PROJECT DESCRIPTION
2020 FALL/WINTER

NPS UNIT: GLEN CANYON NATIONAL RECREATION AREA
PD #: 2020425

Position Title: GIS Assistant (1)
Position Type: GIP Intern
Primary natural resource discipline: Multidisciplinary
Project keywords: Landscape change, NDVI, GIS analysis, climate change
Location: Page, Arizona

COVID-19 NOTICE
This project description was developed prior to the onset of the COVID-19 outbreak. Therefore, 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 GIP Team will work with the park and project mentors to assess the situation and determine the best course of action at that time.

PROJECT DESCRIPTION AND WORK PRODUCTS

Position Description: The primary focus of this internship will be to complete additional GIS analysis of the NASA DEVELOP park maps for Glen Canyon National Recreation Area prepared in 2018 and 2019, which show sequential vegetation changes over the past 24 years and which include an initial assessment of plant cover and productivity (Spence and Cushing 2019).

GLCA staff will ground truth both the NASA DEVELOP maps and GLCA 2017 parkwide vegetation map by completing additional long-term vegetation plots in areas of the park that are not currently covered. Quantitative methods will focus on new plots in vegetation types not covered in previous monitoring, in particular pinyon-juniper woodlands. Currently, there are 87 permanent long-term monitoring plots in the park (methods are outlined in Spence 2017). Data derived from these plots include current plant community composition, biological soil crusts, and soil conditions. Using these data, it will be possible to identify the loss of key plant components such as Indian ricegrass (Achnatherum hymenoides) and that show a shift to a different future vegetation composition. These will describe key indicators of aridification and the resultant increase in bare and eroding soils (NRCS 2010).

Spring-summer NDVI data will be available for the period of 1995 to 2019 for the entire park. Using GIS analyses, these data will be overlaid with soils and vegetation data from the 2017 GLCA vegetation classification.

The principal focus will be on those vegetation types that are shown to have experienced the greatest declines in productivity based on plot and NDVI data. Preliminary data suggest that the NRCS ecological sites Desert Sand, Semidesert Sand, Semidesert Sandy Loam, and Semidesert Shallow Sandy Loam have experienced the largest changes over the last 25 years. Some of these ecological sites show significant declines in vegetation and biological soil crust cover and productivity. The vegetation composition on these sites include desert grasslands, blackbrush shrublands, and pinyon-juniper woodlands.

Species distribution models (SDM’s) are currently available from the USGS for two critical plant species, pinyon pine (Pinus edulis) and Utah juniper (Juniperus osteosperma; Copeland et al. 2018). SDM’s are not
available for blackbrush or grass species. The USGS will be consulted on whether there is a potential to model some of these species for the study. These SDM’s will be used in combination with the most current downscaled GCM’s for climate projections to model changes over time based on predicted future climates in GLCA. Weather station data from the region will also be consulted.

Field work may include visiting additional relict sites in the park that have not been grazed, although most of these sites are very difficult to access.

This project will provide critical information on the impacts of climate change and livestock grazing in the largest unit of the NPS where grazing occurs.

This position is offered through the National Park Service’s Geoscientists-in-the-Parks (GIP) Internship Program in partnership with Stewards Individual Placement Program (Stewards) and The Geological Society of America (GSA).

**Work Products:**
- Documentation of changes in plant community composition indicating that, either in specific areas or parkwide, GLCA is transitioning from grassland or mixed grass/shrub communities to desert shrub and annual plant communities.
- Indications that aridification/desertification is occurring parkwide and further impacting both natural and cultural resources through loss of plant cover and biological soil crusts, increasing soil erosion.
- Identification of specific areas that show significant changes in vegetative composition over the past 24 years and/or that are experiencing loss of vegetation cover due to climate change and aridification/desertification.
- Identifying specific soil-vegetation community combinations that seem to be most at-risk from the impacts of ongoing climate change.
- Determining specific resource indicators that show that climate change is impacting terrestrial landscapes (livestock/human accessible areas, relict areas or both) and that grazing livestock is and may further accelerate those impacts.
- Maps, compiled range data and GIS layers showing results of the project. These layers will include extrapolated rangeland health conditions for specific allotments based on a variety of data sources, including NDVI-based change layers to help prioritize management actions.

**QUALIFICATIONS**

Advanced GIS skills and abilities; landscape ecology and landform interpretation; soils

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 veteran up to age 35. Prior to starting this position, a government security background clearance will be required.

**VEHICLE AND DRIVER LICENSE REQUIREMENTS**

**Applicant must have a valid driver license and a good driving record.** A driver license is required to drive a government vehicle while on duty.

**A personal vehicle is RECOMMENDED but not required for this position.** Housing is from 1-8 miles from offices.

If the GIP is required to drive a park vehicle for their position, Stewards will perform a driving records search, and the GIP’s ability to drive a park vehicle during work hours will be contingent upon the results. GIPs will have to have had their license for 3 years or be over the age of 21 to be insured as drivers under Stewards insurance policy. Examples of things that will preclude a GIP from driving a park vehicle include: GIP under the age of 21 years old that has been licensed less than three years, DUls, multiple moving vehicle violations, suspended or revoked license, or three or more accidents (regardless of fault) in the last 3 years. If the driver’s search is favorable, Stewards will provide driver’s liability insurance while the intern is
driving a NPS vehicle for their GIP position. If the GIP is denied coverage by Stewards, they will not be permitted to drive during work hours.

**HOUSING**

**Park housing is available and will be provided at no cost to the participant.** Housing consists of a shared 3-bedroom, 2-bathroom house, fully furnished except for kitchen utensils, plates, pots, etc. Each house has a washer and drier. Wifi is available in the Page area, but will need to be purchased by the occupants. Cell service is reliable in the area.

**INTERNSHIP DATES**

- **Start Date:** 9/14/2020
- **Number of weeks:** 12 weeks
- **Flexibility of dates:** Yes

**LIVING ALLOWANCE**

12 weeks ($350/week = $4,200)

**RELOCATION ALLOWANCE**

$250

**PROFESSIONAL DEVELOPMENT ALLOWANCE**

$500

**AMERICORPS PROGRAM**

AmeriCorps is a program that engages individuals in intensive community service work with the goal of “helping others and meeting critical needs in the community”. The GIP Program is supported through AmeriCorps by providing a Segal Education Award in addition to the GIP’s living stipend and relocation allowance.

Upon successful completion of the GIP position, the GIPs (AmeriCorps members) are eligible for a $1,612 - $6,095 pre-tax education award that can be used for paying back student loans or for continuing their education. The amount of the education award is based on the length of the position.

AmeriCorps limits the number of terms an individual can serve to 4 terms. If an applicant has previously completed 4 GIP or other AmeriCorps positions, they will not be eligible to apply for an additional GIP position.

**NATURAL AND PHYSICAL WORK ENVIRONMENT**

- **Natural Environment:** Glen Canyon National Recreation Area is the 2nd largest park in the NPS Intermountain Region at approximately 1.25 million acres and houses Lake Powell. Page is a modern city of ca. 8000 with good shopping and medical services and the Page airport. Fall weather is variable but typically warm and sunny, gradually becoming colder towards December.

- **Physical Work Environment:** Office setting in a cubicle with computer. Field work will occur in remote areas of the park using vehicles and hiking. Hiking will be up to 4-5 miles and the intern should expect to be moving and standing for around 8 hrs/day. Optional river and lake boating opportunities may be provided as needed.

**MENTORING AND LEARNING GOALS**

**Mentoring:** Chief scientist will work closely with intern on GIS analyses and landscape condition assessments; training will potentially include Operational Leadership; will work with USGS scientists on using and developing SDM models; may be involved in NPS-USGS climate change planning for Colorado Plateau grasslands and pinyon-juniper woodlands.

**Learning Goals:** Application of GIS to remote-sensed data; vegetation ecology, soils and geology of the Colorado Plateau; use of available data to interpret landscape changes for specific plant species; many other opportunities in association with USGS scientists.
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<td><strong>Primary:</strong></td>
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<tr>
<td>John Spence</td>
<td>Ken Hyde</td>
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<tr>
<td>Deputy Chief, Natural Resources and Chief Scientist</td>
<td>Division Chief, Science &amp; Resource management</td>
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