

# Grand Bay National Estuarine Research Reserve

## System Wide Monitoring Program

Thousands of years ago, a river flowed south-southeast through Mississippi into the Point aux Chenes Bay-Grand Bay area forming a delta. It remains unresolved as to which river formed the delta, either the Escatawpa River or the Pascagoula River, although the Escatawpa River is the most widely accepted theory. The deterioration of the delta began when the two rivers joined and started flowing south-southwest into the Mississippi Sound, as the southern portion of the Pascagoula River. In 1999, this retrograding delta became home to the 24th National Estuarine Research Reserve (NERR), the Grand Bay NERR, a predominately marine system.

Since the designation of the National Reserve system, many exciting programs have been launched. In the early 1990's, scientists began developing a monitoring program to track environmental and biological changes within each reserve. These early discussions led to the inception of the System-wide Monitoring Program, known by its acronym SWMP (pronounced "swamp"). SWMP is a three-part program, consisting of water quality monitoring, meteorological monitoring, and nutrient monitoring. The objectives of the program are: 1) to provide a three-dimensional assessment of the reserve through the analysis of the water, air and soil found within the reserve, 2) to identify and track short-term variability and long-term changes in the integrity and biodiversity of each reserve, and 3) to provide information used to aid coastal decision makers at local, regional, and national levels.

The water quality component was initiated at two sites within the Grand Bay NERR in January 2004. The addition of



two more sites in March 2004, met the four-site requirement set forth by national guidelines. Two sets of four YSI-Endeco 6600 data sondes are rotated at field locations to provide each site with a clean and calibrated sonde as needed. A ninth sonde is used to perform field quality assurance and quality control checks on the retrieved sondes. Data loggers within the sondes record water temperature, depth, conductivity, salinity, dissolved oxygen, pH, and turbidity every fifteen minutes. The sondes are deployed in stainless steel sleeves at fixed locations around the reserve. Active water quality sampling stations are located in Bayou Heron, Point Aux Chenes Bay, Bayou Cumbest, and Bangs Lake.

Data for the Bangs Lake site are available at the following web addresses:  
<http://cdmo.baruch.sc.edu/QueryPages/googlemap.cfm>

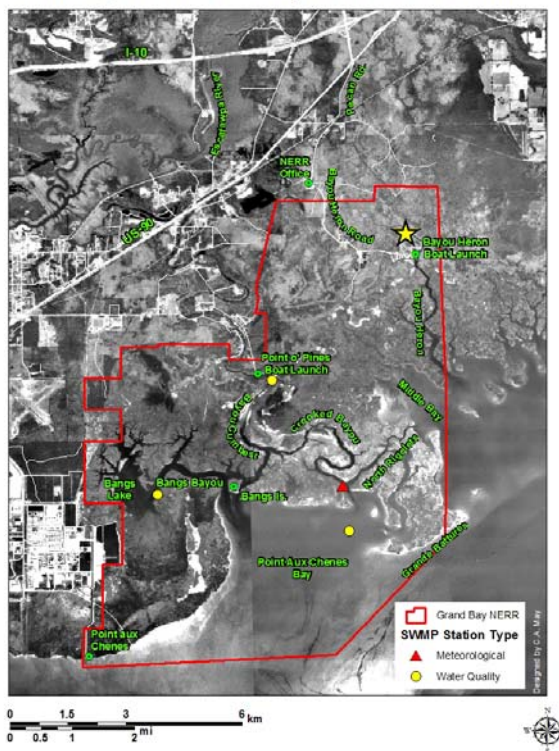
**For additional information, please contact Christine Walters or Mark Woodrey @ (228) 475-7047.**

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**Bayou Heron (BH):** [30° 25.068'N, 88° 24.324'W]. The Bayou Heron site provides water quality data for the Bayou Heron sub-watershed. The water depth range is from 0.16 m to 1.69 m and the salinity range is from 0.0 ppt to 25.9 ppt. The depth readings represent the water depth above the depth sensor, which is located 0.5 m above the bottom. Salinity tends to decrease rapidly when rain events occur at the site or within the watershed. Because the sensor is located near the bottom and there are no major sources of freshwater into this bayou, it has been concluded that some source of freshwater exists close to the bottom of the bayou. Hydrology studies are being designed to further understand this occurrence. This site tends to become hypoxic during warmer months (May – October). The bottom type is soft muddy sediments. Water quality readings have been collected at this site since January 2004.

Grand Bay NERR - Base Map with SWMP Stations



Month	Temperature (°C)	Salinity (ppt)	Dissolved Oxygen (mg/l)	Depth (m)	pH
January	16.2 ± 1.51	22.5 ± 1.53	6.3 ± 1.09	1.11 ± 0.24	7.3 ± 0.22
February	16.2 ± 1.32	16.5 ± 2.77	5.8 ± 2.63	1.18 ± 0.22	7.0 ± 0.20
March	19.8 ± 1.87	16.6 ± 1.97	6.0 ± 1.10	1.32 ± 0.21	7.2 ± 0.27
April	24.5 ± 1.68	17.8 ± 1.05	5.4 ± 1.01	1.33 ± 0.22	6.9 ± 0.23
May	26.6 ± 2.50	19.1 ± 4.02	2.9 ± 1.12	1.30 ± 0.21	6.8 ± 0.36
June	30.3 ± 0.74	27.1 ± 1.70	3.3 ± 1.50	1.30 ± 0.22	6.8 ± 0.20
July	31.2 ± 0.91	25.2 ± 1.02	2.7 ± 1.38	1.36 ± 0.19	6.9 ± 0.19
August	31.3 ± 0.60	23.1 ± 0.83	1.2 ± 1.00	1.36 ± 0.18	6.8 ± 0.15
September	29.5 ± 1.03	23.3 ± 1.33	1.4 ± 1.16	1.43 ± 0.18	6.9 ± 0.17
October	24.3 ± 2.58	25.9 ± 1.56	3.2 ± 1.22	1.42 ± 0.23	7.1 ± 0.27
November	18.1 ± 2.32	23.4 ± 3.40	5.8 ± 1.51	1.31 ± 0.24	7.4 ± 0.39
December	15.5 ± 2.68	22.1 ± 3.20	5.4 ± 2.39	1.28 ± 0.23	7.1 ± 0.39

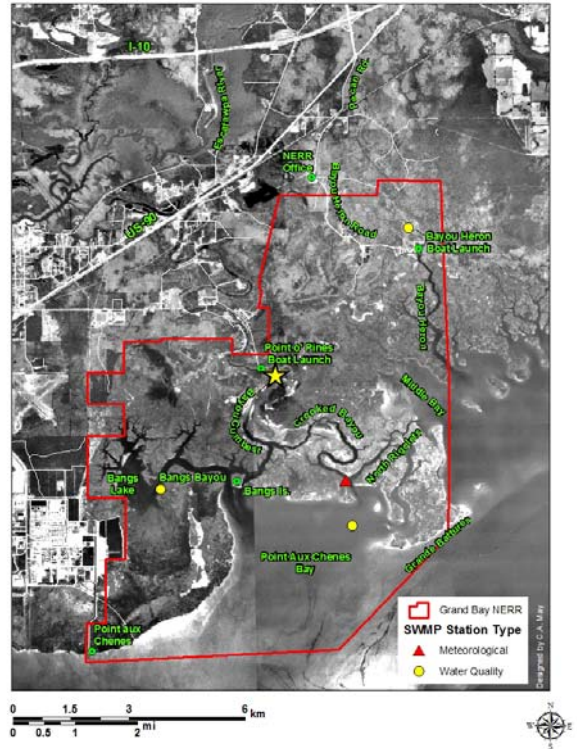
\*These averages (± SD) are based on 2006 water quality data and are for informational purposes only. For additional information, please contact Christine Walters or Mark Woodrey @ (228) 475-7047.

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## System Wide Monitoring Program

**Bayou Cumbest (BC):** [30° 23.016'N, 88° 26.184'W]. The Bayou Cumbest site monitors water quality for the Bayou Cumbest sub-watershed. The water depth range is from 0.00 m to 1.10 m and the salinity range is from 0.5 ppt to 27.8 ppt. The depth readings represent the water depth above the depth sensor, which is located 0.5 m above the bottom. The site is located over soft sediments with unconsolidated oyster shell reefs. Water quality readings have been collected at this site since March 2004.

Grand Bay NERR - Base Map with SWMP Stations



Month	Temperature (°C)	Salinity (ppt)	Dissolved Oxygen (mg/l)	Depth (m)	pH
January	15.8 ± 2.33	20.1 ± 5.30	9.9 ± 1.86	0.22 ± 0.20	7.5 ± 0.36
February	15.2 ± 2.16	15.2 ± 5.00	9.5 ± 1.08	0.30 ± 0.17	7.1 ± 0.37
March	19.8 ± 2.20	18.0 ± 3.52	8.2 ± 1.24	0.40 ± 0.18	7.3 ± 0.29
April	24.7 ± 1.92	20.9 ± 1.78	6.5 ± 0.98	0.39 ± 0.21	7.2 ± 0.25
May	27.3 ± 2.53	17.6 ± 4.88	5.9 ± 1.28	0.38 ± 0.20	7.0 ± 0.28
June	30.3 ± 1.44	28.1 ± 1.64	5.3 ± 1.16	0.38 ± 0.21	7.1 ± 0.20
July	30.9 ± 1.51	27.7 ± 1.48	5.2 ± 1.17	0.41 ± 0.18	7.1 ± 0.19
August	31.4 ± 1.32	19.6 ± 4.03	5.5 ± 1.71	0.43 ± 0.17	7.1 ± 0.22
September	28.6 ± 1.78	19.5 ± 4.76	4.9 ± 1.32	0.48 ± 0.18	6.9 ± 0.23
October	23.6 ± 3.44	24.2 ± 4.55	6.0 ± 1.72	0.47 ± 0.22	7.5 ± 0.40
November	17.8 ± 2.92	19.3 ± 6.45	7.9 ± 1.33	0.39 ± 0.19	7.7 ± 0.45
December	14.4 ± 3.47	19.7 ± 6.54	7.9 ± 1.18	0.38 ± 0.19	7.9 ± 0.46

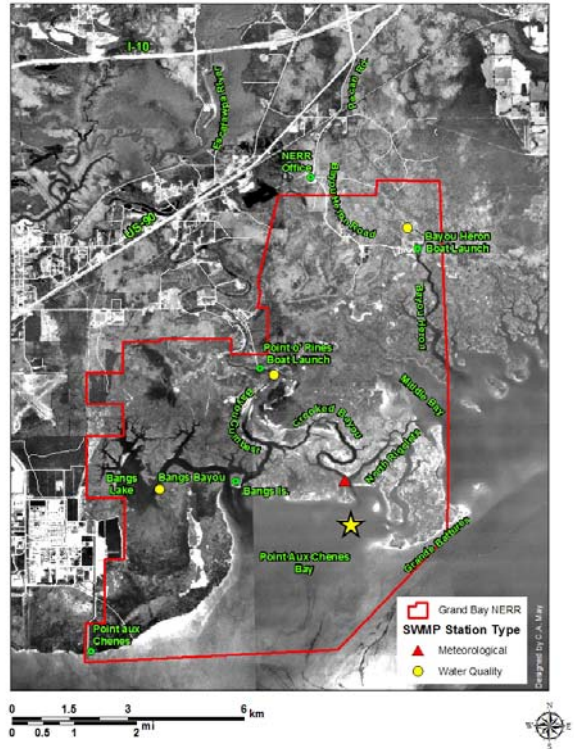
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## System Wide Monitoring Program

**Point Aux Chenes (PC):** [30° 20.916'N, 88° 25.112'W]. The Point Aux Chenes site is the most southern water quality site within the boundaries of Grand Bay NERR. It is located in Point Aux Chenes Bay and is highly influenced by the Mississippi Sound. The water depth range is from 0.30 m to 1.60 m and the salinity range is from 17.2 ppt to 32.1 ppt. The depth readings represent the water depth above the depth sensor, which is located 0.5 m above the bottom. The bottom type is soft muddy sediments. Water quality readings have been collected at this site since August 2005.

Grand Bay NERR - Base Map with SWMP Stations



Month	Temperature (°C)	Salinity (ppt)	Dissolved Oxygen (mg/l)	Depth (m)	pH
January	14.9 ± 2.15	27.7 ± 1.91	9.1 ± 0.87	0.82 ± 0.23	8.2 ± 0.12
February	14.2 ± 1.98	21.1 ± 3.32	9.8 ± 1.25	0.92 ± 0.22	8.2 ± 0.17
March	18.6 ± 2.06	19.1 ± 4.70	8.2 ± 0.95	1.04 ± 0.20	8.1 ± 0.15
April	24.0 ± 1.79	20.0 ± 1.43	6.8 ± 0.90	1.04 ± 0.20	7.9 ± 0.15
May	26.2 ± 2.24	22.3 ± 2.64	6.9 ± 0.81	1.04 ± 0.21	7.9 ± 0.21
June	29.4 ± 1.19	27.4 ± 1.26	6.4 ± 0.92	1.00 ± 0.21	7.9 ± 0.14
July	29.3 ± 1.21	27.7 ± 1.25	6.2 ± 0.87	1.04 ± 0.18	7.9 ± 0.13
August	30.6 ± 1.03	26.5 ± 1.01	6.2 ± 1.01	1.01 ± 0.17	8.0 ± 0.12
September	29.3 ± 1.94	25.7 ± 2.11	6.2 ± 1.05	1.03 ± 0.18	8.0 ± 0.19
October	23.1 ± 3.53	27.9 ± 1.58	7.8 ± 1.13	1.04 ± 0.22	8.2 ± 0.13
November	16.4 ± 3.10	27.7 ± 1.90	9.0 ± 1.10	0.90 ± 0.24	8.4 ± 0.18
December	13.7 ± 3.21	25.6 ± 2.09	9.2 ± 1.07	0.91 ± 0.23	8.1 ± 0.28

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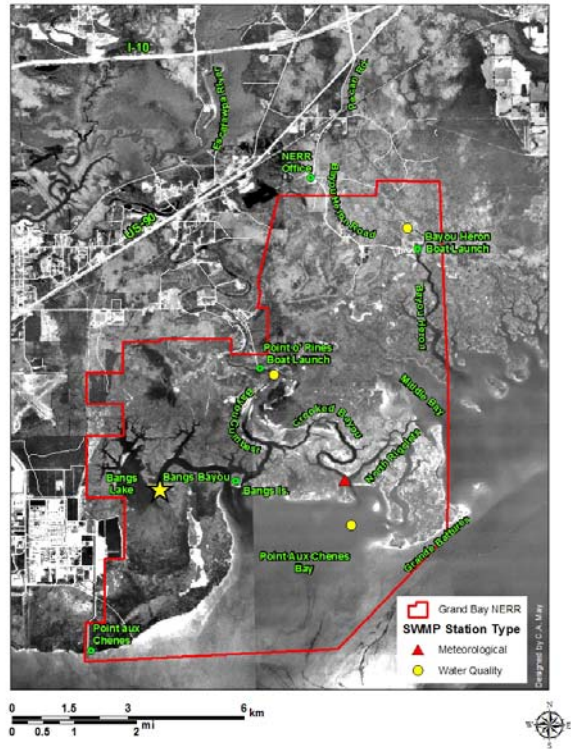
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**Bangs Lake (BL):** [30° 21.426'N, 88° 27.774'W]. The Bangs Lake site monitors the water quality of the Bangs Lake sub-watershed. The water depth range is from 0.00 m to 1.37 m and the salinity range is from 9.6 ppt to 28.0 ppt. The depth readings represent the water depth above the depth sensor, which is located 0.5 m above the bottom. The site is located over a soft sediment bottom. Water quality readings have been collected at this site since March 2004 and are available at the following web address:

<http://cdmo.baruch.sc.edu/QueryPages/googlemap.cfm>.

Grand Bay NERR - Base Map with SWMP Stations



Month	Temperature (°C)	Salinity (ppt)	Dissolved Oxygen (mg/l)	Depth (m)	pH
January	15.1 ± 2.66	27.2 ± 1.56	8.9 ± 1.06	0.21 ± 0.20	8.1 ± 0.21
February	14.3 ± 2.42	20.8 ± 2.89	9.5 ± 0.93	0.29 ± 0.17	8.0 ± 0.19
March	19.1 ± 2.26	20.8 ± 2.11	8.2 ± 1.12	0.39 ± 0.18	8.0 ± 0.29
April	24.2 ± 1.93	21.3 ± 1.05	7.1 ± 1.07	0.37 ± 0.21	7.7 ± 0.23
May	26.6 ± 2.54	21.5 ± 2.72	6.7 ± 1.05	0.35 ± 0.19	7.7 ± 0.28
June	29.9 ± 1.37	28.9 ± 0.78	5.7 ± 1.10	0.37 ± 0.22	7.5 ± 0.20
July	30.8 ± 1.37	28.8 ± 0.68	5.4 ± 1.14	0.44 ± 0.19	7.4 ± 0.18
August	30.8 ± 1.21	25.2 ± 1.38	5.1 ± 1.29	0.41 ± 0.17	7.5 ± 0.18
September	28.0 ± 1.72	25.4 ± 1.72	5.0 ± 0.94	0.50 ± 0.18	7.4 ± 0.23
October	23.1 ± 3.76	29.0 ± 1.09	6.0 ± 1.36	0.47 ± 0.22	7.6 ± 0.30
November	16.6 ± 3.12	26.3 ± 1.70	8.0 ± 0.99	0.41 ± 0.20	8.0 ± 0.27
December	13.7 ± 3.71	24.8 ± 2.33	8.8 ± 1.30	0.39 ± 0.19	7.9 ± 0.29

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