Proactive Interpretive Tools to address Confounding Factors in Dredge Material Bioassays

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Problem:

- Whole sediment toxicity bioassays result in dredged material evaluation "failures" not relatable to measured contaminants of concern
- Such failures prevent open water placement
- Regulators may not accept retroactive "retesting" determinations

Objectives:

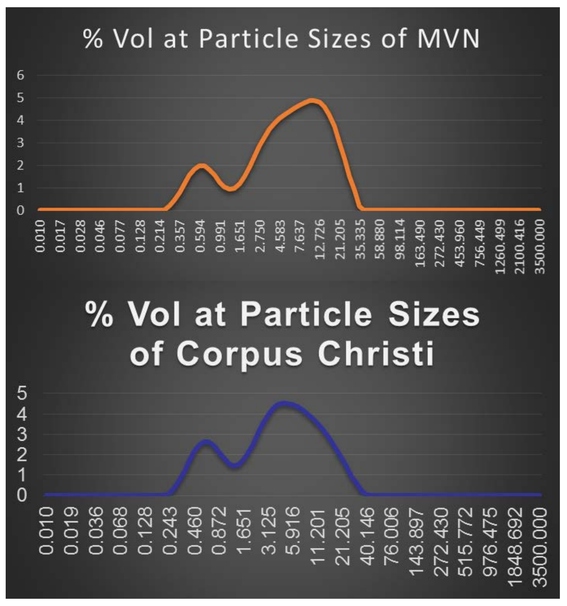
- Need improved, species-specific grain size tolerance and decision guidance for a priori decisions to identify and mitigate confounding factors (e.g., grain size, TOC)
- Generate supportive scientific data

Value Statement:

- Dredging project managers will have new guidance for selection of appropriate bioassay test organisms based on sediment characteristics which will reduce testing failures due to ecologically irrelevant species and will result in saving millions in annual O&M costs.

Approach

- Task 1 Fraction Methods
- Task 2 Biological Threshold testing
- Task 3 Engage Stakeholders and EPA to inform them on Research objective
- Task 4 Decision Guidance



Source Material Particle Analysis

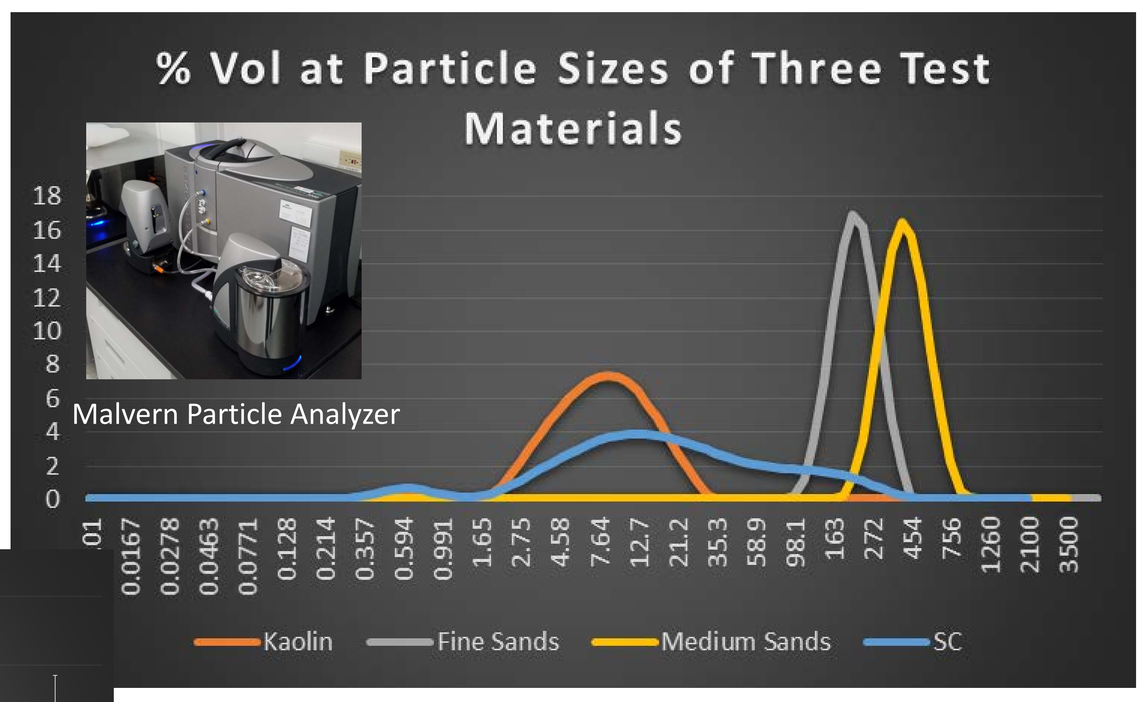
Particle Size:

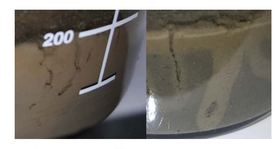
- Fractionate and bin in sizes understood to be biologically incompatible with test species
- Sources: MVN, Corpus Christi, Washed Sands, and Kaolin Clay.


Sieves used for fractionation

Baseline Grain Size and TOC testing

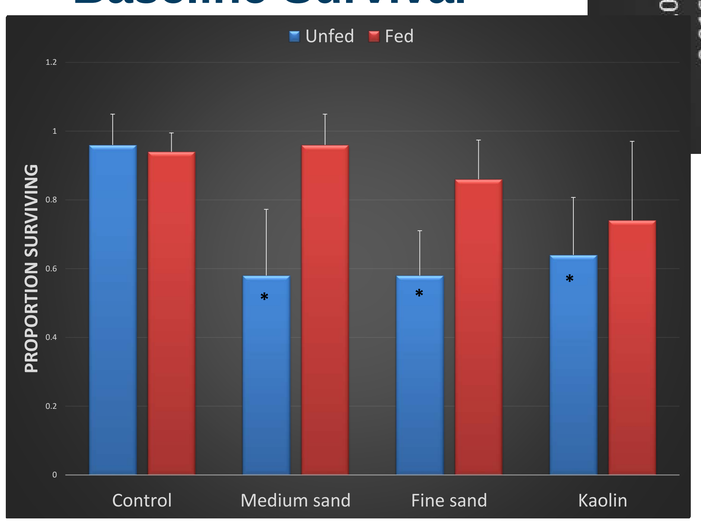
- Feeding (TOC) significant factor ($P<0.01$) for overall survival and survival in sand.
- Fine particle size is a significant factor even when TOC is provided.

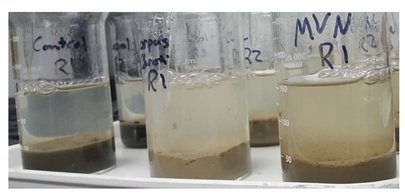




Lepto Burrows in MVN and SC

Baseline Survival



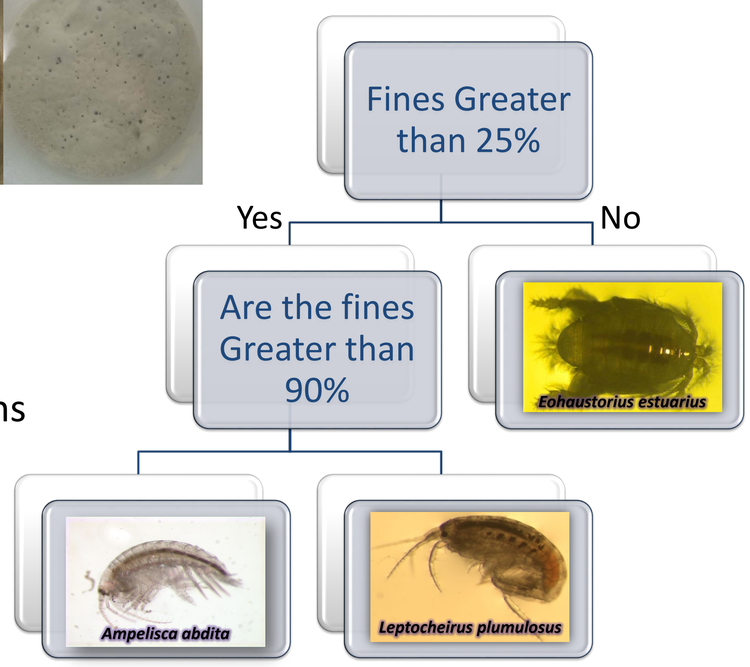

Source material testing

Species Priority List

Species	Habitat	Grain size	other
Leptocheirus	Free burrowing, moderate fines	Coarse sand: ✗ Very fines: ?	in house East coast
Eohaustorius	Free burrowing, medium sands, estuarine, high organic preferred	Coarse sand: ✓ Very fines:✗	West coast
Ampelisca	Tube builders, wide distribution, higher salinity tolerance	Coarse sand: ? Very fines: ?	Both coasts
Rhepoxynius	Fines	Coarse sand: ✗ Very fines: ✓	West coast

Decision Guidance

- Tree to quickly parse out best species given conditions (Grain Size Distribution and TOC)
- Decision can be made prior to initiation of testing



Simplified Grain Size Decision Tree

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