

Toxic and Harmful Algal Blooms *“Geographic Variation”*

The food web you created in the food web game was one that is found in the Antarctic. As you might imagine, a food web in the tropics looks very different from the one you created. Environmental conditions (temperature, light, nutrients) are different in the two areas, so it would make sense that the organisms that live in those areas might be different also. What might a food web from a tropical marine environment look like? How about one from a temperate coastal area?

Divide into groups to create your own food web games. Use books and the internet to find information about the areas listed below or think of some on your own. Create food webs that you might find in those areas. Give your completed game to the other groups to play. Don't forget to come up with clues to be provided if a player guesses incorrectly!

1) **The west coast of South Africa** - This is an area often associated with phytoplankton blooms. Upwelling brings nutrient-rich water from deep, dark depths to the sunlit surface. Phytoplankton are quick to utilize these upwelled nutrients, making this among the most productive areas in the world. However, there are also recurrent harmful and toxic blooms along the South African coast that threaten some members of the ecosystem, along with the fishing and shellfish industries.

2) **The middle of the Sargasso Sea** - The Sargasso Sea in the North Atlantic is named for the sargassum seaweed that is found throughout it. Due to the convergent circulation pattern of the sea, new nutrients are not upwelled from deeper waters, so the Sargasso is often called a marine desert. Despite its relatively low productivity, the warm, clear waters of the sea are home to entire communities built around mats of floating sargassum.

3) **A hydrothermal vent environment on the East Pacific Rise** - Unlike the food webs we have discussed thus far, hydrothermal vent communities are not dependent on solar energy. These communities are found in waters deeper than 1500m, where sunlight cannot penetrate. Instead, the hydrothermal vent food webs are driven by geothermal energy. Hydrogen sulfide (H_2S) is released in the fluid that is forced from the vents, and is then utilized by bacteria to form organic matter. This process is called chemosynthesis, and the bacteria that chemosynthesize are the primary producers of the food web.

4) **Lake Erie** - Lake Erie is a freshwater lake that has experienced major changes in its food web over the past few decades. The lake's populations of primary producers (phytoplankton and cyanobacteria) have varied with reductions in phosphorus loading, and the introduction of exotic species (i.e. zebra mussel). There are also recurrent harmful and toxic blooms that threaten some members of this freshwater ecosystem.