

A close-up photograph of a hand holding a large, textured oyster shell. The shell is light-colored with a rough, porous surface and several circular holes. The background is a solid, light blue color.

Oyster Reef Restoration Metrics Workshop

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Measuring and Modeling Seston Uptake Rates by Suspension-Feeding Benthos

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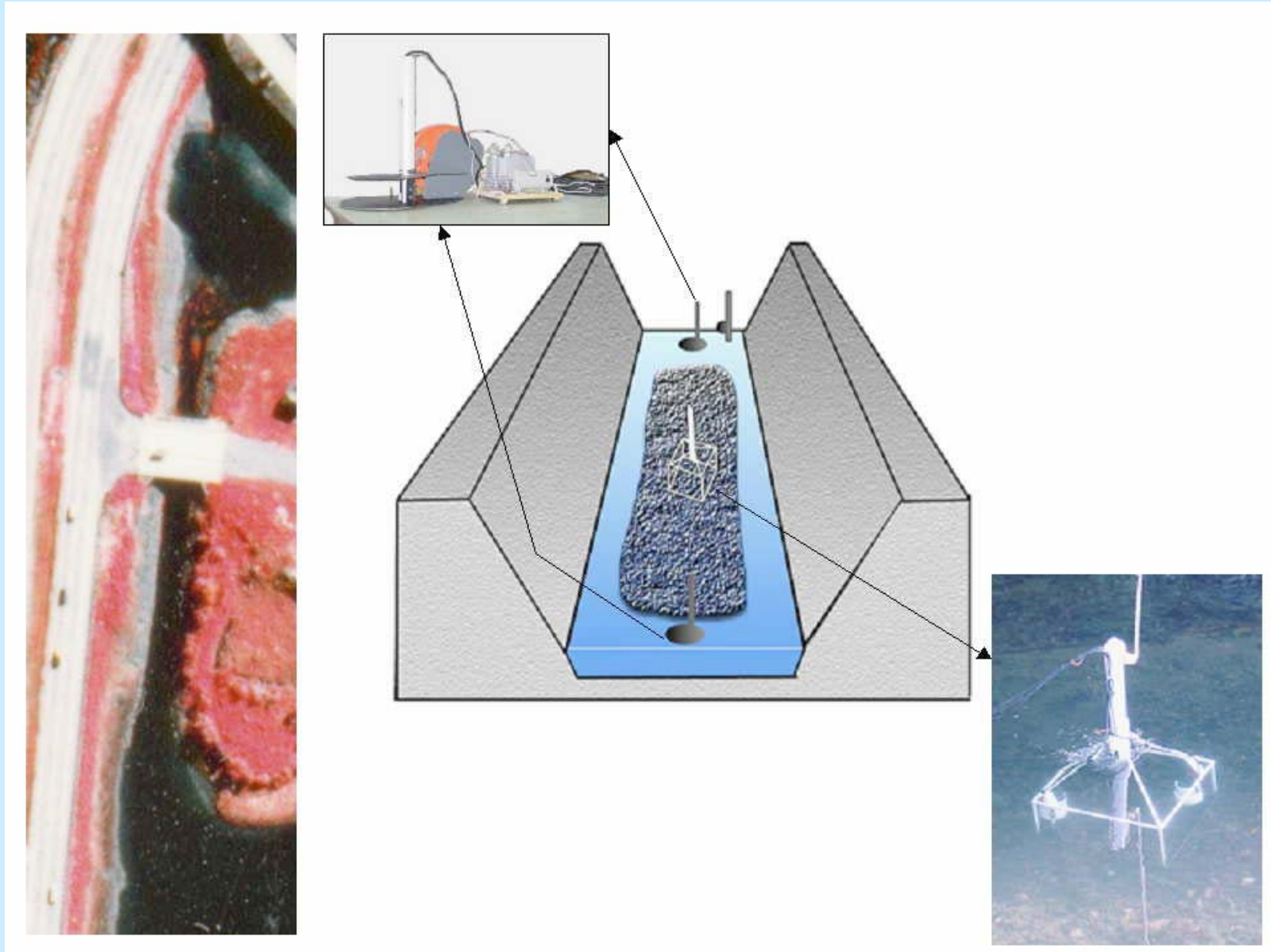
University of New Hampshire

Metrics Measured - 2

- Seston uptake – upstream/downstream sampling, in situ fluorometry and pumped samples; selected projects



Measuring Seston Uptake Rates



Modeling Seston Uptake Rates

$$\begin{aligned}\% \text{ Clearance (seston uptake)} &= (\text{Total bivalve clearance} / \text{Total water flow}) \times 100 \\ &= (A \times B \times C) / (D \times E) \times 100\end{aligned}$$

where:

A = Mean bivalve density in modeled area (# individuals/m²)

B = Mean individual water clearance rate (L/individual/hr converted to m³/ind/hr)

C = Bottom area of modeled reef (m²)*

D = Cross-sectional area of stream (m²)*

E = Mean water flow (cm/s converted to m/hr)

*Assumes a 1-m wide "modeled area" in open water situations where there are no constraints horizontally on flow

Variables A, C, D, and E are measured. Variable B (individual clearance rate) is taken from the literature based on average size of bivalves in the study area

Summary of Measured Uptake and Model Predictions

Eastern oyster (<i>Crassostrea virginica</i>)											
	Model Parameters						Seston Uptake (% difference up- and downstream)				
	Mean Bivalve Density	Mean Bivalve Size	Clear. Rate	Flow Length	Mean Flow Speed	Mean Water Depth					
Location	(# m ⁻²)	(mm)	(L hr ⁻¹)	(m)	(cm s ⁻¹)	(m)	Model Predictions	<i>In situ</i> Fluor.	Chl. <i>a</i>	Total Seston	Organic Seston
FL reef 1	61	33.3	3.3	12	11.8	0.31	1.8	12.0(7)	-	-	-
FL reef 2	122	52.2	5.2	20	4	0.19	46.4	38.7(4)	-	-	-
FL reef 3	76	48.8	4.9	45	5.3	0.45	19.5	11.5(8)	17.2	0	0
FL reef 4	134	45	4.5	17	8	0.17	20.9	27.1(5)	-	-	-
Blue mussel (<i>Mytilus edulis</i>)											
	Model Parameters						Seston Uptake (% difference up- and downstream)				
	Mean Bivalve Density	Mean Bivalve Size	Clear. Rate	Flow Length	Mean Flow Speed	Mean Water Depth					
Location	(# m ⁻²)	(mm)	(L hr ⁻¹)	(m)	(cm s ⁻¹)	(m)	Model Predictions	<i>In situ</i> Fluor.	Chl. <i>a</i>	Total Seston	Organic Seston
NH reef 1 (OSMP)	292	47	4.7	12	15	~1	2.5	0	0	0	0
NH reef 2 (Albacore)	440	45	4.5	63	19.5	0.37	47.0	27.8(4)	16.3	-	-