Dissolved Oxygen: Principles

Like land organisms, aquatic animals and plants need oxygen to live.

- Oxygen enters water in two ways:

  Physically, when air mixes with water; this is usually the primary source of dissolved oxygen (DO) in streams.

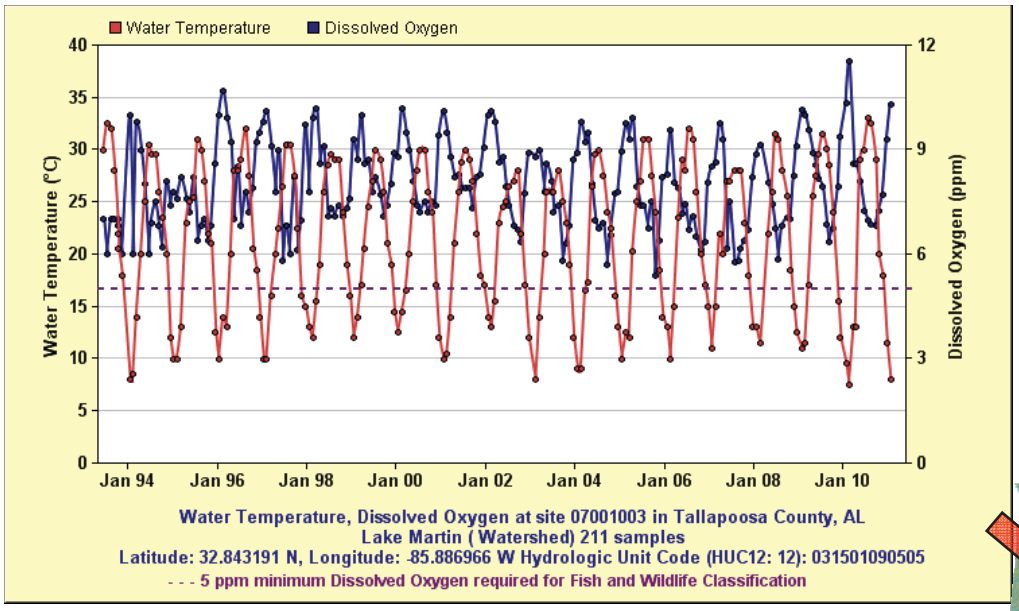
  Biologically, when aquatic plants release oxygen during photosynthesis; this is usually the primary source of DO in lakes and oceans.

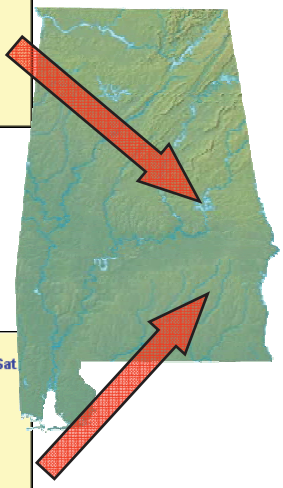
- Oxygen from the atmosphere enters water more readily through the action of wind and waves, or when water passes over riffles or waterfalls.
- DO is naturally at least 10,000 times more concentrated in air than in water!
- Organic matter, both natural and from pollution, can create high biological oxygen demands (BOD) and remove oxygen from water. This may cause "fish kills" and otherwise alter aquatic organism communities.
- A DO value of at least 5.0 ppm is desirable for most aquatic organisms, and is required for streams classified as "Fish & Wildlife" or better.

Effects of DO on fish and other aquatic life	
DO (ppm)	**Effects**
0 – 2	Not enough to support life
2 – 5	Only few species of fish and insects survive
5 – 7	Good for most aquatic life
7 – 11	Very good for most stream animals
> saturation	Possible gas bubble trauma in some fish

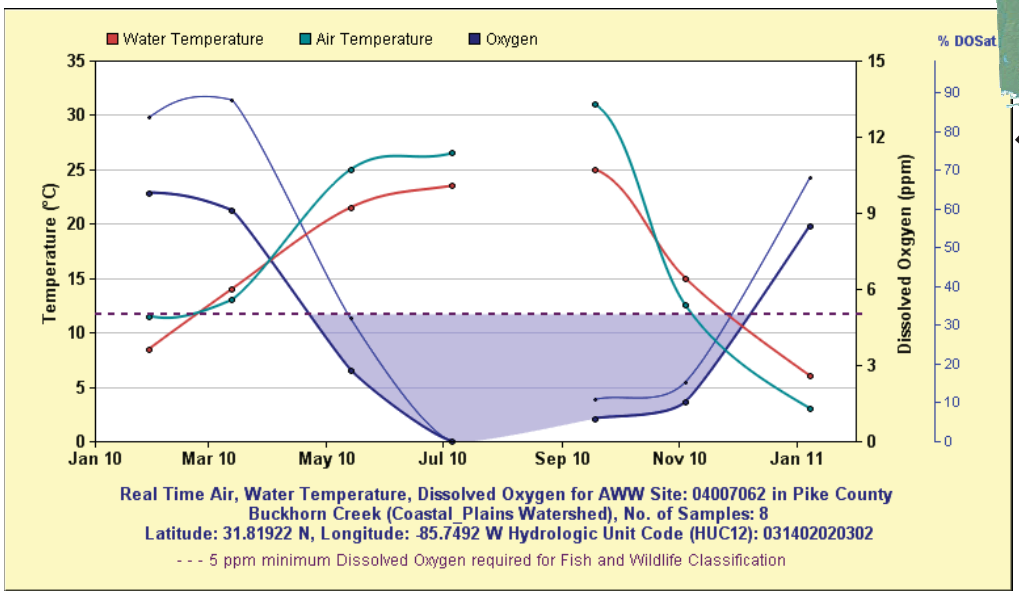
- Dissolved oxygen decreases with increasing temperature, so DO values are expected to be higher during the winter and lower during the summer.
- Dissolved oxygen usually decreases with increasing depth, so DO values are expected to be higher at the surface of a lake and lower toward the bottom.
- In lakes and ponds with high nutrient concentration, DO can change dramatically throughout the day because of photosynthesis by aquatic plants.

Dissolved Oxygen standards for surface water in Alabama are found on page 21.





Measurements of Water Temperature and Dissolved Oxygen from Lake Martin near Bay Pine Island, Tallapoosa County, AL (AWW Site Code 07001003), illustrating the inverse relationship of these two variables. Lake Watch of Lake Martin has been actively monitoring this site since 1994.



Real Time graph of Air and Water Temperature, Dissolved Oxygen and % Dissolved Oxygen Saturation at Buckhorn Creek, Pike County AL (AWW Site Code 04007062). Notice the sharp decline of Dissolved Oxygen and Oxygen Saturation from April to July, when air and water temperatures were rising. DO continued to stay below 5 ppm into the Fall months, when temperatures began to decline.