

POSITION ANNOUNCEMENT:

GEORGE MELENDEZ WRIGHT INITIATIVE FOR YOUNG LEADERS IN CLIMATE CHANGE

The National Park Service (NPS) is pleased to announce the 2017 *George Melendez Wright Initiative for Young Leaders in Climate Change* (YLCC) to provide a pathway for exemplary students in higher education (graduate students, advanced undergraduate students, and recent graduates) to apply their skills and ideas to park-based challenges and solutions. The Initiative offers 12-week paid internships which allow students to gain valuable work experience, explore career options, and develop leadership skills through mentorship and guidance while helping to advance the NPS response to climate change. Successful students may be eligible for non-competitive hire into federal positions for which they qualify following completion of all academic requirements.

CLIMATE CHANGE IMPACTS AT NAVAJO NATIONAL MONUMENT:

PRESERVING CLIFF DWELLINGS IN THE FACE OF ARROYO INCISING AND EXPANSION

Navajo National Monument
Shonto, AZ

Characterize the current state of incising affecting monument archeological sites to aid resource management decision making. Collaborate with NPS staff and partners to identify possible causes of regional down cutting in canyons impacting some of the best preserved prehistoric cliff dwellings in the Southwest US and assist in the development of possible erosion control treatments.

INTERNSHIP PROJECT BACKGROUND

Navajo National Monument includes three of the best preserved Ancestral Puebloan cliff dwellings in the Southwest US. Two of the cliff dwellings – Keet Seel and Inscription House – are located in sandstone alcoves overlooking canyon bottoms that are undergoing severe arroyo incising and expansion. At Inscription House, the traditional access route into the ruins has been cut off by the alluvial terrace calving off the lower cliff face into the wash below. The collapsing terrace includes archeological midden deposits in addition to providing site access on the otherwise sheer cliff face. Likewise, Keet Seel terrace erosion is encroaching on the archeological resources, monument fencing, and a NPS ranger station.

In the Southwest US, climate change is manifested in higher temperatures, decreased precipitation, and more severe flash flood events. Currently, Navajo National Monument is working with Colorado State University and the Southwest Exotic Plant Management Team through a cooperative CESU agreement (2016-2018) to develop treatment plans for mitigating the intensifying erosion processes. Also, we have scheduled a December 2016 teleconference with the USGS, our CESU partners, and other specialists to discuss a long-term course of action to manage the canyon landscapes encompassing the monument's premier archeological resources.

INTERNSHIP PROJECT DESCRIPTION

The goal of the proposed internship is to integrate data collect by the intern and NPS partners for developing site management plans at both Keet Seel and Inscription House through a characterization of current conditions and possible multi-scalar causes. The intern can assist NPS partners who established arroyo cross-section monuments in October 2016 in the monitoring of the current rate of change of arroyo expansion. Additionally, using archival climate data, and historic photographic archives, the intern could help understand the timing of the severe and even catastrophic erosion witnessed today. Was there an episode or trigger that resulted in cascading erosion processes from fine-scale erosion to the broad-scale patterns seen today? What were the key factors in the markedly falling water table: climate change, introduced exotic vegetation, Navajo livestock grazing?

The intern will interact with PhD level researchers at the NPS staff level and our university and USGS partners working to understand and mitigate the impacts of the changing environment on monument cultural resources. The information and research provided by the intern will be directly integrated into the resource division's site management plans and assessment of proposed erosion control treatments. The new data will also be used to inform monument visitors, local residents/land users, and Navajo Chapter Houses about the impacts of climate change on monument sites and the efforts proposed by Navajo National Monument to preserve our vanishing treasures.

Internship Tasks

The intern will develop a thorough characterization of the current state of arroyo incising and expansion adjacent to Keet Seel and Inscription House cliff dwellings through site visits, erosion documentation, and collaboration with our research partners. The intern will work with cultural resource staff on interpreting the geomorphological, hydrological, and ecological data with regards to the implications for threats to cultural resources at the monument. The intern will analyze archival photography and description of the associated canyons to establish a possible historic erosion timeline and its relationship to climatic patterns and local land use activities. In addition to regular meetings with park management and partners for project updates, the intern will develop a poster and presentation on the most pertinent findings for park staff, public bulletins and the scientific community. Finally, the intern will assist in the development of possible erosion control treatments and future monitoring plans.

Internship Products

Planning tools: First order estimates of arroyo incision and headcut of arroyo edge migration.
Recommendations for future quantitative erosion change detection.
Education tools: Documentation of erosion history using historic and modern photos along with historic and modern aerial photography, as well as historic descriptions of the canyon environment.
Analysis: Recommendation about areas of future study and methodologies or baseline data sets that will be needed to quantitatively track changing erosion patterns. Also, in consultation with our research partners, an assessment of alternative erosion treatments with regards to preserving archeological deposits from current level of loss.

QUALIFICATIONS

Required: A Bachelor's degree in Geology, Physical Geography, Ecology, Hydrology, or Geosciences. Prior field experience documenting erosional environments. Backcountry hiking and camping experience.

Desired: Graduate training in the Geomorphology, Hydrology, or Ecology. Experience implementing erosional control treatments in monsoonal, desert environments. Experience with spatial technologies including GIS, GPS, terrestrial lidar, or photogrammetry. Interest in prehistoric archeology of the Southwest US.

LEADERSHIP DEVELOPMENT

The nature of the research and processes explored by the intern are time-sensitive in that archeological resources and access to those resources are being lost as a result of erosional processes in the monument canyons. The intern will have the opportunity to present to and work with the monument's Chief of Integrated Resources, Superintendent, Cultural Resource Program Manager and monument partners to develop resource management plans and erosion treatment recommendations. While the intern will collaborate with NPS partners with PhDs in Ecology and Geology on the project, the intern will be our primary in-house geomorphology/geoscience specialist during the 12 weeks internship. Accordingly, the intern will play an integral role as lead scientist focused on environmental processes related to climate change at the monument. The intern will have the opportunity to present at local Navajo Chapter House meetings to present on the state of erosion threats to archeological sites and proposed treatments. Presentation to non-specialists with vested interests will be an important skill for the developing scientist. At the end of the intern's season, there will be an opportunity to present their work at the Southwest's primary archeology conference at Pecos National Historical Park. Finally, working with our university, NPS, and USGS partners we will explore opportunities available with DOI agencies for scholars focused on the impacts of climate change on federal resources and landscapes.

DATES OF POSITION

Flexible start date: May 1st, 15th, 30th, or June 12th. Internship runs 12 weeks from selected start date.

COMPENSATION

This initiative supports one student at \$15/hour for 12 weeks, or 480 hours.

HOUSING

NPS housing will be a private bedroom in a shared 3 bedroom NPS house with 2 baths. Washer & dryer and furnished rooms including kitchen. Navajo National Monument is a remote national park located on the Navajo Nation reservation. Employee housing includes 3-4 permanent and several seasonal employees. Several campgrounds at the monument are free for over-night tourist use. Shonto is located about 8 miles away via a dirt road and has a trading post with a US Post Office, convenience store type food items, and a gas pump. Kayenta is located about 30 miles away via state and federal highways and has a supermarket, restaurants, hardware store, gas stations, and other services. Page, AZ is located about 1 ½ hours away and Flagstaff, AZ is located about 2 ½ hours away. FedEx and UPS deliver to the monument. USPS mail is delivered to a PO Box in Shonto and picked up by park staff. The landscape around the monument is stunning and life is quiet and peaceful. Verizon reception for phone and data service is patchy. Internet service away from the office is ok when smart phones are used as a hot spot.

WORK ENVIRONMENT

The position will require both office and field work. The two study areas are located in remote backcountry locations. Access to the study areas requires difficult 4wd driving and rugged hiking conditions including transport over slickrock, dunes, washes with quick sand, and rocky roads. The intern will be required to work with NPS staff or NPS partners in the backcountry. The cultural resources division will supply all camping and backcountry equipment. Interns should bring comfortable, sturdy, water resistant boots along with appropriate hiking clothes. A personal sleeping back is recommended for potential camping field work. Rattle snakes are scarce in the monument but present. Also, coyotes and mountain lions are rare but present. The rugged terrain, high temperatures and monsoon thunderstorms are the greatest threat to personal safety in the backcountry. Backcountry first aid training will be provided. The intern should be comfortable hiking over rugged terrain.

CONTACT INFORMATION

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