Pearce Creek DMCF Exterior Monitoring Post-Placement Sampling

Fall 2024 Results

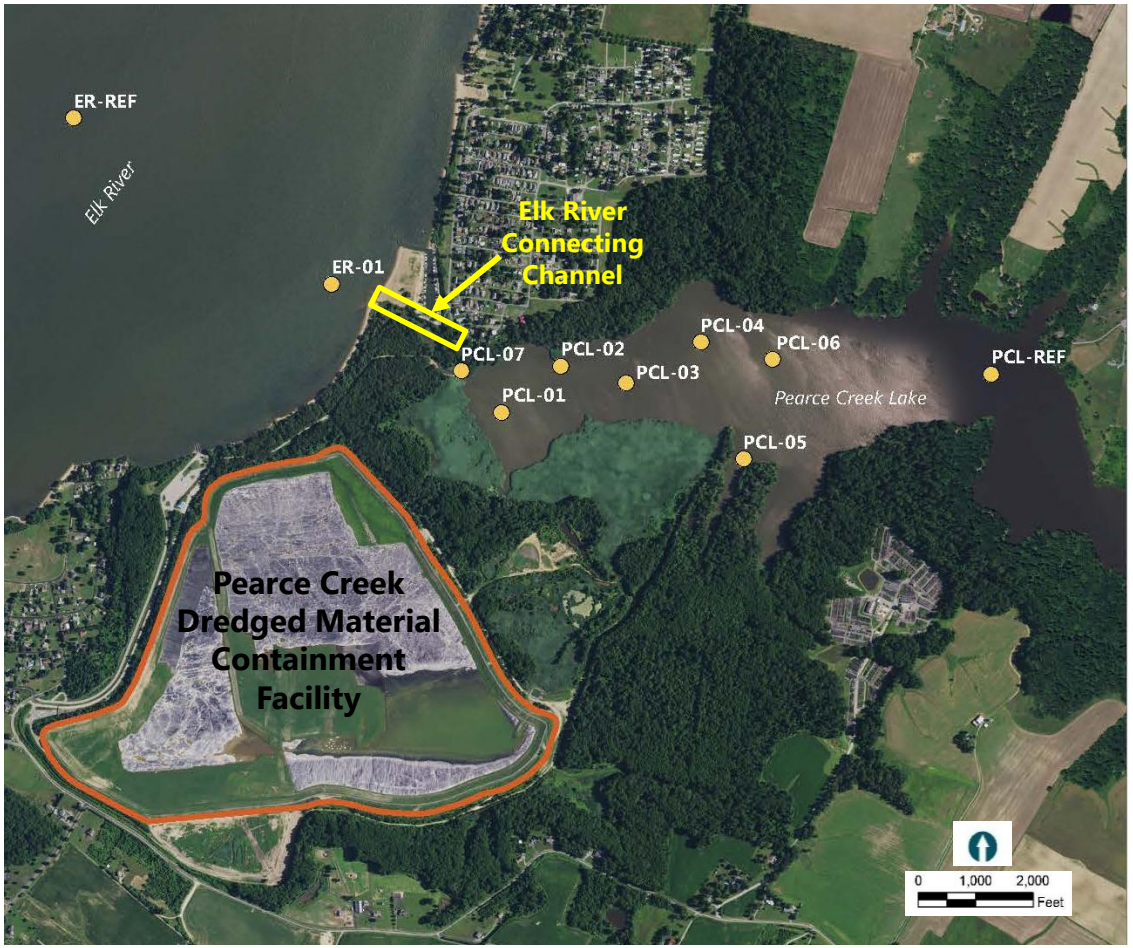
Pearce Creek Implementation Committee
May 2025

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 2024 were collected September 23 and 24, 2024
- Fall 2024 sampling program included:
  - Surface water chemistry – testing of target chemicals
  - 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 2024

- 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

- Data comparable between the reference and the monitoring locations, except for zinc in the Elk River reference sample, which exceeded concentrations at the monitoring location
- Data were also within the range of baseline concentrations, except for zinc in the Elk River reference sample, which exceeded baseline concentrations
- Hardness in Pearce Creek Lake: slightly lower than baseline, but data comparable between the reference and monitoring locations
- Chemical Testing - Metals
  - Low concentrations overall; consistent with results from previous sampling events
  - Within the range of concentrations observed during baseline monitoring events
  - Zinc in the Elk River reference sample was the only exceedance of water quality criteria

Location PCL-05

Location PCL-07

Sediment Results

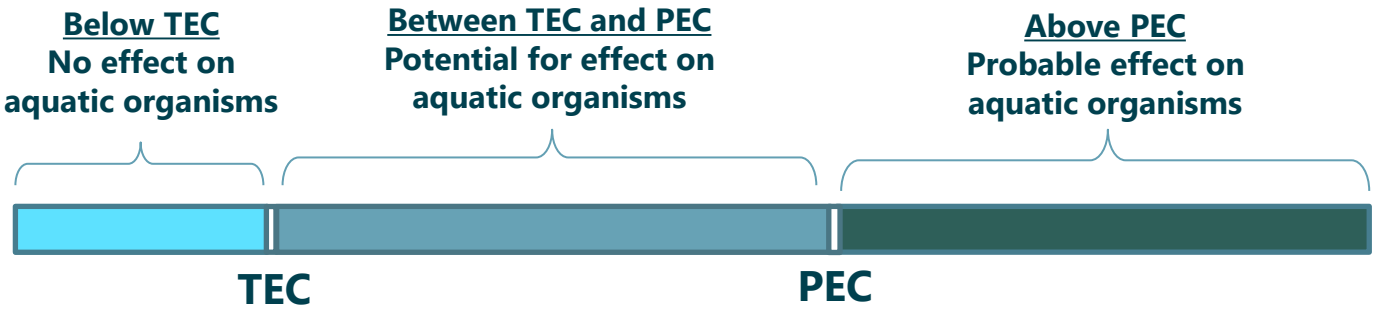
- Data comparable between the reference and the monitoring locations
- Data were also generally within the range or slightly above baseline concentrations
- Sediment type
  - Pearce Creek Lake monitoring locations comprised of silts and clays, except PCL-07 (sands and silts)
  - Pearce Creek Lake reference location comprised of silts and clays
  - Elk River monitoring location was comprised of gravel and sand
  - Elk River reference location was mostly gravel with some silt
- Nutrients: Naturally variable at all locations, although PCL-06 had notably higher concentrations of total Kjeldahl nitrogen and total phosphorous

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
      - No metals were greater than the TEC
    - Reference Site
      - No metals were greater than the TEC

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

Sediment Bioassay Results

- 10-day whole sediment toxicity testing using *Hyallela 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
  - Sediments support benthic organisms

Benthic Community Results

- Most of the metrics were within the range of the baseline data
- Abundance is 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
- The Chesapeake Bay Benthic Index of Biotic Integrity measures benthic community conditions
  - All but one Pearce Creek Lake location met restoration goal, PCL-07 classified as degraded (reference site was marginal)
  - Elk River monitoring location met restoration goal (reference site was marginal)

Exterior Monitoring Summary

- Ninth round of post-placement monitoring since placement at the Pearce Creek DMCF started again 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

Adaptive Management

- Adaptive management is the periodic review of long-term monitoring programs and incorporates lessons learned to support decision-making
  - Sediment, surface water, sediment toxicity, and benthic community sampling will continue for Spring and Fall 2025

Questions/Discussion