

HARMFUL ALGAL BLOOMS (HABS) IN THE GULF OF MEXICO



GULF STATES MARINE FISHERIES COMMISSION

March 16, 2016

Holiday Inn, San Antonio Riverwalk

San Antonio, Texas

Commissioners and Proxies

ALABAMA

N. Gunter Guy Jr.
Alabama Department of Conservation
and Natural Resources
64 North Union Street
Montgomery, AL 36130-1901
Proxy:
Chris Blankenship, Director
ADCNR, Marine Resources Division
P.O. Box 189
Dauphin Island, AL 36528

Representative Steve McMillan
P.O. Box 337
Bay Minette, AL 36507

Chris Nelson
Bon Secour Fisheries, Inc.
P.O. Box 60
Bon Secour, AL 36511

FLORIDA

Nick Wiley, Executive Director
FL Fish and Wildlife Conservation Commission
620 South Meridian Street
Tallahassee, FL 32399-1600
Proxy:
Dan Ellinor
FL Fish and Wildlife Conservation Commission
620 South Meridian Box 4B2
Tallahassee, FL 32399-1600

Senator Thad Altman
314 Senate Office Building
404 South Monroe Street
Tallahassee, FL 32399-1100

Michael Hansen
393 Cooperwood Road
Crawfordville, FL 32327

LOUISIANA

Charles Melancon, Secretary
LA Department of Wildlife and Fisheries
P.O. Box 98000
Baton Rouge, LA 70898-9000
Proxy:
Toby Gascon

LDWF
P.O. Box 98000
Baton Rouge, LA 70898-9000

Senator R.L. "Bret" Allain, II
600 Main Street, Suite 1
Franklin, LA 70538

John E. Roussel
7072 Wayne Floyd Road
Gonzales, LA 70737

MISSISSIPPI

Jamie Miller, Executive Director
Mississippi Department of Marine Resources
1141 Bayview Avenue
Biloxi, MS 39530
Proxy:
Kelly Lucas
MSDMR
1141 Bayview Avenue
Biloxi, MS 39530

Joe Gill, Jr.
Joe Gill Consulting, LLC
P.O. Box 535
Ocean Springs, MS 39566-0535

Joe Gill, Jr.
Joe Gill Consulting, LLC
P.O. Box 535
Ocean Springs, MS 39566-0535

TEXAS

Carter Smith, Executive Director
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, TX 78744
Proxy
Robin Riechers or Mark Lingo
Texas Parks and Wildlife Department
4200 Smith School Road
Austin, TX 78744

Troy Bello Williamson, II
P.O. 967
Corpus Christi, TX 78403

General Session
Harmful Algal Blooms (HABs) in the Gulf of Mexico
Wednesday, March 16, 2016
San Antonio, TX
8:30 am – 12:00 noon

- HABs in the Gulf of Mexico: Impacts on Fisheries – *Michael Wetz*, Texas A&M University–Corpus Christi
- Overview of State HAB Programs and the Data Collected During the 2015-2016 Red Tide Event.
 - Texas – *Alex Nuñez*, Texas Parks and Wildlife Department
 - Louisiana – *Gordon LeBlanc*, Louisiana Department of Health & Hospitals
 - Mississippi – *Kristina Broussard*, Mississippi Department of Marine Resources
 - Alabama – *Carol Dorsey*, Alabama Department of Public Health
 - Florida – *Kate Hubbard*, Florida Fish and Wildlife Conservation Commission
- NOAA’s HAB Program and Operational Forecast System – *Kate Derner*, NOAA
- The Gulf of Mexico Ocean Observing System Regional Association (GCOOS) and our vision for HAB Observing – *Barb Kirkpatrick*, GCOOS
- Overview of Gulf of Mexico Alliance Efforts to Address HABs and Future Gulf-wide Needs – *Kate Hubbard*, Florida Fish and Wildlife Conservation Commission

Following this general session, there will be a discussion on the ways states can coordinate activities during future widespread HAB events in the Technical Coordinating Committee’s meeting (1:30 – 5:00 pm).

Overview of Harmful Algal Bloom (HAB) Programs in the Gulf of Mexico with Relevant Points of Contact

ALABAMA:

Alabama has about 100 miles of coastline along the Gulf of Mexico and in Mobile Bay and Mississippi Sound. In past years there have been blooms of numerous HAB species including *Karenia brevis*, responsible for fish-kills and hypoxia. There are sharp gradients from very turbid, nutrient-rich, to very clear, nutrient-depleted waters. Consequently, optically-based monitoring is very difficult. The high diversity within the microalgae makes chlorophyll an unreliable proxy for HAB abundance.

AL has three tiers of HAB monitoring:

1st tier: State and federal agencies are coordinated through Alabama Department of Public Health (ADPH). These state agencies, including Conservation and Natural Resources and the Department of Environmental Management, monitor Gulf beaches and oyster-growing areas in Mobile Bay, with further adaptive sampling during blooms. ADPH has regulatory authority over oyster harvesting. Routine monitoring is weekly, bi-weekly or quarterly, depending on site and season. Data include cell counts and (usually) temperature and salinity.

2nd tier: Volunteer network (initiated by the NOAA Phytoplankton Monitoring Network (PMN)) that report to the PMN database, is a small but significant effort in the Little Lagoon area of Baldwin County. These inshore waters are not routinely sampled by ADPH. The relatively low level of training can reduce reliability as a monitoring tool, but the volunteer network is an excellent education and outreach opportunity. Biweekly sampling includes relative abundance of net plankton, physical hydrography, chlorophyll a, nutrients, etc.

3rd tier: Instrument arrays are maintained by National Data Buoy Center (NDBC) (one site on Dauphin Island), Dauphin Island Sea Lab/Mobile Bay National Estuary Program (three sites in Mobile Bay, one in Perdido Bay is pending), US Geological Survey / Alabama Department of Conservation and Natural Resources (one site in Wolf Creek) and the Weeks Bay National Estuarine Research Reserve (four sites in Weeks Bay). Data vary by site, but include hourly meteorology and hydrography (temperature, salinity, dissolved oxygen). High fouling rate in Mobile Bay and Weeks Bay limits potential application of optical sensors because of the need for daily or near-daily cleaning.

HAB Contact Information for Alabama:

Byron Webb, Shellfish Specialist

Alabama Department of Public Health- Seafood Branch

Phone: (251) 433-2428

byron.webb@adph.state.al.us

Drew Sheehan, Senior Microbiologist

Alabama Department of Public Health, Mobile Division Laboratory

757 Museum Drive Mobile, AL 36608. Phone: (251) 344-6049.

drew.sheehan@adph.state.al.us

Chris Blankenship, Director

Alabama Marine Resources Division

Dauphin Island Office

P.O. Box 189 Dauphin Island, AL 36528

Phone: 251-861-2882

Chris.blankenship@dcnr.alabama.gov

Jason Herrmann

Alabama Marine Resources Division- Mobile County

Dauphin Island Office

P.O. Box 189 Dauphin Island, AL 36528

Phone: 251-861-2882

Jason.herrmann@dcnr.alabama.gov

Chris Denson

Alabama Marine Resources Division- Baldwin County

Gulf Shores Office

P.O. Box Drawer 458 Gulf Shores, AL 36547

Phone: 251-968-7576

Chris.Denson@dcnr.alabama.gov

Mark Ornellas

Alabama Department of Environmental Management

Phone: (251) 450-3400

meo@adem.state.al.us

FLORIDA:

Greater than 70 nuisance or toxic HAB species have been identified in estuarine and marine waters of Florida, which cover thousands of miles of coastline. The state of Florida has tasked the Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute (FWC/FWRI) to monitor HABs in state waters and mitigate their negative effects. The monitoring efforts of FWC/FWRI largely focus on the dinoflagellates *Karenia brevis* and *Pryodinium bahamense* and diatoms in the genus *Pseudo-nitzschia*, organisms for which regulatory actions (e.g., shellfish harvesting area closures) are established; however, when blooms of other harmful taxa occur, management activities are initiated. HAB monitoring is accomplished through a unique collaboration between FWC/FWRI, the Florida Department of Agriculture and Consumer Services (FDACS), Mote Marine Laboratory (MML), the University of South Florida (USF), county agencies, other private non-profit agencies, and citizen volunteers (i.e., the Red Tide Offshore Monitoring Program). Together, this team collects samples alongshore or by boat; deploys underwater vehicles to map blooms; uses satellite images to measure bloom extent and distribution; and produces short-term forecasts of bloom movement (see organizational efforts below). Ancillary physical, chemical and biological data are available with discrete HAB samples collected through the monitoring efforts of FWC/FWRI and MML, but the remaining network of samplers typically collect samples for HAB analysis only. HAB samples are analyzed via microscopy, and the results are reported to managers and stakeholders via daily reports, weekly web bulletins (www.MyFWC.com/RedTideStatus), weekly recordings (866-300-9399), regional conference calls, and social media (e.g., www.Facebook.com/FLHABs, <http://on.fb.me/1Dpq9fu>). At present, weekly

web bulletins focus on *K. brevis*, and include static tables and maps, interactive Google Earth maps, and custom products (i.e., overlays of cell abundance and satellite images, forecast information).

1. Collaboration between FWC/FWRI and FDACS: Routinely and in response to blooms, FWC/FWRI provides the FDACS with HAB abundance and toxicity data used to manage legal shellfish harvesting areas. For *K. brevis*, FDACS closes shellfish harvest areas when concentrations equal to or greater than 5,000 cells L⁻¹ are detected in harvest areas. When *P. bahamense* is present in a harvest area at any level or when *Pseudo-nitzschia* spp. abundance approaches or exceeds 106 cells L⁻¹, shellfish testing begins; harvest is temporarily closed if saxitoxin or domoic acid exceed established guidance levels. Shellfish harvest areas are reopened only when HABs dissipate from the areas and toxin concentrations in shellfish are below federal guidance thresholds (i.e., brevetoxin <20 MU/100 gm, saxitoxin < 80 µg equivalents/100 gm, domoic acid < 2 mg/100 gm). Researchers at FWC/FWRI are currently working in collaboration with federal partners to validate improved toxicity tests for brevetoxin and saxitoxin.
2. FWC/FWRI-MML Cooperative Program: FWC/FWRI operates a cooperative program with MML to support monitoring of *K. brevis* in Florida. The ongoing program fills major gaps in red tide monitoring, research, and public education. Through the program, MML routinely monitors coastal waters along Sarasota County and the Florida Keys, leads event response efforts, and supports the Sarasota Operations Coastal Ocean Observing Laboratory (SO-COOL), and Beach Conditions Reporting System (BCRS).
3. USF/FWC Collaboration for Prediction of Red Tides (CPR): The CPR is a joint effort between researchers at the USF and FWC/FWRI, which utilizes physical and biological models in conjunction with monitoring data and satellite imagery to provide forecasts of red tide movements in Florida waters. A HAB tracking tool projects 3.5 surface and bottom movement by using modeled particle trajectories originating from *K. brevis* sampling locations (http://ocgweb.marine.usf.edu/hab_tracking/HAB_trajectories.html). This tool is driven by a fully automated, nested circulation model running daily with the results available on the web (<http://ocgweb.marine.usf.edu/>). In the last few years, the tracking tool has been improved by the transition to FVCOM, an expanded grid, passive tracers, and the incorporation of the vertical dimension of the water column. FWC/FWRI, MML and the USF are currently planning an expansion of the core monitoring infrastructure along the southwest Florida Shelf to support the development of seasonal bloom forecasts.
4. Collaboration between FWC/FWRI and the USF's Optical Oceanography Laboratory (OOL): FWC/FWRI routinely uses satellite imagery provided by the OOL at the USF to detect and track surface blooms of *K. brevis* in coastal waters. Satellite images fill offshore gaps, often providing the spatial extent of blooms that frequently cannot be accessed due to patchiness in sampling. Overlays of satellite images with sample results are provided as custom data products in the weekly FWC/FWRI bulletins. In addition, since 2012, the OOL has provided integrated imagery, cell abundance, and surface current files to users at <http://optics.marine.usf.edu/>. This integration provides users with the current status of red tide occurrence (e.g., location, severity, spatial extent), while presenting a simple way to

estimate bloom trajectory, thus delivering an effective method for near real-time tracking of red tides.

5. NOAA Harmful Algal Bloom Operational Forecast System (HAB-OFS): NOAA's HAB-OFS utilizes *K. brevis* data collected by FWC/FWRI and MML, ocean color satellite imagery, and meteorological observations and forecasts to predict *K. brevis* bloom movement, intensification and associated level of respiratory irritation. The forecasts are communicated through HAB-OFS conditions reports and bulletins (<http://tidesandcurrents.noaa.gov/hab/overview.html>). The conditions report includes a forecast of the potential levels of respiratory irritation associated with a *K. brevis* bloom over the next 3-4 day period. This is posted on the web twice a week after confirmation of a bloom, and once a week during the inactive HAB season. Additional bloom analysis is emailed to a subscriber list of state and local coastal resource managers, public health officials, and research scientists.

HAB Contact Information for Florida:

Dr. Kate Hubbard, Research Scientist

Florida Fish and Wildlife Conservation Commission, Fish and Wildlife Research Institute
100 Eighth Ave SE St. Petersburg, FL 33701.

Phone: (727) 502-4961.

katherine.hubbard@myfwc.com

Jillian Fleiger, Environmental Administrator

Shellfish Environmental Assessment Section

Florida Department of Agriculture and Consumer Services
600 S Calhoun Street, Suite 217, Tallahassee, FL, 32399.

Phone: (850) 617-7600.

jillian.fleiger@freshfromflordia.com

LOUISIANA:

The Louisiana Department of Health and Hospitals (LDHH) Molluscan Shellfish Program conducts both a routine Water Quality monitoring program and a HAB monitoring program. Monthly water samples are collected from approximately 700 bacteriological sample stations and examined for fecal coliform. Other parameters recorded include salinity, temperature, and wind speed and direction. Generally at the same time, monthly water samples are collected from 24 HAB sample stations; of these 14 are located east of the Mississippi River. Samples are analyzed for cell counts of *Karenia brevis*, salinity; and other environmental conditions such as turbidity, tides, wind, etc. are collected. In the event that cell counts exceed 5000/L, additional water samples are taken and analyzed by the state laboratory and oyster meats are analyzed for toxins at either the FDA laboratory or a qualified university or private laboratory. If HAB toxins are detected, the information is shared with NOAA, the FDA Shellfish Specialist, and shellfish officials from neighboring states. If toxins are above allowable threshold, affected shellfish areas would be closed to harvest. If beds are closed to harvesting, public advisories are issued by LDHH through press releases, the news media, and the LDHH website.

HAB Contact Information for Louisiana:

Gordon LeBlanc, Program Manager, Molluscan Shellfish Program

Department of Health and Hospitals

628 N. 4th Street P.O. Box 4489 Baton Rouge, LA 70821.

Phone: 225-342-7539 Fax: (225)-342-7617.

gleblanc@dhh.la.gov

MISSISSIPPI:

The Mississippi Department of Marine Resources (MDMR), Shellfish Bureau conducts bimonthly phytoplankton samples during oyster season. The samples are collected at two locations on oyster reefs in the western Mississippi Sound. These locations correspond to the northernmost and southernmost perimeter of productive oyster reefs off the shore of Pass Christian. When an influx of freshwater is released into the western Mississippi sound, a third sampling location is added. This additional site is located within the St Joe Oyster reef southwest of Bayou Caddy near the Louisiana/Mississippi State line.

Bimonthly samples are collected using a 20 µm mesh plankton net and enumerated in-house for the presence of all phytoplankton. Shellfish staff follows the procedures of the NOAA PMN for sampling protocol. All results are recorded in the MDMR data collection program and are reported to PMN. Environmental and water quality data is collected during each sample trip. This includes: air and water temperature, salinity, dissolved oxygen, pH, turbidity, wind speed and direction, and barometric pressure. This data is collected using a hydrolab, secchi disk and Kestrel. Sample qualitative analysis is conducted in the MDMR Marine Fisheries Lab using a phase contrast microscope. In the event of a bloom, quantitative analysis is conducted in-house using an inverted microscope to determine the number of cells per liter.

In addition, MDMR personnel conduct field observations for water discoloration during weekly routine water sampling trips. If an area is suspected of a toxic bloom, samples are collected and analyzed immediately. MDMR personnel investigate possible toxic blooms reported by credible sources, primarily: adjacent state agencies, federal agencies, local health agencies, and academic institutions.

To request information about this sampling program, contact Scott Gordon, MDMR Shellfish Bureau Director at (228) 523-4096 or Scott.Gordon@dmr.ms.gov. To request a copy of public records, visit the MDMR website at: <http://www.dmr.ms.gov/index.php/dmr-information> and complete a public records request.

HAB Contact Information for Mississippi:

Joe Jewell, Marine Fisheries Director

Mississippi Department of Marine Resources, Office of Marine Fisheries

1141 Bayview Avenue Biloxi, MS 39530

Phone: (228) 523-4072.

Joe.Jewell@dmr.ms.gov

Kristina Broussard, Marine Scientist

Mississippi Department of Marine Resources, Shellfish Bureau

1141 Bayview Avenue, Biloxi, MS. 39530.

Phone: (228) 523-4067, Fax (228) 374-5220

kristina.broussard@dmr.ms.gov

Emily Cotton, Environmental Administrator, Coastal Monitoring Section
Mississippi Department of Environmental Quality, South Regional Office
1141 Bayview Ave, Suite 208, Biloxi, MS. 39530

Phone: (228) 432-3447

Emily.Cotton@deq.state.ms.us

TEXAS:

HAB monitoring in Texas is case-specific for fishery impacts and health concerns, such as the opening/closing of designated shellfish harvesting areas. Although an active routine HAB monitoring program is not established in Texas, a continuous monitoring Image Flow Cyto-bot station in Port Aransas aids both agencies in HAB response activities. Example: In early 2008, the Image Flow Cytobot alerted Texas Department of State Health Services (TDSHS) to a *Dinophysis* bloom, which allowed for the closure of oyster beds before the oysters were consumed at a local oyster festival.

Texas Parks and Wildlife Department (TPWD) investigates fish kills and enforces shellfish closures issued by the TDSHS. Water sampling for HAB's during a fish kill is conducted to determine the extent of the bloom and duration of the fish kill event.

TDSHS is tasked to protect the consumer from disease or other health hazards transmissible by oysters, clams, mussels, scallops, and crab meat produced in or imported into Texas. Once a HAB is identified, active sampling occurs by TDSHS in shellfish growing areas. Shellfish closures to harvesting are issued as needed by TDSHS, with closure enforcement provided by TPWD Law Enforcement.

During a multi-agency response such as a *Karenia brevis* bloom, TPWD works closely with the TDSHS, as well as Texas Cooperative Extension, the University of Texas and Texas A&M University to monitor and assess impacts. Coordination with agencies and universities occurs to avoid duplication of efforts, i.e. if another agency is collecting water samples in one area, TPWD will collect samples elsewhere.

HAB Contact Information for Texas:

Alex Nuñez, Coastal Ecologist

Texas Parks and Wildlife Department, Coastal Fisheries,
Ecosystem Resource Program, Kills and Spills Team, Region 4.
NRC Building, Suite 2501, 6300 Ocean Dr., Unit 5846 Corpus Christi, Texas 78412.

Phone: (361) 825-3246.

alex.nunez@tpwd.texas.gov

Kirk Wiles, Manager, Seafood and Aquatic Life Group

Department of State Health Services.

P.O. Box 149347 Austin, TX 78714-9347.

Phone: (512) 825-6757.

Kirk.Wiles@dshs.state.tx.us

FOR GULF-WIDE INFORMATION, CONTACT:

Dr. Barbara Kirkpatrick, Executive Director

Gulf on Mexico Coastal Ocean Observing System (GCOOS),

Department of Oceanography, 3146 TAMU, College Station, TX 77843-3146

Phone: (941) 724-4320.

barb.kirkpatrick@gcoos.org

OTHER HAB REFERENCES:

The GCOOS HAB Observing System Plan can be viewed at:

<http://gcoos.tamu.edu/documents/HABIOSPlan-Sept2015.pdf>

The GCOOS/GOMA Primer on HABs can be found at:

<http://gcoos.tamu.edu/documents/HabPrimer-10162013.pdf>

Participants/Attendees

James Ballard
Gulf States Marine Fisheries Commission

Patrick Banks
LA Dept. of Wildlife and Fisheries

Donna Bellais
Gulf States Marine Fisheries Commission

Gregg Bray
Gulf States Marine Fisheries Commission

Kristina Broussard
MS Department Of Marine Resources

Rhonda Cummins
Texas Sea Grant

Kate Derner
NOAA/National Ocean Service

Carol Dorsey
Alabama Department of Public Health

Ryan Easton
Texas Parks and Wildlife Department

Bradley Ennis
Florida Fish and Wildlife Conservation
Commission

Jason Ferguson
Texas Parks and Wildlife

Joseph Ferrer
Gulf States Marine Fisheries Commission

Traci Floyd
MS Dept. Of Marine Resources

Andres Garcia
Texas Parks and Wildlife Coastal Fisheries

Dwight Gledhill
NOAA Ocean Acidification Program

Matt Hill
MS Dept. Of Marine Resources

Kate Hubbard
Florida Fish and Wildlife Conservation
Commission

Joe Jewell
MS Dept. Of Marine Resources

Barb Kirkpatrick
GCOOS

Gordon LeBlanc
LA Dept. of Health and Hospitals

Mark Lingo
Texas Parks and Wildlife Department

Christopher Mace
Texas Parks and Wildlife Department

Nancy Marcellus
Gulf States Marine Fisheries Commission

John Mareska
ADCNR/Marine Resources Division

Keith Mille
Florida Fish and Wildlife Conservation
Commission

Jamie Miller
MS Dept. Of Marine Resources

Alex Nunez
Texas Parks and Wildlife Department

Evan Pettis
Texas Parks and Wildlife

Jeff Rester
Gulf States Marine Fisheries Commission

Jeffrey Short
JWS Consulting LLC.

Thomas Sminkey
NOAA Fisheries

Darin Topping
Texas Parks and Wildlife

Michael Wetz
Texas A&M University-Corpus Christi



**Gulf States Marine Fisheries Commission
2404 Government Street
Ocean Springs, Mississippi, 39564**