Human population density, and therefore urbanization, is predicted to increase rapidly along South Carolina’s (SC) coast over upcoming decades, which will undoubtedly affect estuarine nutrient (N) and phosphorus (P) levels. This project examines how inorganic and organic forms of N, with or without P, influence phytoplankton biomass and community composition among four coastal SC habitats: a forested tidal creek, an urbanized tributary, a salt marsh, and a stormwater detention pond. Phytoplankton biomass and community composition responses will be assessed via seasonal field sampling and nutrient addition bioassays over two years (2011-2013). Fluorometric analyses of chlorophyll a will be used to calculate phytoplankton biomass. High performance liquid chromatography (HPLC) pigments will be analyzed using CHEMTAX to determine relative abundances of algal taxa. Dissolved organic carbon (DOC) and heterotrophic bacterial abundances will also be assessed.

**Introduction**

**Land Cover**

Diversity of land cover along the SC coast
- Urban, industrial, residential, relatively untouched forested wetlands
- Land cover likely influences nutrient condition
Urbanization expected to increase along coastal habitats, which may alter N and P levels into coastal habitats

**Phytoplankton Response to Macronutrients**

Phytoplankton biomass is strongly influenced by dissolved inorganic nitrogen in Pamlico Sound, NC⁴ and Neuse River Estuary, NC⁵

**Dissolved Organic Carbon (DOC)**

Coastal SC is rich in DOC; most is terrigenous DOC fuels microbial respiration and can contribute to hypoxia

**Objective 1:** Determine whether seasonal phytoplankton biomass (chlorophyll a) responds to macronutrient (N and P) form across sites.

**Objective 2:** Determine whether seasonal phytoplankton community composition responds to macronutrient form across sites.

**Objective 3:** Assess whether heterotrophic microbial levels mimic patterns of DOC and phytoplankton biomass between sites.

**Methodology**

**Nutrient Additions (in triplicate)**

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Control</th>
<th>NH₄⁺</th>
<th>NO₂⁻</th>
<th>NO₃⁻</th>
<th>Urea</th>
<th>PO₄³⁻</th>
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</thead>
<tbody>
<tr>
<td>Whole Water</td>
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</tbody>
</table>

**Bioassay Deployment**

**Incubation Water** (t=0 and post-bioassay)

- Water quality
  - total N and P
  - dissolved nutrients
  - DOC
  - T, S, DO, pH
  - verify HPLC
  - Lugol's preservation for phytoplankton abundance
- Microscopy
- HPLC Analysis
- Chlorophyll a measurements
- phytoplankton biomass

**Flow cytometry**

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**References**