Assessing Dredging Windows for Winter Flounder Using Effects-Based Data for Total Suspended Solids: Range-Finding Experiment Update

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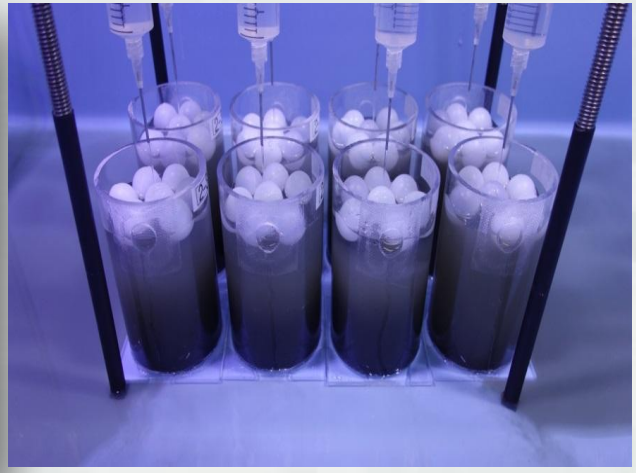
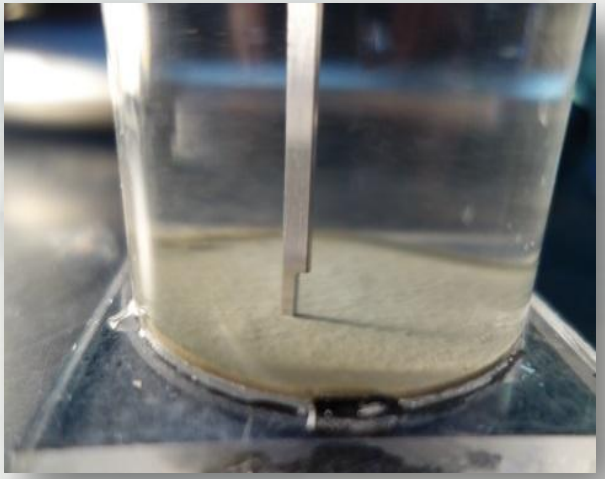
WFL Experiment Preparations

- Received Patchogue River sediment- Jan 2015
- Stakeholder review of experimental design- Feb 2015
- ERDC developed responses to comments- Mar 2015
- Revisions to design include:
  - Sediment processing to separate grain sizes
  - Portion of processed sediment sent to UNH to declump eggs
  - Methods to create sediment monolayer
  - Methods to measure sediment depth





Sediment Processing Procedure

- Determine particle size of interest and calculate settling time using Stoke's Law
- Manually mix 4 L water with 1 L sediment in "mixing" bucket
- Let settle in mixing bucket for predetermined time period (e.g., 90 sec)
- Decant suspended sediment into a "holding" bucket
- Sediment is allowed to settle 24 h
- After 24 h overlying water is siphoned down to sediment surface
- Portion sent to UNH and portion kept in-house

Sediment Processing Procedure - Video

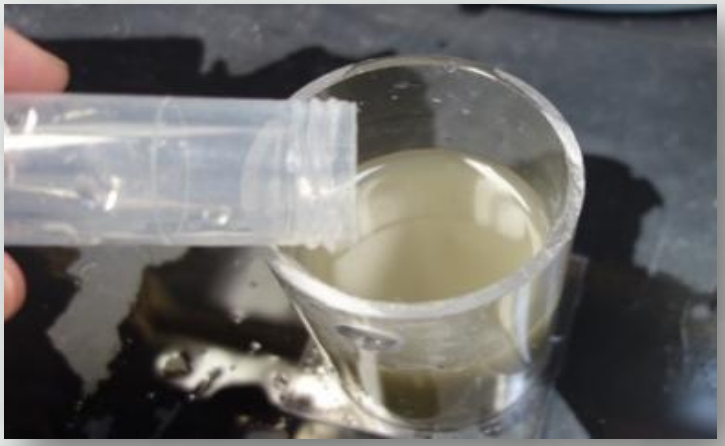
UNH - Declump Eggs with Sediment

- Eggs are typically declumped with commericially available diatomaceous earth
- We will use site sediment to declump eggs; mimic field conditions when a dredge plume is present
- Mix approximately 500 ml of test sediment with 1 gal of hatchery water
- Add this slurry to the egg bowl for declumping

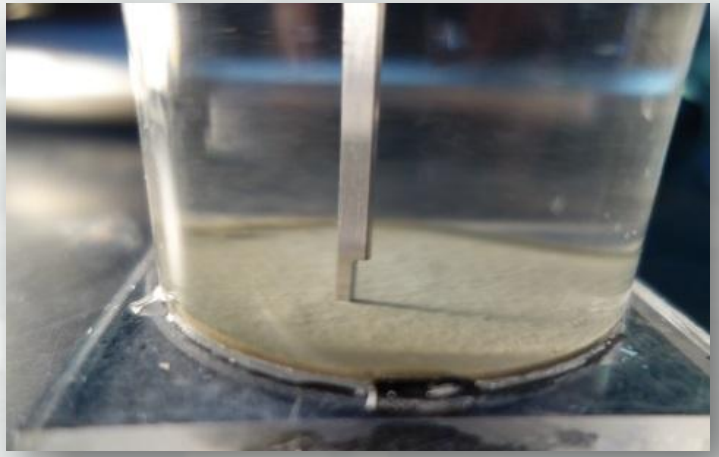
Creating Sediment Monolayers over Eggs

(1) Weight wet sediment (±0.0001g)

(2) Transfer to centrifuge tube

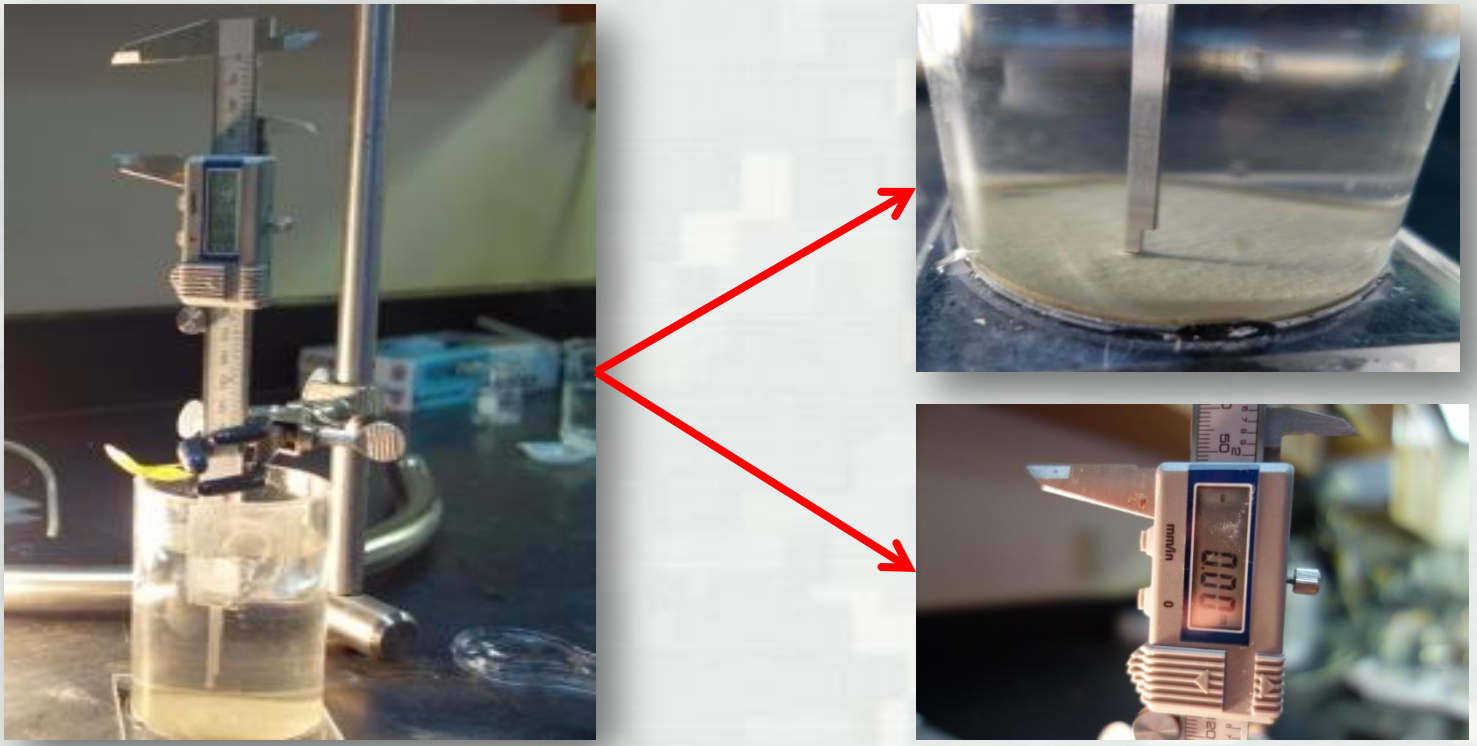


(3) Create slurry; transfer



(4) Let settle; measure (±0.01 mm)

Sediment Depth Measurements

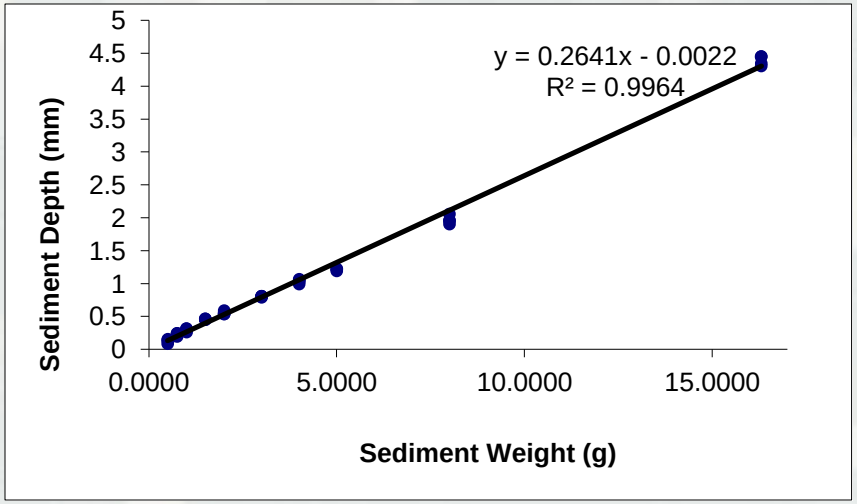


- Compaction beyond 24 h (**after 24 h = 4.08 mm**, after 48 h = 3.83 mm)
- Sediment treatment depths will be based on 24 h settling time depths
- Sediment depth will be measured with digital caliper depth probe lowered into vessel
- Sacrificial vessels will be used to monitor sediment compaction over time
- Is there a relationship between time to compaction and egg mortality?

Sediment Depth Calculations

- Introduced various wet sediment weights (0.5, 0.75, 1.0, 1.5, 2.0, 3.0, 5.0 g) into test vessels (4 reps of each weight)
- Let settle 24 h then measured depth with a digital caliper depth plunger (± 0.03 mm)

Linear regression for Patchogue River sediment



- Developed regression between sediment weight and depth; used equation to predict sediment weight for desired depths
- Confirmed accuracy of equation by introducing the predicted weights into test vessels and measuring depth

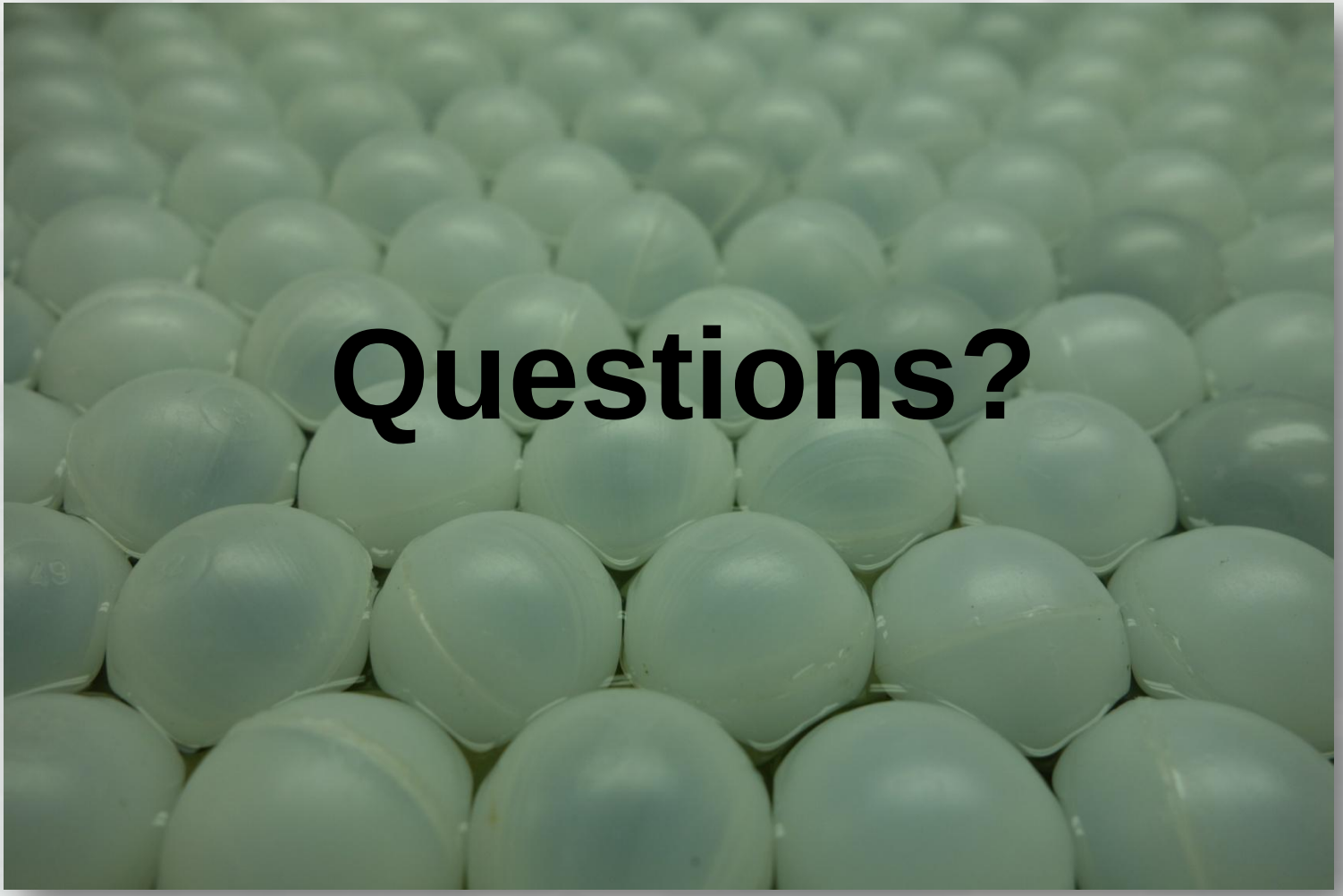
Test Vessels and Flow Through Conditions

- 6 vessels/treatment, 3 are for final sampling, 3 for in-life testing
- Flow-through water delivery
- 2-4 volume exchanges per day
- Successfully introduced water without resuspending sediment
- Thermal balls on water surface to reduce energy of water entering the vessel

Test Vessels and Flow Through Conditions – Video

Path Forward

- Finalize experimental design details- ASAP
- Obtain 2nd and 3rd sediments from NAE- April 6th
- WFL spawn (E. Fairchild, pers. comm.)- mid April
- Projected Patchogue River experiment start date- mid April
- Projected experiment start date with 2nd and 3rd sediments- late April


Questions?