



## MOSAICS IN SCIENCE Diversity Internship Program 2021 Project Descriptions

NPS UNIT: COLONIAL NATIONAL HISTORICAL PARK		PD #: 2021513
<p><b>Project Title:</b> Salinity and Chemical Testing on Groundwater and Soil on Jamestown Island</p> <p><b>Position Type:</b> Mosaics Intern</p> <p><b>Primary natural resource discipline:</b> Physical Sciences</p> <p><b>Project keywords:</b> Hydrology, sea level rise, adaptation, groundwater, surface water, swamps, wetlands, botany</p> <p><b>Location:</b> Jamestown, Virginia</p>		
<b>COVID-19 NOTICE</b>		
<p>As the COVID-19 pandemic continues to change and evolve, project timelines and structure remain flexible and it may be necessary to postpone start dates, begin work remotely, or reformulate the project's description. Should any development in the COVID-19 outbreak impair a project's timeline or results, the SIP Team will work with the park and project mentors to assess the situation and determine the best course of action at that time.</p>		
<b>PROJECT DESCRIPTION AND WORK PRODUCTS</b>		

**Position Description:** The purpose of this project will be to collect and analyze groundwater, soil chemistry and vegetation stress of the Jamestown Island ecosystem. The goal is to develop a conceptual model of the groundwater system of Jamestown Island. It is part of a larger research and monitoring project to determine the impact of sea level rise on both the natural and cultural resources on the island. The applicant will be working in the field collecting samples of two ponds and soil samples under the direction and mentorship of USGS hydrologists who are directing this research. Work will include:

1. Soil sampling across the island (and metadata documentation) (approx. 50 sample sites)
2. Collecting GPS-points of 2 ponds extents (may be repeated through the growing season)
3. Downloading transducers and making measurements of pond stage
4. Creating plots of pond data and with well and tide data.
5. Working with park staff, document existing flora along the water sampling transect lines.
6. Working up vegetation survey data ( species tables, maps, charts) of habitats surrounding interior ponds and work with USGS mapping staff to analyze plant stress patterns.
6. Collect any fauna data of herps as they are observed and compare the species with the 2005 and 2015 inventories completed in the park. Identifying amphibians such as frogs is an indicator of fresh or saline water environments which can become a vital sign for a changing habitat.

Basic methods include using Small diameter (3/8-inch) Henry push point samplers inserted by hand into the beds of open ponds and within forested wetlands. Henry samplers will be equipped with manometers to evaluate spatial patterns in hydraulic head gradients and direction of flow between the ponds and underlying groundwater systems. Field parameters including pH, SC, and DO will be measured directly in ponds using multi-parameter water-quality meters and indirectly in groundwater through small syringes or peristaltic pumps used with Henry samplers. Bottles will be filled for stable isotopes and sent for analysis at the USGS Reston Stable Isotope lab to support conclusions from field observations and assess possible evaporative enrichment (i.e. deuterium excess) of bed sediment pore water in the case of recharging ponds.

Vegetation transects will be completed in and along the edges of the ponds leading 50-100 feet outward into the adjacent vegetation to capture species diversity, association to wet/dry habitat and signs of stress based on marsh migration/surface water increase.

The 2012 Colonial National Historical Park (COLO) Natural Resource Condition Assessment (NRA) identified sea level rise, erosion and saline intrusion as being primary stressors to the ecosystem functions of forest and wetland systems on Jamestown Island . These stressors also degrade the condition of over 60 archaeology sites scattered throughout the Island. The NRA recommended the Park should proactively manage, intervene, and closely monitor sea-level rise markers and groundwater conditions by implementing inundation and salinity monitoring.

Based on the NRA findings and the completion of a 2016 Park Integrated Resource Vulnerability Assessment, Jamestown Island was identified as the park unit within COLO at greatest risk to ecosystem function loss. In response, the park identified existing I&M data and collected additional data needed to understand the spatial and temporal response of ecological resources to inundation, erosion and sea-level rise.

Additionally, the park determined that information on groundwater chemistry was insufficient to characterize subsurface conditions on the island. The park also needed high-resolution vegetative mapping to define areas where groundwater salinity is changing in response to sea-level rise. Linking vegetative and salinity changes is important to characterize island-wide vulnerabilities and develop a plan to remove important archeological

<b>NATURAL &amp; PHYSICAL WORK ENVIRONMENT</b>
<p>Despite the unknown conditions of social distancing due to COVID-19 next summer, it is expected that the candidate will primarily be in the field working with a small team from USGS/NPS or individually, or teleworking from home. The park adheres to the CDC's guidelines to insure safe social distancing in the field with others. The park's primary concern is for the health of its staff and interns. If restrictions are lifted, the applicant's duty station will be in the park's resource management office. Colonial NHP is located on the southeastern peninsula within the Virginia Coastal Plain. It is a 8900 acre oasis in the midst of a developing urban area known as Tidewater Virginia. Shopping and entertainment activities are within 10 to 30 minutes from any part of the park. Colonial National Historical Park includes the Colonial Parkway which connects two other units of the park: Jamestown, the site where the first permanent English settlement began (1607), and Yorktown, the site of the final siege of the American Revolution (1781). The park lies in between two major tidal rivers, the James and the York. The Outer Banks and Cape Hatteras Seashore are 3 hours away: the Eastern shore is 1.5 hours and the mountains are 3-4 hours away. Kayaking, fishing, boating and bicycling are sports favored by many in this area. Norfolk and Richmond are both mid-sized cities located an hour in opposite directions from the park. Bush Gardens, Water Country and Colonial Williamsburg are located in Williamsburg. Summers here are very warm and humid, often reaching 100F for a week's stretch at time.</p>
<b>QUALIFICATIONS</b>
<p>Qualified applicants should be working towards an undergraduate or graduate geology/hydrology major. Experience in water sampling and analysis is a benefit, but not required. A minor in a biological science relating to ecosystems is also preferred, due to the requirements of identifying plants and herpetofauna. Good technical writing skills and proficiency in developing tables and plot samples should be highlighted in their application. Some GIS skills are also required.</p> <p>The applicant must be a U.S. citizen or U.S. permanent legal resident ("green-card-holder") between the ages of 18 and 30 years old, inclusive, or veterans up to age 35. Prior to starting this position, a government security background clearance will be required.</p>
<b>VEHICLE AND DRIVER LICENSE REQUIREMENTS</b>
<p><b>Applicant must have a valid drivers license and a good driving record.</b></p> <p><b>A personal vehicle is RECOMMENDED but not required for this position.</b></p>
<b>HOUSING</b>
<p><b>Park housing is NOT available. The intern will be responsible for finding housing in the nearby area.</b></p>
<b>INTERNSHIP START/END DATES</b>
<p><b>Start Date:</b> 5/17/2021  <b>End Date:</b> 7/30/2021</p> <p>Eleven weeks of the internship will be in the park. A mandatory Career and Leadership Workshop will be held in Washington, D.C. from August 1 – 5, 2020.</p>
<b>PLEASE DIRECT ANY QUESTIONS TO ENVIRONMENT FOR THE AMERICAS</b>
<p>Email: <a href="mailto:mosaics@environmentamericas.org">mosaics@environmentamericas.org</a></p>