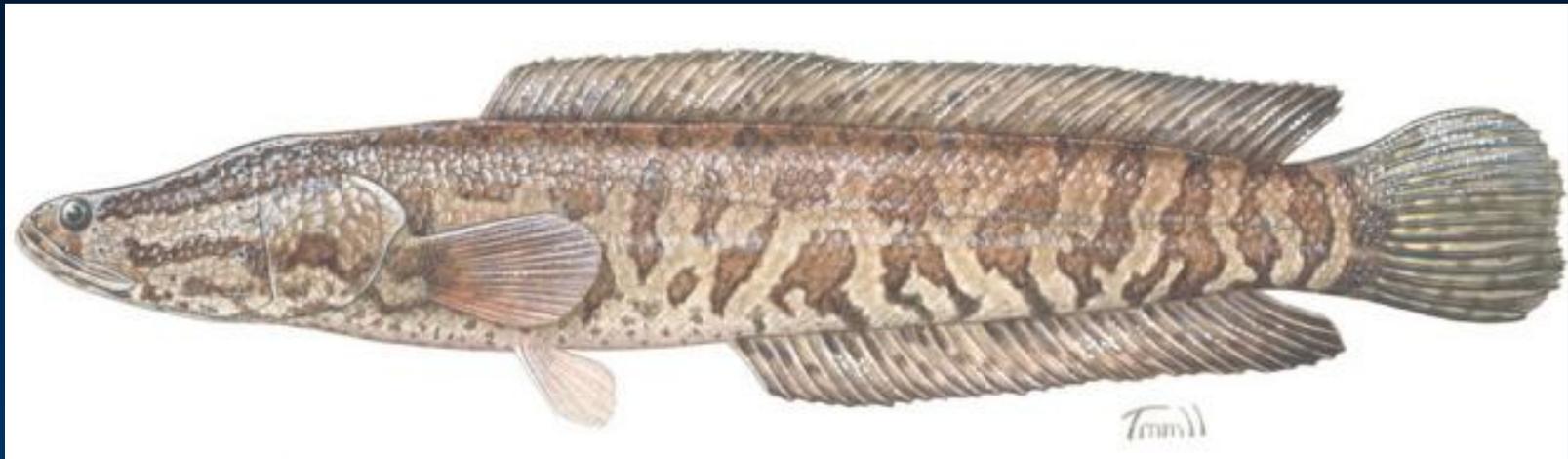


# Northern snakehead

## *Channa argus*

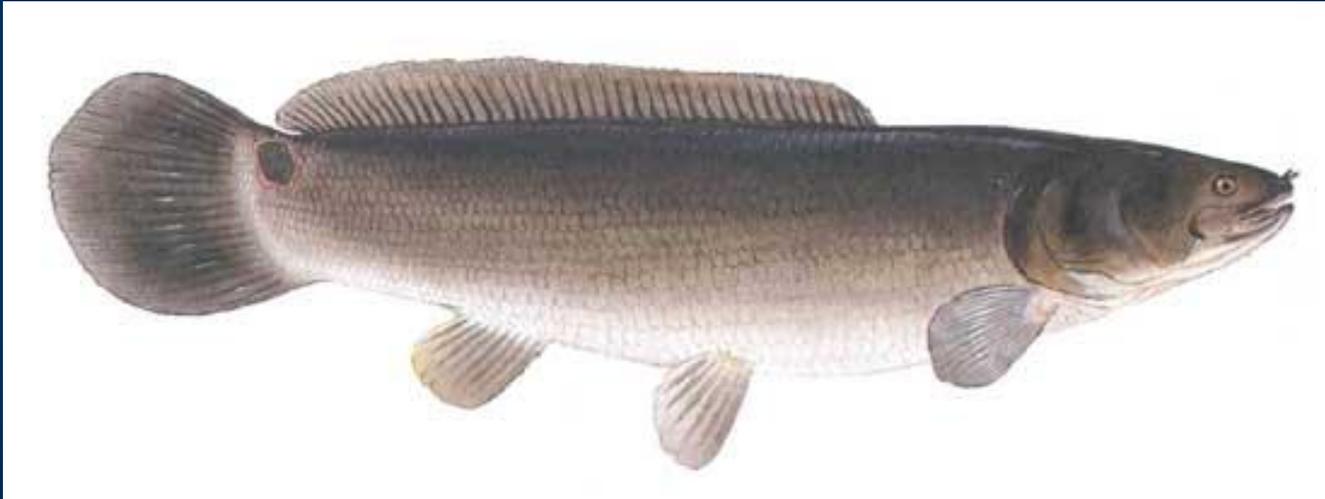
photo by Joe Perillo





# Bowfin

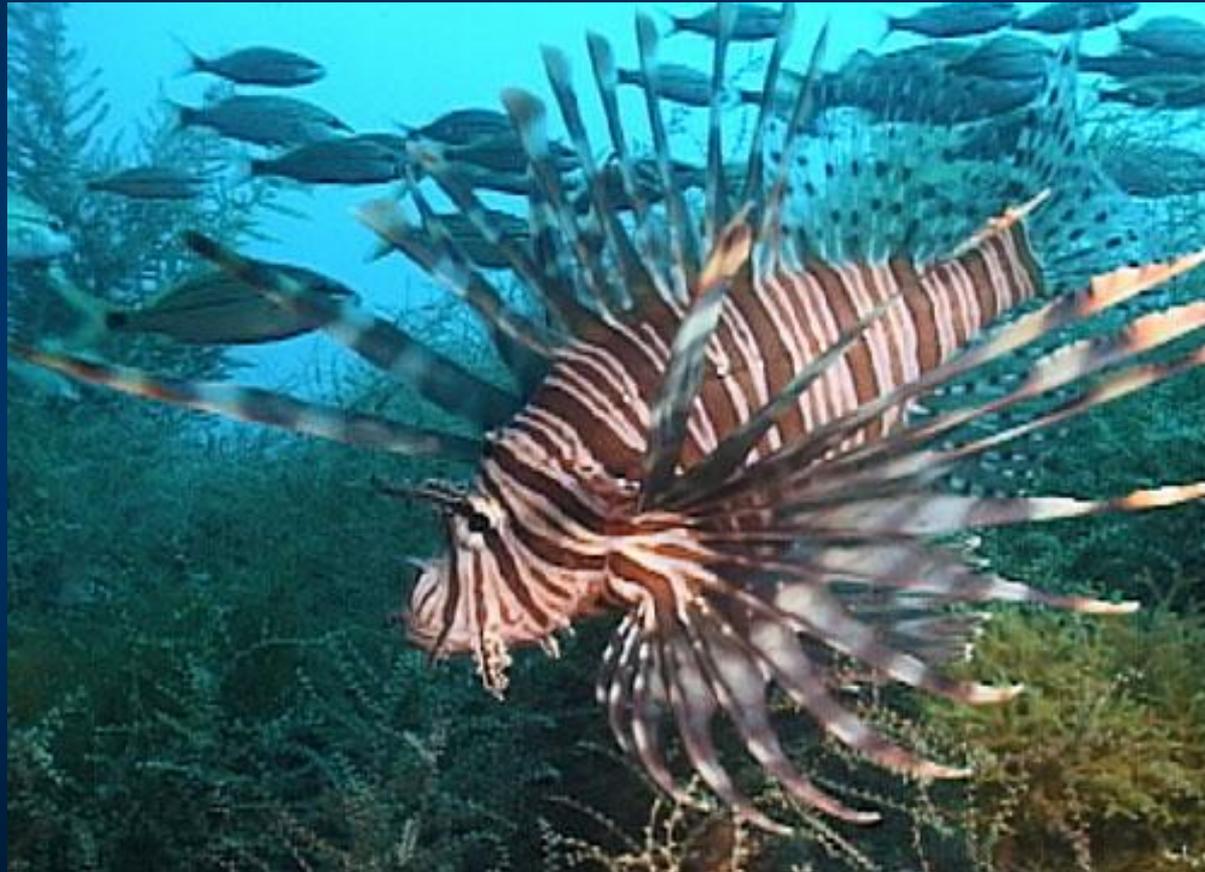
## *Amia calva*



Often mistaken for snakeheads

# Lionfish

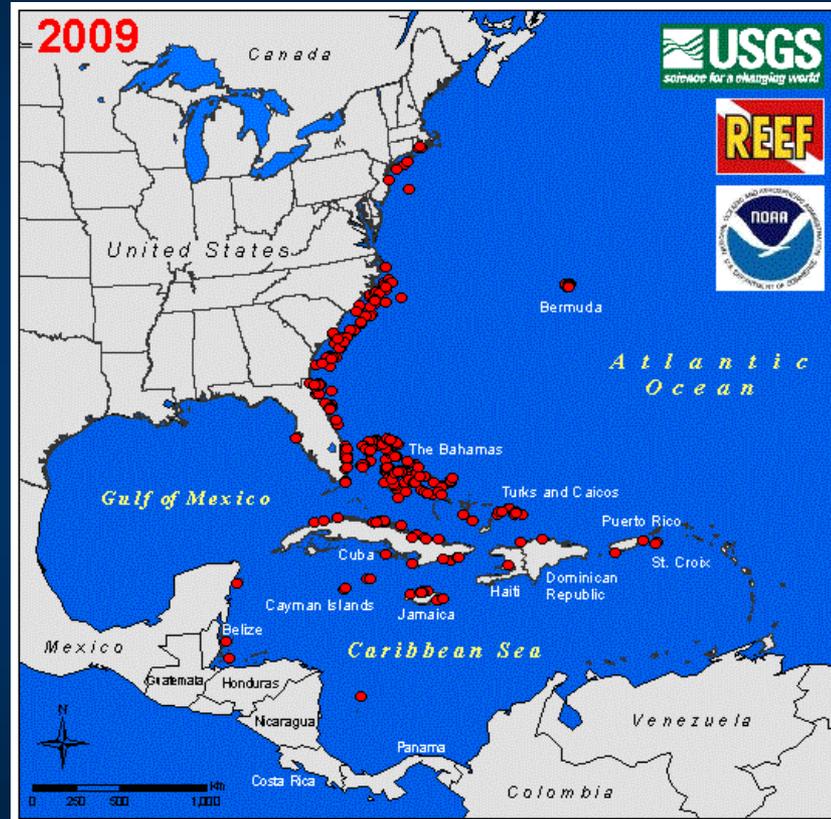
*Pterois volitans*



# Lionfish expansion



# Lionfish expansion



# Invasive Plants

# Texas' most Problematic Aquatic Plant Species



**Giant Salvinia (11 reservoirs)**



**Hydrilla (Over 100 reservoirs)**



# Texas' most Problematic Aquatic Plant Species



**Water hyacinth (35 reservoirs)**



**Giant Reed (Statewide)**



# Commercial Nursery



# Integrated Pest Management

## Biological Controls



## Herbicides



## Drawdowns



## Mechanical Removal



**Mottled water hyacinth weevil *Neochetina eichhorniae* (top left), chevroned water hyacinth weevil *Neochitina bruchi* (bottom left), and plant hopper *Megamelus scutellaris* (below).**



# Giant Salvinia

## *Salvinia molesta*



UGA0002106

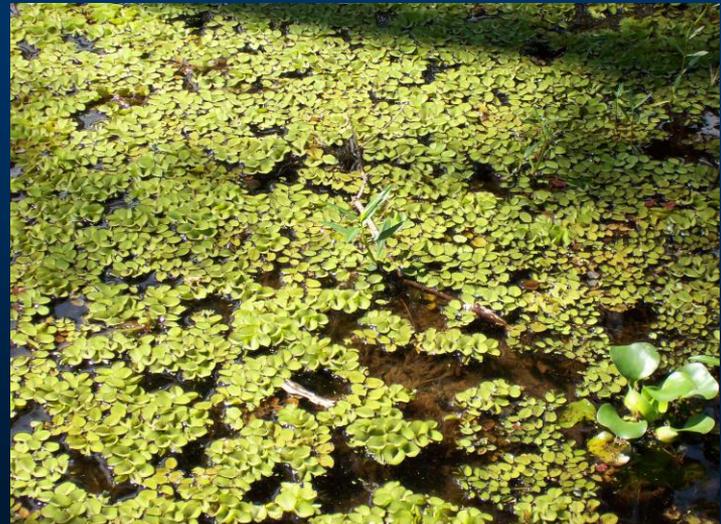
# Toledo Bend



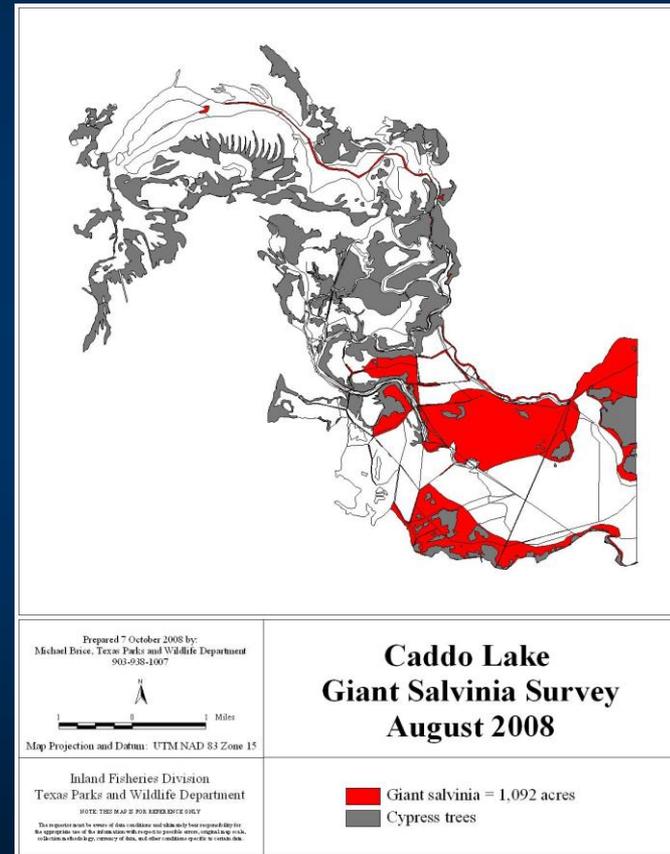
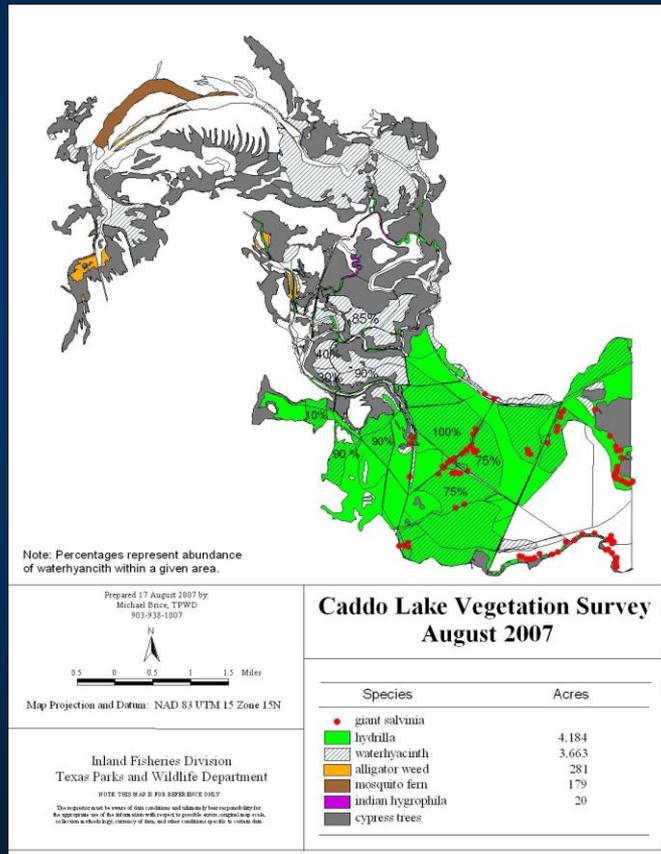
# Boat Ramp, Toledo Bend Reservoir



# Giant salvinia and Caddo Lake



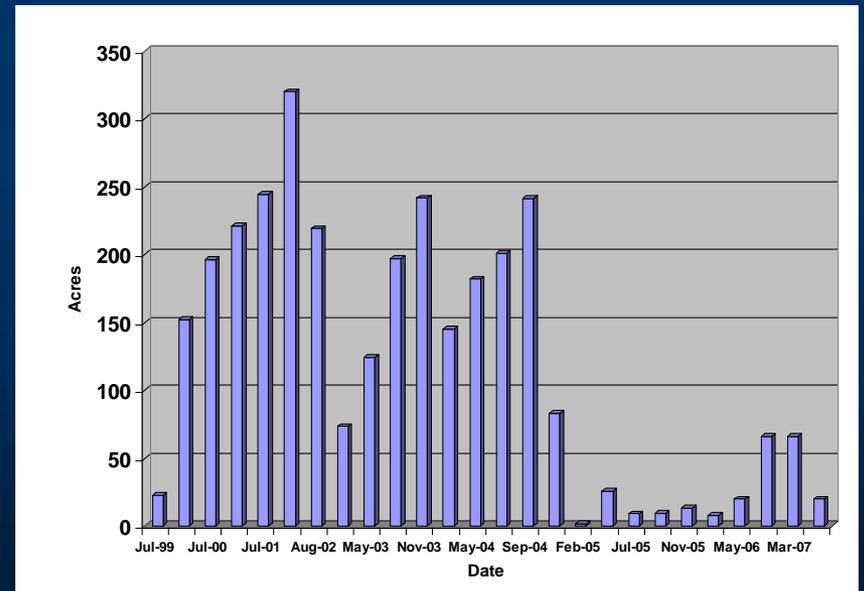
# Surveys



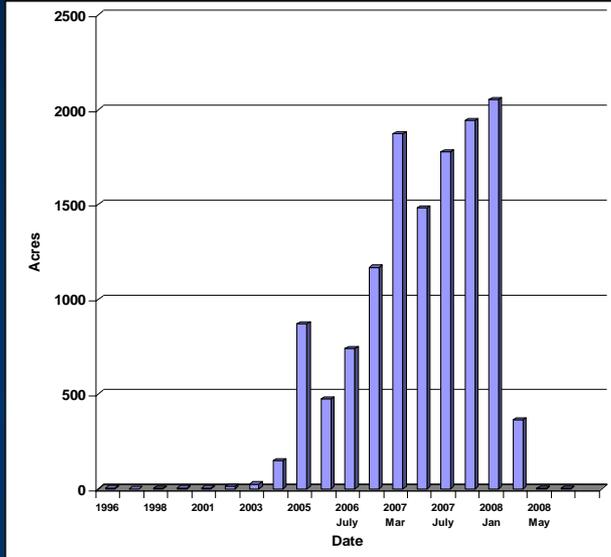
# Hydrilla

## *Hydrilla verticillata*

### Lake Austin



# Lake Conroe



# Water hyacinth on the Rio Grande





05/14/2003

# Mouth of the Rio Grande

2001



# Control Efforts in 2003



**Mechanical Removal**

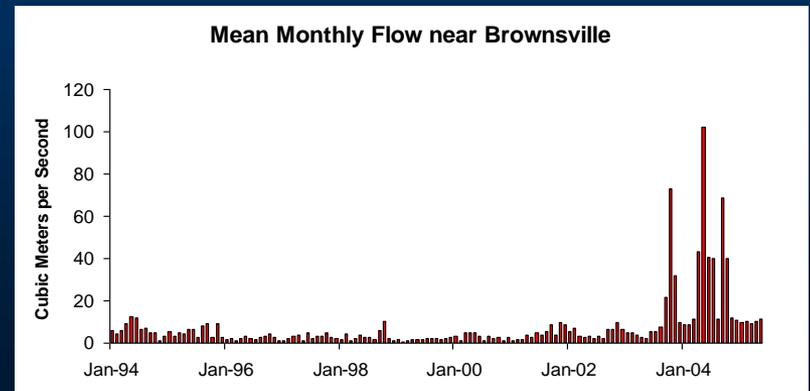


**Herbicides**



**Rain**

## Triploid Grass Carp



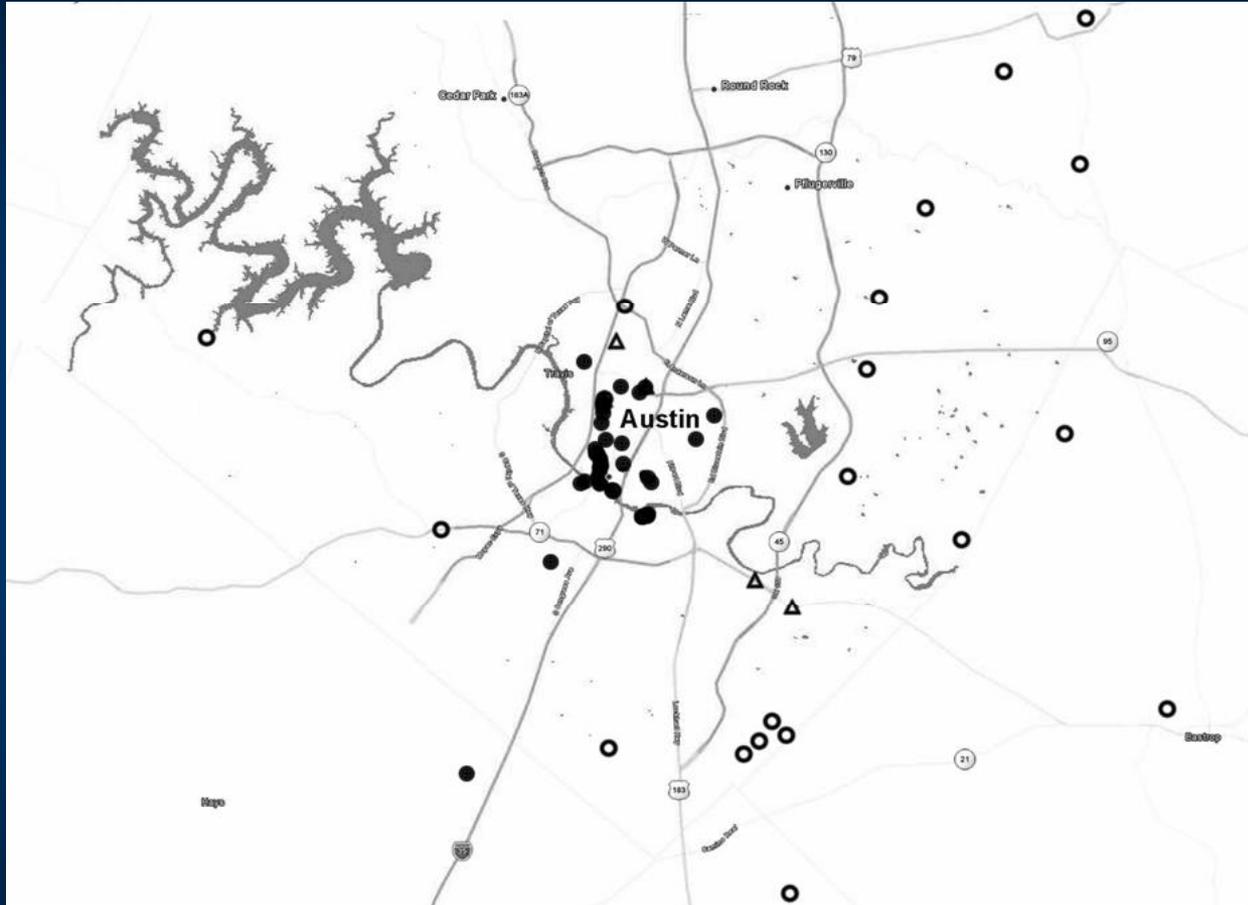
# *Arundo donax*



# *Tetramesa romana*



# *Tetramesa romana*



# Current Status of Exotic Aquatic Plant Regulations

- TPWD has regulatory authority over the importation, possession, sale or placement into water of the state of exotic harmful or potentially harmful aquatic plants

# Current Status of Exotic Aquatic Plant Regulations

- Some exotic aquatic plants have been identified as harmful or potentially harmful. The sale, purchase, or possession of these plants is prohibited.
- Prohibited plants may be possessed with a permit (such as water spinach).
- Permits have conditions to minimize environmental risk.

# Disadvantages of Current System

- Adding new plants is a lengthy process, making it difficult to respond to new threats.
- Non-listed species may become established before they can be listed.
- This can lead to environmental damage and economic costs.

# Development of a New Regulations

- During the last legislative session, TPWD was directed to publish a list of exotic aquatic plants that are approved for use in Texas without a permit
- TPWD was also directed to develop rules that are as permissive as possible without allowing plants that pose environmental, economic, or health problems
- New rules will be considered by the Texas Parks and Wildlife Commission in January 2011

# Development of New Regulations

- TWPD compiled a list of exotic (non-native) aquatic plants (including macroalgae) currently imported into Texas (over 3,500 plant names).
- Plant names reduced to about 500 species names.
- TWPD sought input from persons and businesses that could aid in adding or deleting plants from the draft list.

# Development of New Regulations

- All plants on the draft list (with the exception of microalgae) were evaluated for potential risk to aquatic environments using a scientific risk analysis based on Pheloung et al. (1999).
- If a plant had a low risk of invasiveness it was placed on the draft approved list.
- Permits for possession of some plants would have been maintained.

# Definition Highlights

- Exotic aquatic plant - nonindigenous aquatic plant not normally found in Texas
  - Includes vascular plants, macroalgae, microalgae, genetically modified organisms, and hybrids of exotics
- Approved list – exotic aquatic plants that could be possessed without a permit
- Ineligible species list – included rejected and previously prohibited species

# Risk Assessment

- Conduct a literature review that includes:
- Native range and climate
- History of invasiveness
- Reproductive requirements, potential, and dispersal
- Control techniques and efficacy
- Habitat requirements
- Economic benefit
- Environmental and agricultural impact if established
- History in Texas

# What is an Aquatic Plant?

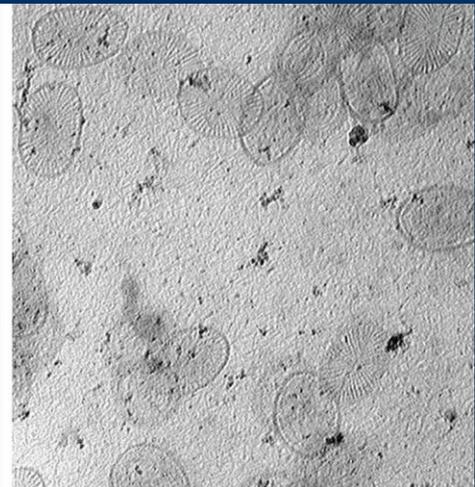
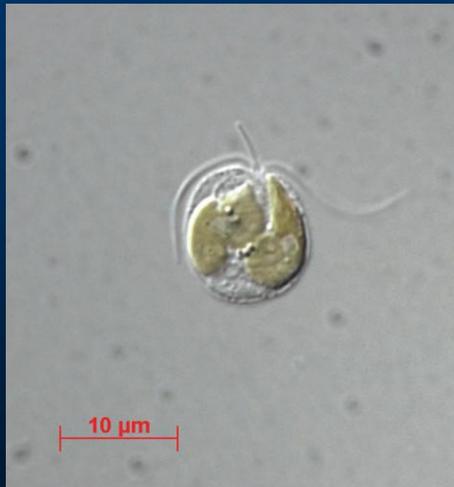
Any member of the Kingdom Plantae, as documented using the most recent posting of the Integrated Taxonomic Information System, that is typically found in either aquatic or riparian habitats.

**Why include algae?**

# *Didymosphenia geminata*



# *Prymnesium parvum*



# Microalgae

- Escalating interest for use in biofuels
- Requires separate treatment
  - Thousands of species/strains
  - Many poorly described

# Special Concerns

- Toxicity
  - Humans
  - Animals
  - Other plants
- Propensity to bloom
- Competition with native species

**TPWD was directed to  
discontinue development  
of new Regulations in  
January 2011**

**TEXAS**

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**PARKS &**

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**WILDLIFE**