

Human Impacts on the estuary

Use this lesson plan as a guide but follow this powerpoint with local examples instead of this San Diego fish kill

<https://coast.noaa.gov/estuaries/curriculum/human-impacts-on-an-estuary.html>

Read article about a fish kill in Myrtle Beach

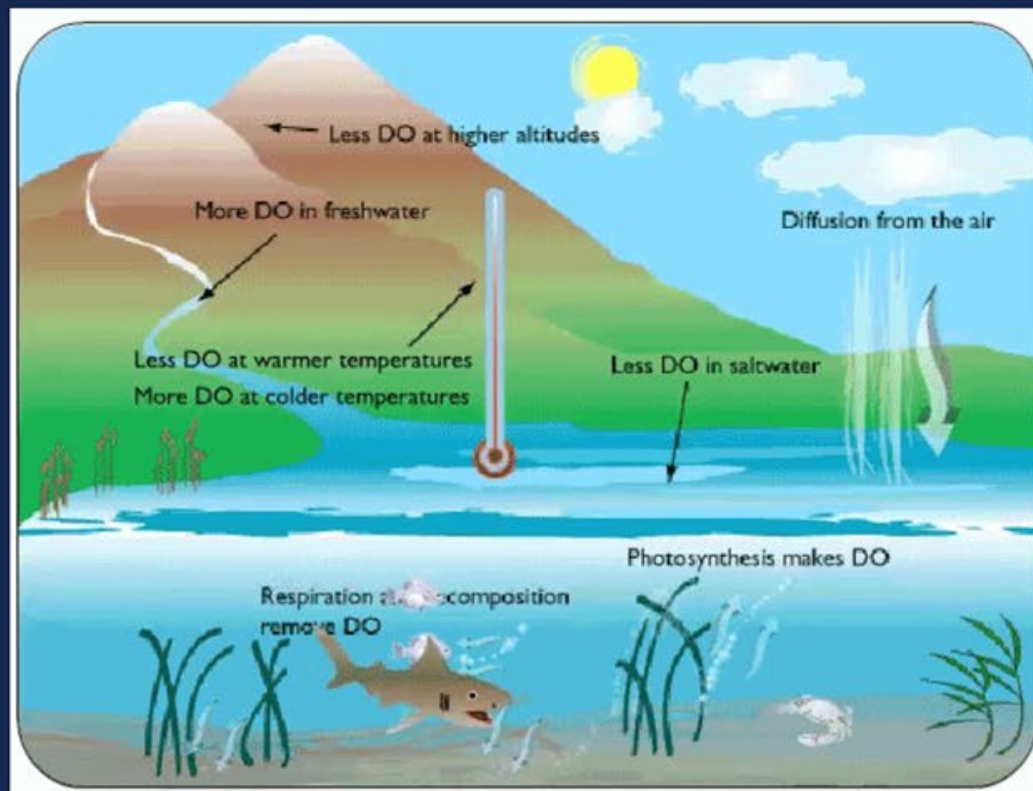
- [8/17/12: https://wpde.com/news/local/its-a-mystery-whats-causing-fish-kill-off-myrtle-beach](https://wpde.com/news/local/its-a-mystery-whats-causing-fish-kill-off-myrtle-beach)

Brainstorm some questions

Brainstorm the ANCHORING driving question students ask (or that have surfaced) that will be investigated and answered by students. Examples include:

- What are some of the primary factors that affect Dissolved Oxygen (DO)?
- How can human activity create drastic changes in an ecosystem?

Dissolved oxygen is the amount of oxygen dissolved in the water. It is the oxygen that aquatic plants and animals use to live. Dissolved oxygen is often called DO for short. SWMP uses a membrane-covered dissolved oxygen monitoring probe. Dissolved oxygen diffuses across the membrane and reacts with the probe surface. The amount of oxygen that diffuses across the membrane is measured and converted into a DO reading. Just as humans need air to breathe, aquatic organisms need dissolved oxygen to live. Fish, invertebrates, bacteria, and plants all need dissolved oxygen for respiration. Dissolved oxygen is also needed for the decomposition of organic matter.



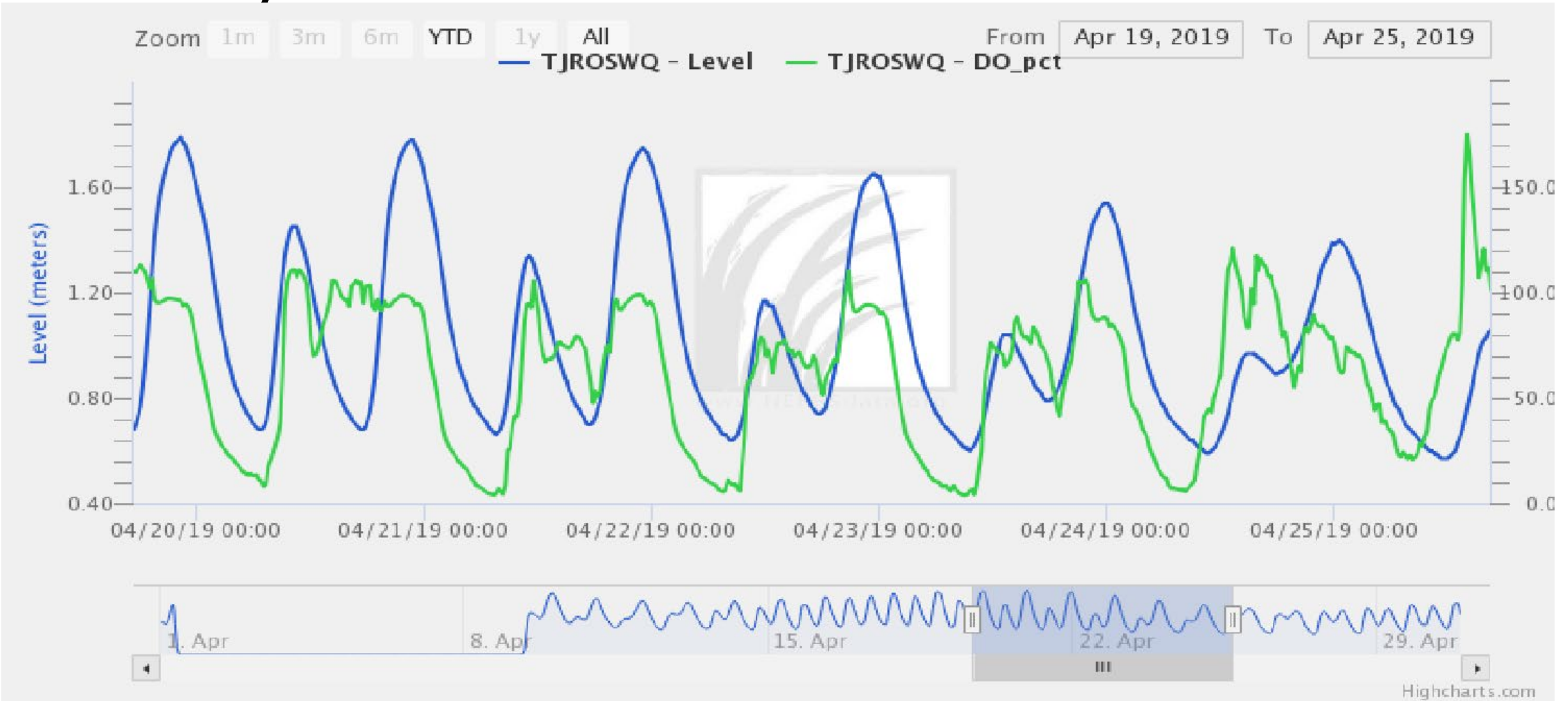
<https://coast.noaa.gov/estuaries/science-data/>

The screenshot shows a web browser window with the URL coast.noaa.gov/estuaries/science-data/. The main content is a table titled "Consequences of Low Dissolved Oxygen". The table has two columns: "Dissolved Oxygen" and "Consequences". The rows show the effects of different oxygen levels on marine life, ranging from 5.0 mg/L (few adverse effects) to 0.0 mg/L (anoxia-intolerable environment). The table is attributed to the US EPA - Long Island Sound Program.

Dissolved Oxygen	Consequences
Greater Than 5.0 mg/L	Few adverse effects on marine life.
4.0 mg/L	Reduced survival of some crab larvae by 30%.
3.0 mg/L	Reduced growth of crabs & lobsters. Some fish start to avoid the area.
2.5 mg/L	Growth reduced in grass shrimp, Summer flounder & lobster. Most fish avoid the area.
2.0 mg/L	Sharply reduced growth. Lowest safe level for many juvenile organisms.
1.5 mg/L	High lethal effects on fish, shrimp & lobster.
1.0 mg/L	Total avoidance by bottom fish. Very high lethal effects.
0.0 mg/L	Anoxia-intolerable environment for nearly all marine organisms.

(US EPA - Long Island Sound Program)

Ecosystem Metabolism

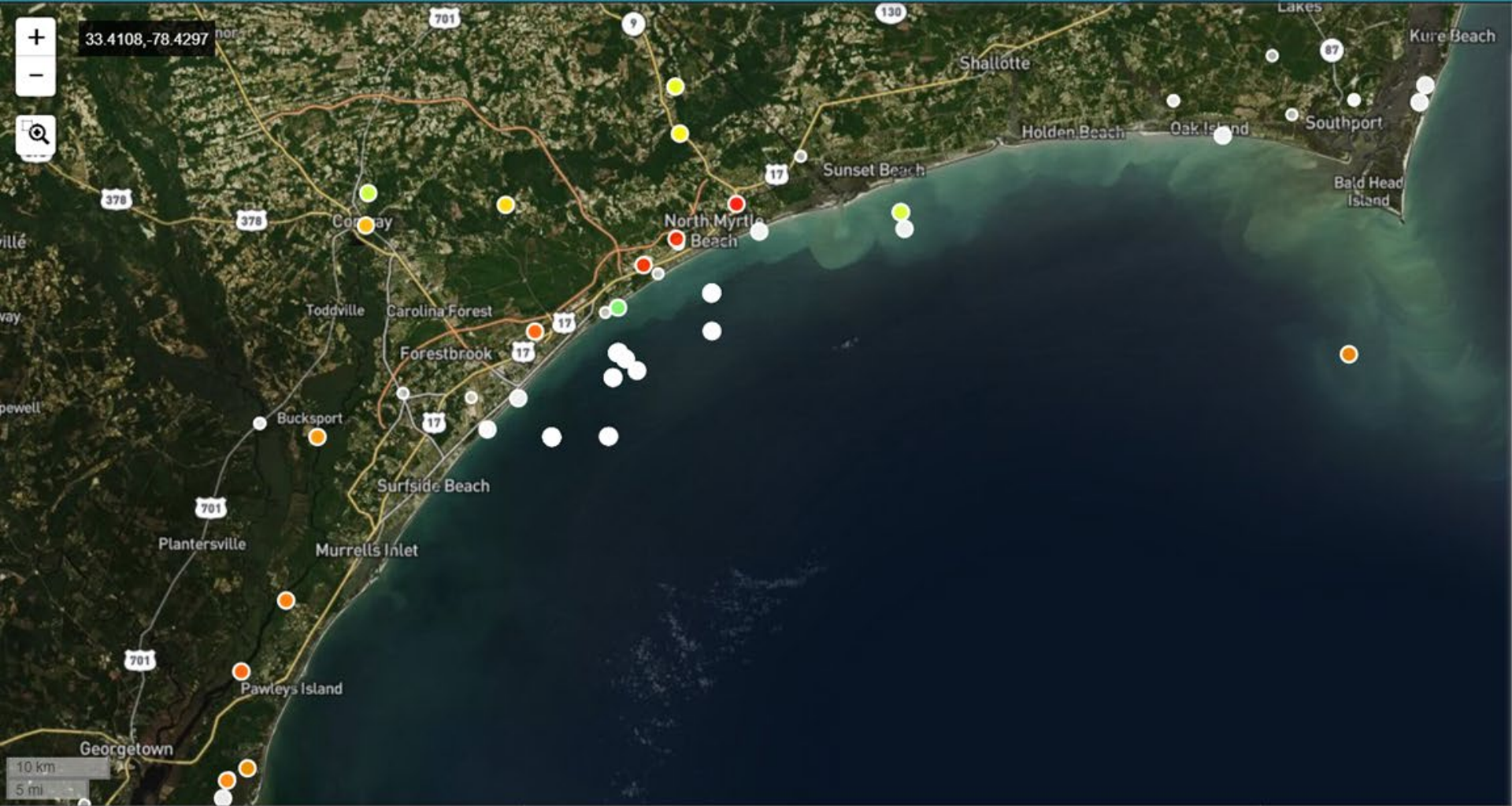


Natural Factors that affect DO:

- Balance of photosynthesis (which produces oxygen) and respiration (which uses oxygen) in estuarine waters -called “ecosystem metabolism”
- Mixing of water from the river, estuary, and ocean, all of which can have different oxygen levels
- Water temperature

Data sets:

- SECOORA Real-time and datasets: <https://portal.secoora.org/#map>
- North Inlet-Winyah Bay NERR data: <https://cdmo.baruch.sc.edu/dges/>
- [SCDHEC Swim Advisories Real time:](https://gis.dhec.sc.gov/beachaccess/#)
<https://gis.dhec.sc.gov/beachaccess/#>



Legend Find Data

Minimize all Hide all

SECOORA Real-time Sensors

SECOORA Real-time Sensors

845 to 845 m

69.62 79.79 89.96

Water Temperature (°F)

Variable types

Water Temperature (709)

Show all

Sources

All

Platform

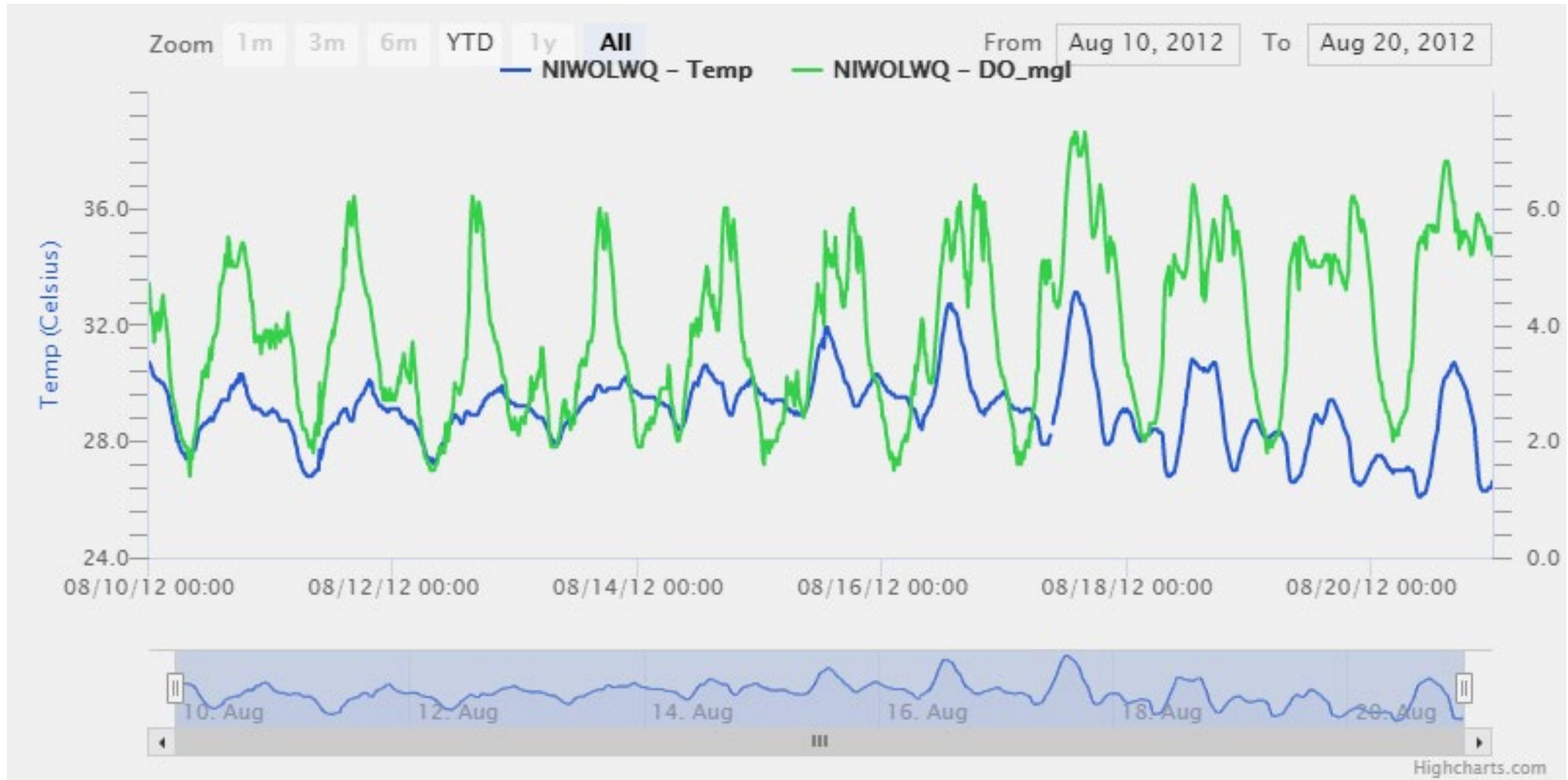
All

Search available sensor stations

+ Advanced



Total points: 1599 On screen: 95

North Inlet data from 8/17/12



Another fish kill in SC

- 1/1/18: <https://sccoastalresources.com/home/2018/5/7/update-winter-impacts-on-spotted-seatrout-and-shrimp?rq=seatrout>

<p><u>Temperature:</u> 15-27 °C</p> <p>Winter fish kills of seatrout occur when air temperatures drop to 7 °C for 12 hours or more.</p> <p><u>Salinity:</u> 11-44 ppt</p> <p>Spawning generally peaks when salinity in the home estuary is high, typically 30 - 35 ppt</p> <p><u>Dissolved Oxygen :</u> Above 3 ppm</p>	<p><i>Spotted Sea Trout</i></p>  <p><u>Habitat:</u> All ages live in estuaries and rivers, but they can also shallow coastal bays and sounds and possibly along front beaches of barrier islands.</p>  <p>DNR</p>
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Zoom

1m

3m

6m

YTD

1y

All

From

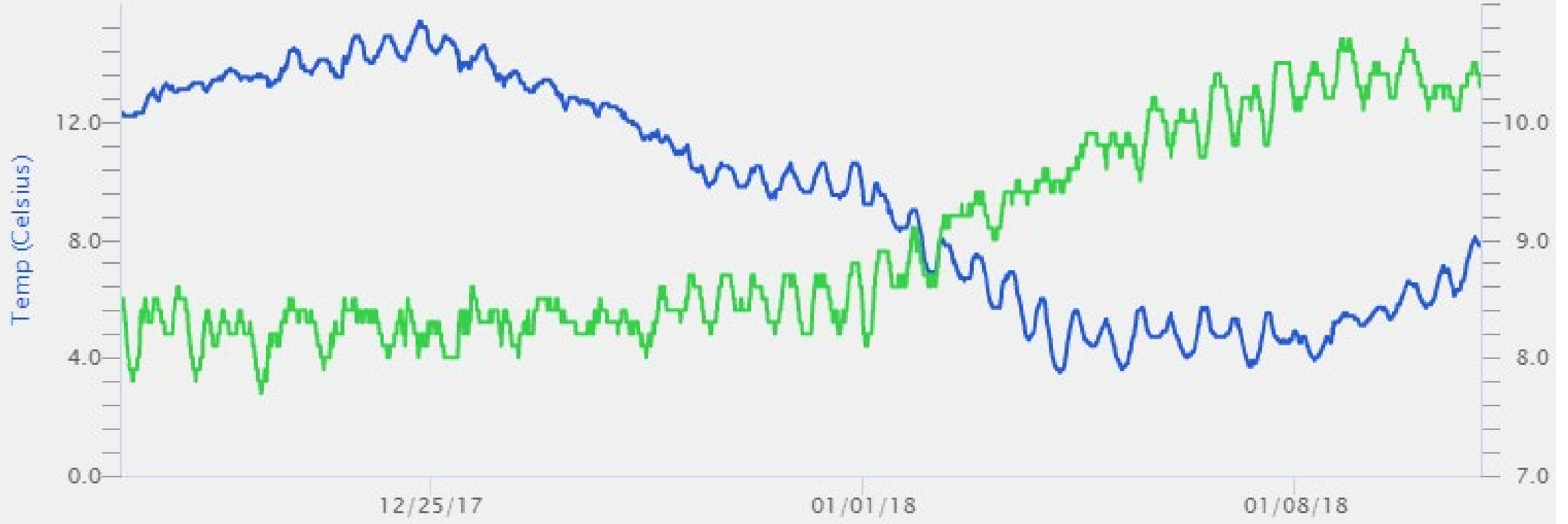
Dec 20, 2017

To

Jan 10, 2018

— ACEEIWQ - Temp

— ACEEIWQ - DO_mgl



Conclusions about causes of low DO? It can be caused by natural factors, man-made factors, or a combination of both.

Natural Factors

- Balance of photosynthesis (which produces oxygen) and respiration (which uses oxygen) in estuarine waters -called “ecosystem metabolism”
- Mixing of water from the river, estuary, and ocean, all of which can have different oxygen levels
- Water temperature

Man-made Factors

- Excess fertilizer run-off
- Changes to water levels from water control structures
- Sediment runoff from nearby construction
- Excess bacteria from sewage treatment facilities or septic tanks