

# 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

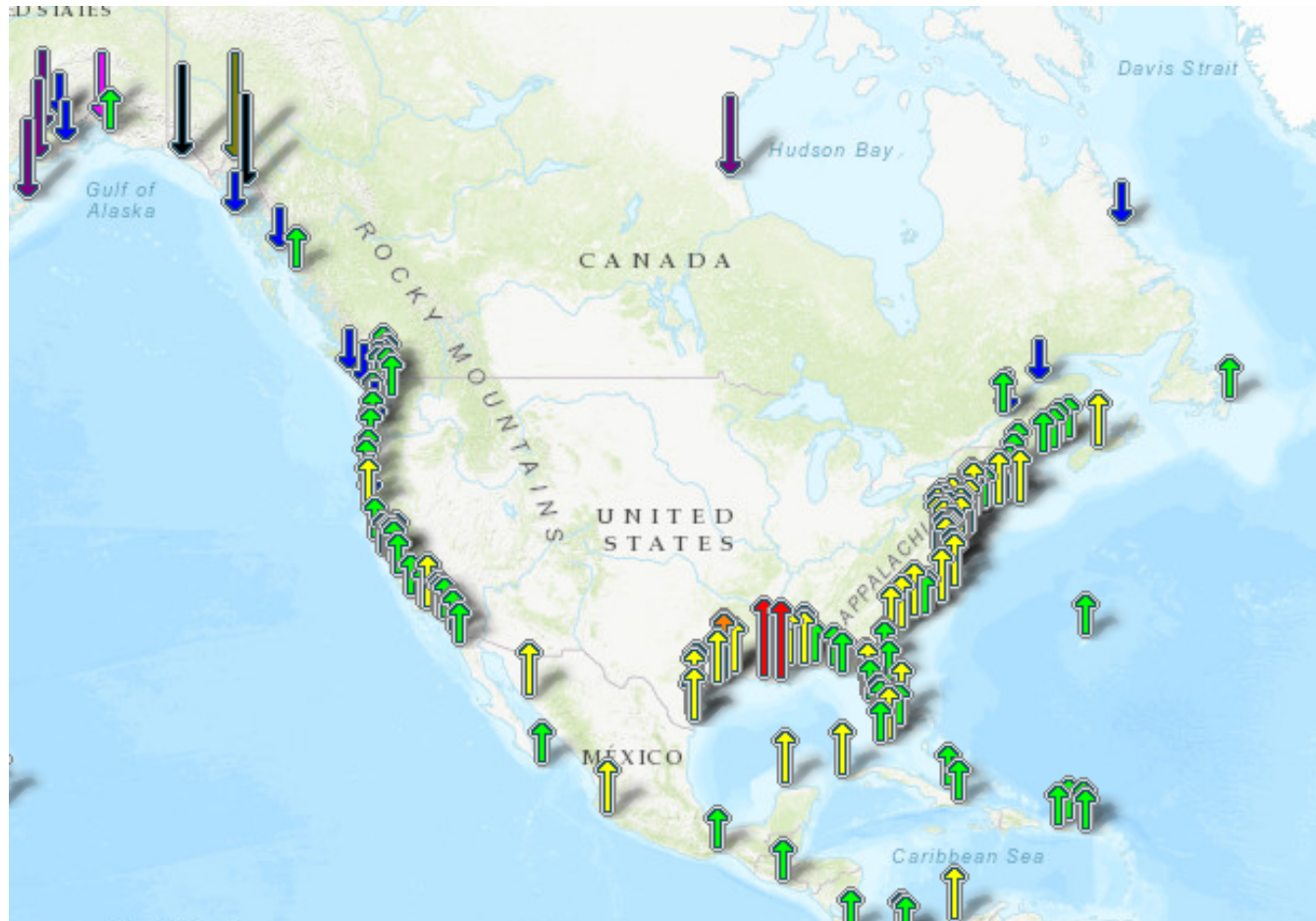
# Climate Change Effects in the Southeast United States

- 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)

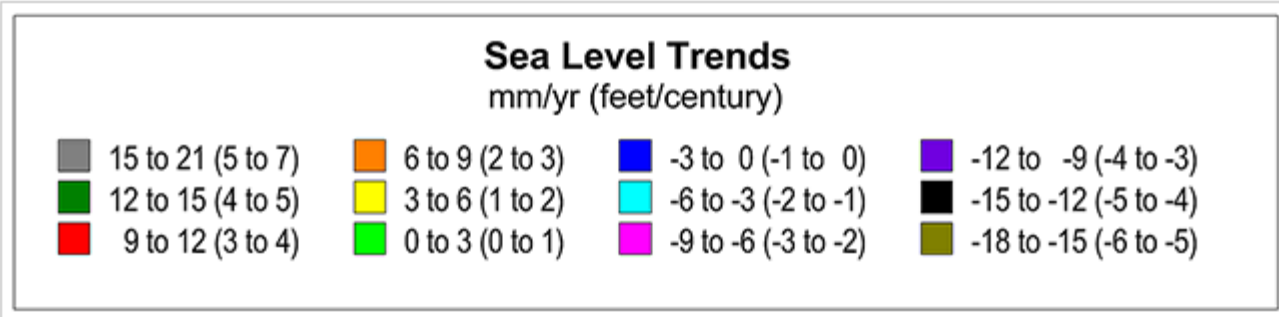
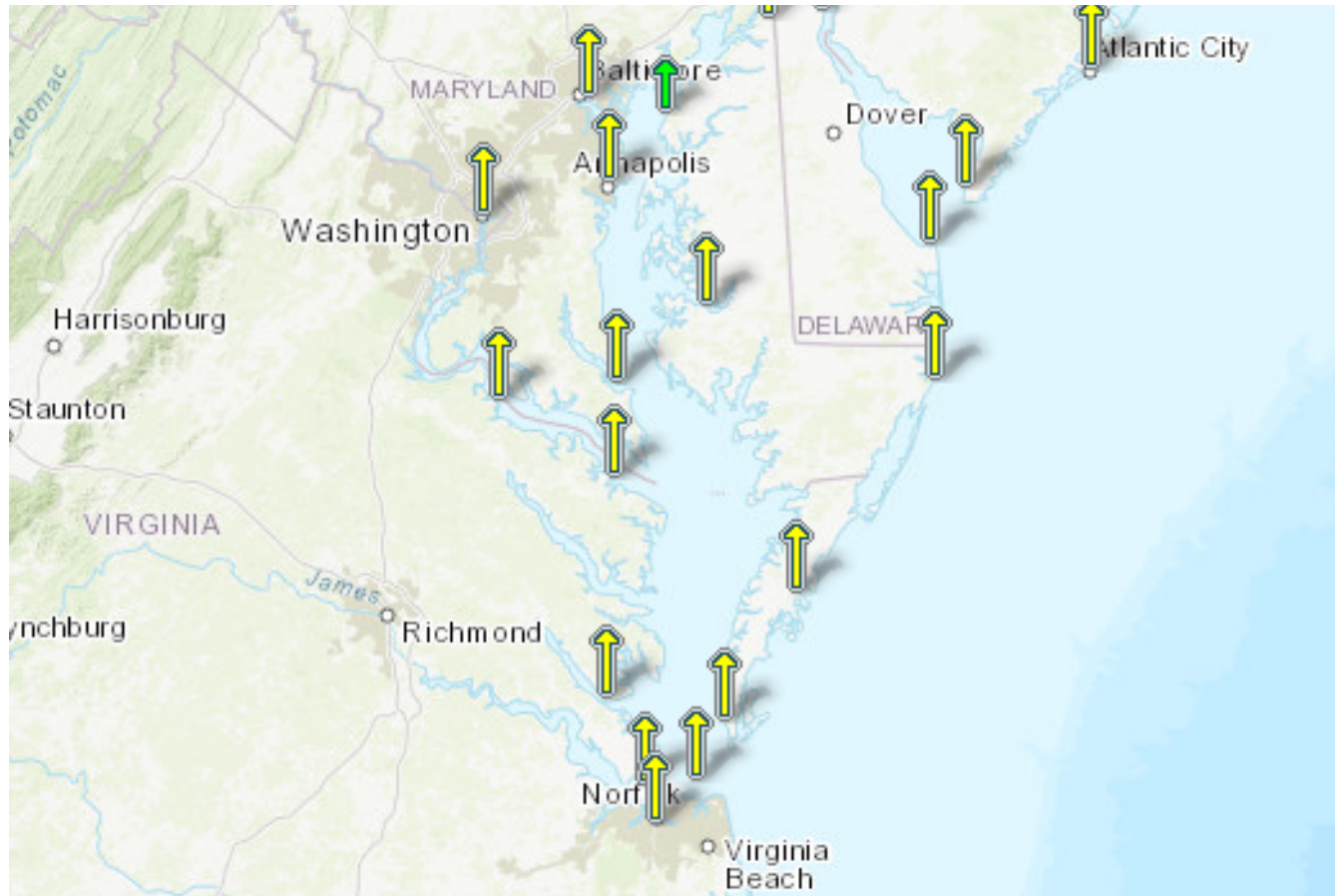
# Sea Level Rise Trends



**Sea Level Trends**  
mm/yr (feet/century)

15 to 21 (5 to 7)	6 to 9 (2 to 3)	-3 to 0 (-1 to 0)	-12 to -9 (-4 to -3)
12 to 15 (4 to 5)	3 to 6 (1 to 2)	-6 to -3 (-2 to -1)	-15 to -12 (-5 to -4)
9 to 12 (3 to 4)	0 to 3 (0 to 1)	-9 to -6 (-3 to -2)	-18 to -15 (-6 to -5)

# Sea Level Rise Trends

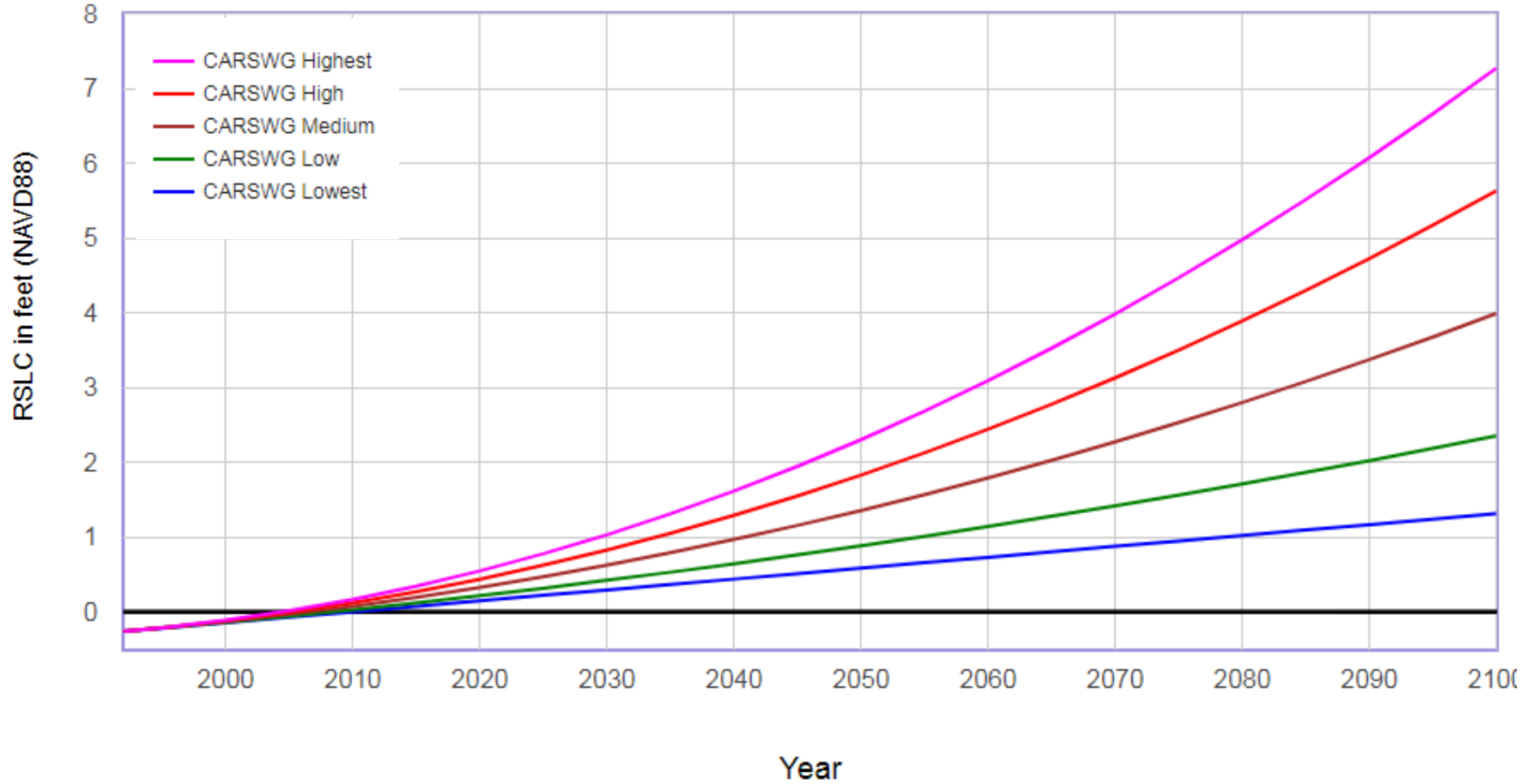


# Sea Level Rise Trends – NOAA Data Location



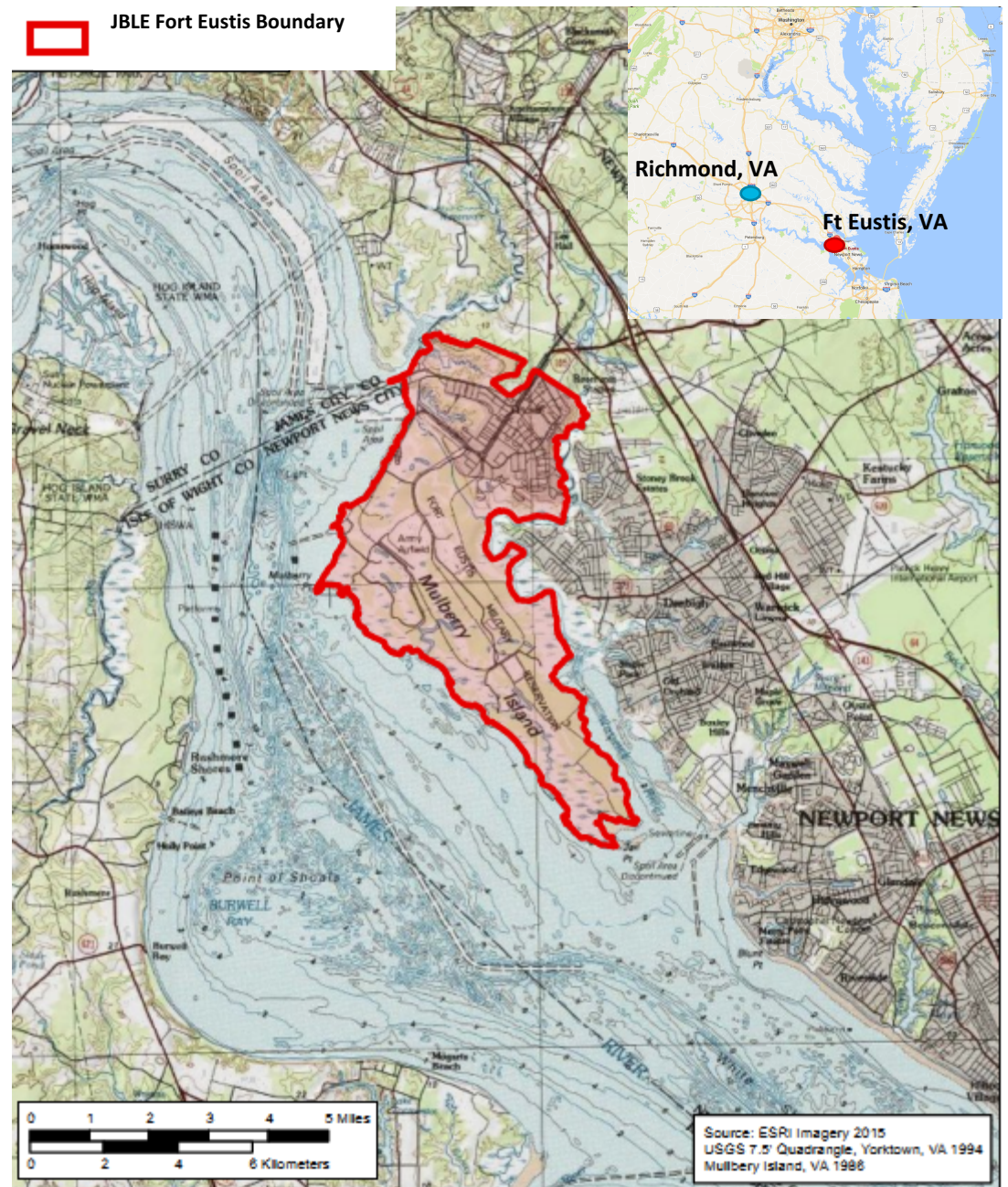
# Sea Level Rise Trends

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



# 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



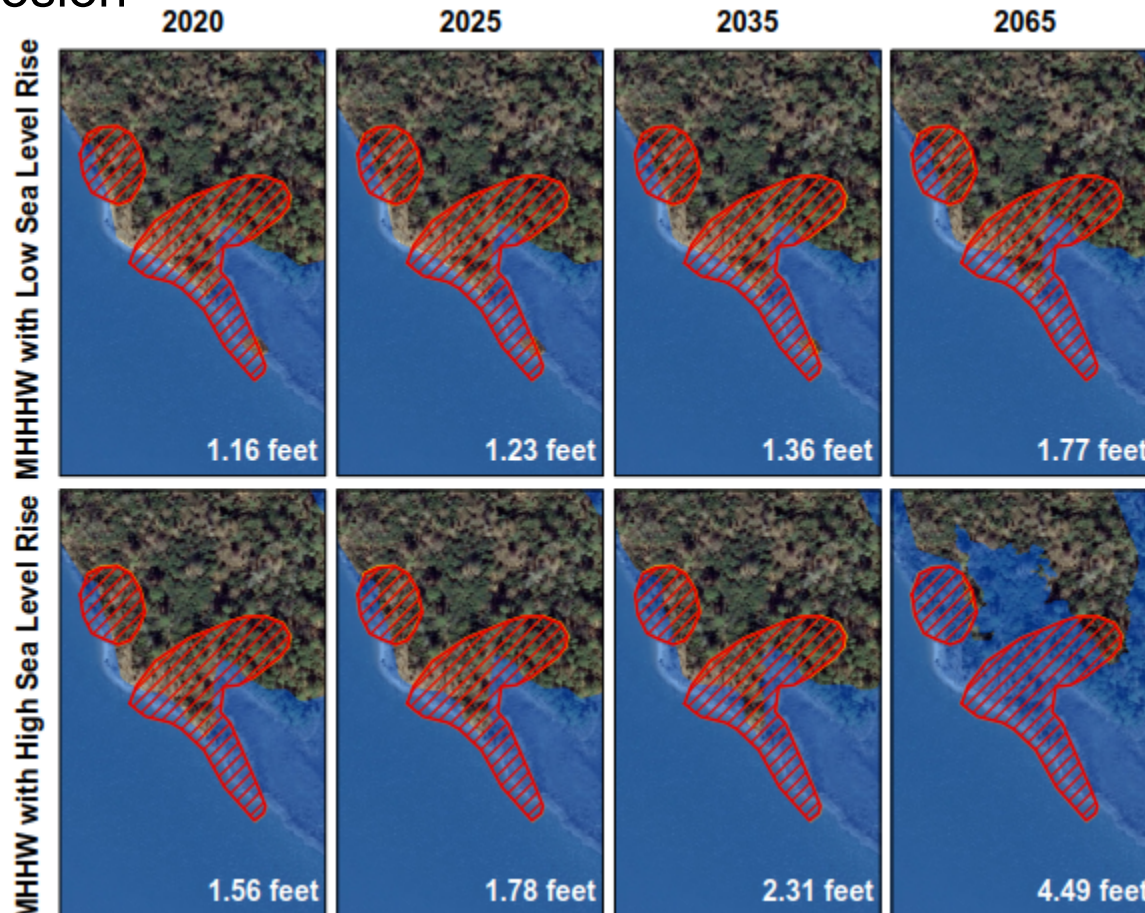
# Ft Eustis

- 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)

Site	NRHP Eligibility	Eroding Artifacts (Yes-No)	Features within 5 m of Shore (Yes-No)
44NN0012	DNM*	Y	Y
44NN0013	Y	N	N
44NN0014	DNM	Y	Y
44NN0015	Y	Y	Y
44NN0017	Y	Y	N
44NN0019	DNM	Y	Y
44NN0030	N	N	N
44NN0034	Y	N	N
44NN0105	DNM	Inundated during high tide	Inundated during high tide
*DNM = Determination not made			

## Cultural Resources Vulnerability Index (Part 2)

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

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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