

# Ross Barnett Backwater Restoration: 2012 Pilot Project



A Report to the Pearl River Valley Water Supply District

**Bradley T. Sartain and John D. Madsen**

Mississippi State University  
Geosystems Research Institute  
Box 9627, Mississippi State, MS 39762-9627

Geosystems Research Institute Report 5056  
January 2013



**MISSISSIPPI STATE**  
UNIVERSITY™



# **Ross Barnett Backwater Restoration: 2012 Pilot Project**

---

## **INTRODUCTION**

The Ross Barnett Reservoir, located in central Mississippi, is a 33,000 acre water supply reservoir that was constructed in the early 1960's. The Ross Barnett Reservoir is the largest surface water impoundment within the state, and is a popular recreation area for boaters, water skiers, anglers, campers, and other users. In addition to recreation, it also provides shoreline commercial and residential land developments, as well as, a vast expanse of wildlife habitat (Cox et al. 2010). The construction of the Ross Barnett Reservoir created excellent habitat for sport-fish such as largemouth bass, bluegill sunfish, and both black and white crappie. In particular, the former oxbow lakes and backwater areas were prime habitat for fish reproduction and recruitment. With the Ross Barnett Reservoir now in its fifth decade, many of these backwater areas have since filled in with emergent vegetation, which has led to increased sedimentation, created poor habitat for fish reproduction, and made access by hunters and fisherman nearly impossible.

## **OBJECTIVES**

Objectives were to 1) reopen these areas as bass habitat to sustain bass reproduction, as well as reproduction for other fishes, and 2) re-establish access for hunters and fisherman to these backwater resources, enlarging the recreational opportunities in the Ross Barnett Reservoir. While that is the stated purpose, we want to ensure through monitoring that the herbicide treatments are in fact restoring habitat without adversely affecting fish reproduction, survival and water quality.

## **MATERIALS AND METHODS**

Two backwater areas (River-bend and Twin-sisters, Figure 1) were chosen during the summer of 2012 for herbicide treatment assessments. Both sites were assessed by Mississippi State University Geosystems Research Institute (MSU/GRI), with assistance from the Mississippi Department of Wildlife, Fisheries, and Parks (MDWFP) for pre-treatment and post-treatment plant species composition using a point intercept sampling method. A reference site, River-bend (23 acres), was selected and consisted of 57 sample points (Figure 2), and a treatment site, Twin-sisters (66 acres), was selected and consisted of 69 sampling points (Figure 3). A Trimble Yuma™ (Sunnyvale, California) tablet computer, with an internal global positioning system (GPS), was used to navigate to each point. Presence and absence of plant species was collected by deploying and pulling in a weighted plant sampling rake attached to a rope and by visual observations at each survey point. Depth was also recorded at each point using a depth measuring stick. Spatial data were directly recorded into the tablet computer using FarmWorks Site Mate® software version 11.4 (Hamilton, Indiana). The software enables navigation to specific points and displays attribute and geographic data for this survey. Presence and absence of plant species was averaged over all points sampled within each site and multiplied by 100 in order to obtain percent frequency. Percent frequency comparison of pre-treatment and post-treatment plant occurrence were compared using a McNemar's statistical test.

The herbicide application was applied to the treatment site (Twin Sisters) during July 2012. A mixture of 3 quarts glyphosate/1 quart imazapyr/1 quart non-ionic surfactant was applied per acre. A second treatment was applied several weeks later as a follow up treatment. After all treatments have been concluded, both sites were sampled post treatment on September 13, 2012.

# Ross Barnett Backwater Restoration: 2012 Pilot Project

---

## RESULTS/DISCUSSION

### River Bend

A total of 28 different aquatic and riparian plant species were recorded between both the pre and post treatment sampling periods (Table 1). Alligatorweed (*Alternanthera philoxeroides*) and water hyacinth (*Eichhornia crassipes*) were the two most recorded species over both sampling periods. No American frog's bit (*Limnobium spongia*) was recorded pre-treatment, but a large percentage increase was recorded during the post treatment sampling. This is most likely due to that fact that small plants were more difficult to see and were hidden among stands of water hyacinth during the pre-treatment surveying. River Bend increased in plant canopy and biomass throughout the season and was impassable to boats, other than airboats (Figure 3). With a dense canopy and poor oxygen reaeration potential, it would make for poor fish habitat.

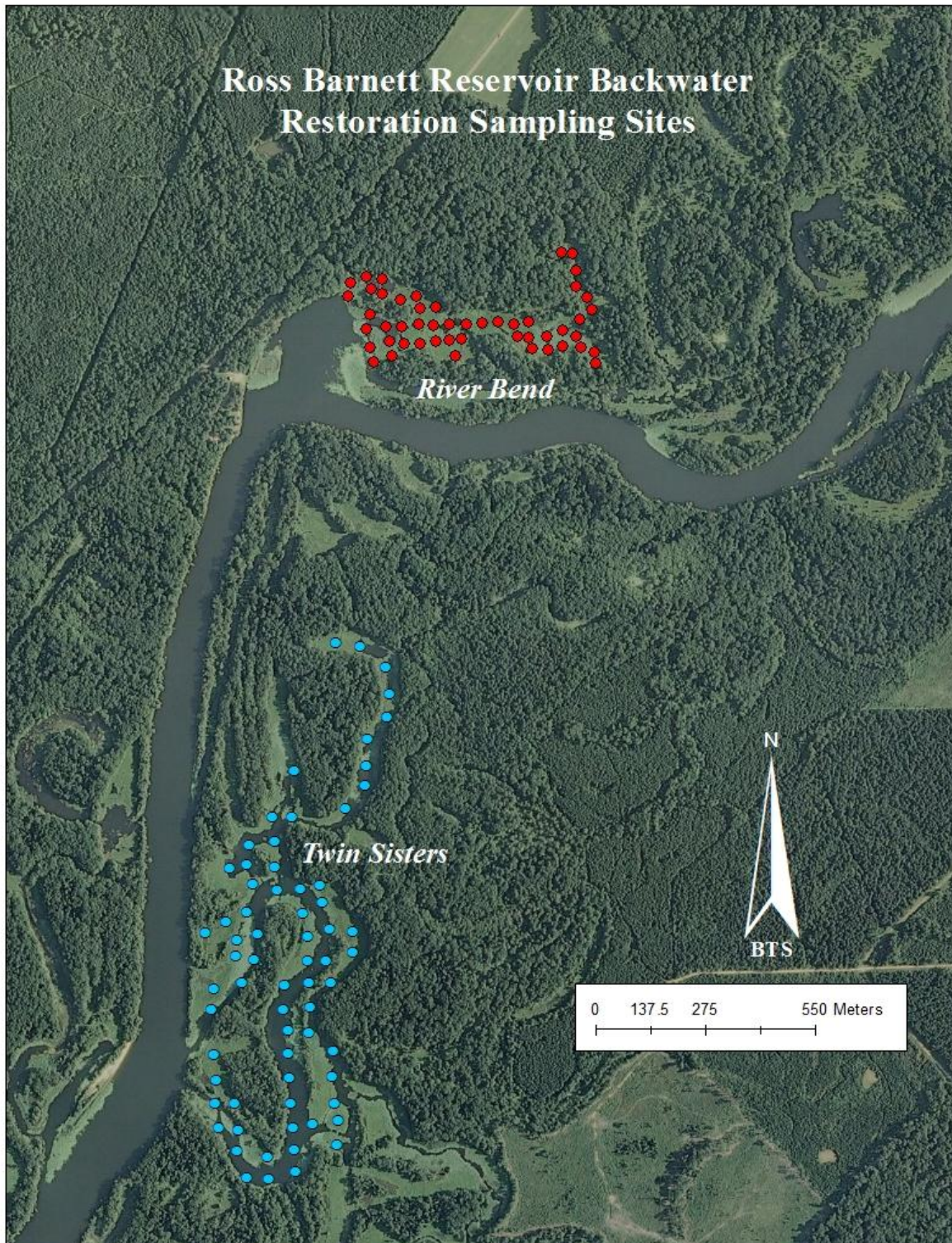
### Twin Sisters

A total of 24 different aquatic and riparian plant species were recorded between both the pre and post treatment sampling periods (Table 1). Alligatorweed and common duckweed (*Lemna minor*) were the most recorded plant species both pre and post treatment. Although, percentage of occurrence was not reduced among several species post-treatment, standing biomass of plants was significantly reduced based off visual observations (Figure 3). Due to the reduction of biomass submersed aquatic plants such as coontail (*Ceratophyllum demersum*) showed a significant increase in occurrence. Some re-growth of plants was occurring after the second herbicide treatment, which could have also contributed to no reduction in percentage of occurrence. Treatments allowed some boat access, and also opened the canopy to allow reoxygenation and improve fish habitat.

## LITERATURE CITED

Cox, M. C., J. D. Madsen, and R.M. Wersal. 2010. Aquatic plant distribution assessment within the littoral zone of the Ross Barnett Reservoir, MS in 2009: A five year evaluation. GRI Report #5038. Geosystems Research Institute , Mississippi State University.

# Ross Barnett Backwater Restoration: 2012 Pilot Project



**Figure 1:** Points sampled both pre and post treatment within each site. River Bend is the reference site, and Twin Sisters is the treatment site.

# Ross Barnett Backwater Restoration: 2012 Pilot Project

**Table 1:** Percentage of occurrence for plant species sample pre and post treatment in River Bend (Reference) and Twin Sisters (Treatment). \*significant change, \*\* not present pre-treatment

Species	Common Name	<u>River Bend</u>		<u>Twin Sisters</u>	
		% Pre	% Post	% Pre	% Post
<i>Alternanthera philoxeroides</i>	alligatorweed	87.50	58.33*	47.14	50.00
<i>Azolla carolinia</i>	mosquito fern	18.75	18.75	2.86	2.85
<i>Cabomba carolinia</i>	fanwort	16.67	10.42	15.71	7.14
<i>Ceratophyllum demersum</i>	coontail	29.17	18.75	18.57	35.71*
<i>Colocasia esculenta</i>	wild taro	0.00	0.00	1.43	0.00
<i>Eichhornia crassipes</i>	water hyacinth	64.58	75.00	15.71	7.14
<i>Hydrilla verticillata</i>	hydrilla	0.00	0.00	1.43	1.42
<i>Hydrocotyle umbellata</i>	pennywort	22.92	10.42	11.43	1.42*
<i>Juncus effusus</i>	common rush	0.00	10.42	0.00	0.00
<i>Lemna minor</i>	common duckweed	39.58	50.00	44.28	67.14*
<i>Limnobium spongia</i>	American frog's bit	0.00	60.42*	0.00	38.57*
<i>Ludwigia peploide</i>	water primrose	37.50	16.67*	41.42	31.42
<i>Myriophyllum aquaticum</i>	parrotfeather	6.25	0.00	1.42	2.85
<i>Najas minor</i>	brittle niaid	0.00	4.17	0.00	0.00
<i>Nelumbo lutea</i>	American lotus	29.17	39.58	32.85	8.57*
<i>Nitella</i>	nitella	0.00	0.00	0.00	0.00
<i>Nymphaea odorata</i>	white waterlily	20.83	12.50	14.28	11.42
<i>Oxycaryum cubense</i>	cuban bulrush	0.00	0.00	15.71	18.57
<i>Pistia stratiotes</i>	water lettuce	0.00	0.00	0.00	0.00
<i>Potamogeton foliosus</i>	leafy pondweed	0.00	0.00	0.00	0.00
<i>Potamogeton nodosus</i>	American pondweed	0.00	0.00	0.00	0.00
<i>Sagittaria latifoli</i>	broadleaf arrowhead	0.00	0.00	0.00	1.42
<i>Sagittaria platyphylla</i>	deltaleaf arrowhead	4.17	0.00	14.28	0*
<i>Schoenoplectus validus</i>	soft stem bulrush	4.17	0.00	2.85	0.00
<i>Spirodella polyrhiza</i>	giant duckweed	35.42	0*	31.42	0*
<i>Typha sp.</i>	cattail	33.33	14.58*	11.42	1.43*
<i>Utricularia vulgaris</i>	bladderwort	8.33	22.92	10.00	2.86
<i>Zizaniopsis miliacea</i>	cut grass	10.42	0.00	7.14	0.00
<i>Brasenia schreberi</i>	water shield	2.08	0.00	0.00	0.00
<i>Polygonum**</i>	smart weed	0.00	43.75	0.00	7.14
<i>Cyperus**</i>	sedge	0.00	35.42	0.00	8.57
<i>Paspalum**</i>	Vasey's grass	0.00	35.42	0	0
	greater marsh St. Johns				
<i>Triadenum**</i>	wort	0.00	4.17	0	0
<i>Platanthera flava**</i>	pale green orchid	0.00	6.25	0	0
<i>Sacciolepis striata**</i>	American cupscale	0.00	2.08	0.00	0.00
Total Species richness		4.71	5.50	3.41	3.05
Native Species Richness		3.06	4.13	2.59	2.26
Invasive Species Richness		1.55	1.38	0.83	0.8

## Ross Barnett Backwater Restoration: 2012 Pilot Project

---



**Figure 2:** Photos of Twin Sisters treatment site pre-treatment (left) and post treatment (right). Twin Sisters was treated twice during the summer with herbicides.

## Ross Barnett Backwater Restoration: 2012 Pilot Project

---



**Figure 3:** Photos of River Bend control site pre-treatment (left) and four weeks after the second treatment to the other site (right). River Bend was a reference site, and was not treated with herbicides.