

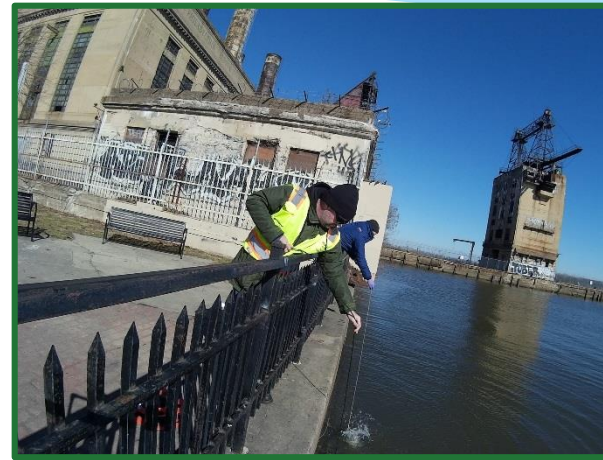
Delaware River Basin Commission

The State of the Basin - 2019 *Water Quality and Living Resources*

John Yagecic, P.E.
Manager, Water Quality Assessment

WRA DRB
Fall Technical Symposium

November 6, 2019
Bordentown, NJ

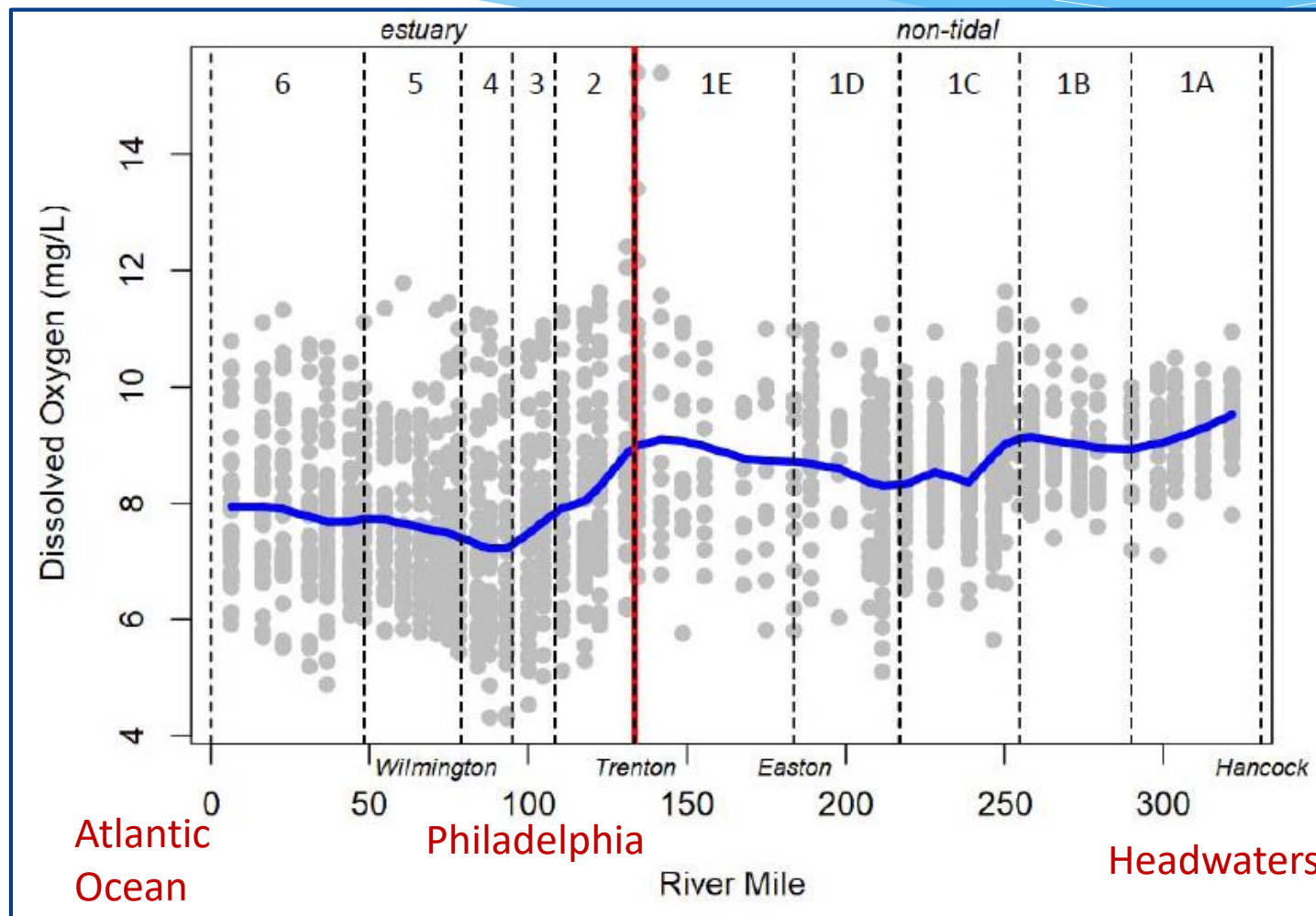


Water Quality & Living Resources in State of the Basin

WATER QUALITY	19
DISSOLVED OXYGEN	20
NUTRIENTS	22
pH	25
SALINITY	26
TEMPERATURE	28
CONTAMINANTS	29
FISH CONTAMINANT LEVELS	30
EMERGING CONTAMINANTS	31
WHOLE EFFLUENT TOXICITY	32

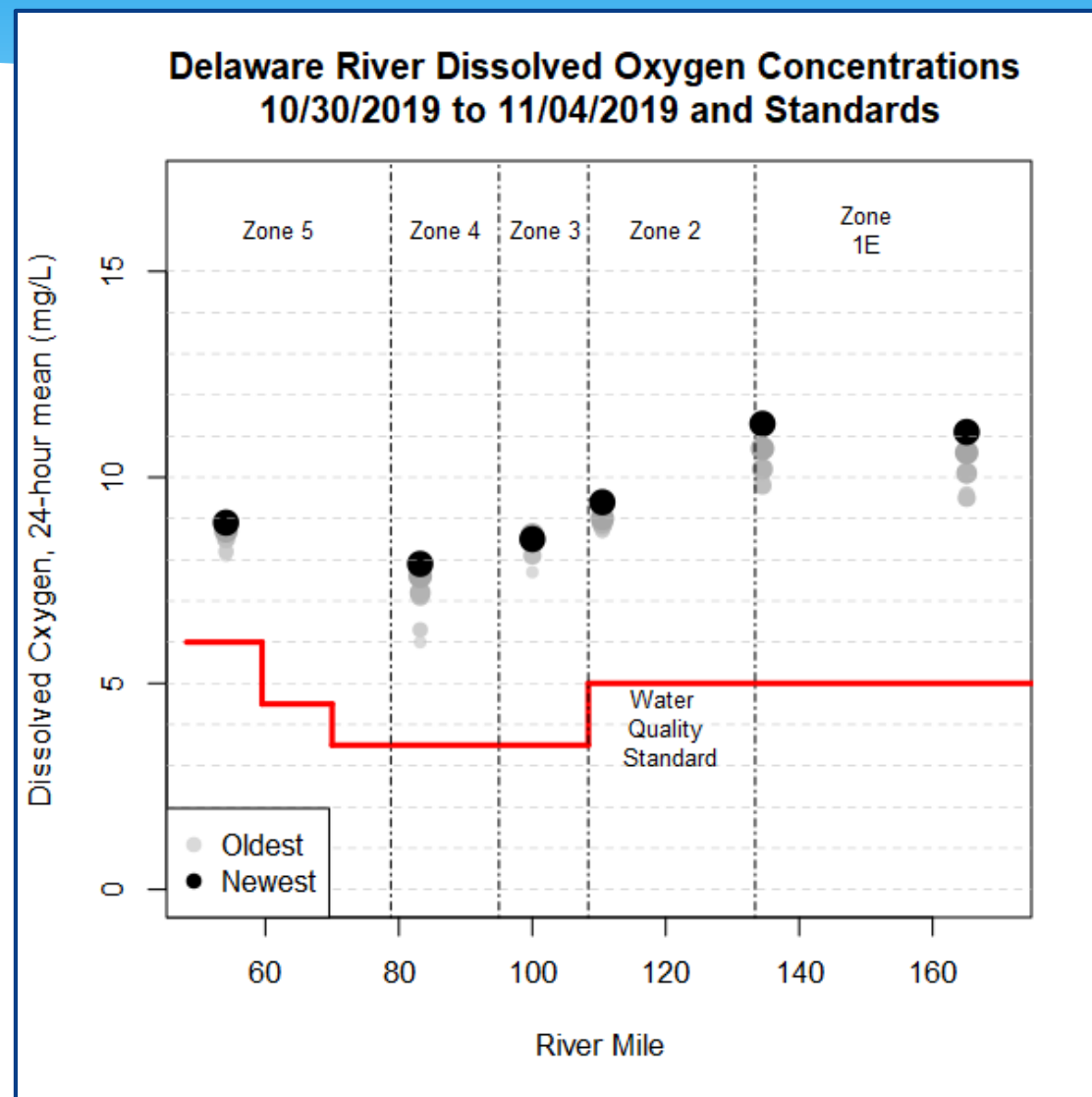
LIVING RESOURCES	33
ATLANTIC STURGEON	34
WHITE PERCH	35
STRIPED BASS	36
WEAKFISH	37
AMERICAN EEL	38
AMERICAN SHAD	39
BROOK TROUT	40
BLUE CRAB	41
HORSESHOE CRAB	42
EASTERN OYSTER	43
FRESHWATER MUSSELS	44
MACROINVERTEBRATES	46
INVASIVE SPECIES	48
OSPREY	50

Present Status, Dissolved Oxygen Spatially along the Delaware River



Available data, Water Quality Data Portal, 2008 through 2016

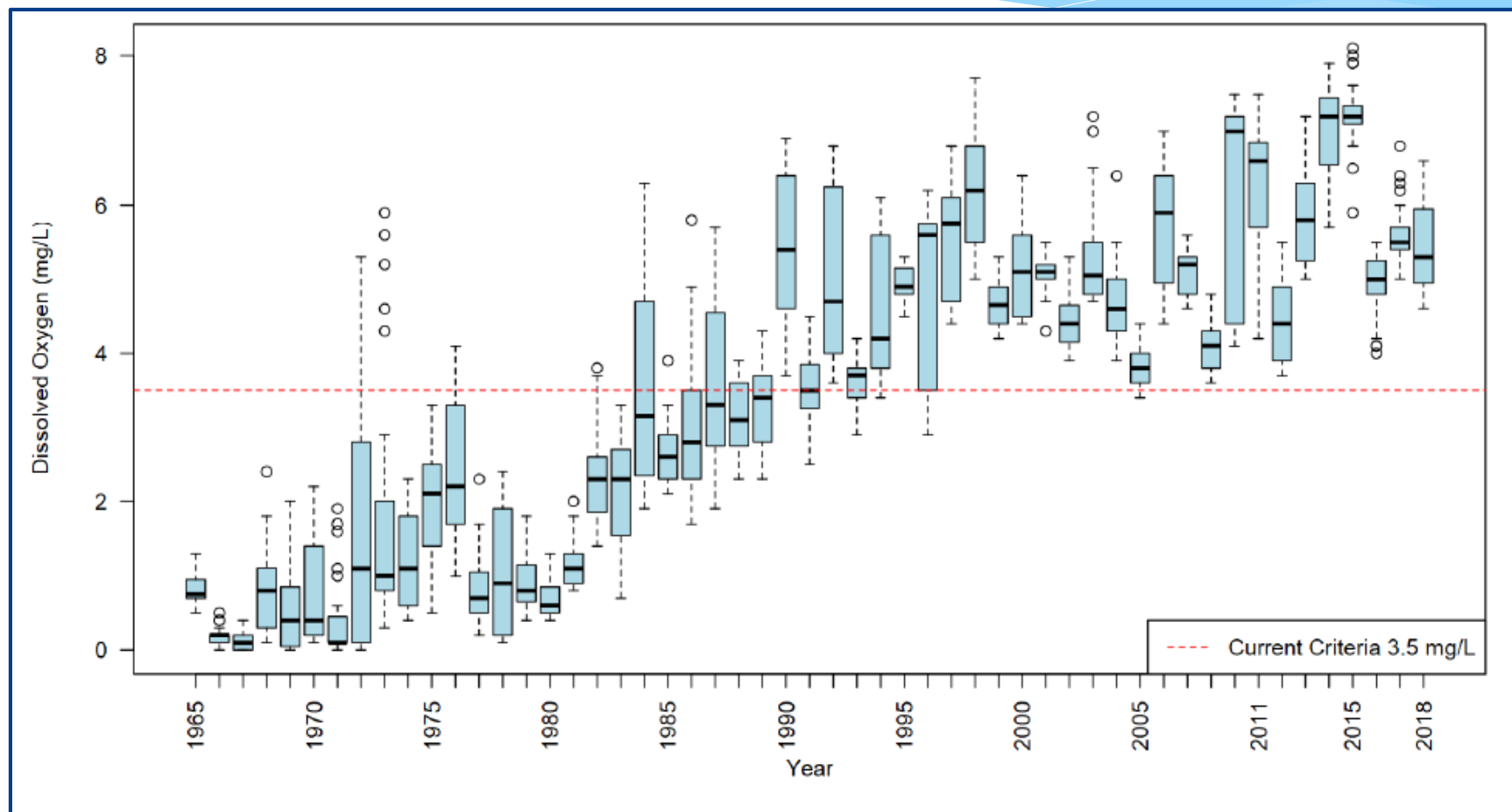
Dissolved Oxygen right now



Data: USGS gages

DRBC's near-Real Time Water
 Quality Dashboard:
<https://drbc.net/Sky/waterq.htm>

Dissolved Oxygen Trends 1965 through to the present

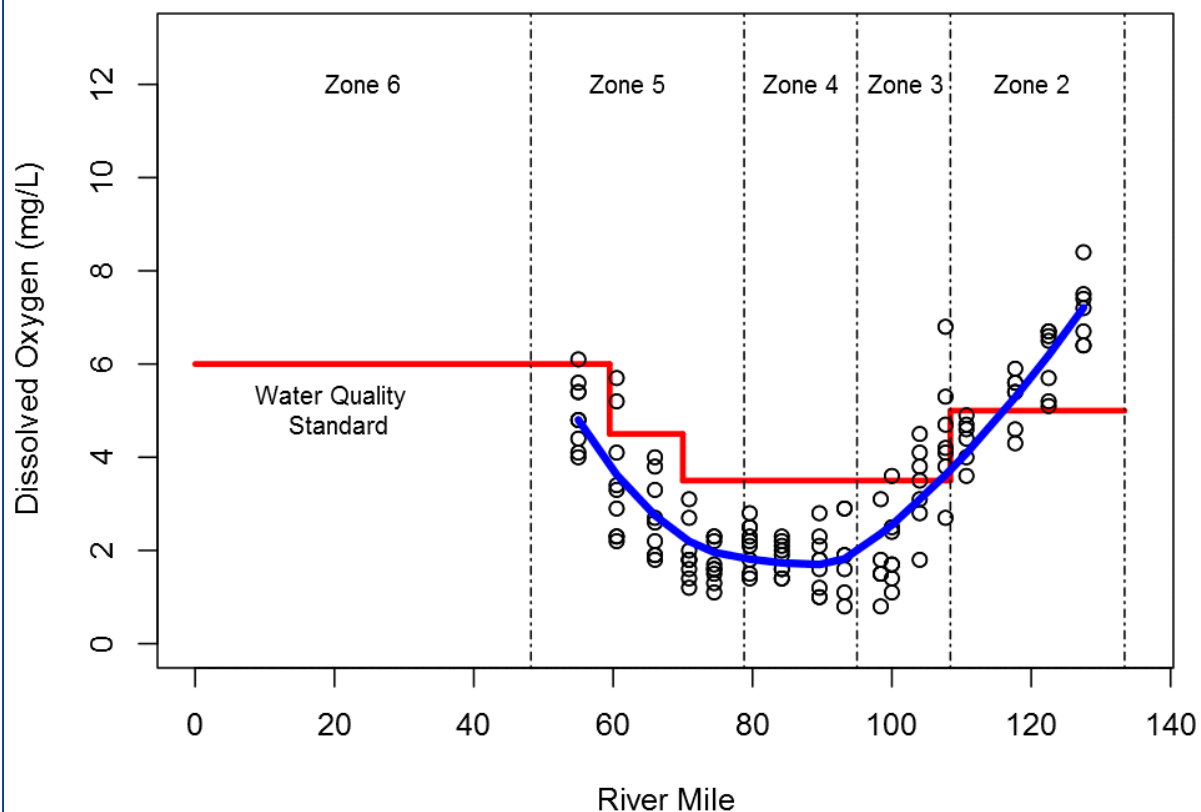


- RM 100 is near the low point of the DO sag

USGS gage,
 Delaware River
 at Ben Franklin
 Bridge
 (River Mile 100)

Dissolved Oxygen Trends - Animated

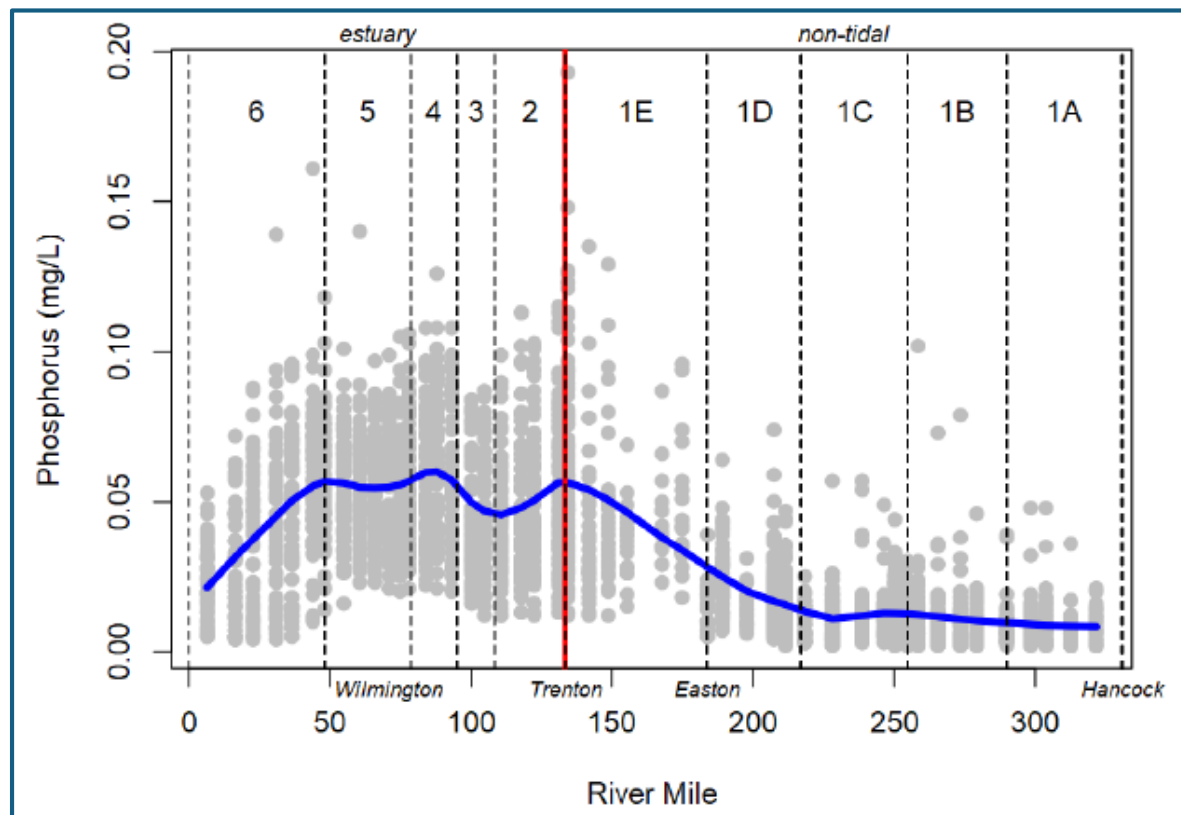
DRBC Delaware Estuary Monitoring
 July & August 1967



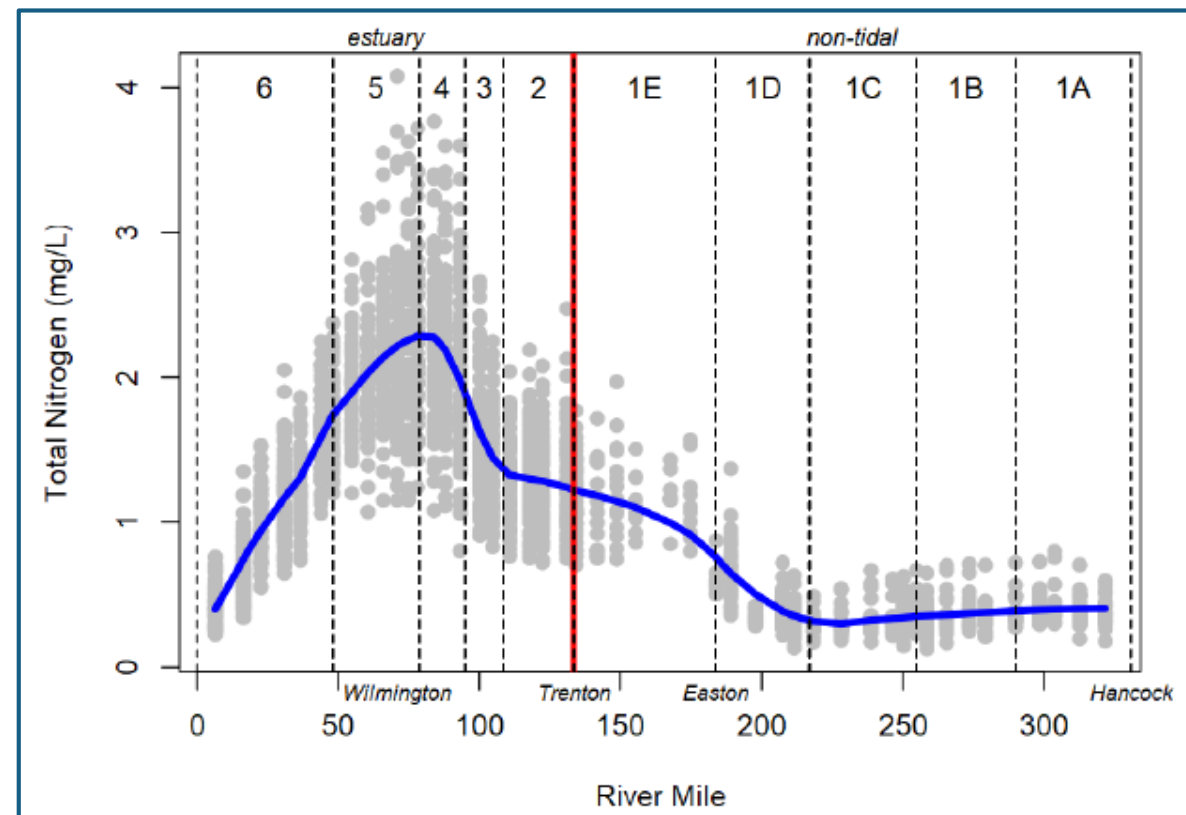
- 3.5 mg/L criteria near Philadelphia, Camden, & Wilmington protect fish migration (not propagation)
- 1960's & 1970's criteria hardly ever attained
- By 2000's that criteria is nearly always attained
- Designated Use Study underway to determine what is achievable

Mainstem Phosphorus & Nitrogen

Phosphorus

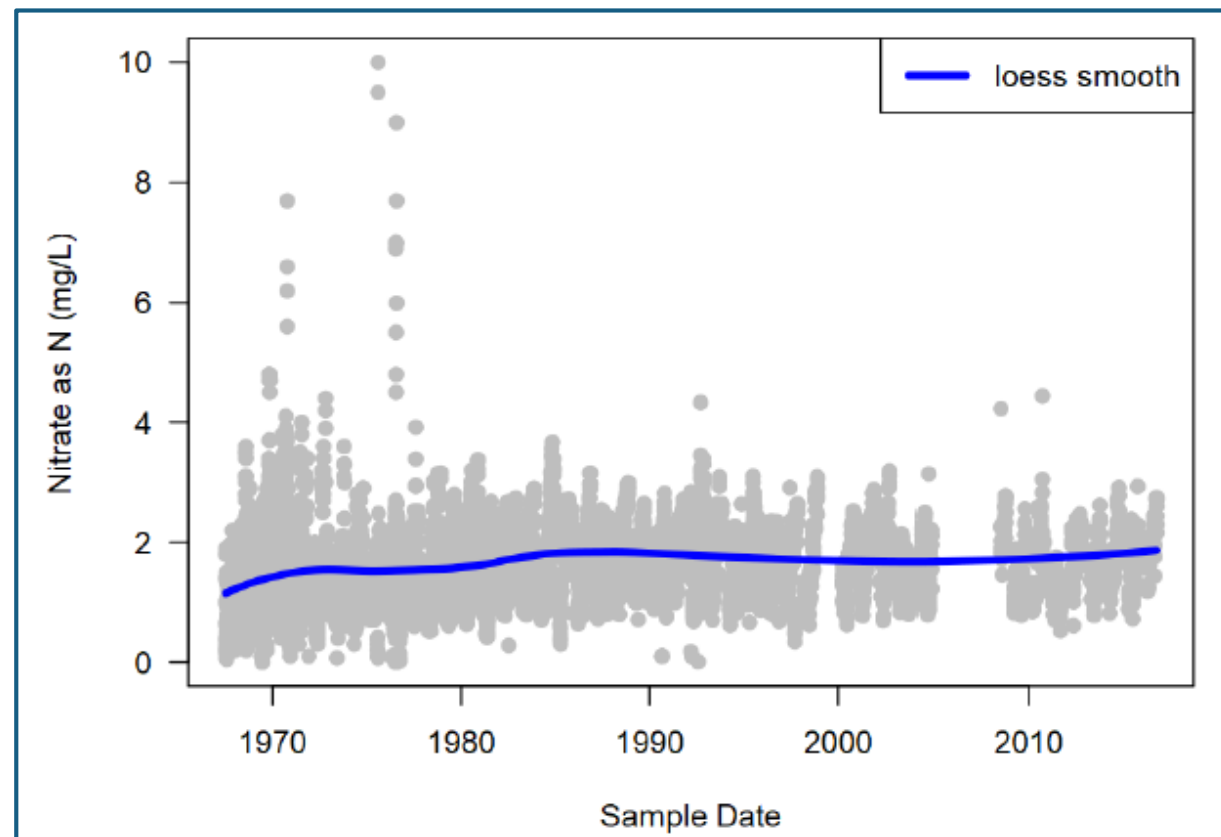
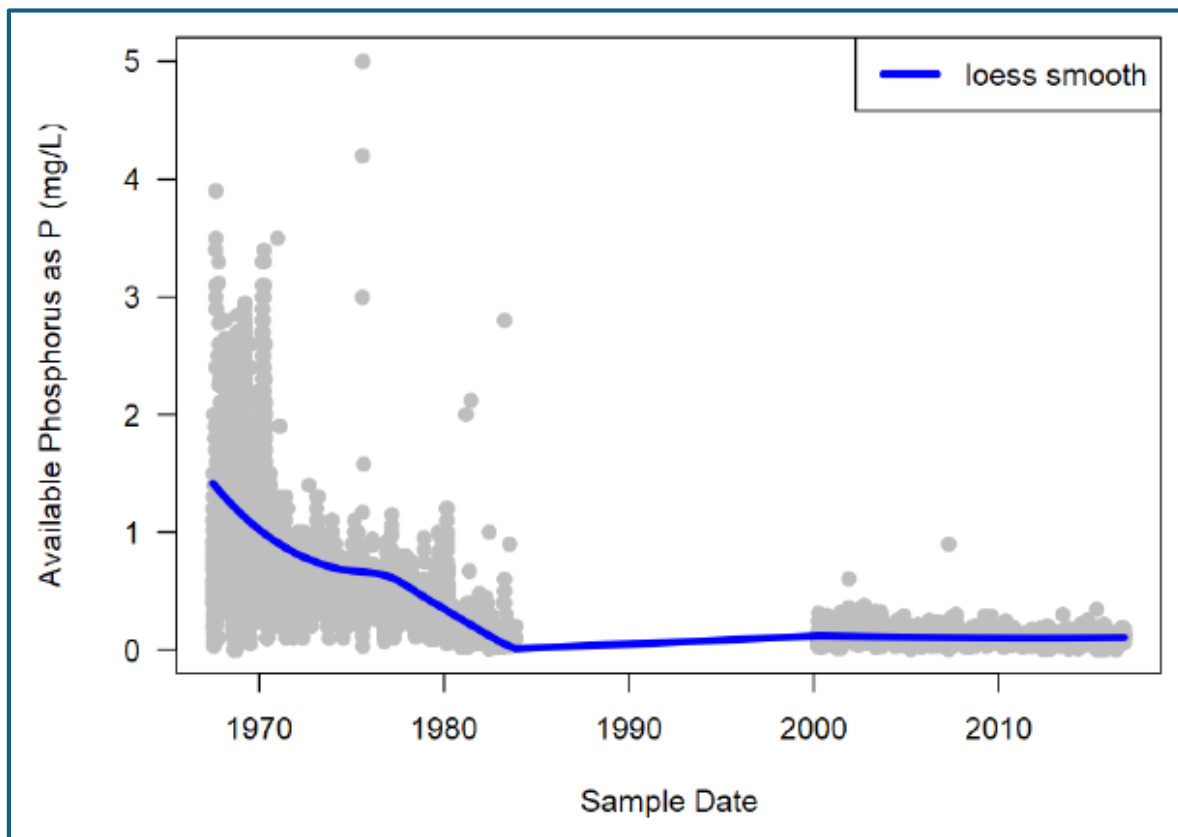


Nitrogen



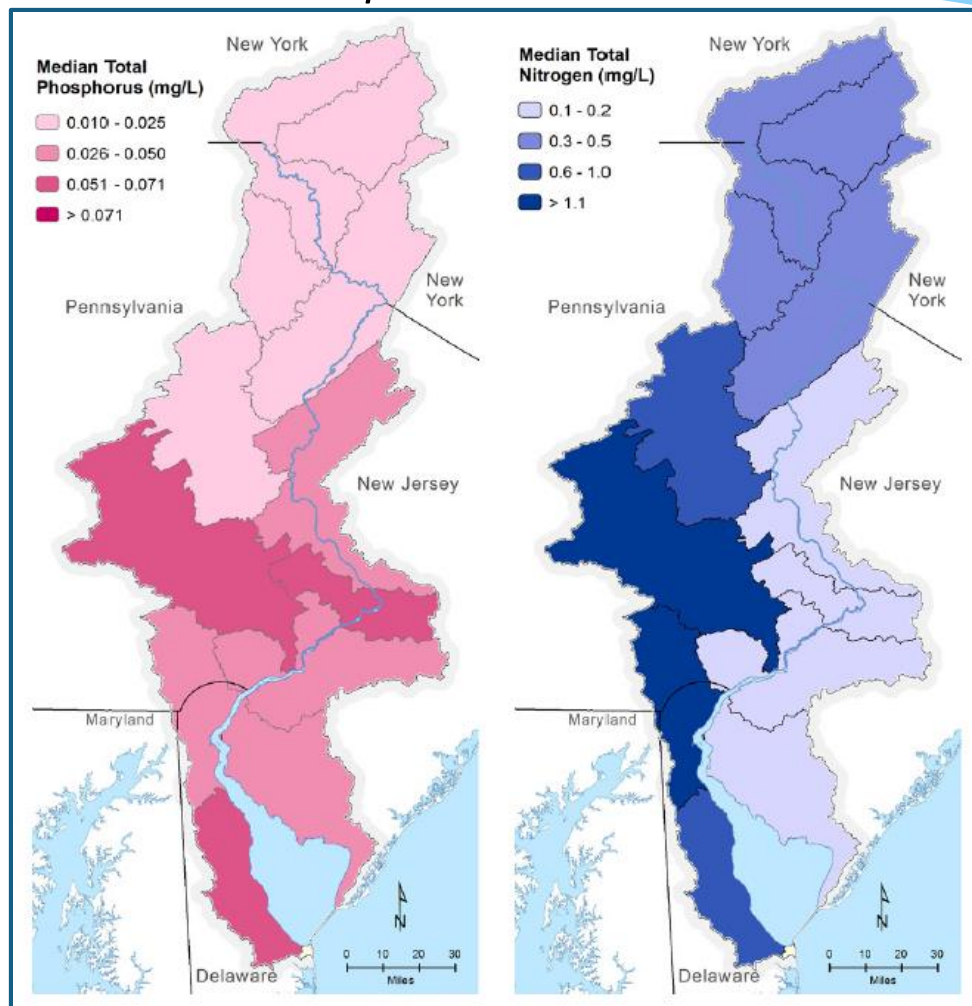
Long Term Trends: Phosphorus & Nitrogen, Delaware Estuary

DRBC's Delaware Estuary Water Quality Monitoring Program (Boat Run)



Nutrients Status: Phosphorus & Nitrogen

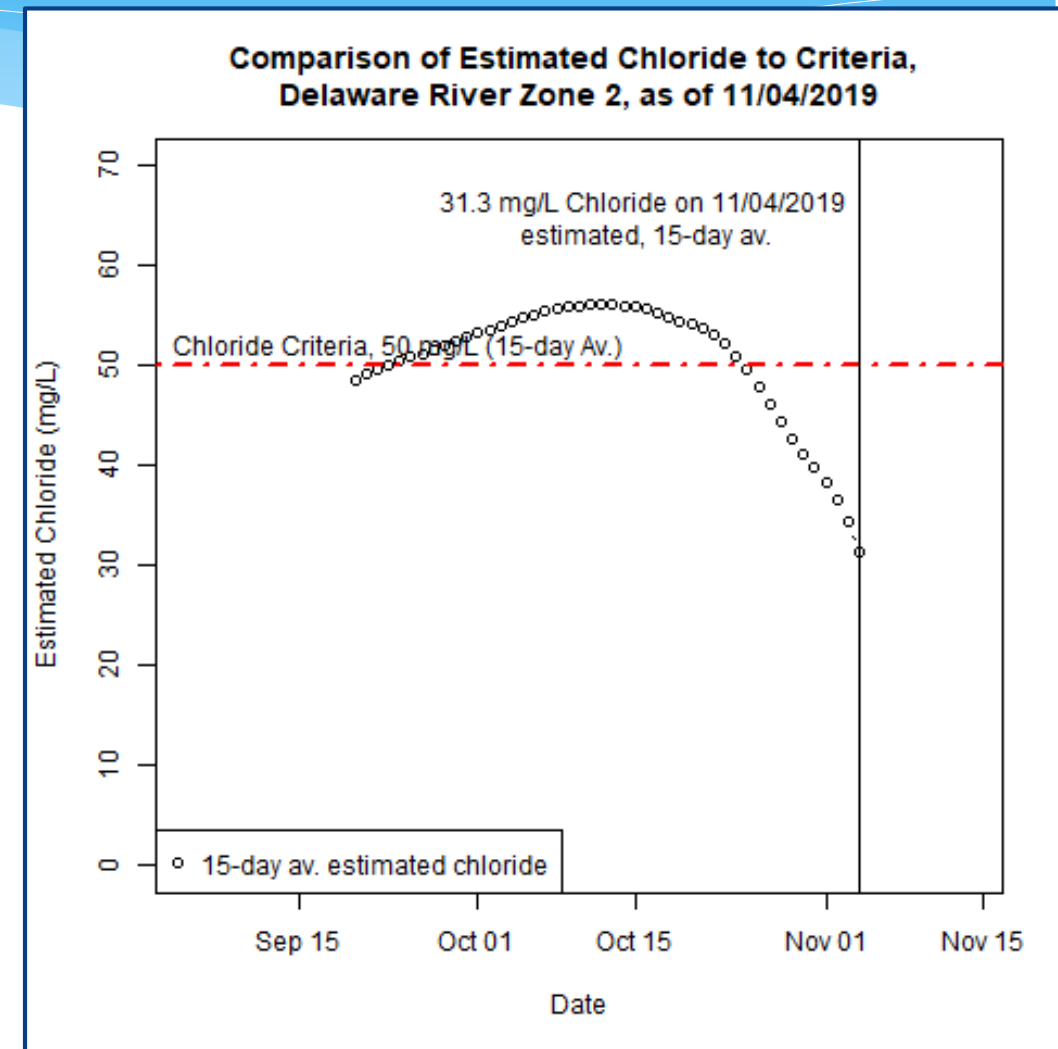
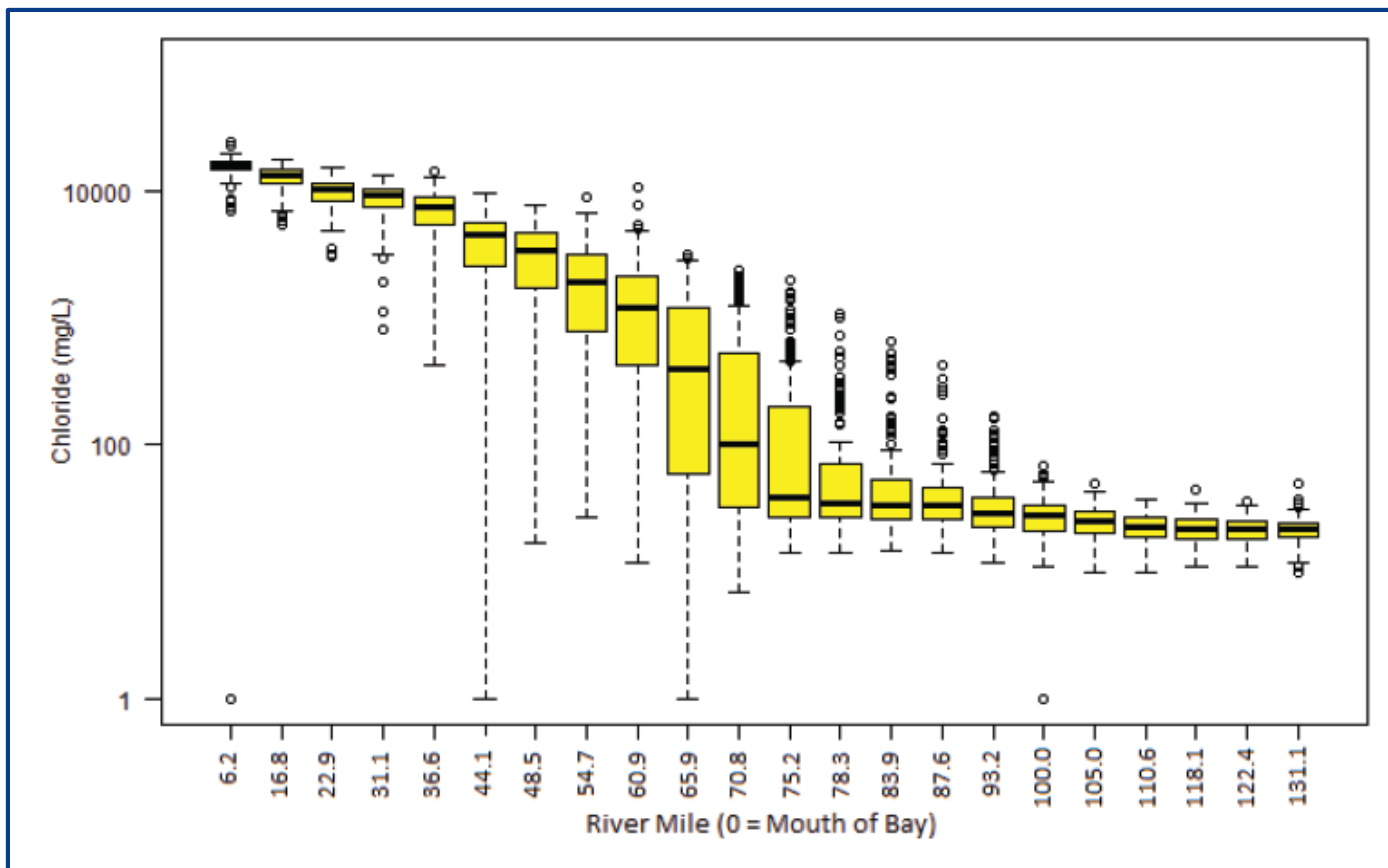
WQ data portal 2000 - 2016



Nutrient Synthesis

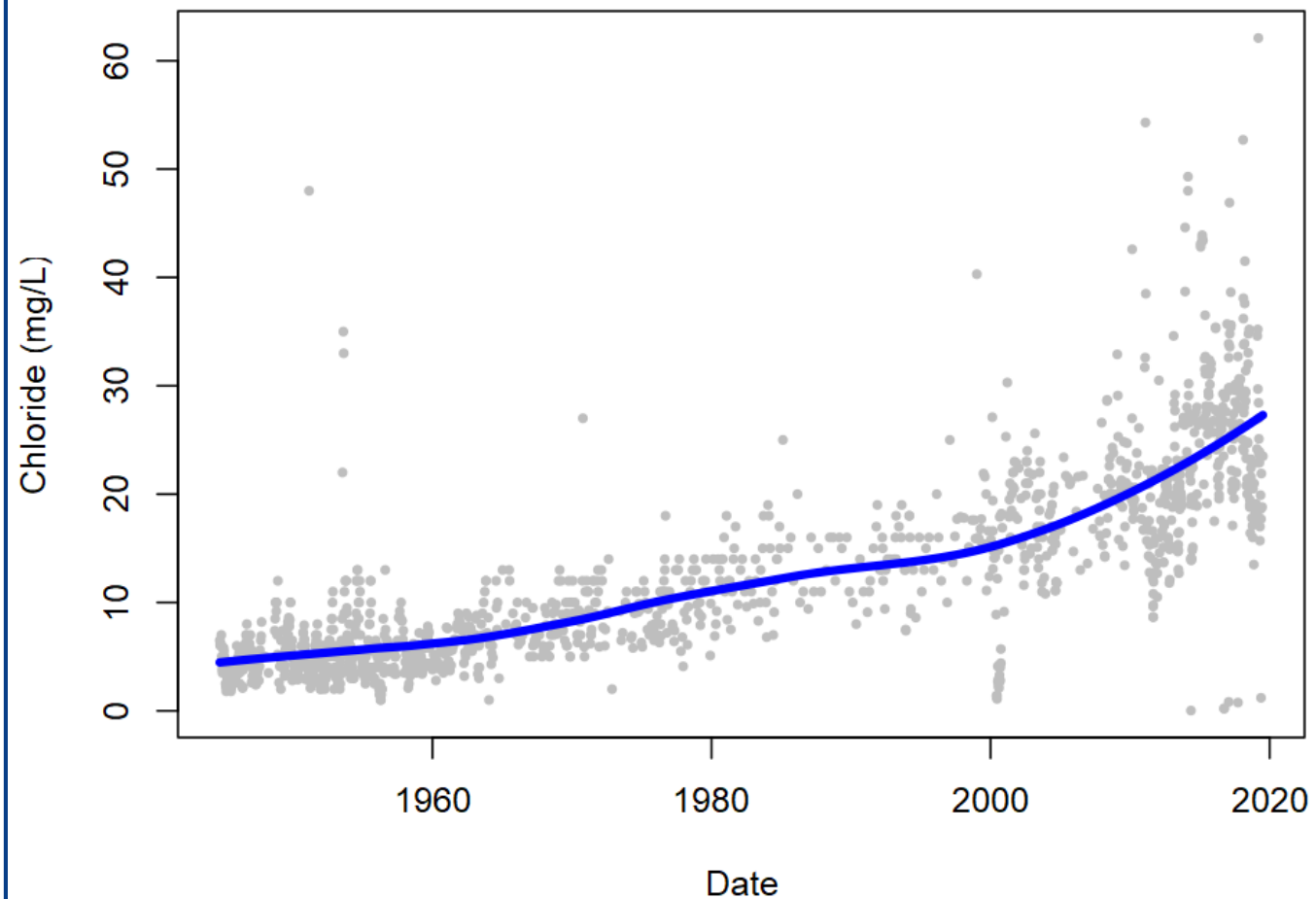
- Very Good and improving in the non-tidal
- Higher concentrations in the estuary

Chloride Status



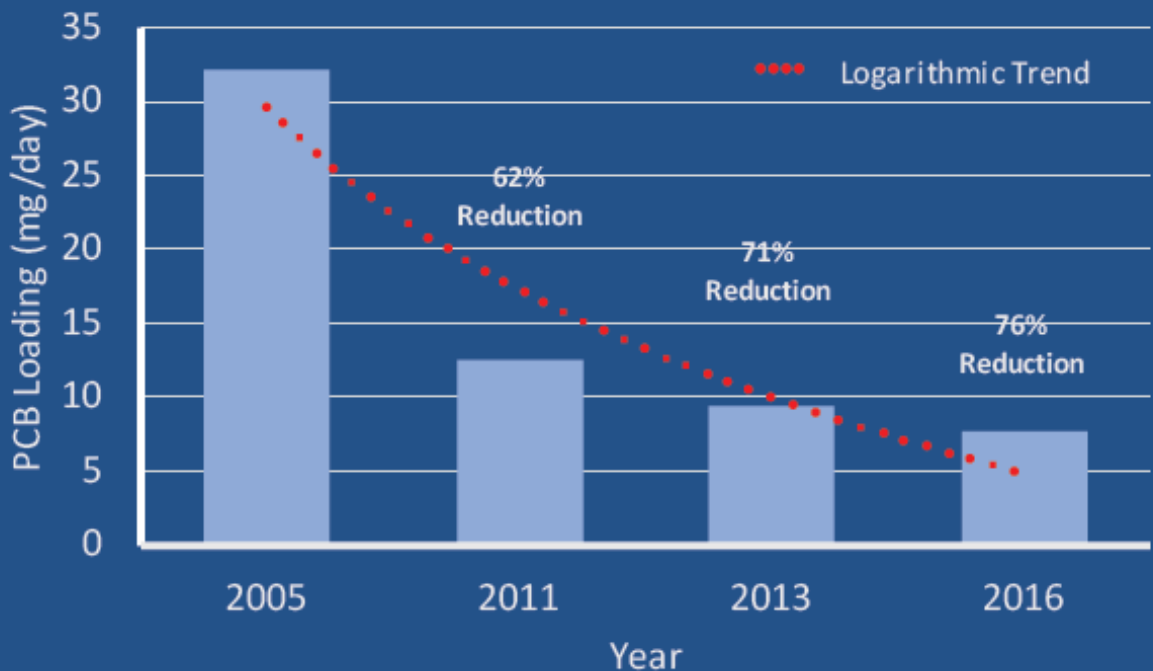
Chloride Trend

Chloride Time Series, Delaware River at Trenton












*All available chloride data
from the National Water
Quality Data Portal*

Toxics: PCB Trends in Effluent



- PCBs are probable human carcinogen
- Human exposure from fish & water consumption
- Delaware Estuary 100 to 1000X higher than criteria
- DRBC developed TMDLs 2003 & 2006
- 90+ Point dischargers perform pollutant minimization plans – DRBC reviews
- DRBC manages all the data from PMPs
- Decades long commitment
- Top 10 dischargers reduced their contributions by 76% between 2005 and 2016

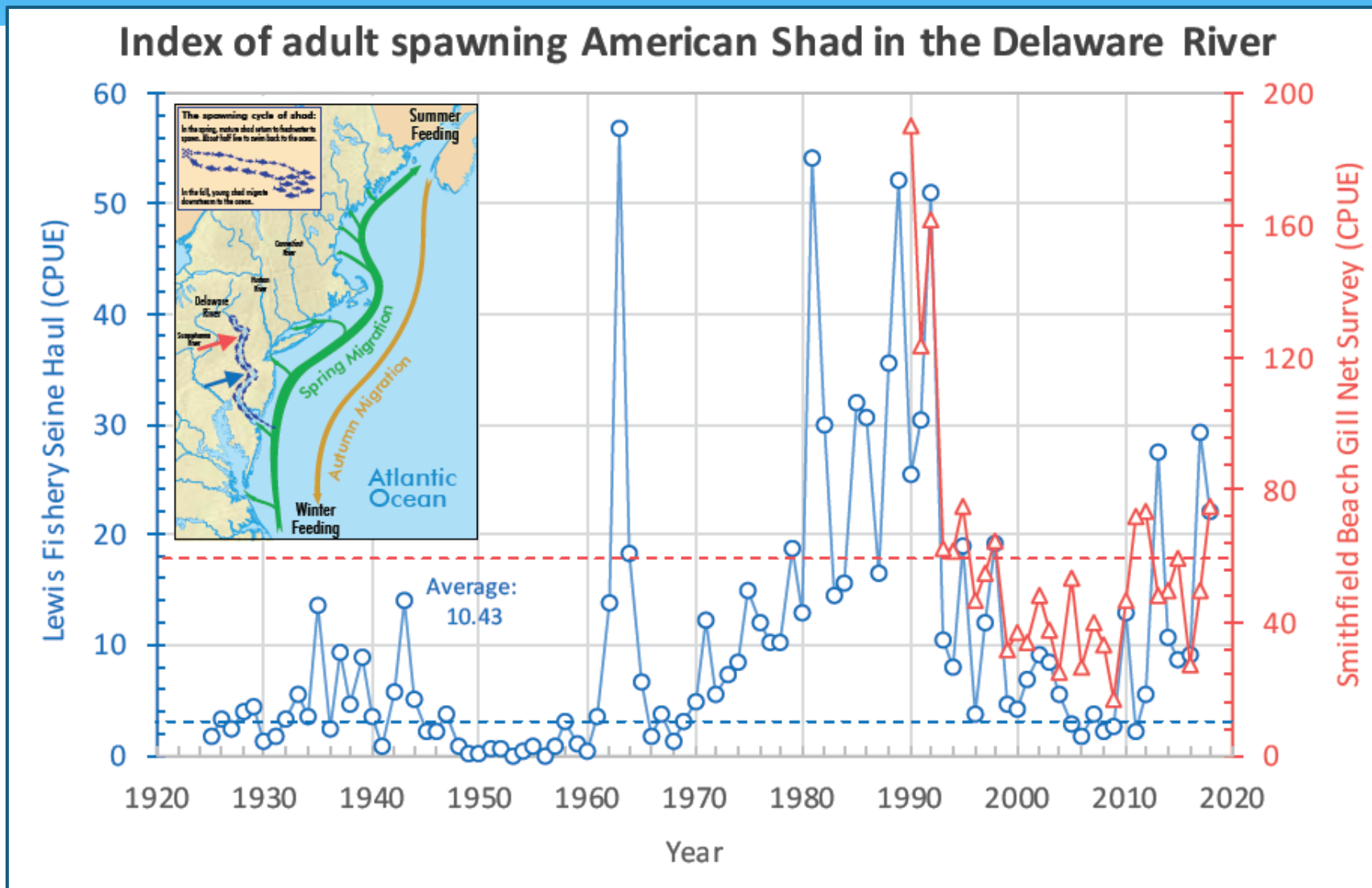
Dissolved Oxygen		<i>Good</i> From the mid-1990s onward, criteria has mostly been met, although DO concentrations exhibit high variability from year to year.	<ul style="list-style-type: none"> • Examine whether DO criteria needs revision • Measure sources of nutrient and oxygen-depleting materials • Build water quality model
Nutrients		<i>Very Good</i> Total nitrogen and phosphorus concentrations were highest towards the Upper Delaware River.	<ul style="list-style-type: none"> • Continue developing and monitoring nutrient criteria • Develop eutrophication model
pH		<i>No Rating</i> All pH values from each monitoring station are within DRBC's criteria.	<ul style="list-style-type: none"> • Develop a better understanding of the Estuary carbon cycle and its impact on pH
Salinity		<i>Good</i> It is estimated that the range of the salt front will be pushed upstream along with its maximum extent of upstream intrusions.	<ul style="list-style-type: none"> • Create better models to establish relationship between sea level rise and salinity • Evaluate different adaptation options • Research increasing trends in chlorides
Temperature		<i>Good</i> Temperature at Trenton is expected to remain stable for the foreseeable future.	<ul style="list-style-type: none"> • Continue developing temperature criteria in non-tidal portion of Delaware River • Create stronger linkages between meteorological drivers and resultant water temperatures
Contaminants		<i>Fair</i> It is likely that levels will remain relatively the same at their current levels.	<ul style="list-style-type: none"> • Continue evaluating and monitoring effects of contaminants on water quality • Continue implementing PCB PMPs • Provide technical reviews and support to the community
Fish Contaminants		<i>Good</i> There is a trend of increasing concentration moving from non-tidal to tidal regions.	<ul style="list-style-type: none"> • Partake in pollution minimization efforts • Cooperate between state and federal agencies to reduce bioaccumulation contaminants and expand to address persistent toxic pollutants
Emerging Contaminants		<i>Fair</i> PFOA and PFOS levels are below current EPA and basin state human health advisory levels in parts of the Delaware River.	<ul style="list-style-type: none"> • Continue monitoring PFAS in drinking water and the environment • Track and evaluate other emerging contaminants of concern
Whole Effluent Toxicity		<i>Fair</i> Recent data do not predict exceedances of stream quality objectives for chronic toxicity by individual discharges.	<ul style="list-style-type: none"> • Continue coordinating between the basin states, DRBC, and USEPA to generate consistent WET testing • Monitor both effluent from discharges as well as ambient environment

Living Resources

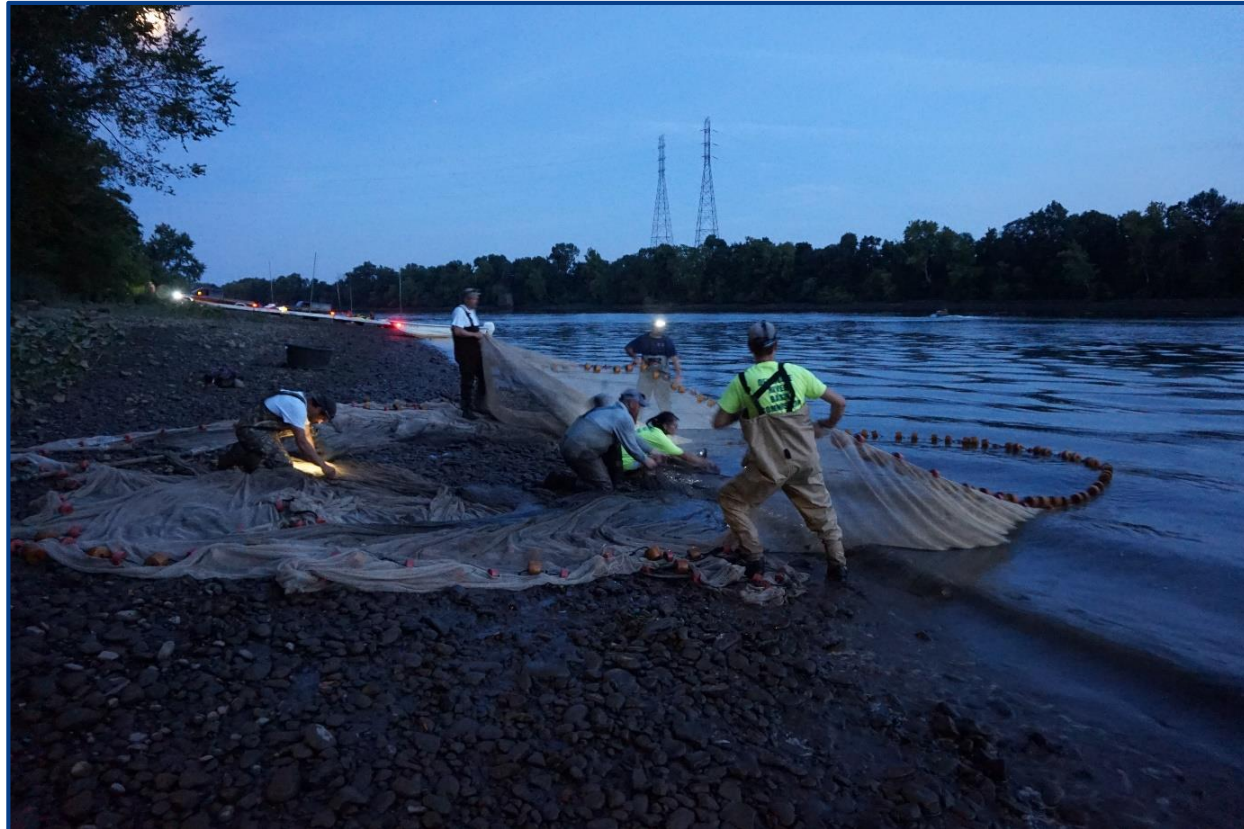
- Focus on American Shad and Atlantic Sturgeon

LIVING RESOURCES	33
ATLANTIC STURGEON	34
WHITE PERCH	35
STRIPED BASS	36
WEAKFISH	37
AMERICAN EEL	38
AMERICAN SHAD	39
BROOK TROUT	40
BLUE CRAB	41
HORSESHOE CRAB	42
EASTERN OYSTER	43
FRESHWATER MUSSELS	44
MACROINVERTEBRATES	46
INVASIVE SPECIES	48
OSPREY	50

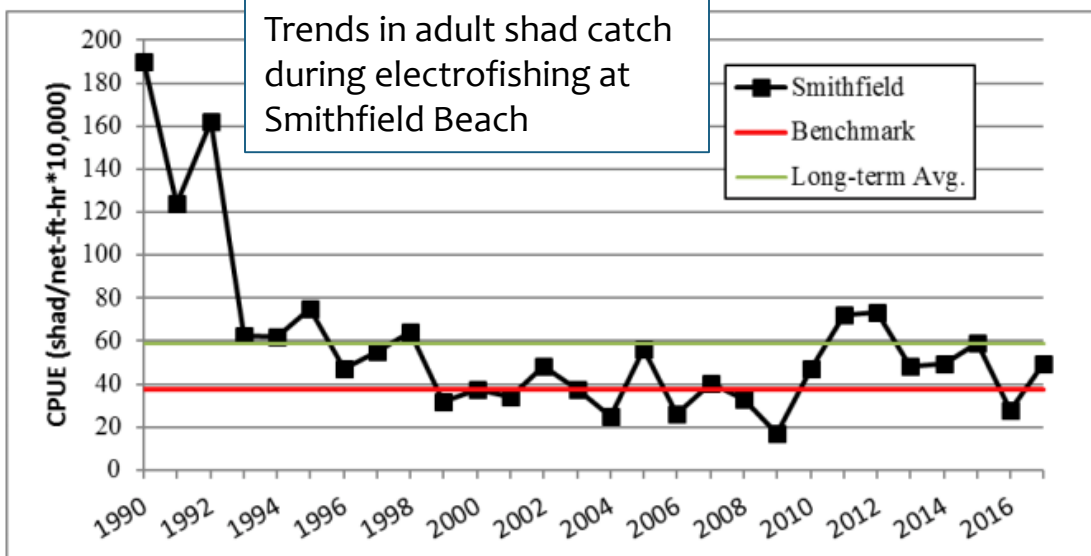
American Shad



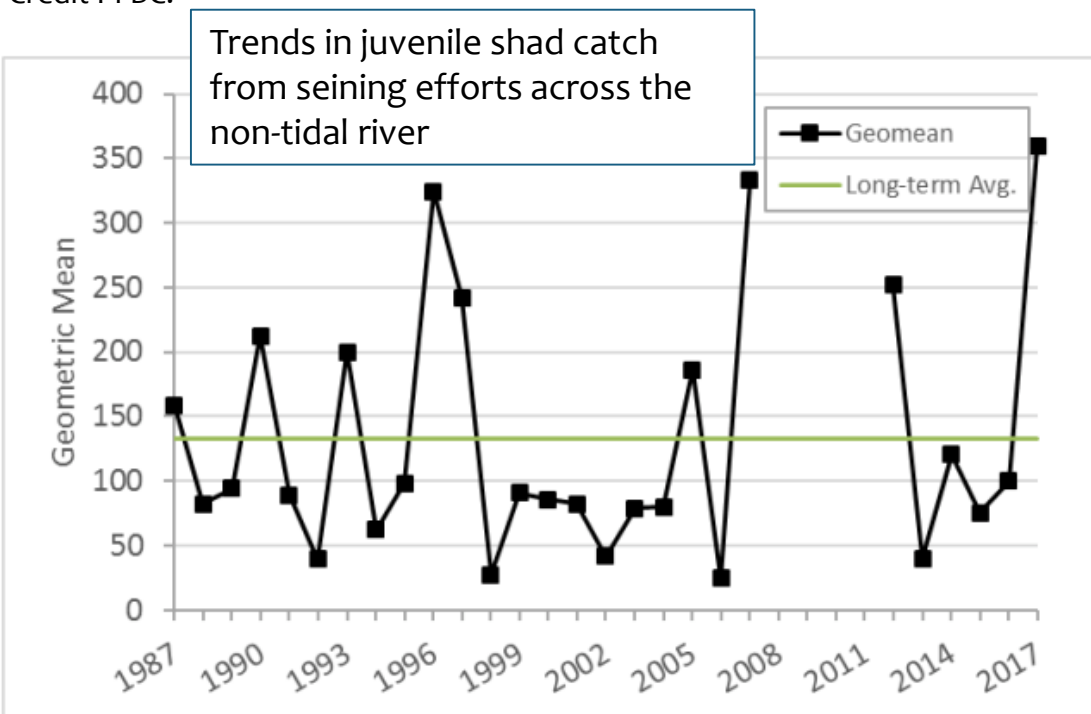
Shad Young of Year Seining



American Shad



Credit PFBC.

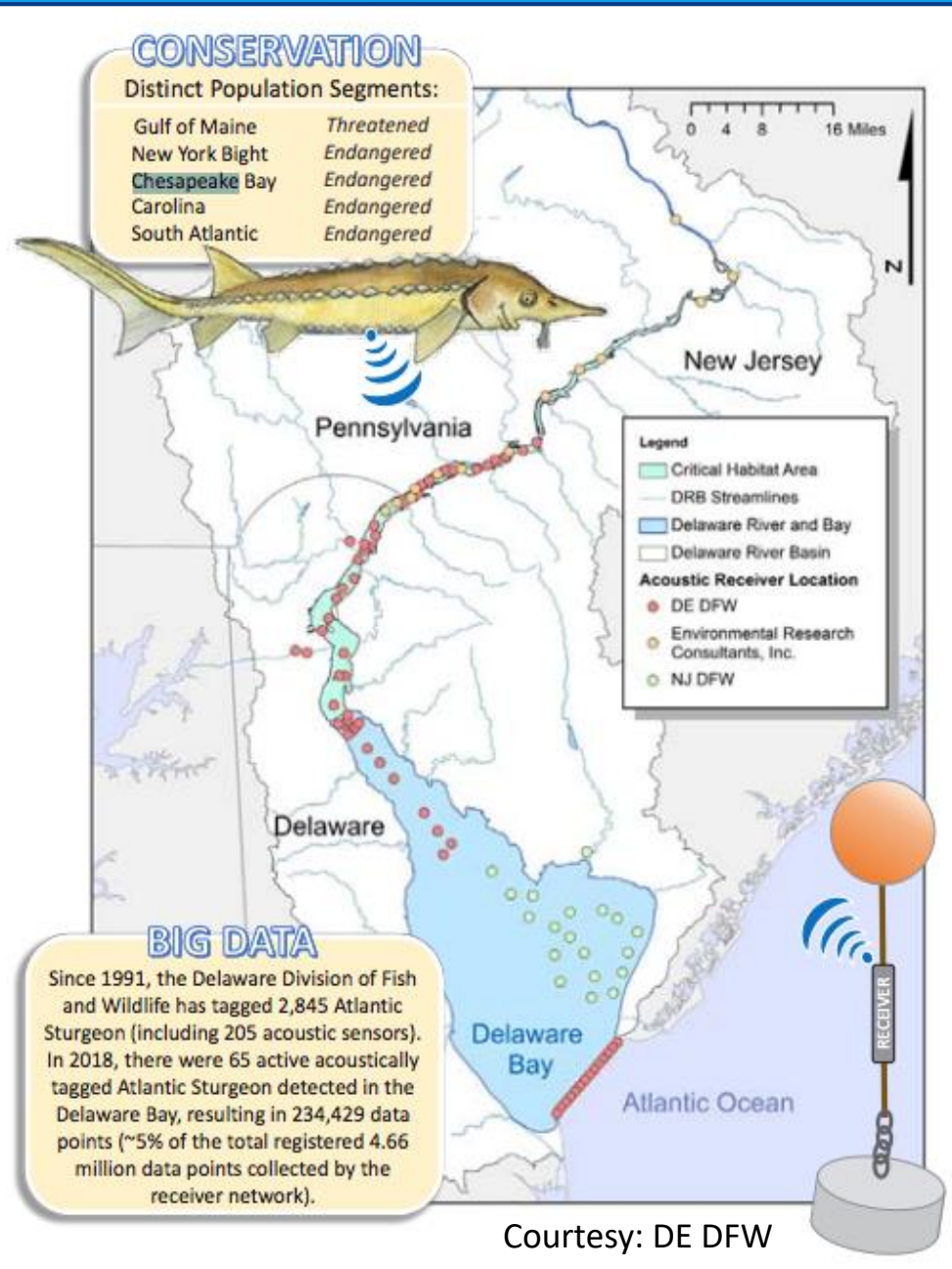


Credit PFBC.

- American shad populations in the Delaware River have rebounded from historical lows in the mid 20th century
- Today, the river supports a fishable American shad population
- Monitoring results generally meet long-term goals and recent juvenile shad surveys have returned promising results



Atlantic Sturgeon



- The Delaware River once supported the largest Atlantic sturgeon population in the US
- Commercial fishing, degraded water quality, and ship strikes contributed to a declining population
- Listed as an Endangered Species in 2012
- Delaware Division of Fish and Wildlife (DE DFW) monitors juvenile sturgeon gill net surveys, tagging and acoustic tracking
- A tag-recapture study in 2014 estimated 3,656 juvenile Atlantic sturgeon (but wide confidence intervals)





NOAA Fisheries; [fisheries.noaa.gov](https://www.fisheries.noaa.gov)

Atlantic Sturgeon









TRENDS

- DE DFW has documented successful sturgeon reproduction in recent years.
- Uncertainty about adult spawning population in the Delaware River
- There has been a recent increase of reported sturgeon carcasses attributed to vessel strikes; however, it is unclear if this is a result of increased reporting awareness, or increased mortality rates.

ACTIONS/NEEDS

- Continue monitoring, telemetry studies - behavior & habitat
- Expand research into causes of mortality and survival
- Expanded study of ship strikes in collaboration with shipping to minimize population impacts

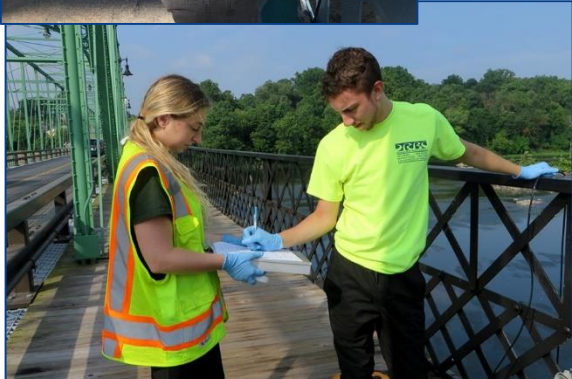
Living Resources Summary

Living Resources			
Atlantic Sturgeon		<i>Poor</i> Commercial demand for their meat and degraded water quality contributed to their declining population.	<ul style="list-style-type: none"> • Continue monitoring abundance • Continue telemetry studies to better understand behavior • Expand study of ship strikes • Collaborate with shipping industry
White Perch		<i>Very Good</i> The species' tolerance and wide range of habitat will help it continue to support healthy fisheries.	<ul style="list-style-type: none"> • Protect upper reaches of tidal tributary areas under developmental pressure • Establish an 8-inch minimum size for white perch to ensure they have a chance to spawn
Striped Bass		<i>Very Good</i> The overall status of the Delaware River spawning stock is positive.	<ul style="list-style-type: none"> • Continue monitoring long-term trends in biomass and recruitment
Weakfish		<i>Poor</i> Coastwide, weakfish population is considered depleted.	<ul style="list-style-type: none"> • Investigate factors contributing to recent weakfish decline • Recreational and commercial fishing sectors should practice catch and release • Continue artificial reef use and creation
American Eel		<i>Good</i> Coast-wide populations have declined in recent years, but there is no apparent bases for future predictions.	<ul style="list-style-type: none"> • Improve monitoring of species abundance in non-tidal reaches • Continue monitoring in the Estuary • Improve fish passage at dams
American Shad		<i>Good</i> 2017 and 2018 data show abundance well above the recent average.	<ul style="list-style-type: none"> • Continue restoring blocked habitat • Maintain and monitor habitat conditions in spawning reaches • Establish sustainable harvest limitations after restoration
Brook Trout		<i>Fair</i> There have been widespread reductions in populations due to many factors. Efforts to reverse this trend have increased.	<ul style="list-style-type: none"> • Continue conservation/management efforts • Determine if special designation or current status reclassification is needed • Continue researching and monitoring population
Blue Crab		<i>Good</i> They are at healthy levels of abundance and safe levels of fishing mortality.	<ul style="list-style-type: none"> • Continue long-term ad fishery-independent management surveys • Report fishery landings accurately • Preserve and restore habitat needed for critical life stages

John Yagecic, Manager, Water Quality Assessment

John.Yagecic@drbc.gov

www.drbc.gov



Delaware River Basin Commission

DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

*Managing, Protecting and
Improving the Basin's Water
Resources since 1961*

