

## **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.

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### **GLEN CANYON PHOTOGRAMMETRIC ARCHEOLOGY**

Glen Canyon National Recreation Area

Page, AZ

#### **INTERNSHIP BLURB**

Develop and implement photogrammetry methods for topographic change detection at archeological sites in Glen Canyon National Recreation Area (Glen Canyon). Data gathered from this work will be used to inform park management about the severity of erosional damage and threats to key archeological resources and to help acquire and prioritize funding for archeological preservation.

#### **INTERNSHIP PROJECT BACKGROUND**

Glen Canyon's 1.25 million acres contains a spectacular and vast array of archeological resources spanning 11,000 years. Recent in-park projects have demonstrated that landscape- and landform-scale erosion causes severe damage to these resources; however, because of the scale that these processes operate at, they can be extraordinarily difficult to track at the site level. For example, changes to archeological site topography caused by aeolian-driven dune deflation, gully downcutting and expansion, and retreating river terraces can be quantified at only the grossest levels by visual examination and standard photography. If small changes can be identified, however, preservation and mitigation measures can be emplaced before significant damage occurs.

The erosion types noted above are largely controlled by rainfall patterns and the amount and type of vegetation cover; in turn, these controls respond to regional and global climatic change. For example, Glen Canyon is in a nearly two-decade long drought; nevertheless park-wide drought impacts on archeological site stability are just beginning to be understood.

To address these issues, Glen Canyon is developing photogrammetry methods to track changes at a scale of less than 10 cm and to identify erosion issues before significant impacts result. The goals of this project are completion of methods development, establishing the accuracy of methods, instruction of permanent staff, and production of a methods manual.

## **INTERNSHIP PROJECT DESCRIPTION**

The intern will test and refine nascent Glen Canyon photogrammetry methods, establish the accuracy of the improved methods, perform photogrammetry documentation of archeological sites in a variety of park settings including, but not limited to, the Colorado River corridor, compare gathered data to existing data to identify the location and scale of topographic change on sites, write a methods manual covering data collections and analysis, and instruct select park staff members on how to perform the developed methods. While collecting photogrammetry data, the intern will be expected to assist with collection of additional archeological data such as total station recording, photography, GPS recording, field form completion, and artifacts analysis. The intern may also perform photogrammetry work on non-archeological resources to test the utility of developed methods for other park programs.

The intern will produce digital and hard-copy maps and written descriptions of archeological site topography and erosion impacts informed by photogrammetry data and other pertinent information; where appropriate, descriptions will quantify the amount and location of topographic change over time. The intern will also produce a methods manual that will include, minimally: camera setting requirements, how to collect data in the field using structure-from-motion (or similar) methods and stationary camera methods, post-processing methods, analysis methods (e.g., detection of topographic change over time), and a discussion of data accuracy. The manual's intended audience is resource management professionals with a rudimentary understanding of photogrammetry; the manual will be written accordingly. Drafts of the method manual will be periodically produced for review by the intern's supervisor and other personnel.

## **QUALIFICATIONS**

- Familiarity with modern structure-from-motion (SFM) photogrammetry data collection, processing and analysis as demonstrated through six (6) college hours of education and/or professional/volunteer experience.
- Familiarity with AGISoft's PhotoScan Pro is highly desired.
- Ability to work to the following requirements: SFM data will be collected by walking transects using pole-mounted cameras and through stationary cameras with overlapping views (drones will NOT be employed); data collection areas will typically be less than 2 hectares, desired resolution is 10 cm or less.
- Familiarity with ArcGIS as demonstrated through six (6) college hours of education and/or use of ArcGIS in a professional setting. Experience incorporating photogrammetry products into ArcGIS is desired.

- Familiarity with field methods in at least one (1) of the following disciplines: archeology, geoarcheology, and geomorphology. Familiarity is demonstrated through a successfully completed field school and/or professional experience.
- Ability and willingness to instruct non-photogrammetry specialists in data collection and analysis methods.
- Strong technical writing skills.
- Ability to perform moderate to strenuous work outdoors for extended periods in a variety of conditions, especially hot and dry conditions. The intern must be comfortable with occasional overnight backcountry camping. Willingness to travel as a passenger in a small airplane and in motorized boats is required.
- The intern must possess a valid state driver's license. If opting to utilize provided housing, the intern must be willing to share housing with other seasonal park staff and commute approximately 5 miles one-way over highways and city streets.
- Familiarity with total station operation is desired.

### LEADERSHIP DEVELOPMENT

The success of this project will depend a great deal upon successful development and use of leadership skills in the areas of:

- **Communication.** The intern will be tasked with developing a) materials and hands-on practice sessions that teach photogrammetry field and analysis methods to park staff and b) presentations that showcase project results for park managers.
- **Task prioritization and scheduling.** Working in close cooperation, the intern and her/his supervisor will clearly define project goals and deliverables. Once these are defined, the intern will be responsible for identifying intermediate goals and developing methods and timelines for their completion.
- **Interpersonal/Work Relationships.** The intern will be working with a variety of people in many different settings including park resource managers, professional partners, and other subject-matter experts. The intern will often work with Glen Canyon teams, especially in the field; balancing project-specific goals with team objectives will be essential.
- **Peer networking.** The intern will work and consult with photogrammetry experts at the United States Geological Survey's Grand Canyon Monitoring and Research Center, other NPS units, and other organizations. The intern will also be encouraged and supported in presenting project results at venues such as the annual Pecos Conferences, held this year in early or mid-August near Flagstaff, Arizona.

### DATES OF POSITION

The preferred starting date is May 7, 2018, however dates of the position are flexible, depending upon availability. Ideally the intern will work 480 hours between May 7 and August 10.

**COMPENSATION**

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

**HOUSING**

Shared government or non-government housing will be provided in either Page, Arizona or in the Wahweap area of Glen Canyon (approximately 7 miles from Page); both locations are less than 7 miles from park headquarters, the duty station. Page, with a population of 8,000, has grocery stores, gas stations, shopping, restaurants, hotels, a small airport, and is an excellent base for exploring the Colorado Plateau. The two nearest large communities, Flagstaff, Arizona and St. George, Utah, both have a population of approximately 75,000 and are approximately 150 miles from Page.

**WORK ENVIRONMENT**

Work will be performed both indoors and outdoors. Outdoor work will occur throughout Glen Canyon in northern Arizona and southern Utah; it may entail travel over rough roads in four-wheel drive vehicles, boat travel, small-airplane travel, and hiking with field gear over rough and/or steep terrain for several miles. Overnight camping for up to eight nights may be required; typically, overnight camping will be for shorter durations. Camping equipment will be provided. Weather during the internship will be mostly hot (with daily highs in the mid-90s or low 100s F°) and dry. Depending on internship dates, however, cooler weather and thunderstorms may be encountered. Fieldwork will occur at elevations between 3000 and 8000 feet above sea level. All outdoor activities are performed with safety as a primary concern and ample training and supervision will be provided. Should there be concerns about performance of one or more of the outdoor activities, concession will be made to accommodate the needs of the intern.

**CONTACT INFORMATION**

National Park Service Supervisor:

Brian Harmon

brian\_harmon@nps.gov

928-608-6277

Project Advisor:

Jack Wood

john\_wood@partner.nps.gov

303-969-2814