Coastal Restoration on Long Island

Assessing the Nitrogen Problem

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Background

- Suffolk County, New York
- Sole Source Aquifer
- Water Quantity & Quality
- Surface Water Impacts
Computational Model Framework
Discretization Added to Finite Element Grids
Groundwater Contributing Areas to Surface Waters
Estimation of Parcel-Specific Nitrogen Loads

- **Sanitary Wastewater**
  - On-site Sanitary Wastewater Systems
  - Sewage Treatment Plant Discharges

- **Fertilizer**
  - Residential Areas
  - Agriculture
  - Golf Courses & Parks

- **Atmospheric Deposition**
  - To Contributing Area
  - To Surface Water

- **Pets**
2016 Land Use Data
Simulated Water Table (ft, msl)

<table>
<thead>
<tr>
<th>Simulated Time of Travel (yrs.)</th>
<th>West Neck Bay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel Time (yrs)</td>
<td>% of Total Area</td>
</tr>
<tr>
<td>0 to 2</td>
<td>46%</td>
</tr>
<tr>
<td>2 to 10</td>
<td>38%</td>
</tr>
<tr>
<td>10 to 25</td>
<td>13%</td>
</tr>
<tr>
<td>25 to 50</td>
<td>2%</td>
</tr>
<tr>
<td>50 to 100</td>
<td>&lt; 1%</td>
</tr>
<tr>
<td>100 to 200</td>
<td>0%</td>
</tr>
</tbody>
</table>
2,325 point sources

Point Source

- Simulated Water Table (ft, msl)

Land Use

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Industrial
- Institutional
- Recreation & Open Space
- Agricultural
- Vacant
- Transportation
- Waste Handling Management
- Water
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Shelter Island – Areas Contributing Groundwater Baseflow to Subwatersheds
Simulated Nitrogen Concentrations
Equilibrium Nitrogen Concentrations after 200 Years
Wastewater Management Planning Criteria

- Travel Time to Discharge
- Land Use
- Nitrogen Load
- Depth to Groundwater
- SLOSH zones
Nitrogen Load Reduction Considerations

- Unit Nitrogen Loads
- Residence Times
- Dissolved Oxygen
- Total Nitrogen
- Total Phosphorus
- Chlorophyll ‘a’
- Secchi Depth
- Harmful Algal Blooms
  - Human Health Impacts
  - Environmental Impacts
Subwatershed Priorities for Nitrogen Load Reduction
Nitrogen Load Reduction Approach

- Reference Water Body
- Stress-Response
- Published Values
Draft Example Nitrogen Load Reduction Goals for Marine Subwatersheds
Questions?