

Protecting Mississippi Waterways from Aquatic Invasive Species

Mike Pursley

It was 2005 in coastal Mississippi when one of the world's most invasive plants, giant salvinia quickly covered an estimated 1,950 acres of the Pascagoula River. The source of the infestation could not be determined, but it is thought to be unwanted plants discarded from an overgrown water garden or aquarium. The outlook for the river was bleak. Giant salvinia, one of the fastest growing plants in the world, was expanding rapidly. Something had to be done and done quickly. The Aquatic Invasive Species Program of the Mississippi Department of Marine Resources (MDMR) was born out of this necessity.

Later that year, Hurricane Katrina (in addition to its terrible destruction) provided some unexpected relief. The storm surge and elevated salinity stranded and killed much of the giant salvinia. Seizing this opportunity, before the surviving population had time to rebound, MDMR with support from the U.S. Geological Survey began a complete inspection of the Lower Pascagoula River system. The objectives were to find, map, and destroy the surviving giant salvinia. The effort was successful in eliminating the visible giant salvinia. However, isolated giant salvinia plants, hidden in the dense vegetation of Pascagoula Marsh, continued to survive and provided a source of re-infestation. Periodic heavy rainfall and high water conditions cause the nearly dormant plants to float out of the confines of the marsh and enter the open waterway where conditions are extremely favorable for reproduction.¹ Over the past 14 years, using a variety of techniques, MDMR's Aquatic Invasive Species Program has been able to suppress the giant salvinia population to a very low, hardly noticeable level. One exception to this success occurred in 2019 when an unusually long period of low salinity allowed giant salvinia to temporarily thrive in a six-acre bayou near the Mississippi Sound.²

What are aquatic invasive species?

Since the appearance of giant salvinia in 2005, other aquatic invasive species unfortunately also have arrived in South Mississippi, and MDMR's Aquatic Invasive Species Program has worked diligently to protect waterways from these harmful introductions as well. Aquatic invasive species (or AIS for short) are water-dependent organisms living outside their native range. They establish quickly and harm natural ecosystems, human health, and the economy. Louisiana and Texas spend millions of dollars every year on aquatic invasive plant control, mostly on giant salvinia. AIS generally have no natural enemies and outcompete native species for nutrients, sunlight, and habitat. They can also reduce native populations by direct predation, parasitism, habitat alteration, and by transmitting disease.

AIS introductions are usually the result of human activity. Ships can carry aquatic organisms attached to their hulls, as part of the cargo, or in their ballast water. Live aquatic animals and plants imported for aquarium, gardening, or food use can escape, get released, or even planted on purpose into new environments.³

Modern global internet-based commerce has greatly accelerated the rate of these biological invasions. Aquatic life from all parts of the globe that were formerly isolated by distance and geography can now arrive anywhere in a just a matter of hours or days. Thankfully, not all these aquatic world travelers have the potential to cause harm. The ones that do however, like giant salvinia, end up causing expensive, sometimes permanent problems.⁴

Mississippi's Most Recent Aquatic Invasive Species: Salvinia

Giant salvinia (*Salvinia molesta*) is a free-floating invasive fern from the Amazon River. It was once a popular water gardening plant, but now its sale is banned as a state and

federal noxious weed. *Salvinia* has small oblong leaves with fine eggbeater shaped hairs on the surface. This extremely fast-growing plant (capable of doubling its population every four days) accumulates and forms dense mats that choke out native aquatic life and impede navigation. *Salvinia* reproduces by fragmentation and can be spread by hitchhiking on watercraft or animals. In 2018 giant salvinia had spread to Ross Barnett Reservoir in Jackson and has also been recently spotted in several lakes in North Mississippi.⁵



To combat the Pascagoula River infestation mentioned above, MDMR's AIS crew conducts a year-round program of integrated pest management. Activities include regular surveys of the affected areas by boat and by air. Spot herbicide application is used when necessary in accordance with all applicable laws. Small, isolated clusters of salvinia are simply netted and disposed of whenever possible. U.S. Department of Agriculture-approved [bio-control weevils](#) have also helped slow the reproduction of salvinia, but it is not clear whether these cryptic tiny weevils have survived recent cold winters.

A closely related and similar-looking plant, common salvinia (*Salvinia minima*), is also found on the Pascagoula and Pearl Rivers. Inoculated with the same bio-control weevils as giant salvinia, the slower-growing common salvinia has not required as much intervention. Currently common salvinia infestations are being monitored so a rapid response can be initiated if populations expand and herbicide application becomes necessary.

Giant Applesnail

Giant Applesnail (*Pomacea maculata*), is also from the Amazon River area. These snails were widely sold as pets until the Mississippi Department of Agriculture learned of the damage they cause and issued an emergency regulation in 2001 to protect the State's rice crop.⁶ In addition to destroying rice fields, infestations of giant applesnail can also strip lakes and marshes of aquatic vegetation. These voracious pests also consume the eggs of native frogs and toads. Giant applesnails can grow to the size of a baseball and can produce 85,000 offspring during their several-year life span. These snails usually remain hidden in the water during daylight hours. Their presence is usually first detected by the clusters of bright pink eggs that they deposit just above the waterline.

The giant applesnail was first discovered in Mississippi in a [Pearl River County lake](#) in 2008. In 2013-2014 two separate infestations were detected in Jackson County: at a constructed [wetland sewage treatment facility](#); and on the [Pascagoula River](#). The constructed wetland treatment facility infestation is thought to have been from snails hitchhiking on aquatic plants purchased for the treatment ponds. The Pascagoula River and Pearl River County infestations are suspected to have started from the release of unwanted pets.

To help prevent damage to critical marsh habitat by these destructive snails, MDMR's AIS program, together with help from [Gulf Corps](#) (a youth environmental conservation training program), have removed a total of 1,100 live snails and destroyed 30,000 egg masses (which equates to 75 million live snails, if those egg masses had all hatched) during weekly Pascagoula River control missions. The Jackson County Utility Authority has been working to contain and control the infestation on their facility. Future MDMR efforts to protect the Pascagoula River marsh include a 2-year, \$836,000 control and monitoring grant in partnership with the Mississippi Department of Environmental Quality awarded through the Gulf Environmental Benefit Fund and the National Fish and Wildlife Foundation.⁷

Beach Vitex

Beach Vitex (*Vitex rotundifolia*) is a fast-growing vine native to the Pacific Rim that is showing up with increasing frequency in Mississippi. It was first brought to the United States in the 1990s as a plant to control dune erosion. This robust and hard to kill woody vine can grow to 60 feet long. Also

known as “Kudzu of the Coast” aggressive infestations engulf dunes hindering sea turtle and shorebird nesting.⁸ The first Mississippi beach vitex sighting was in 2015 on [Deer Island](#). This infestation was successfully eliminated by removing the vine and digging out its roots. Beach vitex was also found growing out of a rock jetty in [Gulfport](#). This infestation is currently under treatment. A report of beach vitex on [Cat Island](#) is being investigated.

Lionfish

Indo Pacific lionfish (*Pterois* sp.) are voracious marine super predators with venomous spines. These popular aquarium fish have caused declines in native reef fish populations of 80% following a single lionfish introduction. Females release up to two million eggs per year. The eggs float freely with ocean current as they develop into hungry little lionfish ready to infest their new location.⁹ Lionfish were first discovered in Mississippi waters in 2012 after [gradual westward movement](#) from the Florida Gulf Coast. Lionfish have no natural predators in the Northern Gulf. Spearfishing is the only known way to remove them. Unfortunately, lionfish can live in deeper waters than recreational divers can reach. Control options are limited.



Asian Tiger Shrimp

Asian tiger shrimp (*Penaeus monodon*) are the world’s most aquacultured shrimp species because of their large size and fast growth. They can reach almost a pound in weight, which seems wonderful, but they are also aggressive predators that could harbor exotic diseases detrimental to

Mississippi’s shrimping industry. These crustaceans are easily identified by their large size and the distinctive dark and light “tiger” striping. Asian tiger shrimp were first reported in Mississippi waters in 2009. The exact source of these shrimp is unknown, but they are thought to have escaped from aquaculture in Central or South America.¹⁰ After a decade of residence in the Mississippi Sound, their reported numbers remain very low and tiger shrimp have not been a significant part of the overall wild shrimp harvest to date. In order to keep an eye on this ongoing situation, MDMR continues to monitor for the presence of Asian tiger shrimp, encourage fishermen to report sightings, and to post all confirmed sightings to the [Nonindigenous Aquatic Species Database](#).

Future Threats: Silver Carp

Silver Carp (*Hypophthalmichthys molitrix*) are native to Asia. Silver carp were first imported into the United States to help manage water quality in ponds. They are plankton feeders that effectively strip the base of the food chain with adverse effects to both game and non-game fish. When startled, these big silver fish leap out of the water, jumping up to ten feet into the air. Many boaters have been seriously injured, and waterskiing is considered hazardous in silver carp infested areas as the fish jump in the boat’s wake.¹¹

These fast-growing, fast-reproducing fish can weigh up to 80 pounds, reaching nearly 12 pounds in their first year. In one study of an infested lake, silver carp made up 42% of the total biomass. In Mississippi they are found in the Tennessee-Tombigbee, Pearl River, Yazoo River, and the Mississippi River. Two large adult fish have been reported in South Mississippi, but so far, no evidence of a reproducing population has been detected in coastal waters.¹² MDMR regularly performs fish sampling in the waters of Coastal Mississippi to monitor native fish populations as well as for the presence of exotic fish like silver carp.

Hydrilla

Hydrilla (*Hydrilla verticillata*) [exists in nearby areas](#) but has not been found in South Mississippi’s natural waterways, yet. Imported from India in the 1950s as an aquarium plant, this rooted submerged noxious weed forms dense accumulations up to 25 feet deep and is considered one of the world’s most invasive weeds. This plant can crowd out

native plant species, reduce the habitat available to fish and interfere with navigation. Hydrilla spreads by plant fragmentation and by its root bulbs. The most common method of spread is by boats.¹³ MDMR's AIS program actively monitors boat ramps and other high-risk areas for early detection and rapid response to any outbreaks of hydrilla.



Credit: David J. Moorhead,
University of Georgia, Bugwood.org

You can help

Everyone can help in the fight against aquatic invasive species. A great way to start is by learning how to identify these harmful invaders. A link to a downloadable invasive species poster can be found on the [MDMR website](#). Another important way is not releasing or dumping aquarium pets or plants outside. Instead, they must be put in sealed plastic bags and put in the trash. The two most problematic invasive species in South Mississippi, giant salvinia and giant applesnail, were likely the result of careless mistakes. To help stop the spread of AIS by watercraft, before leaving the water's access, boaters should clean their boat, trailer, and gear of all plant or animal life, and drain the bilge, livewell, and other water-holding areas. Boaters should let the craft dry before entering another body of water.¹⁴

If you find an aquatic invasive species in South Mississippi, please report it by email with a picture and description of the location to MDMR (report.invasive@dmr.ms.gov) or by phone at (228) 374-5000. If wishing to report an invasive species in some other area, please contact your local fish and game or environmental quality agency. [↗](#)

Mike Pursley is the Coastal Preserves Invasive Species Program Manager for the Mississippi Department of Marine Resources. He also serves on the Gulf and South Atlantic Regional Panel on Aquatic Invasive Species and as the Coordinator for the Mississippi Aquatic Invasive Species Council.

Endnotes

1. Pam L. Fuller, Mike G. Pursley, et al., *Effects of Hurricane Katrina on an Incipient Population of Giant Salvinia, Salvinia molesta in the Lower Pascagoula River, Mississippi*, Gulf and Caribbean Research Vol. 22 (1): 63-66 (2010).
2. Doug Walker, *DMR Stepping up efforts to rid bayous of koi kandy*, WLOX (June 19, 2019).
3. U.S. Fish and Wildlife Service, *Fish and Aquatic Conservation, Aquatic Invasive Species, Overview*.
4. John E. Havel, et al., *Aquatic Invasive Species: Challenges for the Future*, Hydrobiologia, 750(1), 147-170 (Jan. 2015).
5. Nikki Rowell, *PRV/SD Continues to Battle Invasive Plant*, Northside Sun (Dec. 6, 2019) (noting that the Pearl River Valley Water Supply District spent more than \$250,000 in 2019 in salvinia control).
6. Mississippi Department of Agriculture and Commerce, Bureau of Plant Industry, Plant Pest Program, *Emergency Regulation on Applesnails* (Sept. 12, 2001).
7. Mississippi Department of Environmental Quality, *Gov. Bryant Announces Restoration Projects* (Nov. 12, 2019).
8. Betsy Brabson and Randy G. Westbrook, *Beach Vitex – 'Kudzu' of the Carolina Coast*, South Carolina Beach Vitex Task Force (Oct. 14, 2004).
9. Mike Pursley, *New Lion King Invading Gulf Waters*, Coastal Angler Magazine (Dec. 13, 2013).
10. Wally Northway, *Monster Shrimp, Monster Problem*, Mississippi Business Journal (Jan. 12, 2012).
11. U.S. Geological Survey, *Are Asian Carp Dangerous?*
12. Dennis Riecke, *The Jumping Invader*, Mississippi Department of Wildlife, Fisheries and Parks (Dec. 9, 2019).
13. John D. Madsen and Wilfredo Robles, *Hydrilla Fact Sheet*, Mississippi State University Geosystems Research Institute (2007).
14. *Protect Your Waters*, Stop Aquatic Hitchhikers!