Harmful Algal Bloom Task Force

Karenia brevis Red Tide Priority Needs and Recommendations
Draft December 6, 2019

The Harmful Algal Bloom (HAB) Task Force was established in 1999 (section 379.2271, F.S.), charged with assessing needs and making recommendations for research, monitoring, detection, mitigation and control strategies for HABs in Florida waters. The original Task Force identified and made recommendations for action for six major HAB concerns in Florida including *Karenia brevis* (red tide), macroalgae, cyanobacteria, and other HAB priorities. From 1999-2002, HAB Task Force-recommended priority projects were funded through Florida Fish and Wildlife Conservation Commission's Fish and Wildlife Research Institute (FWC-FWRI) and investigated human, animal and environmental health threats; economic impacts; and enhanced monitoring and detection methods. Since 2002, various funding sources have supported initiatives that address priorities identified by the Task Force, and cooperative work on issues related to red tide and other HABs have continued with the partnerships and networks established through the Task Force.

Beginning in November 2017 and ending in February 2019, Florida experienced a *K. brevis* bloom of national and historical significance. Negative impacts on the economy, wildlife, water quality, natural resources, and public health were experienced at all levels from local to state – key industries such as tourism, aquaculture, other fisheries, and coastal businesses suffered. The severe red tide bloom affected both the Gulf and Atlantic coasts and several inland waterways in Florida. Although *K. brevis* blooms occur annually, this 16-month bloom was the fifth longest event documented in the state's HAB Monitoring Database (which extends back to 1953 with anecdotal records back to the 1880s) and directly impacted 22 counties. At the peak of the bloom, more than 400 miles of coastline were affected, with the bloom extending across thousands of square miles. This bloom also coincided with a freshwater blue green-algae HAB event during the summer and fall of 2018 (which impacted Lake Okeechobee and associated rivers and estuaries to the east and west), co-occurred with different HAB events in other parts of the state, and coincided with a hypoxic/anoxic event offshore of the greater Charlotte Harbor areas. To protect the public from the consumption of red tide-associated toxic shellfish, state-managed aquaculture areas were closed for harvest in critically affected areas in southwest Florida from November 2017 to months after the bloom dissipated, effectively shutting down aquaculture operations in several parts of the state. Human exposures to aerosolized red tide-produced toxins (brevetoxins) were manifest, with dozens of daily reports of respiratory irritation during the red tide's most severe time in 2018. Widespread impacts on wildlife included extensive fish kills of over 100 species; over 500 and 290 sea turtle and manatee mortalities, respectively; an unusual bottlenose dolphin mortality event; and a suspected whale shark mortality.

Multiple years of data will be needed to fully evaluate the economic and ecological impacts of this event, including recovery.

In response to these significant bloom events, the state has taken several actions. In January 2019, Governor Ron DeSantis' signed Executive Order 19-12. The Order established a Blue-Green Algae Task Force to work to reduce blue-green algae blooms (coordinated by Florida Department of Environmental Protection) and directed state agencies to participate in FWC-FWRI's HAB Task Force to provide technical expertise and assistance studying causes and impacts of red tide, including human health impacts. Senate Bill 1552, signed into law, additionally established the Red Tide Mitigation and Technology Development Initiative (coordinated by Mote Marine Laboratory) to lead the development of innovative technologies and approaches to address the control and mitigation of red tide and its impacts.

As of July 1, 2019, FWC-FWRI reconvened HAB Task Force. Focusing on coastal and marine HABs, the HAB Task Force will work closely with the Blue Green Algae Task Force and the Red Tide Mitigation and Technology Development Initiative to determine strategies to decrease impacts of HABs in Florida waters.

The HAB Task Force has adopted general, long-term focal areas within which it will evaluate existing approaches or knowledge; pinpoint gaps in our efforts or understanding; build a portfolio of strategies and tactics to fill those gaps by assessing their attractiveness and feasibility; and recommend:

1. actions to reduce excess loads of nutrients entering our freshwater and coastal systems developed in collaboration with the Blue-Green Algae Task Force, Department of Environmental Protection, Department of Economic Opportunity, Department of Health, Department of Agriculture and Consumer Services, Visit Florida, water management districts, and other relevant stakeholders;

2. improvements to current policies and procedures that mitigate the impacts of harmful algal blooms on public health, ecosystem sustainability, economic viability, and other valued facets of society;

3. enhancements to communication, coordination, cooperation, and collaboration among stakeholders charged with responding to harmful algal blooms and their effects; and

4. useful research into the biology and ecology of species creating harmful algal blooms; detection, tracking, modeling, and prediction of blooms; fate of algal toxins; impacts of blooms on valued facets of society; control and mitigation of blooms; and other key issues.

Consistent with the Governor's direction, the HAB Task Force has adopted an initial short-term top priority focus on issues associated with red tides caused by *K. brevis*. The Task Force convened twice in 2019 to conduct an initial review of current policies,

research, and response efforts and identified *K. brevis* priority needs and information gaps in the areas of Public Health, Management and Response, Communication, and Research.

The following priority needs and recommended actions have been identified.

Public Health

Karenia brevis produces neurotoxins (brevetoxins) that affect both animal and human health, causing fish kills, animal mortalities, human respiratory irritation, and Neurotoxic Shellfish Poisoning. The HAB Task Force considered impacts of red tide and brevetoxins on public health and communities, reviewing information gaps and research needs for risks from exposure to toxins and impacts on quality of life.

Priority Needs and Information Gaps:

There is currently insufficient knowledge regarding short- and long-term effects on health from exposure to red tide and brevetoxins. Needs include assessing effects on mental and social health; of exposure to toxins via inhalation, ingestion, and direct skin or mucous membrane contact; of chronic low-level exposures; and identifying risks for more susceptible subpopulations (e.g., elderly, children, immunocompromised, occupationally-exposed).

Recommended Action(s):

- The HABTF should create a technical advisory group…
- The DOH…
- Develop….
- Establish…

Management and Response

Red tides in Florida naturally develop offshore, away from man-made nutrient pollution, and are transported inshore by currents. Once blooms enter coastal and inshore waters, however, elevated nutrients can provide fuel for *K. brevis* and may influence the duration or severity of the bloom. Currently, the only regulatory guidelines related to red tides address levels of toxicity in shellfish. Extensive monitoring efforts include regular offshore and inshore water sampling, multiple surveillance systems, and improved brevetoxin monitoring and detection methods. The HAB Task Force reconsidered management responsibilities of activities related to *K. brevis* monitoring and event response to identify updated needs for effective management.

Priority Needs and Information Gaps:

Over the last several years, a number of technological advances have been made in the field of real-time automated detection of HABs and HAB toxins. The Task Force agreed there is a need to identify those technologies mature enough to incorporate into

automated or semi-automated red tide monitoring and to design a plan to effectively apply and implement these technologies and address the required data analytics.

Given that the state has made recent investments towards developing strategies to control blooms or mitigate their impacts (e.g., the establishment of the Red Tide Mitigation and Technology Development Initiative and the Department of Environmental Protection's Harmful Algal Bloom Innovative Technology Grant Program), the Task Force has identified the concomitant need to create a regulatory framework to guide entities seeking to test or implement HAB control and mitigation technologies or approaches, including during emergency response.

More broadly, comprehensive statewide plans for coordinated response to red tides and their impacts need to be created or updated and implemented at multiple levels of government from local to state.

Recommended Action(s):

- The HABTF should create a technical advisory group…
- The DEP…
- Identify …
- Conduct…

Communications

Public communications are developed for information, awareness and education purposes and for mitigation strategies to reduce exposure to and impacts from red tide on living resources (human, animal and environmental). Interagency communications related to red tide focus on management and response needs, from local to state level, and vary depending on the location, duration, and impacts of events. The HAB Task Force discussed current coordinated efforts, communication avenues, outreach resources, and monitoring and surveillance systems.

Priority Needs and Information Gaps:

The Task Force identified a need to develop a statewide communication strategy to safeguard public health and inform all stakeholders (public, businesses, medical professionals, tourists, etc.). The strategy should include multi-lingual outreach materials, a long-term educational campaign, and address short-term event response needs.

Recommended Action(s):

- Conduct focus groups and social science studies to identify public information needs and wants, and to identify the most effective messaging and dissemination methods.
- Identify…
- Establish interagency….

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Research

Progress in red tide science continues to move forward and is applied to management and communications in a variety of ways. Improving our understanding of bloom dynamics, enhancing methods for predicting and forecasting blooms, and targeting practical and acceptable ways to control blooms would allow managers to make better-informed decisions and develop more effective response plans. The HAB Task Force assessed the current state of knowledge of *K. brevis* research to identify information gaps and focus on high-level priority needs. Research priorities were considered in the key areas of: Initiation, Development, and Termination; Prediction and Modelling; Detection and Monitoring; and Mitigation and Control.

(Note: will discuss following sections at December 10 Task Force meeting)

Priority Needs and Information Gaps:

Initiation, Development & Termination

Prediction and Modelling

Detection & Monitoring

Mitigation & Control

Recommended Action(s):

Initiation, Development & Termination

Prediction and Modelling

Detection & Monitoring

Mitigation & Control