Pearce Creek DMCF Exterior Monitoring Post-Placement Sampling

Fall 2018 Results

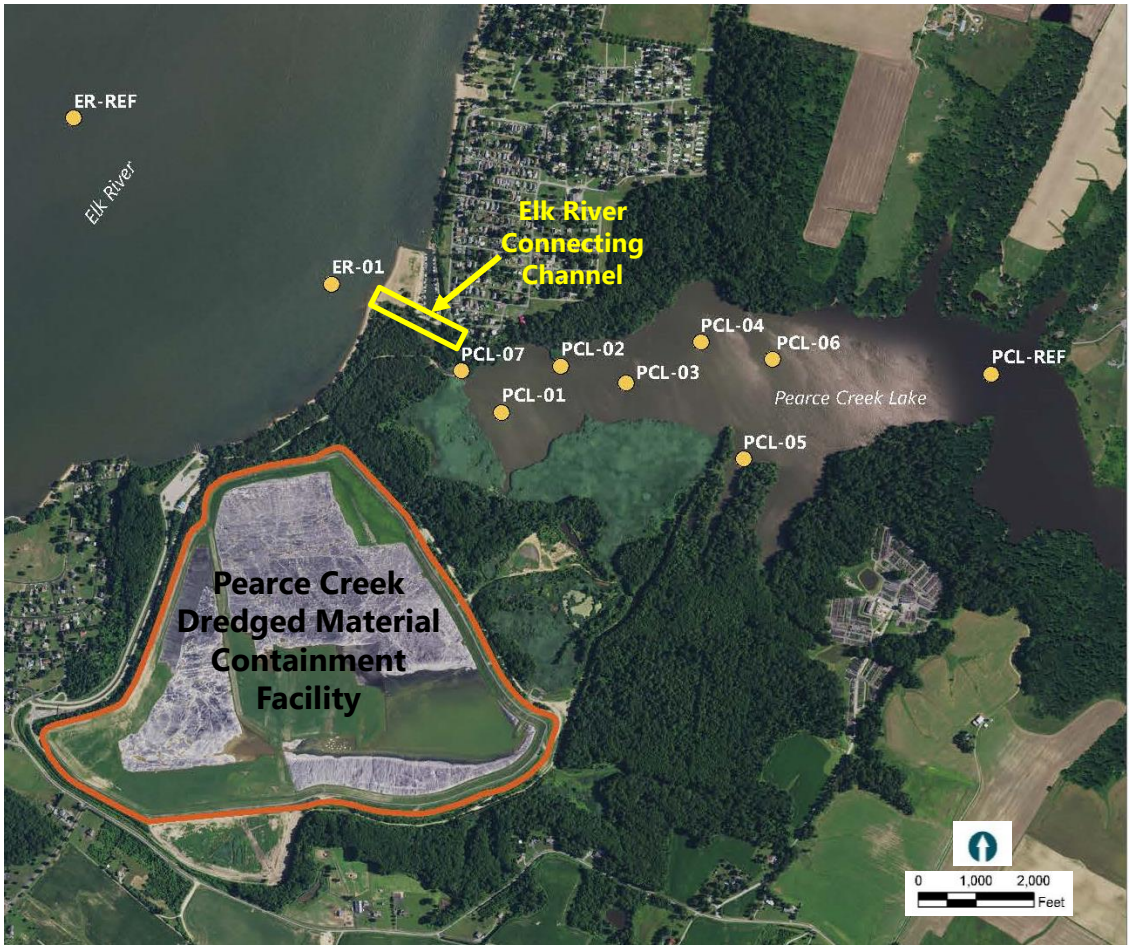
Pearce Creek Implementation Committee
May 17, 2019

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 occurred in the 2017/2018 dredging cycle
- Post-placement monitoring samples for fall collected October 1-3, 2018
- 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 2018

- 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, except for aluminum
- 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; generally consistent with results from previous sampling events
  - Aluminum exceeded chronic water quality criterion at one location
  - High bank erosion rates at this location increases turbidity and may contribute to aluminum concentration

Location PCL-05

Location PCL-07

Sediment Results

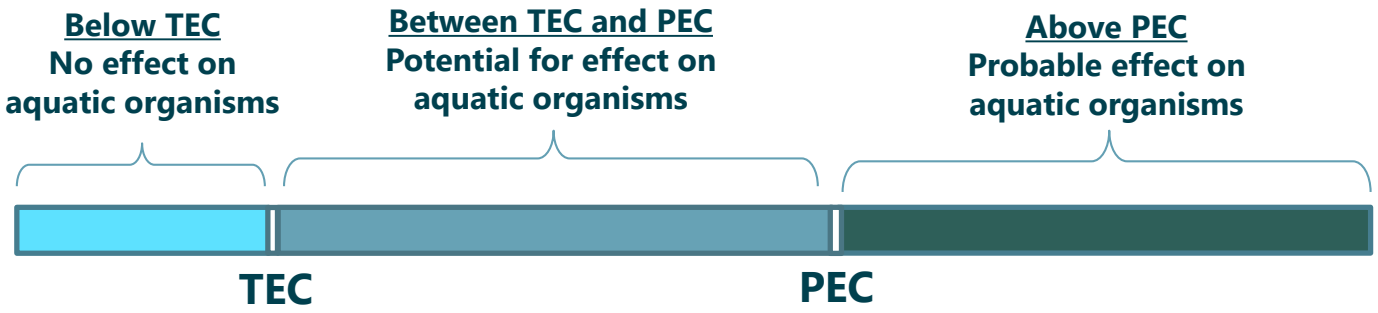
- Post-placement data comparable between the reference and the monitoring locations
- Post-placement data were also generally within the range of baseline concentrations
- Sediment Type
  - Pearce Creek Lake sediment comprised of silts and clays, although PCL-07 was sandy
  - Pearce Creek Lake reference location comprised of silts and clays
  - Elk River monitoring location was sandy with shell material
  - 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
      - 4 metals were between the TEC and PEC
      - Nickel exceeded the PEC
  - Elk River
    - Monitoring Location: no metals exceeded the TEC
    - Reference Site: 2 metals were between the TEC and 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)
- 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
- Observed one location that had one dominant species (PCL-07)
  - Skews the data – high abundance, but low diversity
  - Overall the conditions at the individual location did not change
- Abundance is highly variable at each location, but consistent with the baseline data (within the range of data observed previously)

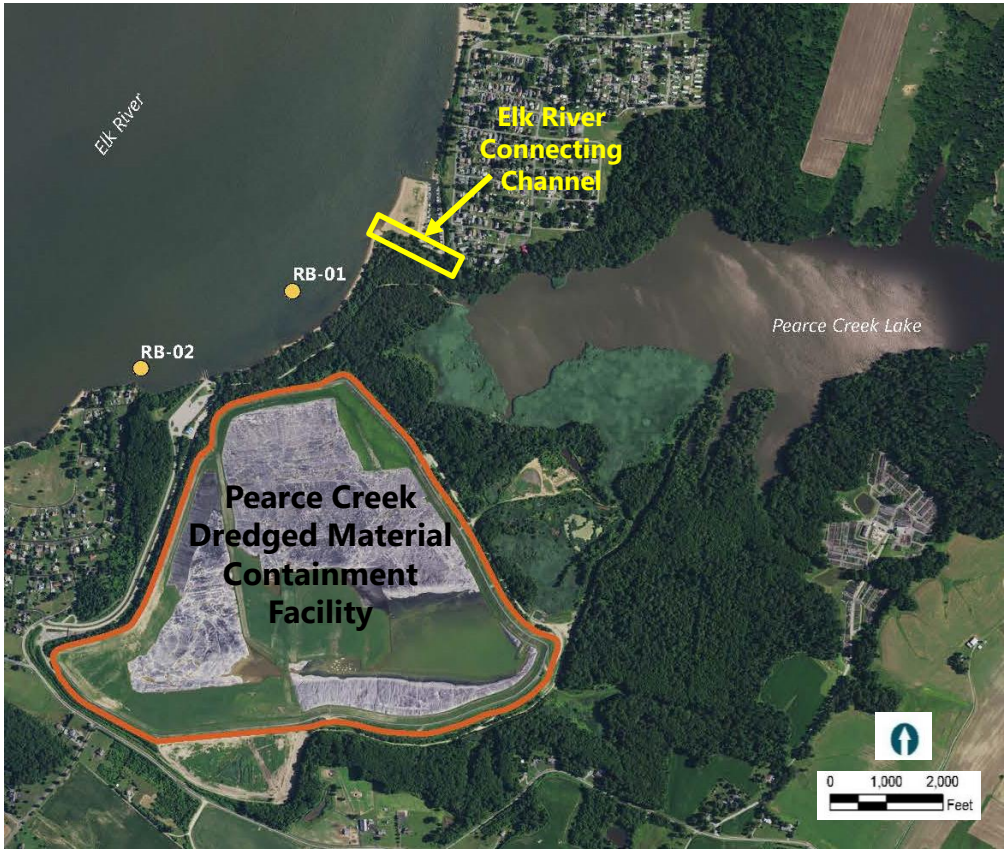
Exterior Monitoring Summary

- Second round of post-placement monitoring since dredged material placement at the Pearce Creek DMCF occurred during the 2017/2018 dredging cycle
- 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 2018

- Samples collected in nearshore locations close to beach areas in the Elk River
- Added at the request of citizens
- Evaluated independently from the exterior monitoring data
- Samples were collected on October 2 and 3, 2018
- Included same testing program
  - Sediment chemistry
  - Surface Water quality
  - Benthic community
  - Benthic bioassays

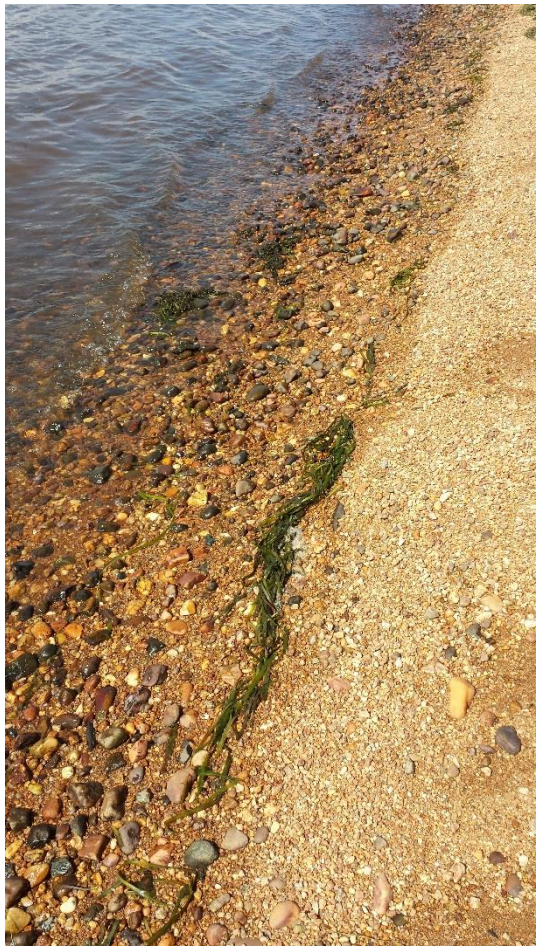


Surface Water Results

- Locations were classified as freshwater – no measurable salinity
  - Previous events were classified as oligohaline (salinity of 0.5 to 5 ppt)
- Turbidity was low (12 and 8 NTUs)
- Chemical Testing
  - Concentrations are very low; consistent with previous sampling
  - All of the samples were well below 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 is not toxic

Elk River - Beach Sampling Summary

- This was the fifth round of sampling at these locations; second round since placement of dredged material was resumed at the Pearce Creek DMCF
- Results from all the testing – sediment, surface water, benthic community, and benthic toxicity – is consistent with previous sampling events

Questions/Discussion