The Bonnet Carré Spillway has been opened for a total of 115 days in 2019.

Hurricane Barry made landfall in southern Louisiana on July 13 as a Category 1 hurricane, and its passage south of Mississippi influenced waters of the Mississippi Sound.
- The weather system originated in northwestern Georgia, entered the Gulf of Mexico south of Tallahassee, Florida, and moved along a generally westerly track before shifting north and making landfall at Marsh Island, Louisiana.
- As the storm passed south of Mississippi, the system’s cyclonic circulation (from the southeast) pushed high-salinity marine water to the northwest and locally into the Mississippi Sound temporarily increasing salinity levels generally from July 10 to 14 (Figure 1); with the passage of the storm, salinity levels have returned to pre-hurricane levels and remain relatively low in the western Sound compared to the prior three years (Figure 2).

Expanded sampling was conducted by USM on July 17 to assess water quality conditions throughout the Mississippi Sound.
- Despite the passage of Hurricane Barry which temporarily increased salinity in the Mississippi Sound, salinity levels in the western Mississippi Sound remained low for both surface and bottom measurements (Figure 3).
- Dissolved oxygen levels measured on July 17 (Figure 4) showed a marked increase compared to the prior week’s measurements (Figure 5). The increased oxygen levels can likely be attributed to the higher wave conditions and associated mixing of surface and bottom water layers brought on by the passage of Hurricane Barry in the preceding days.

Notable Field Observations on July 17 for Stations 1-7: Large algal bloom observed on the surface of the water between the two westernmost stations.

Notable Field Observations on July 17 for Stations 8-16: Higher dissolved oxygen readings compared to prior sampling events.

Water contact warnings remain in effect for coastal waters immediately adjacent to Mississippi Gulf Coast beaches (http://opcgis.deq.state.ms.us/beaches/) as a result of the presence of a freshwater cyanobacteria capable of producing toxins (http://www.epa.gov/cyanohabs/learn-about-cyanobacteria-and-cyanotoxins).

- The MDMR Harmful Algal Bloom (HAB) Response Team has analyzed 399 water samples from June 12 to July 15, 2019, and is continuing to see an abundance of the freshwater cyanobacteria, Microcystis.
- Water samples from all 21 MDEQ Beach Monitoring sites were sent to Green Water Laboratory, a HAB and Algal Toxin Testing Lab in Palatka, Florida, for additional toxin analysis following the passage of Hurricane Barry. Results received on July 18 revealed Microcystins were not determined to be present above the Method Reporting Limit of 0.3 ng/mL in any of the samples.
- Additional samples from more offshore waters of the Mississippi Sound are being collected and analyzed by USM and MDMR.
- The MDMR is continuing to test water and fish samples to ensure seafood safety in Mississippi waters and is advising fishermen to avoid catching seafood in waters where algae is present. Thus far, water samples tested by MDMR and the National Oceanic and Atmospheric Administration have not shown toxin levels high enough to warrant concern for consumption of local seafood. Recreational and commercial fishing offshore in Mississippi waters remains unaffected by the algal bloom and is safe for consumption. The MDMR is committed to frequent sampling to ensure the safety for fresh, locally-caught seafood.
-Seafood samples from a variety of finfish species, shrimp and blue crab were analyzed for cyanotoxins to include saxitoxin, anatoxin-a, microcystins and cylindrospermopsin. Results indicated that no cyanotoxins were detected above the Method Detection Limit in the meat samples from shrimp, fish and crab. Subsequent samples will be sent for additional analysis.

Report any unusual observations associated with the Bonnet Carré spillway opening to the USM Hotline at 228-818-8099. Dolphin and turtle strandings should be reported to the IMMS 24-hour hotline at 888-767-3657.
Modeling of surface salinities for July 16 illustrates the interaction of freshwater outflow primarily associated with the Bonnet Carré spillway and typical coastal circulation patterns influenced by wind, ocean currents and tides (Figure 6); animated imagery available at http://131.95.1.37/~BCS_share/CircModel/hourly/20190716/ngofs_saltUV_20190716.gif. Note that the model projects a persistence of lower salinity waters along the central Mississippi coastline as the two water masses interact throughout the course of a day. Image Interpretation: Warmer colors (yellow to red) represent higher salinity waters typically observed in the region, while cooler colors (blue) are representative of lower salinity waters primarily associated with the freshwater influence from the Bonnet Carré spillway discharge in the western Mississippi Sound. Source: USM

Preliminary reports for June 2019 show the catches of shrimp in fishery-independent monitoring trawls were down approximately 59% compared to the prior five-year average (Figure 7), with white shrimp comprising 68% of the overall catch. In the previous five years, brown shrimp had comprised approximately 80% of the landings for the month of June. Source: MDMR

For July 2019 (to 7/18/19), two dead dolphins and three dead sea turtles have been reported. At total of 135 dead dolphins and 180 dead turtles have been reported during 2019. Source: IMMS

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Figure 1. Daily salinity measurements from May 01 to July 18, 2019, at USGS/MDMR gauges in the Mississippi Sound. Increased salinity levels observed were a result of the passage of Hurricane Barry, with salinities subsequently decreasing to generally pre-hurricane levels thereafter. Source: USGS/MDMR
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Figure 2. Daily salinity measurements for the period of February 01 to July 18 for 2016 (blue), 2017 (black), 2018 (green) and 2019 (red) at stations in the western and central Mississippi Sound (Source: USGS/MDMR). Gaps in data lines are periods of no data collection at gauge sites. Note that the Bonnet Carré spillway was also opened in 2016 (22 days) and 2018 (30 days).

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Figure 3. Depiction of surface and bottom salinity levels in the Mississippi Sound for July 17, 2019, as extrapolated from field data at expanded water quality stations (yellow squares). Salinity continues to remain low in the western Sound as a result of the Bonnet Carré freshwater discharge. Source: USM

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Figure 6. Screen shot of regional surface salinity model animation for July 16; animation of modeled salinity circulation is available at http://131.95.1.37/~BCS_share/CircModel/hourly/20190716/ngofs_saltUV_20190716.gif. Depiction illustrates the interaction of freshwater outflow primarily associated with the Bonnet Carré spillway and typical coastal circulation patterns influenced by wind, ocean currents and tides. Modeled persistence of lower salinity waters along the central Mississippi coastline is indicated with black arrows. For general interpretation, warmer colors (yellow to red) represent higher salinity waters typically observed in the region, while cooler colors (blue) are representative of lower salinity waters primarily associated with the freshwater influence from the Bonnet Carré spillway discharge in the western Mississippi Sound. Source: USM
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Figure 7. Comparison of shrimp catch per unit effort (CPUE, g) from Mississippi monitoring stations by month for 2019 (red) and the prior five-year average (blue) for January to June; preliminary data subject to revision. Source: MDMR

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