



# Pearce Creek DMCF Baseline Exterior Monitoring Fall 2016 Results

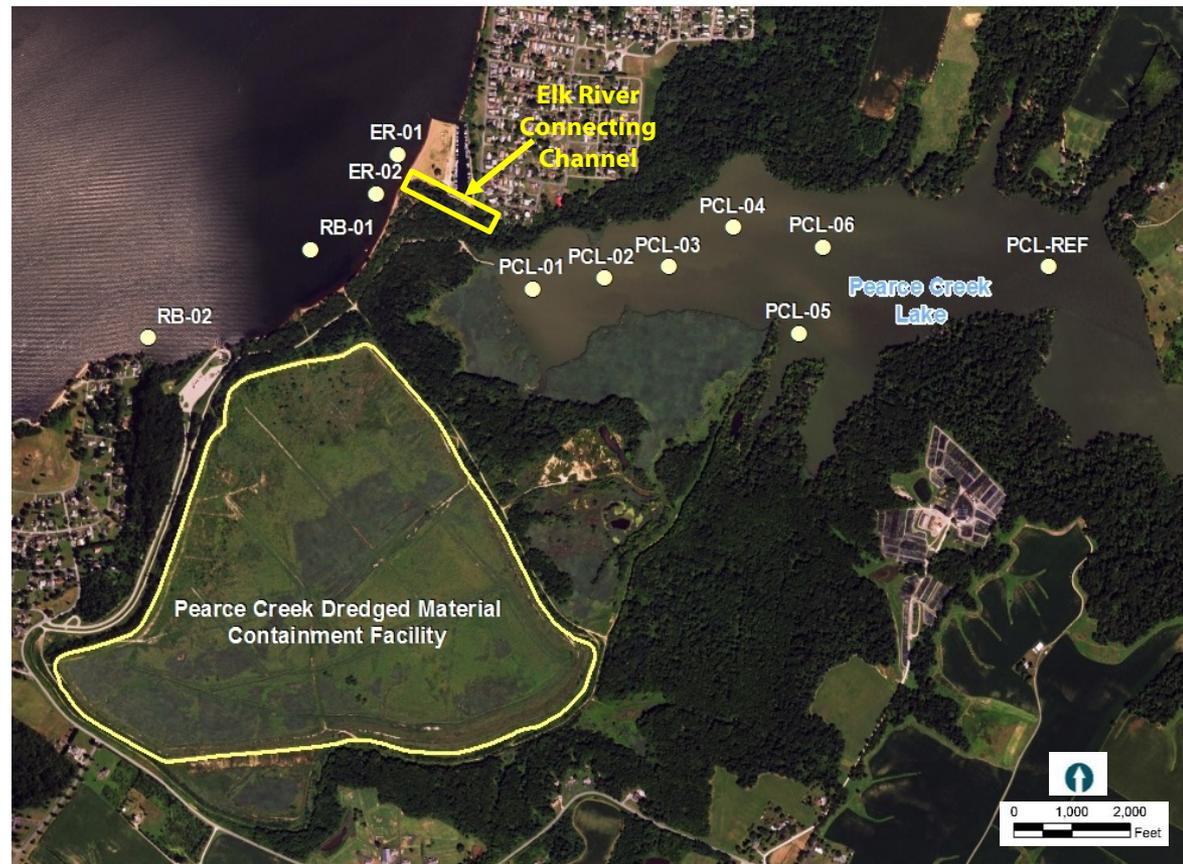
Pearce Creek Implementation Committee  
April 21, 2017

# Project Overview

- Objective: Collect data from monitoring locations to establish baseline conditions that will be used to monitor environmental conditions after dredged material placement starts
- First sampling event was conducted in Fall 2015; second event conducted in Spring 2016; third sampling event conducted in Fall 2016
- Testing program included:
  - Surface water quality
  - Sediment chemistry – testing of target chemicals
  - Sediment bioassays – 10-day tests that evaluate organism survival
  - Benthic community – Identification of bottom-dwelling organisms, including number of species (diversity) and number of organisms (abundance)

# Sampling Overview – Fall 2016

- 10 Sampling Locations:
  - 7 Pearce Creek Lake monitoring locations
  - 1 Pearce Creek Lake reference location
  - 1 Elk River monitoring location
  - 1 Elk River reference site
- Reference locations represent areas that are outside of the influence of the DMCF



# Surface Water Results

- Turbidity
  - Highly variable at Pearce Creek Lake locations because of natural factors (i.e., bank erosion, algae)
  - Elevated at Elk River reference because of runoff from rain storms
- Chemical Testing
  - Low concentrations overall; generally consistent with Fall 2015 and Spring 2016 data
    - In Fall 2016, copper slightly exceeded criteria at one location



**Location PCL-01**



**Location PCL-05**

# Sediment Results

- Sediment Type
  - Pearce Creek Lake mostly silts and clays
  - Elk River was silty clays, and Elk River reference location was silty with a lot of shell material
- Nutrients and Metals
  - Nutrient concentrations naturally variable at all locations
  - Overall, concentrations of metals were low at both the Pearce Creek Lake and Elk River monitoring and reference locations



**Elk River Connecting Channel – Elk River Outlet at High Tide**

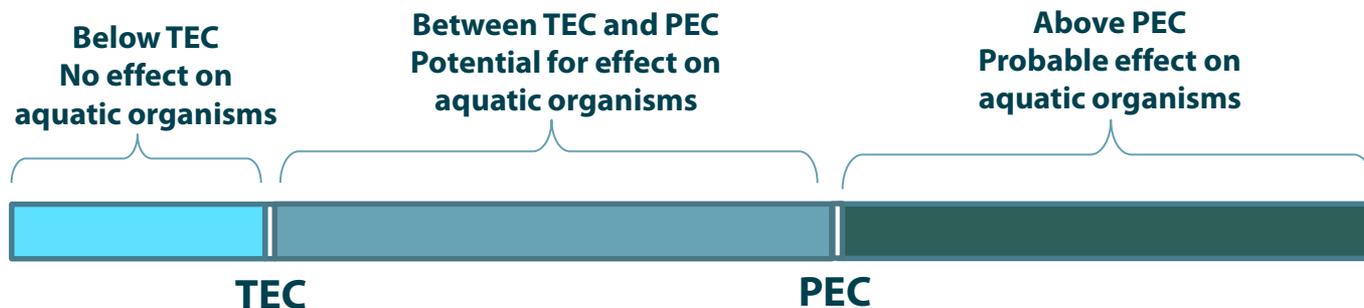


**Elk River Connecting Channel – Elk River Outlet at Low Tide**

# Sediment Chemical Screening

- Results are generally consistent with the Fall 2015 and Spring 2016 data
  - For Pearce Creek Lake monitoring locations, 5 metals were between the TEC and PEC, and nickel exceeded the PEC
  - For the Pearce Creek Lake reference location, 4 metals were between the TEC and the PEC, and nickel exceeded the PEC
  - For Elk River monitoring location, none exceeded the TEC
  - For Elk River reference location, 2 metals were between the TEC and PEC, none of the metals exceeded the PEC

Nickel concentrations are generally consistent with sediment in the upper reaches of the Chesapeake Bay



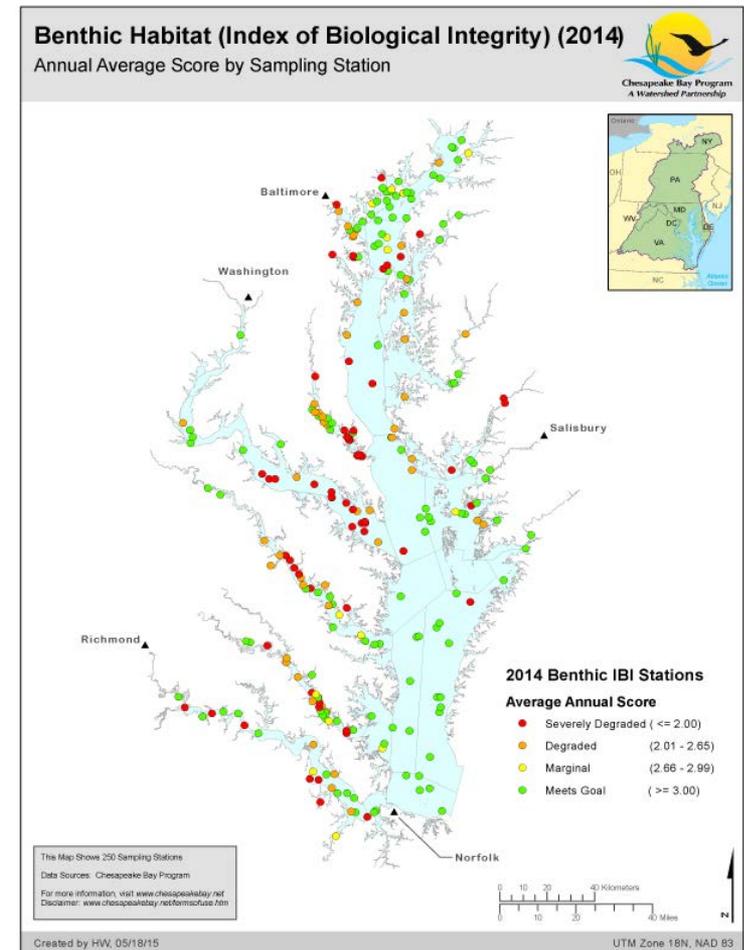
# Benthic Bioassay Results

- 10-day whole sediment toxicity testing using *Hyallela azteca* : freshwater amphipod (laboratory cultured)
- Compared results for each location to reference site
- Results
  - Survival high for the Pearce Creek Lake and Elk River sediments
  - Sediments are not toxic, and support benthic organisms



# Benthic (Bottom Dwelling) Community

- Several of the metrics are combined into a value called the Chesapeake Bay Benthic Index of Biotic Integrity (B-IBI)
  - Allows for direct comparison between sites throughout the Bay
- Can be influenced by natural conditions (i.e. low dissolved oxygen, low total organic carbon) or a response to poor sediment quality
- Based on results, locations are classified as:
  - Meets Restoration Goal
  - Marginal
  - Degraded
  - Severely Degraded



# Benthic Community Results

- Pearce Creek Lake
  - The Pearce Creek Lake reference location met the Chesapeake Bay restoration goal
  - Six of the Pearce Creek Lake locations met the Chesapeake Bay restoration goal
  - One Pearce Creek Lake location (PCL-07) was classified as degraded (improvement from 2016)
- Elk River
  - The Elk River reference site met the Chesapeake Bay restoration goal
  - The Elk River monitoring location was classified as marginal



# Elk River - Beach Sampling

# Sampling Overview – Spring 2016

- Samples collected in nearshore areas close to beach areas in the Elk River
- Added at the request of the citizens
- Evaluated independently from the baseline exterior monitoring data
- Included same testing program
  - Sediment
  - Water quality
  - Benthic community
  - Benthic bioassays (one location only)



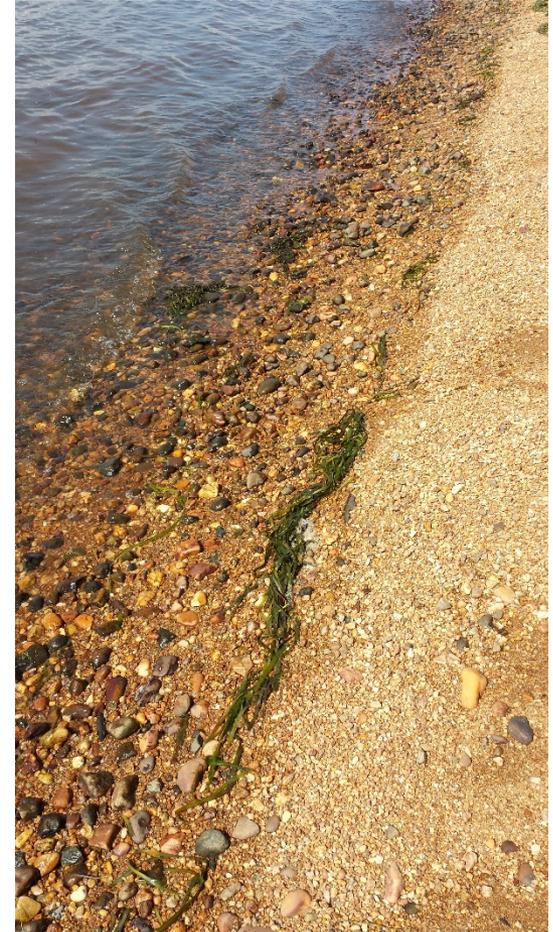
# Surface Water Results

- Salinity was oligohaline → salinity of 0.5 to 5 ppt
- Turbidity was low
- Chemical Testing
  - Concentrations are generally very low
  - No water criteria exceedances; well below water quality criteria



# Sediment Results

- Sediment Type
  - Location 1 was mostly shell fragments with some sand
  - Location 2 was primarily sand
- Nutrients and Metals
  - Nutrient concentrations naturally variable
  - Metal concentrations generally low
  - None of the metals exceeded TEC → concentrations lower compared to Elk River monitoring location



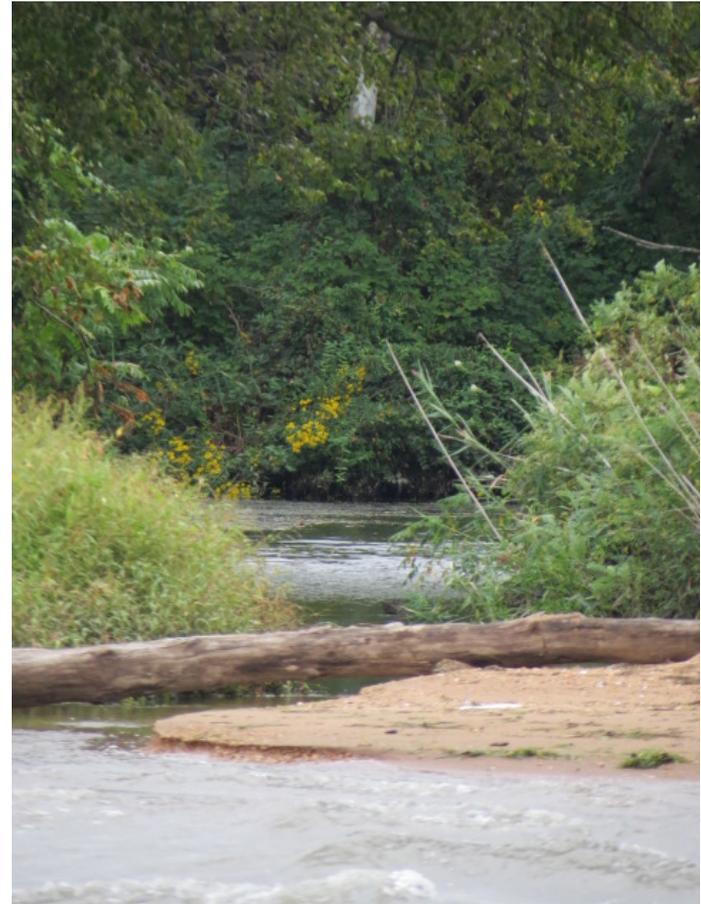
# Benthic Community and Bioassay Results

- Benthic Community
  - Higher diversity and higher abundance compared to Elk River monitoring location
  - Grain size effect (shell hash and sand)
  - Lots of clams observed at Location 1
- Benthic Bioassays
  - Location 2 was 97 percent sand and gravel, so no bioassay sample collected
  - Sample from Location 1 had high survival, therefore the sediment is not toxic



# Elk River - Beach Sampling Schedule

- This is the second round of sampling
- Sampling will continue in Spring 2017
- Establish the “existing” condition for water, sediment, and benthic community
- Evaluate if there are any changes to the environmental conditions over time



# Questions/Discussion

