

2020 Progress Report

Watershed Approach to Toxics Assessment and Restoration (WATAR) Program

Delaware Department of Natural Resources and Environmental Control (DNREC)

April 9, 2021

WATAR TEAM:

**John Cargill, Dave Wolanski, Andy Howard, Bhanu Paudel,
Watershed Assessment and Management Section (WAMS)**

**Todd Keyser, Randy Wolfe, Vanessa Hamm, Patrick Boettcher, Stephen Peterson
Remediation Section (RS)**

**Ellen Dickey, Kaitlyn Mitchell, Dave McQuaide
Environmental Laboratory Section (ELS)**

**Mike Stangl, Johnny Moore, Edna Stetzar, Jordan Zimmerman
Fisheries Section (FS)**

**Gordon Woodrow, Tony Hummel
Surface Water Discharge Section (SWDS)**

**Bob Scarborough, Margaret Pletta, Kristen Thornton
Delaware Coastal Programs**

Introduction: The Watershed Approach to Toxics Assessment and Restoration (WATAR) was conceived by DNREC in 2012 with the intention of building a bridge between the surface water toxics program and the site investigation and restoration program in Delaware. The focus of the WATAR program is surface waters, sediments, fish, and other aquatic life impacted by toxics, the health of fish and shellfish consumers, and the link to the sources/sites responsible for those impacts. The concept was officially endorsed by DNREC leadership in the fall of 2012 following a series of briefings and the completion of a 5-year work plan. Data and information collected in conjunction with this plan are intended to be used to document progress toward implementing Total Maximum Daily Loads (TMDLs) for PCBs and other toxic compounds in the Delaware Estuary and its tributaries. The data and information collected will also be used to identify other contaminants that may need TMDLs or other clean up actions in order to restore water quality.

The second WATAR 5-year work plan (2018-2022) identifies eleven (11) specific activities for 2020. Those 11 activities are listed below with a status report on each. In addition to the 11 items, there were

numerous additional activities that have been ongoing, and for which updates are provided. Last, there were a few new items which arose during 2020 in which the WATAR team became involved. All of these items and activities are presented in this progress report.

As was noted in the WATAR 2018 Progress Report, Dr. Richard Greene retired from the State of Delaware's DNREC (in April 2018). Dr. Greene managed many aspects of the WATAR program, and his depth of knowledge about Delaware's surface waters and Delaware's fish advisory program will be missed. To date, Dr. Greene's position within the Watershed Assessment and Management Section of DNREC has not been filled. Until such time that the position is filled, and the incumbent is "brought up to speed" on WATAR related issues and projects, there may be a slight delay in the completion of some planned activities. This is not to say that the items won't be addressed; only that some lower priority items will be pushed further down the 5-year schedule of planned activities. WATAR Progress Reports, including this report, will serve to document items that have been put on hold, or cancelled altogether, with accompanying rationale. In the interim, the WATAR Team has expanded to include staff from multiple programs across the Department that had previously not been formally acknowledged. The efforts of staff in these other DNREC programs has assisted with the "cultural" change towards adoption of WATAR program principles across the Department.

Finally, COVID-19 work restrictions (office and field) began for DNREC on March 13, 2020. As a result, certain planned activities were not able to be completed. The WATAR team will attempt to mitigate the time lost with expanded efforts in 2021, but that will depend on how/when office and field restrictions are eased/removed.

Items below are listed in the 2018-2022 five-year plan for calendar year 2020:

1. Continue/finalize draft HSCA Sediment Assessment & Remediation Guidance

Status: On Hold

Discussion: An overarching framework/technical guidance document for assessing contaminated sediments has not been completed. However, an initial outline of the document was completed in 2015/2016. Furthermore, the WATAR team has documented several of its sediment quality screening assessment procedures and data evaluation methods based on previous site-specific assessments. That documentation will eventually become part of a guidance document that is well informed by WATAR's experience. Due to personnel changes, sectional reorganizations and competing priorities in 2019 and 2020, work towards sediment guidance development has been put on hold. However, the DNREC Hazardous Substance Cleanup Act (HSCA) program is redrafting all of its guidance related to sampling and assessment of contaminated materials (including sediments), and the influence of the WATAR program is improving the HSCA standard guidance. Progress towards completion of the updated HSCA guidance has also been affected by an unprecedented influx of new sites to the cleanup program.

2. For Delaware watersheds that flow towards the Chesapeake Bay, create a priority list of potential actions to address sources of toxics in need of follow-up investigation, clean-up and/or restoration (due by May 31, 2020)

Status: Ongoing

Discussion: As was summarized in detail in the 2018 Annual Report, the DNREC-WATAR team collected sediment, water, and fish samples from Delaware's Chesapeake Bay watersheds in 2017 and 2018. At this time, DNREC is working on compiling all of the data collected and received from laboratory analyses. Due to the volume of data and information, in addition to workload prioritization for WATAR team members, a data summary report has not been completed. Once fully compiled, however, the data summary report will be submitted to the USEPA Chesapeake Bay Program.

Two priority actions based upon the data collected in 2018 and 2019 have been initiated, however. Fish tissue data evaluation showed two potential areas of concern in Delaware's Chesapeake Bay drainages. Specifically, PCB concentrations from composite samples of blue catfish from the Nanticoke River in 2017 were above Delaware's fish tissue screening value. In addition, methylmercury concentrations from composite samples of largemouth bass from the Marshyhope Creek in 2017 were above Delaware's fish tissue screening value. WATAR team members from WAMS and FS were able to safely collect largemouth bass samples for individual analysis from the Marshyhope Creek in the fall of 2020. Samples were submitted to a contract laboratory for analysis in early 2021. In addition, and in cooperation with USGS, DNREC was able to obtain portions of blue catfish for PCB analysis from a separate blue catfish study in the Nanticoke River. Samples were transported to DNREC in late 2020 and will undergo laboratory analysis in early summer 2021. Fish tissue data from both the Marshyhope Creek bass and the Nanticoke River catfish will be used to establish fish consumption advisories, if necessary.

3. Prepare a scope-of-services for a remedial investigation/feasibility study of sediment remediation technologies in the tidal Christina and tidal Brandywine Area(s) of concern

Status: Complete

Discussion: In August 2020, the WATAR team secured funding to initiate a sediment remediation feasibility study process for portions of the tidal Christina and tidal Brandywine Rivers. A proposal was requested and received from Brightfields, Inc. (<https://www.brightfieldsinc.com/>) who also partnered with AnchorQEA (<https://www.anchorqea.com/>) on the project. Three tasks were funded, including compilation of existing data and information, development of a conceptual site model, and identification of data gaps. The contract was awarded in late December 2020, and it is anticipated that the scope-of-work will take approximately 1 calendar year to complete. Additional tasks will include sampling to fill data gaps, development of remedial alternatives, comparison of alternatives and costs, and recommendation of a preferred alternative.

The feasibility study is part of a larger initiative called the Christina & Brandywine River Remediation Restoration and Resilience project, or CBR4. The DNREC WATAR team has partnered with DNREC Coastal Programs, Christina Conservancy, American Rivers, Brightfields, Inc., and others to develop plans for restoration and resilience projects within the project area, and to help involve the surrounding urban communities in the process. More details regarding the CBR4 Project are included below.

4. Provide data supporting listings and delistings for toxics for the 2020 Clean Water Act 303(d) list

Status: Ongoing

Discussion: During the 2020 “Open Season,” DNREC moved the Upper Saint Jones River and Silver Lake segments to a lower priority category. The reason being that fish tissue data collected from those waters in the late fall of 2019 (data received in March 2020) indicate that concentrations of dioxins/furans have significantly decreased (Upper Saint Jones), or dropped below screening levels (Silver Lake). DNREC believes that a lack of contaminant sources and natural recovery are the most likely reason for the decreases observed in the fish data. Further, and as a result, a TMDL is no longer necessary.

Additionally, DNREC committed to doing a TMDL for dioxins/furans and DDT and metabolites (together DDX) in the Red Clay Creek by September 30, 2022. Due to the lack of sources of these compounds in Delaware, it is believed that contaminants are migrating downstream from sources in Pennsylvania. In addition, and per the WATAR 5-year plan, samples (fish and/or water) are scheduled to be collected from the Christina Basin (which includes the Red Clay Creek) in 2021, COVID restrictions permitting.

**5. Collect consumption advisory follow-up fish tissue samples from the following watersheds:
Army Creek and Appoquinimink**

Status: On Hold

Discussion: Due to COVID restrictions beginning in March 2020, field sample collection efforts and associated laboratory coordination was not possible. Fish tissue sampling from Army Creek and Appoquinimink watersheds will be conducted in Fall 2021, assuming restrictions are lifted.

6. Collect “head of tide” surface water samples for the Army Creek watershed and the Appoquinimink watershed to track progress towards DRBC PCB TMDL (target 1 dry and 1 wet event).

Status: On Hold

Discussion: Initially, this sampling would have been conducted alongside fish tissue collection in the Fall of 2020. However, prior to planning field exercises for the 2019 sampling, the WATAR team contacted the Delaware River Basin Commission (DRBC) to discuss sampling protocols and data quality objectives for the head of tide samples. The DRBC recommended that Delaware hold off on the sampling until after the Stage II PCB TMDL went into effect. Further, the DRBC said that they, themselves, were conducting head of tide PCB sampling in different Delaware River watersheds on a rotating basis. As a result, DNREC and WATAR have put this multi-year effort on hold until a later date and have instead focused on other emerging issues. DRBC has assured DNREC that data will be shared to supplement WATAR efforts, once conducted.

7. Army Creek and Appoquinimink Area(s) of Concern sampling (focus on sediments)

Status: On Hold

Discussion: As mentioned earlier, personnel retirements, vacant positions, and Division of Waste & Hazardous Substances reorganization were complicating factors in 2018 and 2019. COVID related restrictions became a limiting factor in 2020. These complications, along with competing priorities for WATAR team time and expertise, has resulted in the postponement of Army Creek and Appoquinimink River sediment source trackback studies in 2020. These activities will simply be

postponed until a later date and will be better informed by up-to-date fish tissue data (which we hope to collect in 2021).

8. Continue to provide technical assistance to the City of Wilmington and New Castle County Special Services on the City's PCB trackback and implementation, and coordinate with DRBC

Status: Ongoing

Discussion: In an ongoing fashion, the WATAR team has worked with the City of Wilmington and New Castle County as well as the DRBC to better understand, isolate and control sources of PCBs in the City and County's sewer system, which flows to the City's 100 MGD regional wastewater treatment plant. Effluent from the plant, in turn, discharges to the Delaware River. Through source identification studies and subsequent remedial actions, the City of Wilmington has achieved an approximate 90% reduction of PCB loading from their wastewater treatment plant effluent over the 10-year period 2005 – 2015.

The WATAR team continues to offer technical assistance, as necessary, and reviews annual pollution minimization reports when submitted to DNREC and DRBC. Several localized trackback studies aimed at source site discovery were conducted in 2019. While these efforts did not lead to a regulatory mitigation action, it does highlight the challenges related to detections of contaminants in the environment that do not have a readily identifiable source. Additional investigations by New Castle County and City of Wilmington will continue.

COVID restrictions have limited the ability of the City and County sampling teams to conduct work and report results from 2020. As data become available and analyses are complete it is anticipated that reporting and a coordination meeting will occur in early 2021.

9. Provide technical assistance to New Castle County Special Services and DelDOT on their MS4 PCB PMP trackback and implementation, and coordinate with the DRBC

Status: Ongoing

Discussion: The WATAR team has previously worked with New Castle County Special Services and the Delaware Department of Transportation in the design and implementation of a sampling plan for analysis of PCBs in regulated stormwater discharges. This work was purposefully designed to complement sampling of receiving waters performed by the WATAR team within watersheds known to be impacted by PCBs. Results of the sampling events are reported to DNREC and DRBC as required by their MS4 permits. In 2020, the WATAR team continued its efforts to improve source tracking of PCBs to the Delaware River by assisting DNREC's MS4 group with reviewing trackback studies and corrective actions to mitigate larger stormwater PCB loads in impacted waterways as required by the Phase I NPDES permit. The Phase I permit covers New Castle County, Wilmington and 5 smaller municipalities. A new Phase I permit that will build upon the PCB trackback and mitigation work is scheduled for issuance in 2021.

In addition, Wilmington's individual NPDES permit for their wastewater treatment plant and Combined Sewer System (CSS) requires a pollutant minimization plan for PCBs throughout the CSS.

As part of an MS4 audit in October 2020, PCB expert and consultant Larry Sandeen provided the audit team with an overview of the past year's work on locating PCB hotspots, trackback studies to determine the sources of the hotspots and remedial activities performed to reduce the levels of PCBs in the CSS. He stated the current goal focuses on tracking back PCB throughout the CSS. Field work has been halted due to the pandemic, however. They are developing plans and strategies for collecting samples in accessible areas above the hotspots. There are many challenges with access to get the samples due to private property restrictions, heavy traffic at manholes and other challenges. They are developing alternative plans to get the samples they need when conditions allow. Although there are only a few potential areas where PCBs could be migrating through the MS4, contamination in the MS4 conveyances should be evaluated as the discharges are unfiltered and go directly to surface waters instead of being filtered through the treatment plant.

10. Tech Transfer: DNREC Leadership & Staff, DNERR, USEPA, ASTWSMO, ITRC, DENIN, etc.

Status: Ongoing

Discussion: An original goal of the WATAR program was to communicate and partner with others within and outside of DNREC to raise awareness and identify synergies leading to accelerated improvement of water quality in Delaware. Due to its success, the WATAR team continues to accomplish that goal by making presentations at local, regional, and national meetings; preparing videos highlighting various projects; and preparing annual reports describing work accomplished. The WATAR approach has been noticed and sought out by government agencies at all levels; non-governmental organizations (NGOs) such as the Partnership for the Delaware Estuary, the Delaware Nature Society, the William Penn Foundation, the Christina Conservancy, American Rivers, Collaborate Northeast and the Center for the Inland Bays; academia and the private sector. Specific presentations given in 2020 are listed below. In addition, but more difficult to document, the WATAR team gathers on a regular basis to provide insight from lessons learned on projects amongst technical peers as well as newly hired staff within DNREC. These meetings are part of the technical and policy mentoring that the WATAR team has implemented through its overall plan.

11. Progress Report

Status: Completed

Discussion: This document represents the Progress Report for 2020.

Ongoing/Unfinished Work from Previous Years: Since the initiation of the WATAR program in 2012, priorities and specific project momentum have shifted from time to time. The following section summarizes some of the projects that are important to the Program, but that were either 'On Hold' or 'Ongoing' and that have an update since the last WATAR Annual Report.

Brandywine Dam Sediment Evaluation

Status: Completed

Discussion: In late 2018, DNREC's WATAR Team was contacted by representatives from Delaware Senator Chris Coons' office and a representative from the University of Delaware to discuss the removal of dams in the Brandywine Creek and the potential impacts from contaminated sediments that reside behind them. Not long after, in 2019, a group called Brandywine Shad 2020

(BS2020) successfully obtained a National Fish and Wildlife Foundation (NFWF) grant to evaluate removal or modification of the dams to promote passage of anadromous fish species. As part of the study, BS2020 contacted DNREC's WATAR program for information related to sediment quality behind the dams. At the time, data was very limited.

Due to the importance of being prepared for any potential surface water quality impacts from dam removal activities upstream of drinking water intakes, the WATAR team partnered with BS2020 to conduct a sediment quality evaluation. In return for BS2020 hiring a contractor to safely collect numerous sediment cores from behind each of the dams in the Brandywine River, DNREC offered a rough sediment sampling work plan to determine the nature and extent of potential contaminants, staff for the processing of sediment samples in the field, funds for analytical coordination and costs, and staff expertise for development a summary report of analytical results and data interpretation.

Field sampling began in March 2020 and was interrupted by the onset of COVID restrictions. With a skeleton crew, sampling was completed in June 2020. Upon receipt of analytical results, the WATAR team completed a data summary and interpretation report, which was published in December 2020. Visit [DNREC-WATAR webpage](#) for the data summary report and associated analyses.

A-Street Mouth/Christina River Pilot Study (Sedimite™ with inoculant)

Status: Ongoing

Discussion: As was reported in the 2018 WATAR Annual Report, funding for the innovative PCB destroying technology was awarded by DNREC-RS in June 2018. Per the DNREC approved workplan, baseline sampling of sediments using traditional techniques and more innovative passive sampling techniques (time integrated) was conducted in April/May 2019. Application of the inoculated Sedimite™ was conducted in June 2019. A USEPA Multipurpose Grant was awarded to the DNREC WATAR program to help fund sampling, analysis and reporting of samples collected in November/December 2019, and June/July 2020.

Results of DNREC's July 2020 sampling of the A-Street Ditch show reduced concentrations of dissolved PCBs in the sediment porewater across the entire project area. Results from two of the nine samples that were collected in July 2020 (one surface water sample and one sediment sample) showed localized increases in PCB concentrations. The WATAR team is evaluating potential reasons for these increases. DNREC is planning to assess PCB concentrations in sediment, surface water and sediment porewater again in July 2021. Visit the [DNREC-WATAR webpage](#) for monitoring reports and a DNREC YouTube video about the [A-Street Ditch project](#).

Continue evaluation of Delaware specific bioaccumulation factors (BAFs) and biota sediment accumulation factors (BSAFs)

Status: Ongoing

Discussion: In 2016, the WATAR team reported that Delaware specific BAFs may be much lower than some of the BAFs used by USEPA to derive national recommended human health water quality criteria (specifically for B[a]P). This evaluation was based upon Delaware's unique set of WATAR data. Based on the strength of the analysis, EPA has agreed to consider a Delaware proposal to adopt

Delaware-specific human health criteria using Delaware-specific BAFs. Data evaluation is ongoing, and draft BAF calculations have been submitted to EPA Region 3 for discussion in the first quarter of 2021. After discussion with EPA experts, the Department expects those Delaware specific BAFs to be used in the Triennial Review that the Department expects to complete by the end of 2021.

Coordinate with the DRBC and USEPA on Stage 2 PCB TMDL for Delaware Estuary

Status: Ongoing

Discussion: In February 2020, EPA requested that basin states provide a formal determination as to whether they would support EPA finalizing the Stage II PCB TMDL, or whether they would complete the TMDL independently. DNREC requested that EPA provide the latest draft for review, which was received on May 14, 2020. A deadline of June 30, 2020 was requested for a response. The WATAR team took the lead in reviewing the document and coordinating comments between DNREC programs (Division of Water and Division of Watershed Stewardship). In addition, the WATAR team took the lead in coordinating a conversation between appropriate basin state staffers to ensure that each jurisdiction was aware of each other's concerns. Due to the complexity of the document, DNREC requested, and was granted, a 30-day extension to the June 30 deadline for response. DNREC's final letter supporting the finalization of the Draft Stage II PCB TMDL, with considerations, was submitted to EPA on July 22, 2020.

Build partnerships and seek funding for additional Christina River cleanup objectives/goals

Status: Ongoing

Discussion: Beginning in 2017, DNREC's WATAR team coordinated with the Christina Conservancy to scope a high-resolution bathymetric survey of the lower Christina River and lower Brandywine Creek, where previous sampling of sediment, water and fish tissue has shown the most impact from chemical contaminants. The survey was completed in 2018 and will serve as a baseline for all other programs and partners to overlay data and restoration plans.

Following completion of the bathymetric survey in 2018, DNREC's WATAR team co-sponsored a kickoff symposium for the long-term initiative to clean up the Lower Christina River and Lower Brandywine River in September 2019. The initiative, dubbed CBR4 (Christina/Brandywine River Remediation, Restoration and Resilience), aims to leverage public and private dollars in a concerted effort to reduce chemical and nutrient loading to the rivers, along with preparations for sea level rise in this commercially and recreationally used portion of New Castle County. DNREC's WATAR team is leading the effort for the remedial portion of the project by planning a feasibility study of remedial technologies to understand the costs and timing requirements needed for success. Details about the feasibility study portion of the project are highlighted in item #3 above.

Delaware's Christina Conservancy and American Rivers is coordinating restoration and resilience planning by taking the lead in preparing grant applications. The team was awarded a two-year NFWF grant in 2020 for resilience and restoration planning in the project area. The WATAR team is a primary partner in restoration and resilience efforts, as well. The DNREC Division of Climate, Coastal and Energy have assumed a prominent role in organization, planning and communication for the CBR4 vision that will undoubtedly take years to implement. Funding through grants administered by the Delaware Coastal Programs has jump-started the effort to create a sustainable project with a multitude of partners.

Former Dupont Edgemoor Dredging Data Review

Status: Complete

Discussion: The former Dupont Edgemoor facility in northern New Castle County Delaware was operated as a titanium dioxide manufacturing facility from approximately 1930 until 2015. In 2016, Diamond State Port Corporation purchased the facility with plans to develop the site into a containerized cargo port. In order for ships to be able to approach from the main channel of the Delaware River and dock at the site, approximately 3.5 million cubic yards of sediment will need to be removed and a new docking structure constructed. DNREC's WATAR team was engaged by the environmental consultant on the project to provide comments to their evaluation of sediments for dredging and storage in a confined disposal facility. The WATAR team provided initial comments on the draft evaluation of chemical contaminants in sediment in September 2018, which led to another comprehensive round of sediment sampling and analysis. A second version of the report, which included a more comprehensive evaluation of site conditions and contaminant distributions, was submitted in draft in November 2019. Upon review, the WATAR team provided additional comments on the Environmental Assessment Report in February 2020. In March 2020, the project consultant submitted a partial Subaqueous Lands Permit Application to DNREC. An edited and finalized Environmental Assessment Report was submitted to DNREC in June 2020. Subsequently, a public hearing was held on the more complete application in September 2020.

The DNREC WATAR team continues to be heavily involved with the project through coordination on contaminant issues with DNREC Subaqueous Lands, USACE and DRBC. The proposed disposal site for the 3.5 million cubic yards of sediment is the Wilmington Harbor South (WHS) Confined Disposal Facility (CDF). WHS is located near the mouth of the Christina River along the Delaware River. The overall port expansion project represents the removal of a significant source of both land based and aquatic based PCBs to the Delaware River and Estuary.

In addition to items noted above, a WATAR team member coordinated a multi-Division DNREC team between 2018 and 2020 to assist with identifying issues and solutions related to construction of a new CDF near the refinery in Delaware City, Delaware. Initially, the new CDF was intended to hold dredged sediment from the Edgemoor Port Expansion Project. The CDF project was put on hold in mid-2020.

Coordinate with the City of Wilmington on the A-Street Ditch and South Wilmington Wetlands Project remediation.

Status: Ongoing

Discussion: The City of Wilmington began the construction phase of the South Wilmington Wetland remediation and restoration project in Summer 2019. Construction was ongoing through 2020, and inoculated Sedimite™ application in the west side of the A-Street Ditch occurred in July 2020. In addition, cleanout of stormwater system piping beneath Walnut Street and conduits beneath A-Street occurred in May and June 2020, respectively. Due to COVID related restrictions and weather delays, it is now anticipated that the remediation and restoration of the South Wilmington Wetland site will be completed in the Summer of 2021. This project, when combined with other remedial projects

conducted in the area, will result in a major improvement in water quality (including PCBs) in this area of the Christina River. The DNREC-RS project oversight manager is also a WATAR team member.

Finalize Cleanup Plan for the Amtrak Wilmington Former Fueling Facility (including sediments within the Eastern Drainage Ditch)

Status: Completed

Discussion: Comments were provided to Amtrak by USEPA TSCA regarding the risk assessment for the Former Fueling Facility site in late 2019, and a final version of the Focused Feasibility Study Report was approved by the agencies (DNREC and USEPA TSCA) in May 2020. Subsequently, DNREC issued a Proposed Plan of Remedial Action for the site in July 2020. No comments were received from the public during the public notice period; therefore, a Final Plan of Remedial Action was issued for the site in August 2020. The estimated cost for the chosen remedy for the Amtrak Former Fueling Facility Site is \$43M. Amtrak and its consultants must now prepare a Risk Based Disposal Approval Application (RBDAA) for USEPA TSCA approval. The DNREC-RS project oversight manager is also a WATAR Team member.

Review the Amtrak West Yards Remedial Investigation Report

Status: Ongoing

Discussion: DNREC received the Remedial Investigation Report in May 2019. The DNREC WATAR team had intended to collect and analyze sample surface water and/or samples from the hydraulically connected Little Mill Creek and adjacent tributaries and provide that data to Amtrak and their consultant as part of the RI report comments. However, COVID restrictions in 2020 resulted in a cancellation of the planned sampling. Instead, RI Report comments were provided to Amtrak in late 2020 in order to generate movement of the site within the Voluntary Cleanup Program (VCP) regulatory process.

The Amtrak West Yard site is located west of Wilmington in close proximity to Little Mill Creek and the Peterson Wildlife Area. Cleanup of this site is being overseen by DNREC- RS through its Voluntary Cleanup Program, similar to the other two Amtrak sites in Wilmington. Sampling of Little Mill Creek in anticipation of the Meco Drive ditch remediation and the Little Mill Creek flood risk mitigation project identified the Amtrak West Yards as a probable source of PCB loading to Little Mill Creek and the Christina River. The DNREC-RS project oversight manager is also a WATAR team member.

Interface between WATAR Team and Delaware's Toxics in Biota Committee (Fish Advisories)

Status: Ongoing

Discussion: The WATAR team, in accordance with its 5-year plans, collects fish tissue samples mainly from 303(d) toxics-listed Delaware watersheds. The Delaware Toxics in Biota Committee, led by a WATAR team member, reviews these data and makes recommendations to the Secretary of DNREC and the Secretary of the Department of Health and Social Services (DHSS) when new or revised fish consumption advisories may be needed. Based on fish tissue data that the WATAR team collected in 2019, and which were evaluated during 2020, positive changes to fish consumption advisories for portions of the Saint Jones River, C&D Canal, and Red Lion Creek are anticipated.

Sampling of fish in Army Creek and the Appoquinimink River were postponed due to COVID related restrictions in 2020. However, sampling of fish in Delaware's portion of the Marshyhope Creek and Nanticoke Rivers was conducted in 2020 (details summarized in item #2 above).

Indian River Dredging Evaluation

Status: Completed

Discussion: In 2019, the WATAR team was asked by DNREC's Wetland Assessment and Monitoring Section to help evaluate whether dredge material from the Indian River in Delaware could be used beneficially for wetland restoration without increasing risk to ecological receptors. In order to conduct the evaluation, sediment samples were collected and analyzed for toxic compounds. Next, an evaluation was done to determine if any compounds were present that might impact benthic aquatic life, if there were any anticipated detrimental effects related to the dredging itself, and whether there might be any human health risks related to placement of dredge material in an upland location for drying. The next phase of the evaluation was to determine if contaminant concentrations of the dredge material will have any predicted impact on birds or other wildlife that would inhabit and feed within the proposed intertidal wetland. It was determined that there was little risk of impact. As a result, the next round of dredging, in 2021, will be utilized to construct/repair an intertidal wetland in Sussex County, Delaware. This evaluation was used to support of the issuance of the dredging permit in early 2020.

Little Mill Creek/Meco Ditch post-remediation sampling - Meco Pipe

Status: Ongoing

Discussion: The Little Mill Creek Flood Risk Mitigation Project was completed in the summer of 2015. This project, spearheaded by the US Army Corps of Engineers (USACE), the New Castle Conservation District (NCCD), DNREC, and New Castle County, commenced in 2014. The project involved excavation and removal of bank soils and creek sediments to increase hydraulic storage capacity and decrease flooding of nearby properties. Monitoring of the success of the project was planned for 2017, but the team did not complete the task due to inclement weather and extreme temperatures.

Following this time of inclement weather and extreme temperatures, the team discovered an ongoing release of petroleum from one of the stormwater pipes that flows to Little Mill Creek. The corrugated steel pipe had failed between the storm grate and the discharge due to deterioration from the pipe sitting in free-phase petroleum. Free phase petroleum is associated with the historic filling on several industrial park areas surrounding Little Mill Creek.

In early spring 2020, DNREC- RS completed a pipe replacement project in what is hoped to be the final remedial action at the Meco Drive site before being able to issue a Certificate of Completion of Remedy (COCR). The pipe replacement project grew in scope once the original pipe was removed and the extent of the contamination and damage were determined. As mentioned above, the DNREC WATAR team had intended to sample surface water and/or sediment from Little Mill Creek and adjacent tributaries and provide that data to Amtrak and their consultant, but COVID restrictions halted the data collection effort. The DNREC-RS project oversight manager is also a WATAR team member.

Red Clay Creek zinc TMDL/NVF Yorklyn post-remediation monitoring

Status: Long Term Monitoring

Discussion: During the summer/fall of 2017, DNREC-RS completed a comprehensive source removal action at the NVF-Yorklyn site that resulted in the removal and disposal of approximately 170 tons of zinc from the soil. This soil source served as an ongoing groundwater source, which for almost a decade was captured to remove dissolved zinc prior to reaching the Red Clay Creek. In December 2017, and as part of the post-remediation monitoring, the zinc groundwater treatment system was taken offline. The Red Clay Creek was monitored monthly through 2018 to evaluate the effectiveness of source removal on loading of dissolved zinc through groundwater discharge. Regular monitoring of zinc in Red Clay Creek was ongoing in 2019 and 2020 through statewide network sampling. There have been no exceedances of the zinc water quality criterion observed since the treatment system was taken offline. As such, DNREC is in the process of formally documenting the monitoring results and will take the necessary steps to delist zinc as a contaminant-of-concern in the Red Clay Creek in Delaware. The DNREC-RS project oversight manager is also a WATAR team member.

Red Clay Creek per- and polyfluorinated substances (PFAS) investigation

Status: Ongoing

Discussion: The WATAR team completed several rounds of sampling for per- and poly-fluorinated substances (PFAS) in Red Clay Creek in New Castle County in 2019. Following multiple detections and models regarding potential sources, the WATAR team conducted surface water sampling in the lower Red Clay Creek below Kirkwood Highway (Route 2). Data analysis has not been able to determine where the PFAS impact(s) to the tributaries of the Red Clay Creek are originating. However, a facility located along the main stem of the Red Clay Creek is currently negotiating a VCP agreement with DNREC-RS to conduct PFAS related remedial actions. The WATAR team hopes to report progress within the VCP process for this facility in the 2021 annual report.

Coordinate with EPA on Saint Jones River Sediment Assessment and Potential Remediation (associated with former Dover Gas Light site)

Status: In USEPA Control

Discussion: DNREC personnel met with USEPA's Environmental Response Team (ERT) and R3 personnel in May 2018 to discuss findings from their independent assessment of PAHs in sediments of the Saint Jones River in the area of interest. At that meeting, DNREC identified a potential mathematical error in USEPA's evaluation, which was later confirmed, and which changed the overall evaluation results and potential steps forward. DNREC received a final report in 2019 which summarized the field activities and evaluated data collected at the site. The conclusion was that a layer of coal tar related to the Dover Gas Light site exists beneath the sediments in the Saint Jones River in proximity to the former Tar Ditch (Meetinghouse Branch). Concentrations in sediments are causing impacts to benthic aquatic life in the Saint Jones River, and the full downstream extent of the PAH contaminated layer was not determined. Because the Dover Gas Light site is on the National Priorities List and cleanup is under the control of the USEPA (all responsible parties settled years ago), it is up to them to determine next steps.

DNREC's WATAR team last contacted EPA about assessment activities in the river in September 2020. EPA indicated to DNREC that a new Remedial Project Manager was being assigned to the Dover Gas Light Site (Chris Vallone), and that the Saint Jones River sediments were "not a closed issue for EPA." The email indicated that EPA would be moving forward with a Baseline Ecological Risk Assessment (BERA) in the future. No indication of schedule was provided.

Continue data compilation and summary for 2013 – 2017 WATAR sampling

Status: On Hold – To Be Incorporated Into Future TMDL Alternative Reports

Discussion: Due to the retirement of key personnel in early 2018, reorganization of the Site Investigation and Restoration Section into the Remediation Section in 2019 and redistribution of tasks outlined in the WATAR workplan, this action item has not been a priority.

As described in greater detail below, DNREC is planning to work with USEPA on a TMDL Alternative/Alternative Restoration Plan (ARP) framework for toxic compounds, which could be applied to any contaminant in any watershed. It is now envisioned that data collected by the WATAR team between 2012 and 2016 will be used along with historic and newer data to show that DNREC has achieved significant reductions in listed compounds. Ongoing areas of concern (AOCs) will be noted along with known or suspected sources (both point sources and non-point sources). Results from WATAR sampling conducted in 2017 and 2018 in Delaware's Chesapeake Basin drainages are currently being summarized in a separate report to be submitted to USEPA's Chesapeake Bay Program.

Continue data compilation

Status: Ongoing

Discussion: As of December 31, 2020, all WATAR data reported during calendar year 2019 was successfully entered into the EQUiS database. Further, data collected at other sites where the high-resolution WATAR sampling approach was followed have been imported into EQUiS as part of the overall data compilation effort.

Roll out pilot web-based mapping utility

Status: Ongoing

Discussion: The EQUiS Enterprise utility is configured to allow some basic data mapping, by location and concentration, to occur. DNREC is continually working to expand data import/export capabilities utilizing the software that is already owned by the Department. As work continues to progress with the EQUiS database, a re-evaluation and cost/benefit analysis will be completed for a comprehensive and user-friendly third-party web-based mapping utility. In the interim, DNREC is conducting a pilot of data sharing and mapping with the USDOC National Oceanographic and Atmospheric Administration (NOAA) through their Environmental Response Management Application (ERMA) platform. Currently, development of an output from DNREC's EQUiS database to the ERMA platform is underway between NOAA and DNREC. COVID related issues and subcontractor personnel changes limited progress towards this goal in 2020.

Other significant activities of the WATAR team during 2020: The items below are summaries of projects/initiatives that were unplanned during preparation of the WATAR 5-Year Plan (2018-2022), but for which the WATAR team became involved.

PFAS Team and Steering Committee:

Status: Initiated/Ongoing

Discussion: Staff from multiple Departments in the State of Delaware began meeting in 2020 to coordinate efforts related to PFAS. Staff have formed a PFAS Team to report on investigations and responses and a PFAS Steering Committee to focus the efforts of the team. Primarily the idea is to ensure that efforts are not being duplicated by different Departments along with attempting to leverage funding when efforts occur. Meetings are held on an as-needed basis and membership is voluntary. The Team is a forum for sharing training and education opportunities, as well as sampling results, analysis and interpretation. The groups are considering adding PFAS sampling to several existing programmatic efforts to gather data valuable to the state for considering potential regulatory standards. Several WATAR team members participate in the PFAS Team and Steering Committee.

PFAS Science Roundtable – UMES and MDE – October 5, 2020 – Two WATAR team members participated in a scientific roundtable organized by the State of Maryland Department of the Environment. This roundtable was useful to see what other states were doing related to PFAS and watershed management. In addition, the state of Maryland is coordinating a regional PFAS working group that will meet virtually on a monthly basis to discuss common issues related to PFAS between regional jurisdictions. Two WATAR team members will participate on behalf of the State of Delaware.

Review Remedial Investigation and Focused Feasibility Study for the Amtrak Wilmington Maintenance Facility

Status: Ongoing

Discussion: As agreed to by USEPA TSCA and DNREC-RS, the Former Fueling Facility Site and the Maintenance Facility Site (contiguous properties) will be brought to the same DNREC regulatory process point (Final Plan of Remedial Action) before any remedial action begins. The purpose of this decision is to allow for a global remedy to occur on both portions of the site simultaneously. This rationale will likely result in a more comprehensive remedy that is implemented in a shorter timeframe. As such, DNREC and USEPA TSCA received a Remedial Investigation and Focused Feasibility Study Report for the Maintenance Facility Site in April 2020. Once comments are coordinated between agencies and sent to Amtrak, a final report can be issued. subsequently, DNREC will prepare a Proposed Plan of Remedial Action for public review and comment. The DNREC-RS project oversight manager is also a WATAR team member.

White Clay Creek Dam Sediment Evaluation

Status: Ongoing

Discussion: In early 2020, DNREC's WATAR team was contacted by University of Delaware to discuss potential requirements related to the removal of Dam #2 and Dam #4 in the White Clay Creek. UD was awarded a NFWF grant to assist in the removal process in September 2020. As a

result, in November 2020 the WATAR team consulted on sampling requirements and shared data analysis techniques to assist UD with obtaining permits for dam removal. It is anticipated that the WATAR team will be asked to review the data analysis, either by UD or by the DNREC Subaqueous Lands Section, once completed.

Fish Advisory Sign Project

Status: Ongoing

Discussion: In early 2020, DNREC-RS staff and DNREC-WAMS staff began collecting information about locations of fish consumption advisory/swimming advisory signs across the state. An application was created for use on phones and/or tablets that allowed location information and photos to be uploaded as other field work was conducted in 303(d) listed water bodies. Although it will take some time to inventory all signs, the intent is to replace/update or remove signs that provide misinformation. COVID restrictions have impacted field activities, so this project will be revisited when restrictions are lifted.

Various Dredging Project Assessments

Status: Ongoing

Discussion: The WATAR team regularly assists multiple other DNREC groups in the evaluation of toxic contaminant data collected in relation to proposed dredging projects. These groups include the DNREC Wetland and Subaqueous Lands Section, Shoreline and Waterway Management Section and Coastal Program's Federal Consistency program. Evaluations of sediment toxicity were either initiated, or completed, for the following projects in 2020:

- Indian River Thin Layer Placement Project – 1/2020
- Delaware River – Dupont Edgemoor Port Expansion – 2/2020
- Delaware City Refining Co. – 2/2020
- Oldmans Creek, NJ – Discharge to DE waters – 4/2020
- PSEG Wind Port Project, NJ – Discharge to DE waters – 10/2020

WATAR Webpage Overhaul

Status: Completed

Discussion: Between May and July 2020, the WATAR program's webpage was overhauled and updated to DNREC's newest platform. The opportunity was used to update webpage content and to check all links. Click [here](#) to be directed to the new webpage. New content will be added as necessary and as available.

Economic Analysis of Impacts from Sea Level Rise

Status: Completed

Discussion: In late 2020, WATAR team members coordinated with DNREC Coastal Programs staff and contractors on their Economic Analysis of Impacts from sea level rise. Specifically, the WATAR team assisted with evaluation of costs related to the inundation of contaminated sites within the state. The report is expected to be finalized in early to mid-2021.

WATAR Related Presentations: Members of the WATAR Team delivered the following presentations related to the program’s activities during 2020:

- Keyser, T.A., 2020. Christina & Brandywine River Remediation Restoration & Resilience - Presentation given at Delaware Wetlands Conference, January 30, 2020.
- Cargill IV, J.G., 2020. NVF-Yorklyn Remediation and Wetland Creation – Presentation given at Delaware Wetlands Conference, January 30, 2020.
- Keyser, T.A., McGee-Solomon, M., 2020. WATAR CBR4 – Achieving Goals Together – Poster Presentation given at the Delaware Wetlands Conference, January 30, 2020.
- Cargill IV, J.G., 2020. An Integrated Approach to Revitalizing a Brownfield Site – Achieving Multiple Benefits Through Collaboration – NVF-Yorklyn, Delaware. Presentation given at Delaware Regional Parks Society, March 10, 2020.
- Cargill IV, J.G. and Keyser T.A., 2020 - Delaware’s Watershed Scale Strategy for Contaminant Management. Presentation given at DRBC Co-Regulator’s Meeting, August 11, 2020.

Peer Reviewed Publications:

- Patmont, E., et.al., Full-Scale Application of Activated Carbon to Reduce Pollutant Bioavailability in a 5-Acre Lake, Journal of Environmental Engineering, February 2020 146(5):0402024 (John Cargill was a contributing author).
- Williams, S.N., et. al., Clean Water – What is DNREC Doing?, Outdoor Delaware Magazine, March 2020 (John Cargill was a contributing author).

National Organization Involvement: WATAR team members played key roles in advancing watershed scale assessment and management of contaminated sediments nationally in 2020:

- Association of State and Territorial Solid Waste Management Officials (ASTSWMO) – WATAR team member Todd Keyser is a member of the ASTSWMO Sediments Focus Group. The focus of the team has been to foster collaboration, innovation and consistency amongst state agencies when determining regulation, policy and innovative approaches to contaminated sediment investigation, analysis and remediation. Team activities merged with the Investigation and Remedy Selection Team in 2019.

Kudos related to WATAR work – American Rivers named the Delaware River the 2020 River of the Year due to the extensive efforts of many agencies and parties that work to remediate and restore this waterway. While not naming WATAR, this does acknowledge the concerted regional effort to work on the Delaware River, Bay and Estuary water quality. Click [Delaware River Named River of the Year / Public News Service](#) for more information.

Grant Support for Innovative Research: Due to the innovative nature of much of the WATAR team's work, DNREC was contacted to support several grant proposals in 2020:

- DNREC provided a letter of support, along with DRBC, for a University of Rhode Island (URI) Superfund Research grant proposal related to the development of passive samplers as proxies for bioaccumulation of legacy, novel and total per- and polyfluoroalkyl substances (PFAS) in the Delaware River and Estuary.
- DNREC provided a letter of support to University of Maryland Baltimore County (UMBC) for a NIEHS Superfund Research Program grant proposal titled *Leveraging the chemo-physical interaction of halorespiring bacteria with solid surfaces to enhance halogenated organic compounds bioremediation*. As was summarized above, DNREC is already testing this type of technology in its A-Street Ditch project.

Local and Regional Workgroup Involvement: WATAR team Members played participatory roles in advancing regional and local initiatives in 2020:

- DRBC Toxics Advisory Committee
- DRBC Co-Regulators Committee
- Chesapeake Bay Program Toxic Contaminants Workgroup
- Chesapeake Basin States PFAS Roundtable/Workgroup
- DENIN External Advisory Board (Delaware Environmental Institute – UD)
- DGS State Map Geologic Mapping Advisory Committee
- Delaware Environmental Monitoring Coordination Council