

## The Colors of an Algal Bloom

Algal blooms occur when environmental conditions allow explosive growth of phytoplankton that create very dense clouds of these organisms (blooms) which can change the color of ocean water. These blooms are often called 'red tides.' However, red tides are not always "red," and furthermore, they really have nothing to do with the tides. They are found all over the world—in the United States, they occur from Alaska to Florida and can last anywhere from a day to a few months depending on their resources. In California, red tides generally occur between spring and early fall.

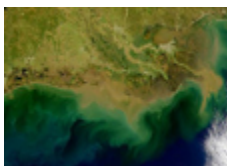
All photosynthetic phytoplankton have chlorophyll as their primary pigment, which explains why researchers measure [chlorophyll concentrations](#) to figure out how much phytoplankton there are in a certain region. Phytoplankton also have accessory pigments that allow them to use different wavelengths of sunlight for cellular growth and nourishment. There are three kinds of "red" tides: red, brown, and green.

### What Types of Algal Blooms Can Phytoplankton Cause?

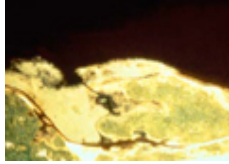
Red tides are caused by phytoplankton that have a reddish pigment called peridinin. Most dinoflagellates, such as *Alexandrium catenella*, have this pigment. As a result, when there is a bloom of dinoflagellates, the ocean will generally turn red. This type of tide is very common on both the east and west coasts as well as Florida and the Gulf of Mexico.



Green tides can be caused by *Phaeocystis*, which is a unicellular, photosynthetic algae found throughout the world. Green tides can also be caused by macroalgae such as *Enteromorpha* spp. and *Codium isthmocladum*, which have caused serious damage to many coastal regions. When in bloom, macroalgae often outcompete seagrass and coral reefs. This results in habitat loss for marine fish, less oxygen and sunlight for other organisms, and an ecosystem that is more vulnerable to extinction and invasions.



Brown tides are caused by the pelagophytes (another type of microalgae) such as *Aureococcus anophagefferens*. *Aureococcus* is a spherical, non-motile species that has caused noticeable damage to the coastal ecosystems in which it occurs. Brown tides are commonly seen in the northeast and mid-Atlantic US estuaries.



Algal blooms need a combination of environmental factors:

- bright sunlight
- high nutrient levels
- calm waters (low wind and circulation)
- limited number of grazers or predators
- Other environmental factors to consider are temperature and salinity, which influence HABs differently but may help in determining the sources of blooms.

Visible algal blooms can be caused by different species, both harmful and non-harmful. Therefore, water discoloration is not an accurate way to tell if the bloom is toxic or dangerous. In fact, some harmful blooms occur when the water is perfectly clear.

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Additional Links:

Find more material and explanations of all the different types of algae in Monterey Bay at [MBARI's Marine Botany](#)

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Most algal blooms are natural and essential components of any marine ecosystem. However, [harmful algal blooms](#) can harm or kill marine animals, contaminate shellfish, and threaten human life.

How can you tell when there's a harmful algal bloom? Check out our [When a Bloom Turns Harmful](#) page to learn more!