



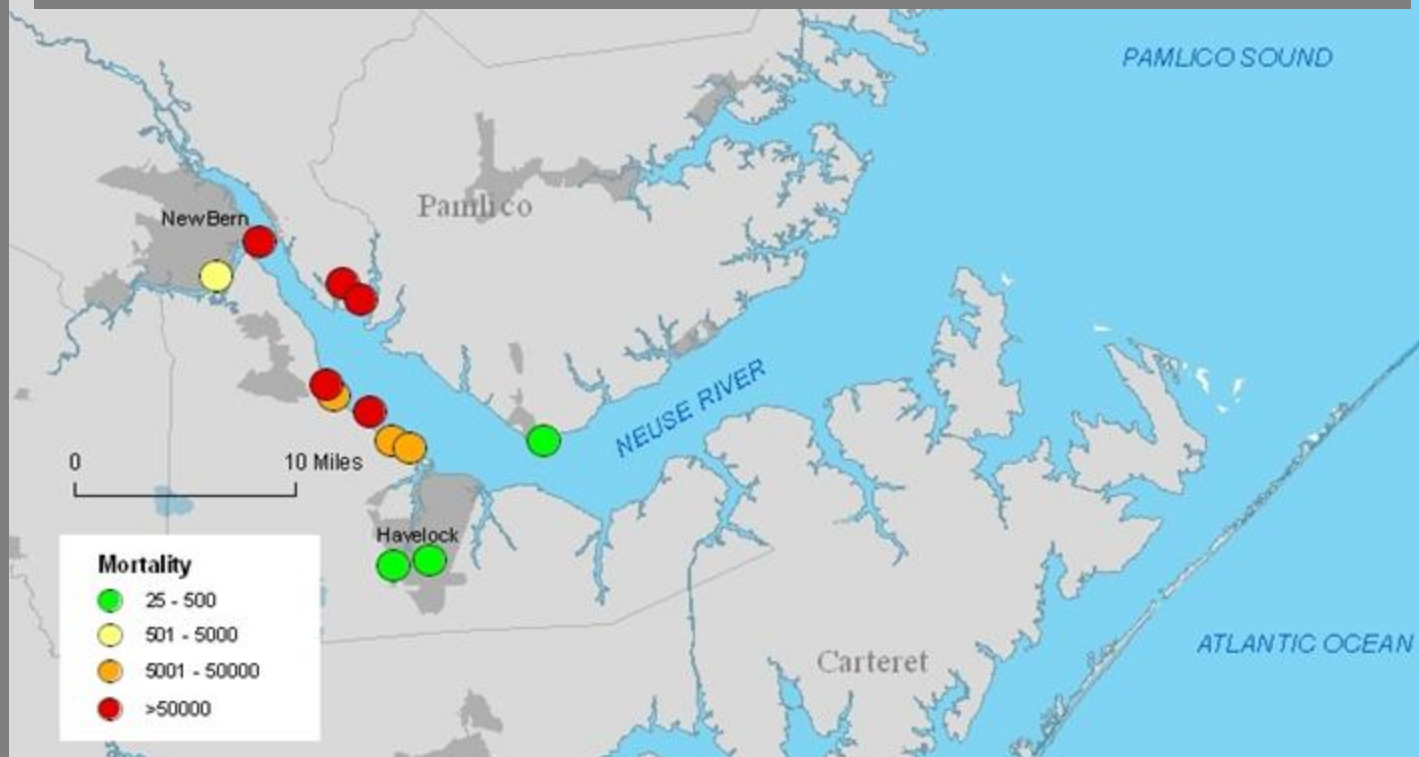
Div OF WATER QUALITY Parker

2009

NEUSE RIVER FISH KILL EVENTS

Jason Green
Maverick Raber

2009
12 fish kill events
Over 13 million dead fish



FALL 2009 EVENT

New
Bern

Over 10.2 million dead Atlantic menhaden
35 square mile area, 15 miles long
Lasted Sept. through Oct.
Concentrated near New Bern

Image © 2009 DigitalGlobe
Image © 2009 TerraMetrics
Image U.S. Geological Survey

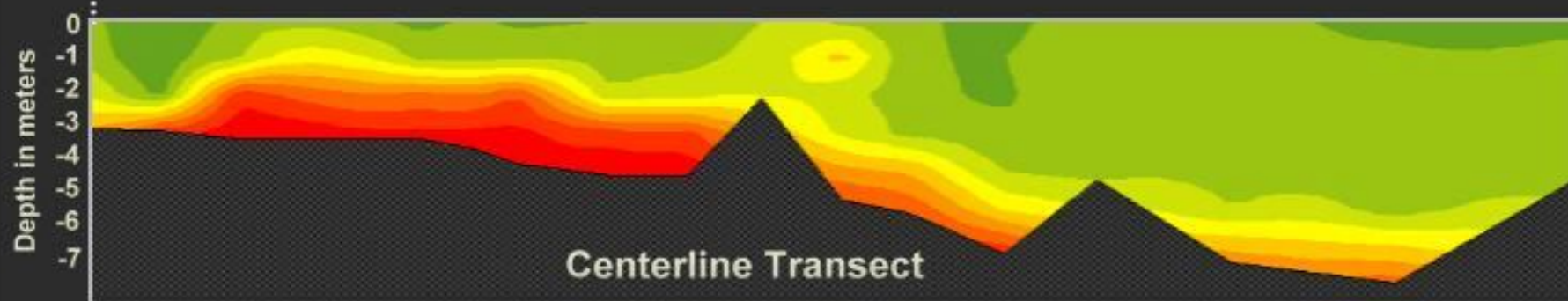
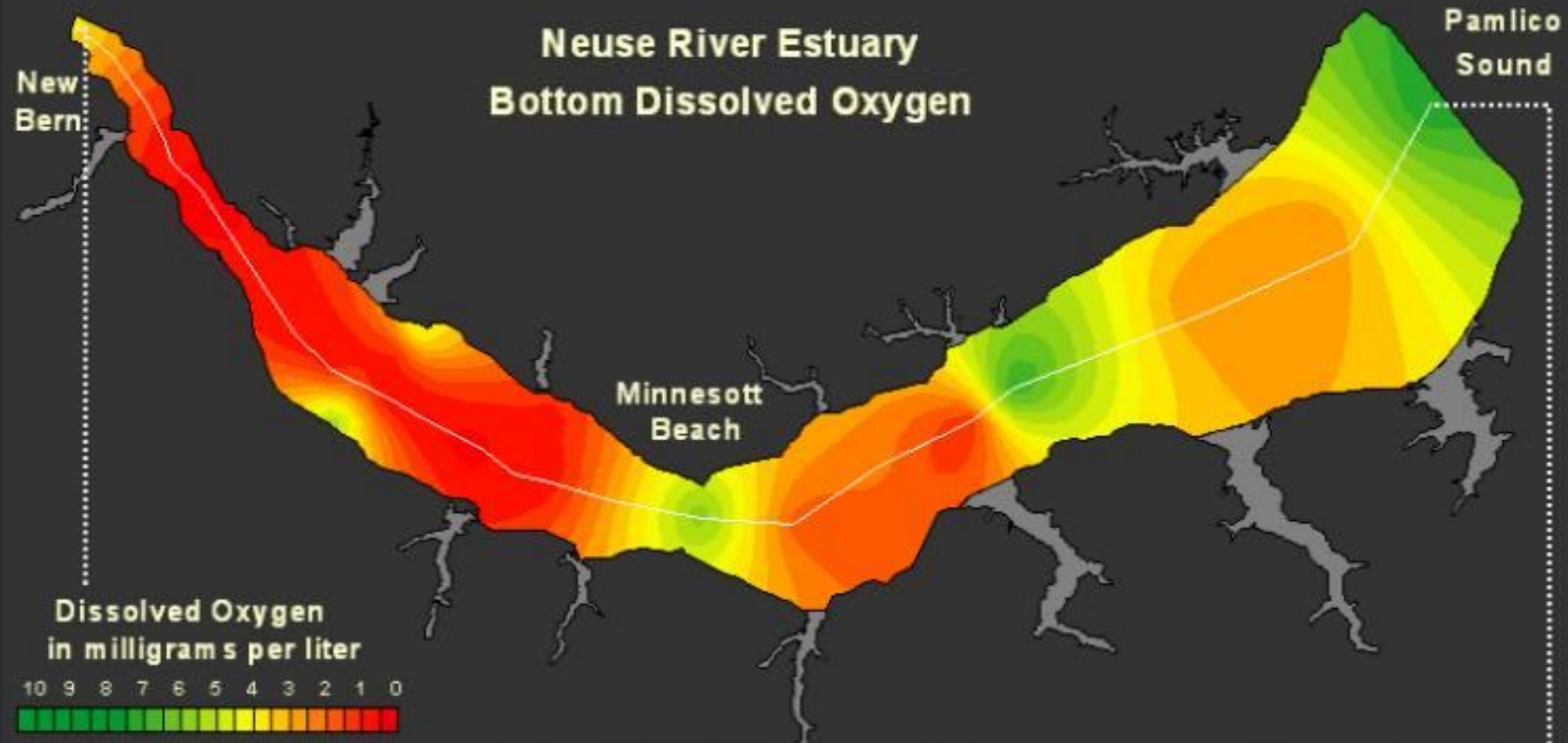
81°

elev 21 ft

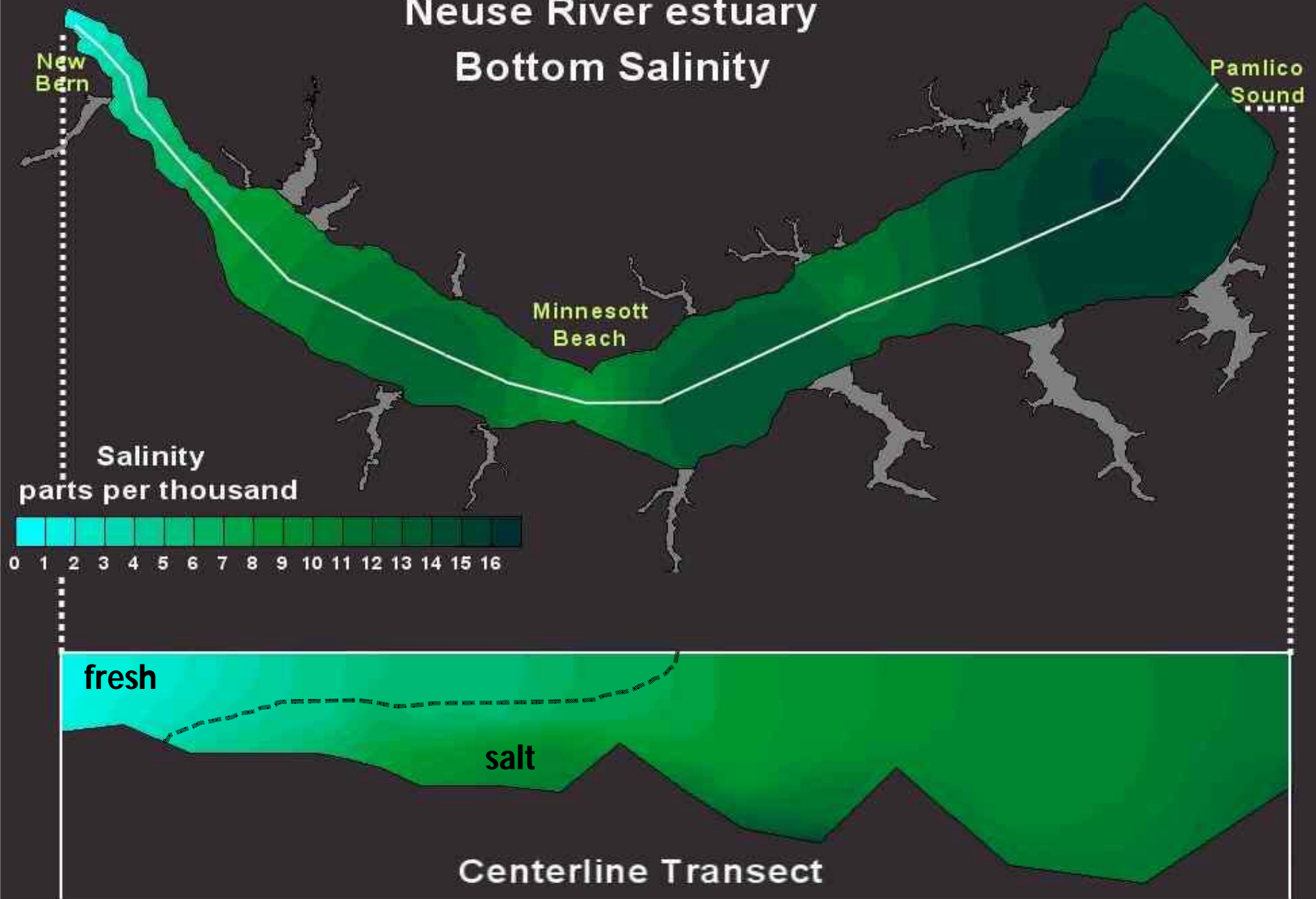


area shown

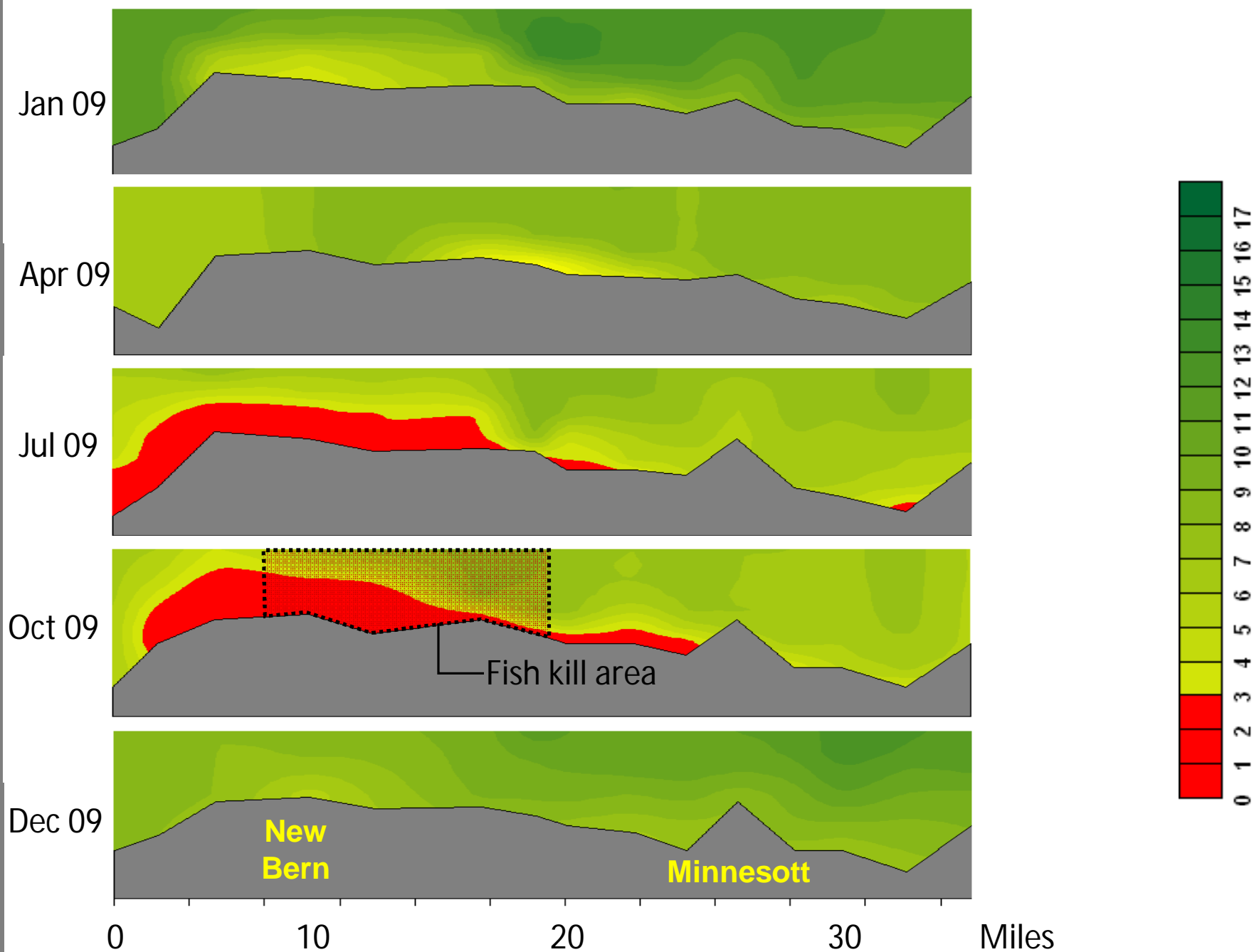
Neuse River Estuary Bottom Dissolved Oxygen



Neuse River estuary Bottom Salinity



Neuse River Dissolved Oxygen (mg/L)



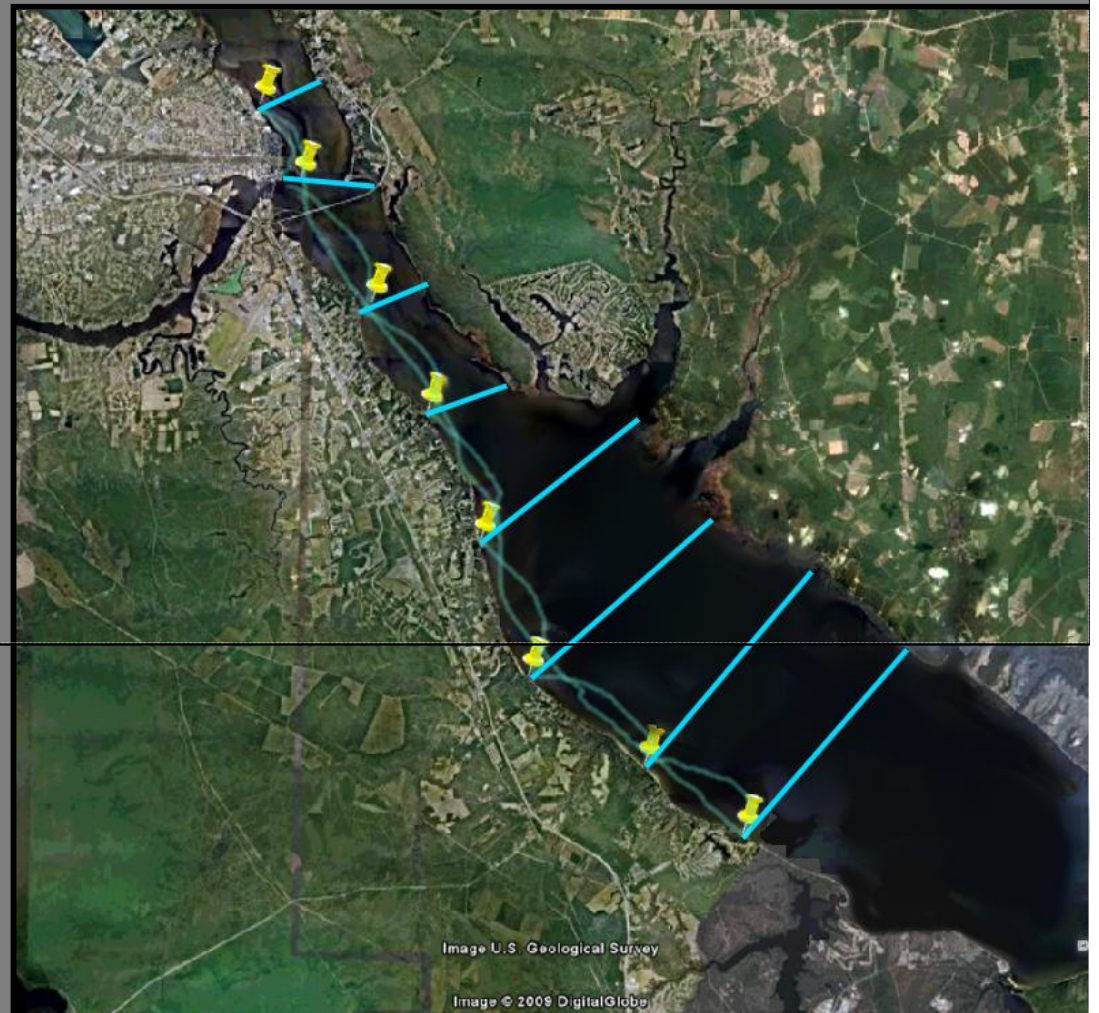
Why Menhaden?

- Small sensitive fish
- Swim in large, dense schools
- Are very susceptible to Low D.O.



Neuse fish kill investigations

- **Methods (American Fisheries Society)**
- **Use calibrated equipment**
- **Collect samples**
- **Review data**



Stressors examined fall 2009

- **Low dissolved oxygen** **present**
- **Overcrowding of fish** **present**
- **Toxic Algae** **ruled out**
- **Ulcerative Mycosis (lesions)** **ruled out**
- **Parasite related stresses** **ruled out**
- **Toxic compounds** **no indication**

Fall 2009 fish kill sampling results

Nutrients

- Elevated Nitrogen and Phosphorus
- High ammonia
- Suggests nutrient cycling



Algae

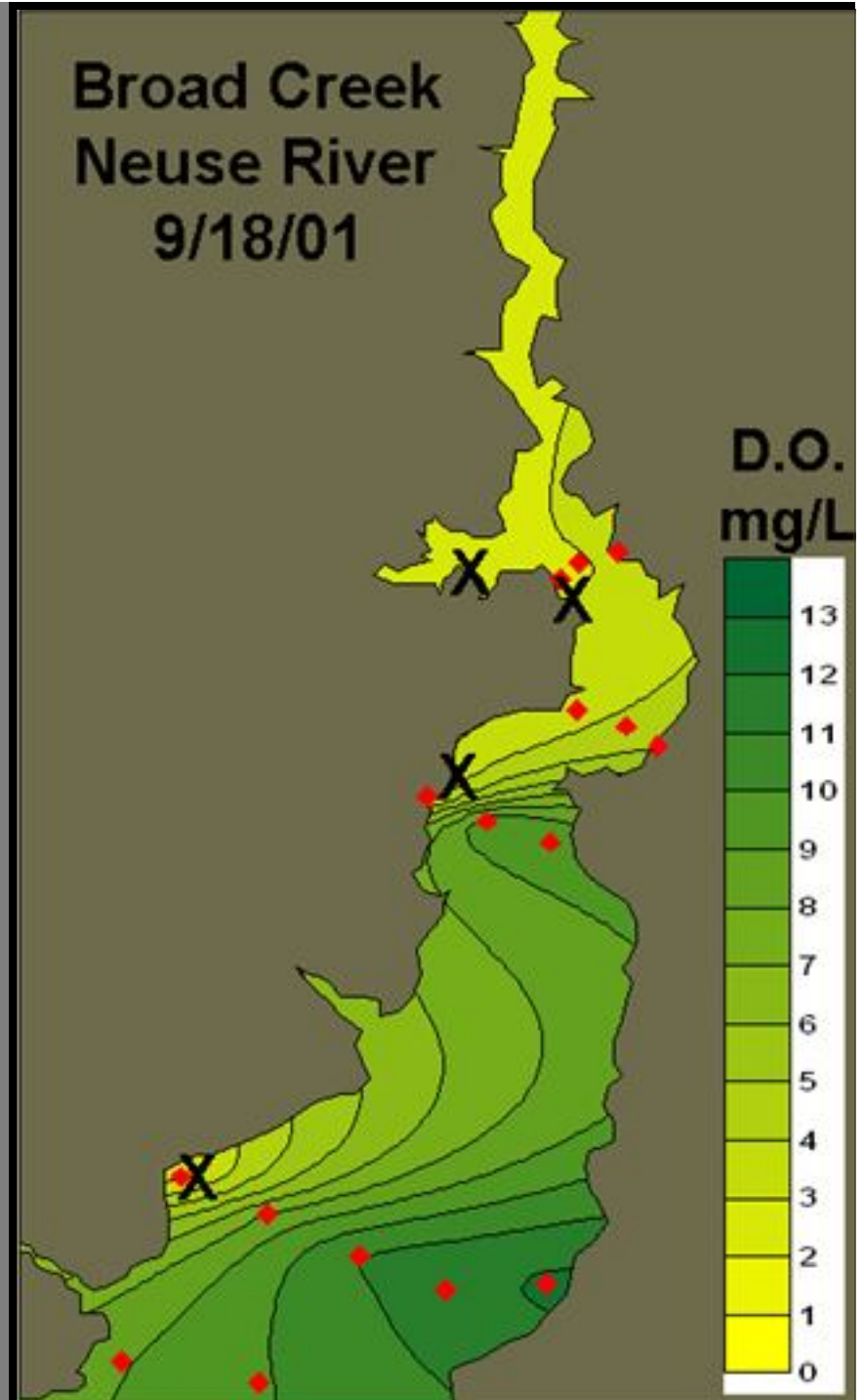
- Typical species for Neuse estuary
- No toxic species in bloom stages (no pfiesteria)

Fish Tissue Analysis (NCSU)

- No lesions observed
- No gill damage
- No other anomalies during histopathic analysis

Similar Previous events (Broad Creek 2001)

- Similar observations in 2009.
- Large dense schools of menhaden
- Fish dying over 1 month
- Singular species involved in event
- Low oxygen levels inside schools
- Normal oxygen levels outside schools
- Low incidence of HAB's , and lesions



Cause of fall 2009 Neuse River fish kill

LOW DISSOLVED OXYGEN STRESS

Consulted with university researchers to support theory

**NCSU Vet School
UNC**

**Dr. Mac Law
Dr. Hans Pearl, Dr. Ben Pierls,
Dr. Nathan Hall**

