Tracking the health of Mobile Bay

Ashley McDonald
Dauphin Island Sea Lab
What to monitor?

• What has changed?
  • Land use
    • Forested, grasslands, marsh ➞ Agriculture, industrial, urban
    • Impervious surfaces ➞ sedimentation, nutrient loading
    • Approx. 60% increase in urban area surrounding Mobile Bay (1974-2008)

What to monitor?

- What is the best parameter to monitor?
  - EPA designates 5 categories from multiple parameters:
    - **Water quality**- clarity, Chlorophyll a, DO
    - **Sediment quality**- toxic compounds (PAHs, PCBs, metals)
    - **Benthic index**- related to low WQ (sedimentation, low DO)
    - **Coastal habitat index**- wetland, SAV
    - **Fish tissue contaminants**

U.S. EPA/NCA (2012)
What to monitor?

- Comparison to other estuaries?
  - Monitoring from other regions, Chl a and DO:
    - Chesapeake Bay
    - Roanoke and Pamlico Sounds, NC
    - Sounds of Georgia
    - Galveston Bay
    - South Slough Estuary, OR
    - San Francisco Bay

Where are we?

Environmental/Anthropogenic Stressors vs. Ecosystem quality

Mobile Bay???
What data is available?

- Historical datasets for Mobile Bay

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Years encompassed</th>
<th>Parameters</th>
<th>Sampling schedule</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pennock et al.</td>
<td>1989- 1999</td>
<td>DO, chl a, light attenuation</td>
<td>Random</td>
</tr>
<tr>
<td>Alabama Coastal Foundation</td>
<td>1991- 2005</td>
<td>DO, secchi depth</td>
<td>Weekly</td>
</tr>
<tr>
<td>EPA</td>
<td>2000- 2003</td>
<td>DO, secchi</td>
<td>Yearly</td>
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<tr>
<td>McIntyre et al.</td>
<td>2005- 2007</td>
<td>Chl a, light attenuation</td>
<td>Monthly</td>
</tr>
<tr>
<td>ADEM</td>
<td>2011- 2013</td>
<td>DO, chl a, secchi</td>
<td>Bimonthly, only 3x year</td>
</tr>
</tbody>
</table>

• Prior to 1989?
• Datasets past 2005 in Area of Interest are sporadic, not necessarily comparable
Historical data for Mobile Bay

- EPA standards: Good, Fair, Poor

\[ y = 0.7255x - 1439.3 \]
\[ R^2 = 0.5261 \]

\[ y = -0.0764x + 158.57 \]
\[ R^2 = 0.2444 \]
Issues with historical and future datasets

• Compatibility!
  • Technique A ≠ Technique B
  • Chlorophyll sampling: in situ fluorescence vs. extractive analysis
  • Light availability: light extinction, secchi, turbidity

• Incomplete sampling sets
  • Sample rounds conducted only once to three times per year
  • Single replicate samples
  • Lack of spatial replication

• Location!
  • monitored sites change with agencies
What do we need to do?

Confirm current chlorophyll and DO temporal tendencies in Mobile Bay

• Resume monitoring in sampling stations and temporal replication similar to Pennock and ACF datasets
• Keep monitoring for 3 years (2014-2017)
• Interpolate past datasets (1990-2005) with the new dataset (2014-2017)
Questions?!

Thank you!

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