Pearce Creek DMCF Exterior Monitoring Post-Placement Sampling

Fall 2019 Results

Pearce Creek Implementation Committee

May 2020

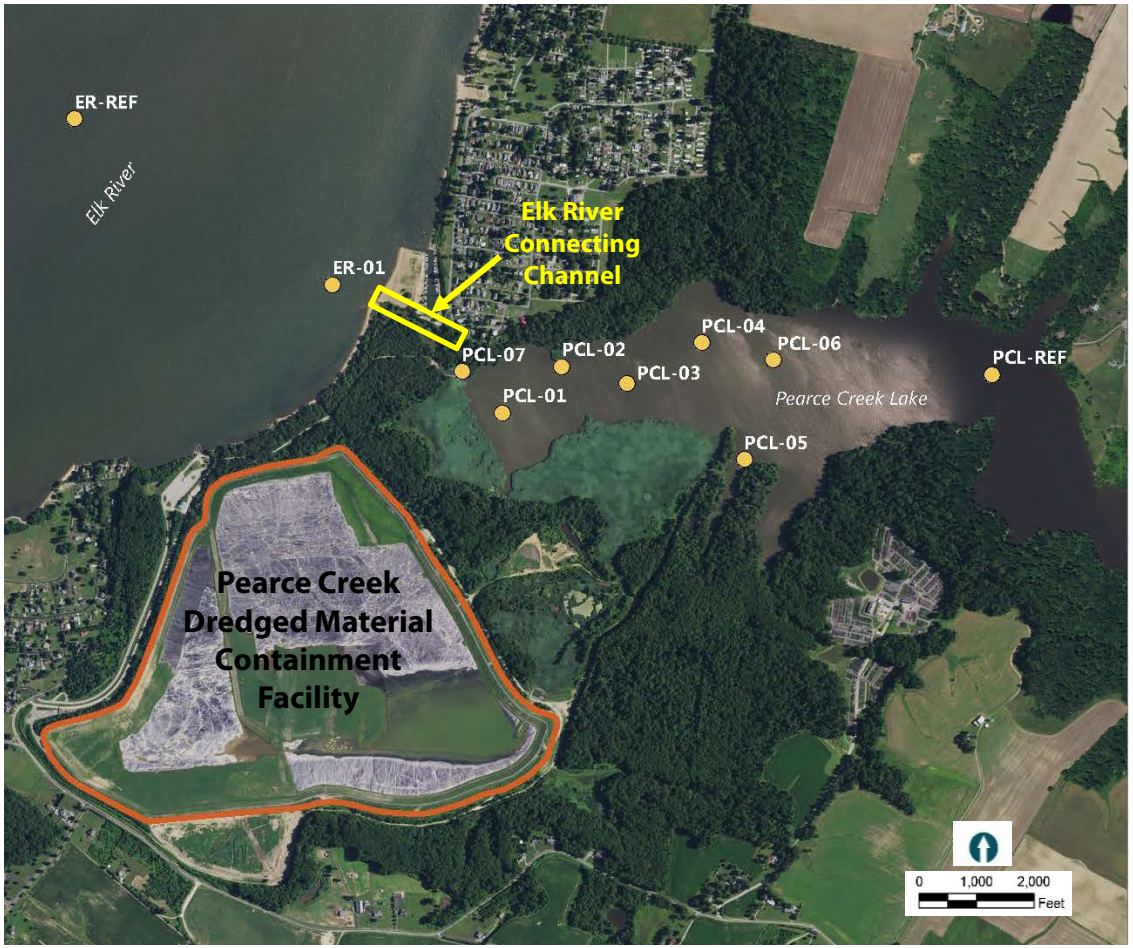
Project Overview

- 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 since the 2017/2018 dredging cycle
- Post-placement monitoring has occurred since Spring 2018; samples for fall 2019 were collected September 16-18, 2019
- 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 2019

- 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
  - None of the metals had concentrations that exceeded the water quality criteria

Location PCL-05

Location PCL-07

Sediment Results

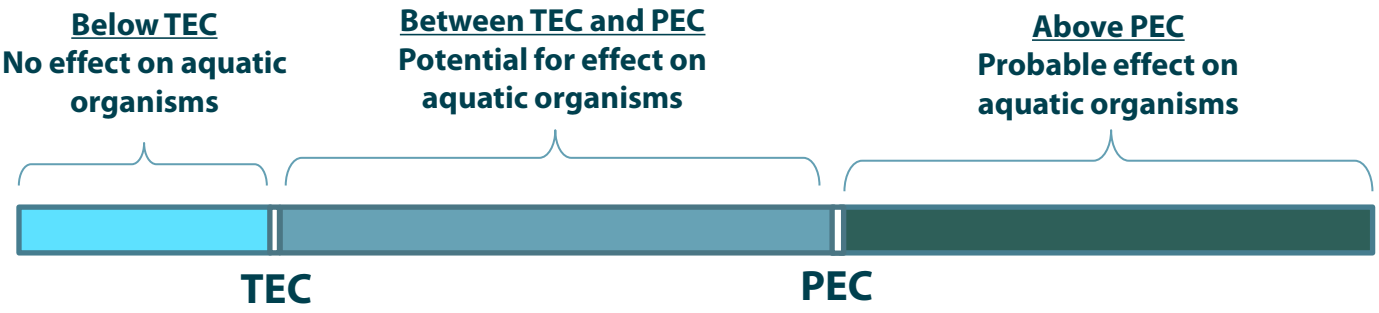
- Post-placement data comparable between the reference and the monitoring locations
- Post-placement data were also generally within the range of baseline concentrations
- Sediment Type
  - Pearce Creek Lake monitoring locations comprised of silts and clays, except PCL-07 (sands)
  - Pearce Creek Lake reference location comprised of silts and clays
  - Elk River monitoring location was silty clays
  - Elk River reference location was comprised of silty clays, with a lot 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
      - 3 metals were between the TEC and PEC
      - Nickel exceeded the PEC
  - Elk River
    - Monitoring Location
      - 3 metals were between the TEC and PEC
      - Nickel exceeded the PEC
    - Reference Site: 2 metals were 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 *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 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

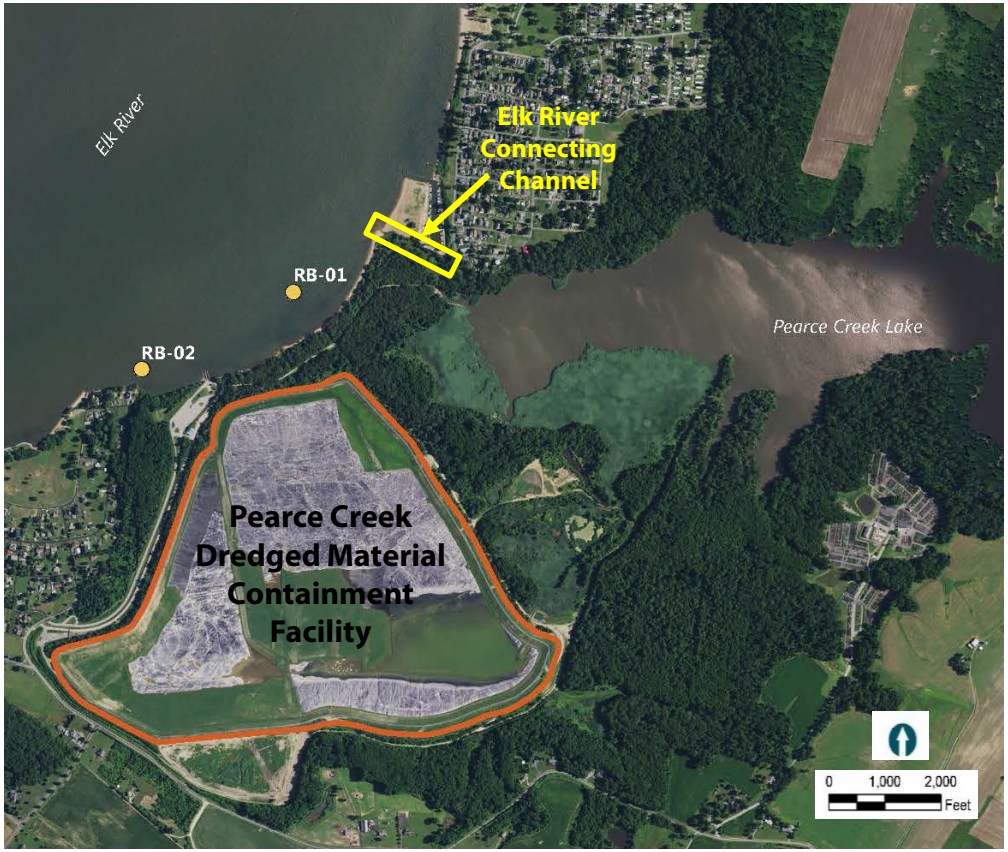
Exterior Monitoring Summary

- Fourth round of post-placement monitoring since the Pearce Creek DMCF was reactivated in December 2017, followed by two years of dredged material placement
- 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 2019

- 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 18, 2019
- Included same testing program
  - Sediment
  - Water quality
  - Benthic community
  - Benthic bioassays

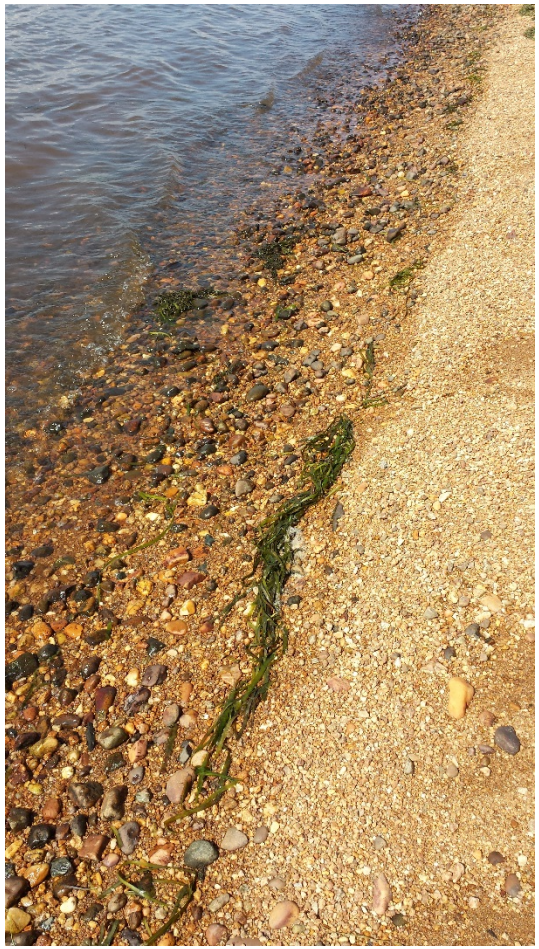


Surface Water Results

- Locations were classified as freshwater – no measurable salinity
- Turbidity was low (4.5 and 4.7 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 7th round of sampling at these locations; 2nd round of dredged material placement since the site was reactivated in 2017
- Results from all the testing – sediment, surface water, benthic community, and benthic toxicity – is consistent with previous sampling events

Questions/Discussion