Managing the Effects of Sea Level Rise on Archaeological Sites at Fort Eustis, Newport News, Virginia

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Talk Outline

– Climate Change Effects
– Project Area (Ft Eustis)
– Archeological & Engineering Assessments
– Cultural Resource Management Solutions
– Engineering Solutions
Climate Change Effects in the Southeast United States

- Rising seas and retreating shores
- Saltwater intrusion
- Increased high temperatures
- Decreased freeze events

Vulnerability to the effects of sea level rise (National Climate Assessment 2014 based on research from Hammar-Klose and Thieler 2001)
Sea Level Rise Trends
Sea Level Rise Trends
Sea Level Rise Trends – NOAA Data Location
Sea Level Rise Trends

Estimated Relative Sea Level Change Projections - Gauge: 8638610, Sewells Point, VA

RSLC in feet (NAVD88)

Year
Ft Eustis

- Sites located on Mulberry Island (part of the Joint Base Langley-Eustis)
- Along the James River (west) and Warwick River (east)
- Dozens of archaeological sites on the island; many currently experiencing erosional damage
Shoreline Stability

- Shoreline classified as Stable or Unstable
- Based on field data collected by the Virginia Institute of Marine Science (VIMS) in 2010
- Field reconnaissance conducted to verify current conditions at site locations
Ft Eustis

- Exciting field reconnaissance for an engineering - included boats, bugs, and a UXO expert!
Archeological & Engineering Assessments

1. Determine the **location** of the culture resource and current **exposure**.
2. Determine the **significance** of the site based on the National Register of Historic Places eligibility criteria.
3. Determine the **risk** of losing the cultural resource due to sea level rise and/or erosion.
### Cultural Resources Vulnerability Index (Part 1)

<table>
<thead>
<tr>
<th>Site</th>
<th>NRHP Eligibility</th>
<th>Eroding Artifacts (Yes-No)</th>
<th>Features within 5 m of Shore (Yes-No)</th>
</tr>
</thead>
<tbody>
<tr>
<td>44NN0012</td>
<td>DNM*</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>44NN0013</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>44NN0014</td>
<td>DNM</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>44NN0015</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>44NN0017</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>44NN0019</td>
<td>DNM</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>44NN0030</td>
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<td>N</td>
<td>N</td>
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<tr>
<td>44NN0034</td>
<td>Y</td>
<td>N</td>
<td>N</td>
</tr>
<tr>
<td>44NN0105</td>
<td>DNM</td>
<td>Inundated during high tide</td>
<td>Inundated during high tide</td>
</tr>
</tbody>
</table>

*DNM = Determination not made
### Cultural Resources Vulnerability Index (Part 2)

<table>
<thead>
<tr>
<th>Site</th>
<th>Past Erosion Rate (Score)</th>
<th>Present Erosion Threat (Score)</th>
<th>Future Erosion Threat, Low (Score)</th>
<th>Future Erosion Threat, High (Score)</th>
<th>Total Coastal Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>44NN0012</td>
<td>Unstable (1)</td>
<td>Significant threat (3)</td>
<td>Not inundated (0)</td>
<td>Inundated within 50 years (0.5)</td>
<td>4.5</td>
</tr>
<tr>
<td>44NN0013</td>
<td>Stable (0)</td>
<td>Low threat (1)</td>
<td>Not inundated (0)</td>
<td>Inundated within 20 years (0.75)</td>
<td>1.75</td>
</tr>
<tr>
<td>44NN0015</td>
<td>Unstable (1)</td>
<td>Significant threat (3)</td>
<td>Inundated within 50 years (3)</td>
<td>Inundated within 10 years (1.5)</td>
<td>8.5</td>
</tr>
<tr>
<td>44NN0017</td>
<td>Very low</td>
<td>Low threat (1)</td>
<td>Not inundated (0)</td>
<td>Inundated within 50 years (0.5)</td>
<td>1.5</td>
</tr>
<tr>
<td>44NN0018</td>
<td>Very low</td>
<td>Moderate threat (2)</td>
<td>Not inundated (0)</td>
<td>Inundated within 50 years (0.5)</td>
<td>2.5</td>
</tr>
<tr>
<td>44NN0233</td>
<td>Low (1)</td>
<td>Significant threat (3)</td>
<td>Inundated within 5 years (3)</td>
<td>Inundated within 5 years (2)</td>
<td>9</td>
</tr>
</tbody>
</table>

High Score = High Vulnerability  
Low Score = Low Vulnerability
Management Options

Archeological Management Options
1. No Action
2. Monitoring
3. NRHP Evaluation
4. Archaeological Data Recovery
5. Alternative/Creative Mitigation

Engineering Management Options
1. Geotextile Tubes
2. Living Shorelines
3. Oyster Reefs
4. Hard Structures
Conclusion

- It takes a village
  - Archeologists & Engineers

- Action may not be necessary right away
  - A holistic vulnerability review can help identify priority areas

- Engineered solutions come in many shapes and sizes
  - …and should be applied appropriately based on the shoreline conditions
Questions & Comments?
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