Potential Role Of Index Tools in the 2010 Assessment

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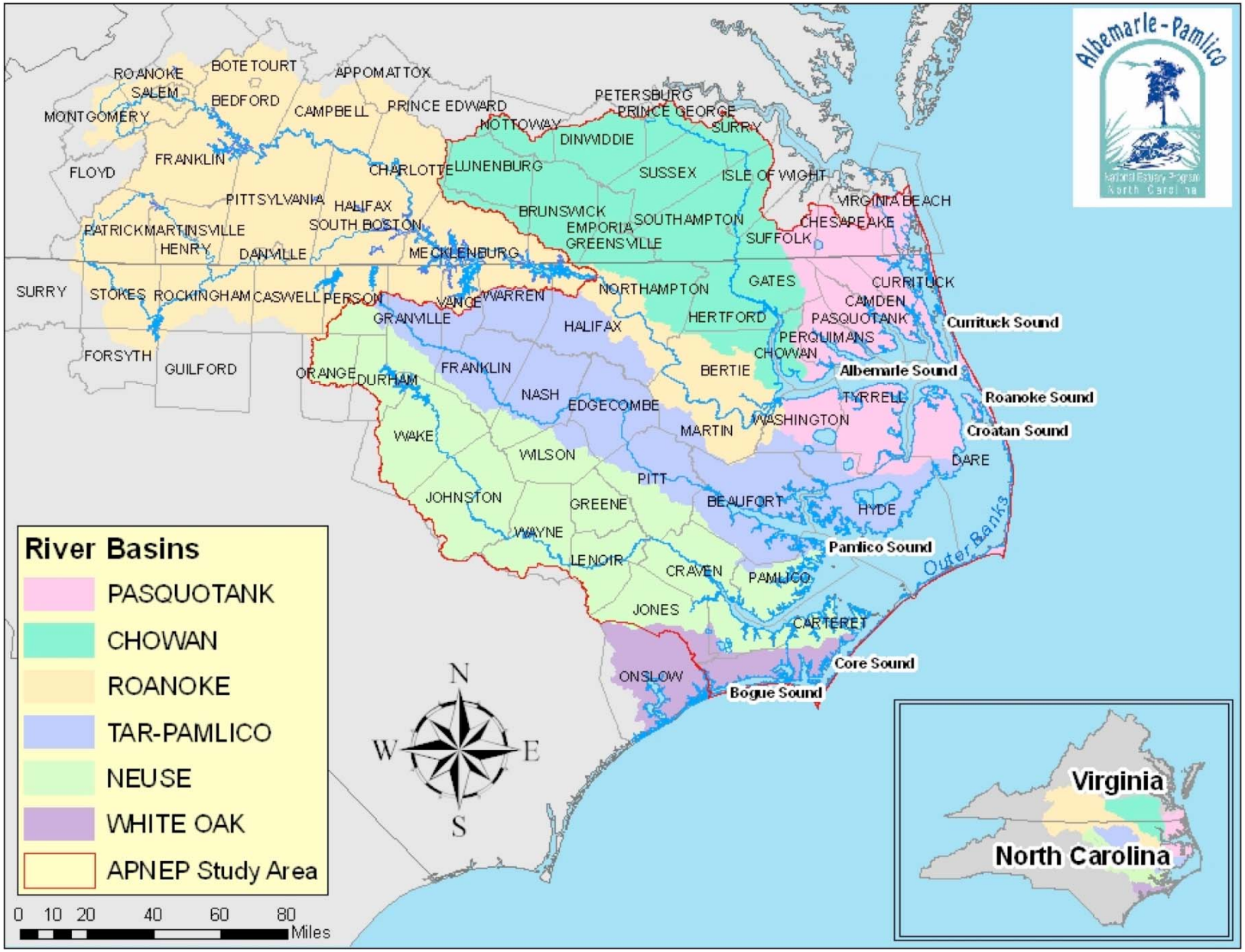
Data Inventory and Report Card Framework Project – *Pasquotank and Chowan*

- Data collection
- Data transformation
- Data assessment
- Water Quality Index Development
- Report card development

Focus Area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MONTGOMERY
NOTTOWAY
DINWIDDIE
SURRY
FRANKLIN
FLOYD
CHARLOTTE
LUNENBURG
SUSSEX
ISLE OF WIGHT
PITTSYLVANIA
HALIFAX
BRUNSWICK
VIRGINIA BEACH
PATRICK
MARTINSVILLE
SOUTH BOSTON
EMPORIA
SOUTHAMPTON
CHESAPEAKE
HENRY
DANVILLE
MECKLENBURG
GREENSVILLE
SUFFOLK
SURRY
STOKES
ROCKINGHAM
CASWELL
PERSON
VANCE
WARREN
NORTHAMPTON
GATES
CURRITUCK
CAMDEN
GRANVILLE
HERTFORD
PASQUOTANK
Currituck Sound
HALIFAX
PERQUIMANS
FORSYTH
GUILFORD
ORANGE
DURHAM
FRANKLIN
CHOWAN
BERTIE
Albemarle Sound
NASH
TYRRELL
Roanoke Sound
EDGECOMBE
WASHINGTON
MARTIN
Croatan Sound
WAKE
WILSON
DARE
PITT
JOHNSTON
GREENE
BEAUFORT
HYDE
WAYNE
Pamlico Sound
LENOIR
CRAVEN
PAMLICO
Outer Banks
JONES
CARTERET
ONSLOW
Core Sound
Bogue Sound
River Basins
PASQUOTANK
CHOWAN
ROANOKE
TAR-PAMLICO
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WHITE OAK
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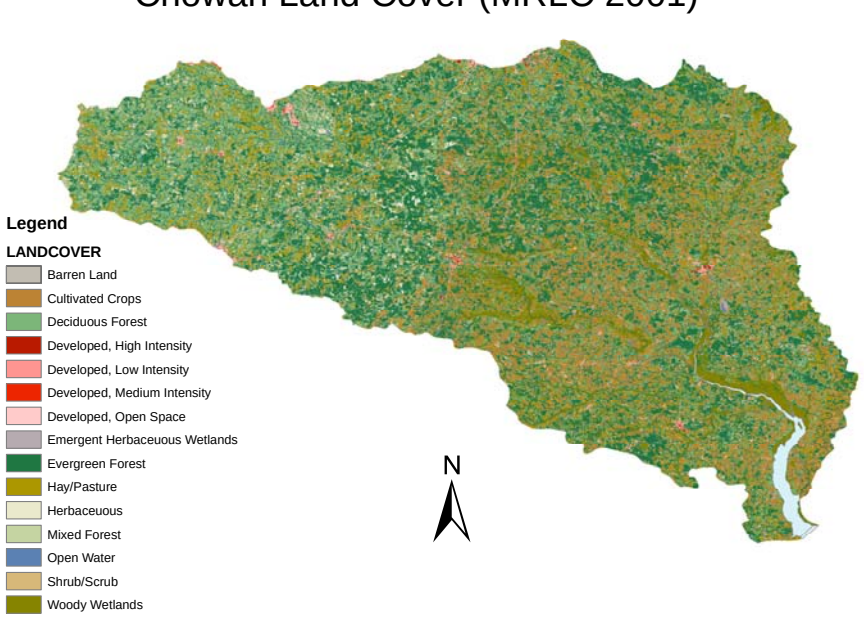
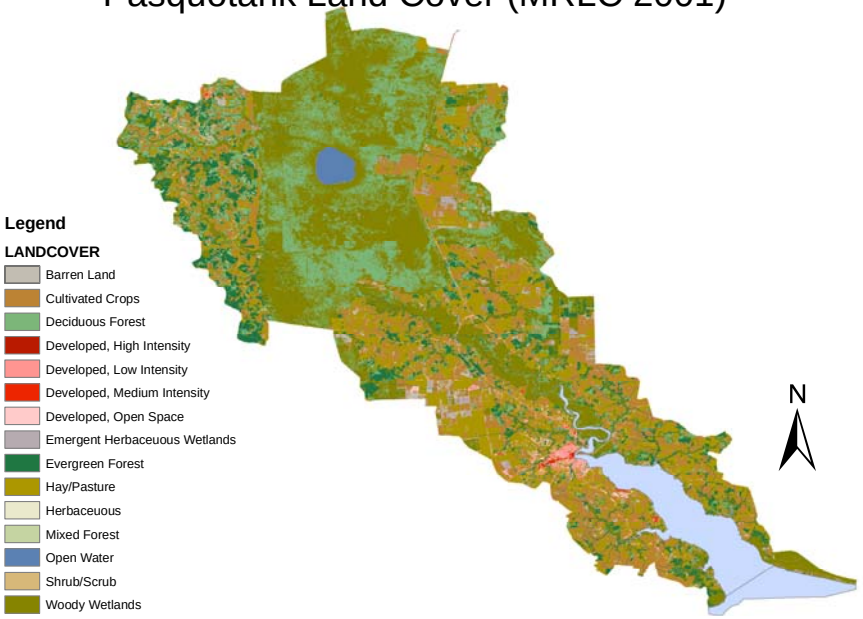
Virginia
North Carolina

Focus Area

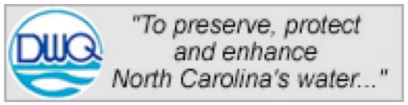
Chowan Land Cover (MRLC 2001)



Pasquotank Land Cover (MRLC 2001)



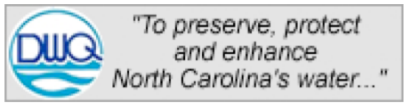
Data Sources

- NADP  National Atmospheric Deposition Program
- NC Division of Water Quality 

- Climate Office of NC 

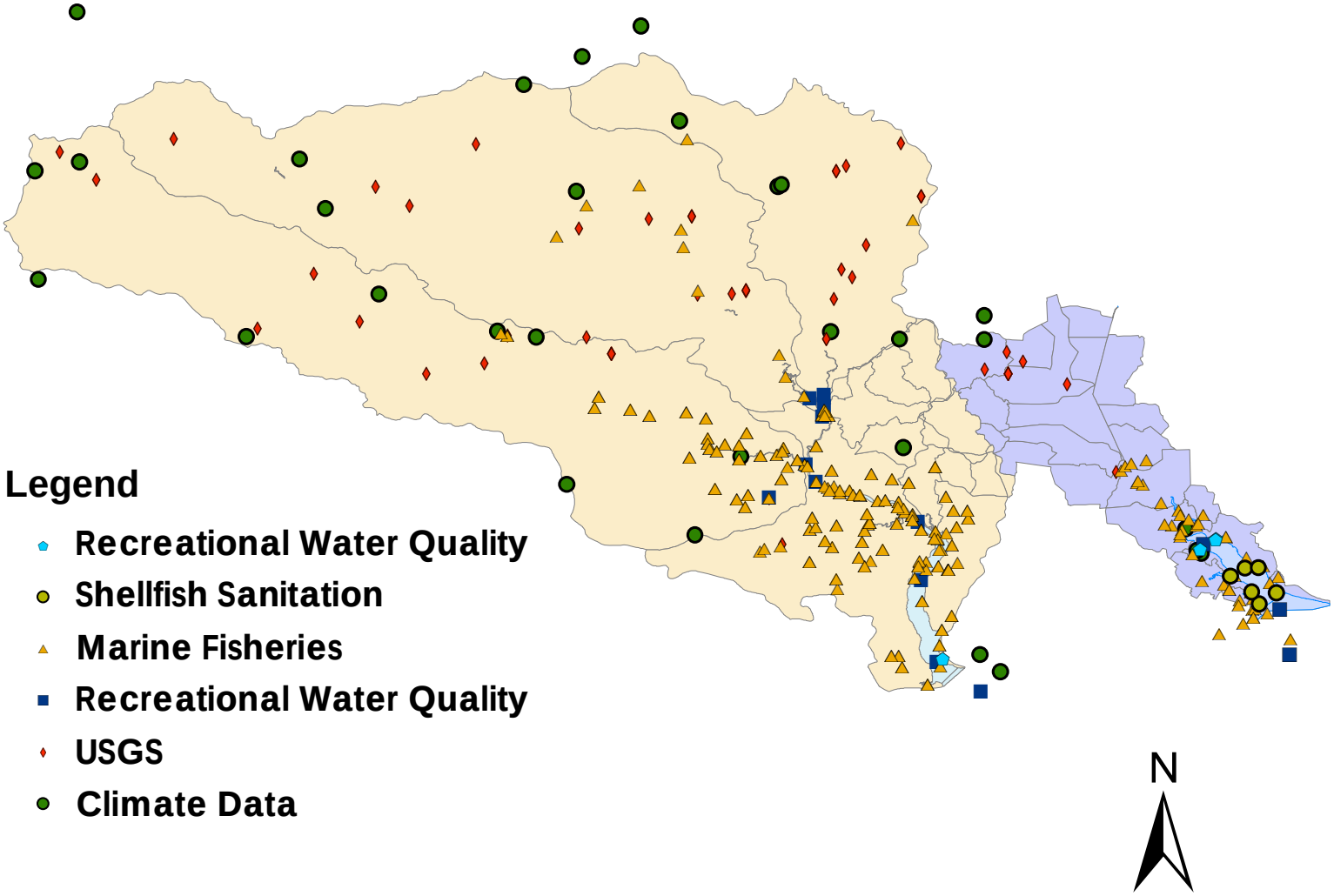
- NCDEP Recreational Water Quality 

- USGS 

- Marine Fisheries 
- Shellfish Sanitation 

- Land Use, MRLC

Data Sources on a Map



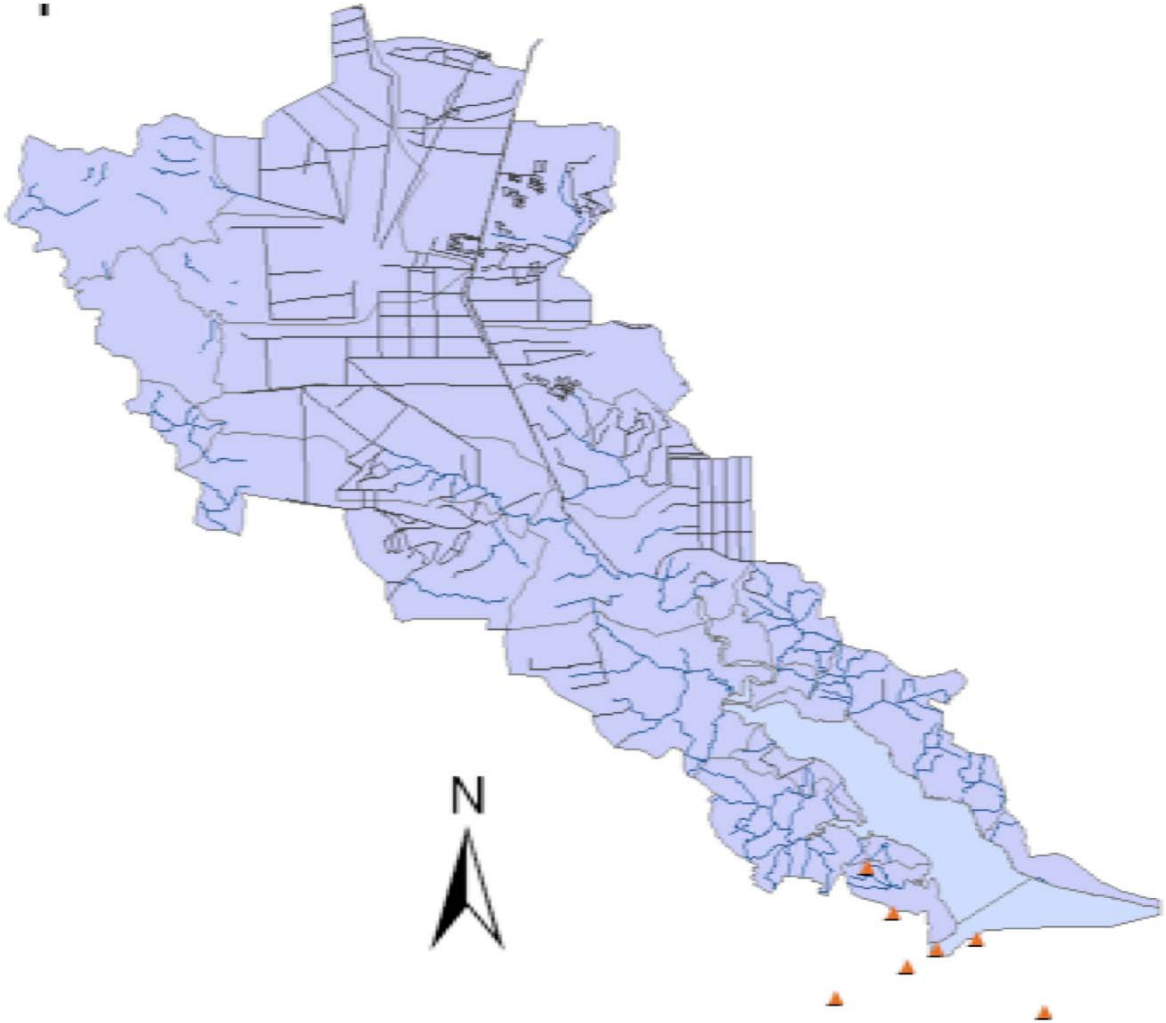
Data Transformation

- Various data formats from each source
- Data from all sources put into a consistent, horizontal format.
- Station coordinates were obtained
- Access data base was created
- Import programs written to bring data into SAS

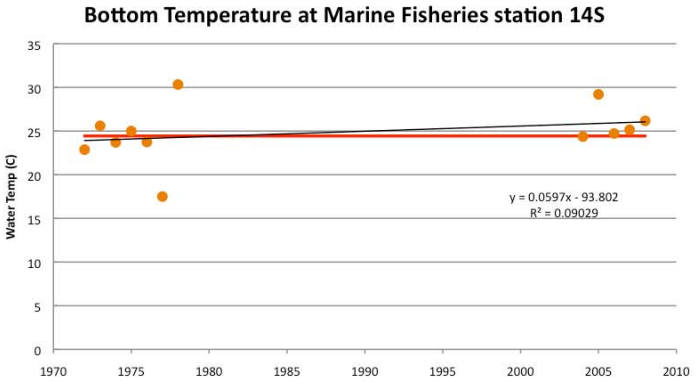
Data Assessment

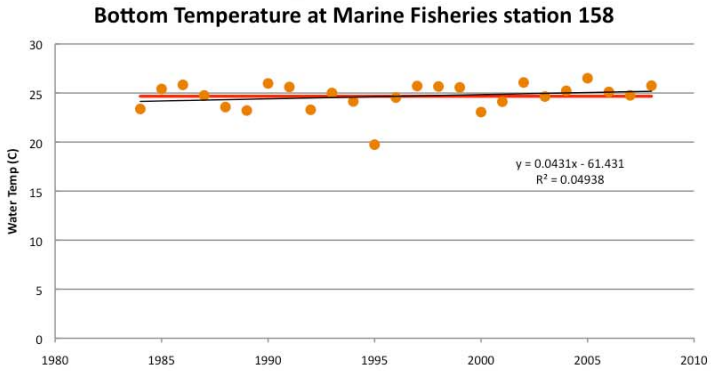
- NADP – *Lots of parameters, no stations in either basins, interpolated results.*
- NC-DWQ – *13 stations in Chowan; 2 in Pasquotank, Phys/Chem parameters, Variable data density in time and space*
- Climate – *Temp and Precip, Long data record, several stations*
- RWQ – *2 stations in Pasquotank and 1 in Chowan, bacteria, temp and salinity, data 2001-present*
- USGS – *5 stations, Daily flow back to 1930s*
- Marine Fisheries – *Out of 166 stations, only 7 with decent WQ data*
- Shellfish Sanitation – *6 stations in the Pasquotank; Sal, WT, FC; 1998-present*
- Land Cover – *Land cover data from 2001*

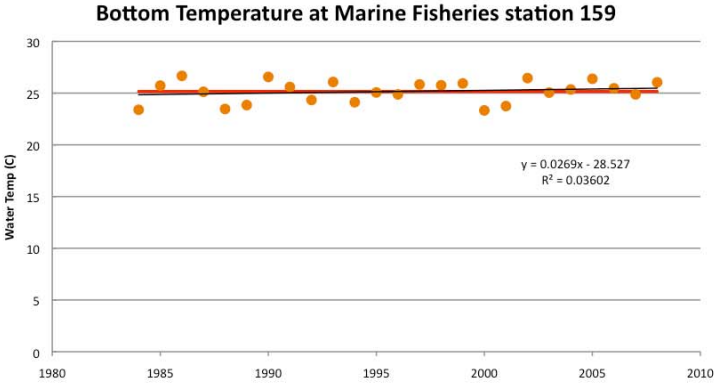
Climate Change analysis at Marine Fisheries stations

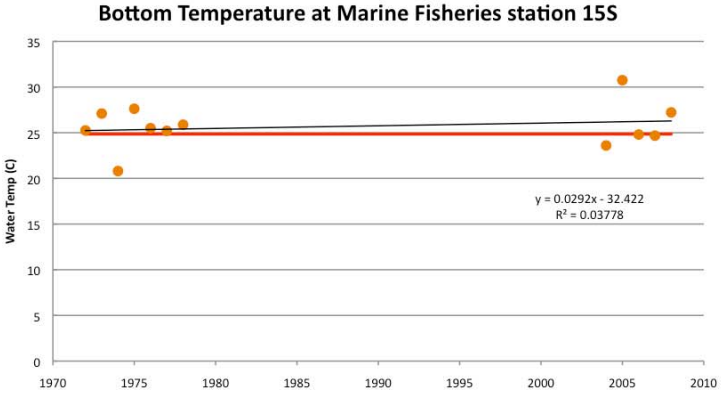


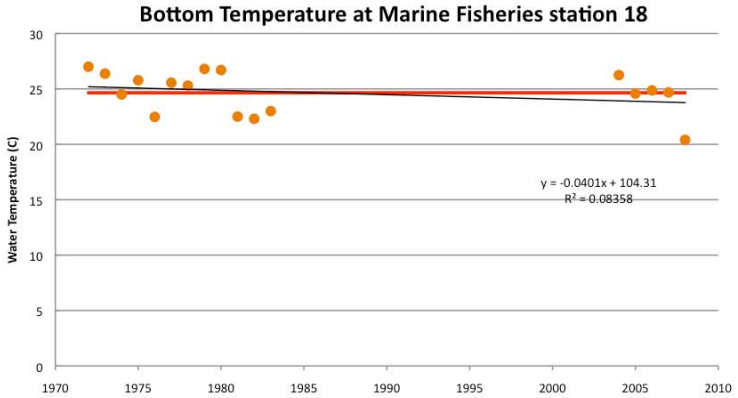
Climate Change?

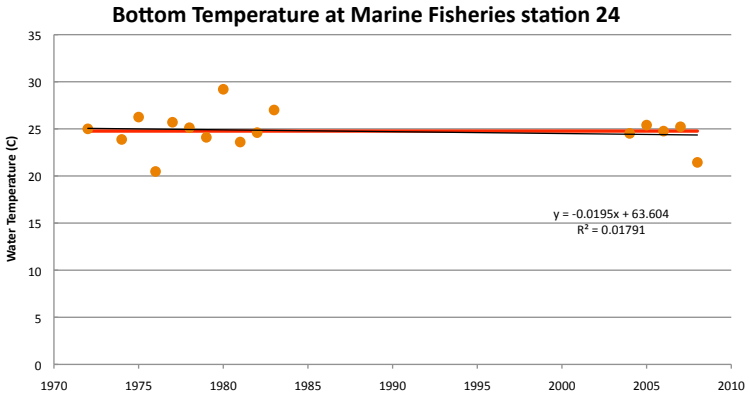




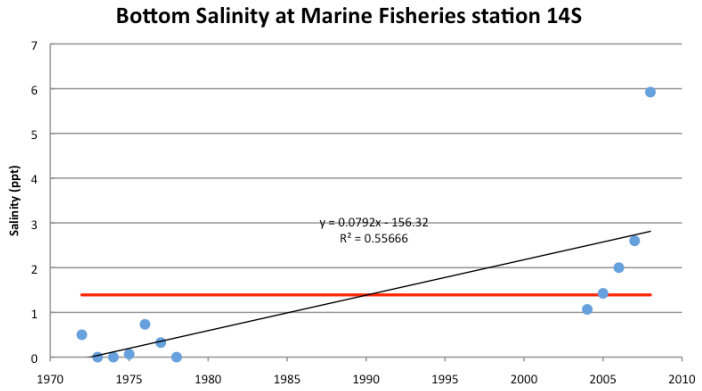


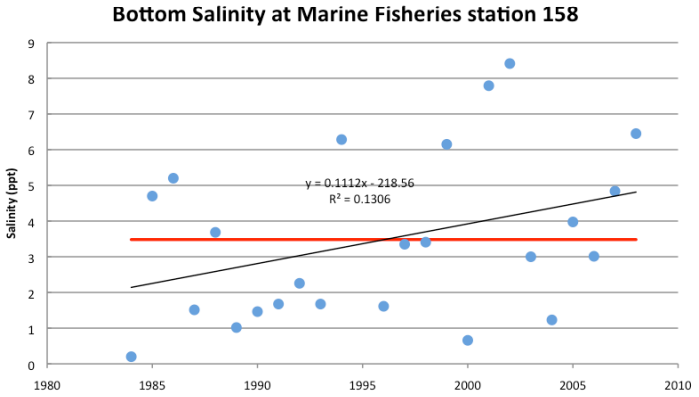


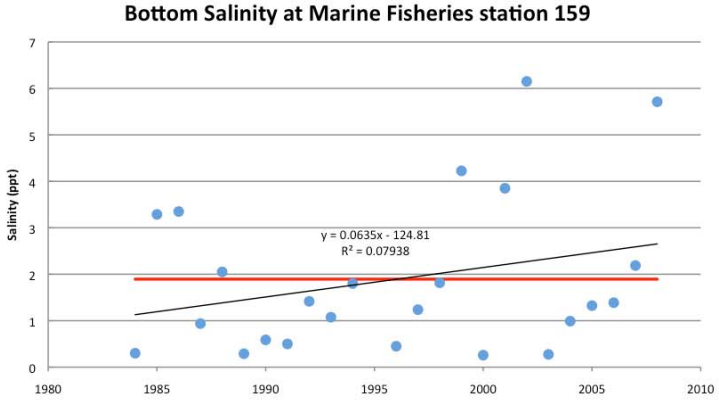


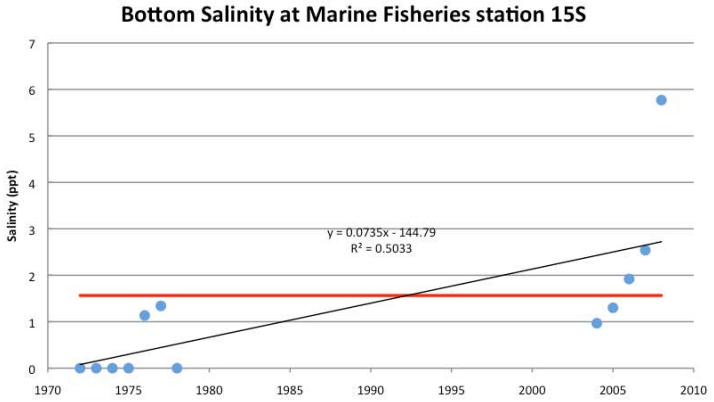


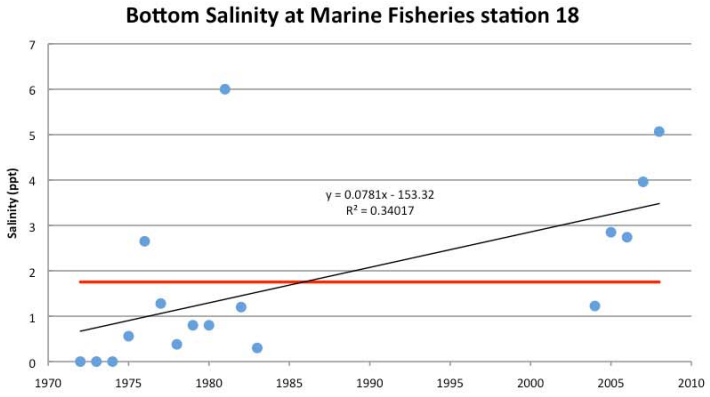
Sea Level Rise – Bottom Salinity

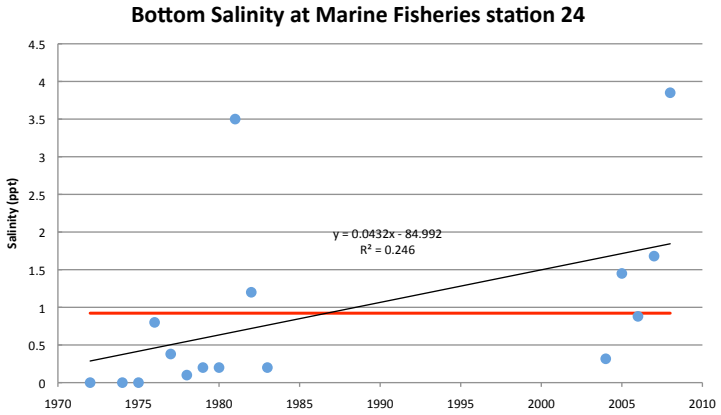




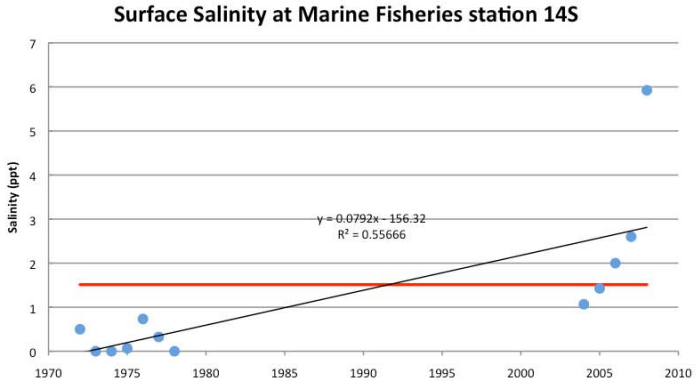


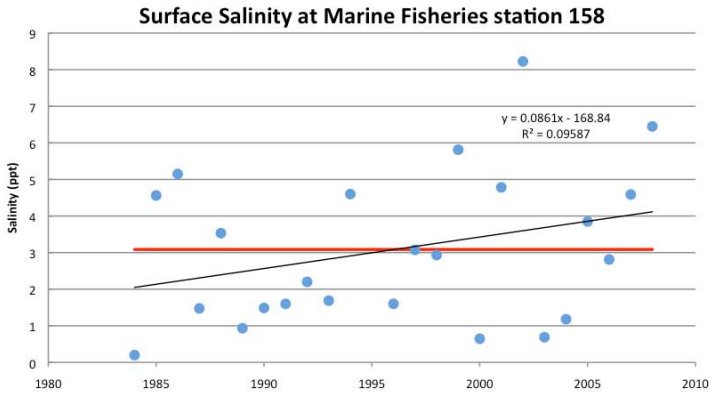


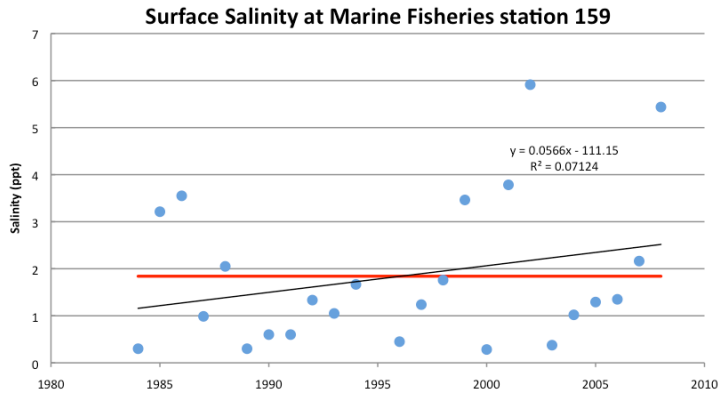


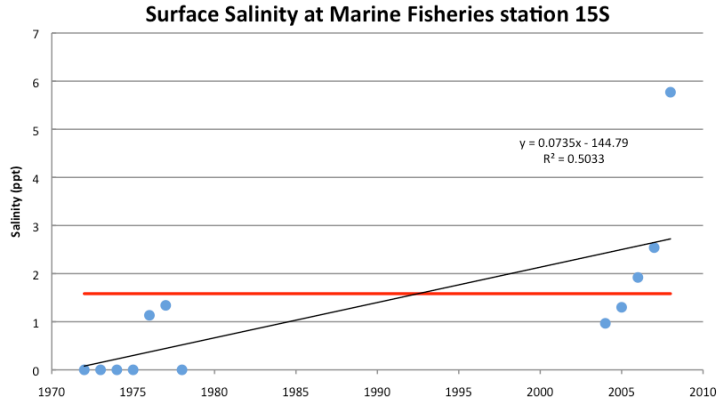


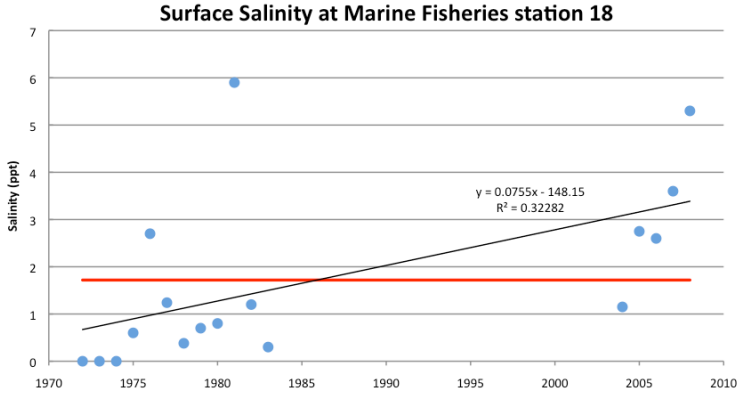
Sea Level Rise – Surface Salinity

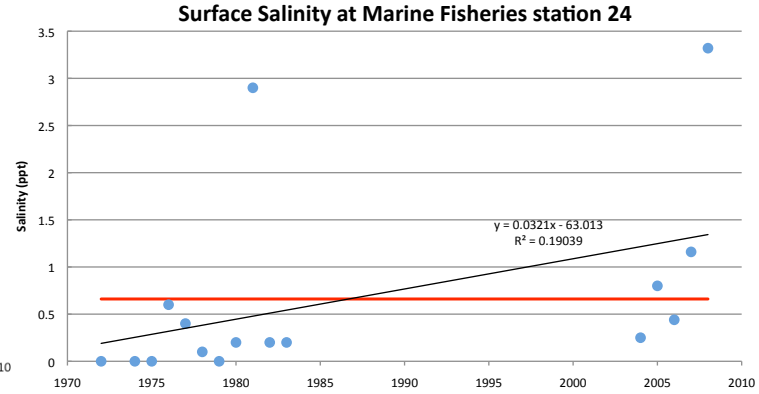






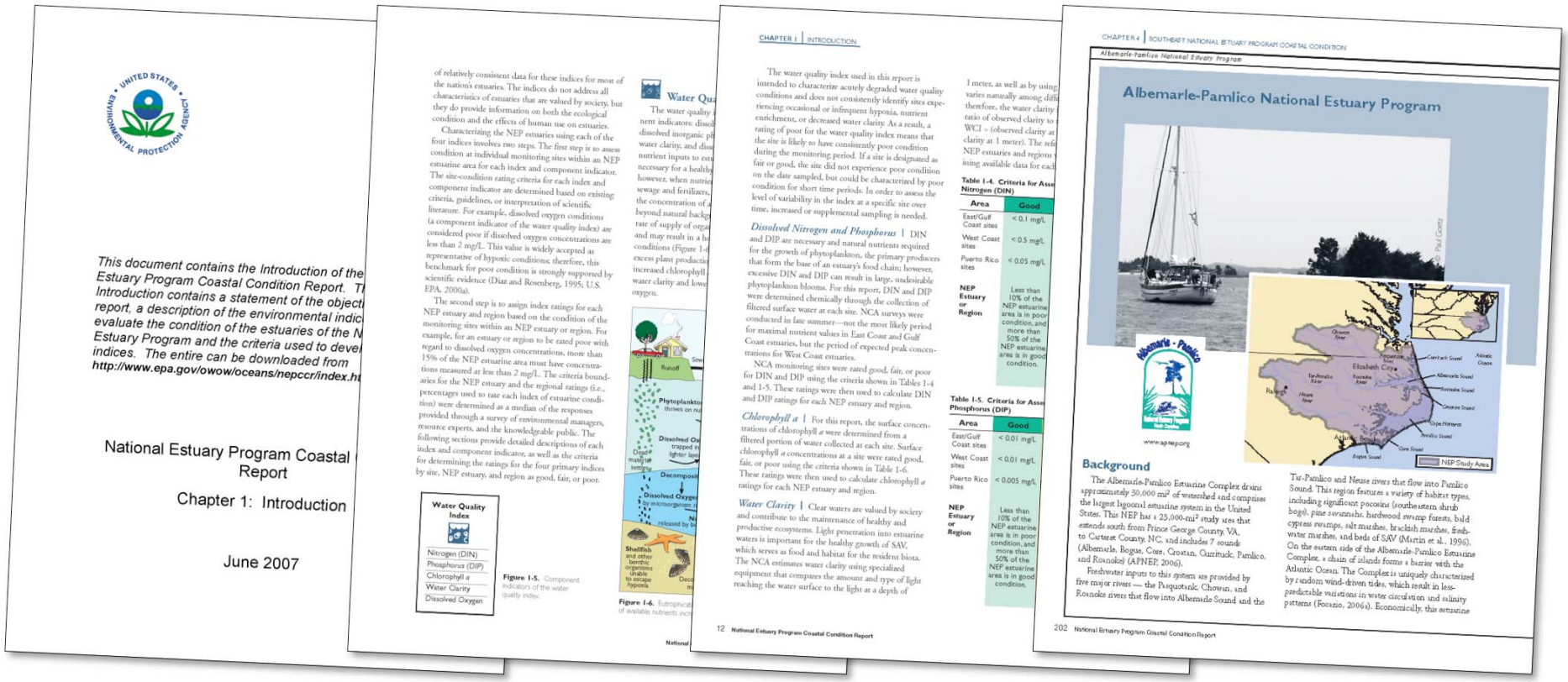






The Water Quality Index

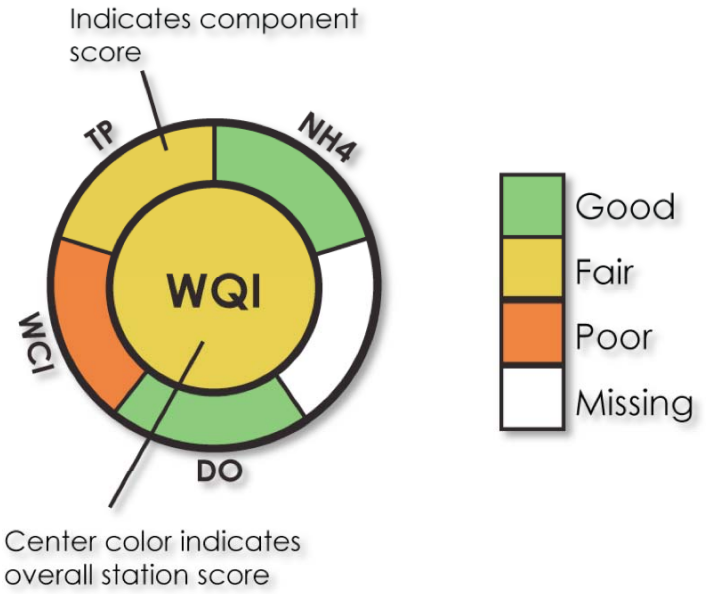
Based on the index used by the National Estuary Program



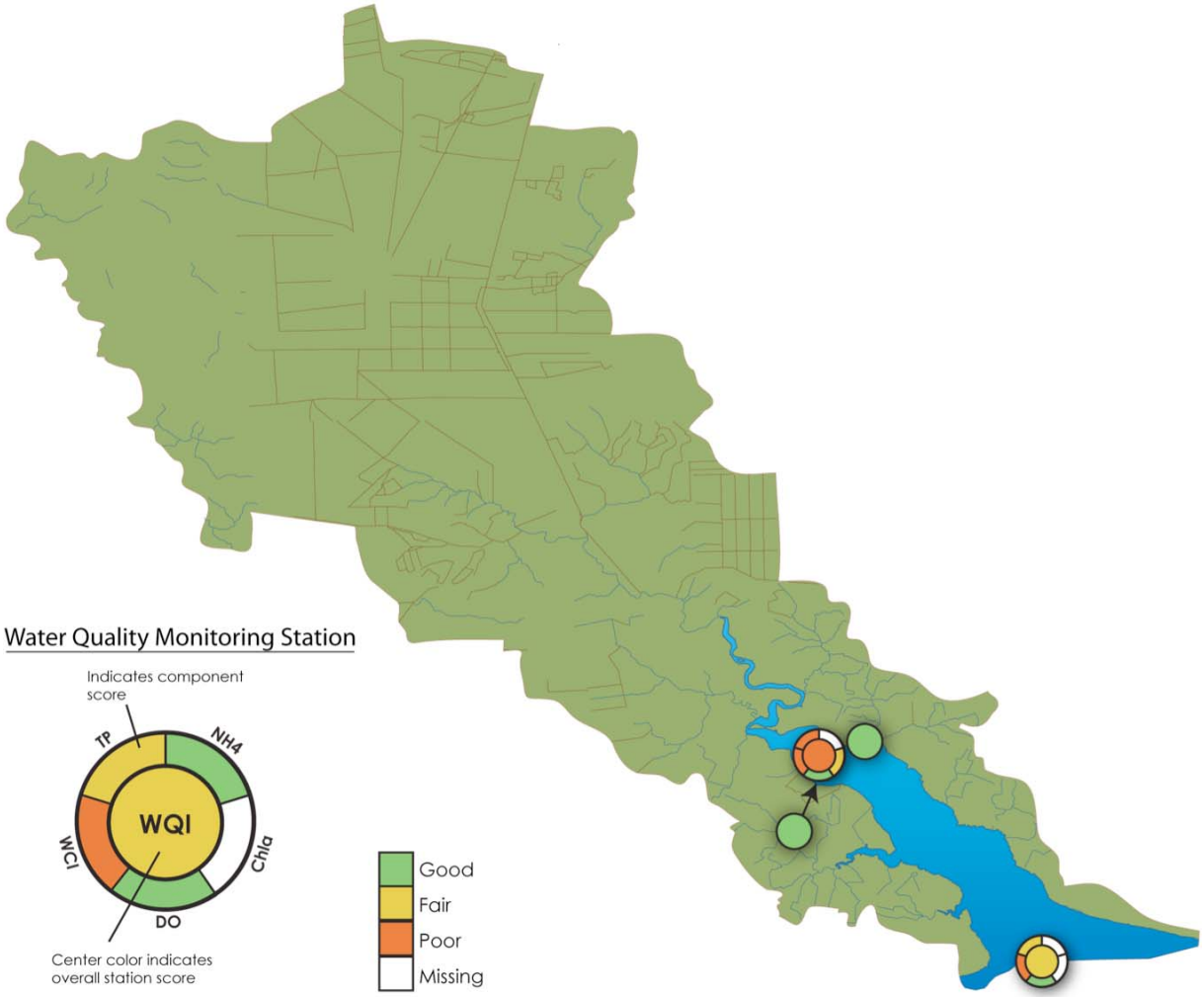
The Water Quality Index

	Good	Fair	Poor
Dissolved Oxygen ($mg\ l^{-1}$)	>5	>2 and <=5	<=2
NH4 ($mg\ l^{-1}$)	< 0.1	< 0.5	> 0.5
Total Phosphorus ($mg\ l^{-1}$)	< 0.01	<0.05	>0.05
Chlorophyll-a ($ug\ l^{-1}$)	< 5.0	<20.0	>=20.0
Water Clarity Index (WCI)	>2	<2 and >1	<=1

Good	Fair	Poor
<= 1 Fair AND 0 Poor	1 Poor OR >= 2 Fair	>= 2 Poor



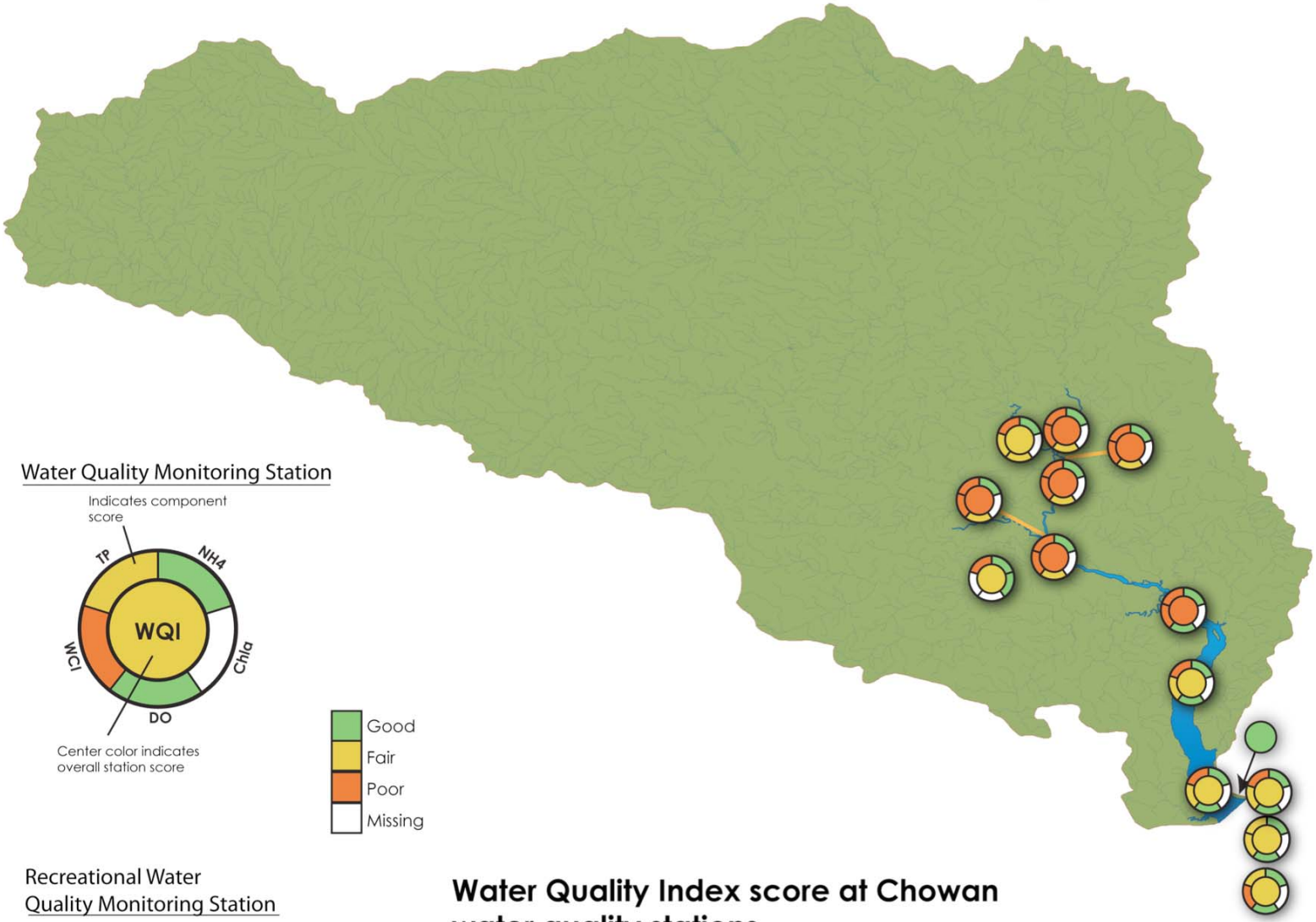
Pasquotank WQI Map



Water Quality Monitoring Stations in the Pasquotank River.

- WQI Scores based on 2005-07 spring and summer medians for TP, NH4, Chla, DO and Water Clarity Index (WCI).
- Recreational station scores based on the number of Alerts and Advisories during 2007-2009.

Chowan WQI Map



Water Quality Index score at Chowan water quality stations.

- WQI Scores based on 2005-07 spring and summer medians for TP, NH4, Chla, DO and Water Clarity Index (WCI).
- Recreational station scores based on the number of Alerts and Advisories during 2007-2009.

Pasquotank Report Card

Pasquotank Report Card

Parameter	Grade	Comments
NH_4	Fair	NH4 not measured sufficiently at either station.
TP	Fair	TP was "Poor" at the upstream station and "Fair" at the downstream station
Chl	Fair	Chl only monitored at the upstream station
WCI	Poor	Water clarity was "Poor" at both stations
DO	Good	DO was "Good" at both stations
Bacteria	Good	There were no "Alerts" or "Advisories" for recreational water use.

Overall Grade = C

Chowan Report Card

Chowan Report Card

Parameter	Grade	Comments
NH_4	Good	NH4 was "Good" at all stations.
TP	Poor	TP was "Poor" at all stations except the two stations in the lowest part of the estuary which were "Fair"
Chl	Incomplete	Out of 13 stations Chl only monitored at one upstream station (rated "Good")
WCI	Fair	Water clarity was "Fair" to "Poor" throughout the estuary.
DO	Good	Upper estuary stations were "Fair" and lower estuary stations were "Good"
Bacteria	Good	There were no "Alerts" or "Advisories" for recreational water use.

Overall Grade = C

Issues to Resolve

- Are we on the right track?
- Are the thresholds correct (ie – TP)?
- Different variables/thresholds for fresh/ non-tidal?
- Other variables in addition to/instead of?
- Assess rivers by segment?
- Gap analysis – What questions do we have and what parameters and resolutions are needed to answer them? What's the gap between need and have?
- Report on Management efforts?
- Inclusion of additional ecosystem variables?