Dissolved Oxygen

All of the organisms in the Chesapeake Bay, from bay grasses to worms to fish, need oxygen to survive. The oxygen they need is dissolved in the waters of the Bay—therefore oxygen in water is called dissolved oxygen (DO). The oxygen dissolved in the Bay comes from the atmosphere, from algae and bay grasses undergoing photosynthesis, and from water flowing into the Bay from streams, rivers and the ocean. All aquatic organisms use either gills or diffusion to remove oxygen from the water.

Different organisms require different levels of dissolved oxygen (DO) to survive and thrive, and as the level of DO decreases it becomes harder for animals to get the oxygen they need for survival. There is a complicated set of interactions that cause the DO levels in the Bay to decrease. When DO levels fall to below what most organisms need to survive (about 2 mg/L) a dead zone develops and few, if any, organisms can continue to live.

Some of the factors involved in the depletion of DO are:

- Temperature—as water warms it holds less oxygen. Currently, even at its warmest temperatures the Bay water can hold enough DO to support all the organisms that live there.

- Algae growth—when algae growth increases far beyond what the filter feeders (such as mussels and oysters) can eat, the algae that are “leftover” die and sink to the bottom where they are decomposed by bacteria. These bacteria use oxygen in this process of decomposition which can decrease DO levels significantly. This process, known as eutrophication, is a significant factor in the “dead zones” that develop in the Chesapeake Bay. The excessive growth of algae is usually caused by nutrient runoff—too much nitrogen and phosphorus in the water.

- Water Flow—sometimes the water in the Bay is prevented from mixing well due to a variety of factors including the geography of the bottom of the Bay and the meeting of heavier (more dense) salty water with lighter fresh water. If the water at the bottom of the Bay is not mixing with the more oxygen rich waters on the surface the bottom waters can become very low in DO.