

Delaware River Basin Commission

Water Quality Assessment Report Draft Results

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Water Quality Advisory Committee
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Presented to an advisory committee of the DRBC on July 28, 2020. Contents should not be published or re-posted in whole or in part without permission of DRBC.

Background

- Every two years, the DRBC compiles a Delaware River and Bay Water Quality Assessment Report, which provides an assessment of the Delaware River and Bay's support of various uses during previous years
 - Maintenance of aquatic life
 - Providing a raw water source for human consumption
 - Swimming and recreation
 - Fish consumption
 - Shellfish consumption

Parameters

- Parameters evaluated include:
 - Dissolved oxygen
 - pH
 - Water temperature
 - Total dissolved solids
 - Alkalinity
 - Hardness
 - Chlorides
 - Phenols
 - Sodium
 - Turbidity
 - Odor
 - Bacteria
 - Toxics
 - Biological community
 - Consumption advisories

99% rule applied for bold parameters

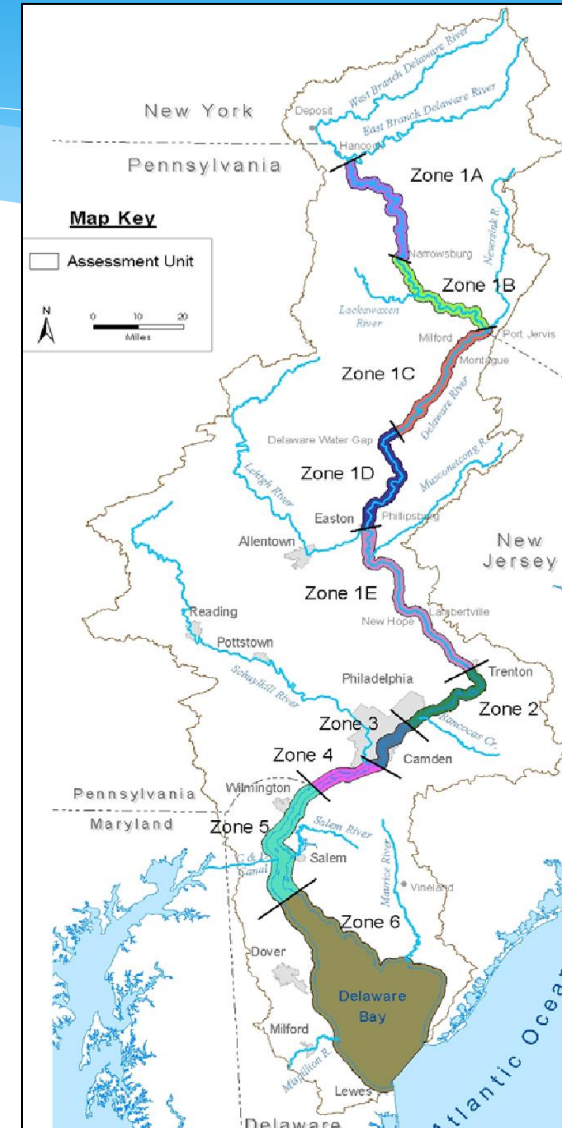
Data

- Data window for the 2020 report was 10/1/2014 – 9/30/2019
- Data sources include:
 - DRBC
 - NJDEP
 - PADEP
 - NYSDEC
 - USGS
 - EPA
 - NOAA
 - NPS

Assessment Units

- Assessment units are broken down by water quality zone

| WQM Zone | Location (as River Mile) |
|----------|--------------------------|
| 1A | 330.7 – 289.9 |
| 1B | 289.9 – 254.75 |
| 1C | 254.75 – 217.0 |
| 1D | 217.0 – 183.66 |
| 1E | 183.66 – 133.4 |
| 2 | 133.4 – 108.4 |
| 3 | 108.4 – 95.0 |
| 4 | 95.0 – 78.8 |
| 5 | 78.8 – 48.2 |
| 6 | 48.2 – 0.0 |



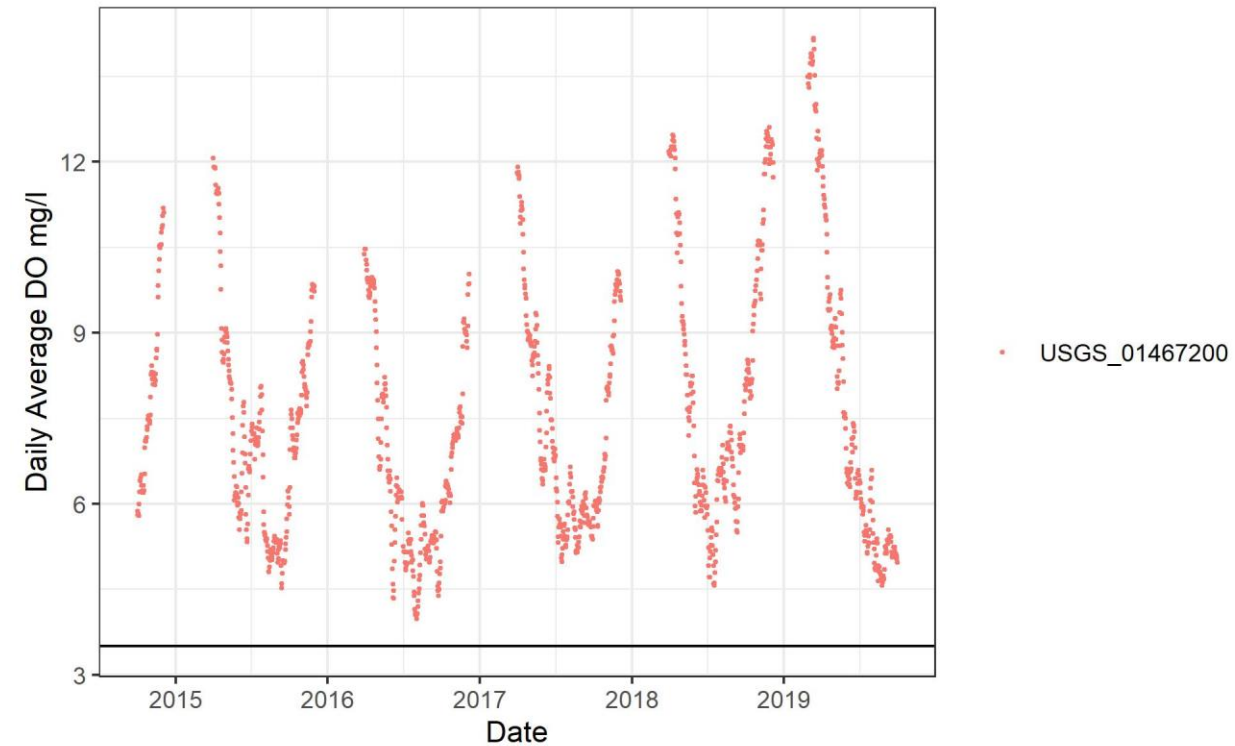
Designated Uses

| Designated Use | DRBC WQM Zone or AU | | | | | | | | | |
|-----------------------|---------------------|----|----|----|----|---|---|---|---|---|
| | 1A | 1B | 1C | 1D | 1E | 2 | 3 | 4 | 5 | 6 |
| Aquatic Life | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Drinking Water | √ | √ | √ | √ | √ | √ | √ | | | |
| Primary Recreation | √ | √ | √ | √ | √ | √ | | √ | √ | √ |
| Secondary Recreation | | | | | | | √ | √ | | |
| Fish Consumption | √ | √ | √ | √ | √ | √ | √ | √ | √ | √ |
| Shellfish Consumption | | | | | | | | | | √ |

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Aquatic Life Use – Dissolved Oxygen

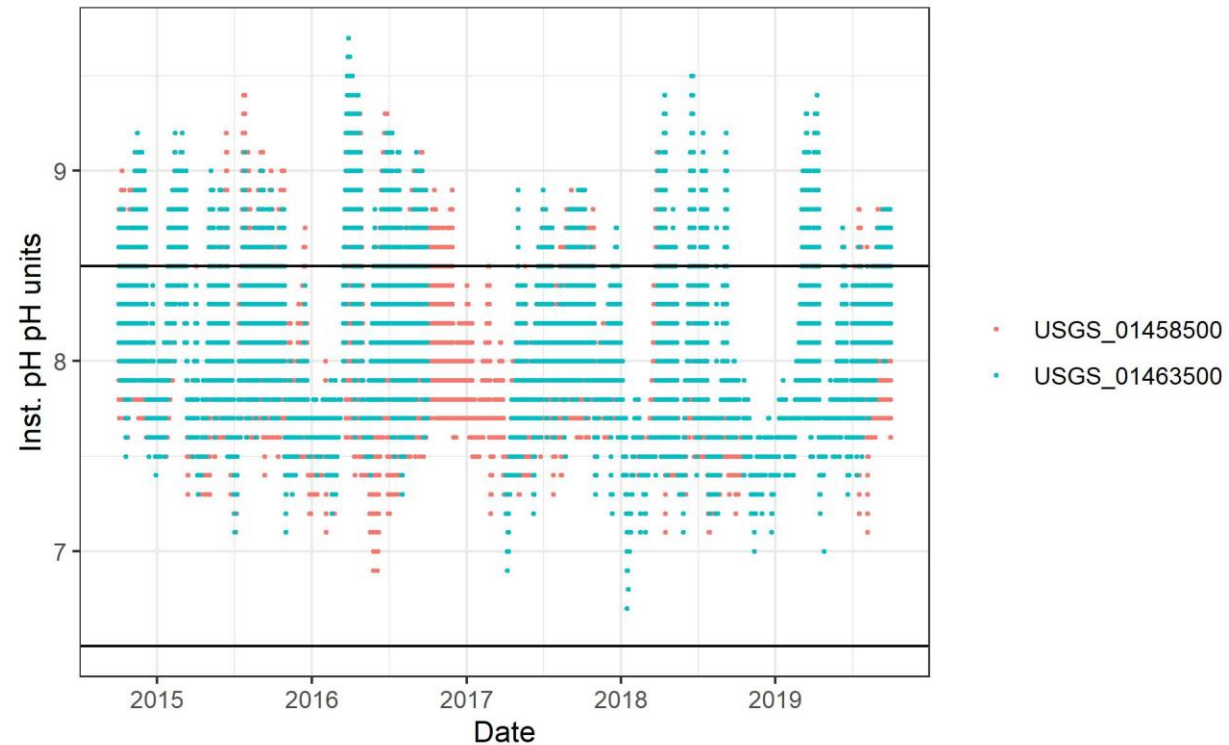
| Zone | % Observations Meeting Daily Mean Criteria | % Meeting Seasonal Criteria | % Meeting Instantaneous Minimum Criteria | Source | Notes |
|------|--|-----------------------------|--|------------------------------|--------------------------------|
| 1a | 99.9% | 100% | 100% | NPS | |
| 1b | 100% (presumed) | NA | 100% | DRBC,NYSDEC,PA DEP | Daytime spot measurements only |
| 1c | 100% (presumed) | NA | 100% | DRBC | Daytime spot measurements only |
| 1d | 100% (presumed) | NA | 100% | DRBC,PADEP | Daytime spot measurements only |
| 1e | 100% | NA | 100% | USGS_01458500, USGS_01463500 | |
| 2 | 100% | 100% | NA | USGS_014670261 | |
| 3 | 100% | 100% | NA | USGS_01467200 | |
| 4 | 100% | 100% | NA | USGS_01477050 | |
| 5 | 96.9% | 100% | NA | USGS_01482800 | |
| 6 | 90.0% (presumed) | NA | 98.7% | DNREC,DRBC,NJD EP | Daytime spot measurements only |



Daily Average DO Observations Compared to Criteria in Zone 3 at Ben Franklin Bridge

Aquatic Life Use – pH

| Zone | % Observations Meeting Criteria | Source | Notes |
|------|---------------------------------|-----------------------------|--|
| 1a | 95.5% | NPS | Most violations were higher than the pH maximum (8.5). Few violations observed below the pH minimum (6.5). |
| 1b | 96.1% | DRBC,NYSDEC,PADEP | Daytime spot measurements only |
| 1c | 96.1% | DRBC,USGS_NJWSC | Daytime spot measurements only |
| 1d | 98.4% | DRBC,PADEP,USGS_PAWSC | Daytime spot measurements only |
| 1e | 87.2% | USGS_01458500,USGS_01463500 | All violations were higher than the pH maximum (8.5). No violations observed below the pH minimum (6.5). |
| 2 | 99.9% | USGS_014670261 | |
| 3 | 100% | USGS_01467200 | |
| 4 | 100% | USGS_01477050 | |
| 5 | 100% | USGS_01482800 | |
| 6 | 97.1% | DNREC,DRBC,NJDEP | Daytime spot measurements only |

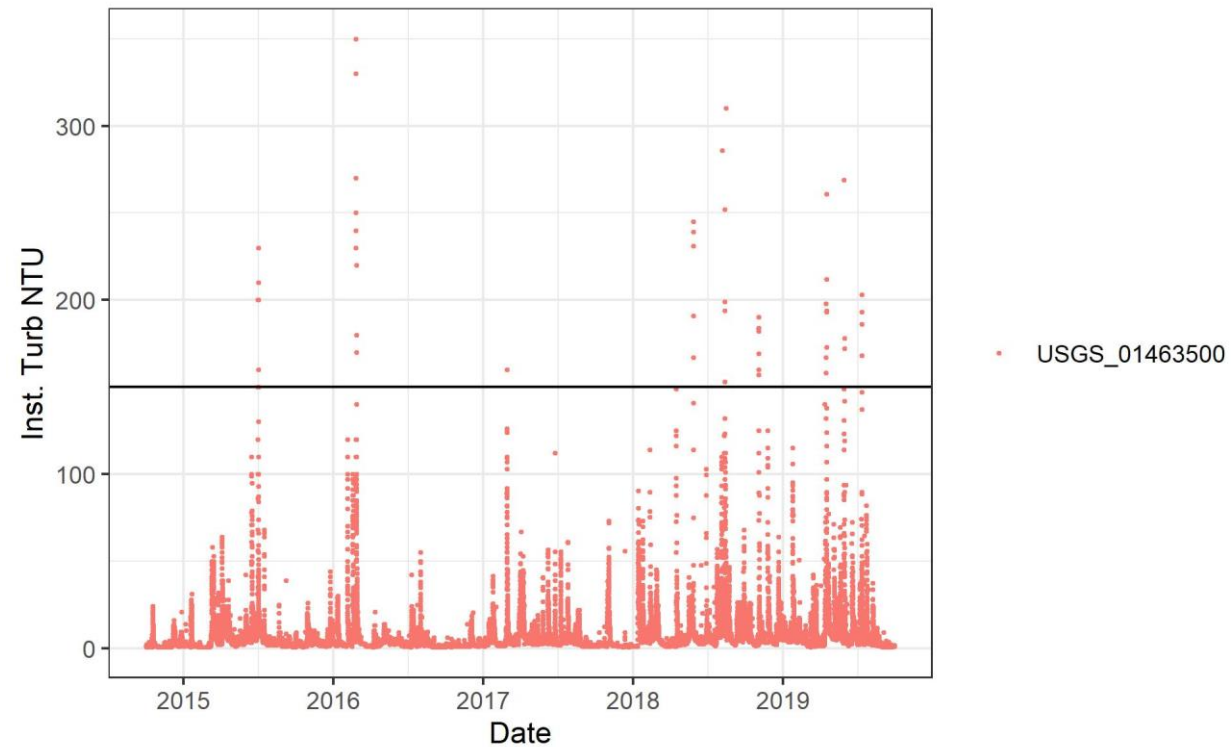


pH Observations Compared to Criteria in Zone 1E

*The pH criteria allow exceedances if due to natural conditions, however the Commission has not defined what would constitute demonstration of natural conditions.

Aquatic Life Use – Turbidity

| Zone | % Observations Meeting Max Criteria | % Meeting 30- day Average Criteria | Source | Notes |
|------|-------------------------------------|------------------------------------|------------------|-------------------------|
| 1a | 99.8% | NA | NPS | |
| 1b | 100% | NA | DRBC,NYSDEC | Spot measurements only. |
| 1c | 100% | NA | DRBC,USGS_NJWSC | Spot measurements only |
| 1d | 100% | NA | DRBC,USGS_PAWSC | Spot measurements only |
| 1e | 99.9% | 100% | USGS_01463500 | |
| 2 | 100% | 100% | USGS_014670261 | |
| 3 | 100% | NA | DRBC | Spot measurements only |
| 4 | 100% | NA | DRBC | Spot measurements only |
| 5 | 100% | NA | DNREC,DRBC | Spot measurements only |
| 6 | 98.0% | NA | DNREC,DRBC,NJDEP | Spot measurements only |

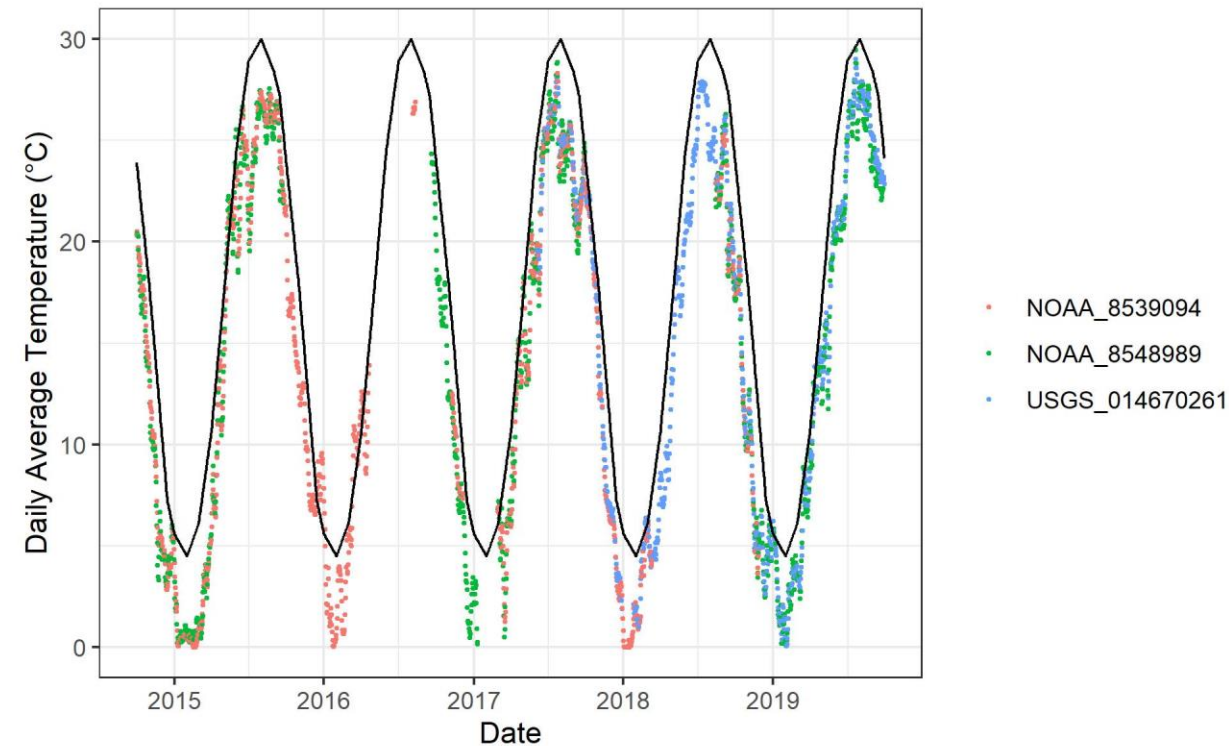


Turbidity Observations Compared to Criteria in Zone 1E

Aquatic Life Use – Temperature

| Zone | % Observation Days Meeting Day-of-Year Criteria | % Observation Days Meeting Criteria Instantaneous Maximum | Source | Notes |
|------|---|---|--|-------|
| 1 | Criteria applicable to Heat Dissipation Areas only for Zone 1 | | | |
| 2 | 96.0% | 100% | NOAA_8539094, NOAA_8548989, USGS_014670261 | |
| 3 | 97.3% | 100% | NOAA_8545240, NOAA_8546252, USGS_01467200 | |
| 4 | 97.6% | 100% | NOAA_8540433, USGS_01474703, USGS_01477050 | |
| 5 | NA | 98.9% | NOAA_8551762, NOAA_8551910, USGS_01482800 | |
| 6 | NA | 99.8% | NOAA_8536110, NOAA_8537121, NOAA_8555889, NOAA_8557380 | |

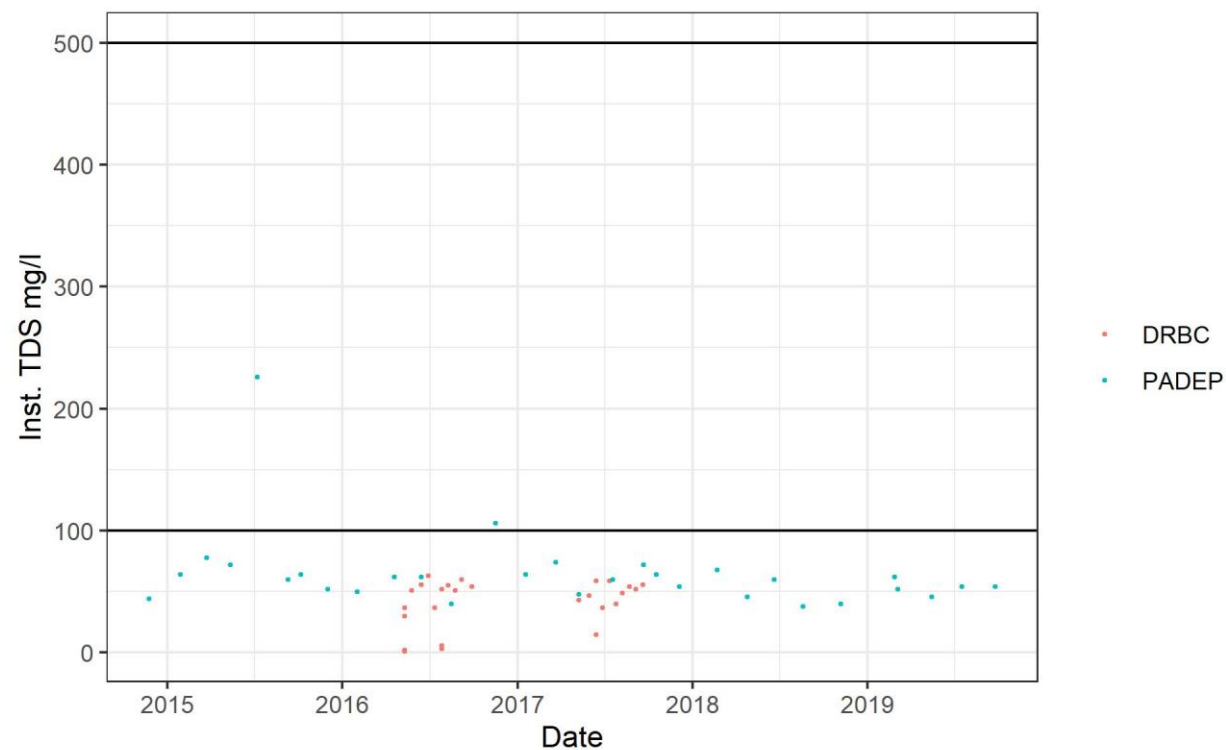
- Difficult to disentangle the influence of atmospheric conditions from anthropogenic influences



Water Temperature Observations Compared to Criteria in Zone 2

Aquatic Life Use – TDS

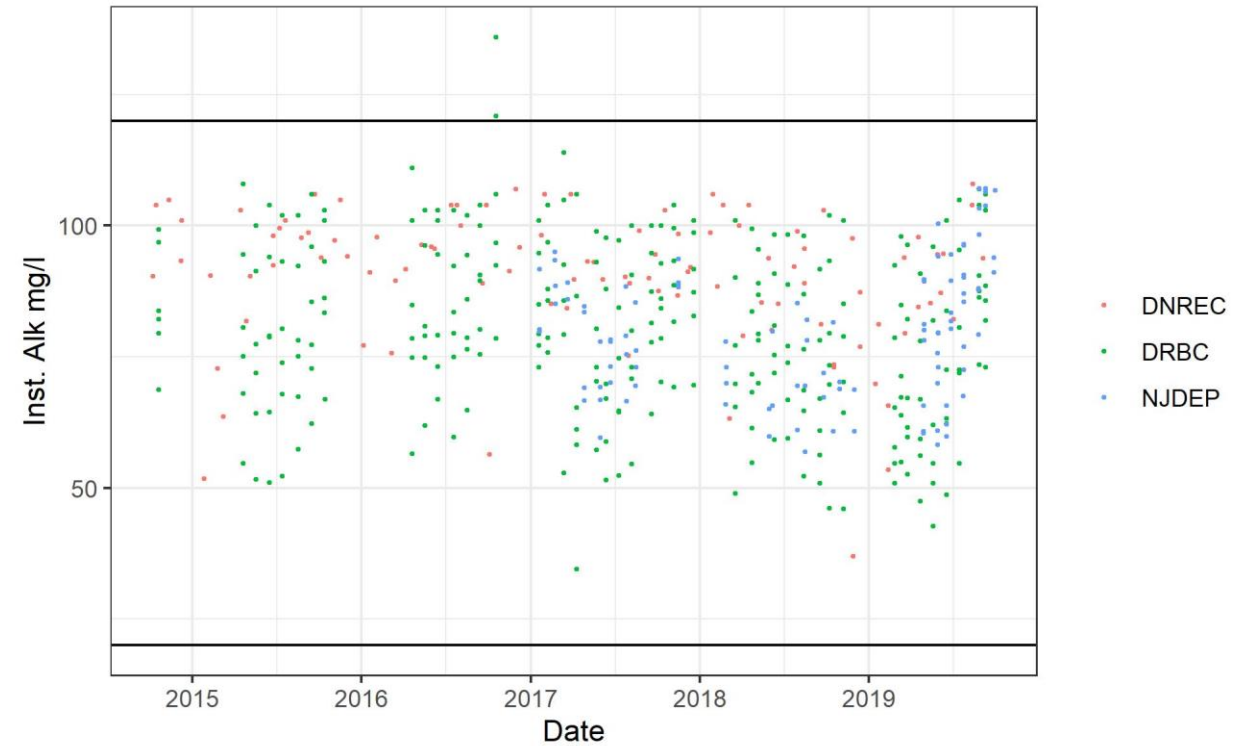
| Zone | % Observations Meeting 133% of Background Criteria | % Observations Meeting 500 mg/l criteria | Source | Notes |
|------|--|--|-----------------------|-------|
| 1a | 96.4% | 100% | DRBC,PADEP | |
| 1b | 98.2% | 100% | DRBC,NYSDEC,PADEP | |
| 1c | 100% | 100% | DRBC,USGS_NJWSC | |
| 1d | 96.8% | 100% | DRBC,PADEP,USGS_PAWSC | |
| 1e | 100% | 100% | DRBC,PADEP | |
| 2 | 100% | 100% | DRBC | |
| 3 | 100% | 100% | DRBC | |
| 4 | Does not apply | | | |
| 5 | No Criteria | | | |
| 6 | | | | |



TDS Observations Compared to Criteria in Zone 1a

Aquatic Life Use – Alkalinity

| Zone | % Observations Meeting Criteria | Source | Notes |
|------|---------------------------------|------------------|-------|
| 1a | No Criteria | | |
| 1b | | | |
| 1c | | | |
| 1d | | | |
| 1e | 97.1% | DRBC,PADEP | |
| 2 | 99.4% | DRBC | |
| 3 | 97.8% | DRBC | |
| 4 | 100% | DRBC,PADEP | |
| 5 | 100% | DNREC,DRBC | |
| 6 | 99.6% | DNREC,DRBC,NJDEP | |



Alkalinity Observations Compared to Criteria in Zone 6

Aquatic Life Use – Toxics

- DRBC monitors and assesses a wide array of toxics
- Exceedances occurred for
 - Copper in Zones 1a, 1b, 1d, 1e, and 5
 - Aluminum in Zones 2, 3, 4, and 5
 - Dieldrin in Zones 2, 3, 4, 5, and 6
 - Based off single monitoring survey

Aquatic Life Use – Biological Assessment

| Zone | Years of Data | Stations per Assessment Unit | % of samples in time window w/ 6-metric IBI < 75.6* |
|-------------|----------------------|-------------------------------------|---|
| 1a | 1 (2017) | 5 | 0% |
| 1b | | 3 | 0% |
| 1c | | 6 | 17% |
| 1d | | 5 | 20% |
| 1e | | 7 | 29% |

*DRBC has defined "impairment" as greater than 30% of sampling falling below the threshold

Aquatic Life Use – Summary

| Zone (Assessment Unit) | DO | pH | Turbidity | Temperature | TDS | Alkalinity | Toxic Pollutants | Biological Assessment | 2020 Assessment | 2018 Assessment |
|------------------------------|----------------|----------------|----------------|-------------------|------------------|----------------|------------------|--------------------------|--------------------|--------------------|
| 1A | + | - ^A | + | N/A ^C | - ^A | NC | - ^F | + | NS ^E | NS |
| 1B | + | - | + | N/A ^C | - ^A | NC | - ^F | + | NS ^E | NS ^E |
| 1C | + | - ^A | + | N/A ^C | + | NC | + ^F | + | NS ^E | NS ^E |
| 1D | + | - ^A | + | N/A ^C | - ^A | NC | - ^F | + | NS ^E | NS ^E |
| 1E | + | - | + | N/A ^C | + | - ^A | - ^F | + | NS | NS |
| 2 | + | + | + | - ^{A, B} | + | + | - ^G | NC | NS ^E | NS ^E |
| 3 | + | + | + | - ^{A, B} | + | - ^A | - ^G | NC | NS ^E | NS ^E |
| 4 | + | + | + | - ^{A, B} | N/A ^D | + | - ^G | NC | NS ^E | NS |
| 5 | - ^A | + | + | - ^{A, B} | NC | + | - ^G | NC | NS ^E | NS |
| 6 | - ^A | - ^A | - ^A | + | NC | + | - ^G | NC | NS ^E | NS |

Notes:

+ -- The Assessment Unit meets WQC

-- The AU does not meet WQC

A – Rate of criteria exceedance is below the historical threshold of 10%.

B – Temperature criteria exceedance may be driven, in part, by meteorologic and atmospheric conditions. The proportion of temperature exceedance caused by controllable anthropogenic inputs is unknown at this time.

C – Temperature criteria in Zone 1A through 1E are expressed relative to ambient temperature, but ambient temperature is not defined. We interpret these criteria to be applicable to thermal mixing zones. Therefore, Zones 1A through 1E lack a surface water quality standard for temperature.

D – Criteria expressed relative to background, but background is undefined.

E – Based primarily on fewer than 10% exceedances of criteria

F – The Assessment Unit meets (+) or does not meet (-) the most stringent of applicable basin states' standards

G – TMDL PCB Zones 2 – 6

<http://www.nj.gov/drbc/library/documents/TMDL/FinalRptDec2003.pdf> &

https://www.state.nj.us/drbc/library/documents/TMDL/Zone6final-rpt_Dec2006.pdf

NC – No criteria developed.

ID – Insufficient data to make an assessment

NS – The assessment does not support the designated use

N/A – The parameter is not applicable in this assessment unit

Public Water Supply Use – Hardness, Chloride, Sodium

- Sodium
 - Criteria only in Zone 3 (30-day mean)
 - Grab samples only
 - No exceedances
- Hardness

| Zone | % Observations Meeting Criteria | Source | Notes |
|------|-----------------------------------|--------|---|
| 1a | No Criteria | | |
| 1b | | | |
| 1c | | | |
| 1d | | | |
| 1e | | | |
| 2 | 98.3% | DRBC | |
| 3 | 100% | DRBC | No individual observation exceeded criteria, therefore, attainment of 30- day mean criteria is presumed |
| 4 | Use not applicable in these zones | | |
| 5 | | | |
| 6 | | | |

- Chloride

| Zone | % Observations Meeting Criteria | Source | Notes |
|------|-----------------------------------|--------|---|
| 1a | No Criteria | | |
| 1b | | | |
| 1c | | | |
| 1d | | | |
| 1e | | | |
| 2 | 99.4% | DRBC | Only a single observation exceeded criteria, therefore, attainment of 30- day mean criteria is presumed |
| 3 | 100% | DRBC | No individual observation exceeded criteria, therefore, attainment of 30- day mean criteria is presumed |
| 4 | Use not applicable in these zones | | |
| 5 | | | |
| 6 | | | |

Public Water Supply Use – TDS, Turbidity, Phenols, Odor, Toxics

- TDS and Turbidity
 - Same assessment as aquatic life use
 - TDS Exceedances in Zones 1a, 1b, and 1d
 - No turbidity exceedances
- Phenols
 - No data Zone 1
 - Zone 2 and 3, all non-detects
- Odor
 - No data
- Toxics
 - Assessed for systemic toxicants and carcinogens
 - All assessments supported use in Zones 1, 2, and 3

Public Water Supply Use – Summary

| Zone (AU) | TDS | Hardness | Chlorides | Odor | Phenols | Sodium | Turbidity | Systemic Toxicants | Carcinogens | Drinking water closures | 2020 Assessment | 2018 Assessment |
|-----------|----------------|----------------|-----------|------|---------|--------|-----------|--------------------|-------------|-------------------------|-----------------|-----------------|
| 1A | - ^A | NC | NC | ID | ID | NC | + | + | + | + | NS ^B | NS ^B |
| 1B | - ^A | NC | NC | ID | + | NC | + | + | + | + | NS ^B | NS ^B |
| 1C | + | NC | NC | ID | ID | NC | + | + | + | + | S | S |
| 1D | - ^A | NC | NC | ID | ID | NC | + | + | + | + | NS ^B | NS ^B |
| 1E | + | NC | NC | ID | ID | NC | + | + | + | + | S | NS ^B |
| 2 | + | - ^A | + | ID | + | NC | + | + | + | + | NS ^B | S |
| 3 | + | + | + | ID | + | + | + | + | + | + | S | S |

Notes:

+ -- The Assessment unit meets WQC

- - - The Assessment unit does not meet WQC

A – Rate of criteria exceedance is below the historical threshold of 10%.

B – Based primarily on fewer than 10% exceedances of criteria

ID – Insufficient Data

N/A – Not applicable (no criteria in this assessment unit)

S – The use is supported in this Assessment Unit

NS – The use is not supported in this Assessment Unit

NC- No criteria developed

Contact Recreation– Summary

- Boat Run, center channel data only

| AU | Fecal Coliform | | Enterococcus | | 2020 Assessment | 2018 Assessment |
|---------------|----------------|-----------|--------------|-----------|--------------------|--------------------|
| | Primary | Secondary | Primary | Secondary | | |
| 1A | ID | ID | NC | NC | ID | ID |
| 1B | ID | ID | NC | NC | ID | ID |
| 1C | ID | ID | NC | NC | ID | S |
| 1D | ID | ID | NC | NC | ID | ID |
| 1E | ID | ID | NC | NC | ID | ID |
| 2 | + | + | + | + | S | S |
| 3 | NC | + | NC | + | S | S |
| 4 (> RM 81.8) | NC | + | NC | + | S | S |
| 4 (< RM 81.8) | ID | ID | ID | ID | ID | ID |
| 5 | + | + | + | + | S | S |
| 6 | + | + | + | + | S | S |

Notes:

+ -- The Assessment Unit meets WQC

---TheAssessmentUnitdoesnotmeetWQC

ID– Insufficient Data

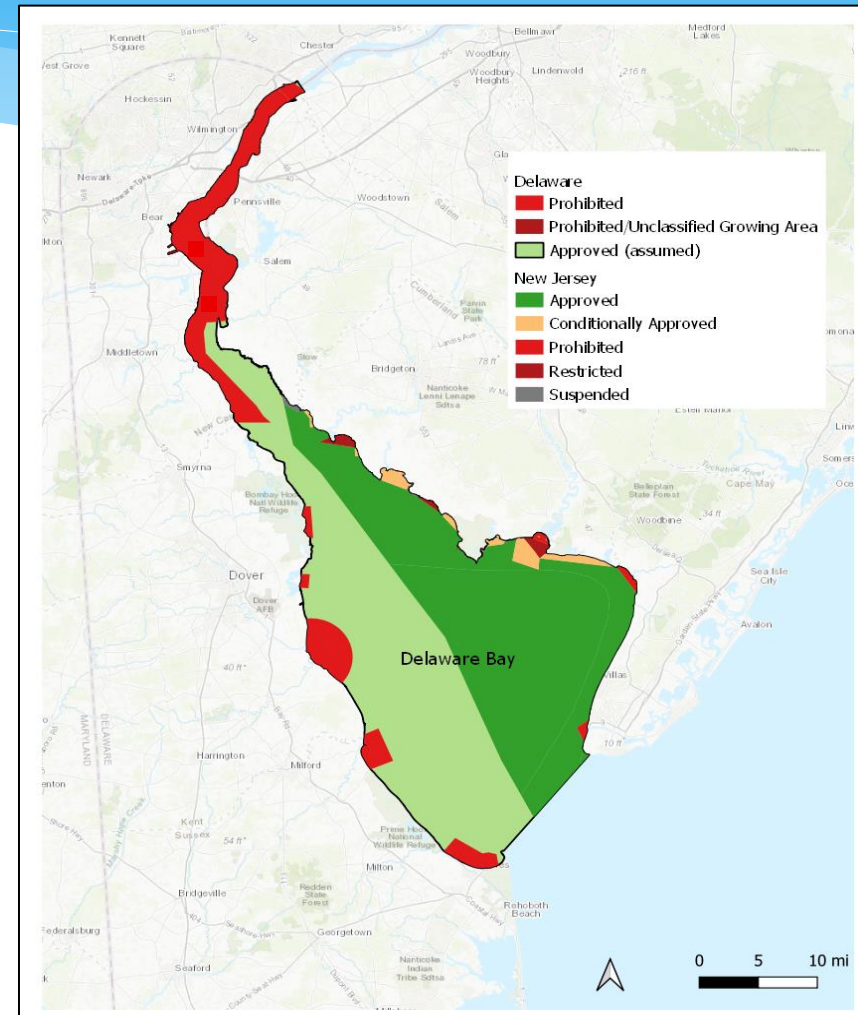
NC- No criteria developed

S – The use is supported in this Assessment Unit

NS – The use is not supported in this Assessment Unit

Consumption - Summary

- Fish Consumption
 - Advisories exist in every zone
 - Use is not supported
 - Improvements have occurred in recent years
- Shellfish Consumption
 - Applies only to zone 6
 - Map at right shows areas where shellfish harvest is approved



Assessment Summary

| Zone (AU) | Aquatic Life | | Drinking Water | | Recreation | | Fish Consumption | |
|-----------|-----------------|-----------------|-----------------|-----------------|------------|------|------------------|------|
| | 2020 | 2018 | 2020 | 2018 | 2020 | 2018 | 2020 | 2018 |
| 1A | NS ^A | NS | NS ^A | NS ^A | ID | ID | NS | NS |
| 1B | NS ^A | NS ^A | NS ^A | NS ^A | ID | ID | NS | NS |
| 1C | NS ^A | NS ^A | S | S | ID | S | NS | NS |
| 1D | NS ^A | NS ^A | NS ^A | NS ^A | ID | ID | NS | NS |
| 1E | NS | NS | S | NS ^A | ID | ID | NS | NS |
| 2 | NS ^A | NS ^A | NS ^A | S | S | S | NS | NS |
| 3 | NS ^A | NS ^A | NS ^A | S | S | S | NS | NS |
| 4 | NS ^A | NS | N/A | N/A | S | S | NS | NS |
| 5 | NS ^A | NS | N/A | N/A | S | S | NS | NS |
| 6 | NS ^A | NS | N/A | N/A | S | S | NS | NS |

Notes:

A – Based primarily on fewer than 10% exceedances of criteria
 ID – Insufficient Data
 N/A – Not applicable (not an applicable designated use)
 S – The use is supported in this Assessment Unit
 NS – The use is not supported in this Assessment Unit

Recommendations for Future Action

- Define the linkage between atmospheric and meteorological drivers of temperature exceedances.
- Define natural conditions for the application of pH criteria.
- Evaluate how to integrate enhanced bacterial monitoring data into contact recreation assessment.
- Additional monitoring of pesticides in zones 2-6 due to high readings in single sample.