Sea Grant VIRGINIA BRIDGE ocean science education **DATA Series**

HABs: In Full Bloom

Lesson Time : 60-90 minutes
Grade Level : 9-12
Vocabulary: harmful algal bloom (HAB), phytoplankton, diatoms, dinoflagellates, cyanobacteria

Summary
Compare concentrations of harmful algal blooms using NOAA's Coastal Services Center Harmful Algal Bloom Forecasting (HABF) Project data.

Objectives

- List 3 kinds of harmful phytoplankton and ways that these algae impact organisms.
- Compare concentrations (percentages) of *Karenia brevis* over time.
- Analyze the severity of HAB blooms.

Introduction

Spring is upon us and flowers are beginning to bloom, but along with the warmer temperatures and April showers can come a bloom of a different color. Harmful algal blooms, also known as HABs or red tides, occur when there is a population explosion of potentially harmful phytoplankton such as certain diatoms, dinoflagellates, and cyanobacteria. Often blooms are caused by one of these troublesome species being brought inshore from offshore areas by currents. If the conditions such as water temperature and nutrient concentration in the inshore waters are right, a bloom can happen.

Harmful algal blooms can impact the health of marine organisms and humans several ways. If a toxin-producing species (of which there are only a few dozen) is ingested by a marine organism, those toxins can be passed through the food web affecting fish, marine mammals and even humans. Some of the illnesses contracted this way include amnesiac shellfish poisoning (ASP), ciguatera fish poisoning (CFP), diarrhetic shellfish poisoning (DSP), neurotoxic shellfish poisoning (NSP), and paralytic shellfish poisoning (PSP). Other ways that HABs can impact organisms are:

- **Predation** – Example: *Pfiesteria piscicida* eats through the skin of a fish causing lesions which can lead to death by *Pfiesteria* or by secondary infection.
- **Injury or Irritation** – Example: Spiny diatoms like *Chaetoceros* species can get stuck in fish gills causing irritation and eventually death.

- **Starvation** – Example: *Aureococcus*, which causes brown tides, ingested by a scallop can inhibit the scallop's ingestion of other food.
- **Anoxia** – Example: After harmful algal blooms die, large numbers of the dead algae decompose which requires oxygen and causes anoxic conditions.

Harmful algal blooms have always occurred and affect almost all coastal U.S. waters. Scientists are concerned that HABs are increasing in number and diversity causing not only health problems but economic problems to the tune of $100 million a year for fisheries and tourism. And while some of the increase in number of blooms each year may simply be a result of improved detection methods, human influences including exotic species introduction through ballast water, global warming and increased nutrient runoff may also be big contributors. To aid in the early detection of harmful algal blooms, some states like South Carolina have a citizen volunteer phytoplankton monitoring program.

In this data activity, we will look at Florida blooms of the red tide-causing dinoflagellate *Karenia brevis* (formerly *Gymnodinium breve*) to see if these HABs are increasing in frequency or severity. *K. brevis* usually blooms in Florida in the fall or winter and causes fish kills, shellfish poisoning, and respiratory and skin irritations in humans. In 1996, *K. brevis* caused the death of about 10% of the Florida manatee population.

Data Activity

For this activity, visit the **Florida Fish & Wildlife's Red Tide Status Page** to view current "red tide" (*K. brevis)* concentrations in southwest Florida and answer the discussion questions below.

Discussion

What is the current prevalence of *K. brevis*? Is there a red tide?
2. Is the prevalence of *K. brevis* increasing or decreasing over time?
3. How about the severity of the blooms?
4. From your observations, do you think that the *K. brevis* blooms in southwest Florida are worsening?
5. How might you verify this? (Continued monitoring, increased sampling).
6. What could you do to prevent or lessen the impact of these blooms?