



# New kids on the block: Evaluation of alternative species for marine sediment bioaccumulation assessment

## Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS

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### Problem

Reliance on a limited number of species specified in national and regional guidance documents going back to the 1990's and that has not kept pace with scientific advancements and changes in the commercial availability has created a critical challenge towards performing laboratory bioaccumulation testing of dredge materials. Bioaccumulation testing, the costliest and most time-consuming component of required assessments for dredged materials, is complicated by sediment holding time constraints and the potential unavailability of field-collected organisms at desired testing times. Extreme weather events have impacted the availability of some field-collected species, and the limited number of commercial suppliers (often a single supplier) for testing organisms adds to the complexity of the problem. These challenges can lead to aborted testing, requiring costly efforts to re-collect sediments and substantial delays in executing the dredging mission. A specific challenge is the recent difficulties procuring the marine clam *Macoma nasuta* by Districts around the U.S. (e.g., Seattle and New England Districts). The single current supplier for *Macoma* in the U.S. reported a massive die off during a "Heat Dome" event in the summer of 2021 that set record high temperatures in the Pacific Northwest which is recovering but may impact the availability of adult *Macoma* for multiple years. Extreme heat events may become more likely which could continue to impact our ability to obtain *Macoma* for testing in the future.

### Study Description

We will conduct a side-by-side comparison study with *M. nasuta* and other clam species. One of the clam species to be evaluated is the purple varnish clam (*Nuttallia obscurata*), which has naturalized populations in the Pacific Northwest (British Columbia to Oregon, including Puget Sound). A preliminary study conducted in 2023 has shown that the purple varnish clam accumulated PCB congeners and metals at levels similar to those accumulated in *M. nasuta* within a factor of two. We will conduct side-by-side bioaccumulation exposure tests using field collected sediment with analyte concentrations that are likely to accumulate to detectable levels in both species. Classes of contaminants of concern (COC) evaluated will include metals, PCB congeners, chlorinated pesticides, PAHs, and dioxins and furans. Results of the clam comparison will be evaluated using the decision-making process per various regional guidance to allow a more robust determination of the appropriateness of the alternate clams as recommended test species. In addition, lipid content of exposed clams will be measured, and biota-sediment accumulation factors (BSAFs) derived for all clam species. We will also run the tissue results through the food web models to compare estimated risks from the clam compared using sediment bioaccumulation tests.

### Products

Planned products are a journal article on results of the limited-scope experiment comparing the bioaccumulation of PCBs in *M. nasuta* and *N. obscurata*. After completion of the project experimental work, results will be published in a journal article. A webinar and or and/or video presentation summarizing will summarize project results.

### Summary

The goal of the project is the selection of an appropriate new test species for sediment bioaccumulation tests that can be field-collected year-round, harbors minimal background whole-body contamination, and meets test species requirements described in guidance documents. We will conduct a side-by-side comparison study with *Macoma nasuta* and the purple varnish clam (*Nuttallia obscurata*), which occurs in the Pacific Northwest. Reduced reliance on a species with limited availability will reduce likelihood of costly project delays. The scientifically validated use of alternate marine clam species that may be utilized with confidence will benefit all Corps districts that conduct coastal navigation dredging.



*Balancing operational and environmental initiatives and meeting complex challenges of dredging and dredged material placement in support of the navigation mission.*

POC: Gui Lotufo

Environmental Laboratory • guilherme.lotufo@usace.army.mil

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## Research Products

Product Type	Product Title



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POC: Gui Lotufo

Environmental Laboratory • [guilherme.lotufo@usace.army.mil](mailto:guilherme.lotufo@usace.army.mil)

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