



# Pearce Creek DMCF Exterior Monitoring Post-Placement Sampling Fall 2021 Results

Pearce Creek Implementation Committee  
April 2022

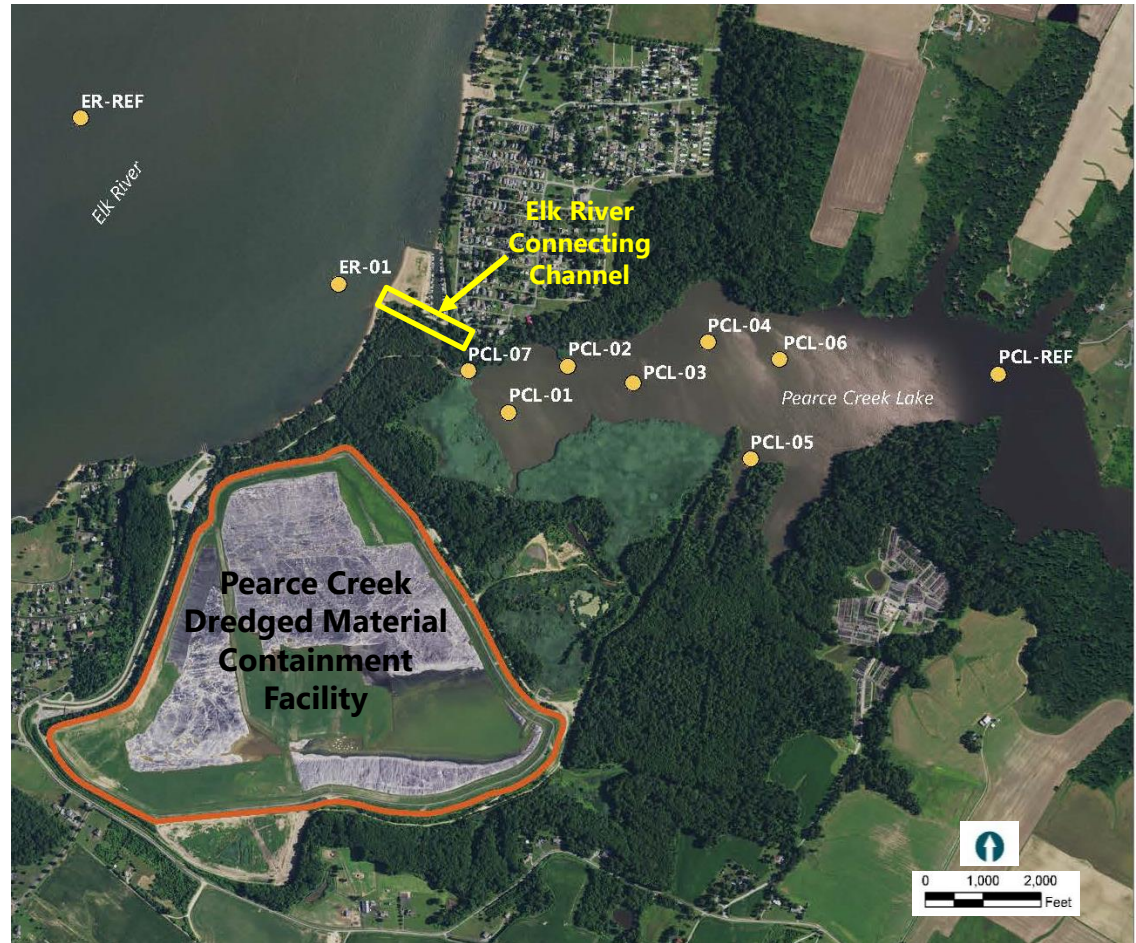
# Project Overview

- Objective: Collect post-placement data from locations to monitor environmental conditions after dredged material placement
- Baseline sampling events were conducted in Fall 2015, Spring and Fall 2016, and Spring 2017
- Dredged material placement has occurred annually since the 2017/2018 dredging cycle
- Post-placement monitoring has occurred since Spring 2018; samples for Fall 2021 were collected September 27 to 29, 2021
- Post-placement testing was consistent with the baseline monitoring program:
  - 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 2021

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



# Surface Water Results

- Post-placement data comparable between the reference and the monitoring locations
- Post-placement data were also within the range of baseline concentrations
- Turbidity: highly variable at Pearce Creek Lake locations because of natural factors (i.e., bank erosion, algae, or stormwater runoff)
- Chemical Testing - Metals
  - Low concentrations overall; consistent with results from previous sampling events
  - Within the range of concentrations observed during baseline monitoring events
  - One metal (aluminum) exceeded the chronic water quality criterion in one sample but was substantially less than the acute water quality criterion.



**Location PCL-05**



**Location PCL-07**



# Sediment Results

- Post-placement data comparable between the reference and the monitoring locations
- Post-placement data were also generally within the range of baseline concentrations
- Sediment Type
  - Pearce Creek Lake monitoring locations comprised of silts and clays, except PCL-07 (sands)
  - Pearce Creek Lake reference location comprised of silts and clays
  - Elk River monitoring location was silty clays
  - Elk River reference location was comprised mostly of shell material
- Nutrients: Concentrations naturally variable at all locations



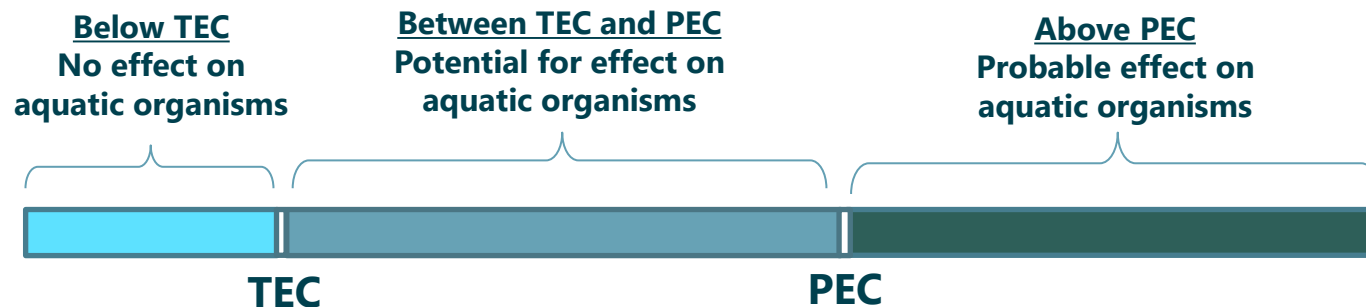
**Elk River Connecting Channel – Elk River Outlet at High Tide**



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

# Sediment Data Analysis - Metals

- Results of chemical testing were compared to freshwater sediment guidelines
  - Derived by scientific community based on actual sediment concentrations
  - Each chemical has two values:
    - A threshold effect concentration (TEC)
    - A probable effect concentration (PEC)



- An “effect” means that an organism’s behavior is impacted, such as a slow down of organism growth rate
- “Effects” do not indicate mortality

# Sediment Chemical Screening - Metals

- Results are generally consistent with the baseline data
  - Pearce Creek Lake
    - Monitoring Locations
      - 5 metals between the TEC and PEC
      - Nickel exceeded the PEC
    - Reference Site
      - 2 metals were between the TEC and PEC
      - Nickel exceeded the PEC
  - Elk River
    - Monitoring Location
      - 2 metals were between the TEC and PEC
    - Reference Site
      - 1 metal was between the TEC and PEC

- Nickel concentrations are consistent with sediment in the upper reaches of the Chesapeake Bay
- Nickel concentrations are consistent with baseline results and represent background levels for this site

# Benthic Bioassay Results

- 10-day whole sediment toxicity testing using *Hyallolella azteca*: freshwater amphipod (laboratory cultured)
- Results for each location compared to reference site and to baseline data
- Results are consistent with the baseline data
  - Survival high for the Pearce Creek Lake and Elk River sediments
  - Survival in one Pearce Creek location was lower than the reference site
    - Sediment quality hasn't changed; other localized variability could be an influence
  - Sediments support benthic organisms





# Benthic Community Results

- Most of the metrics were within the range of the baseline data
- Abundance is highly variable at each location, but consistent with the baseline data (within the range of data observed previously)
- Indicates that while there is localized variability, the overall benthic community condition has not substantially changed compared to baseline monitoring results



# Exterior Monitoring Summary

- Sixth round of post-placement monitoring since the Pearce Creek DMCF was reactivated in December 2017
- Baseline data was collected from Fall 2015 through Spring 2017
- Results from all the testing – sediment, surface water, benthic community, and benthic toxicity – is consistent with previous sampling events

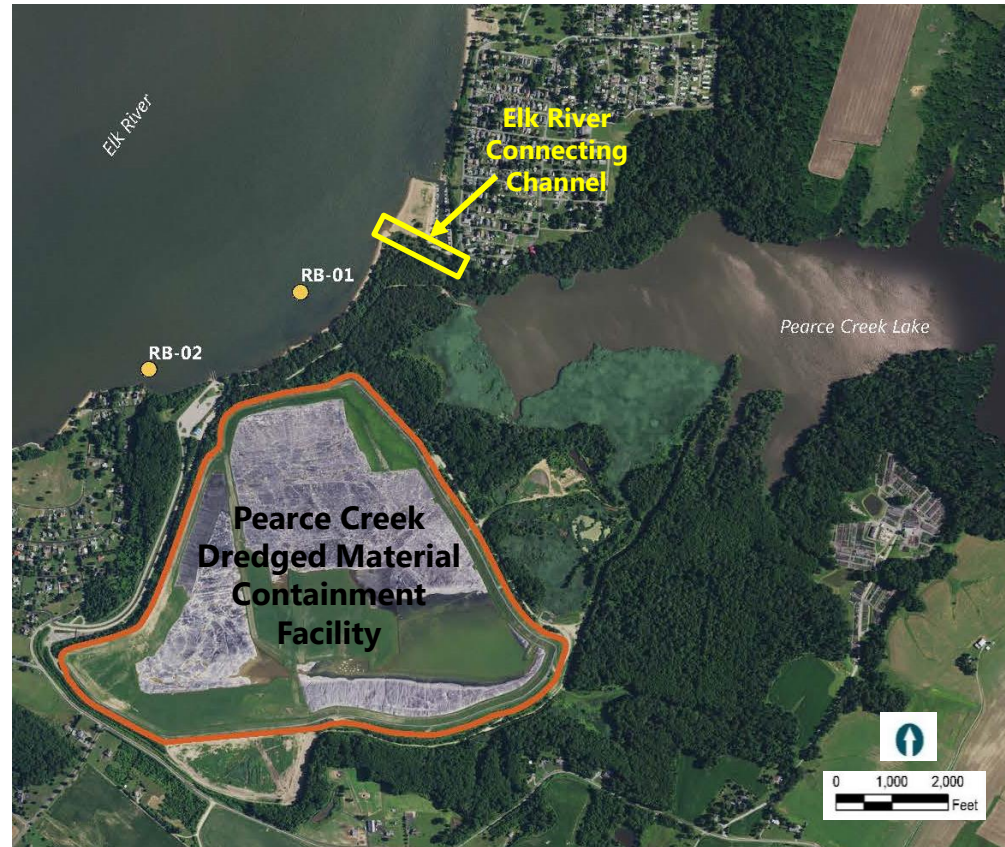


# Elk River - Beach Sampling



# Sampling Overview – Fall 2021

- Samples collected in nearshore areas close to beach areas in the Elk River
- Added at the request of citizen members of the PCIC
- Evaluated independently from the exterior monitoring data
- Samples were collected on September 29, 2021
- Included same testing program
  - Sediment
  - Water quality
  - Benthic community
  - Benthic bioassays



# Surface Water Results

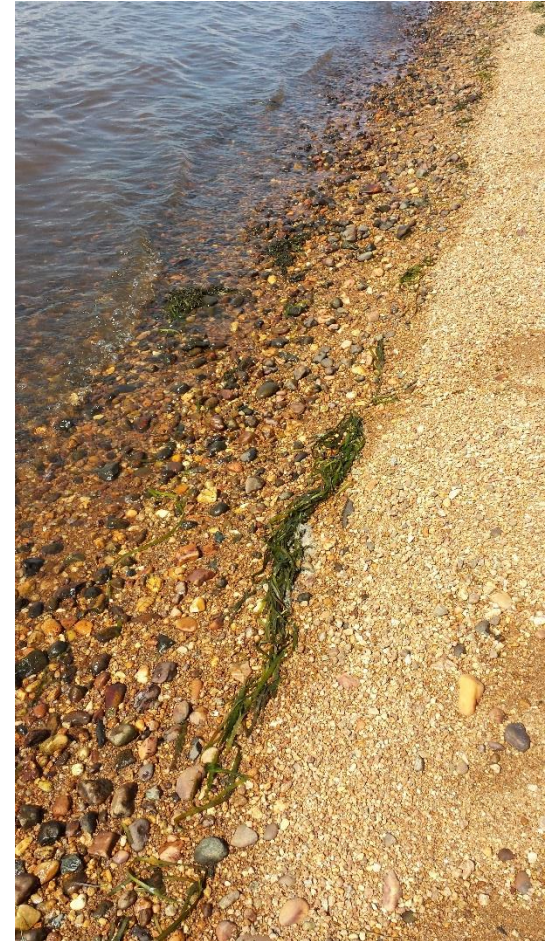
- Locations were classified as tidal freshwater (both 0.1 ppt)
- Turbidity was low (14.5 and 14.0 NTUs)
- Chemical Testing
  - Concentrations are very low; consistent with previous sampling
  - None of the samples had chemical concentrations that exceeded water quality criteria





# Sediment Results

- Sediment Type
  - Location 1 (RB-01) was mostly sand
  - Location 2 (RB-02) was primarily sand with some shell fragments
- Nutrients and Metals
  - Nutrient concentrations naturally variable
  - Metal concentrations generally low and well below the sediment quality criteria
  - None of the metals exceeded TEC values
  - Results consistent with previous sampling events





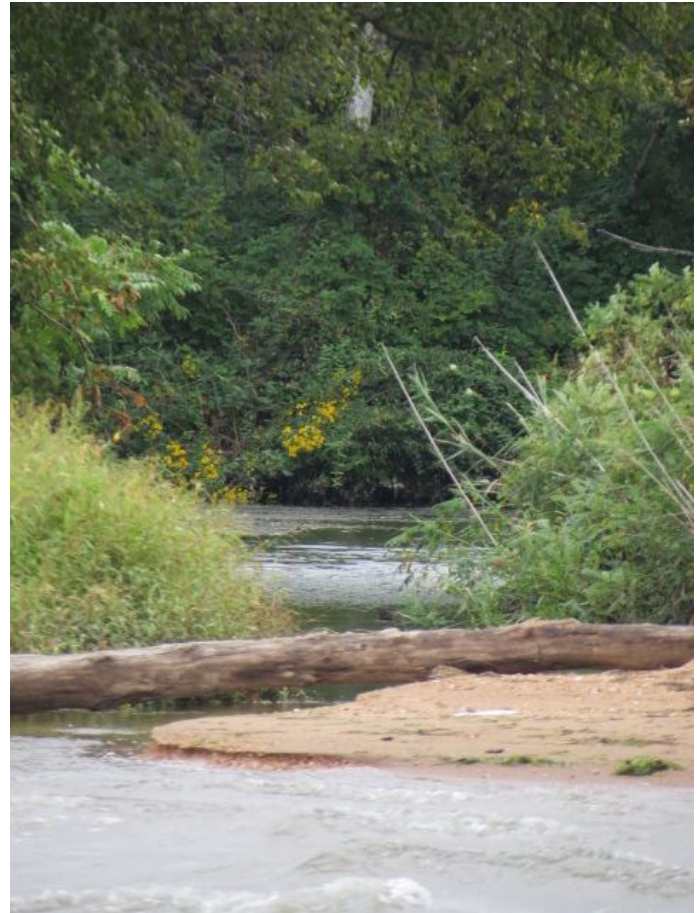
# Benthic Community and Bioassay Results

- Benthic Community
  - Abundance variable, but generally consistent with previous sampling events
- Benthic Bioassays
  - Both samples had high survival, therefore the sediment supports benthic organisms



# Elk River - Beach Sampling Summary

- This was the 9th round of sampling at these locations
- Results from all the testing – sediment, surface water, benthic community, and benthic toxicity – is consistent with previous sampling events



# Adaptive Management

- Adaptive management is the periodic review of long-term monitoring programs and incorporate lessons learned to support decision-making
- **Pearce Creek Exterior Monitoring**
  - Sediment, surface water, and benthic community sampling will continue for Fall 2022
  - Benthic toxicity testing demonstrated that the sediments are not harmful to organisms. This program goal was met, and annual testing is no longer necessary
- **River Beach Sampling**
  - Results from nine sampling events show that the conditions are consistent and have not changed. This program goal was met, and the river beach sampling is no longer necessary



# Questions/Discussion

