

Focus on: Sediment Quality in Elliott Bay



Ecology research vessel heading into Elliott Bay.

Elliott Bay sediments evaluated

In June 2021, Ecology sampled surface sediments at 36 monitoring stations in Elliott Bay as part of our Puget Sound Sediment Monitoring Program Urban Bays Surveys. The surveys characterize current surface conditions for large geographic areas rather than targeted locations or cleanup sites. We published results in an [interactive story map](#)¹ that summarizes findings from the analysis of physical, biogeochemical, and chemical contaminant parameters, and the composition of the sediment-dwelling invertebrate communities. We compared the results to those from our 1998, 2007, and 2013 surveys.

Summary of findings

Habitat

Elliott Bay is a highly urbanized and modified bay in central Puget Sound with a complex shoreline serving industrial, commercial, and residential uses (Figure 1). The Elliott Bay study area has a wide depth range, with surface sediments composed mainly of sand or mixtures of sand and silt. Elemental and isotopic carbon and nitrogen results showed a clear spatial distribution out of the Duwamish River and along the eastern shoreline.

Chemical contamination

Exposure to potentially harmful chemicals, as measured with the Sediment Chemistry Index, increased since the 2013 survey of Elliott Bay. We found eight chemicals with concentrations above (not

meeting) Washington State's Sediment Quality Standards. Metal pollutants were associated with fine sediments and organic carbon and nitrogen content. Contaminant concentrations were highest in the Duwamish Waterways and along the eastern shoreline.

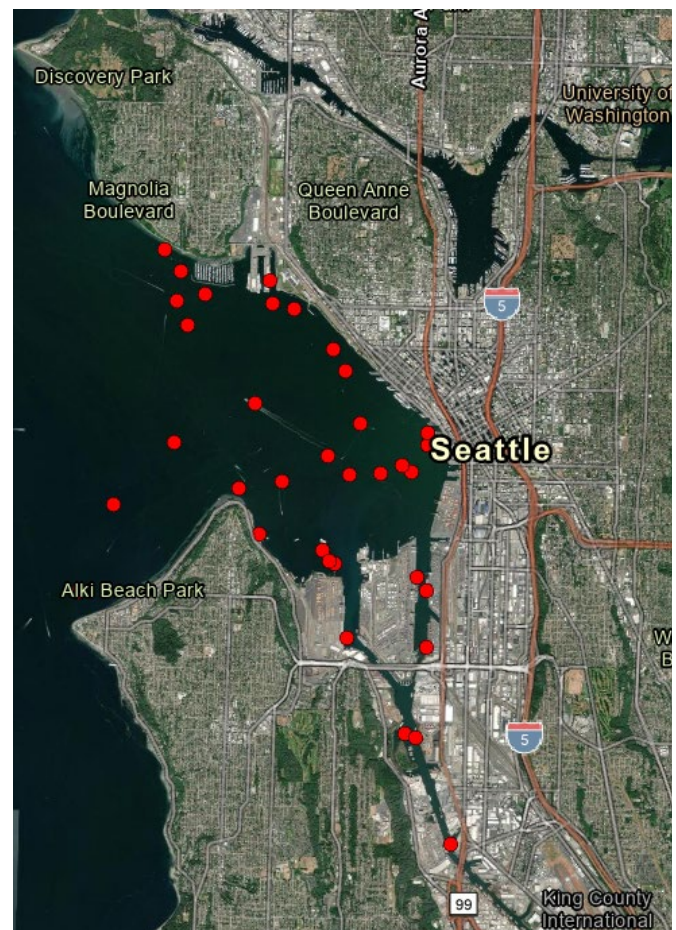


Figure 1. Map of Elliott Bay sampling locations.

Benthos

Benthic community condition improved, with an increase in the area represented by unaffected benthic assemblages. Overall, the benthic community structure changed little over the four surveys conducted in Elliott Bay. A clear spatial pattern was displayed over all samplings, with distinct communities in the Duwamish Waterways, along the shorelines, and in the center of the Bay.

Putting it all together

Shallow sites located in the Duwamish Waterways and along the shoreline had higher concentrations of polycyclic aromatic hydrocarbons (PAHs), total polychlorinated biphenyl (PCB) Aroclors, and terrestrially-sourced carbon.

The shoreline sampling stations were the most diverse, while the Waterway stations had low diversity, which may be attributed partially to grain size differences in these areas. Stations in the deep central portion of the bay were less diverse and had finer-grained sediments with higher metal concentrations.

Station depth, sediment characteristics, and several biogeochemical parameters explained 51.3% of the variability observed in the benthic community. However, over one-third (35%) of the variability observed in the benthic community was associated with unmeasured parameters.

Data gaps

New parameters and analytical tools have increased our ability to see and understand patterns in benthic communities. Nevertheless, a large proportion of the variability in Elliott Bay benthos remains unexplained.

Additional research and collaborations are needed to improve our understanding of the pressures and impacts in Elliott Bay and their effects on the benthos, including:

- Adequate temporal and spatial resolution of oceanographic properties of overlying water.
- Additional parameters at the sediment-water interface.
- Sedimentation rates, transport, and depositional patterns.
- Ecological functions of benthic species.



Ecology scientists sampling Elliott Bay sediments.

Related information



[Marine sediments - Washington State Department of Ecology²](#)

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ADA accessibility

To request an ADA accommodation, contact Ecology by phone at 360-407-6831 or email at EAPPubs@ecy.wa.gov, or visit <https://ecology.wa.gov/accessibility>. For Relay Service or TTY, call 711 or 877-833-6341.

¹<https://storymaps.arcgis.com/stories/ec7db88b3d734e308df0b843e8a08b6b>

² <https://ecology.wa.gov/Water-Shorelines/Puget-Sound/Sound-science/Marine-sediments>