

Meeting of the MACC

Eutrophication Model Development Monitoring

Delaware River Basin Commission

West Trenton, NJ

December 18, 2019



Delaware River Basin Commission

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



Presented to the joint MACC meeting on December 18, 2019.
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| Monitoring & Site Category | Parameters | 2018-2019 Sampling Frequency [N sampling events] |
|--|---|---|
| Delaware at Trenton & Schuylkill River Nutrient & Ultimate BOD Monitoring | CBOD-5 , Particulate Inorganic Phosphorus | Once per month, January through December [24] |
| | COD, Chloride, Ammonia, Nitrate+Nitrite, TKN, SKN , Alkalinity, TSS, TS, TVS, TFS, TOC, DOC, POC, Ortho-P, TP, Total & Dissolved Silica, Chlorophyll-a, Sulfate | Twice per month, January through December [48] |
| | Ultimate BOD (90 day), Nitrate+Nitrite (0 & 90 day), TKN (0 & 90 day), TOC & DOC (0, 5, 20, and 90 day) | Once per month, June 2019 through November 2019 [6] |
| Ultimate BOD Monitoring | Ultimate BOD (90 day), Ammonia (Days 0 & 90 day), Nitrate+Nitrite (0, 5, 20, 60, 90 day), TKN (0 & 90 day), TOC & DOC (0, 5, 20, 60, 90 day), COD (0 & 90 day) | Once per month, May through October [6] |
| Top 10 Tributaries - Nutrients | Total & Dissolved Silica , Particulate Inorganic Phosphorus | Once per month, March through October [16] |
| All 25 Tributaries - Nutrients | CBOD-5 , COD, Chloride, Ammonia, Nitrate+Nitrite, TKN, SKN , Alkalinity, TSS, TS, TVS, TFS, TOC, DOC, POC, Ortho-P, TP, Chlorophyll-a | Once per month, March through October [16] |

Added in 2019



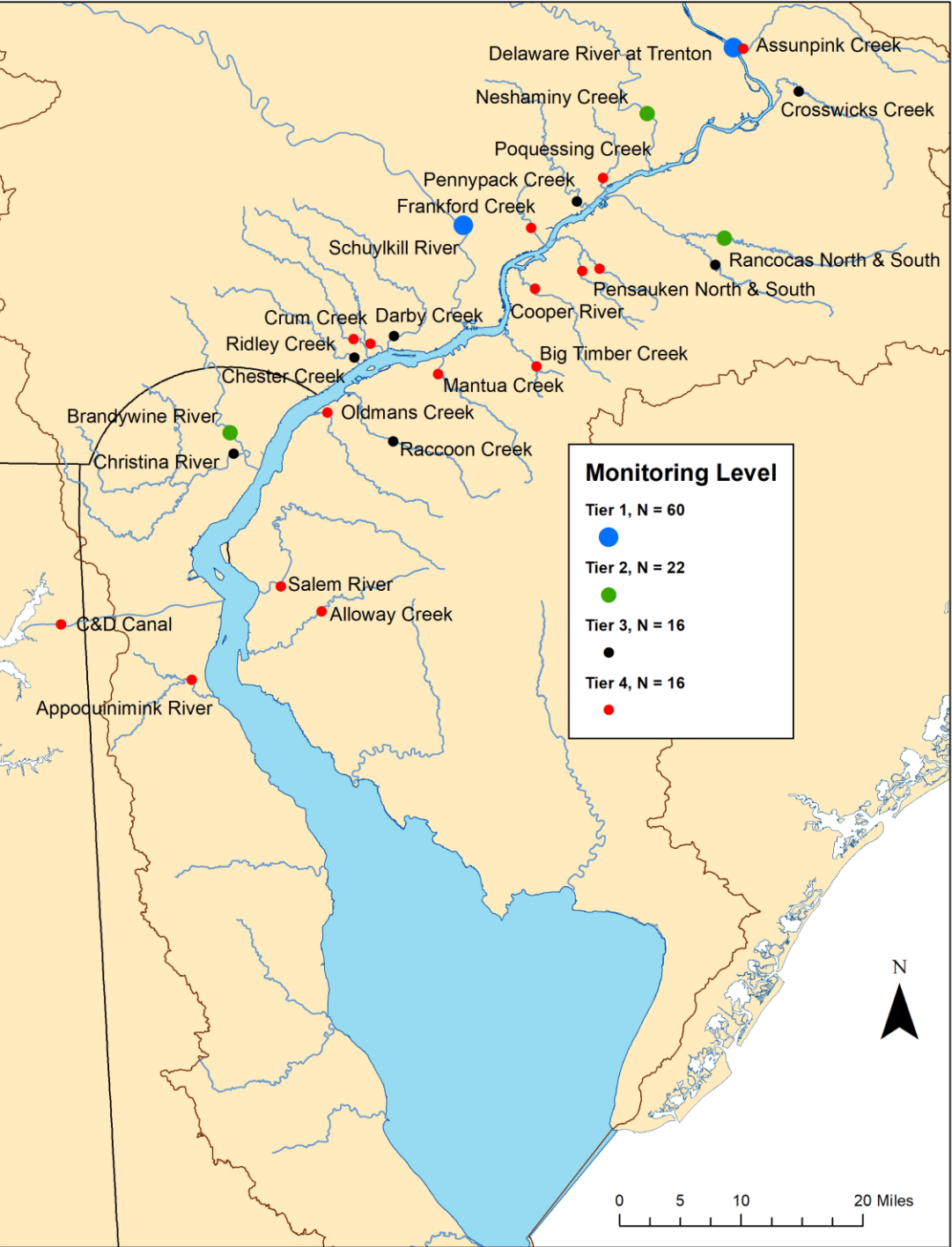
2018-2019 Tributary Nutrient Monitoring Sites - Tiered

Tiered based on number of:

- * Sampling events;
- * Parameters analyzed

| Tier [N = Samples Analyzed] | Sites |
|-----------------------------|--|
| 1 [1,078] | Delaware River at Calhoun Street Bridge in Trenton Schuylkill River at East Falls Bridge in Philadelphia |
| 2 [488] | Brandywine River Neshaminy Creek Rancocas Creek – North Branch |
| 3 [344] | Rancocas Creek – South Branch Crosswicks Creek Pennypack Creek Darby Creek Chester Creek Raccoon Creek Christina River |
| 4 [257] | Poquessing Creek Assunpink Creek Mantua Creek Big Timber Creek Cooper River Frankford Creek Pennsauken Creek – North Branch Pennsauken Creek – South Branch Ridley Creek Crum Creek Salem River Oldmans Creek Alloway Creek Appoquinimink River C&D Canal (boundary) |

Tributary Nutrient Monitoring Coverage



Round 2 Point-Discharge Monitoring

- * Monitoring period spanning March/April 2018 through March/April 2020
- * Round 1 of Point-Discharge Monitoring started in 2011-2015 in order to later categorize dischargers into tiers (71 facilities):
 - * Tier 1 dischargers:
 - * Contribute top 95% of total load for Ammonia-N, TKN, or BOD₅
 - * 12 facilities identified (one sample per week)
 - * Tier 2 dischargers:
 - * Contribute top 95% of total load for TP, SRP, Nitrate-N, or TN
 - * 20 facilities identified (one sample per month)
 - * Tier 3 dischargers:
 - * Remaining 39 facilities
 - * No additional monitoring required

| Analytical Parameter | Units | Filtered, Unfiltered, or Both | Sample Type |
|---|---------------|-------------------------------|----------------------------------|
| Total Phosphorus (TP) | mg/L as P | Unfiltered | 24-hour composite |
| Total Kjeldahl Nitrogen (TKN) | mg/L as N | Unfiltered | 24-hour composite |
| Nitrate Nitrogen (NO ₃ -N) | mg/L as N | Unfiltered | 24-hour composite |
| Nitrite (NO ₂ -N) | mg/L as N | Unfiltered | 24-hour composite |
| 20-day BOD (BOD ₂₀) | mg/L | Unfiltered | 24-hour composite |
| 5-day Carbonaceous BOD (CBOD ₅) | mg/L | Unfiltered | 24-hour composite |
| Chemical Oxygen Demand (COD) | mg/L | Unfiltered | 24-hour composite |
| Dissolved Organic Carbon (DOC) | mg/L | Filtered | 24-hour composite |
| Total Organic Carbon (TOC) | mg/L | Unfiltered | 24-hour composite |
| Total Suspended Solid (TSS) | mg/L | Unfiltered | 24-hour composite |
| Soluble Reactive Phosphorus (SRP) | mg/L as P | 0.45 µm membrane filter | 24-hour composite |
| Soluble Kjeldahl Nitrogen (SKN) | mg/L as N | 0.45 µm membrane filter | 24-hour composite |
| Ammonia Nitrogen (NH ₃ -N) | mg/L as N | 0.45 µm membrane filter | 24-hour composite |
| Discharge Flow* | MGD | N/A | 24-hour mean or higher frequency |
| Water Temperature | °C | N/A | 24-hour mean |
| Dissolved Oxygen | mg/L | N/A | 24-hour mean |
| pH | 1-14 | N/A | 24-hour mean |
| Specific Conductance or TDS | µS/cm or mg/L | N/A | 24-hour mean |

Point-Discharge Nutrient Monitoring Requirements



Added in 2019

Additional Point-Discharge Monitoring

- * Tier 1 Facilities (weekly monitoring starting March 2018):
 - * Philadelphia Water Department Southwest
 - * Philadelphia Water Department Northeast
 - * Philadelphia Water Department Southeast
 - * Lower Bucks County Joint Municipal Authority
 - * DELCORA
 - * Morrisville Borough Municipal Authority
 - * Camden County Municipal Utilities Authority
 - * Gloucester County Utilities Authority
 - * Hamilton Township – Wastewater Utility
 - * Trenton Sewer Utility
 - * Willingboro Municipal Utilities Authority
 - * City of Wilmington, Department of Public Works

Additional Point-Discharge Monitoring

* Tier 2 Facilities (monthly monitoring starting April 2018):

- * Bristol Borough Water & Sewer Authority
- * GROWS Landfill, Waste Management
- * Mt. Holly Municipal Utilities Authority
- * Paulsboro Refining Company
- * Delran Sewerage Authority
- * Valtris Specialty Chemicals
- * City of Millville Sewage Treatment Authority
- * Cumberland County Utilities Authority
- * Bordentown Sewerage Authority
- * Moorestown Township WWTP
- * Burlington City STP
- * Florence Township STP
- * Riverside Water Reclamation Authority
- * Chemours Chambers Works
- * Mt. Laurel Municipal Utilities Authority
- * Pennsville Sewerage Authority
- * Cinnaminson Sewerage Authority
- * Delaware City Refining
- * Kent County Dept. of Public Works