

Locating and Mapping the Invasive Species Water Hyacinth in Dog River.

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Water Hyacinth is an invasive species native to South America. It has caused many problems for many countries around the world, and in the U.S. it has been a major problem for Louisiana and Florida. There have been no news articles or research pertaining to water hyacinth in Dog River, located in Mobile, Alabama along the Gulf Coast. During my project I have used a kayak to search Dog River to locate any water hyacinth and map them out using GIS. This information will provide the city of Mobile with the ability to monitor water hyacinth in Dog River and, if necessary, prevent the spread of water hyacinth.

Keyword: Invasive aquatics, water hyacinth, GIS

Introduction:

Water hyacinth, *Eichhornia crassipes*, is a plant native to Brazil, South America (Figure 1). It has become a problem because of its aggressive reproduction rate and its effects on the environments all across the world in fresh water bodies in tropical and subtropical climates. It can grow in temperatures as low as 12° Celsius (54° Fahrenheit), grows best at 25°-30° Celsius (77°-86° Fahrenheit), and can grow at maximum temperature up to 33°-35° Celsius (92°-95° Fahrenheit) (Kasselman 1995). Water hyacinth is believed to have been brought to the U.S. in 1884 during an exposition in New Orleans, Louisiana (Schmitz et al. 1993). After only 70 years, after reaching Florida, the plant had covered 126,000 acres of waterways in Florida which prevented boats from passing or doing anything else in the area of the water hyacinth (Schmitz et al. 1993).



Figure 1: A common Water hyacinth, *Eichhornia crassipes* (www.arhomeandgarden.org)

This can be seen in Figure 2 where it has completely overrun the waterway. Areas with large quantities of water hyacinth “mats” can reduce water quality in areas by reducing oxygen levels by blocking the air-water interface (UFL IFAS 2013). This will reduce the ability of fish to live in the area. They can also reduce the biodiversity of plant species in an area of water hyacinth mats by blocking the sunlight for other aquatic plants, force other plants out of the area by pushing and crushing them, and alter animal



Figure 2: River choked by Water Hyacinth at Wankou Village, Fujian province China (Reuters/China Daily 2012)

communities by blocking their access to the water or getting rid of the plant species that the animals would normally use for food or shelter (UFL IFAS 2013).

Water hyacinth should be a huge concern for the Dog River environment because we live in a humid subtropical environment and our temperatures are perfect for it to grow almost year round and the temperatures usually do not get low enough for long enough to kill the plant. It could damage the Dog River environment with its rapid reproduction. It would also cause problems for people in the community who use Dog River for recreational purposes.

Research Question:

The goal of this research is to map the spatial distribution of the invasive species water hyacinth in the Dog River environment. I focused on Eslava Creek, Rabbit Creek, Halls Mill Creek, and Rattlesnake Creek, in search of water hyacinth. This information will allow the City of Mobile to monitor and, if need be, control areas of Dog River that are threatened by the water hyacinth. By

controlling or even eliminating the water hyacinth in Dog River, it will prevent this aquatic plant from damaging the ecosystem's plants and animals.

Methods:

To locate water hyacinth in my study areas of Dog River, I obtained a kayak. This allowed me to access areas that were inaccessible by larger crafts. I brought along a camera to take photographic evidence of any hyacinth that I found. I also brought a Garmin eTrex Legend H GPS device to record locations of hyacinth and my routes. Using the locations, I recorded I created a map showing my route and any locations that I found water hyacinth. I launched my kayak from 3 different locations. For Eslava Creek, I launched from Dog River Park (also known as Luscher Park). For Halls Mill Creek I launched from a residential dock at 3530 Riviere du Chein Ct (with permission). For Rabbit Creek and Rattlesnake Creek I launched from another residential dock at the end of Schwartz Lane for 5 dollars. I went out a total of six times and kayaked through the areas shown in Figure 3. Since water hyacinth is a fresh water plant, it does not grow in salt water. Unfortunately, I was unable to find much data that I could use to determine where the water changed from fresh to brackish in Dog River, besides some water testing information from Alabama Water Watch which was in pieces from random dates over the years. Because of that, I focused on going upstream instead of downstream where the water would be saltier.

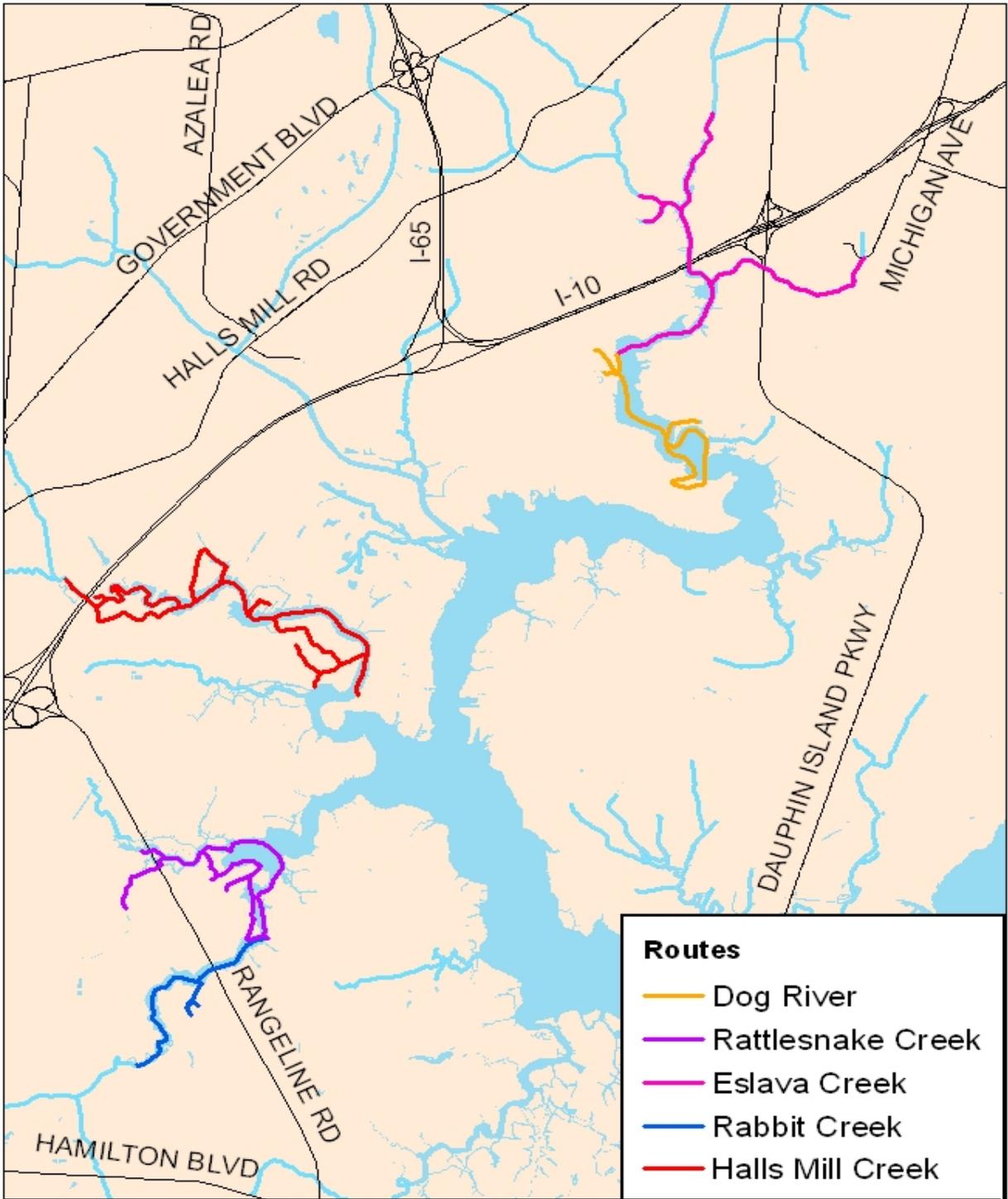


Figure 3: Kayaking Routes I used in Dog River.

Results:

After a total of 6 days kayaking in Dog River I was unable to locate a single hyacinth in Eslava Creek, Halls Mill Creek, Rabbit Creek, or Rattlesnake Creek. I did notice after all my searching that I had not found a single plant that wasn't rooted to the ground as well. After following a tip from Dog River Clearwater Revival of some floating mats of aquatic plants in Halls Mill Creek I located several mats of yellow flowered lily pads native to the area, which I believed to be Spatterdock, *Nuphar advena* (Figure 4). This is a newly added species of lily pad was once considered part of the *Nuphar luteum* species, but has just recently been elevated to its own species (UFL IFAS 2013). While these results are disappointing to me, it is very positive for the Dog River ecosystem that the invasive water hyacinth species has not yet gained a foothold in these specific areas of Dog River.



Figure 4: a mat of the native yellow pond lilies, *Nuphar advena*, in Halls Mill Creek.

Discussion:

After my results a new question had to be answered. Why has water hyacinth, which I know to be in the Mobile area, not gained a foothold in these areas of Dog River? I came up with three reasons that combined to prevent this. The first reason has to do with the impermeable surfaces and canals of the urban environment. This prevents the water from soaking into the ground and making its way slowly to Dog River during and after rainfall events. Instead of slowly flowing to Dog River over time most of the water would flow quickly to Dog River and drag anything not connected to the ground along with it such as trash and the free floating aquatic plants, like water hyacinth during rainfall events. The second reason would be the draining of wetlands farther up Dog River's watershed. Normally these wetlands would slow and maintain the speed of the water flow during both rainfall and non-rainfall events. The slowed and maintained flow of fresh water into Dog River both during and after rainfall events would prevent salt water from intruding into Dog River. These slowed currents are also what water hyacinth grows best in and the wetlands farther up Dog River's watershed would be excellent places for the water hyacinth to grow and float slowly down the waterways. The third reason goes back to salt water intrusion into Dog River. Water Hyacinth will die in salt water and will not grow in brackish water (NSW Government 2010). We can gain an idea of the areas of brackish and salt water in Dog River just by locating the plant, black needlerush, *Juncus roemerianus*, which covers coastal areas of brackish and saltwater, and is native to the Dog River area (UFL IFAS 2013). I believe that the combination of each of these factors is the reason we are not seeing a large number of water hyacinth in not just these areas, but the Dog River watershed as a whole.

To test this new hypothesis would first require data on the flow of water during both rainfall and non-rainfall events. You could use this data to find out if the current is strong enough to push the water hyacinth down in to the salt water areas. Second, would require data to prove that the salinity of the water in Dog River would be enough to prevent the growth of water hyacinth and could kill the water hyacinth. You would also have to find out how far salt water intrusion has gone into Dog River.

Conclusion:

This is an important issue that has caused trouble for many regions around the world causing damage to the natural environment as well as the economy of the area. Florida and Louisiana are great examples of regions that have been fighting water hyacinth. They are using state funds to clean up large areas of water hyacinth just so boats can get through water ways.

The areas that could be affected by water hyacinths are both residential areas and unique wetland ecosystems that need to be protected. If water hyacinths establish themselves in these areas it is very likely that they will have a terrible effect on the Dog River habitat. Dog River is a rare luxury that few cities have and should be protected and maintained for future generations. The watershed should continue to be monitored, so that water hyacinth never becomes a problem for Mobile. I also believe that my hypothesis for why it has yet to gain a foothold in Dog River should be further explored to provide more information to others.

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