

EAST BAY MUNICIPAL UTILITY DISTRICT

DATE: September 1, 2022

MEMO TO: Board of Directors

THROUGH: Clifford C. Chan, General Manager *CCC*

FROM: Donald M. Gray, Interim Director of Wastewater *DMG*

SUBJECT: Harmful Algal Bloom in the San Francisco Bay

DISCUSSION

At the end of July 2022, residents began reporting murky water in the Oakland Estuary. The District, in coordination with other regulatory agencies and scientific organizations, collected water samples to determine if the cause was related to a sewage overflow. On August 4, 2022, the District collected samples from three locations in the estuary. The results indicated typical levels of bacterial indicator organisms which confirmed that the discoloration was not due to the introduction of sewage. Microscopic analyses performed by the California Department of Public Health revealed a proliferation of *Heterosigma akashiwo*, a marine algae species that can cause a harmful algal bloom (HAB) or “red tide.”

The HAB was soon detected in other parts of the San Francisco Bay (Bay), though it is not known if it originated from a single location and then spread, or if the conditions that allowed it to proliferate spread throughout the Bay. The HAB was detected in San Pablo Bay in the north, through the Central Bay, and into the South Bay as well as into Lake Merritt in Oakland. The bloom was observed using satellite imagery, ship-based surveys, and moored instruments. Initial measurements of dissolved oxygen indicated no impairment; however, by the third week in August, fish die-off events were reported along various shorelines of the Bay Area. On August 28, 2022, a significant fish die-off event was observed in Lake Merritt.

Multiple state, federal, and independent organizations, including the Regional Water Quality Control Board (Regional Board), United States Geological Survey (USGS), National Oceanographic and Atmospheric Administration, San Francisco Estuary Institute (SFEI), Department of Fish and Wildlife, and academic institutions including University of California at Davis and University of California at Santa Cruz (UCSC), have been studying and monitoring HABs and the cause or triggering conditions for algal blooms in the Bay. Although an algal bloom would require some level of nitrogen and phosphorus, “[*Heterosigma akashiwo*] blooms and bloom toxicity are strongly correlated to water temperature and salinity. Blooms can form from cysts once bottom temperatures reach 15 degrees centigrade.” (UCSC phytoplankton website http://oceandatacenter.ucsc.edu/PhytoGallery/Other/h_akashiwo.html). At this time,

more research is needed to explain why the current HAB occurred and to prevent future algal blooms.

Concerns Regarding *Heterosigma Akashiwo*

This specific marine algal species has been identified in the Bay for at least the last 20 years. It is known to be toxic to fish, although the specific mechanism of toxicity is unknown. This algal species is not known to be toxic to humans, although the California Department of Public Health has issued a warning against skin contact due to the potential for skin irritation. No advisory has been issued regarding the consumption of fish from the Bay Area.

Impact of Nutrients and Ongoing Research in Bay Area

HABs are not common in the Bay and there have not been any blooms of this magnitude in at least the last 40 years. While nutrients contribute to algal blooms, the specific conditions or triggers that caused this event are not known. Nutrient discharge loading from wastewater treatment plants is slightly lower today than the past nine-year average. Ongoing studies conducted by USGS, SFEI, and others will help to better understand the cause and prevent these occurrences in the future.

Since 2014, the District, along with the 37 Bay Area wastewater treatment agencies that comprise the Bay Area Clean Water Agencies (BACWA), has been under a regional watershed permit to address nutrient discharges from wastewater treatment plants. As part of this permit, BACWA, in collaboration with the Regional Board, is funding extensive scientific studies to monitor, model, and better understand whether nutrient impairment is occurring; how nutrient impairment could develop in the future; and to define the appropriate, evidence-based management actions to mitigate or prevent future impairment. These scientific studies are being carried out by SFEI in close collaboration with the Regional Board, non-governmental organizations, and other state agencies (see SFEI.org website [Harmful Algal Bloom and Fish Mortality San Francisco Bay, San Francisco Estuary Institute](#)). The District contributes the largest share of the annual \$2.2 million that BACWA provides to fund these studies. Over the past ten years, BACWA has invested more than \$14 million in these efforts.

Nutrient Removal

Research to date has not determined a strong correlation between wastewater treatment plant nutrient discharges and impairment to the Bay. At the same time, there is concern that these nutrient discharges could eventually cause some type of impairment. Consequently, the Regional Board and BACWA have been working together to determine how to set future nutrient limits that would be effective and result in protecting the Bay ecosystem. The Regional Board has been deliberate about ensuring that future nutrient limits are based on sound science, because the estimated cost to reduce nutrients is approximately \$10 billion for the Bay Area. For the District to implement nutrient removal, the costs range from \$100 million to \$1.3 billion.

The SFEI has made the following observations and potential outcomes on the current HAB:

- There has been a sharp drop in Chlorophyll-A (measurement quantifying algal quantities), suggesting the bloom is ending or slowing down.
- Dissolved oxygen (DO) levels have decreased with the lowest levels measured on August 31. If DO levels start to increase, this may also signal the bloom is slowing. Alternatively, if DO levels continue to drop more fish kills will result.
- The high heat expected during the next few days (September 2-6) may also stimulate more blooms.

NEXT STEPS

Staff will continue to monitor the situation and support the regulatory, scientific, and non-governmental organizations working to investigate the causes of this algal bloom. The District will also continue to contribute to the ongoing scientific studies and collaborate with the regulatory agencies to ensure that ratepayer dollars invested in any future nutrient removal infrastructure achieve the desired benefits for the Bay ecosystem.

CCC:DMG:ARC