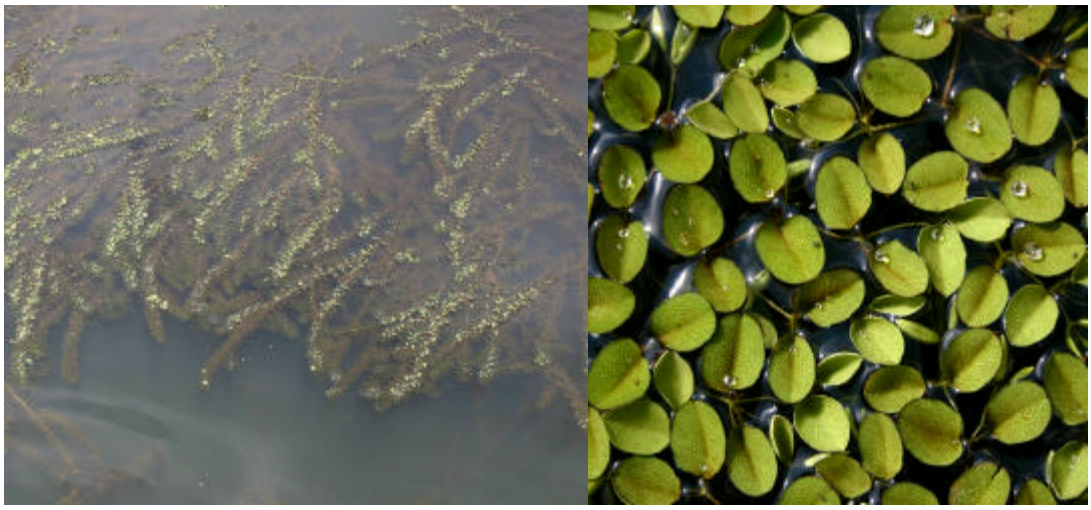
Distribution of Hydrilla and Giant Salvinia in Mississippi in 2006: An Update



An Annual Report to the Mississippi Bureau of Plant Industry

John D. Madsen, Wilfredo Robles, Victor L. Maddox, and Ryan M. Wersal
GeoResources Institute and Department of Plant and Soil Science
Mississippi State University
Box 9652
Mississippi State, MS 39762-9652

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John D. Madsen, Wilfredo Robles, Victor L. Maddox, and Ryan M. Wersal
GeoResources Institute
Mississippi State University

Introduction

Invasive aquatic plant species are a significant threat to the water resources and wetlands of the nation, including the State of Mississippi. For instance, invasive aquatic plants disrupt many bodies of water affecting the ecological interactions, disrupting water supply, and impeding boat traffic. Two species in particular, hydrilla (*Hydrilla verticillata*) and giant salvinia (*Salvinia molesta*) are considered invasive aquatic plants worldwide. Giant salvinia is a free-floating aquatic fern that can double biomass in 10 days through vegetative reproduction. Hydrilla is a submersed aquatic plant that can propagate from stem fragments, turions, and subterranean tubers representing a triple threat for management methods. Both plants are listed as noxious weeds on both the Federal Noxious Weed List and the Noxious Weed List for the State of Mississippi.

Both, hydrilla and giant salvinia are present in the state of Mississippi (GeoResources Institute, 2006). However, little information exists on the number of water bodies impacted counties with records, and control methods implemented against the spread of these two species. Pursuant to that, Mississippi State University has finished a Memorandum of Agreement with the Mississippi Bureau of Plant Industry to survey water bodies in Mississippi for aquatic plants listed on the state noxious weed list. The following report is an update on the survey for giant salvinia and hydrilla in the state of Mississippi.

Methods and Materials

An extensive survey was conducted in 2006 in the state of Mississippi to detect the presence and absence of giant salvinia and hydrilla. A total of 17 counties were surveyed including reservoirs, waterways and major rivers (Table 1). A handheld computer with Global Position System (GPS) capabilities was used to obtain geographic coordinates of surveyed locations. Data were acquire and reported in latitude and longitude, datum WGS 84. Once the GPS points were recorded, aerial photography at 2-meter resolution acquired in 2005 was used to make distribution maps and establish potential sites to spread from known locations. Maps were produced using ArcGIS-ArcMap, v. 9.1. Aerial photography by county was obtained from the Mississippi Automated Resource Information System (MARIS). In order to have information about control methods implemented in a water body to control these two plants, agencies responsible for the water body were contacted. Any control method implemented in the water body was rated as achieving poor, fair, good, and excellent control at the time of the survey.

For hydrilla, we identified sites by contacting natural resource agencies, as well as observing hydrilla infestations as part of our other research activities. For giant salvinia, surveys at known sites were performed including southern Mississippi counties after Hurricane Katrina. Current sites were widely surveyed to detect giant salvinia presence and its potential spread to related water bodies.

Results and Discussion

Presence and absence of hydrilla and giant salvinia in the state of Mississippi during the 2006 survey are presented in Table 1 and Figure 1. The status of each plant and description of known locations will be discussed as well as the performance of control methods implemented in each water body.

Hydrilla Status

1- Tennessee-Tombigbee Waterway

Hydrilla was found in the Tennessee Tombigbee Waterway at Lake Aberdeen, Lake Columbus, and Lake Aliceville (Table 2). Associated species growing with hydrilla include: waterhyacinth (*Eichhornia crassipes*), coontail (*Ceratophyllum demersum*), and Eurasian watermilfoil (*Myriophyllum spicatum*). At Lake Aberdeen and Lake Aliceville, hydrilla has been found localized in boat ramps and scattered shorelines at depths of 2 feet. However, hydrilla populations have exploded in Lake Columbus since 2005 after spraying and subsequent reduction of waterhyacinth abundance. This hydrilla population has been observed in the northern most part of Lake Columbus adjacent to highway 50. The shading of hydrilla by waterhyacinth is no longer impeding the growth of hydrilla at this location. Therefore, hydrilla is likely to spread rapidly in Lake Columbus. To date no control methods have been implemented to manage hydrilla populations in these three water bodies on the Tennessee Tombigbee Waterway. Therefore, a classification of “no action” has been assigned as the control method and control has been rated as poor (Table 4).

2- Noxubee National Wildlife Refuge

Hydrilla was found in the NNWR in Lake Loakfoma (Table 2). Associated species growing with hydrilla include: American lotus (*Nelumbo lutea*) and coontail (*Ceratophyllum demersum*). The only control method performed at this water body was drawdown that was rated as good at the time of the survey (Table 4). Drawdown may be useful as short-term control. However, asexual reproductive structures such as tubers and turions may remain in the sediment and sprout after the water body is allowed to refill with water.

3- Ross Barnett Reservoir

Hydrilla was found in the upper portion of the Ross Barnett Reservoir (Table 2). Associated species growing with hydrilla include: American lotus (*Nelumbo lutea*) and alligator weed (*Alternanthera philoxeroides*). To date, 124 acres of hydrilla have been treated using the aquatic herbicide fluridone. This control method has been rated excellent due to the suppression of hydrilla growth (Table 4). A tuber survey conducted as part of another study in February and December of 2006 only yielded two hydrilla tubers indicating that the tuber bank in the Ross Barnett Reservoir is small (Wersal et al. 2007).

Giant Salvinia Status

1- Wedgeworth Creek

Giant salvinia was found in Wedgeworth Creek that drains into the Leaf River (Table 3). Due to the presence of heavy infestations of giant salvinia at this location and the potential of be escape into a bigger water body, an extensive survey was performed at this location (Figure 2). Parrotfeather (*Myriophyllum aquaticum*) was the only other aquatic plant observed growing with giant salvinia at this location. In 2005, only the northern portion of the creek was infested with giant salvinia. However, in 2006, giant salvinia has spread southward where it was observed growing only124 meters from the Leaf River (Figure 2). At the time of the survey, 100% coverage of giant salvinia was reported under the bridge at Sims Road (Figure 2). Biological control has been implemented in this area to suppress giant salvinia growth. However, giant salvinia still persists along Wedgeworth creek. Therefore, this control method has been rated as poor due to the complete coverage of the water body surface (Table 4). An oxbow located west of Wedgeworth Creek was surveyed and giant salvinia was not found.

2- Pascagoula River

In 2005, giant salvinia was found west of the Pascagoula River delta (Madsen et al. 2006). After hurricane Katrina in August 2005, giant salvinia has not been found since. An extensive survey was performed in 2006 east and west of the Pascagoula River, especially on the north side of Bluff creek and other tributaries related with this area (Figure 3). The storm surge associated with Hurricane Katrina in August 2005 likely changed the water chemistry (salinity), affecting giant salvinia growth at this location.

Conclusions and Recommendations

The authors of this report conclude that aggressive management of hydrilla and giant salvinia in the state of Mississippi is highly recommended in order to prevent spread and heavy infestations in larger water bodies. For instance, hydrilla infestations in the Tennessee-Tombigbee waterway currently do not represent impede navigation and boat traffic or disrupt water flow. However, allowing hydrilla to grow will result in future problems associated with heavy infestations.

The implementation of other control methods such as chemical control to manage giant salvinia is highly recommended to prevent the spread and escape of giant salvinia into the Leaf River. Biological control alone will not control the growth of giant salvinia or prevent its spread.

Giant salvinia has not yet been eradicated in the Pascagoula River region, and further surveys are warranted. Bluff Creek, located north of the first observation of giant salvinia reported in 2005 (Madsen et al. 2006) is a tributary that should be fully surveyed.

Literature cited

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Contact Information:

Dr. John D. Madsen
Mississippi State University
GeoResources Institute
Box 9652
Mississippi State, MS 39759-9652
Ph. 662-325-2428
E-mail: jmadsen@gri.msstate.edu

Table 1. Mississippi counties and water bodies surveyed in the year 2006 as depicted in Figure 1. Positive location = +; Negative location = -

County Name	Water body	Hydrilla	Giant salvinia
Attala	Yockanookany River	-	-
Clay	Lake Columbus	+	-
Forrest	Wedgeworth Creek	-	+
	Leaf River	-	-
George	Pascagoula River	-	-
Greene	Leaf River	-	-
	Chickasawhay River	-	-
Jackson	Pascagoula River	-	-
Leake	Yockanookany River	-	-
Leflore	Yazoo River	-	-
Lowndes	Lake Columbus	+	-
Madison	Ross Barnett Reservoir	+	-
Monroe	Lake Aberdeen	+	-
Noxubee	Noxubee Wildlife Refuge	+	-
	Lake Aliceville	+	-
Oktibbeha	Private Pond	-	-
Perry	Leaf River	-	-
Rankin	Ross Barnett Reservoir	+	-
Washington	Oxbow east to Mississippi River	-	-
Webster	Big Black River	-	-

Table 2. Geographic coordinates with known hydrilla populations in Mississippi.

County	Nearest Town	Latitude	Longitude
Monroe	Aberdeen	-88.525716	33.845178
Clay	West Point	-88.482964	33.585655
Lowndes	Columbus	-88.484098	33.580955
Noxubee	Starkville	-88.778492	33.261165
	Brooksville	-88.285013	33.228169
		-88.285086	33.228194
		-88.289009	33.229184
		-88.294428	33.230946
Madison	Canton	- 89.908500	32.539111
Rankin	Brandon	- 89.900250	32.528333

Table 3. Geographic coordinates with known giant salvinia populations in Mississippi.

County	Nearest Town	Latitude	Longitude
Forrest	Hattiesburg	-89.221700	31.277883
		-89.222183	31.277250
		-89.222000	31.276000
		-89.221817	31.275600
		-89.221767	31.275550
		-89.221767	31.275367
		-89.221583	31.275333
		-89.221533	31.275133
		-89.221517	31.274950
		-89.221500	31.274683
		-89.221517	31.274383
		-89.221250	31.274200
		-89.220483	31.274417
		-89.219467	31.274650
		-89.218733	31.274600
		-89.218383	31.274517
		-89.218183	31.274100
		-89.217333	31.272817
		-89.215850	31.264167
		-89.214050	31.261883

Table 4. Visual ratings at the time of survey for each control method applied at known locations of hydrilla and giant salvinia in Mississippi.

Location	Plant	Method	Agent	Rating
Lake Aberdeen	Hydrilla	None	None	Poor
Lake Columbus	Hydrilla	None	None	Poor
Noxubee Wildlife Refuge	Hydrilla	Physical	Drawdown	Good
Lake Aliceville	Hydrilla	None	None	Poor
Ross Barnett	Hydrilla	Chemical	Fluridone	Excellent
Wedgeworth creek	Giant salvinia	Biological	*Cyrtobagous salviniae*	Poor

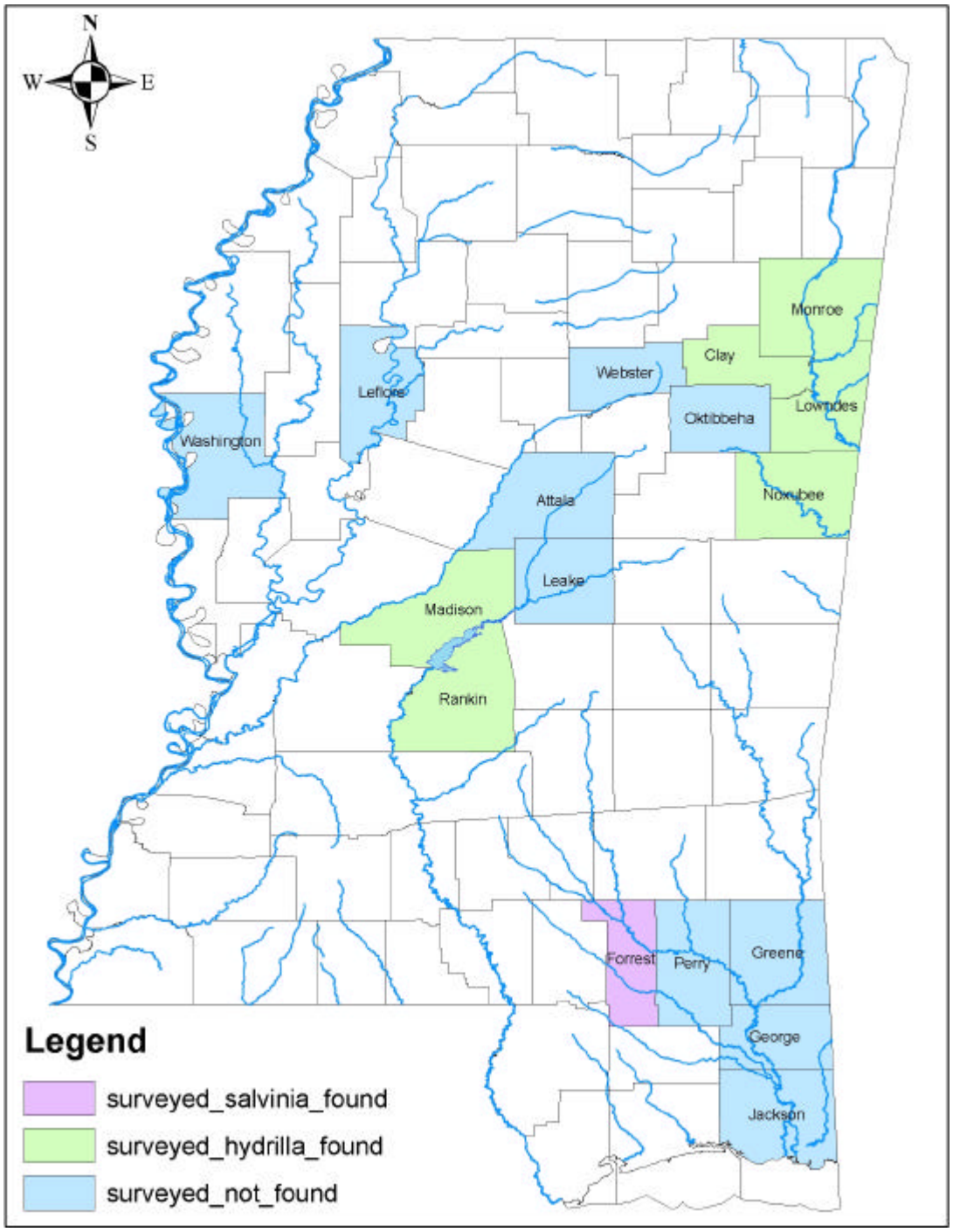

Figure 1. Current status of hydrilla and giant salvinia in Mississippi.

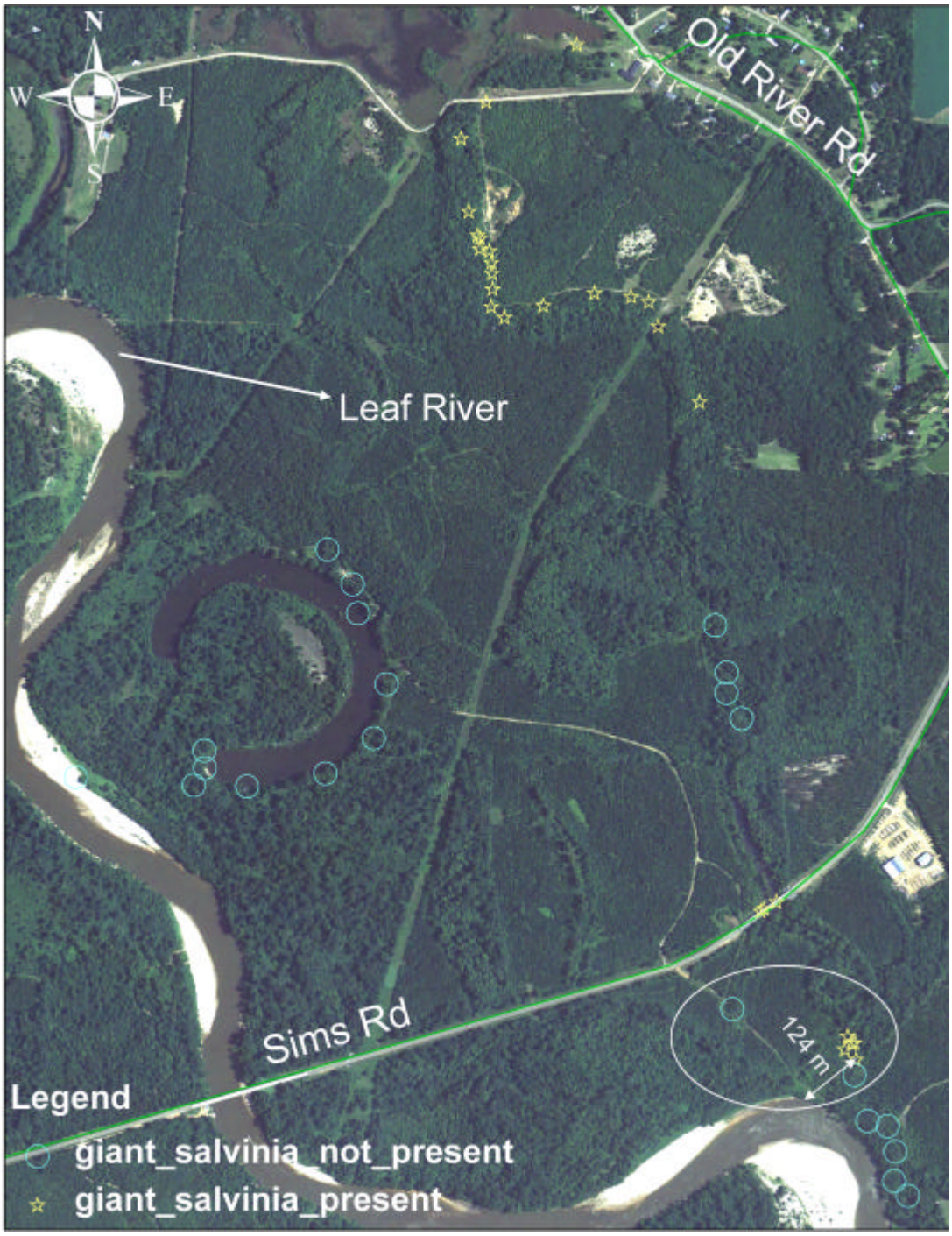

Figure 2. Giant salvinia distribution at Wedgeworth Creek, Hattiesburg, Mississippi. Arrow inside the ellipse represents the distance of the far most known giant salvinia location close to the Leaf River. Distance measured in meters.

Figure 3. Pascagoula River delta giant salvinia survey in 2006. Ellipse represents area of former known location.