

POSITION ANNOUNCEMENT:

FUTURE PARK LEADERS of EMERGING CHANGE

The National Park Service (NPS) is pleased to support the *Future Park Leaders of Emerging Change* (FPL) program as a pathway for exemplary students in higher education (advanced undergraduate students, graduate 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 NPS efforts on emerging management issues. Successful students may be eligible for non-competitive hire into federal positions for which they qualify following completion of all academic requirements.

UNDERSTANDING LANDSCAPE CHANGE AT PETRIFIED FOREST NATIONAL PARK: MONITORING CLIMATE IMPACTS TO BACKCOUNTRY CULTURAL RESOURCES

Petrified Forest National Park
Petrified Forest, AZ

INTERNSHIP BLURB

The project will help develop a network of microclimate stations collecting modern data and combine this with historic data to better understand the potential effects of changing environments of the record of cultural resources stretching back thousands of years. The project will involve working with cultural and natural resource staff of the NPS, college academics, and other professional researchers to develop a professional products and long-term monitoring strategy.

INTERNSHIP PROJECT BACKGROUND

Petrified Forest National Park (PEFO) preserves an incredibly diverse archaeological record of 13,000 years of human history, with over 1300 sites recorded in the core of the park and recently acquired expansion lands. These sites, structures, artifacts, and cultural deposits came to be preserved in active Aeolian environment. They are found in and on top of dunes and sand sheets that had been held in place with grasses and other vegetation. Observations and assessments in the park are showing, however, that many sites have already suffered damage due to wind erosion. The park is concerned that additional changes in climate and surrounding environmental stresses will exacerbate this erosion damage and reactivate erosion in other areas. Left unassessed and unmanaged, ongoing erosion in these environments will destabilize many more archeology sites and cause the deflation of cultural materials from their original context. Such damage proactively takes away the important data used to understand 13,000 years of human history throughout Petrified Forest and the southern Colorado Plateau and challenges the stewardship mission of PEFO. What is needed to begin to address these

challenges is well-organized relevant baseline data about the factors contributing to erosion at and surrounding archaeological sites in this environment. This proposed internship project will do critical work in establishing and using compilations of baseline and sharing this information so that it can be used to develop responsive management plans.

In the Southwest US, climate change is manifested in higher temperatures, decreased precipitation, shifting patterns of precipitation, and more severe flash flooding events resulting in a decline of stabilizing vegetation and various changes to other natural resources. Petrified Forest National Park is consulting with NPS climate change scientists from the regional (IMR) and Washington (WASO) offices and researchers from Arizona State University and the Arizona State Climatologist in an effort to come up with a plan to monitor climate change throughout the park, specifically targeting the effects of climate change on archeological resources located in aeolian environments.

INTERNSHIP PROJECT DESCRIPTION

The goal of this internship is to integrate multiple datasets to better understand the range of climatic variation effecting erosion of backcountry archeological sites in the park by bringing in an intern with direct experience in measuring and interpreting climatic variability. Park partners have built a microclimate monitoring network across the park that has been in place for nearly a decade. Many of their stations are set in backcountry archeological sites. Recently the park has acquired additional stations to augment this network with supplementary monitoring on archeological sites at-risk from erosion. The intern will help deploy these new stations using previously established monitoring protocols. The intern will then work to combine these data with longer term records of climate collected by the park over the last few decades. Climate data will then be compared to historical records: including grazing, homesteads, ground water depths, and recorded descriptions of surface water in the park. These data will allow NPS staff and partners to develop a better idea of the baseline range of variation in climate over the last century. With an understanding of the historic range of climate change, park staff can better identify when climate patterns are shifting beyond the expected variation.

The intern will interact with PhD level researchers from the NPS and partners working to understand and mitigate the impacts of changing environments on the cultural resources of the park. The information from this study will be used to develop a long-term strategy for addressing future impacts to archeological sites and be integrated into Cultural Resource and park planning for future funding, research, stabilization, and public access to these sites. The new data from this study will also be used to inform the public, neighboring Native American communities, and the scientific community about the impacts of climate change on Petrified Forest National Park and our efforts to preserve our cultural resources.

Internship Tasks

- **Set a series of microclimate monitoring** stations on at-risk archaeological sites in the backcountry and develop a protocol for monitoring and recording this data. Data collected will

include temperature, humidity, and sand particle entrainment on site and depth of groundwater in nearby wells.

- **Gather data** of erosion, vegetation, and changes in archeological site condition to help establish an initial baseline. The intern will analyze historic records and photographs to study longer term trends in erosion on archeological sites in the park and relationships with historic records.
- **Work with park cultural and natural resource management** staff to provide project updates and assist in the development of a long term monitoring strategy and suggest possible mitigations to site loss of damage.
- **Develop a professional product** highlighting the project and research to present to the park staff and scientific community.

Internship Products

- **Operational network of microclimate stations** set up in the park to best scientific standards and initial data from the network
- **Developed protocol** for managing the network and downloading and summarizing the data
- **Summary of available historic data** including weather, water depth, and grazing impacts
- **Development of Long-term plan** intern will help NPS staff and partners develop a long-term plan to monitor the effect of climate with a focus on understanding change in a framework of resilience and landscape response to understand when the observed fluctuation is outside the range of expected historic variation.
- **Data Analysis** process the data collected over the course of the internship and work with our partners to recommend future research directions and datasets which can be used to better quantitatively track changing erosion patterns.

QUALIFICATIONS

- Minimum requirements include a student working towards a Bachelor's degree in geology, climatology, or geosciences with preference towards a graduate-level or prospective graduate-level student with instruction in sedimentology, geology, climatology and field experience in documenting aeolian environments and erosion.
- Desired experience in setting up climate monitoring networks and interpreting the effects of erosion in monsoonal, desert environments.
- Twelve (12) college hours in a science-related field **or** experience and a demonstrated ability to understand and communicate scientific principles.
- Demonstrated interest in history or archaeology of the Southwest
- Knowledge of or a demonstrated ability to learn spatial technologies including GIS, GPS, terrestrial LiDAR, or photogrammetry
- Applicants must possess a valid state driver's license, personal transportation, and be willing share housing with other seasonal park staff and volunteers.

LEADERSHIP DEVELOPMENT

- **Independent research and project direction** the intern will work independently to research and develop the protocol and install the monitoring network. The student will work with natural and cultural resource staff in developing climate change monitoring protocol in aeolian environments. This protocol will be used to monitor the impacts of erosion into the future. Results of this internship will assist in developing procedures to mitigate the impacts of climate change on archeological resources that in turn will inform resource adaptation planning across the Southwest and potentially across the NPS.
- **Working with a team** the project will work with a variety of cultural and natural resource expert including a variety of intern and volunteers to complete this project. On occasion the intern may supervise other people to help complete this project.
- **Professional writing and presentation** the intern will be expected to prepare a professional report at the end of their time here as well as outlining the protocol to maintain the monitoring network in a longer-term scale. The intern will also have the opportunity to present these data in a professional setting with archaeologists and cultural resource professionals at the Pecos Archaeological Conference.
- **Professional networking** NPS staff will assist the intern in exploring opportunities available with DOI agencies that focus on climate change impacts on natural and cultural resources.

DATES OF POSITION

The preferred starting date is May 14, 2018, however dates of the position are flexible, depending upon availability. Ideally the intern will work 480 hours between May 14 and August 17.

COMPENSATION

This initiative supports one student at \$16/hour for 12 weeks, or 480 hours.

HOUSING

NPS housing will be provided. Accommodations include a twin bed in a shared or private bedroom in a 3 bedroom, 2 bathroom NPS house. Each house occupies up to 6 people. The houses contain a furnished living room, dining area and kitchen. Cookware, kitchen utensils and flatware will be provided. Bedding and towels are not included in the houses. Bringing items of significant financial or personal value is not recommended. Individual houses may or may not contain televisions and TV reception is only available through satellite service. A recreation building is located on the premise that includes a pool table, ping-pong table and television with cable access. There is also a basic fitness center on site. A US Post Office is located at the park with limited hours. USPS, UPS, and FedEx deliver directly to the park.

Holbrook, AZ is located 25 miles west. It has a US Post Office, UPS drop off location, grocery store, hardware stores, dollar stores, gas stations, restaurants, and other services. Winslow, AZ is located 1 hour west. Snowflake/Taylor, AZ is located 1 hour southwest. Flagstaff, AZ is located approximately 2 hours west. Internet access in housing is limited but is available at park headquarters. The majority of cell phone providers offer coverage in and around the park. The park itself is open with many hiking opportunities available throughout its unique geographical areas. Hiking and other attractions are also located within a 1 hour or more drive of the park.

WORK ENVIRONMENT

The position will require work in both the office and the field. The primary study area is located in the park's backcountry which requires a 4wd vehicle and/or rugged hiking across badlands, dunes, and washes to access. The intern will be required to work with NPS staff or NPS partners in the backcountry. The Cultural Resources division will provide all field equipment required for working in the backcountry. Interns should bring comfortable, sturdy, hiking boots along with appropriate clothing for working in the field. The intern will need to be able to carry a backpack large enough to carry 4 liters of water and field gear. Rattle snakes are present in the park. The rugged terrain, high temperatures and monsoon thunderstorms are the greatest threat to personal safety in the backcountry. The intern should be comfortable working in the backcountry and hiking over rugged terrain.

CONTACT INFORMATION

National Park Service Supervisor:

William Reitze

William_reitze@nps.gov

(928)524-6228 ex. 268