

Hydrilla and Giant Salvinia Survey in Mississippi for 2009



Hydrilla at Fallen Oak Golf Course, Saucier, MS

A Report to the Mississippi Bureau of Plant Industry

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Introduction

Aquatic plants are a vital component in our water bodies and aquatic ecosystems. With an appropriate balance between aquatic plant species and water systems, we can greatly benefit from the use of water and its recreational opportunities. Invasive aquatic plants pose a threat to these systems and present obstacles in these water bodies when introduced. Interruption of natural and vital ecological interactions by these species can change the properties of ecosystems, decrease water quality and property value, and limit recreational use in and around these areas (Madsen 2004).

Water bodies in Mississippi provide recreational opportunities, fishing, transportation, municipal and drinking supply, and wildlife habitat. Invasive aquatic plant species negatively affect all of these when introduced to water bodies. Hydrilla [*Hydrilla verticillata* (L.f.) Royle] and giant salvinia (*Salvinia molesta* D. S. Mitchell) are two aquatic plants that are non-native and present in Mississippi waterbodies. Hydrilla is a submersed aquatic plant native to warmer areas of Asia and has become a serious nuisance plant in the United States (Langeland 1996). The specialized growth habit, reproduction, and physiological properties of hydrilla make it superior to neighboring plant species in the gathering of light, nutrients, and oxygen. For this reason, hydrilla has the well-deserved nickname “the perfect aquatic weed”. Although both dioecious and monoecious biotypes of hydrilla exist in the United States, only the dioecious biotype occurs in Mississippi. Hydrilla can reproduce by fragmentation and through the production of turions and tubers (subterranean turions). Giant salvinia is a free-floating aquatic fern native to southeastern Brazil. It primarily reproduces asexually (daughter plants arising from buds on stolons) and may double in leaf number in less than 8 days (McFarland et al. 2004). The rapid growth rate and proficient reproduction methods of giant salvinia make it an extreme nuisance and competitor in aquatic environments.

Hydrilla and Giant salvinia are both listed on the state Noxious Weed List for Mississippi and the Federal Noxious Weed List. To detect and rapidly respond to infestations of these nuisance species, monitoring and management programs should be implemented. Mississippi State University and the Mississippi Bureau of Plant Industry has developed a Memorandum of Agreement to survey bodies of water in the state of Mississippi for aquatic plant species listed on the State Noxious Weed List. This agreement has been renewed over the last five years to serve as part of an invasive plant monitoring program for the state of Mississippi. An update to the current status of hydrilla and giant salvinia occurrence in the state of Mississippi is included in the following report.

Methodology

Surveys to detect the presence or absence of hydrilla and giant salvinia have been conducted across Mississippi since 2005. Locations surveyed in 2009 were previously non-surveyed areas, while the Ross Barnett Reservoir, Wedgeworth Creek, and Pascagoula River Delta were revisited for an update on hydrilla or giant salvinia occurrence after they were detected in previous surveys. A Hewlett-Packard model 2110 iPAQ handheld computer with Global Positioning System (GPS) capabilities via a Holux GPS model GR-271 receiver was used to obtain geographic locations at approximately 3 m position accuracy. All data was collected and reported in latitude and longitude under datum WGS 84. Location maps with present points were produced using ArcGIS-ArcMap, version 9.2.

Hydrilla and Giant Salvinia Status

Presence and absence of giant salvinia and hydrilla from 2009 in the state of Mississippi is shown in Figure 1.

Hydrilla Status

1- Fallen Oak Golf Course

A survey was conducted in August 2009 on the Fallen Oak Golf Course in Saucier, MS after a report of hydrilla being present in several ponds on the golf course was made by AquaServices, Inc. during an aquatic plant treatment. After surveying other ponds on the golf course, hydrilla populations were observed in the pond at Hole 1 under the bridge and in the narrow, shallow stream that feeds a smaller adjacent pond. It was also observed in the pond at Hole 18, mainly along the banks with some small populations occurring throughout the center of the pond (Figure 2). All hydrilla populations on the golf course were healthy and topped out on the water surface. Control methods for these hydrilla populations are presently being discussed and future monitoring of the hydrilla should be continued.

2- Wall Doxey State Park

A survey was conducted in July 2009 at Wall Doxey State Park in Holly Springs, MS. Hydrilla was observed at the boat ramp on the eastern side of the lake beside the pier. Only one to two small plants were found however, suggesting that this may be a new introduction of the species to the lake (most likely due to boat transportation of fragmented plants). Early implementation of control for hydrilla in this lake will most likely keep this species from spreading throughout the lake in the future. Future monitoring on the lake should be done to indicate the progress or lack thereof of the hydrilla.

3- Ross Barnett Reservoir

Hydrilla populations have been observed in the northern portion of the reservoir, as well as a couple of locations in the middle portion of the reservoir. Due to active management of hydrilla since 2005, these populations have been suppressed (Wersal et al. 2009). Most of these populations are small and scattered, with very few tubers being found in the sediment since 2005. This suggests that the chemical treatments have been successful and the scattered occurrence of hydrilla in the reservoir may be attributed to fragmentation and/or water movement. Management of hydrilla is currently being conducted on the reservoir by AquaServices, Inc., and distribution of the species is being monitored.

4- Noxubee National Wildlife Refuge

Hydrilla was found in Bluff Lake at the Noxubee National Wildlife Refuge in 2008 (Table 1), growing along shorelines and boat ramps. Hand-pulling has previously been conducted, according to the United States Fish and Wildlife Service. Due to the vigorous growth habit of hydrilla, this control method has not been successful. Changes to the management of hydrilla in Bluff Lake should be considered in the future to prevent further spread throughout the lake. Bluff Lake was not surveyed in 2009. Hydrilla was reported to be present in Loakafoma Lake in 2006 (Madsen et al. 2007). It has recently been filled after a previous drainage period, but surveys have not been conducted to indicate the status of hydrilla in the lake.

5- Tennessee-Tombigbee Waterway

According to Robles and others (2009), hydrilla populations still persisted on lakes Columbus, Aberdeen, Aliceville, and Gainesville after surveys conducted in 2008. The populations appeared to be healthy, as they were topped out on the water surface. These locations on the Tennessee-Tombigbee Waterway were not surveyed in 2009.

Giant salvinia Status

1- Wedgeworth Creek

The giant salvinia population observed in Wedgeworth Creek, Forrest County, MS (Table 2) showed re-growth in 2009 after being completely wiped out by an unknown agent in 2007 (Robles et al. 2008). Small populations growing along the shorelines appeared to be young and healthy (Figure 5).

It appears that the introduction of the biological control agent, salvinia weevil (*Cyrtobagous salviniae*), to the area in 2006 has been ineffective at eradicating giant salvinia at this site (Robles et al. 2008). Future monitoring and control methods should be conducted to prevent the spread of giant salvinia in this area.

2- Pascagoula River Delta

Surveys were conducted in the Pascagoula River area, including bayous and oxbows related to former known locations of giant salvinia in 2005. To date, giant salvinia has not been found in

this water body after Hurricane Katrina by our surveys. However, per conversation with the Mississippi Department of Marine Resources, giant salvinia still occurs at this location where follow-up chemical treatments are being performed. The Mississippi Department of Marine Resources shared with us geographic coordinates of current giant salvinia locations in order to verify them. However after surveying these areas, giant salvinia was not found.

Conclusions and Recommendations

Persisting hydrilla populations in the Ross Barnett Reservoir, Tennessee-Tombigbee Waterway, and Bluff Lake suggest that control methods should be continued or initiated in these areas. New populations found at Fallen Oak and Wall Doxey Lake should be treated and monitored, as they will likely spread if ignored. The Ross Barnett Reservoir and Fallen Oak Golf Course are currently the only locations under active management for hydrilla with herbicides. Aggressive control for hydrilla is imperative for all infested sites indicated to prevent future establishment and spread to neighboring locations.

The giant salvinia population in Wedgeworth Creek still persists. The salvinia weevil has not been effective in eradicating giant salvinia from this location. Therefore, more aggressive control techniques should be used to completely remove surviving plants before future spread occurs. The giant salvinia population in the Pascagoula River delta is currently under active management by the Mississippi Department of Marine Resources. This area should continue to be monitored and managed for the possible reoccurrence and spread of giant salvinia populations.

Literature Cited

- Langeland, K. A. 1996. *Hydrilla verticillata* (L. F.) Royle (Hydrocharitaceae), “The perfect aquatic weed”. *Castanea* **61**: 293-304.
- Madsen, J.D. 2004. Invasive aquatic plants: A threat to Mississippi water resources. Pages 122-134 in 2004 Proceedings, Annual Mississippi Water Resources Conference.
- Madsen, J. D., W. Robles, V. L. Maddox, and R. M. Wersal. 2007. Distribution of Hydrilla and Giant Salvinia in Mississippi in 2006: An update. Mississippi State University, Geosystems Research Institute, Report # 5012.
http://www.gri.msstate.edu/resources/pubs/docs/2007/GRI_5012_MS_BPI_2007.pdf.
- McFarland, D. G., L. S. Nelson, M. J. Grodowitz, R. M. Smart, and C. S. Owens. 2004. *Salvinia molesta* D. S. Mitchell (Giant Salvinia) in the United States: A review of species ecology and approaches to management. *APCRP Technical Notes Collection (ERDC/EL SR-04-2)*, U.S. Army Engineer Research and Development Center, Vicksburg, MS. 33pp. June 2004.
- Robles, W., J. D. Madsen, V. L. Maddox, R. M. Wersal. 2008. 2007 Statewide Survey of the Status of Giant Salvinia and Hydrilla in Mississippi. Mississippi State University, Geosystems Research Institute, Report # 5019.
http://www.gri.msstate.edu/resources/pubs/docs/2008/GRI_5019_2008.pdf.
- Robles, W., J. D. Madsen, V. L. Maddox, and R. M. Wersal. 2009. Survey for giant salvinia and hydrilla in Mississippi during 2008: A report to the Mississippi Bureau of Plant Industry. Mississippi State University, Geosystems Research Institute, Report #50. 10pp. November 21, 2008.
- Wersal, R.M., J.D. Madsen, and M.L. Tagert. 2009. Littoral Zone Aquatic Plant Community Assessment of the Ross Barnett Reservoir, MS in 2008: A Four Year Evaluation. GeoResources Institute Report 5031. 26pp.

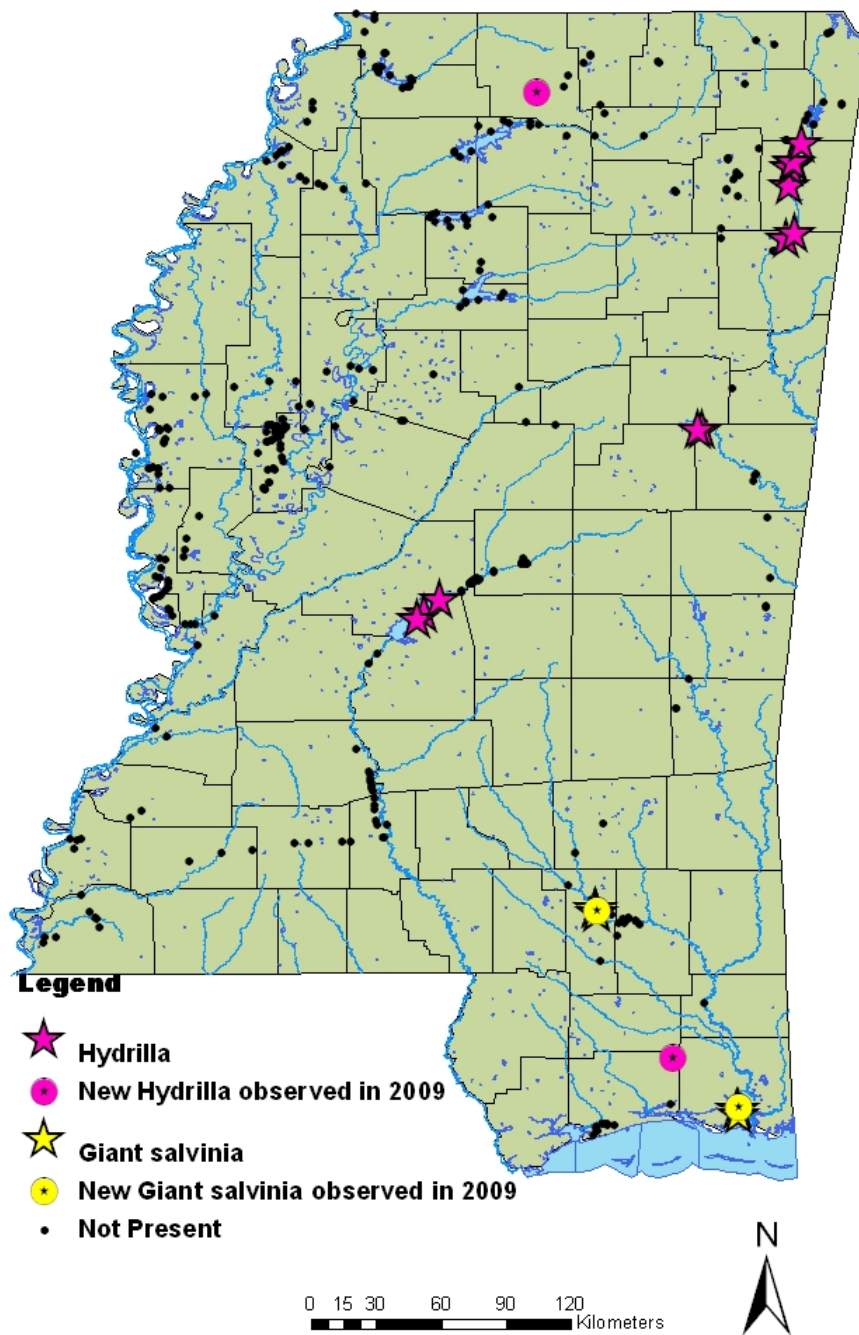


Figure 1. Locations of hydrilla and giant salvinia distribution in Mississippi. Included are points surveyed from 2005 to 2009.



Figure 2. Hydrilla growing along shoreline of hole 18 at Fallen Oak Golf Course in August 2009.

Table 1. Geographic coordinates of known hydrilla populations in Mississippi and Alabama.

Water body	Nearest Town	County	Latitude	Longitude
Tenn-Tom Waterway	Smithville	Monroe	34.06383	-88.42334
		Itawamba	34.08894	-88.39125
	Fulton		34.28742	-88.41695
			34.36222	-88.40683
			34.37777	-88.39213
			34.38476	-88.39568
			34.45953	-88.36025
Bluff Lake	Brooksville	Noxubee	33.27321	-88.79089
			33.27156	-88.77867
Ross Barnett	Canton	Rankin	32.486226	-89.957833
			32.561979	-89.866275
			32.508253	-89.929888
Fallen Oak Golf Course	Saucier	Harrison	30.649280	-88.898900
Wall Doxey Lake	Holly Springs	Marshall	34.664670	-89.466500

Table 2. Geographic coordinates of known giant salvinia populations in Mississippi.

Water body	Nearest Town	County	Latitude	Longitude
Wedgeworth Creek	Hattiesburg	Forrest	31.28041	-89.21993
			31.27896	-89.22016
			31.26431	-89.21560
Pascagoula River	Gautier	Jackson	30.445206	-88.62600



Figure 3. Giant salvinia appearance in August 2009.



Figure 4. Giant salvinia population in Wedgeworth Creek, Forrest County, MS during May 2007 (Robles et al.2008).



Figure 5. Giant salvinia population in Wedgeworth Creek, Forrest County, MS during August 2008 (Robles et al.2009).



Figure 6. Giant salvinia population in Wedgeworth Creek, Forrest County, MS during August 2009.

