



Guidance for Communicating Risks of Microplastics and Nanoplastics in Dredged Sediments

Dredging Operations Environmental Research (DOER) Program

U.S. ARMY CORPS OF ENGINEERS

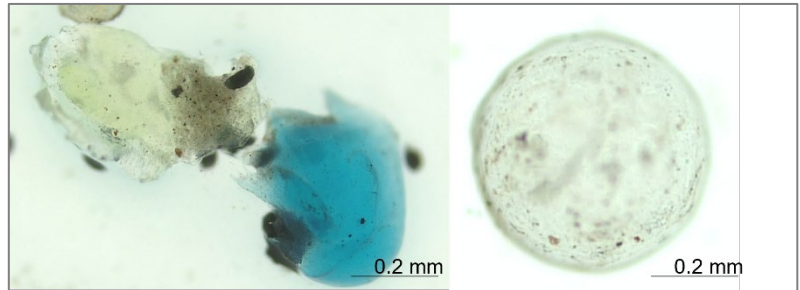
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Focus Area

Risk Management

Problem

There is immense international focus on whether global plastic pollution, more specifically micro- and nano-plastics is a risk to humans and the environment. Overall, the United States lacks a clear strategy to address public concerns regarding plastic pollution. Past research indicates rivers are plastic pollution hotspots where a portion of the plastics accumulates in benthic sediment or gets transported into marine systems. The U.S. Army Corps of Engineers (USACE) is responsible for dredging federal navigation channels which amount to several hundred million cubic yards of sediment being dredged annually. The international focus on plastics may expand precautionary principal concerns leading to stakeholders bombarding dredged material managers with questions about if microplastics should be added to contaminants of concern lists. There remain large uncertainties to the risks plastics pose from freshwater and marine sediments which leads to a large discrepancy between stakeholder and regulator perceptions of perceived versus actual risks. Therefore, the USACE needs a strategic response to concerns, including tools and approaches to communicate the relative exposures and risks often associated with nano- and micro-plastic in dredged sediments. This research task will leverage interdisciplinary expertise in ERDCs nanotechnology, microplastic analysis, polymer science, and apply these capabilities to appropriately bound and communicate risks of nano- and microplastics observed in navigable waterways.



Photos of microplastic fragments (left) and a sphere (right). Photo by ERDC.

Study Description

The overall approach will be to develop support tools (i.e., reference library, website content, guidance framework) for districts and stakeholders for the purpose to communicate the current state-of-the-science of putative risks of microplastics and nanoplastics. To achieve this overarching objective, the specific objectives are to: 1) conduct a literature review of microplastic occurrence and abundance relevant to dredging operations, 2) develop a database as a repository of information (e.g., fate, effects, risk) to support USACE dredge operations, and 3) develop a logical microplastic decisions support framework to help the dredging operation manager and other responsible parties to improve communication and information exchange with stakeholders.

Products

FY23: Web content and Tech Note (TN): “Guidance for Microplastic Occurrence in Sediments Near Dredging Operations”;
FY23: Searchable micro- and nanoplastic database tool

Summary

This research will be beneficial to address precautionary, poorly informed regulatory decisions regarding the disposal of dredged sediment, inform approaches to standardized methods, and inform definitions of micro- and nanoplastic. In the absence of data, often overly conservative (and unrealistic) safety factors and thresholds are applied which adversely impact the USACE dredging mission. This research will complement and build a decision support roadmap for USACE response to microplastic concerns based upon recently completed DOER research and would leverage the congressional research on nanomaterials.



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