Florida Keys Water Watch Newsletter – September 2015


FKWW Workshop in Key Largo

Congratulations to the new groups on Boot Key, Boca Chica, Long Key State Park, Key Largo, Marathon, Key Colony Beach and Plantation Key. **Florida Keys Water Watch currently has 30 sites collecting data and >90 data entries** into the Georgia Adopt-A-Stream Water Quality Database. The University of Florida IFAS Monroe County Extension thanks you for your dedication in monitoring the water quality in the Florida Keys!

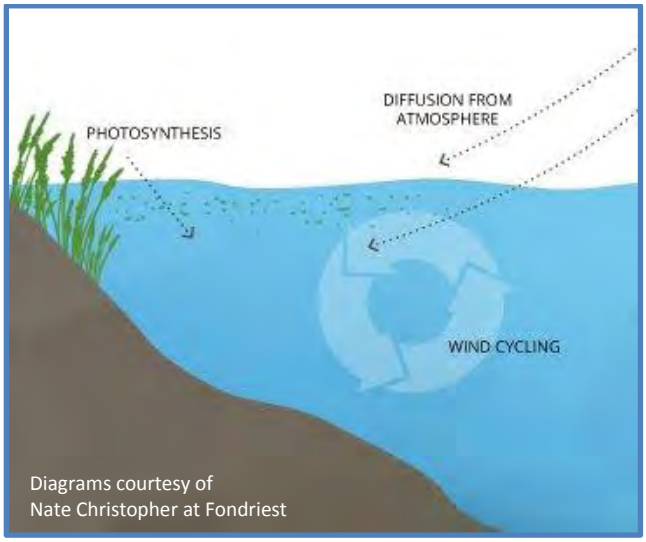
Upcoming Events: Shelly will be giving an update about Florida Keys Water Watch at the National Marine Sanctuary Water Quality Protection Program Meeting, September 30 at Key Colony Beach City Hall

September Water Quality Highlight -- What is Dissolved Oxygen?

Dissolved oxygen is the measure of the amount of free oxygen (O_2) that is dissolved in the water. The highest dissolved oxygen levels tend to be at the surface of the water because most mixing occurs at the surface. The concentration of oxygen in the air is so much higher than the concentration in the water that it is pushed (diffused) into the water at the surface.

How Does Oxygen Enter the Water?

- ✓ **Diffusion -- from the atmosphere and mixing through wave, wind, and tidal action**
- ✓ **Photosynthesis -- in the water by seagrass, algae and phytoplankton**
- ✓ **Manmade – via aerator pumps & fountains**



Diagrams courtesy of Nate Christopher at Fondriest

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What about Temperature & Salinity?

The amount of oxygen that a waterbody can hold is very dependent upon the temperature of the water, the salinity of the water, and the altitude. At sea level, the highest amount of oxygen that can be dissolved in ocean water with a salinity of 35 parts per thousand (ppt) at 20°C (68°F) = 7.4 mg/L, this is called the saturation point. **The temperature, salinity, and atmospheric pressure (altitude) of the water determine the amount of oxygen that can physically be dissolved into the water.** During the Florida Keys Water Watch workshops, we talk a lot about dissolved oxygen and its inverse (opposite) relationship with temperature:

As temperature ↑ the capacity of a waterbody to hold oxygen ↓

Salinity also effects oxygen saturation. Ocean water holds about 20% less oxygen than freshwater that has the same temperature and atmospheric pressure. The table below lists the amount of oxygen the water can actually "hold" (100% saturation) at oceanic salinity (35 ppt) at the given temperatures:

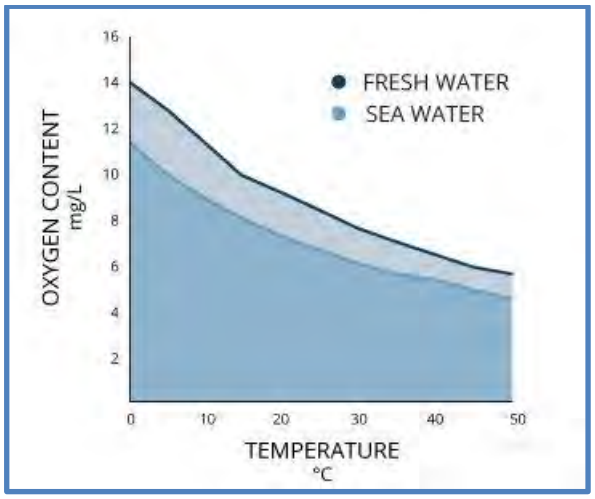
<u>100% oxygen saturation</u>

20°C (68°F) = 7.4 mg/L

25°C (77°F) = 6.8 mg/L

30°C (86°F) = 6.2 mg/L

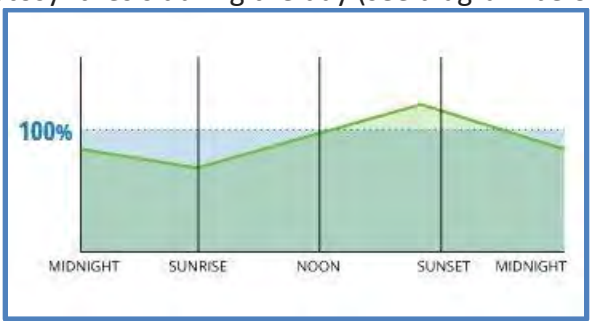
35°C (95°F) = 5.8 mg/L



On the Georgia Adopt-A-Stream site (georgiaadoptastream.org), the dissolved oxygen %saturation is automatically calculated by incorporating your temperature reading and the altitude of your sites – *they are currently working on adding the equation to incorporate your salinity readings*.

Why isn't Dissolved Oxygen %Saturation Always 100%?

When there is more CONSUMPTION by animals, plants, and bacteria than PRODUCTION by plants and MIXING from the atmosphere, there is less than 100% saturation. The oxygen is being consumed by animals, plants and bacteria faster than it is being replenished. Dissolved oxygen can also go OVER 100%, due to photosynthesis during the day (see diagram below) or heavy mixing, like water going over a dam or waterfall, aerator pumps and fountains. The plants in the water produce oxygen, just like the plants and trees on Earth, but they also need oxygen for respiration. During the day they produce oxygen, but at night, they only consume oxygen – this is why the early morning tends to have the lowest levels of dissolved oxygen, which then increases when the sun rises and photosynthesis commences again.



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