HEAD OF TIDE SAMPLING DISCUSSION

Chesapeake Bay Program Toxic Contaminant Workgroup

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Division of Watershed Stewardship **Division of Waste and Hazardous Substances**

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STUDY OBJECTIVES

Primary Objective: Document PCB and/or PFAS Loading from non-tidal portions of watersheds to the tidal portions of watersheds

Secondary Objective: Rank watersheds based upon loading in order to prioritize cleanup and BMP efforts within watersheds with higher loads

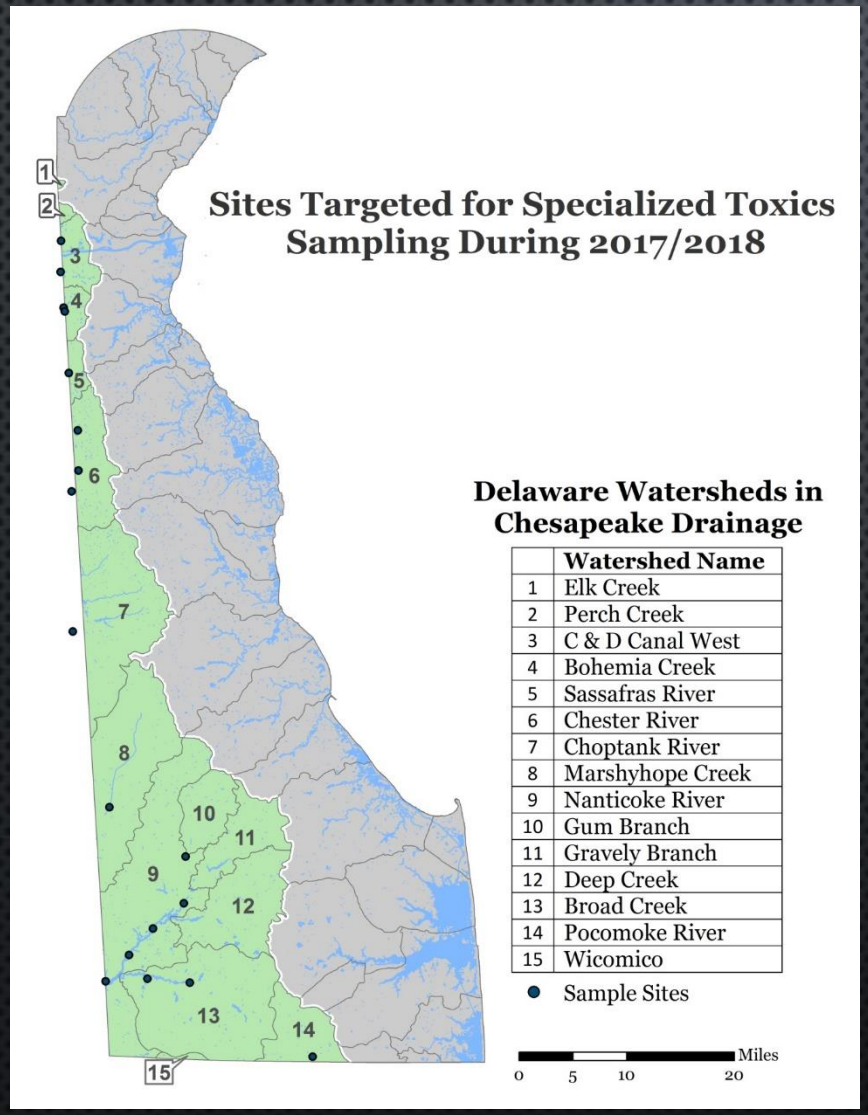
TARGETED MEDIA

For this study, DNREC plans to target surface water

However, previous watershed scale studies performed by DNREC have targeted surface water, sediment and fish tissue

- Allowing for partitioning calculations
- Allowing for BAF calculations
- Allowing for BSAF calculations
- As a baseline for trend assessments

SAMPLE LOCATIONS



- Will target same locations previously sampled in 2017/2018, as appropriate
- Will sample true "head of tide" locations within our Delaware River Drainages

SAMPLE LOCATION EXAMPLES

Bohemia Mill Pond Outflow

Bohemia River Watershed

Gravelly Run (Blanco Road)

Chester River Watershed

Sammons Pond Outflow

C&D Canal West Watershed

SAMPLING FREQUENCY AND COLLECTION METHODS

- Initially, I contemplated two rounds in one year, to assess seasonal differences
- Second thoughts are one wet weather event and one dry weather event to assess differences.
- Let's discuss the pros and cons of each!
    - Grab Samples vs. Passive Samples
- FLOW is a major component to the assessment. Choices are to measure in the field, or use alternate method (ratio of drainage areas)

ANALYTICAL METHODS

- Our WATAR program utilized the best possible high-resolution methods available

For PCBs, we utilize EPA Method 1668

For PFAS, we will utilize the best that the science has to offer at the time of sampling – currently 537(M) for surface water

HIGH RESOLUTION MULTI-MEDIA SAMPLING

SURFACE WATER

- PCBs by EPA Method 1668
- Dioxins and Furans by EPA Method 1613
- Organochlorine Pesticides by EPA Method 1699
- PAHs + Alkylated Homologs by EPA Method 8270/1625

General WATER parameters and sorbents

- BC of Suspended Sediments
- PC, POC, DOC
- Chl-a
- TSS
- DO, T, Cond, pH

SEDIMENT

- PCBs by EPA Method 680/668
- Dioxins and Furans by EPA Method 1613
- Organochlorine Pesticides by EPA Method 8081
- PAHs + Alkylated Homologs by EPA Method 8270 SIM
- Mercury by EPA Method 7471

General SEDIMENT parameters and sorbents

- TOC/BC
- Bulk Density
- Specific Gravity of Solids
- % Moisture
- Grain Size

FISH TISSUE

- PCBs by EPA Method 1668
- Dioxins and Furans by EPA Method 1613
- Organochlorine Pesticides by EPA Method 1699
- PAHs + Alkylated Homologs by EPA Method 8270/1625
- Total Mercury by EPA Method 1631
- Methyl Mercury by EPA Method 1630
- % lipid

Other for Water, Sediment and Fish

- Chlorinated Benzenes in Red Lion Watershed
- Metals in Christina Basin (Sediment only)
- Ambient toxicity (Water only – DRBC)

HOW WILL DNREC USE THE DATA?

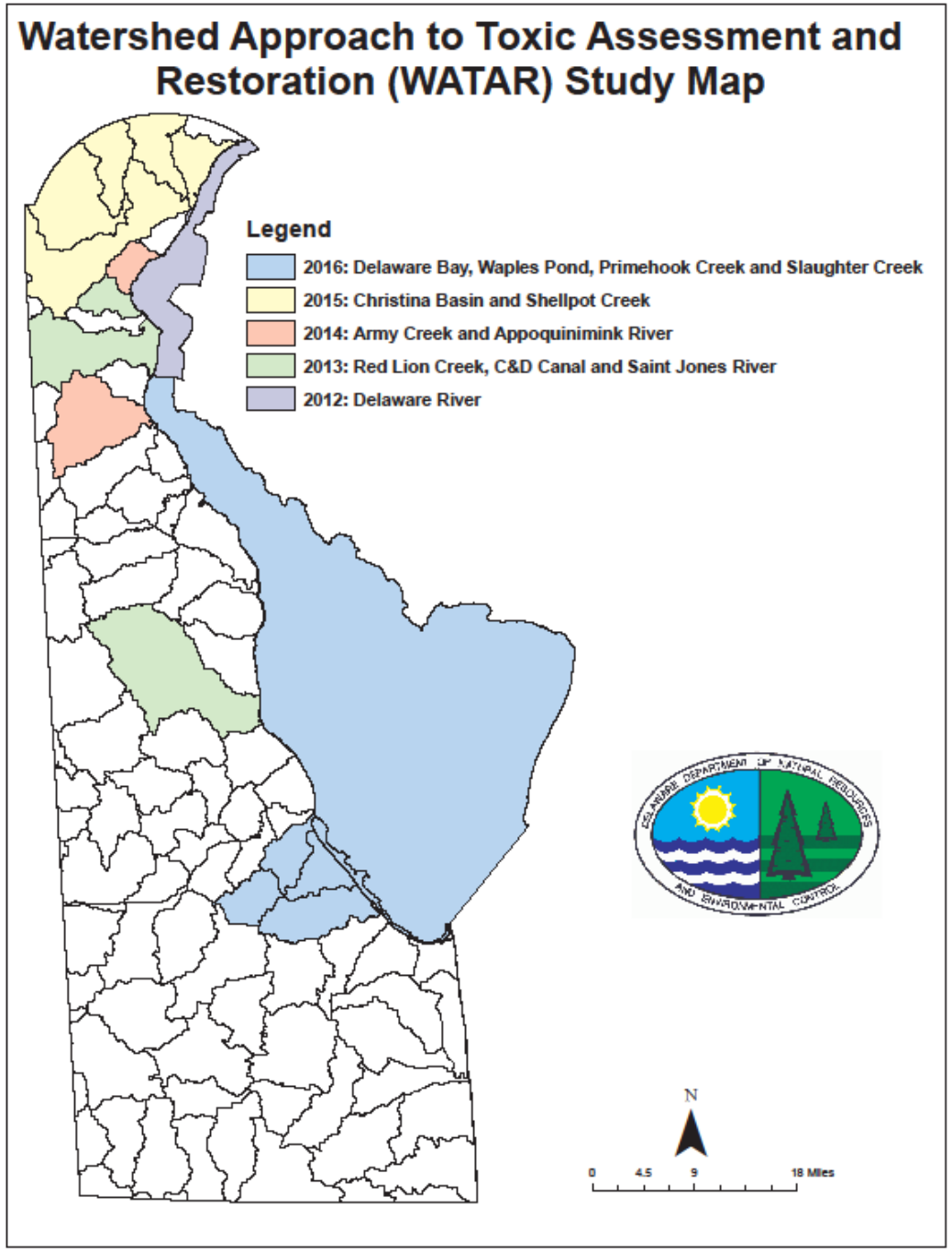
- Main Purpose: to prioritize implementation in the watersheds that have the highest loads
- To address TMDLs, where necessary (primarily in Delaware River drainages)
  - There are approximately 35 tributaries in the DRBC Delaware River and Estuary PCB TMDL
  - As a result, there are 35 load allocations in the TMDL for tributaries, many of which are in Delaware
- To form the basis for TMDL Alternatives (Alternative Restoration Plans) for impacted watersheds
- To identify target areas for follow-up investigation/remediation
- To improve/justify 303(d) listing/delisting decisions
- To begin to develop trends in support of all of the above

LET'S TALK ABOUT LONGER TERM IMPLEMENTATION

Once you prioritize some watersheds for additional attention, then what?

WATERSHEDS SAMPLED

- **2012 -** Delaware River
- **2013 -** Red Lion Creek, C&D Canal, Saint Jones River
- **2014 -** Army Creek, Appoquinimink River
- **2015 -** Christina River Basin (Christina River, White Clay Creek, Red Clay Creek, Brandywine Creek) and Shellpot Creek
- **2016 -** Delaware Bay, Waples Pond, Prime Hook Creek, Slaughter Creek, Red Clay Creek Trout Study
- **2017-2018 -** Chesapeake Bay Drainages
- **2019-2023 -** Return to impacted watersheds and AOCs (tidal Christina/Brandywine)

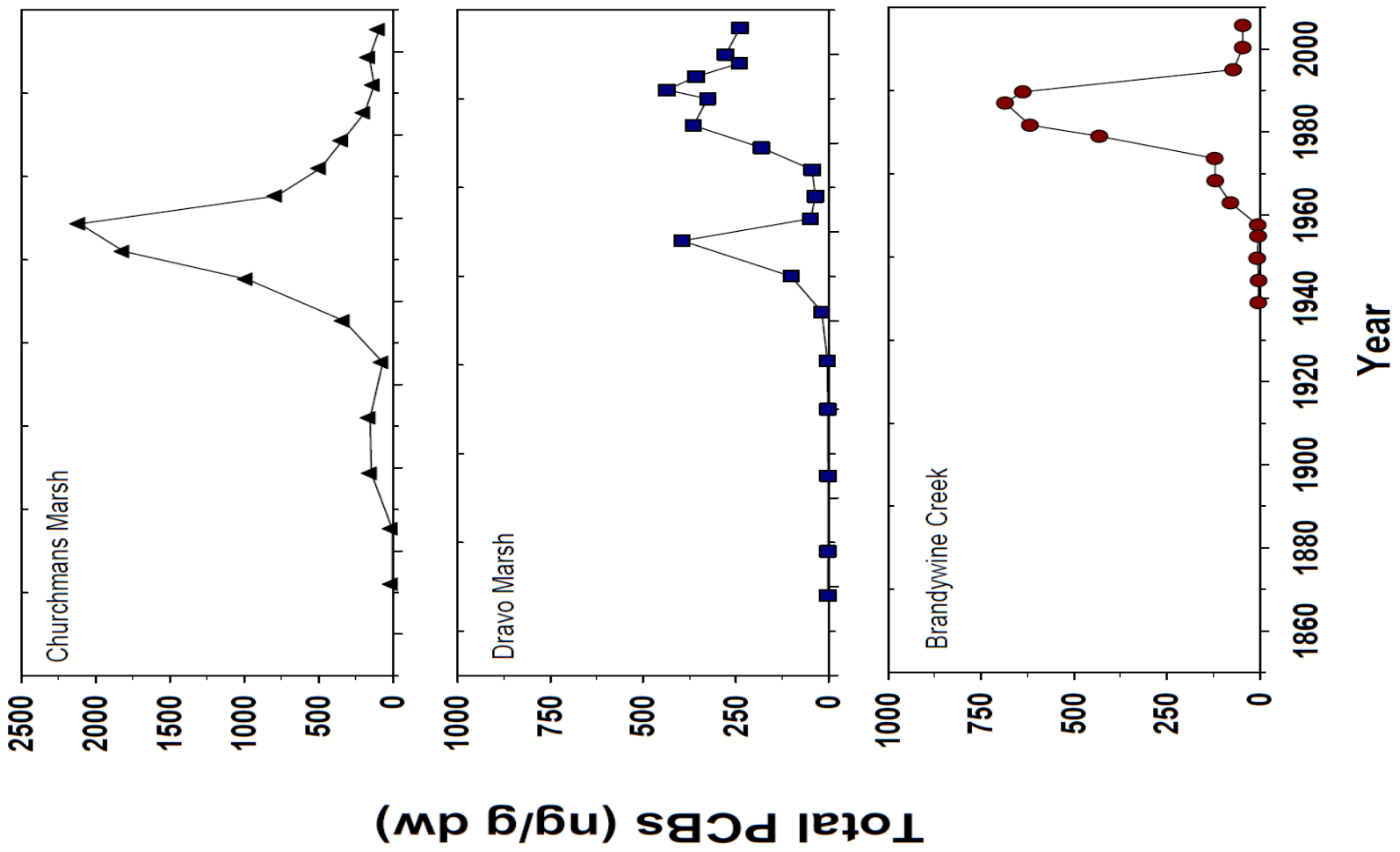


WHAT ARE THE MAIN SOURCES OF PCBS?

1. NPDES Permitted Discharges
2. Storm-water Discharges
3. Hazardous Substance (waste) Site Loads

TMDL = WLA + LA + MOS

RADIO-DATED SEDIMENT CORES



It appears that the worst of the loading to the basin is behind us.

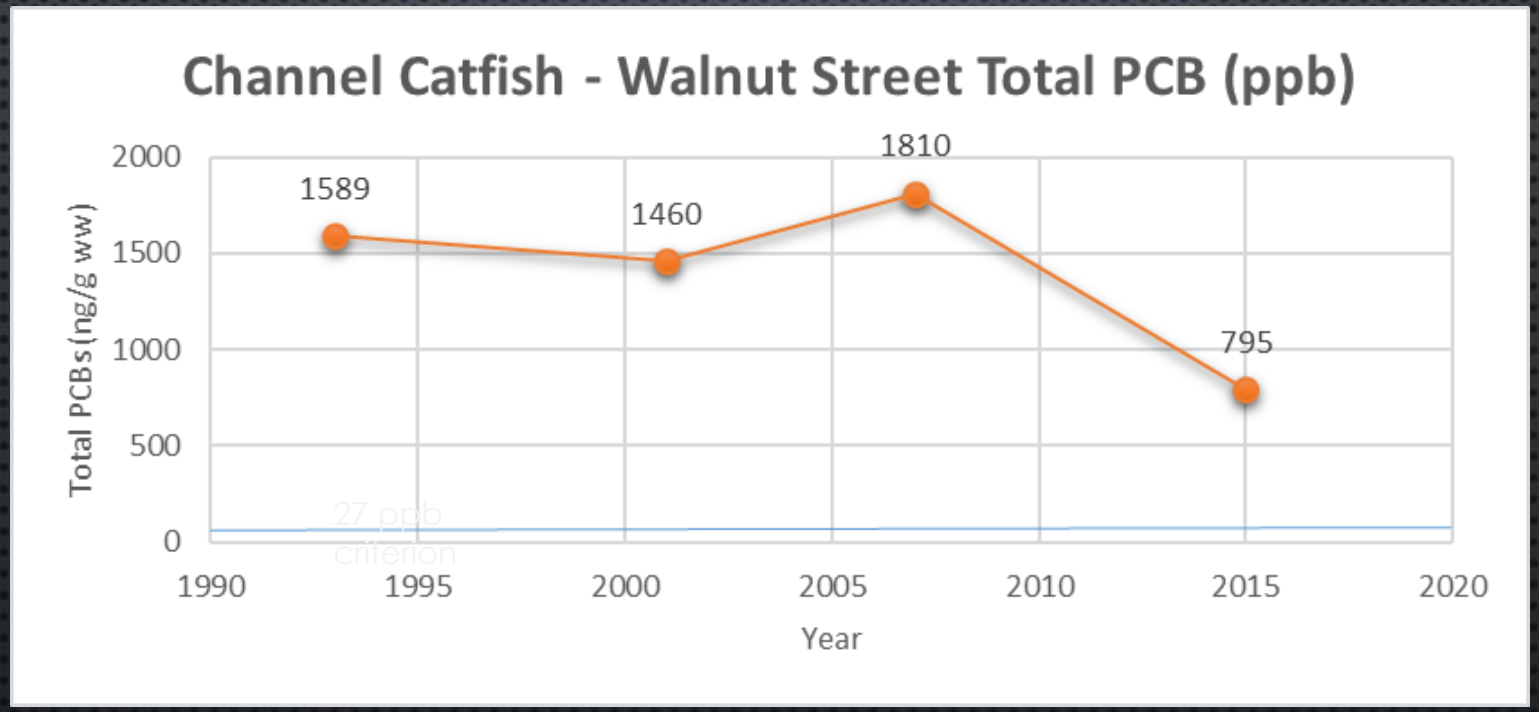
ONCE UPLAND SOURCES ARE CONTROLLED, WHAT'S NEXT?

Secondary Source Remediation

- Additional Sewer Pipe Clean-outs (municipal and storm)
- Improved Storm-Water BMPs
- Wetland Restoration and Resilience
- **Sediment Remediation**

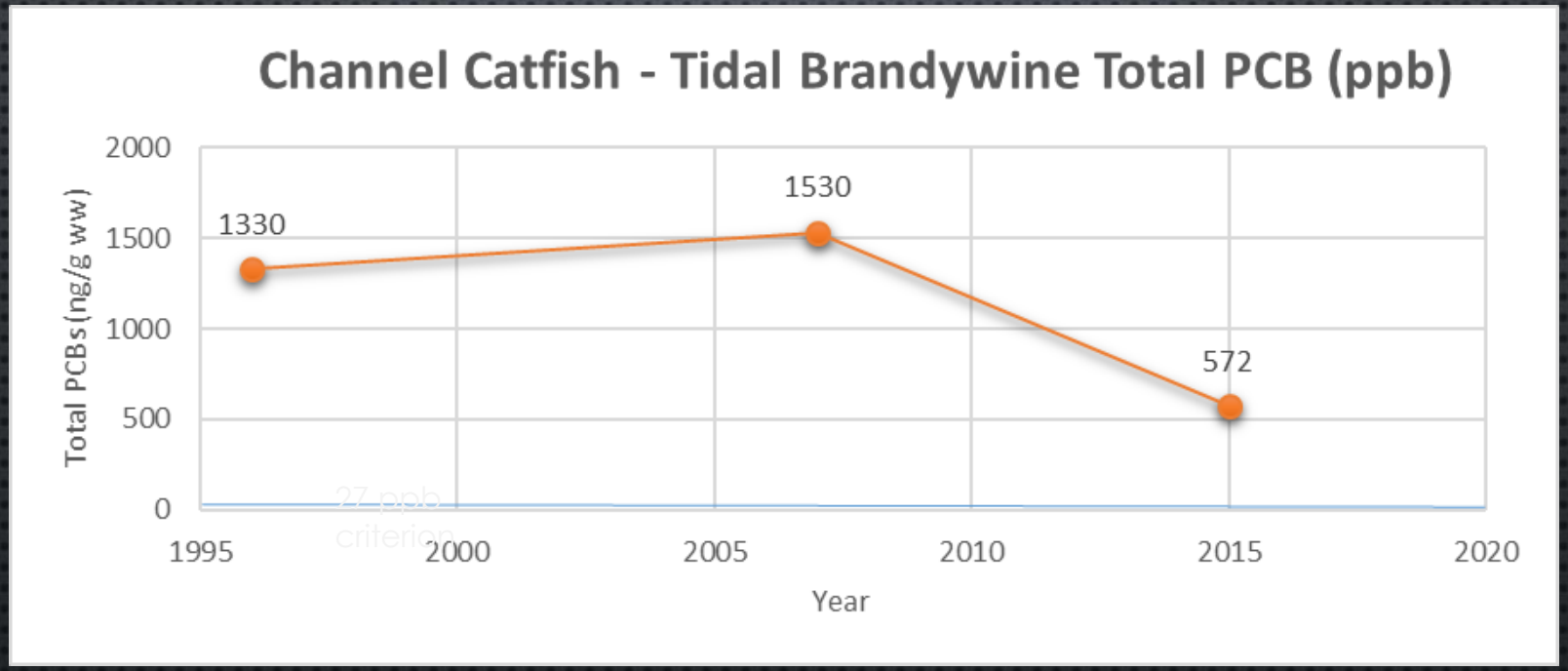
HOW DO WE KNOW THAT OUR EFFORTS ARE WORKING?

FISH TISSUE IMPROVEMENTS-TIDAL CHRISTINA RIVER



- Tidal Christina
  - Improvement attributed to cleanup of upland PCB sources, along with better control of NPDES and MS4 discharges. Highlights cooperation between WATAR and DRBC, along with other DNREC programs.

FISH TISSUE IMPROVEMENTS-TIDAL BRANDYWINE RIVER



- Tidal Brandywine
  - Improvement attributed to cleanup of upland PCB sources, along with better control of NPDES and MS4 discharges. Highlights cooperation between WATAR and DRBC, along with other DNREC programs.

CONTACT INFORMATION

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302-395-2600 (Remediation)

https://dnrec.alpha.delaware.gov/waste-hazardous/remediation/watar/

TAINTED WATERWAYS

New push to make river fish safe to eat

30A SUNDAY NEWS JOURNAL DELAWAREONLINE.COM SUNDAY, SEPTEMBER 27, 2015

Little Mill Creek project completed

XERXES WILSON
THE NEWS JOURNAL

Business owners along Little Mill Creek near

through the decades.

"Many of us have self-diagnosed ourselves with P.T.S.D. — post traumatic storm disorder," said

tainty," Austin said.

Tidal marsh once occupied the land where Germay, Meco and Brookside Drives now host a wide range of commercial and

project.

Paul Betty, director of sales for Coverdeck Systems on Meco Drive, said his businesses has been spared significant flood-

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

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New fix for pollution

Written by Jeff Montgomery The News Journal
Mar. 01

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14A SUNDAY NEWS JOURNAL DELAWAREONLINE.COM SUNDAY, SEPTEMBER 13, 2015

Fish consumption advisory is eased

MOLLY MURRAY
THE NEWS JOURNAL

water management and efforts to find, track and

were able to lift these advi-sories or substantially

Army Creek and Pond from U.S. 13 and the entrance to the creek, including Army Pond

duction.

Much of the legacy pol-