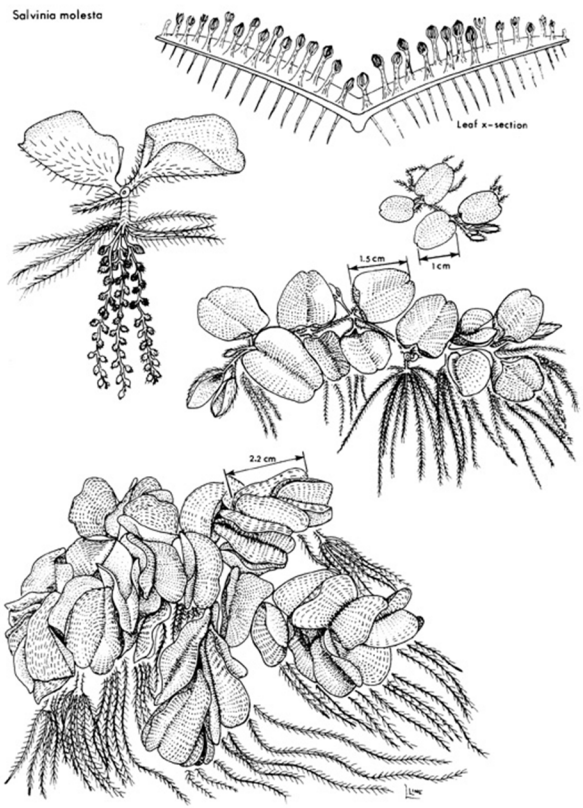
Louisiana: Invasive Aquatic Plant Management

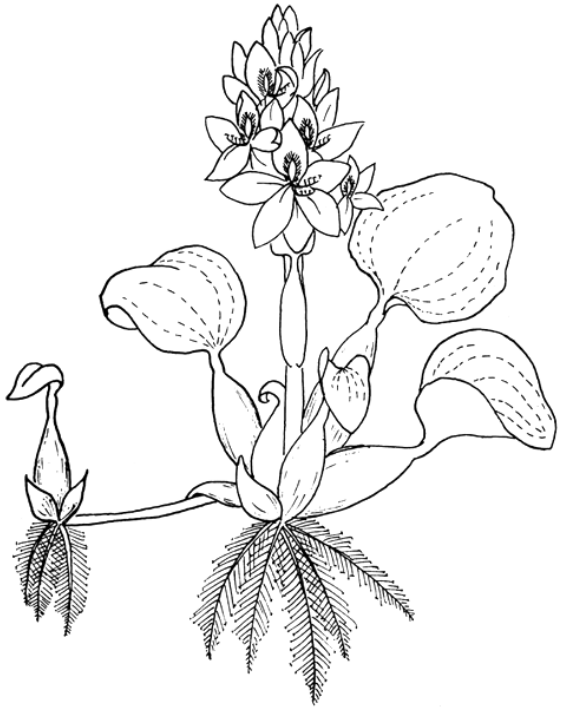
Daniel C. Hill | GULF & SOUTH ATLANTIC REGIONAL PANEL ON AQUATIC INVASIVE SPECIES | November 30, 2022

Giant Salvinia – *Salvinia molesta*



- Native to Southeastern Brazil
- Problem in Australia, Africa, Asia, and US
- Spreads by fragmentation
- Rapid establishment
- Probably entered US in water garden trade

Water Hyacinth – *Eichhornia crassipes*



- Native to South America
- Problem in most of the frost free regions of the world
- Rapid establishment by producing stolons or "daughter" plants
- 1884 Cotton Exposition in New Orleans

Ecology

Giant Salvinia

- Reproduction is strictly vegetative as spores are sterile
- Under favorable natural conditions, biomass can double in about one week to 10 days
- Freshwater species, not tolerating brackish or marine environments

Water Hyacinth

- Fragmentation of stolons and to a lesser extent via seeds
- Under favorable natural conditions, biomass can double in 14 days
- Freshwater species

Environmental Impact

- Displaces all other floating vegetation, native and nonnative
- Once dense mats are formed, virtually all sunlight is blocked, killing all submersed vegetation
- Causes reduced oxygen levels making large expanses unusable
- Can serve as vectors for other invasives…Cuban bulrush and Apple Snails

Economic Impact

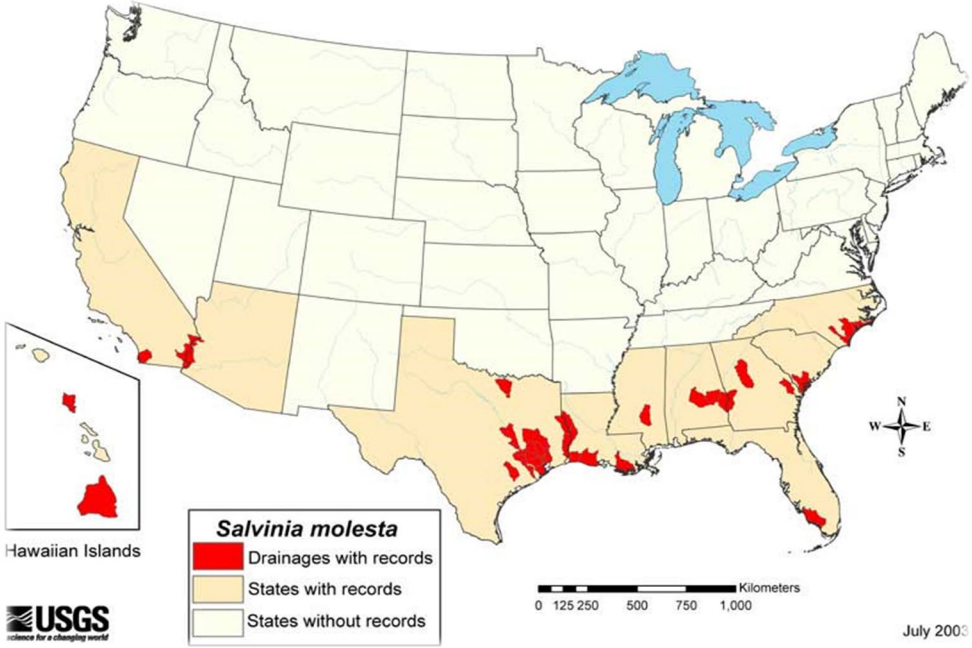
- Limits boating access (hunting, fishing, and recreational activities)
- Decreases property value
- Reduces tourism (swamp tours, aesthetic appearance of lakes)
- Cost associated with control efforts

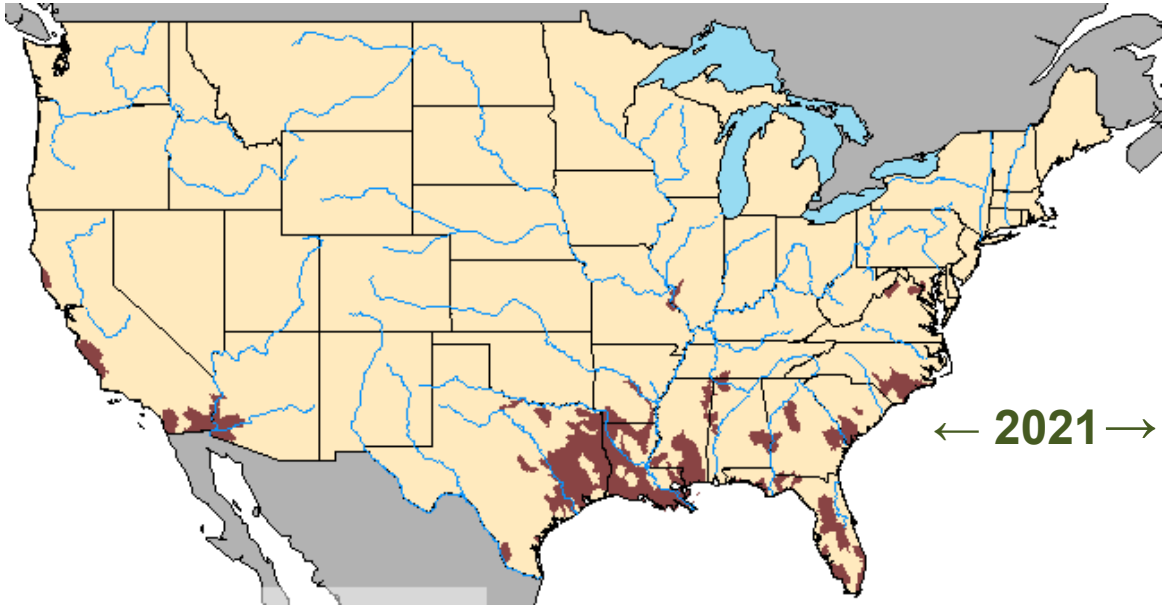
Mechanisms of Dispersal

https://www.dec.ny.gov/animals/48221.html

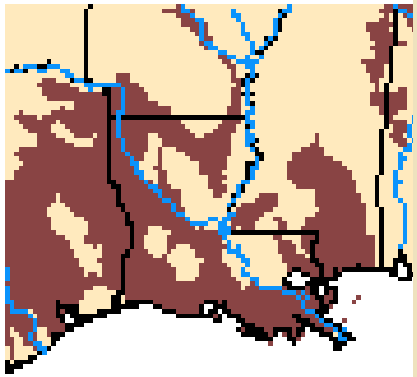
The Spread of Giant Salvinia

2003 →



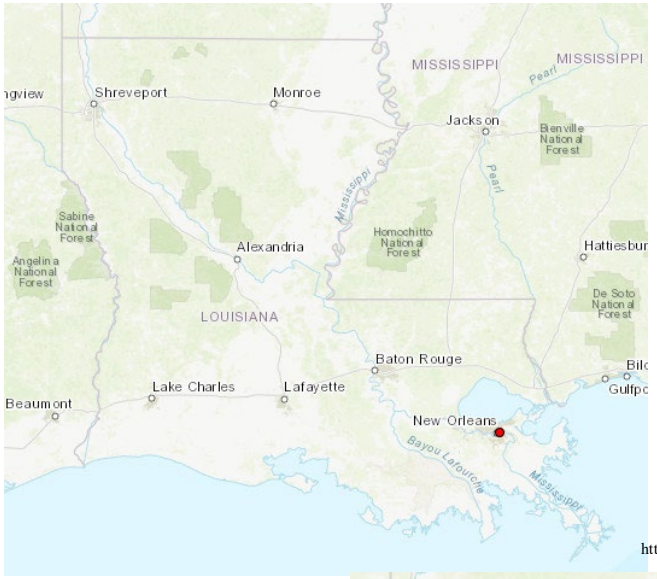


← 2021 →

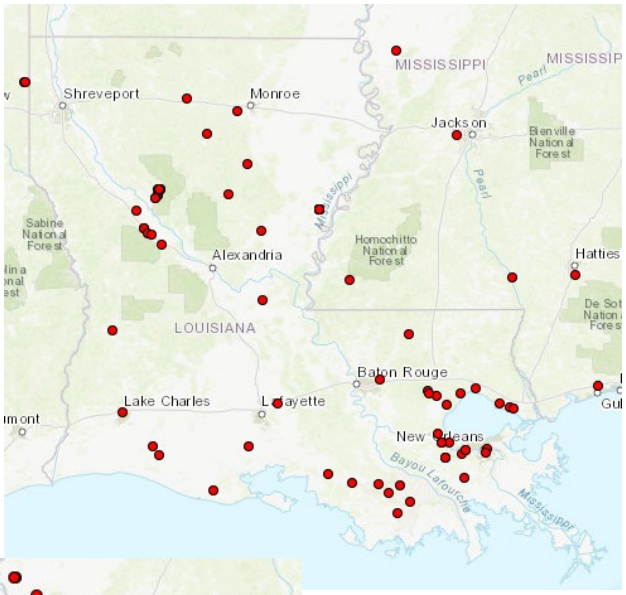


The Spread of Water Hyacinth

1884

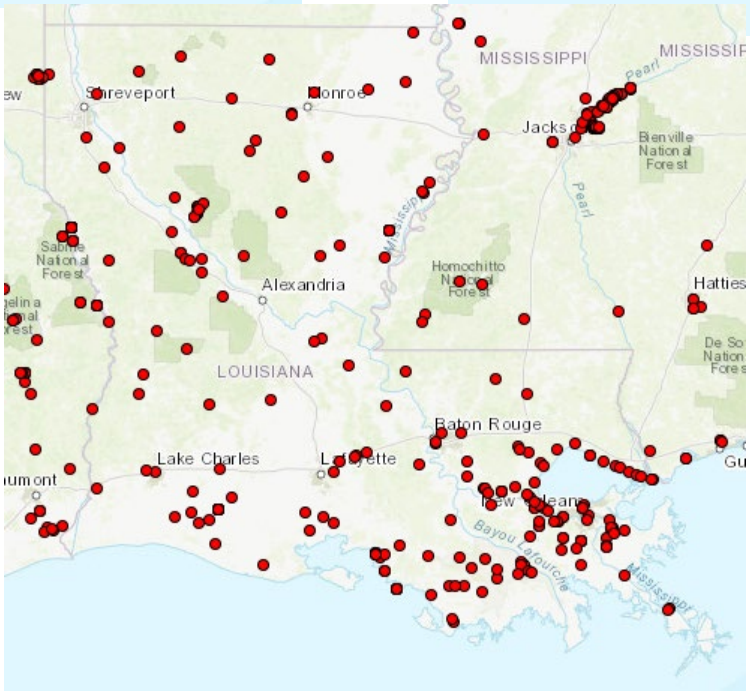


1984



https://nas.er.usgs.gov

2021



Issues in Louisiana

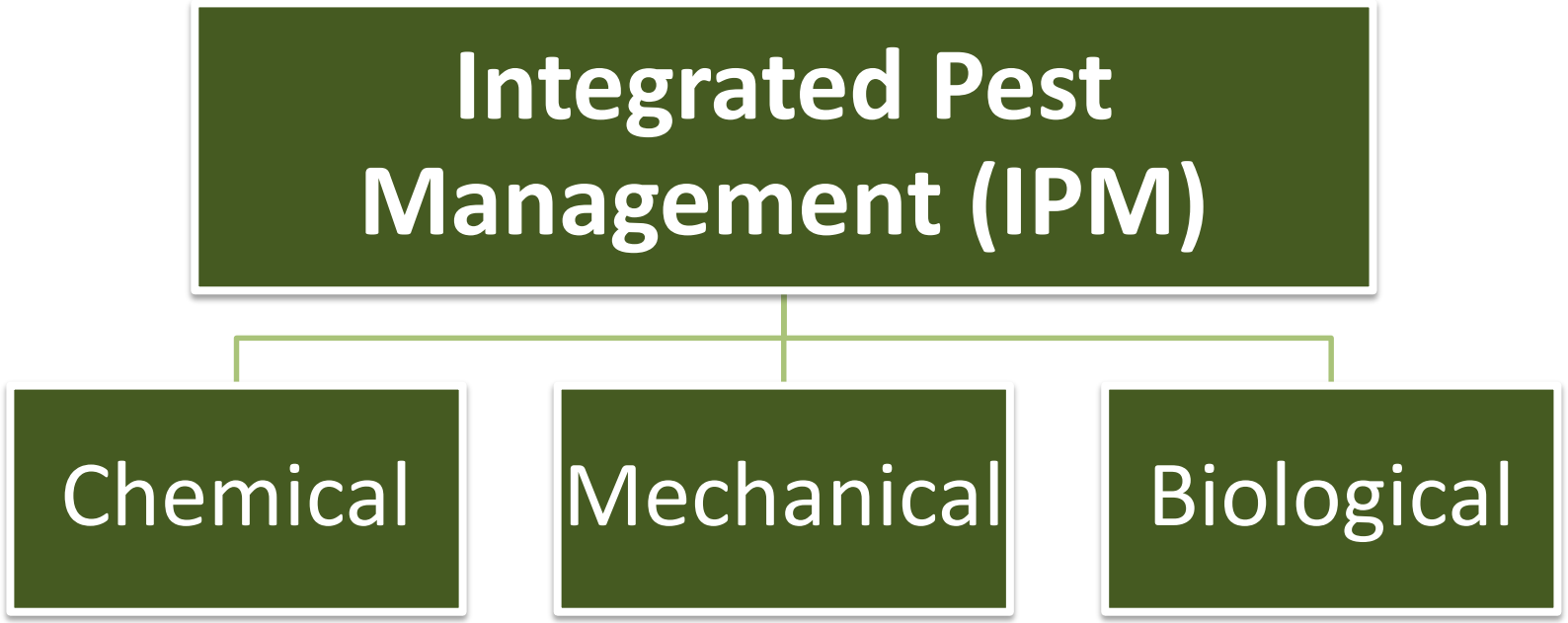
- Large number of freshwater systems
  - 17% of Louisiana is water
- Swamps/flooded timber
- Connected waterbodies – 9,174 miles^2
- Large number of boaters – 316K
- Subtropical Climate

Acreage of Aquatic Plants Treated by LDWF

Fiscal Year	Total Acres (GS : WH)
2012	84,038 (25,115 : 40,127)
2013	98,727 (32,811 : 51,136)
2014	56,506 (19,462 : 25,109)
2015	52,296 (18,098 : 23,138)
2016	53,037 (20,594 : 22,984)
2017	77,369 (47,960 : 21,183)
2018	35,401 (13,516 : 12,594)
2019	38,663 (17,523: 15,193)
2020	34,512 (15,475 : 13,386)
2021	25,817 (10,643 : 10,169)

LDWF Independent Nonpublished Data

Control Methods



Chemical Control

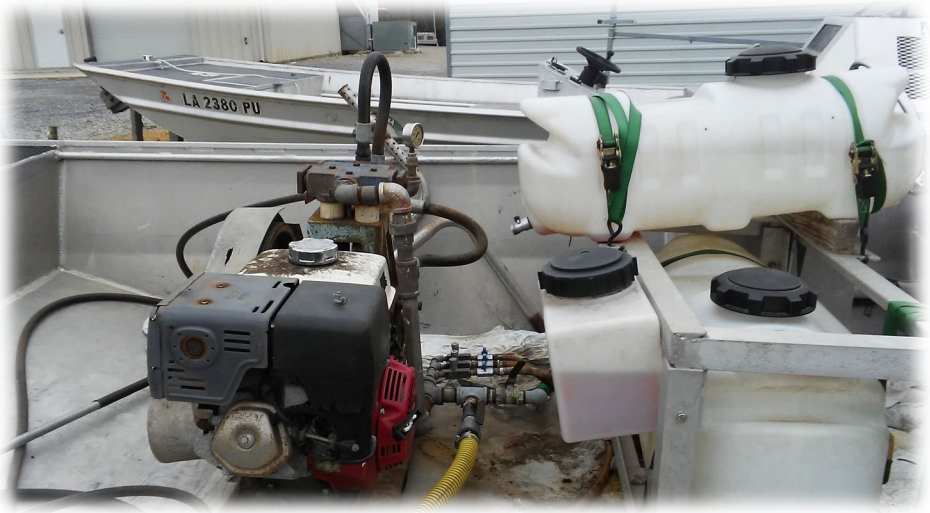
LDWF Spray Crews

- Maintenance/Small Areas

Contract Applications

- Boats
  - Metered/Tank
- Aerial

Chemical Control



Metered

- Larger Areas
- Pulls from waterbody
- Faster
- Less Exact/Chemical Limitations

Tank

- Premixed
- Exact Amounts
- Small Areas
- Refill w/ clean water

(IPM) Chemical Control

- **GPS**

Herbicides & Surfactants

- Bispyribac
- Carfentrazone
- Copper Complexes
- Diquat
- Endothall
- Fluridone
- Flumioxazin
- Glyphosate
- Imazamox
- Penoxsulam
- Topramezone
- Metsulfuron*
- Endogenous biocides, Fungicides

- Non-ionic
- Modified Vegetable Oils
- Methylated Seed Oils
- Organosilicone
- Stickers
- Penetrants
- Acidifiers
- Deposition Aids

Salvinia spp. SOP

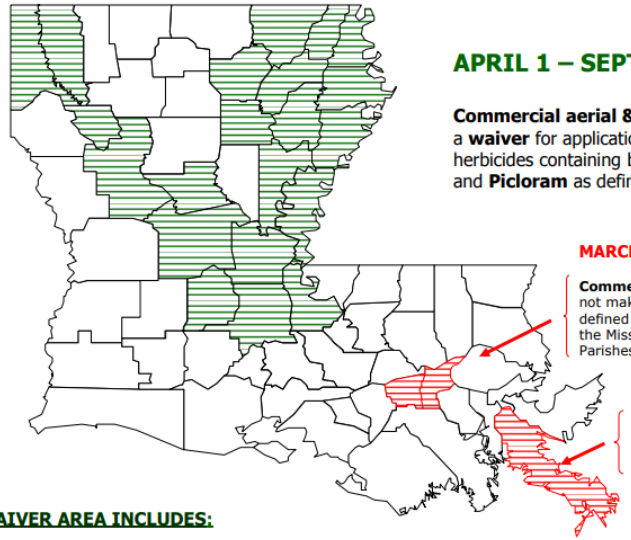
Salvinia spp. Alternative 1 Common/Giant Salvinia (April 1 to October 31)	**Glyphosate (0.75 gal/acre) Diquat (0.25 gal/acre)**	**Turbulence (or approved equivalent, 0.25 gal/acre)**
Salvinia spp. Alternative 2 Common/Giant Salvinia (April 1 to October 31)	Glyphosate (0.75 gal/acre) Flumioxazin (2 oz./acre)	Turbulence (or approved equivalent, 0.25 gal/acre)
Salvinia spp. Alternative 3 Common/Giant Salvinia (April 1 to October 31)	MSM (1 oz./acre) Flumioxazin (1 oz./acre)	Turbulence (or approved equivalent, 0.25 gal/acre)
Salvinia spp. Alternative 4 Common/Giant Salvinia (November 1 to March 31)	Diquat (0.75 gal/acre)	Nonionic surfactant (0.25 gal/acre)
Salvinia spp. Alternative 5 Common/Giant Salvinia (November 1 to March 31)	Flumioxazin (12 oz./acre)	Turbulence (or approved equivalent, 0.25 gal/acre)

Eichhornia crassipes SOP

Water Hyacinth	2, 4-D (0.5 gal/acre)	Nonionic surfactant (1 pint/acre)
Water Hyacinth in waiver areas (March 15 to September 15)	Glyphosate (0.75 gal/acre)	Nonionic surfactant (0.25 gal/acre)

LOUISIANA DEPARTMENT OF AGRICULTURE & FORESTRY
MIKE STRAIN DVM, COMMISSIONER

RESTRICTED HERBICIDE WAIVER APPLICATION AREA



APRIL 1 – SEPTEMBER 15

Commercial aerial & ground applicators must obtain a **waiver** for applications in all marked parishes for any herbicides containing but not limited to **2,4-D, Dicamba** and **Picloram** as defined in LAC section 1103.B.

MARCH 1 – JUNE 15

Commercial aerial & ground applicators shall not make applications of restricted herbicides as defined in LAC section 1103.B in the area between the Mississippi River and U.S. Hwy 61 in the Parishes of **St. James and St. John the Baptist**.

JANUARY 1 – DECEMBER 31

Commercial aerial & ground applicators shall not make applications of restricted herbicides as defined in LAC 1103.B in **Plaquemines** parish.

WAIVER AREA INCLUDES:

Avoyelles, Bossier, Caddo, Caldwell, Catahoula, Concordia, East Carroll, Evangeline (Wards 1, 3, 5), Franklin, Grant, Madison, Morehouse, Natchitoches, Ouachita, Pointe Coupee, Rapides, Red River, Richland, St. Landry, Tensas and West Carroll

Mechanical Controls

Containment Boom

- Limits plant movement
- Containment for herbicide application

Mechanical Controls

Saline Lake

Turkey Creek Lake

Mechanical Controls

Drawdown

- Targets shoreline plants
- Affects entire waterbody
- Can remove large quantities at low cost

Issues

https://plants.ifas.ufl.edu

https://www.weedooboats.com

https://www.amazon.com

Pro

- Herbicide Concerns
- Nutrient Removal
- Highly Selective/Site Specific/Promote Natives

Con

- Labor Intensive/Disposal
- Expensive
- Suspended sediment/Increase Turbidity

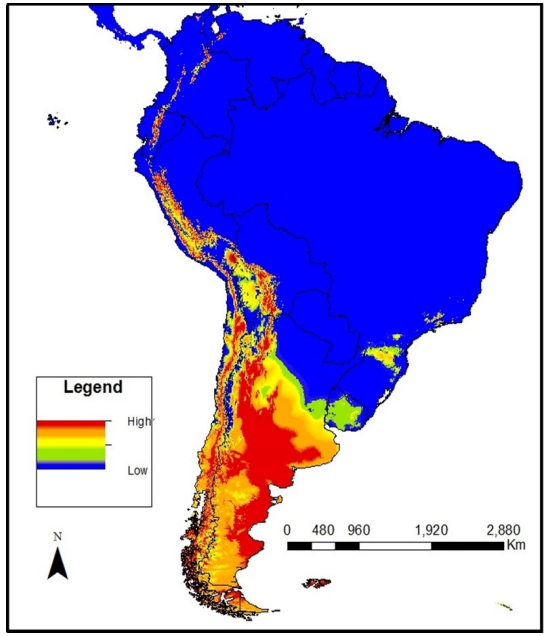
Biological Control

Giant Salvinia Weevil

Stocking

- Rearing/releasing since 2008
- Low winter survival in northern Louisiana
- 3,733,251 Total stocked

Giant Salvinia Weevil



- Failure to establish in temperate regions
  - High winter mortality of adults due to freezing temperatures
  - Failure to establish north of 32° N in US

- Cold tolerant weevils
  - Weevils populations from temperate distribution of native range possibly more cold tolerant than populations from LA?

LSU Weevil Research

Biological control with *Cyrtobagous salviniae* has seen variable success

- **Failure to establish in temperate regions**
  - **Failed to establish south of 34° S in AUS (Julien et al. 2009) and north of 32° N in US (Mukherjee et al. 2014)**
- **Winter mortality of adults and limited reproduction due to freezing temperatures is a limiting factor**
- **Golden question: Can we find a population of *C. salviniae* adapted to survive freezing winter temperatures?**

Biological Control

Species-specific Control

- Water Hyacinth Weevils
- Water Hyacinth Mite
- Water Hyacinth Moth

www.lsuagcenter.com/

www.lsuagcenter.com/

www.lsuagcenter.com/

Water Hyacinth Weevils

- **Two Species Stocked from South America:**
  - ***Neochetina bruchi***
  - ***Neochetina eichhorniae***
- **Suppress growth and reproduction**
- **Adults feed on leaves**
- **Larvae burrow into stem**

https://edis.ifas.ufl.edu/ag019

https://entnemdept.ufl.edu/Creatures/BENEFICIAL/BEETLES/Neochetina_eichhorniae.html.

Water Hyacinth Mite

- *Orthogalumna terebrantis*
  - Native to U.S.
  - Feed on both water hyacinth and the native pickerelweed
- Can be effective control agent when combined with weevil

Katherine Parys, USDA-ARS, Bugwood.org

Insectimages.org

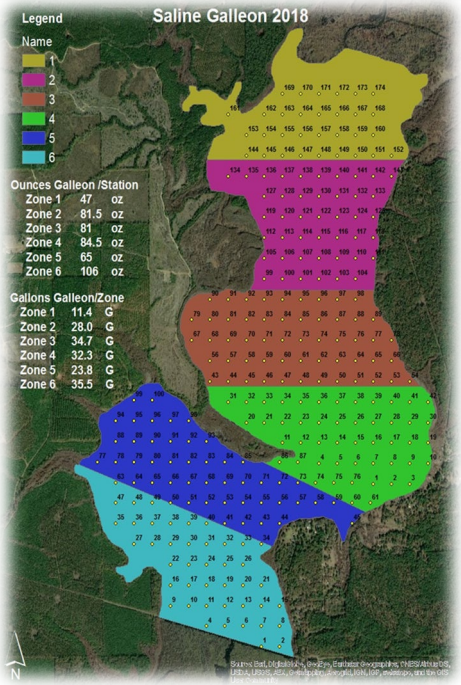
Water Hyacinth Moth

- *Niphograpta albiguttalis*
  - From South America
- First Stocked in Florida in the 1970's
- Now found throughout Gulf Coast
- Larvae feed on buoyant stems and can destroy new buds

https://www.lsuagcenter.com/topics/environment/invasive%20species/water-hyacinth/biocontrol

ISSUES

- Public Perception
- Access
- Watersheds
- In-water
- Tree Removal
- $$$



Current and Future Research

- **LSU AgCenter**
  - **Herbicide/Surfactant trials**
  - **Giant salvinia weevil production**
    - **Brazilian ecotype**
    - **Argentinian ecotype (north LA)**
- **Army Corps of Engineers**
  - **Giant salvinia weevil production**
  - **Weevil population monitoring**
- **University of Louisiana at Lafayette**
  - **Biodiesel**
  - **Methane, hydrogen**
  - **Commercial glues**

Current and Future Research

- LSU AgCenter
  - Herbicide/Surfactant Trials
- Mercantile
  - Commercial Goods

https://www.vintiquewise.com

www.medalistfeed.com/products

https://zocohome.com/

https://amazon.com/

Education

PROTECT YOUR BOAT AND LOUISIANA'S WATERS

Slow the spread of non-native aquatic invaders that:

- Choke waterways
- Foul boats and engines
- Clog intake pipes

These plants become nuisances when they multiply in Louisiana's waters. Avoid accidentally spreading them to other lakes and streams by taking the following precautions after boating:

INSPECT boat and trailer carefully for any living matter, **REMOVE** all plants or other living organisms. Discard in the trash, not in the water.

DRAIN all water from boat, including bilge, live well, and cooling system to avoid transporting small seeds or spores.

DRY boat and trailer in the sun for at least two days to kill plants **OR RINSE** off boat and trailer, anchor, anchor chain – all boat parts – with tap water.

Common Salvinia

Hydrilla

Water Hyacinth

Giant Salvinia

Sea Grant LOUISIANA

LSU AgCenter Research & Extension

PROTECT YOUR WATERS FROM THE GREEN MONSTER

GIANT SALVINIA – exotic plant that can:

- Clog waterways
- Foul boats and engines
- Eliminate recreational activities
- Cover the surface of the water harming fish and wildlife

LOOK OUT FOR THIS INVADER

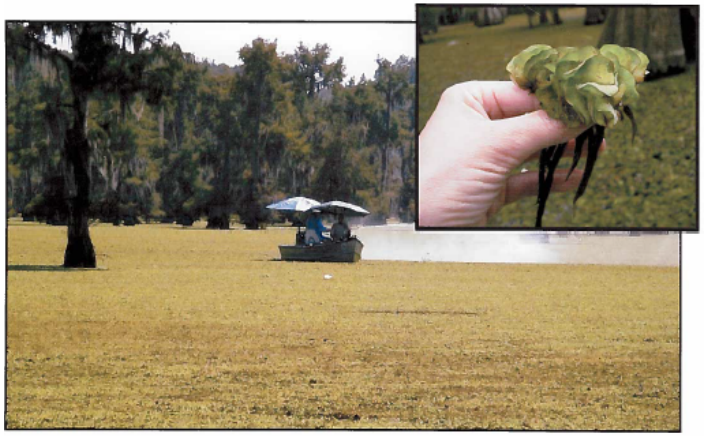
- Report new infestations to the proper authority

HELP PREVENT THE SPREAD – protect your waters:

- Remove all plants from your boat, trailer, prop, tackle, decoys, live well any place that giant salvinia could potentially hide before launching in another waterbody.

SPREAD THE WORD

- Let others know about the dangers and how they can help.



For more information on giant salvinia and other aquatic invasive species please contact Louisiana Department of Wildlife and Fisheries

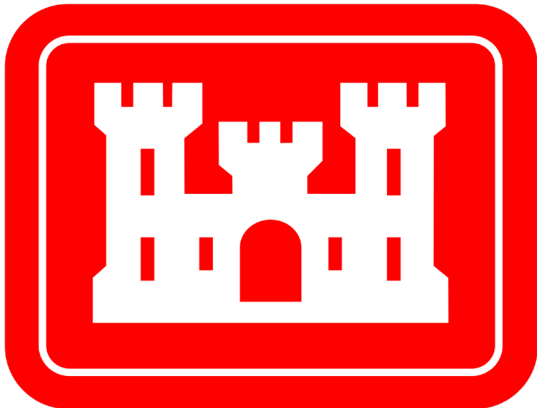
LOUISIANA

Acknowledgements

LSU AgCenter Research & Extension

UF IFAS UNIVERSITY of FLORIDA

TEXAS A&M AGRILIFE EXTENSION



Questions?

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