Coastal Ecological Flows Framework for North Carolina’s Coastal Region

Coastal Ecological Flows Work Group

Evaluational characteristics and classifications using GIS resources (see examples below)
- NC DENR: Water Quality Classifications
- US Fish & Wildlife Service: National Watershed Inventory (tidal, fresh water)
- USGS: National Elevation Dataset (reach slopes), National Hydrography Dataset (reach paths)

Typology Refined via Spatial Data
- Ecosystem Assessment Focus

<table>
<thead>
<tr>
<th>Species</th>
<th>Salinity (ppt)</th>
<th>Temperature (°C)</th>
<th>Dissolved Oxygen (mg/l)</th>
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</thead>
<tbody>
<tr>
<td>Alewife</td>
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Classification:
- Low Gradient, Non-tidal: Sand, mud, saltwater
- Low Gradient, Saline: Sand, mud, saltwater
- Total Freshwater: Sand, mud, saltwater

Recommendations
- Essential continuing efforts for Coastal Streams moving forward:
  - Determine relationship of discharge patterns and stream flow
  - Assess inland extent of tidal influence
  - Identify critical water quality indicators for juvenile species
  - Further definition of hydrologic characteristics in each stream reach
  - Determine baseline flow regimes in respective basins
  - Inventory and account for current and projected withdrawal and discharge rates

Coastal Ecological Flows

Due to tidal influence and tail water conditions common to the region, coastal stream flow is often independent of stage, invalidating a fundamental concept of traditional eco-flow models. A relative lack of long-term and spatially distributed flow records impedes characterization of regional flow regimes. Unique regional ecologies also developed from natural water quality characteristics interdependent with flow, such as low pH and dissolved oxygen, saltwater gradients, and higher dissolved organic carbon. Developing a framework for classifying stream reaches serves as the first step for determining regional eco-flows. The CEFWG’s framework development process is presented here.

Framework Development

The initial typology (figure 2) was developed from the CEFWG’s knowledge and studies of distinguishing ecological characteristics and classifications across the region. Habitats were assigned to each classification.

Typology: Table 1 – Phytoplankton (Algal) and Fish Development Requirements for Resident Freshwater and Anadromous Fishes

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