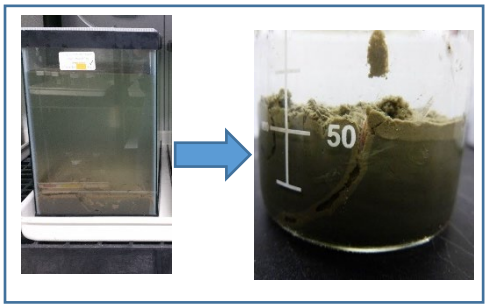
Assessing the Benefits and Viability of Miniaturized Benthic Bioaccumulation Tests and Analytical Methods

Focus Area

Risk Management

Problem

Bioaccumulation testing is the costliest and most time consuming component of the required testing conducted for the evaluation of dredged material (DM). The current suite of bioaccumulation tests requires large volumes of sediment (>50L) to be collected, shipped and processed under controlled conditions. In addition to the collection and transportation costs, the large analytical mass requirement for the standard test organisms introduces additional uncertainty and cost. The standard marine bioaccumulation test organisms are expensive and are field-collected; this is problematic because they may not be available at the desired time of testing and may display varying levels of responsiveness due to variability in native condition or stress during collection and shipping.



Study Description

The one year project will involve 1) brief USACE districts about ERDC research on using the amphipod *Leptocheirus plumulosus* in marine/estuarine bioaccumulation testing and survey their concerns, 2) survey and report the perceived benefits to USACE districts, the USEPA and other federal and state agencies of the commercial availability of standard analytical micro methods for reliable and accurate tissue residues determination from small masses of benthic invertebrate tissue, 3) perform a literature review of micro-analytical methods, and survey researchers in the USA and abroad to learn about and obtain unpublished existing analytical micro methods, 4) survey commercial labs to gauge their interest and requirements for offering small mass analysis as a routine service, 5) survey academic, government and commercial labs for their interest and requirements for participating in interlaboratory evaluations of analytical micro methods. Results of surveys will be used as the basis for conducting a workshop focused on identifying research needs and priorities related to bioaccumulation testing, including discussions on miniaturizing bioaccumulation test methods. The results of this effort would provide the path forward for follow-up proposals to the the Dredging Operations and Environmental Research Program (DOER) and Environmental Security Technology Certification Program that would involve method development, optimization and validation of miniaturized bioaccumulation tests in tandem with analytical micro methods and subsequent generation of standard operating procedures and side-by-side evaluations of conventional (e.g., using *Macoma nasuta* and *Alitta virens*) and small volume testing and analysis (e.g., using *L. plumulosus*) by multiple labs to validate the approach.

Products

The planned product for this one year project is a Technical Note summarizing the outcome of the surveys and workshop, including a proposed path forward for conducting research leading to standard methods for miniaturized bioaccumulation tests and analytical micro methods..

Summary

Bioaccumulation testing is the costliest and most time consuming component of the required testing conducted for the evaluation of dredged material (DM). The current suite of bioaccumulation tests requires large volumes of sediment to be collected, shipped and processed under controlled conditions. The objective of this project is to assess the benefits and viability of standardizing miniaturized benthic bioaccumulation tests and micro analytical methods to optimize bioaccumulation testing while meeting regulatory requirements for adequately assessing potential for biological impacts.

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