

Harmful Algae News

AN IOC NEWSLETTER ON TOXIC ALGAE AND ALGAL BLOOMS

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Florida's West Coast *Karenia brevis* bloom – Spring 2023

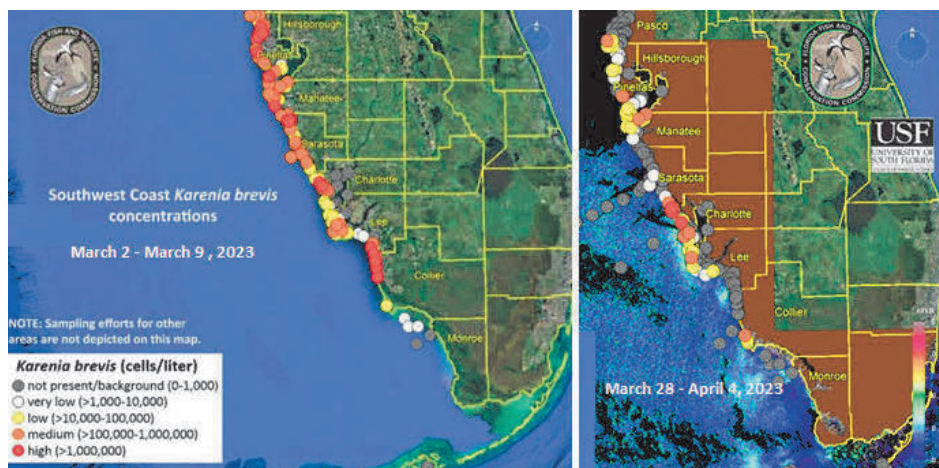


Fig. 1. Mapped *Karenia brevis* cell concentrations 26 days apart in March 2023. Note the offshore stations on 28 March to 4 April 2023 (gray circles right panel) have no *K. brevis* cells in surface samples. <https://floridadep.gov/algalbloom>

On the morning of 6 March 2023, the National Centers for Coastal Ocean Science (NOAA) issued an alert warning of “moderate to high risk of respiratory irritation” due to a *Karenia brevis* bloom along the southwest coast of Florida. This was no surprise to the many beachgoers who walk Florida’s shorelines every day and frequently see dead fish washed up on the beaches during harmful algal blooms (HABs). The city or municipal government of the small towns along the west Florida coast routinely budget for beach clean ups during the nearly annual harmful algal blooms. But dead fish are especially problematic during peak holiday seasons or, in this case, spring break week(s) when schools recess and many visitors flock to Florida’s wide, warm beaches. The “halo” effect of HABs can cause significant losses in revenue as the news, often exaggerated, is broadcast.

In an interview with the Washington Post (reported by A. Ajasa) Dr. Rick Stumpf (NOAA) noted that *K. brevis* cells often accumulate inshore in late summer and are pushed offshore to the mid shelf area of Florida’s west coast) by winter winds associated with high-pressure systems [1,2] the persistent northerly winds do not occur

K. brevis cells remain inshore. Stumpf speculates this is what happened in March 2023. It should be noted that while *K. brevis* blooms are known to occur at all seasons of the year, there are times when they are more frequent. High inshore cell concentrations are affected by wind patterns of frontal systems, hydrographic conditions like upwelling and in turn, nutrients upwelled to the surface waters [3]. Stumpf added “If you have a year where we don’t get those persistent northerly winds pushing it out it [HABs] can hang around. And that’s what’s happening this year.”

Florida’s coast lines are some of the most closely observed marine areas. A number of State, Federal and non-governmental organizations and university programs contribute their resources to help forewarn citizens, public health officials, resource managers, property owners and tourists of conditions that are conducive to HABs (see below). These agencies also have willing volunteers who serve as citizen scientists and help crowd source data along vast stretches of the 1,062 km west Florida coastline. The most recent reports of the spring 2023 *K. brevis* blooms show a decline in the cell concentrations nearshore and no reports of surface



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A bloom of *Pyrodinium bahamense* in the port operations of a seafood processing plant, SE Gulf of Mexico

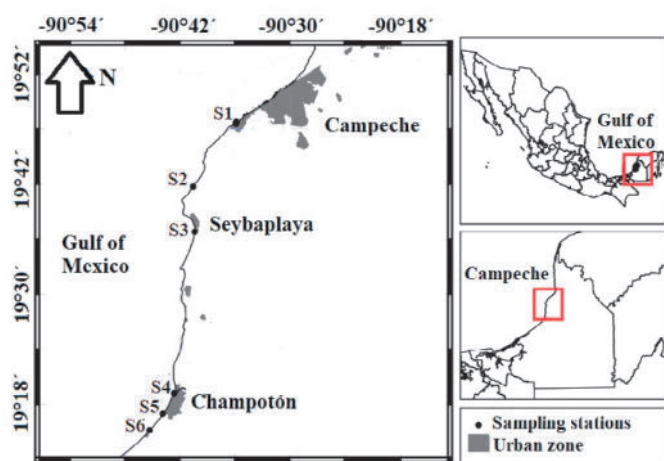


Fig. 1. Study area and sampling sites (S1-S6) in coastal waters of Campeche, Gulf of Mexico

The Mexican state agency CONAPESCA (National Aquaculture and Fisheries Commission) ranked the State of Campeche as seventh in the country in terms of fish catch volume with an active fleet of 3,401 artisanal fishing river boats and 26 plants along the coast providing processing capacity for fishing products. Most of the plants are adjacent to the landing areas, and the processed water is generally discharged directly into the sea without prior treatment. It should be noted that the wastewater discharge process is regulated by Mexican law. In 2005, the state agency for the protection of sanitary risks reported a bloom of a planktonic non-toxic dinoflagellate, *Blixaea quinquecornis*, in a sheltered port in the City of Campeche resulting in the discoloration of water.

As part of the monitoring program of harmful phytoplankton in areas with anthropogenic activities along the central coast of Campeche, six sites (depths of ca. 1 m) at three coastal localities (City of Campeche, Seybaplaya and Champotón; 19°17'52.55"-19°51'50.87"N, 90°30'47.37"-90°46'6.83"W) were sampled (Fig. 1). Sampling stations were chosen at the points of rainwater discharge or near the sites with anthropogenic impact and were monitored monthly from November 2021 to November 2022. Quantification of *P. bahamense* cells was performed according to the Utermöhl technique [1]. The dinoflagellate *Pyrodinium bahamense* reached a maximum value of 1.2×10^6

cells L^{-1} in May 2022 at station S5 (Fig. 2), corresponding to port operations of a seafood processing plant. Salinity was 29.3, temperature 33.1°C, pH 7.9 and dissolved oxygen 9.1 mg L^{-1} . Discoloration of water was not observed. Toxicity of *P. bahamense* in the subtropical waters of the West Atlantic was recorded in the coastal zone of East Florida [2], and there is recent evidence for toxic populations of *P. bahamense* in the coastal waters of Campeche, coupled with the presence of paralytic shellfish toxins in fish collected off the coast of Campeche [3]. Along the Campeche coast, *P. bahamense* is widely distributed, with marked occurrences in the dry (February to May) and rainy (June to September) seasons in 2005, 2008, 2010, 2019 and with abundances ranging from 3.0×10^3 to 3.3×10^5 cells L^{-1} [4]. It should be considered one of the key species with the potential for forming blooms in the study area. The high abundances of *P. bahamense* along this coast may be indicative of eutrophication due to fluc-

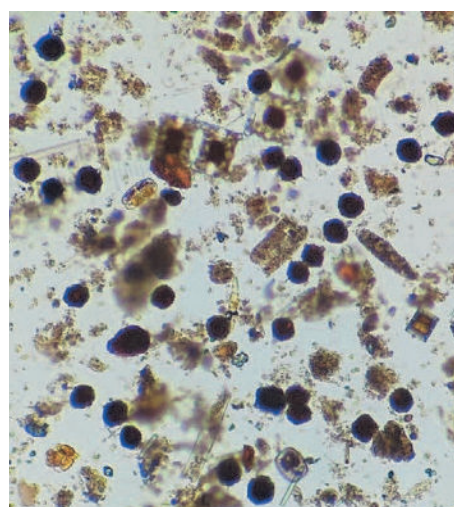


Fig. 2. Net haul of blooming *Pyrodinium bahamense* in the port operations area of a seafood processing plant, SE Gulf of Mexico, with abundant detritus characteristic of a coastal shallow zone

tuations in environmental conditions caused by the intensity and type of human activities [5]. Near the northern coast of Yucatan Peninsula, from 2002-2011, the species was characteristic of the marinas of Telchac, Dzilám de Bravo and of the coast off Progreso, especially in the rainy season (F. del C. Merino-Virgilio, pers. comm.). The proximity of mangroves seems to favour the proliferation of the species. Therefore, it is essential to keep a record of bloom-forming planktonic species, with a special emphasis on harmful species that co-occur with production activities in coastal areas.

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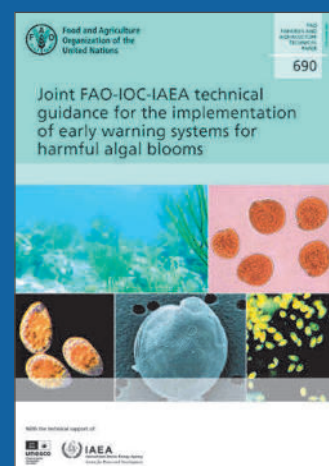
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