Oyster Reef Restoration Metrics Workshop
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Measuring and Modeling Seston Uptake Rates by Suspension-Feeding Benthos

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Metrics Measured - 2

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

% Clearance (seston uptake) = (Total bivalve clearance/Total water flow) x 100

= (A x B x C)/(D x E) x 100

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 (*Crassostrea virginica*)

<table>
<thead>
<tr>
<th>Location</th>
<th>Density (# m(^{-2}))</th>
<th>Size (mm)</th>
<th>Clear. Flow (L hr(^{-1}))</th>
<th>Length (m)</th>
<th>Speed (cm s(^{-1}))</th>
<th>Water Depth (m)</th>
<th>Model Predictions</th>
<th>In situ Fluor. Chl. (a)</th>
<th>Total Seston</th>
<th>Organic Seston</th>
</tr>
</thead>
<tbody>
<tr>
<td>FL reef 1</td>
<td>61</td>
<td>33.3</td>
<td>3.3</td>
<td>12</td>
<td>11.8</td>
<td>0.31</td>
<td>1.8</td>
<td>12.0(7)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FL reef 2</td>
<td>122</td>
<td>52.2</td>
<td>5.2</td>
<td>20</td>
<td>4</td>
<td>0.19</td>
<td>46.4</td>
<td>38.7(4)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>FL reef 3</td>
<td>76</td>
<td>48.8</td>
<td>4.9</td>
<td>45</td>
<td>5.3</td>
<td>0.45</td>
<td>19.5</td>
<td>11.5(8)</td>
<td>17.2</td>
<td>0</td>
</tr>
<tr>
<td>FL reef 4</td>
<td>134</td>
<td>45</td>
<td>4.5</td>
<td>17</td>
<td>8</td>
<td>0.17</td>
<td>20.9</td>
<td>27.1(5)</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### Blue mussel (*Mytilus edulis*)

<table>
<thead>
<tr>
<th>Location</th>
<th>Density (# m(^{-2}))</th>
<th>Size (mm)</th>
<th>Clear. Flow (L hr(^{-1}))</th>
<th>Length (m)</th>
<th>Speed (cm s(^{-1}))</th>
<th>Water Depth (m)</th>
<th>Model Predictions</th>
<th>In situ Fluor. Chl. (a)</th>
<th>Total Seston</th>
<th>Organic Seston</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH reef 1 (OSMP)</td>
<td>292</td>
<td>47</td>
<td>4.7</td>
<td>12</td>
<td>15</td>
<td>~1</td>
<td>2.5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>NH reef 2 (Albacore)</td>
<td>440</td>
<td>45</td>
<td>4.5</td>
<td>63</td>
<td>19.5</td>
<td>0.37</td>
<td>47.0</td>
<td>27.8(4)</td>
<td>16.3</td>
<td>-</td>
</tr>
</tbody>
</table>

### Model Parameters

- **Eastern oyster**
  - Mean Bivalve Density
  - Mean Bivalve Size
  - Mean Clear. Flow
  - Mean Flow Rate
  - Mean Water Length
  - Mean Speed
  - Mean Water Depth
  - Model Predictions
  - In situ Fluor. Chl. \(a\)
  - Total Seston
  - Organic Seston

- **Blue mussel**
  - Mean Bivalve Density
  - Mean Bivalve Size
  - Mean Clear. Flow
  - Mean Flow Rate
  - Mean Water Length
  - Mean Speed
  - Mean Water Depth
  - Model Predictions
  - In situ Fluor. Chl. \(a\)
  - Total Seston
  - Organic Seston