Hypothesis

Eutrophication assessment has a significant effect on the degree of eutrophication in the swashes and can be used along the estuarine coast of North Carolina (Stover & Bivens).

Eutrophication

- Eutrophication is a syndrome caused by increased levels of nutrients in the water. This increase can be caused by natural processes or human activities.
- Nutrient enrichment in the nation's estuaries (Bricker et al. 1999) from NOAA.
- shorelines have been proposed for set by eutrophication and algal blooms. Source of these include:
  - Stormwater runoff containing:
- Phosphorus
- Nitrogen
- Fecal matter (also contains coliform bacteria). Sources of feces include:
  - Domestic sewage
  - Animal waste
- Eutrophication is a syndrome caused by nutrient loading, particularly of the elements, nitrogen and phosphorus.
- These nutrients can come from stormwater runoff containing:
- Pet 
- Wildlife

Summary of Eutrophication Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turbidity</td>
<td>100</td>
</tr>
<tr>
<td>Analyte</td>
<td>Method</td>
</tr>
<tr>
<td>Phosphate</td>
<td>Total and E. Coliforms by Membrane Filtration using Hach™ e-Coli Blue media</td>
</tr>
<tr>
<td>Nitrate</td>
<td>Phosphate and Nitrate + Nitrite by Beer's Law*</td>
</tr>
<tr>
<td>Nitrite</td>
<td>Salinity by Knudsen Titration</td>
</tr>
<tr>
<td>TSS</td>
<td>pH (indicator of the degree of organic matter decay)</td>
</tr>
<tr>
<td>DOC</td>
<td>Phosphate</td>
</tr>
<tr>
<td>Temperature</td>
<td>Phosphate</td>
</tr>
<tr>
<td>Oxygen deficits result</td>
<td>Phosphate</td>
</tr>
<tr>
<td>Percent saturations</td>
<td>Phosphate</td>
</tr>
</tbody>
</table>

Sampling Strategy

A total of 8 swashes were sampled with each swash containing 10 water samples. The sampling stations were selected from the 3 swashes.
- Surf Zone North of Swash during Ebbing Tide
- Surf Zone South of Swash during Ebbing Tide
- Upstream in Swash during Ebbing Tide

Methods

- A total of 8 swashes were sampled in the present study. One sample was taken at each of the following locations:
- Surf Zone North of Swash during Ebbing Tide
- Surf Zone South of Swash during Ebbing Tide
- Upstream in Swash during Ebbing Tide

DATA

Safety (ppm)

- Mean: 8.7 + 0.06
- Limit: 3.0

Dissolved Oxygen (ppm)

- Mean: 2.22 + 0.09
- Limit: 1.5

Alkalinity (mg/L)

- Mean: 5.0 + 0.29
- Limit: 3.0

Figure 1: Figure 1 shows the results of the eutrophication analysis. The SWP (Surf Zone North of Swash during Ebbing Tide) had the highest value for the Eutrophication Index, indicating a higher degree of nutrient loading. The pH values were similar across all swashes, suggesting a buffered effect of the bicarbonate buffer system. The swash has lower alkalinity values because there is not the same amount of buffer capacity as the ocean. Therefore, changes in pH have the potential to cause more significant changes in the swash system compared to the ocean. The pH values in the surf zone correspond with the swash values, suggesting a northward flow of the longshore current.

Figure 2: Figure 2 shows the percent saturation of oxygen for the swash and corresponding ocean sites. The percent saturation of oxygen was higher in the swash compared to the ocean sites, indicating a higher degree of nutrient loading. The oxygen deficits result in doming during the sampling period. This is consistent with the observed turbidity in the surf zone, suggesting a higher degree of nutrient loading in the swash compared to the ocean.
The surf zone at these sites.

The Grand Strand Area, South Carolina

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Conclusions

- The swashes indicate the outflow of the nonpoint runoff, suggesting influence of intertidal mussel beds of nutrients. The swashes show elevated levels of analytes suggesting influence of nonpoint runoff of sewage and/or fertilizers. Nonpoint runoff is the run-off from fields and the ground during rain.

- Environmental Quality Lab, Coastal Carolina University
- Spring 2002 Marine Chemistry Class, Coastal Carolina University
- Marine Sciences Department, Coastal Carolina University
- Environmental Quality Lab, Coastal Carolina University

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