NBC Assist DEM Investigating Fish Kills on Seekonk River

Thomas Uva
Director of Planning, Policy & Regulation
Narragansett Bay Commission

Fish Kills in Seekonk River

Fish Kills have been observed in the Seekonk River

- ✓August 3, 2014
- ✓May 25, 2015
- ✓July 18, 2015
- ✓***August ????? 2015????***

✓Headlines: **"Oxygen-starved menhaden dying in Seekonk River"**

✓***Well, wait a minute, not so fast!!!!***

Oxygen-starved menhaden dying in Seekonk River

Dead fish on the shoreline of the Seekonk River in East Providence, part of the fish kill that has struck the Atlantic menhaden population recently. Photo courtesy of Save The Bay.

By Tracee M. Herbaugh
Journal Staff Writer

Posted May. 29, 2015 at 11:15 PM

PAWTUCKET, R.I. — Hundreds of dead Atlantic menhaden have been washing up on the banks of the Seekonk River near the Pawtucket Falls, and many more are expected to perish in a die-off caused by various environmental circumstances.

About 2,000 of the silvery bait fish, often called pogies, have died or are almost dead, according to Tom Kutcher, an ecologist and advocate with Save The Bay, a nonprofit organization that works to protect and improve the conditions of Narragansett Bay.

"Lots of pogies are doing what I call their death spiral," Kutcher said. "Where they swim around in circles, close to the surface, and gasp for air like goldfish do."

The Seekonk River is an upper part of the Narragansett Bay estuary, where saltwater mixes with freshwater. This particular population of menhaden migrates from locations in the mid-Atlantic to look for food and can end up in Narragansett Bay. In the last few years, however, the fish have been swimming farther up the river to feed on plankton.

A few environmental conditions have influenced the fish kill, Kutcher explained. Ultimately, though, the fish aren't getting enough oxygen in the water.

A10 Thursday, July 30, 2015

ENVIRONMENT

Hundreds of fish die in area rivers

DEM blames fish kill on low oxygen levels

By Tracee M. Herbaugh
Journal Staff Writer

The Rhode Island Department of Environmental Management is watching a large fish kill throughout the Seekonk and Providence rivers caused by low oxygen levels in the water.

Initial reports showed that the fish kill began in the upper Seekonk River around July 17.

and advocate with Save The Bay, a nonprofit organization that works to protect and improve the conditions of Narragansett Bay, estimated "thousands" of fish have died off.

have more work to do."

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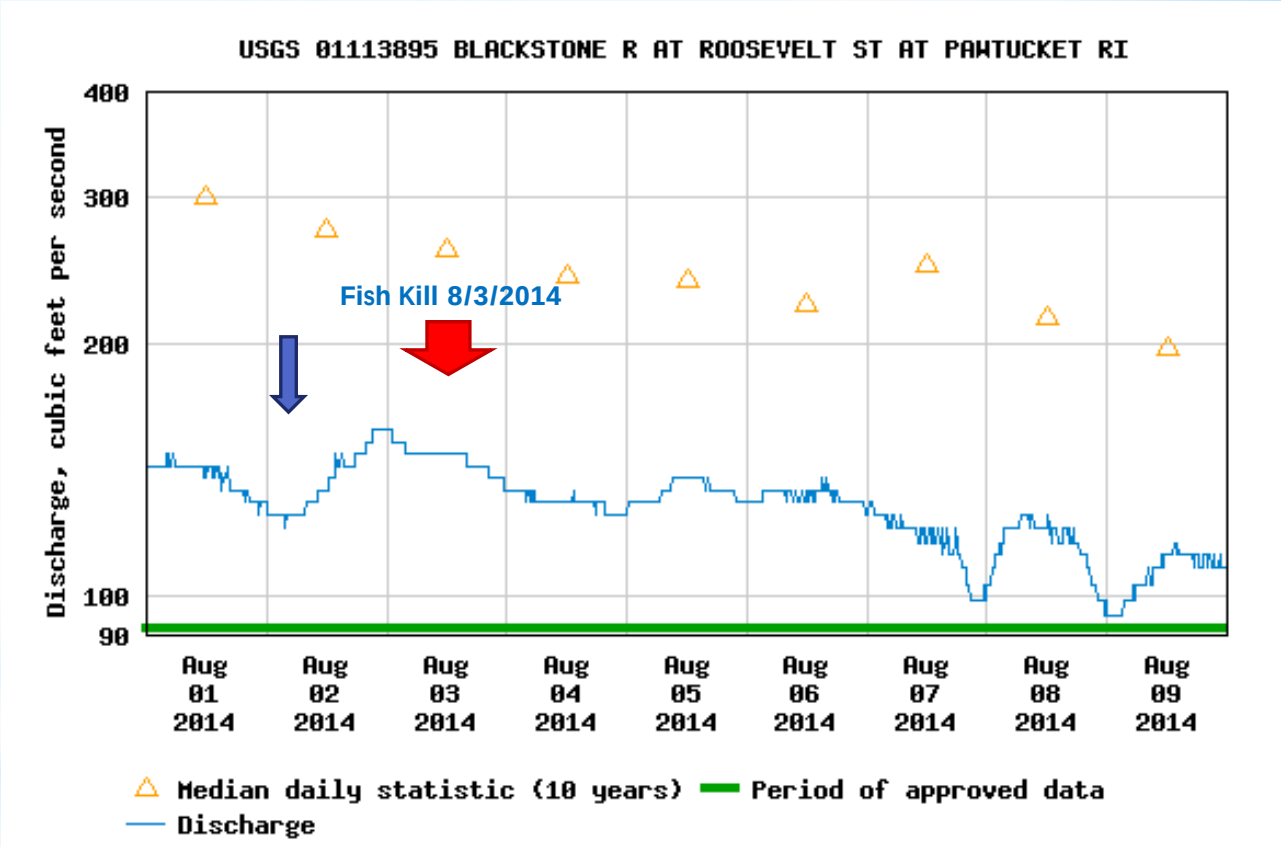
Fish Kills in Seekonk River

NBC Observations:

- ✓Hundreds of dead fish were observed floating and along the banks of the Seekonk
- ✓Kill appeared to begin in the northern most portion of the Seekonk
- ✓Only Menhaden seemed affected. Other schools of baitfish were observed.
- ✓Very interesting things happening!!!

Fish Kill in Seekonk River - 2014

- ✓Similarities in flow changes observed in Blackstone River for 2014 and 2015 fish kill events
- ✓Significant flow drop observed a day or two before each event



Fish Kills in Seekonk River - 2015

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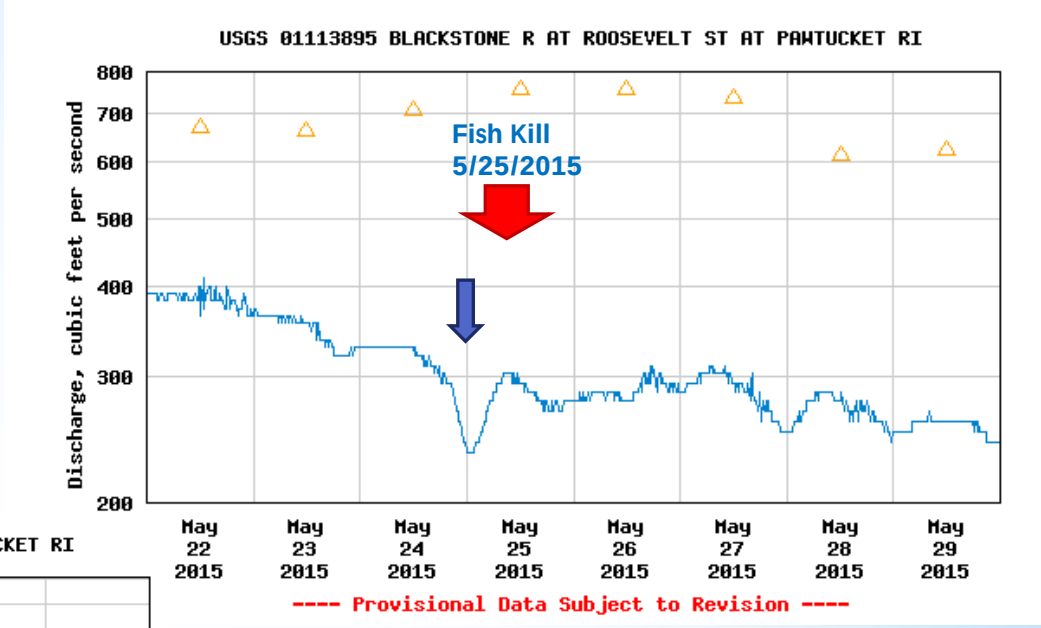
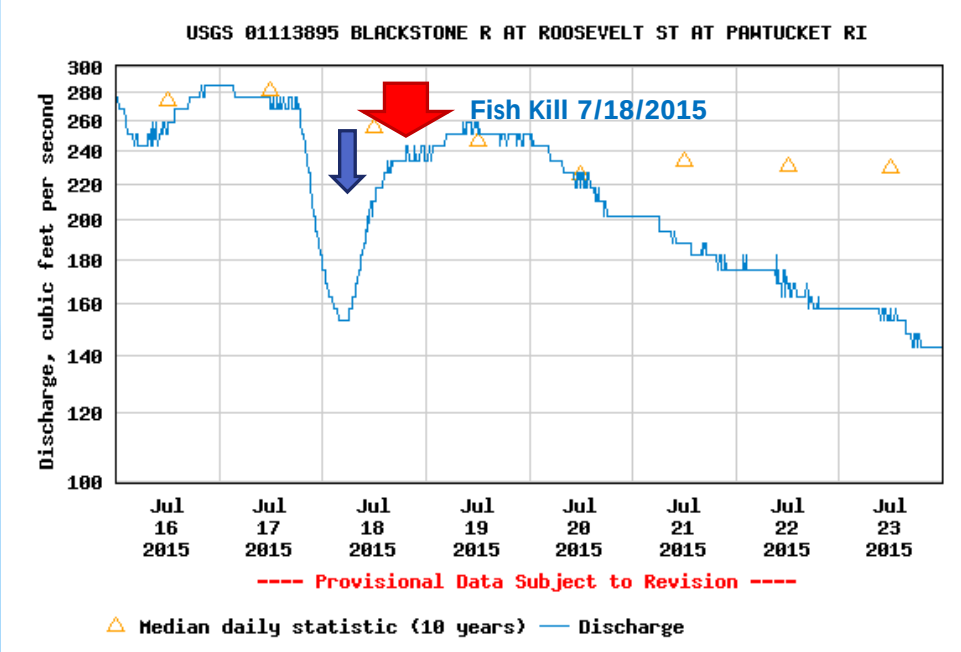




Fish Kills in Seekonk River

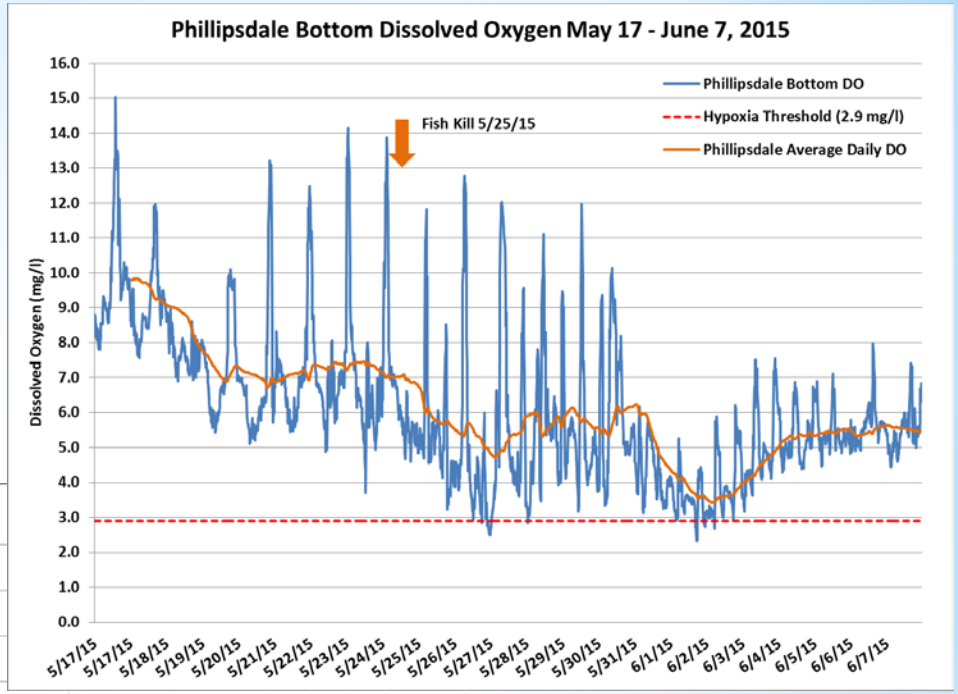
- ✓Atlantic Menhaden were observed doing the “Death Spiral”
- ✓Menhaden seemed to be only fish affected
- ✓Occurring in Atlantic Menhaden schools along the east coast
- ✓Also occurring along CT coast and in CT rivers
- ✓Viral “whirling” disease or the “death spiral” suspected by CT DEEP
- ✓NBC collected 4 live Atlantic Menhaden for analysis by RWU

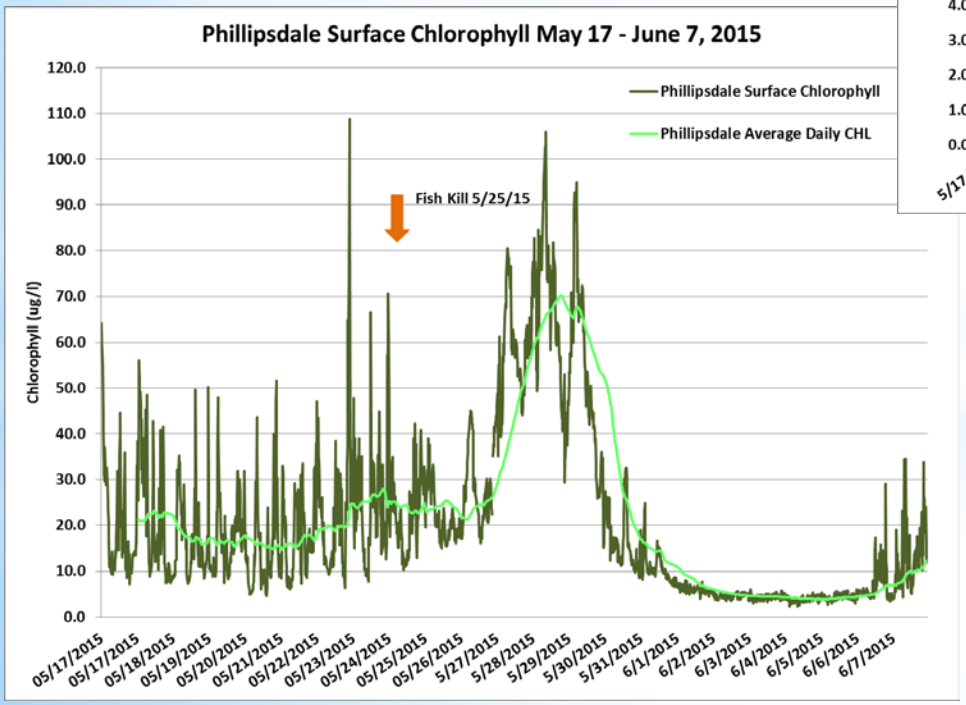
Live Fish Samples Collected

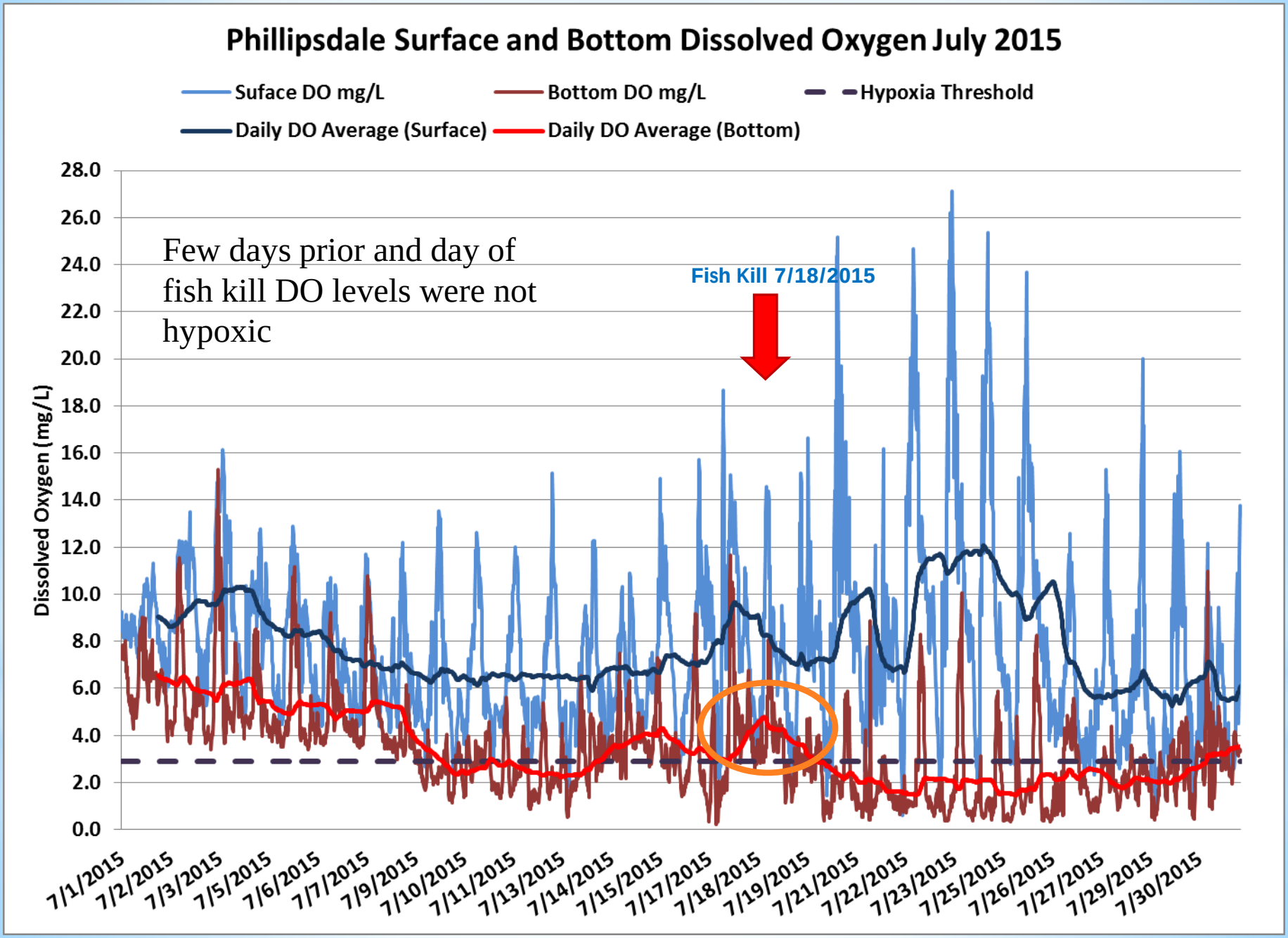
- ✓Fish collected by NBC were doing the “Death Spiral”
- ✓One fish had anchor worm copepod parasites attached
- ✓Fish were immediately frozen for transport to RWU for analysis

Fish Kills in Seekonk River

- ✓Bottom DO at Phillipsdale fixed site was not hypoxic for extended periods prior to the May 25th Fish Kill
- ✓Chlorophyll Levels were high






Phillipsdale Surface and Bottom Dissolved Oxygen July 2015
Suface DO mg/L
Bottom DO mg/L
Hypoxia Threshold
Daily DO Average (Surface)
Daily DO Average (Bottom)
Few days prior and day of fish kill DO levels were not hypoxic
Fish Kill 7/18/2015
Dissolved Oxygen (mg/L)
28.0
26.0
24.0
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
7/1/2015
7/2/2015
7/3/2015
7/5/2015
7/6/2015
7/7/2015
7/9/2015
7/10/2015
7/11/2015
7/13/2015
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7/17/2015
7/18/2015
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7/21/2015
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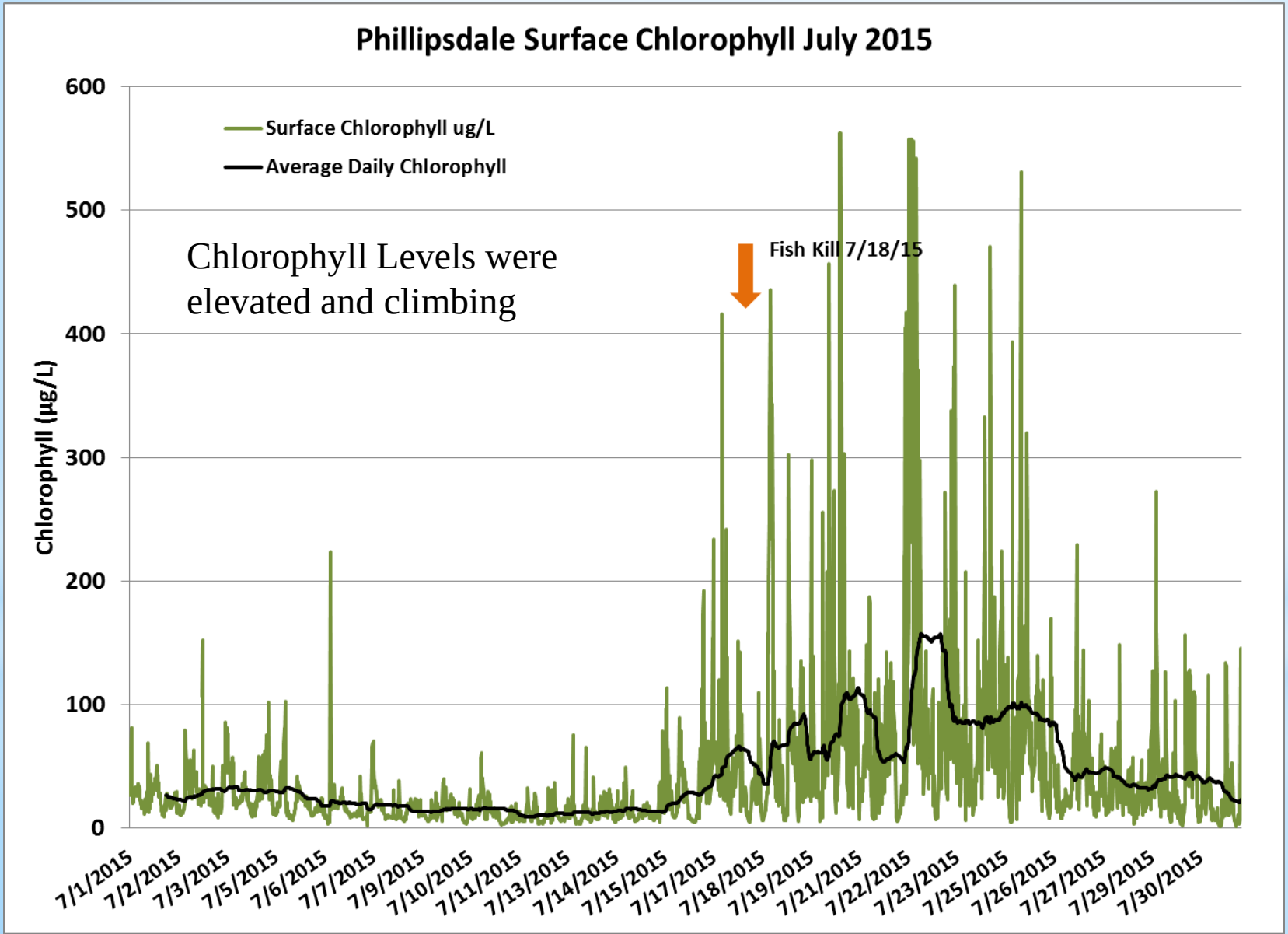
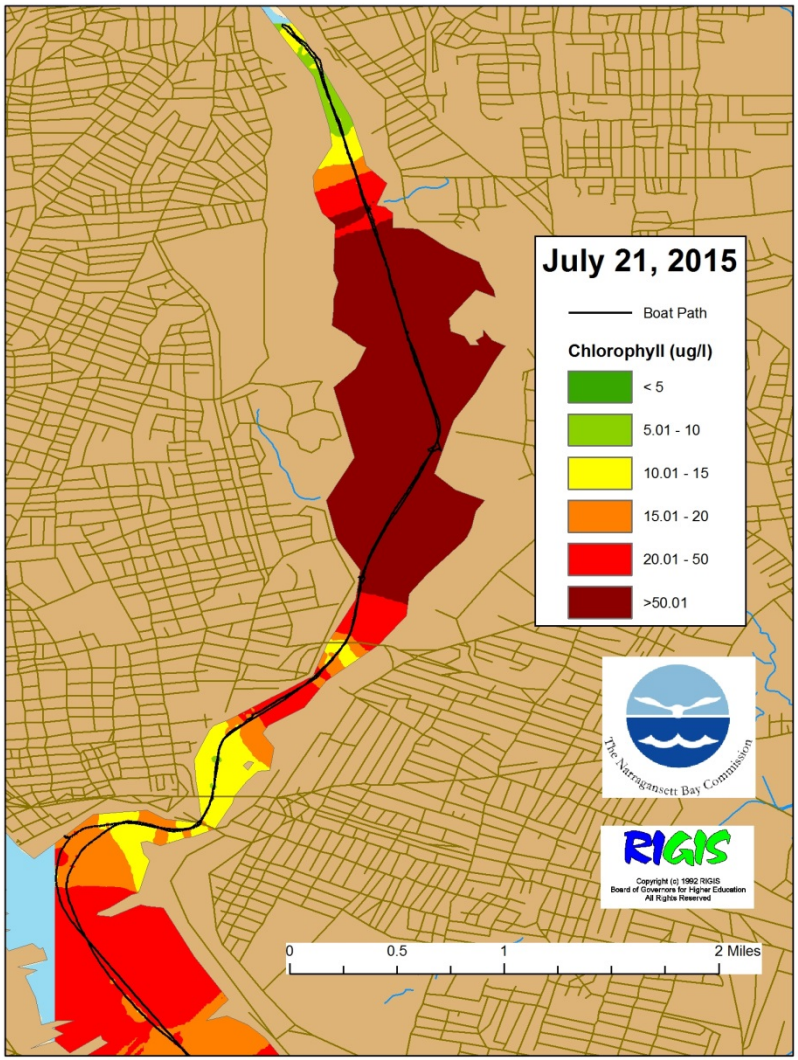
7/29/2015
7/30/2015

Phillipsdale Surface Chlorophyll - July 2015



Fish Kills in Seekonk River

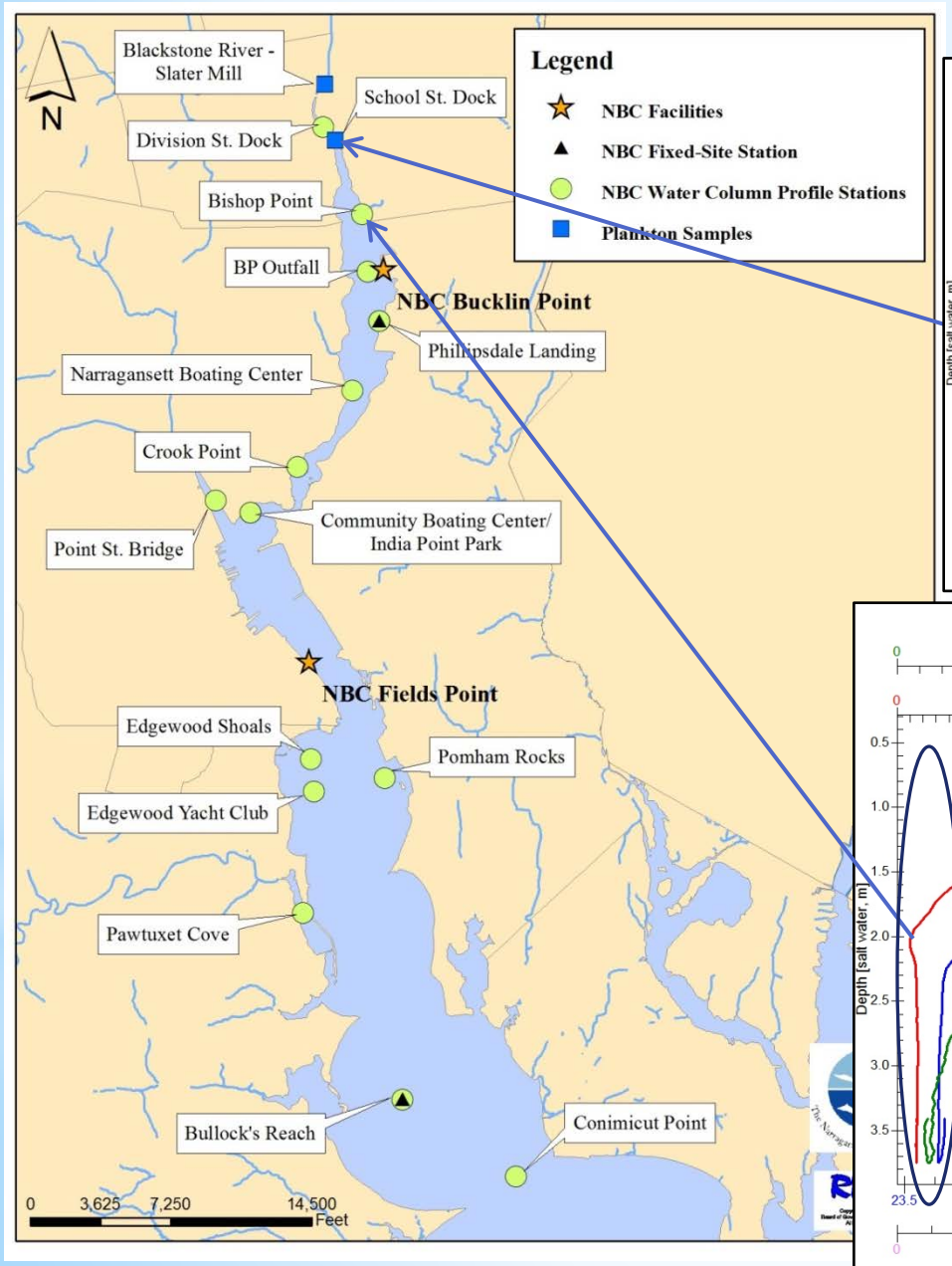
- ✓Surface Mapping was conducted 3 days after the fish kill
- ✓Chlorophyll Levels were very high in the Seekonk
- ✓Large Bloom was still occurring and moving downstream

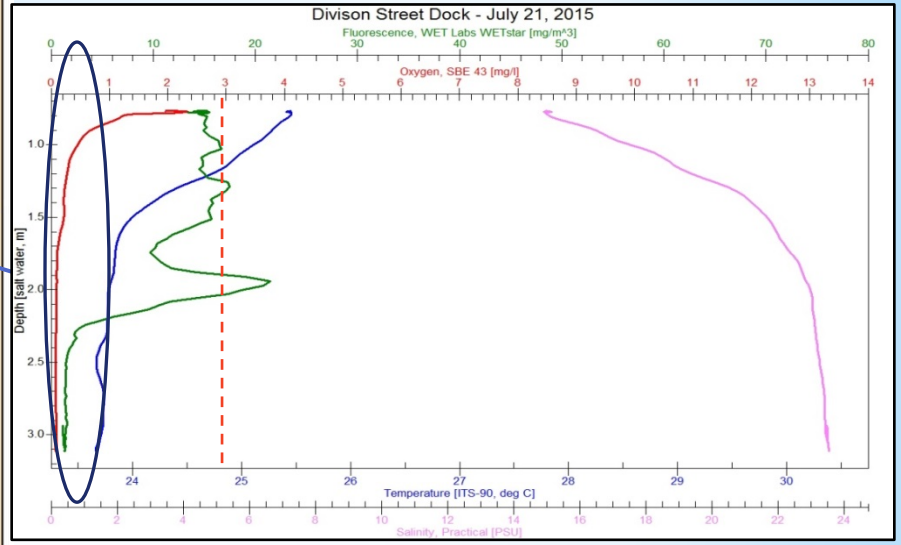


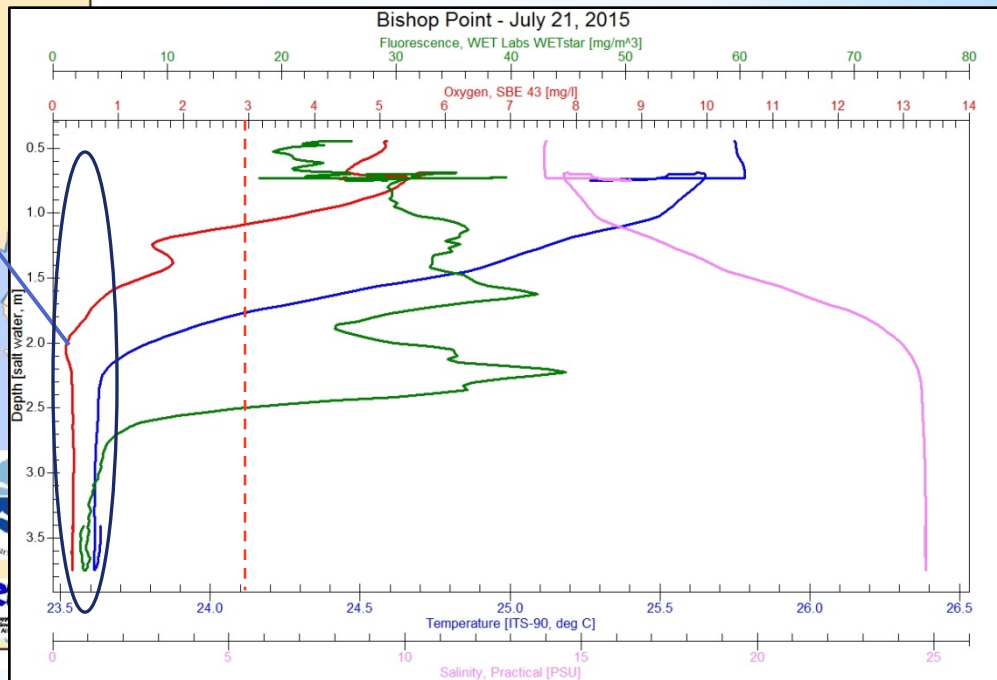
Seabird Data collected July 21 & 22, 2015

Water column profiles July 21, 2015

- ✓ Division Dock & Bishop Point were both Anoxic







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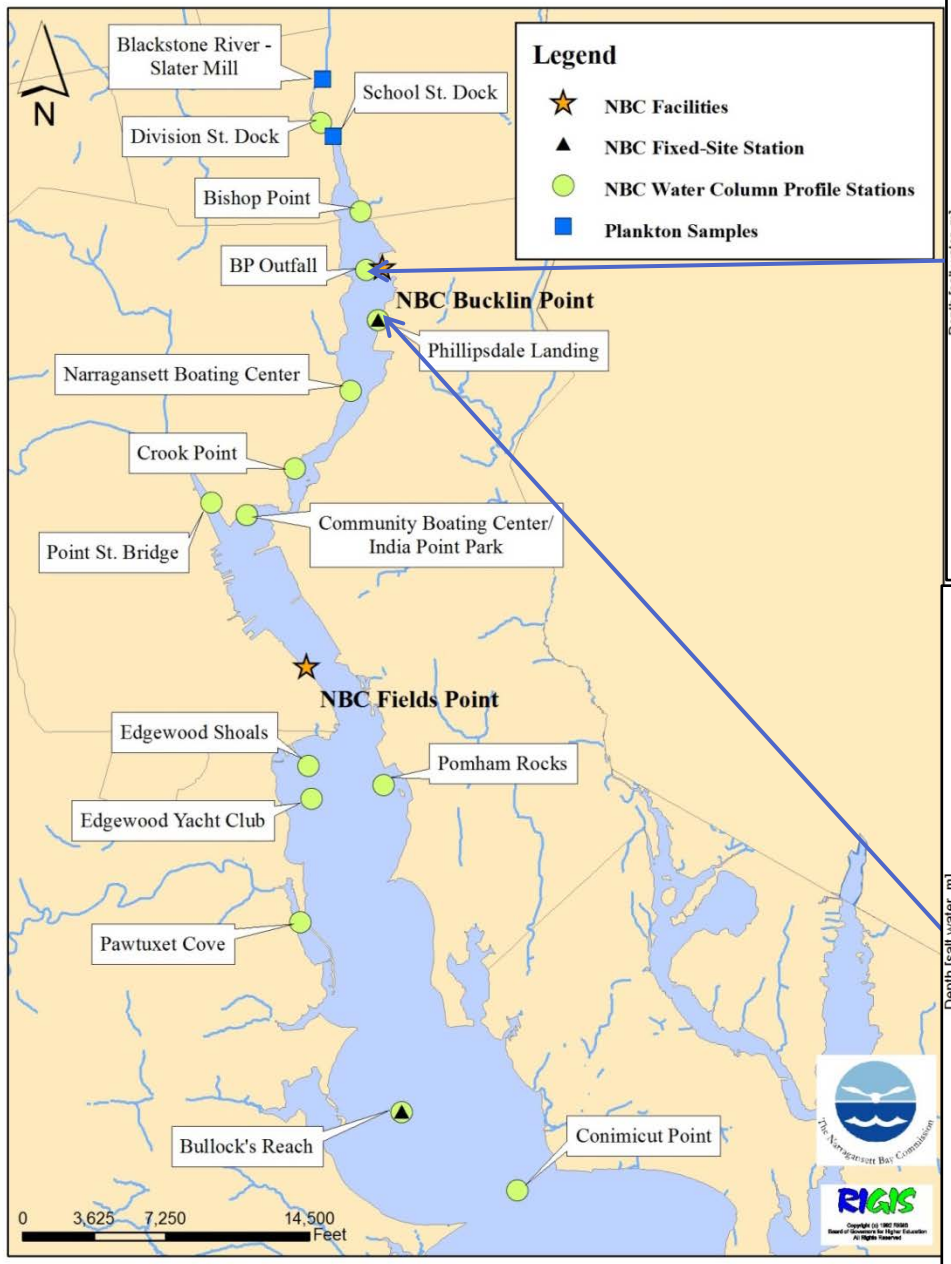
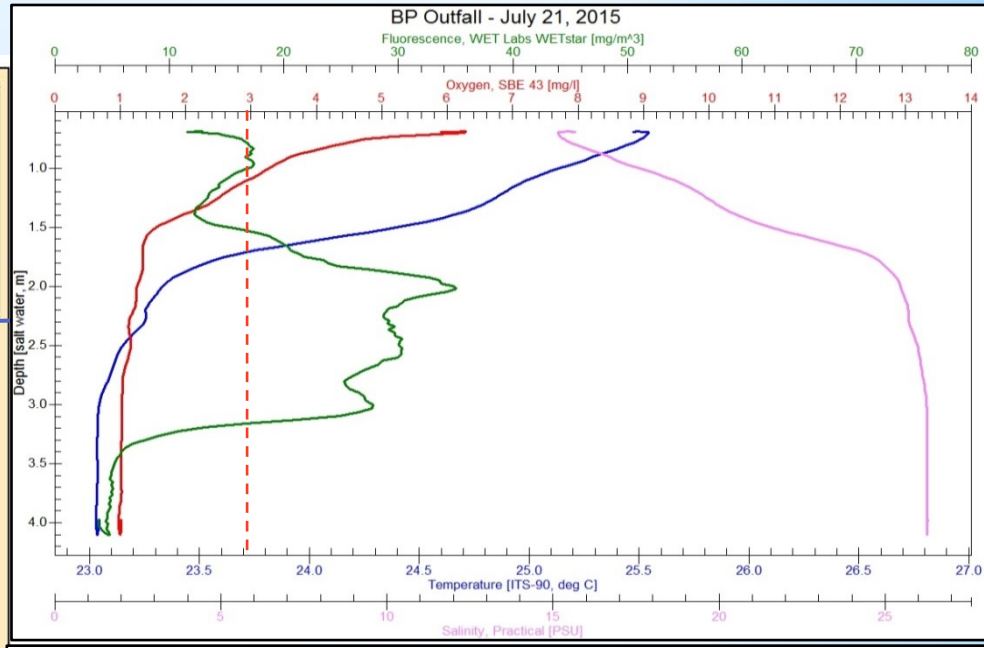
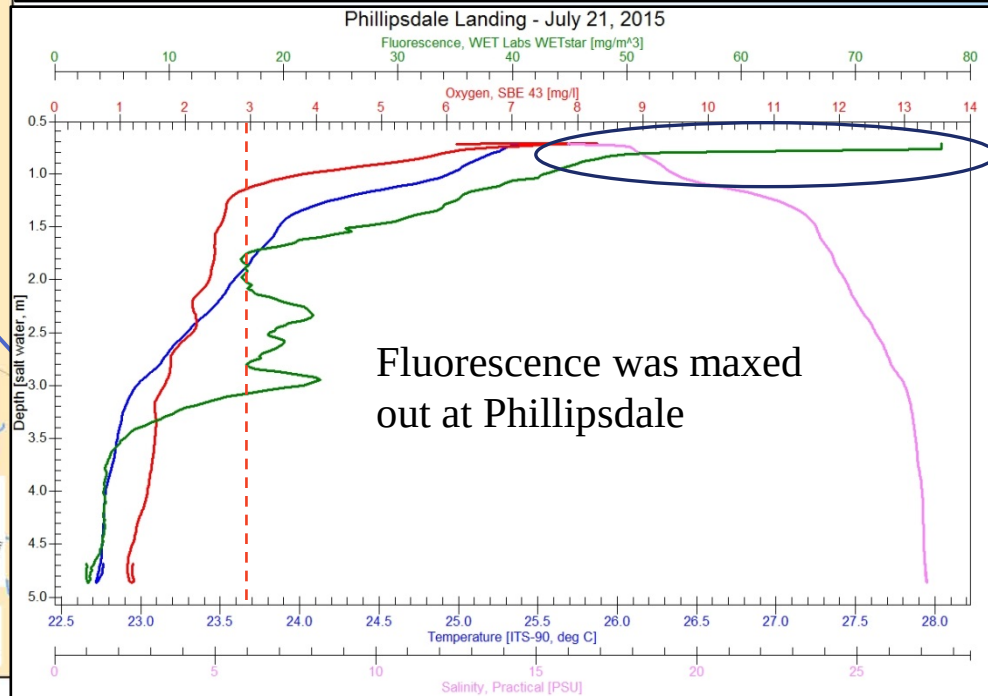


Water column profiles July 21, 2015





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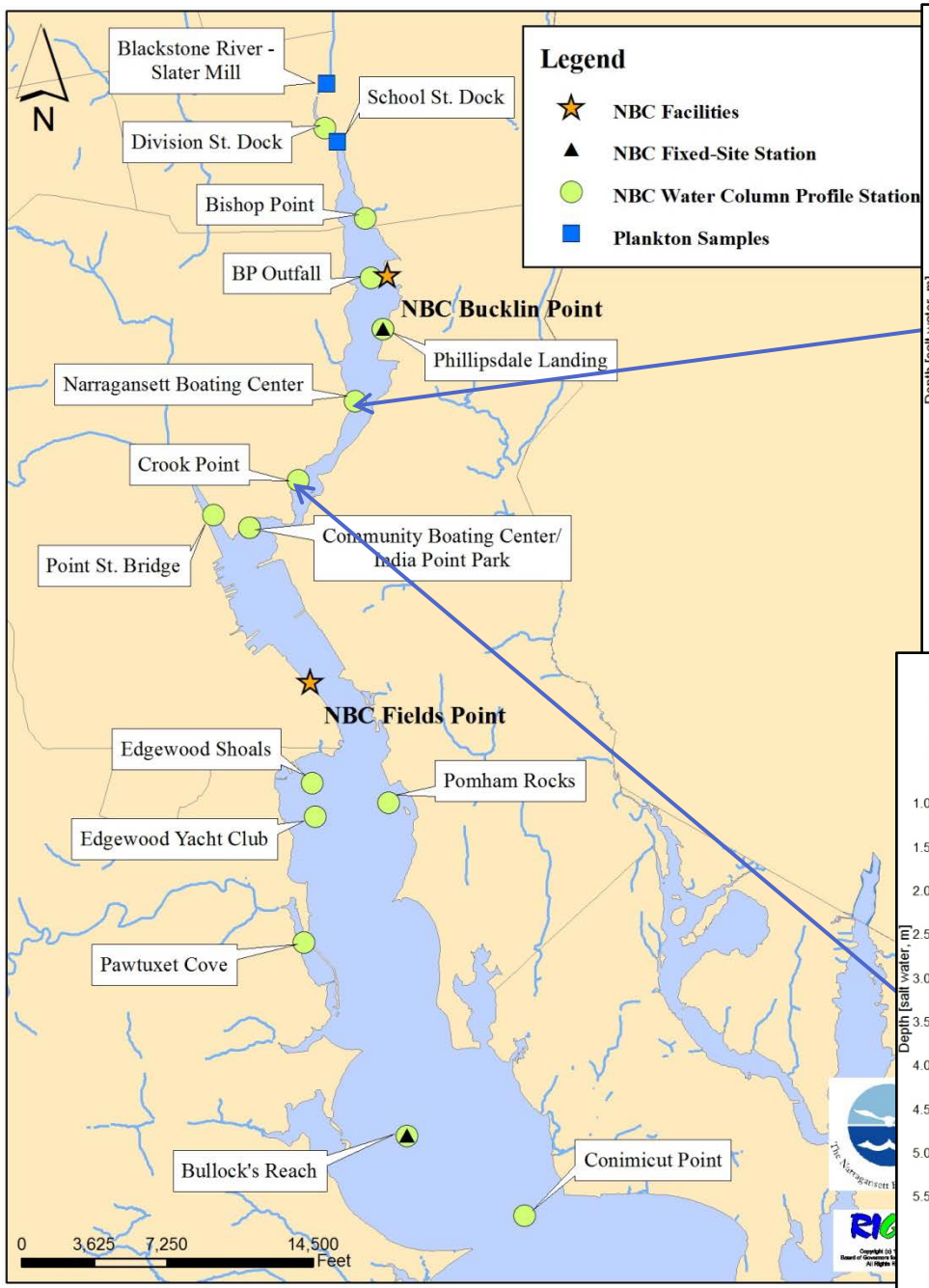
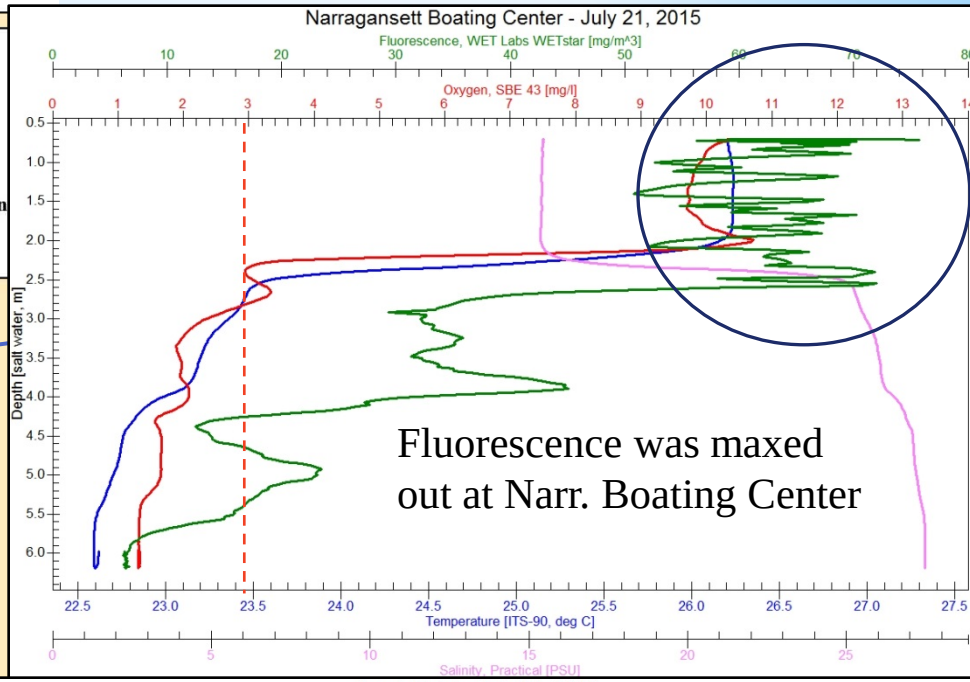
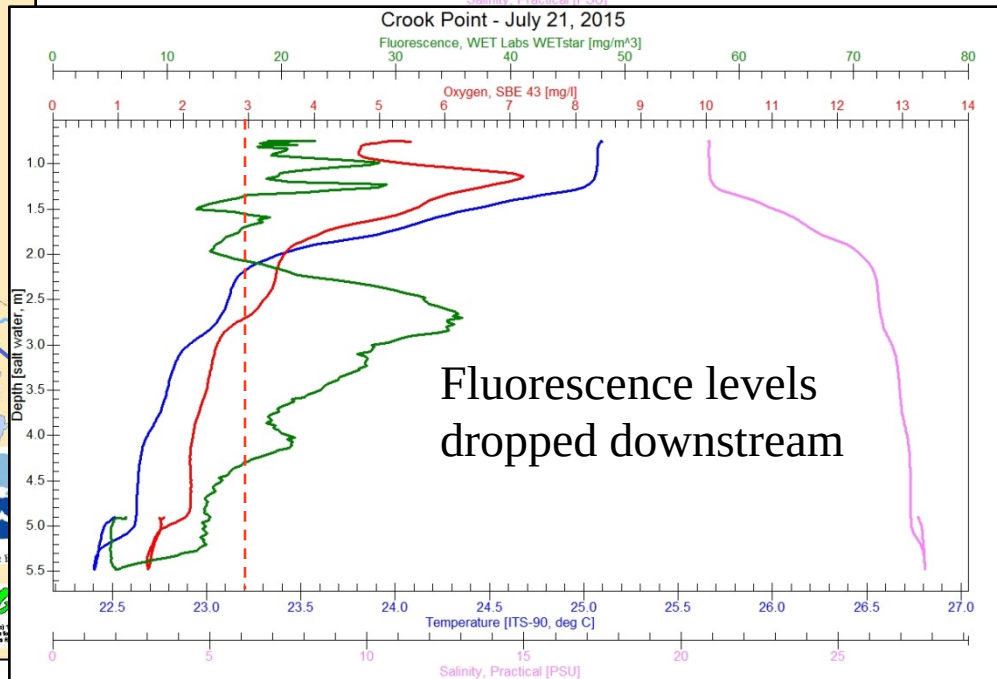


Water column profiles July 21, 2015





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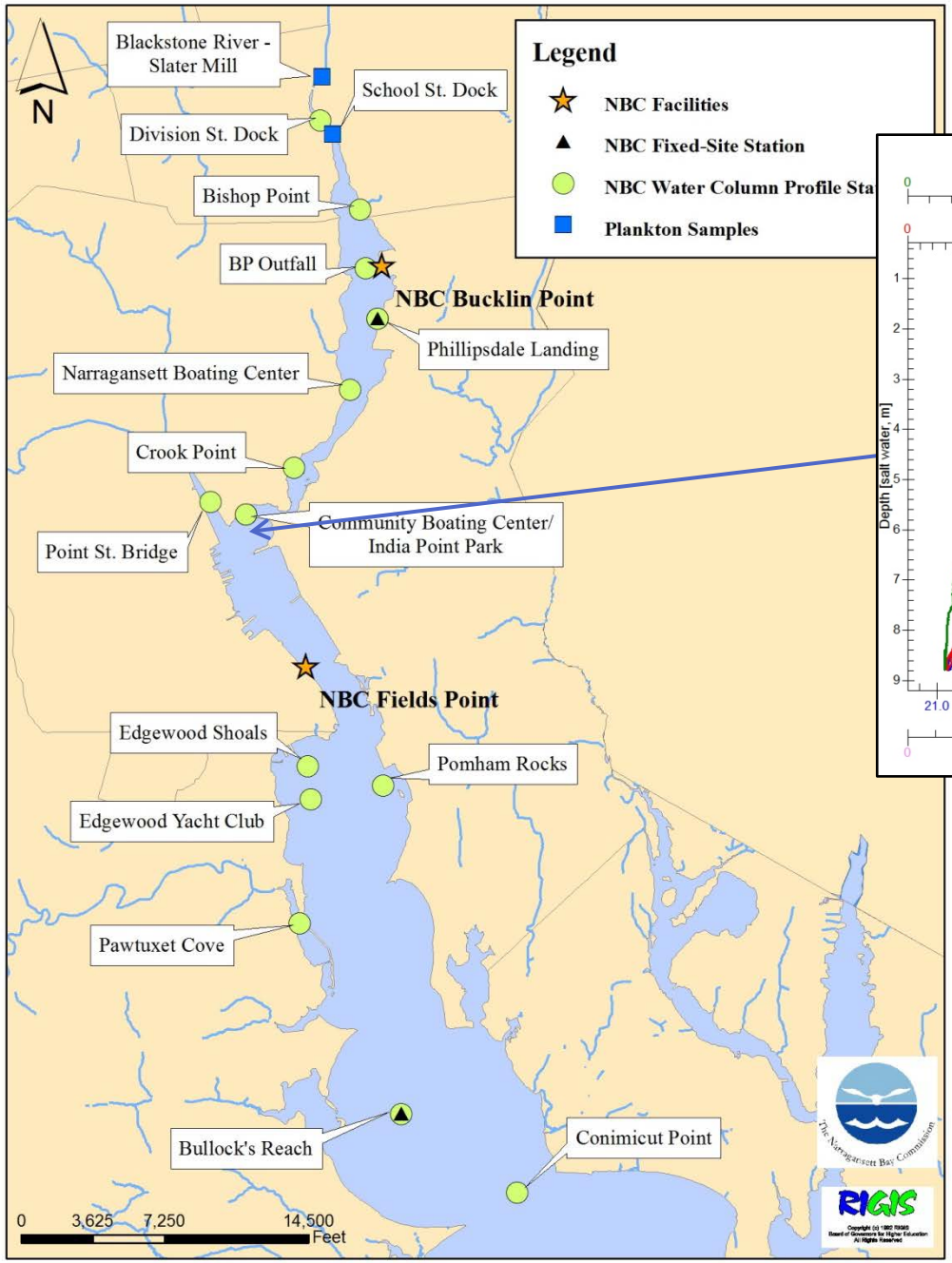
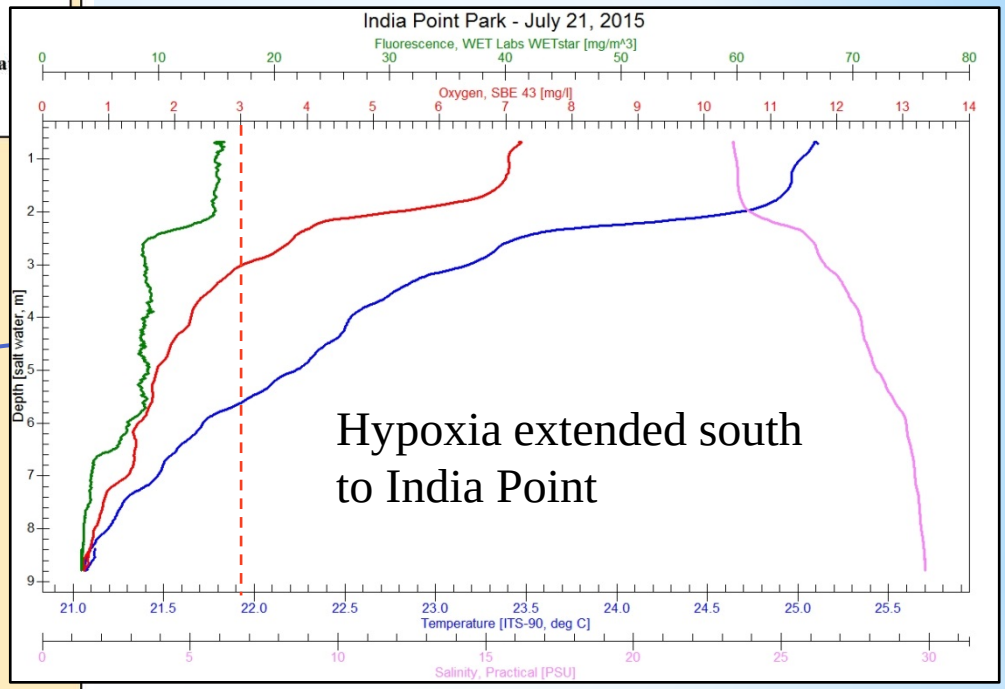


Water column profile July 21, 2015



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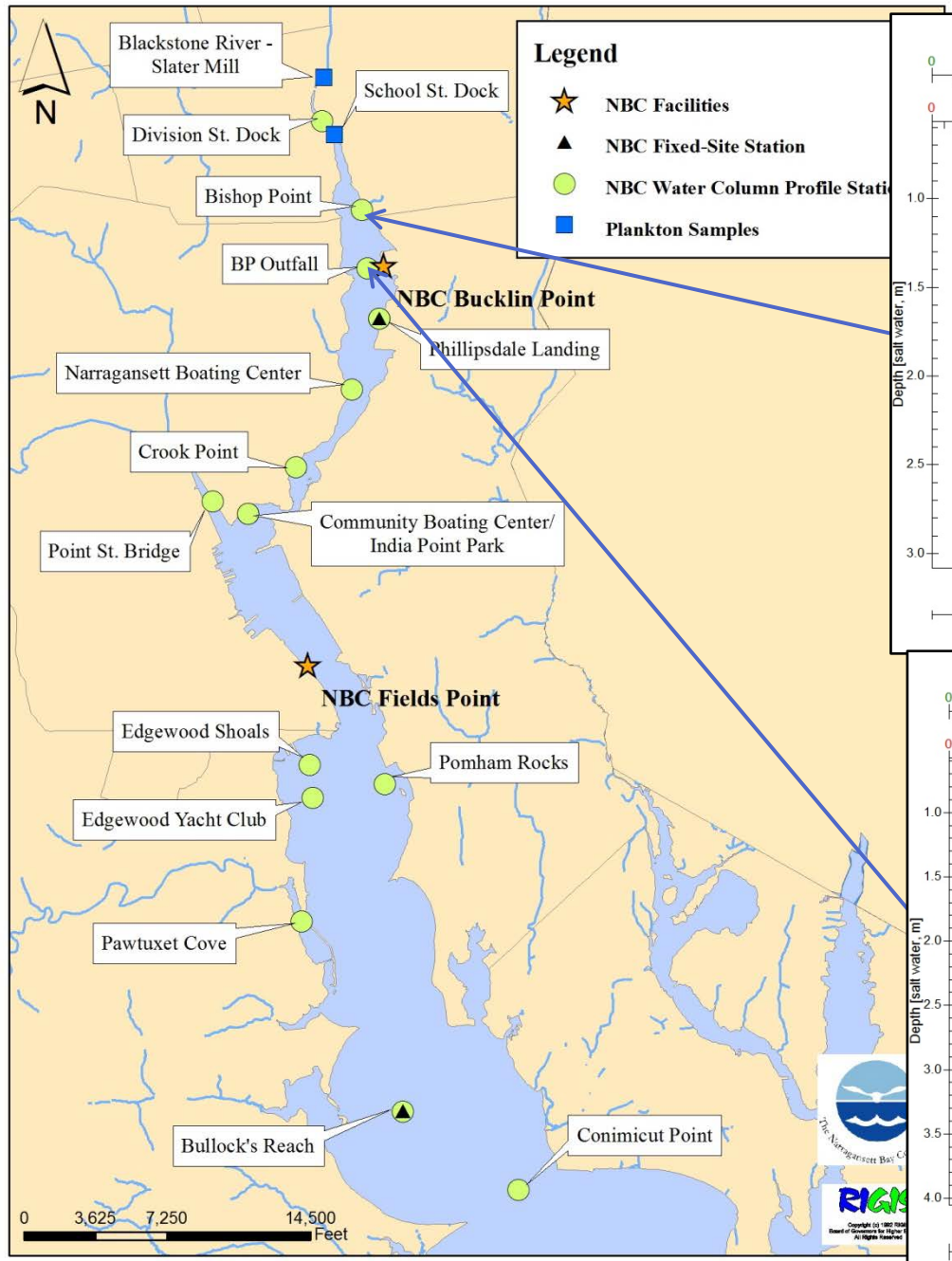
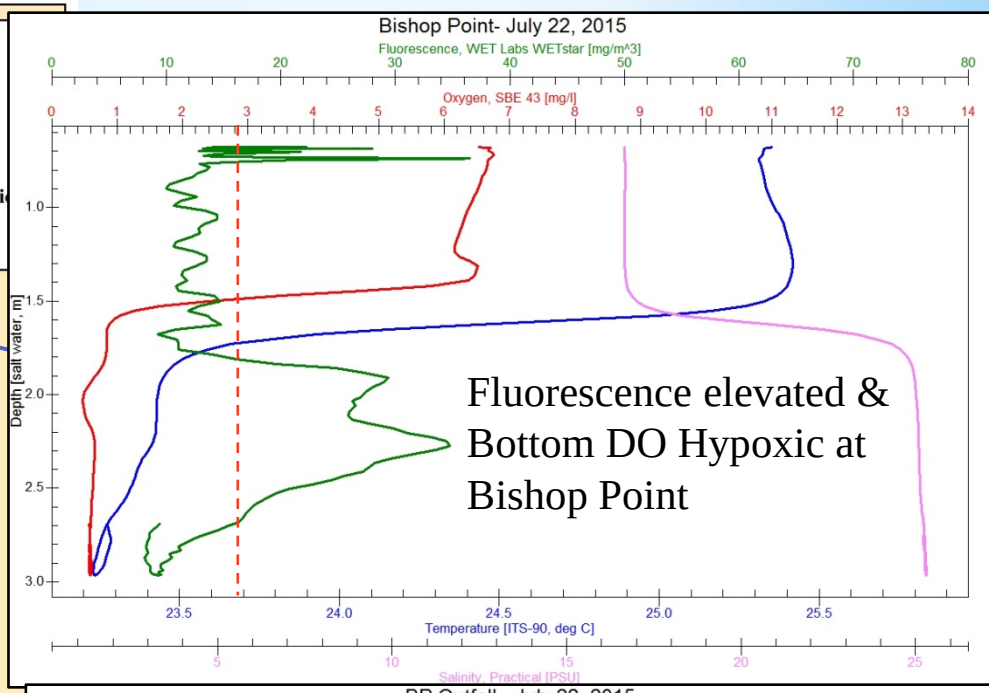
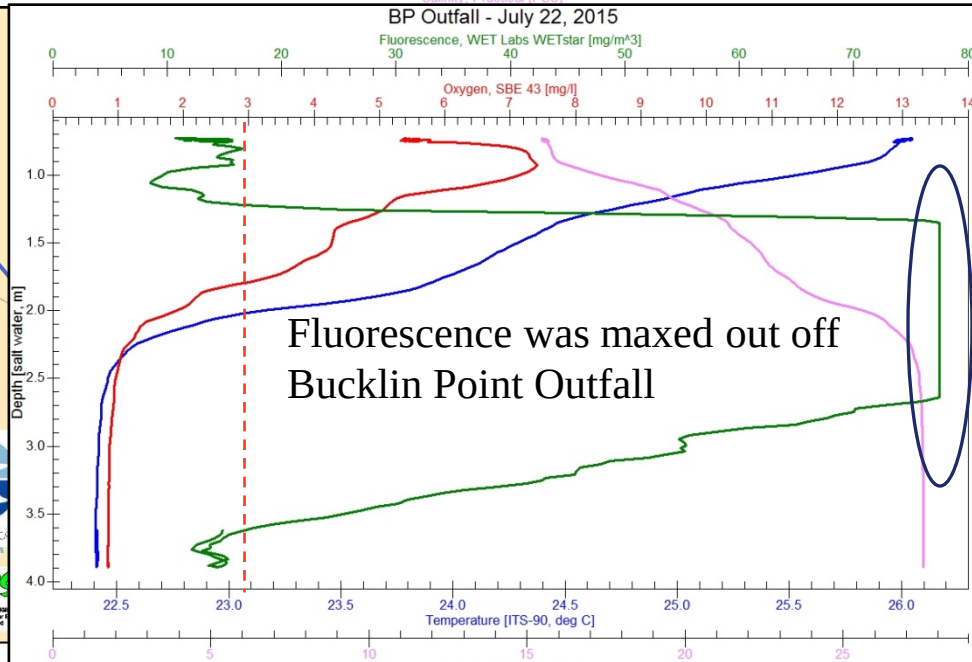


Water column profiles July 22, 2015





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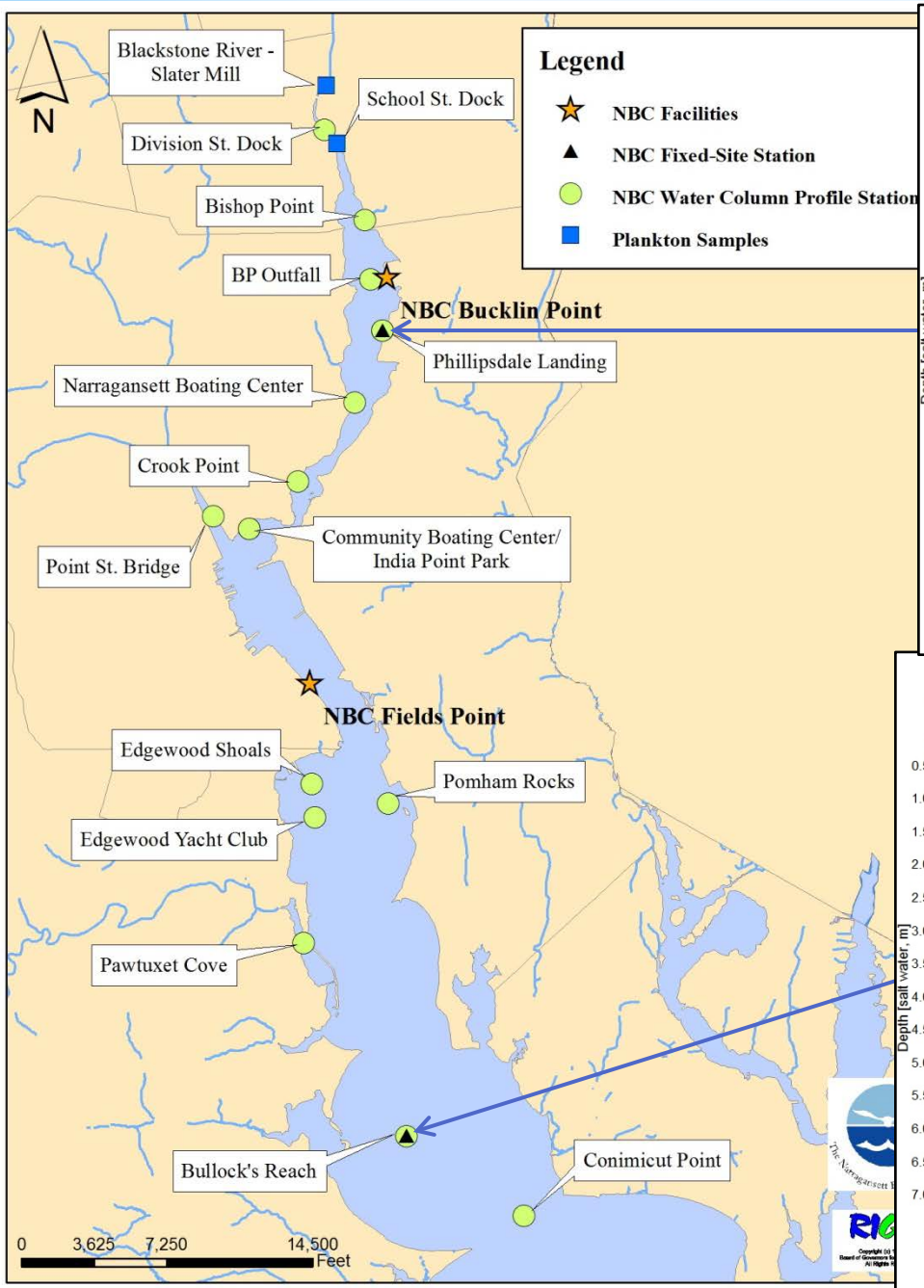
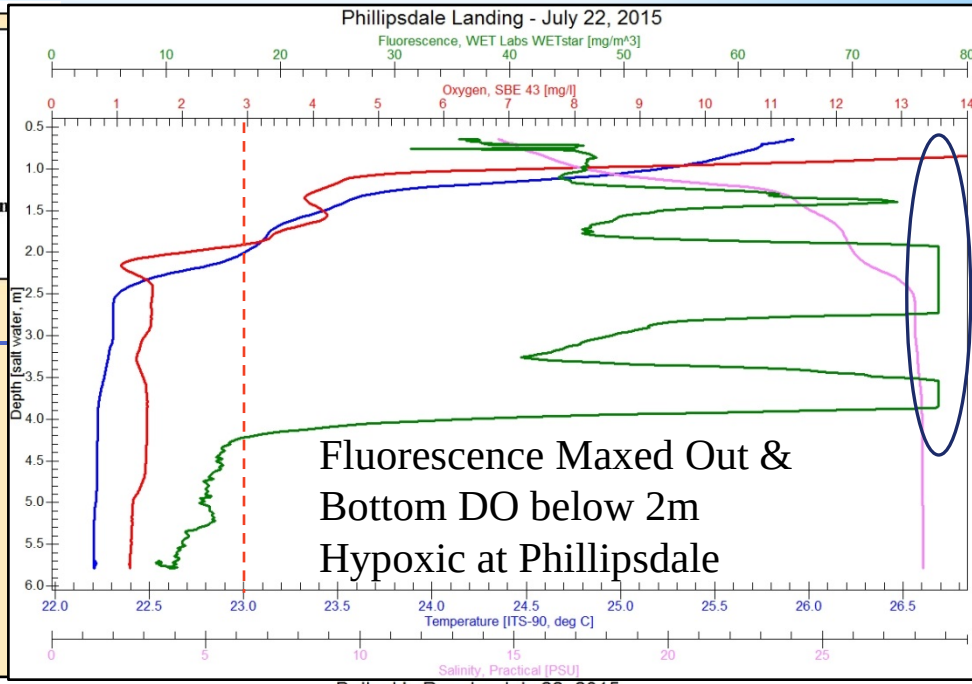
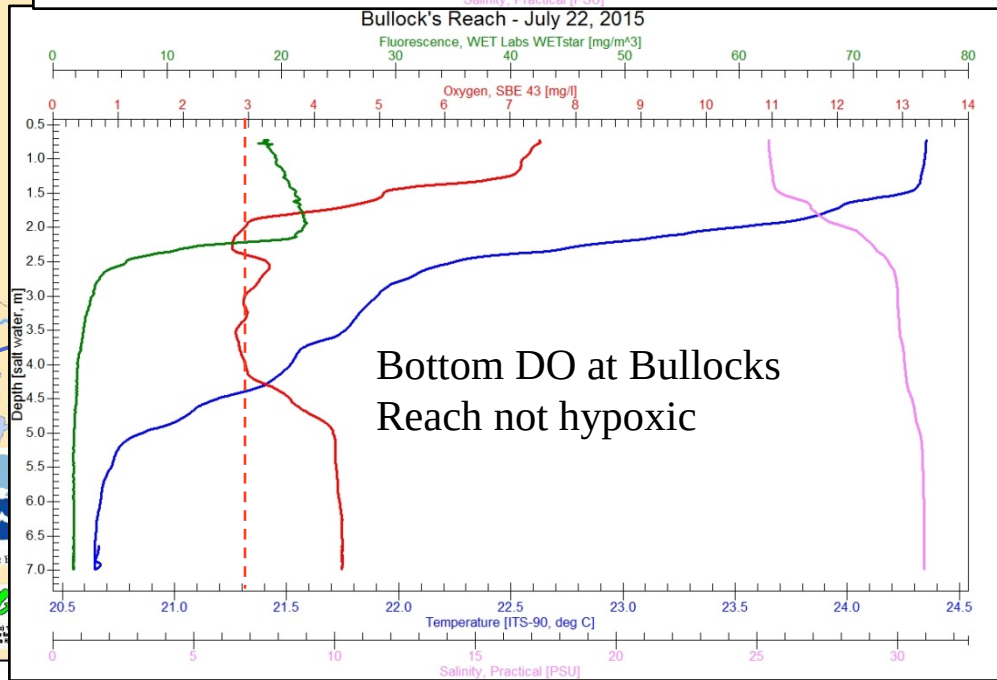


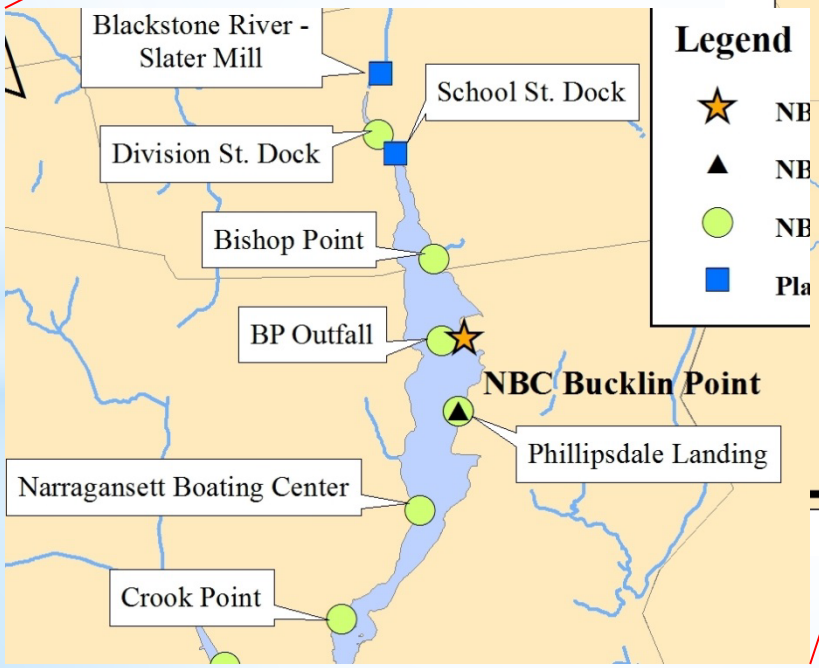
Water column profiles July 22, 2015

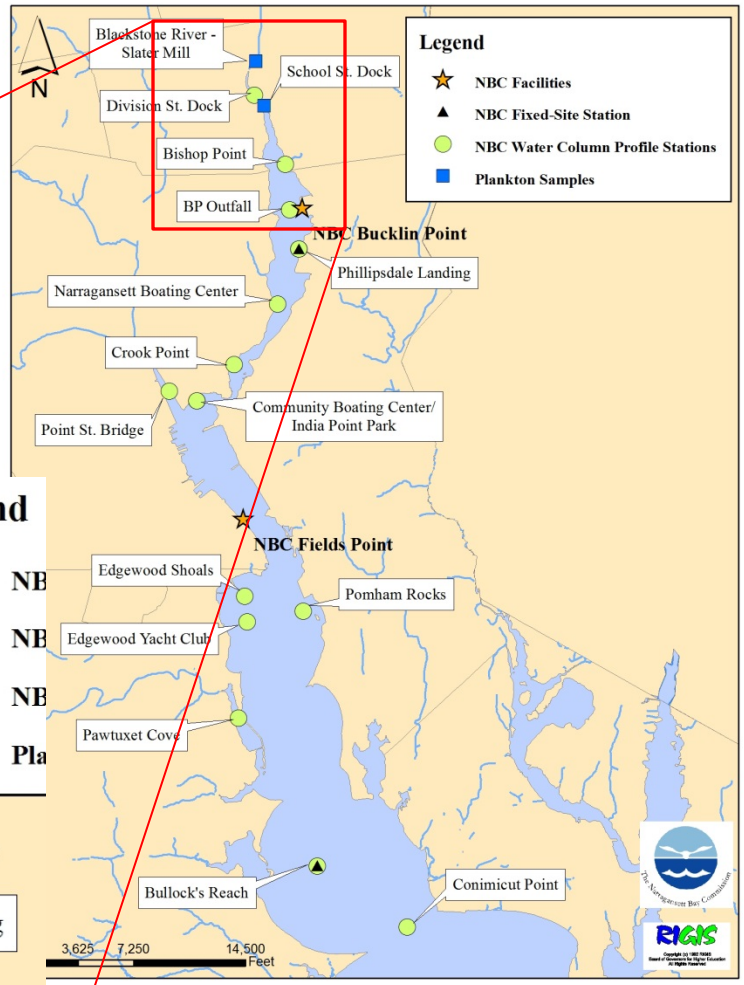




NBC Collected Phytoplankton Samples

- ✓Samples collected at **School Street Dock** – main location of fish kill and bloom
- ✓Additional samples collected upstream of tidal influence on Blackstone River at **Slater Mill**





NBC Performed Phytoplankton Analysis

- ✓NBC performed phytoplankton sample collection & analysis
- ✓Micrographs of observations recorded and shared with DEM and Dr. Tatiana Rynearson at URI-GSO

MICROBIOLOGICAL EXAMINATION

July 23, 2015 Nora Lough Biologist

Samples: The following samples were submitted to the lab for microbiological examination

- Slater Mill sample 7-21-15 (tow net)
- School Street sample 7-21-15 (whole water)
- School Street sample 7-23-15 (tow net)
- School Street sample 7-23-15 (whole water)

Observations:

The plankton tow net sample was filterable with a 20 micron mesh. This concentrate was a light brown color with an easy filterability time. It was analyzed qualitatively for microorganisms using 100x phase contrast microscopy.

The whole water sample was analyzed quantitatively under 200x phase contrast microscopy. A Hensen Stempel pipette was used to accurately deliver 1ml of sample to a Sedge-wick Rafter chamber.

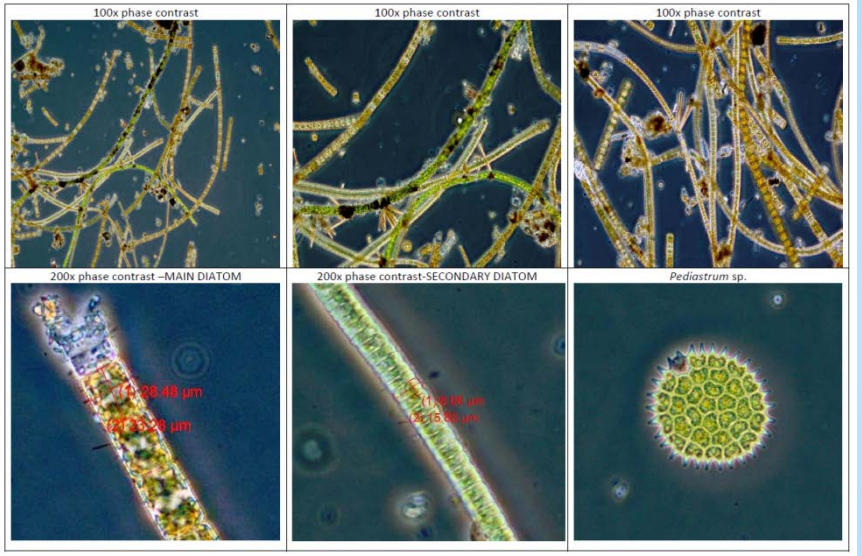
The whole water samples revealed the total number of phytoplankton:

- School Street sample 7-21-15 (whole water) Total number of phytoplankton=694,000/L
- School Street sample 7-23-15 (whole water)Total number of phytoplankton=582,000/L

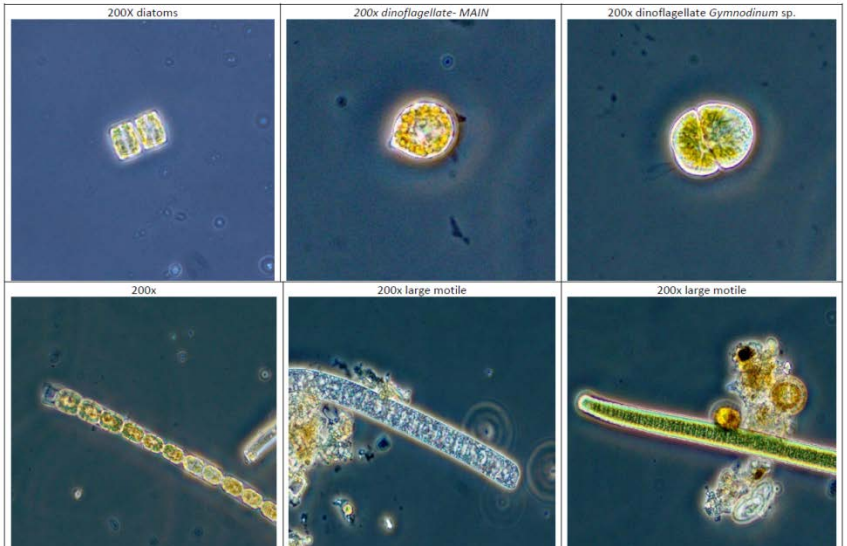
Discussion:

The phytoplankton population appears to be mostly freshwater diatoms and dinoflagellates. Some genera that were detected were estuarine in nature and found in marine waters as well. Please see images below and note the main and secondary abundance levels in the description with the images.

Slater Mill Sample 7-21-15



School Street Sample Net 7-23-15



Most Abundant Phytoplankton

Preliminary Findings:

- ✓Many similar diatoms and dinoflagellates found at both locations
- ✓Most abundant phytoplankton at the School Street location may include:
  - *Scrippsiella*
  - *Alexandrium*
- ✓Awaiting more expert findings from URI-GSO

	Slater Mill (Upstream sample)	School Street (Seekonk River Sample)
Flagellates	pos	pos
Ciliates	pos	pos
Pennate	pos	pos
Cylindrotheca sp.		pos
Micractinium	pos	pos
Scenedesmus sp.	pos	pos
Striatella	pos	
Bacillaria	pos	
Navicula	pos	pos
Peridinium sp.	pos	pos

Some Final Thoughts

- ✓These recent fish kills are incredibly noteworthy! Would make a great doctoral study!
- ✓Brings up interesting questions:
  - ✓Should current models of Narragansett Bay include chlorophyll in river inputs??
  - ✓Do low flows/dry weather stimulate low DO in Seekonk River??
- ✓NBC will investigate all water quality issues in its receiving waters of the Upper-Upper Bay
- ✓NBC will continue to be a valuable partner and resource to sister agencies working to investigate water quality issues
- ✓So, contact the NBC IMMEDIATELY upon becoming aware of an issue

Questions ???

Discussion Questions

- ✓What are the data gaps that impair ability to track water quality improvements as a result of infrastructure improvements (pathogens & nutrients)?
- ✓What are the most useful “end-points” to measure water quality improvement? Hypoxia occurrence? Primary productivity?
- ✓How can the coordination with other programs with similar goals be achieved in order to accomplish a comparative analysis to discover water quality trends?