EPA United States Environmental Protection Agency

Fish and Shellfish Program NEWSLETTER

August 2019
EPA 823-N-19-007

In This Issue

https://www.epa.gov/fish-tech

This issue of the Fish and Shellfish Program Newsletter generally focuses on harmful algal blooms (HABs).

Recent Advisory News

Michigan Issues 'Do Not Eat' Fish Consumption Advisory for All Fish in Beaver Dam Pond and Helmer Creek in Calhoun County Due to PFAS

On March 29, 2019, the Michigan Department of Health and Human Services (MDHHS) issued an emergency 'Do Not Eat' fish advisory for all fish in Beaver Dam Pond and Helmer Creek in Springfield due to perfluorooctane sulfonate (PFOS).

Bluegill fillets tested from Beaver Dam Pond were found to have high levels of PFOS. As a result, MDHHS issued a 'Do Not Eat' advisory for all fish from Beaver Dam Pond and Helmer Creek, both in Calhoun County. The advisory does not extend into the Kalamazoo River. To find the Eat Safe Fish guidelines for the Kalamazoo River, visit the Southwest Michigan Eat Safe Fish Guide at Michigan.gov/eatsafefish.

Michigan 'Do Not Eat" Fish Consumption Advisory for Beaver Damn Pond and Helmer Creek			
Type of Fish	Chemical Causing MI Serving Recommendation	Size of Fish (length in inches)	MI Servings per Month
All fish	PFOS	Any	Do Not Eat

The fish were tested as a result of the state's per- and polyfluoroalkyl substances (PFAS) effort. The advisory relates to the state's work to address PFAS. PFOS is one specific PFAS. Touching the fish or water and swimming in the pond or the creek is not considered a health concern. PFAS do not move easily through the skin. An occasional swallow of pond or creek water is also not considered a health concern. However, the advisory said to avoid foam that forms on the pond or creek. Foam may have higher amounts of PFAS than the water and could be a health risk, especially if swallowed. It is a good idea to wash after touching foam with PFAS. Visit the Health Section at michigan.gov/pfasresponse for more information on PFAS and foam and current guidelines relating to PFAS contamination in fish.

For more information, contact Lynn Sutfin at 517-230-6231 or SutfinL1@michigan.gov.

Source: *Michigan issues 'Do Not Eat' Fish Consumption Advisory for all fish in Beaver Dam Pond and Helmer Creek in Calhoun County due to PFAS*

EPA News

CyAN Mobile App Helps Communities Detect Cyanobacteria in U.S. Waterbodies

A cyanobacteria harmful algal bloom in William H. Harsha Lake in Ohio (2017).

On July 16, 2019, the U.S. Environmental Protection Agency (EPA) published information on a new mobile app to help communities detect cyanobacteria in waterbodies. Since the passing of the Clean Water Act in 1972, water quality in the United States has improved significantly, but threats to clean and safe water still exist. One of these threats is harmful algal blooms (HABs).

Certain environmental conditions in waterbodies can intensify algae growth, causing algal blooms. Blooms with the potential to harm human health or aquatic ecosystems are referred to as HABs. One type of HAB is a cyanobacteria harmful algal bloom. These blooms produce toxins and cause nuisance odors, hypoxia, and unappealing surface scums that create a potential for adverse human health exposures and ecological impacts. These negative impacts to drinking water sources can increase drinking water treatment costs for communities. They also impact the local economy, via revenue loss from recreation and businesses that rely on safe and clean water.

The most effective way of protecting public health from HABs is knowing ahead of time to avoid water containing cyanobacteria. However, this is hard to do because most cyanobacteria events are dealt with reactively, after the bloom has occurred in response to the visual, odor, or toxin confirmation. That is why EPA has developed the Cyanobacteria Assessment Network mobile application (CyAN app), an early warning indicator system for algal blooms in U.S. freshwater systems, which will help local and state water quality managers make faster and better-informed management decisions related to cyanobacterial blooms in their communities.

Water quality managers need access to current, inexpensive, and quality data to protect water resources. In 2015, EPA, the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), and the U.S. Geological Survey (USGS) began work on the CyAN Project, which led to the development of the CyAN app. In 2017, EPA launched the app for Android devices, and it was only available to project collaborators, until now—the app is now publicly available. CyAN app is designed for use on Android™ devices (versions 4.2-9.0) and is available for download on Google Play™. It is currently being developed as a web-based app, which will be compatible with most devices. Learn more about and download the CyAN app.

Though satellite data have been available for many years, its use in decision-making has been hindered by complicated data formats and the time burden to process and access the data. The CyAN app gives water quality managers the ability to easily assess satellite derived cyanobacteria biomass concentrations occurring over larger lakes and reservoirs across the country. This app reduces the need for scientific expertise in satellite data

processing, analysis and interpretation, and eliminates barriers to computer hardware requirements associated with the use of satellite data files. In this easy to use, customizable interface, managers can rapidly distill critical water quality information for their communities.

The georeferenced data in the app allow water quality managers the ability to passively monitor a specific water body without having to filter through other numerous satellite images that aren't associated with their area of interest. Simply, users open the app once a week to receive the updated imagery and monitoring data for locations of interest for the current season. The app provides approximately 70% of the monitoring information. The remaining information (such as identifying site locations of interest and setting warning thresholds) is input by the user during the app settings setup process.

Several communities have beta tested and used the app to assist in water quality management. In 2017, app functionality and satellite data were successfully demonstrated against 25 state health advisories, across seven states. Benjamin Holcomb from the Utah Division of Water Quality (UDWQ) provided helpful feedback on the use of the CyAN app in his community.

"The images we've been receiving through the CyAN project have been tremendously helpful to the Utah Division of Water Quality, providing the foundation for a wide range of useful outputs," Holcomb shared. "It allows UDWQ to better target field sampling and more efficiently use our limited resources to protect public health. Finally, images are easily shared with response agencies as a useful visual communication aid."

Angela Shambaugh from the Vermont Department of Environmental Conservation has used CyAN app to monitor the lakes in her state, saying that "large lakes like Lake Champlain have an extremely patchy distribution of cyanobacteria due to varying environmental conditions and lake shape. The CyAN app helps viewers visualize that patchiness and provides additional context for our [cyanobacteria] Tracker Map which shares data gathered by our cyanobacteria monitoring program."

For additional information, visit the CyAN app website.

For questions or comments, contact the CyAN Project at CyAN@epa.gov.

Source of quotations: EPA Science Matters Article – CyAN Mobile App Helps Communities Detect Cyanobacteria in U.S. Water Bodies

EPA Seeking Public Comments on Freshwater HABs Policy

The Harmful Algal Bloom and Hypoxia Research and Control Amendments Act of 2014 (also known as HABHRCA) requires NOAA and EPA to advance the scientific understanding and ability to detect, monitor, assess, and predict marine and freshwater HAB and hypoxia events in the U.S. The Act also requires maintaining and enhancing a national program to control and mitigate HAB and hypoxia events, delineates the role of the Task Force (Interagency Working Group or IWG), and requires developing reports and plans to reduce the likelihood of HABs formation and mitigate their damage. A recent amendment (HABHRCA of 2017) provides EPA with the statutory authority to determine if a HAB or hypoxia event in freshwater is an "event of national significance."

On September 6, 2019, EPA Assistant Administrator for the Office of Water, David P. Ross, signed a Federal Register Notice requesting public comment to inform the development of an Agency policy for determining if a HAB or hypoxia in freshwater is an event of national significance.

Comments may be submitted to Docket EPA-HQ-OW-2019-0463 in www.regulations.gov. The comment period ends on October 31, 2019.

For additional information, please see the Federal Register Notice or contact Dr. Lesley V. D'Anglada, Office of Science and Technology, EPA at 202-566-1125 or danglada.lesley@epa.gov.

Other Resources

- Harmful Algal Bloom and Hypoxia Research and Control Amendments Act of 2017 (PDF)
- Federal Register: Notice of Intent to Develop a Policy on the Determination of a Harmful Algal Bloom (HAB) and Hypoxia as an Event of National Significance in Freshwater Systems
- Harmful Algal Bloom and Hypoxia Research and Control Amendments Act of 2014 (PDF)
- NOAA's Harmful Algal Bloom and Hypoxia Research and Control Act (HABHRCA) website
- Harmful Algal Blooms and Hypoxia Comprehensive Research Plan and Action Strategy: An Interagency Report (PDF)
- Harmful Algal Blooms and Hypoxia in the United States: A Report on Interagency Progress and Implementation (PDF)

Source: *The Harmful Algal Bloom and Hypoxia Research and Control Amendments Act (HABHRCA)*

Freshwater HABs Newsletter

The *Freshwater HABs Newsletter* highlights current information about HABs in freshwater systems, including news, upcoming events such as conferences and webinars, useful resources, beach closures and health advisories, and recently published journal articles. EPA released information on resources for controlling cyanobacteria and HABs and more in the August 2019 *Freshwater HABs Newsletter*.

For comments, feedback or additional information, please contact Lesley D'Anglada, Project Manager, at 202-566-1125 or Danglada.Lesley@epa.gov.

Sources: *CyanoHABs Newsletters 2019*

Other News

NCCOS Forecasts, Funding, Research Help South Florida Address Harmful Algal Blooms

NOAA's National Centers for Coastal Ocean Science (NCCOS) is working on several efforts to help south Florida address both saltwater and freshwater HABs.

Forecasts

In the summer of 2018, south Florida experienced the worst red tide in more than 10 years. This HAB extended roughly 130 miles along the southwest Florida coast, detrimentally affecting the local economy and human and animal health. Among the health impacts, red tide toxins became airborne through wave action and caused respiratory irritation in people and animals.

In response, NCCOS and its partners developed a risk level forecast for red tide respiratory irritation on Pinellas County beaches. The 24-hour Experimental Red Tide Respiratory Forecasts are updated following the collection and analysis of water samples, and are typically available on Tuesdays, Thursdays, Saturdays, and Sundays. When red tide is in the air, most people experience minor respiratory irritation—coughing, sneezing, teary eyes—which goes away when they leave the beach. However, people with lung problems like asthma and chronic obstructive pulmonary disease can have severe reactions when they breathe in these toxins. Pinellas County residents and visitors who are susceptible to the respiratory impacts of Florida's red tide now have a new tool that will help them know their risks before they visit area beaches during red tides.

NCCOS developed the experimental forecast in partnership with the Gulf of Mexico Coastal Ocean Observing System (GCOOS), the Florida Fish and Wildlife Conservation Commission–Fish and Wildlife Research Institute, and Pinellas County Environmental Management. The forecast was developed through funding from the NASA Health and Air Quality Program and is hosted by GCOOS. For more information on the forecast, contact Richard.Stumpf@noaa.gov.

Funding

The NCCOS HAB Event Response Program provided funding to address different aspects of the 2018 red tide. In August of that year, the program awarded $19,200 to the Florida Fish and Wildlife Research Institute and Mote Marine Laboratory to supplement their efforts to document and understand changes in the severity, duration, and location of the red tide. In September 2018, the program awarded $8,250 to Florida's Clinic for the Rehabilitation of Wildlife and the Florida Fish and Wildlife Conservation Commission Fish–Wildlife Research Institute to study a novel treatment for cormorants sickened by exposure to brevetoxin resulting from red tide. The results could provide insight for treating other marine animals in the future. In October 2018, the program awarded $28,000 to a multi-institution team to enhance the team's sampling of the red tide and assessment of its ecosystem impacts following Hurricane Michael. For more information on the NCCOS HAB Event Response Program, contact Quay.Dortch@noaa.gov.

Research

In the freshwater environment, NCCOS is working with engineers on nanobubble ozone technology (NBOT) to develop an environmentally sustainable method to eliminate harmful blue-green algae and their toxins. The method uses nanobubbles—bubbles smaller than the width of a single human hair—to aerate water bodies. Unlike ordinary bubbles that rise and burst at the surface of the water, nanobubbles implode under the pressure of the water, releasing oxygen and ozone that help dissolve harmful algae.

Dr. Peter Moeller (right) demonstrates ozone nanobubble technology to Dr. Steve Thur (Director of NCCOS) at Hollings Marine Laboratory in Charleston, South Carolina. (*Courtesy of NOAA*)

NCCOS chemist Dr. Peter Moeller recently conducted laboratory validation of the method's efficacy in reducing harmful algae and toxins and is now working to establish application parameters that will ensure wildlife safety. Moeller also helped test the ozone nanobubble system on a freshwater algal bloom near Fort Myers Beach, Florida. Within 48 hours of treatment, the eight-acre pond was well-oxygenated and free of algae, with no apparent harm to other aquatic life in the pond.

Moeller will analyze time-series water samples treated with nanobubbles to characterize chemical changes during the remediation process. Future testing of the method may yield breakthroughs for other natural resource management issues, such as treating ballast water, farm waste, or addressing invasive species.

For more information on ozone nanobubble technology, contact Peter.Moeller@noaa.gov.

For more information, also contact:

- Richard Stumpf at Richard.Stumpf@noaa.gov
- Quay Dortch at Quay.Dortch@noaa.gov

Source: *NCCOS Forecasts, Funding, Research Help South Florida Address Harmful Algal Blooms*

Rocky Bay Algae Bloom Suspected in Clam Die-Off

The Case Inlet toxic bloom is one of several tracked around the Key Peninsula in Puget Sound, Washington.

In mid-July 2019, Norm McLoughlin, who lives on Rocky Bay along northern Case Inlet, went to the beach to check his boat. The stench of dead clams nearly knocked him over, he said.

The beach was covered with open shells and rotting flesh. The algae spotted offshore earlier in the summer of 2019 had developed into a full-blown bloom, and it appeared to have taken its toll.

Teri King, a specialist with Washington Sea Grant (WSG) and program manager for the SoundToxins program, a partnership with WSG, the NOAA Northwest Fisheries Science Center, and Puget Sound Partners, said that a bloom started to form on June 6 in North Bay in Allyn. When King received calls about dead clams in Rocky Bay, close to North Bay, she examined water and shellfish samples sent to her from that location.

Barbara Ann Smolko, Pierce County Surface Water Management, said that similar events were reported in nearby Vaughn Bay.

The organism in both bays was *Protoceratium reticulatum* (*P. reticulatum*), a dinoflagellate phytoplankton that is one of several followed by the monitoring program. "Most of South Sound is being inundated with *P. reticulatum* based on the calls I have been fielding and the samples SoundToxins monitors have been viewing," King said. "The levels are increasing from week to week, as are reported shellfish mortalities and clams surfacing."

Based on the water sample she received July 16 from Rocky Bay, King said, "I would say the bay is in full bloom and with the cysts. I would say it could last a while."

Kent Kingman, owner of Minterbrook Oyster Company near Wauna, also owns approximately 75 acres of tidelands on Rocky Bay that he leases to the Taylor Shellfish Company for cultivation of clams and oysters.

Bill Dewey, a spokesman for Taylor, said they had seen a similar problem in Discovery Bay. "We've experienced significant summer mortality over the years." Last year they had unusually high mortality and he said this could be a trend, but that it is too early to judge.

Taylor will "let nature take its course" with the dead shellfish. Dewey said natural predators should clean the beach fairly quickly. Clams take about three years to mature, and Taylor has not yet decided when to reseed the beach.

"Whether or not the *P. reticulatum* is the cause of the mortality in Rocky Bay and other bays within Puget Sound this year and in past years is a point of active research by the SoundToxins team, which submitted a request to NOAA earlier this year to study them," King said. "We can say that the mortalities and *P. reticulatum* are co-occurring and warrant an active investigation."

P. reticulatum is found in all oceans and can produce yessotoxins, which can be toxic for clams and oysters. Yessotoxins are regulated in the European Union based on concerns for human health, though the degree of harm to humans is unclear.

For more information, contact Sara Thompson, KP News, through editor@keypennews.org or Key Peninsula News, P.O. Box 3, Vaughn, WA 98394.

Source: *Rocky Bay Algae Bloom Suspected in Clam Die-Off*

Recently Awarded Research

$3.5 Million Awarded to Identify Acidification Thresholds in Coastal Ecosystems

Have you ever gone biking down a hill and tried to stop halfway down? It can be difficult, especially compared to stopping on a flat path. What if ocean acidification is causing a slight decline in the health of marine organisms? How will other coastal stressors such as nutrient pollution, warming waters, and decreased dissolved oxygen affect that dip in the health of marine plants and animals? These stressors can cause a marine ecosystem to reach a tipping point or threshold, beyond which it can be difficult to recover. NOAA's NCCOS and Ocean Acidification Program (OAP) have jointly funded four projects totaling $3.5 million to identify the threshold at which ecosystems change rapidly and their services are irreversibly altered. From the Chesapeake Bay to the coastal waters of Alaska, this work will help managers reduce stressors to avoid the decline or potential collapse of valuable marine ecosystems.

How sensitive are systems in the Chesapeake Bay to acidification and nutrient pollution?

Jeremy Testa, University of Maryland

The wild oyster industry has suffered repeated collapses in the Chesapeake Bay due to overharvesting, disease, and declining environmental conditions. How future conditions will affect the Eastern oyster remain uncertain, not only because conditions such as increased freshwater are difficult to predict, but also because the interactions between stressors such as ocean acidification, temperature, nutrient runoff, and sea level rise could lead to unexpected chemical, biological, and economic change. The changes in stressors and their impacts do not always proceed linearly. The potential responses of various life stages of the Eastern oyster to stressors like acidification and eutrophication has received little attention. This project will study the impact of different stressors on the Chesapeake Bay, a large estuarine system, and the Eastern oyster. The study will bring together different models to understand the relationship between biogeochemical cycling of carbon, oxygen, and nutrients, oyster growth and survival, and oyster economic profitability in the Chesapeake Bay ecosystem. The project will provide insights into future conditions and habitats where aquaculture and wild oyster populations may be most vulnerable to the climate and ocean changes.

Can meadows of underwater eelgrass help mitigate the harmful effects of ocean acidification on Eastern oysters?

Emily Rivest, Virginia Institute of Marine Science

Submerged Aquatic Vegetation (SAV), such as eelgrass, could mitigate the harmful impacts of ocean acidification on Eastern oysters by reducing the acidity of waters where oysters grow. These underwater grasses take up carbon dioxide and release oxygen into coastal waters, reducing the exposure of marine organisms to increases in acidic conditions that slow or stop oyster growth and reproduction. Oysters, in turn, improve water clarity for seagrasses to thrive by filtering particles out of the water and allowing more sunlight to penetrate. This modeling project will identify the threshold of acidification beyond which the economically important Eastern oyster is negatively impacted and will evaluate the potential benefit of seagrasses in protecting oysters and the ecosystem services they provide. The modeling tool will also identify the acidification conditions in which seagrass restoration is most helpful and when the economic benefits of this restoration to Eastern oyster production outweigh the costs. At the

end of this project, the final model will be freely available as an online tool and will help scientists, managers, and oyster growers assess the potential for both seagrass and oyster restoration.

Research to inform adaptation decisions for Alaska's salmon fisheries

David Finnoff, University of Wyoming

Alaska is expected to experience ocean acidification faster than any other U.S. coastal waters, primarily due to its colder water which absorbs more carbon dioxide than warmer waters. With seafood industry job incomes over $1.5 billion annually and communities that rely on healthy oceans for subsistence, nutrition, and culture, increased ocean acidification is expected to have significant implications. Research on the potential impact to salmon has emerged as one of the top priorities, identified during a 2016 statewide workshop and stakeholder survey. Despite the economic importance of salmon, little research has been done on the effects of ocean acidification on salmon and the fishing industry and communities that depends on salmon. Acidification has been shown to impair coho salmon's ability to smell and detect their prey. It has also been shown to reduce pink salmon growth rates. In addition, future ocean acidification is expected to affect salmon prey species, which is expected to affect Pacific salmon survival, abundance and productivity. This project will investigate the implication of ocean acidification thresholds and major ecosystem shifts in the Gulf of Alaska on salmon. Integrated human-ecological models will be developed to simulate management scenarios to assess the benefits of pre-emptive adaptation planning and policy making. The information from modeling these scenarios will help create decision tools for salmon managers.

Ocean and coastal acidification thresholds from Long Island Sound to the Nova Scotian Shelf

Ruairidh Morrison, Northeastern Regional Association of Coastal Ocean Observing Systems (NERACOOS)

How will nearshore and coastal ecosystems respond to ocean and coastal acidification in the Northeast? How will these changes affect human communities? An absence of actionable information and understanding of the dynamic nature of coastal acidification is a major challenge to Northeast seafood industry, resource managers, and coastal policymakers. This project will expand the existing Northeast Coastal Ocean Forecast System to develop actionable guidance for coastal water quality and marine resource managers through workshops and direct engagement. Workshops and focus groups will be held to determine information needs, decision scenarios, modeling priorities, and options for delivering actionable information for three specific users: (1) water quality managers and monitoring systems, (2) oyster growers, and (3) the wild harvest shellfishing industry. The research will focus on advancing ocean acidification detection and warning systems that take into account other environmental stressors in Northeast coastal waters.

For more information, contact:

- Jeremy Testa at jtesta@umces.edu
- Emily Rivest at ebrivest@vims.edu
- David Finnoff at finnoff@uwyo.edu
- Ruairidh Morrison at Ru.Morrison@neracoos.org.

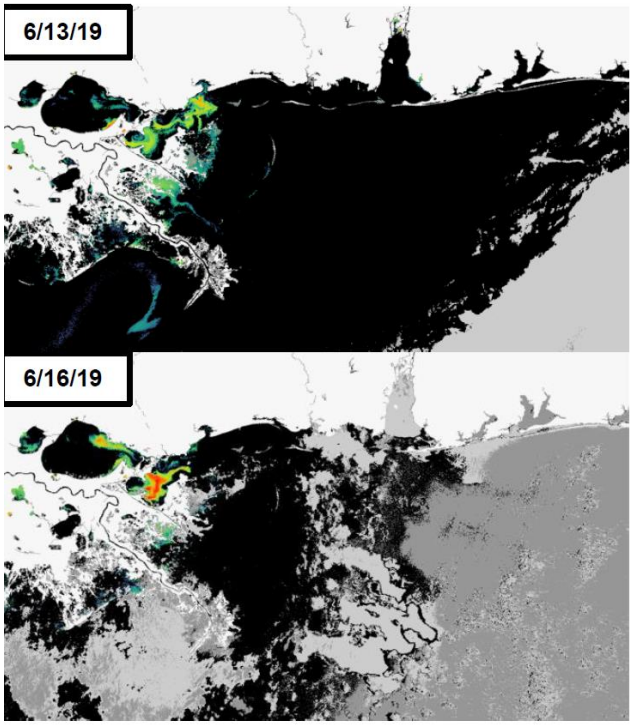
Source: *$3.5 Million Awarded to Identify Acidification Thresholds in Coastal Ecosystems*

NCCOS Assists Response to Cyanobacterial Blooms in Lake Pontchartrain Caused by Opening Bonnet Carré Spillway

On July 10, 2019, NOAA's NCCOS provided a HAB Event Response award of $12,900 to the Louisiana State University (LSU) and Lake Pontchartrain Basin Foundation (LPBF). This award funded their efforts to monitor for the remaining summer months shoreline areas commonly used for recreation around the lake for levels of algal toxins that could be harmful to people or their pets during recreational use. The NCCOS Harmful Algal Bloom Monitoring System also provided satellite remote sensing images of the cyanobacterial blooms to inform decisions about sampling.

These blooms originated from the introduction of large volumes of nutrient-rich fresh river water, via the opening of the Bonnet Carré Spillway, into the lower-nutrient estuarine Lake Pontchartrain. Freshwater inputs from the spillway have been shown to substantially change the chemistry and ecology of the lake. Spillway openings can rapidly depress lake salinities, causing most of the lake to become fresh which can persist for several months, when seasonal weather or tropical activities introduce saltwater from the Gulf of Mexico into the lake. Preliminary field results investigating the bloom composition identified the abundance of cyanobacterial species known to produce a variety of cyanobacterial toxins. These toxins have the potential for causing human illnesses. Previous spillway openings have been associated with toxic cyanobacteria blooms, and there is a concern that blooms could occur in shoreline areas utilized by the public, possibly exposing people and/or their pets to harmful levels of algal toxins.

LPBF and LSU conducted weekly field water quality monitoring, sample collection, and analysis. Monitoring occurred at sites along the north and south shorelines of Lake Pontchartrain. The sampling effort was aided by NOAA providing imagery from the Sentinel-3 satellites. These satellites measure coastal water color, which shows the location of harmful cyanobacteria blooms. If significant blooms were detected in the lake using satellite images, monitoring intensity would have been increased, with more frequent, weekly monitoring at baseline sites as well as additional sites. Monitoring continued until the end of summer after the spillway was closed, when an expected decrease in turbidity throughout the lake was conducive to widespread algal growth. By then the likelihood of a bloom and the risk to people and pets was expected to be low due to decreasing water temperatures and increasing salinities that are unfavorable to the growth of toxic cyanobacteria.



Satellite Image: The red areas show the peak of the cyanobacterial bloom in the Lake Pontchartrain and Lake Borgne regions (dark areas at upper left. The Gulf of Mexico is the large dark area to the right. The Mississippi River Delta (aka bird's-foot delta) is the NW-SE protruding light colored land mass at left-center. (*Courtesy of NOAA derived image from Sentinel-3A satellite*)

This award funded HAB identification and counts and biotoxin analyses for duration of the event; samples were collected for later nutrient analyses. LSU and LPBF researchers and staff will work closely with Louisiana Department of Health, U.S.EPA, and U.S. Army Corps of Engineers to monitor the severity of the bloom and potential public health impacts.

Cyanobacteria Algal Bloom from Satellite in Lake Pontchartrain, LA is updated daily: https://coastalscience.noaa.gov/research/stressor-impacts-mitigation/hab-monitoring-system/cyanobacteria-algal-bloom-from-satellite-in-lake-pontchartrain-la/

The NCCOS HAB Event Response Program provides immediate assistance to help federal, state, and local officials manage events and advance the understanding of HABs as they occur.

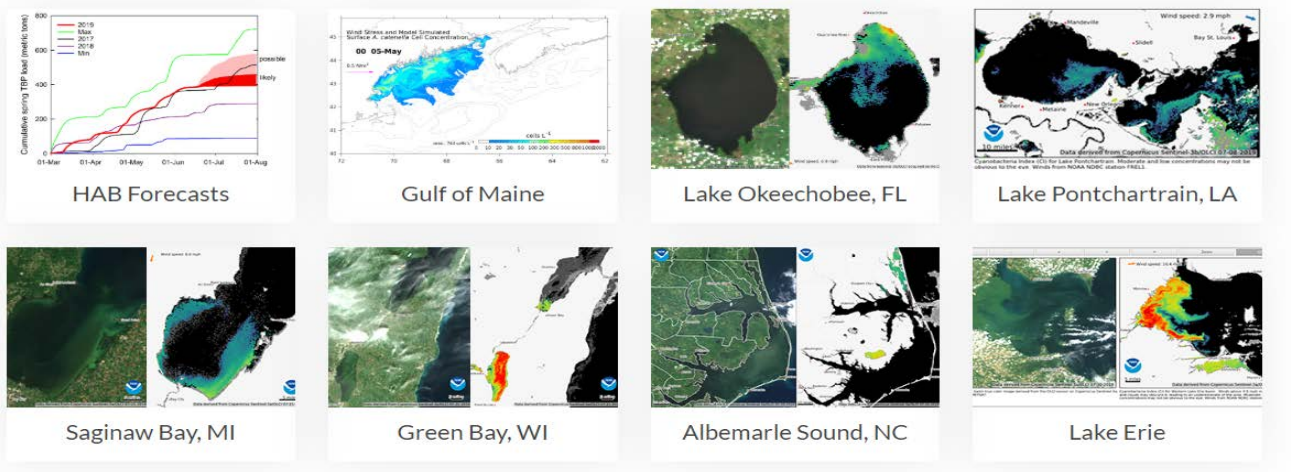
The NCCOS Harmful Algal Bloom Monitoring System routinely delivers near real-time products for use in locating, monitoring and quantifying algal blooms in coastal and lake regions of the U.S. For more information about the Event Response, contact Quay.Dortch@noaa.gov, and for more information about the satellite remote sensing images, contact Richard.Stumpf@noaa.gov.

Source: *NCCOS Assists Response to Cyanobacterial Blooms in Lake Pontchartrain Caused by Opening Bonnet Carré Spillway*

Tech and Tools

Harmful Algal Bloom Monitoring System

HABs occur when certain kinds of algae grow very quickly, forming patches, or "blooms," in the water. These blooms can emit powerful toxins which endanger human and animal health. Reported in every coastal state, HABs have caused an estimated $1 billion in losses over the last several decades to coastal economies that rely on recreation, tourism, and seafood harvesting. Blooms can lead to odors that require more costly treatment for public



Screenshot of HAB Monitoring products. (*Courtesy of NOAA*)

water supplies. NCCOS conducts and funds research that helps communities protect the public and combat blooms in cost-effective ways, and it is breaking new ground in the science of stopping blooms before they occur.

HAB Monitoring Products

NCCOS developed the HAB Monitoring System to routinely deliver near real-time products for use in locating, monitoring and quantifying algal blooms in coastal and lake regions of the U.S. This application delivers a suite of bloom detection products in the form of geographic based images. At this time products are available for selected regions. New products are being evaluated, and new regions are being considered; as they are proven useful, they will be made available through this system.

For more information, contact Richard Stumpf at Richard.Stumpf@noaa.gov.

Source: *Harmful Algal Bloom Monitoring System*

Recent Publications

Journal Articles

The list below provides a selection of research articles focusing on the HABs.

- Decline of freshwater gastropods exposed to recurrent interacting stressors implying cyanobacterial proliferations and droughts
  Gérard, C. and E. Lance. 2019. Decline of freshwater gastropods exposed to recurrent interacting stressors implying cyanobacterial proliferations and droughts. *Aquatic Ecology* 53:79.

- Fishing in greener waters: Understanding the impact of harmful algal blooms on Lake Erie anglers and the potential for adoption of a forecast model
  Gill, D., M. Rowe, and S. J. Joshi. 2018. Fishing in greener waters: Understanding the impact of harmful algal blooms on Lake Erie anglers and the potential for adoption of a forecast model. *Journal of Environmental Management* 227:248-255.

- Determination of microcystins, nodularin, anatoxin-a, cylindrospermopsin, and saxitoxin in water and fish tissue using isotope dilution liquid chromatography tandem mass spectrometry
  Haddad, S.P., J.M. Bobbitt, R.B. Taylor, L.M. Lovin, J.L. Conkle, C.K. Chambliss, and B.W. Brooks. 2019. Determination of microcystins, nodularin, anatoxin-a, cylindrospermopsin, and saxitoxin in water and fish tissue using isotope dilution liquid chromatography tandem mass spectrometry. *Journal of Chromatography A* 1599:66-74.

- µEvaluation of microcystin-LR absorption using an in vivo intestine model and its effect on zebrafish intestine
  Li, J., C. Chen, T. Zhang, W. Liu, L. Wang, Y. Chen, L. Wu, A.M. Hegazy, A.F. El-Sayed, and X. Zhang. 2019. µEvaluation of microcystin-LR absorption using an in vivo intestine model and its effect on zebrafish intestine. *Aquatic Toxicology* 206:186-194.

- Microcystin – LR exposure causes cardiorespiratory impairments and tissue oxidative damage in trahira, *Hoplias malabaricus*
  Martins, N.D., J.S. Yunes, D.J. Mckenzie, F.T. Rantin, A.L. Kalinin, and D.A. Monteiro. 2019. Microcystin – LR exposure causes cardiorespiratory impairments and tissue oxidative damage in trahira, *Hoplias malabaricus*. *Ecotoxicology and Environmental Safety* 173:436-443.

- Concentrations of cylindrospermopsin toxin in water and tilapia fish of tropical fishponds in Egypt, and assessing their potential risk to human health
  Mohamed, Z.A. and A. Bakr. 2018. Concentrations of cylindrospermopsin toxin in water and tilapia fish of tropical fishponds in Egypt and assessing their potential risk to human health. *Environmental Science and Pollution Research* 25(36):36287-36297.

- Potential for dietary exposure to β-N-methylamino-L-alanine and microcystin from a freshwater system
  Scott, L.L., S. Downing, and T. Downing. 2018. Potential for dietary exposure to β-N-methylamino-L-alanine and microcystin from a freshwater system. *Toxicon* 150:261-266.

- Assessment of the cytotoxic impact of cyanotoxin beta-N-methylamino-L-alanine on a fish immune cell line
  Sieroslawska, A. and A. Rymuszka. 2019. Assessment of the cytotoxic impact of cyanotoxin beta-N-methylamino-L-alanine on a fish immune cell line. *Aquatic Toxicology* 212:214-221.

- Heterogeneity of toxin-producing cyanobacteria and cyanotoxins in coastal watersheds of southern California
  Tatters, A.O., M.D.A Howard, C. Nagoda, A.E Fetscher, R.M. Kudela, and D.A Caron. 2019. Heterogeneity of toxin-producing cyanobacteria and cyanotoxins in coastal watersheds of southern California. *Estuaries and Coasts* 42(4):958-975.

- Subcellular localization of microcystin in the liver and the gonads of medaka fish acutely exposed to microcystin-LR
  Qiao, Q., C. Djediat, H. Huet, C. Duval, S. Le Manach, C. Bernard, M. Edery, and B. Marie. 2019. Subcellular localization of microcystin in the liver and the gonads of medaka fish acutely exposed to microcystin-LR. *Toxicon* 159:14-21.

- Concentrations of microcystins in the muscle and liver tissues of fish species from Koka Reservoir, Ethiopia: A potential threat to public health
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Upcoming Meetings and Conferences

2019 Interstate Shellfish Sanitation Conference (ISSC) Biennial Meeting
October 5–10, 2019
San Diego, California

13th World Congress on Aquaculture & Fisheries
October 28–29, 2019
Tokyo, Japan

Organization of Fish and Wildlife Information Managers Annual Conference
October 6–10, 2019
Shepherdstown, West Virginia

Additional Information

This monthly newsletter highlights current information about fish and shellfish.

For more information about specific advisories within the state, territory, or tribe, contact the appropriate state agency listed on EPA's National Listing of Fish Advisories website at https://fishadvisoryonline.epa.gov/Contacts.aspx.

For more information about this newsletter, contact Sharon Frey (Frey.Sharon@epa.gov, 202-566-1480).

Additional information about advisories and fish and shellfish consumption can be found at https://www.epa.gov/fish-tech.