PROJECT DESCRIPTION
2020 FALL/WINTER

POSITION TITLE: Hydrology Assistant (1)
POSITION TYPE: Guest Scientist
PRIMARY NATURAL RESOURCE DISCIPLINE: Water resources
PROJECT KEYWORDS: lake, stage, discharge, rating curve, streamflow, hydrology
LOCATION: Anchorage, Alaska

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: Hydrology encompasses the distribution and movement of water and its interactions with the surrounding environment, whether in the ground, on the landscape, or in the atmosphere. Hydrologic parameters, such as stage and discharge, are useful for understanding patterns observed in aquatic systems. Stage refers to the vertical movement of water and is measured as the height of the water’s surface relative to a chosen reference point. Discharge refers to the longitudinal movement of water and is measured as the volume of water that moves past a given point over a unit of time. Although stage can be measured easily with automated data loggers, discharge cannot. Hence, stage data are frequently continuous and discharge data are discrete, which is sub-optimal since a continuous time series of discharge is often the endpoint of interest. Rating curves offer one solution to this problem. A rating curve plots stage vs. discharge for a given location. The equation that best fits the curve enables the derivation of a continuous time series of discharge from a continuous time series of stage.

The Southwest Alaska Network (SWAN) is one of 32 regional networks established as part of the National Park Service Inventory and Monitoring (I&M) Program. SWAN staff monitor stage and discharge at the outlets of four lakes: Naknek Lake and Lake Brooks in Katmai National Park and Preserve, and Lake Clark and Kjik Lake in Lake Clark National Park and Preserve. Monitoring at most sites dates back to 2006 and occurs primarily during ice-free summer months, with the goal of quantifying changes in the timing, duration, and magnitude of peak summer stage and discharge at these lake outlets.

SWAN is seeking an intern to help finalize, summarize, and analyze the stage and discharge data, and then convey the results in a formal technical report. Specific tasks of this position will be to: (1) finalize the raw data and associated metadata via uploading, correcting, and grading them in a database called AQUARIUS; (2) help refine the rating curves for deriving continuous discharge data in AQUARIUS; (3) produce summary statistics for continuous stage and discharge using AQUARIUS and R; (4) assess status of the timing, duration, and magnitude of peak summer stage and discharge, in terms of their central tendency and variability; (5) assess changes in the timing, duration, and magnitude of peak summer stage and discharge via trend analyses; and (6) document findings on status and trend in a publishable report. Time permitting,
the intern will explore relationships between discharge and other SWAN datasets pertaining to water quality and weather.

Freshwater resources in the SWAN are abundant, featuring thousands of kilometers of rivers and two of the largest lakes in the National Park system: Naknek Lake (58,824 ha) and Lake Clark (31,117 ha). The Naknek Lake and Lake Clark watersheds are so extensive that they cover 48.6% and 31.6% of the land area within their respective parks. In establishing these parks, Congress recognized the cultural, ecological, recreational, and economic importance of freshwater resources, with reference to protecting and maintaining lakes in their natural state in the enabling legislation (ANILCA 1980). SWAN's monitoring of lake outlet stage and discharge addresses the NPS mission of maintaining lakes in their natural state by quantifying the “natural state” baseline and assessing changes over time. The GIP internship described above would contribute directly to that effort. It would also make previously internal datasets public, as mandated under a 2013 Executive Order for open, machine-readable data.

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:**
- Uploaded, corrected, and graded stage and discharge data for four lake outlet sites, with the data made publicly available through the NPS database, AQUARIUS;
- Rating curve equations for each site, and documentation of how each curve was derived;
- Tabular and graphical summaries of parameters of interest (i.e., the timing, duration, and magnitude of peak summer stage and discharge) at each site;
- Technical report documenting status and trend of parameters of interest (above), intended for publication in the NPS Natural Resource Report series;
- R code created during the course of the project, fully commented for transparency and reproducibility; and
- Intermediate data sets generated during the course of the project.

**QUALIFICATIONS**

Applicants must have strong backgrounds in data analysis, as demonstrated through coursework in statistics, applied mathematics, ecological modelling, etc. Applicants must also be proficient at programming in R. Experience communicating scientific information verbally and in writing and the ability to work independently and meet agreed upon deadlines are also required. Prior experience using rating curves or analyzing stage/discharge data is not required, but would be helpful.

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.** This requirement is mainly to preserve options, should the need arise. However, we currently anticipate having little if any need for the intern to drive a park vehicle.

**A personal vehicle is not required for this position.** A personal vehicle is not required for the commute. As stated below, Anchorage is a small city, with many housing options available within walking, cycling, or busing distance of downtown, where the NPS office is located. A bicycle (complete with lock, lights, helmet, and studded tires) is available for loan.
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 NOT available and the intern will be responsible for finding housing in the nearby area. Anchorage is a compact city, with many housing options available within walking, cycling, or busing distance of downtown, where the NPS office is located. Options range from shared housing (at the low cost end) to multi-room apartments (at the high cost end). See Craigslist for short-term rental prices (https://anchorage.craigslist.org/search/hh). Note that prices during summer tend to exceed those during the rest of the year, when this internship will occur.

INTERNSHIP DATES

Start Date: 10/19/2020
Number of weeks: 20 weeks
Flexibility of dates: Yes

LIVING ALLOWANCE

20 weeks ($525/week = $10,500)

RELOCATION ALLOWANCE

$1000

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: Anchorage is Alaska’s most populous city, with a diverse population of ~300,000 residents and a landscape bordered by mountains and ocean. It has a subarctic climate with strong maritime influences that lead to relatively moderate winter weather, compared to Alaska’s interior. Average daytime winter temperatures range from ~5 to 30 °F (~15.0 to ~1.1 °C). High latitude causes winter days to be short (as little as ~6 hours of daylight), however the ability of snow cover to reflect ambient light and brighten surroundings is substantial.

All standard amenities are available in Anchorage, including hospitals, schools, universities, restaurants, museums, theaters, and airports. Indoor and outdoor activities abound. In winter, outdoor activities include skiing (classic, skate, downhill, backcountry), snowboarding, snowshoeing, ice skating, and fat tire cycling, among others. Trails and lakes throughout the city are groomed and hot-mopped (respectively) during winter, and are available for recreation free of charge.
**Physical Work Environment:** Work will be indoors at the Alaska Regional Office, located in downtown Anchorage. Office space and a laptop will be provided.

**MENTORING AND LEARNING GOALS**

**Mentoring:** The intern will be mentored by the SWAN Aquatic Ecologist, first through training and then regular progress meetings. If issues arise outside the expertise of the Aquatic Ecologist, a cadre of experts is available for guidance, including the SWAN Assistant Data Manager, and Natural Resource Specialists in Anchorage and Fort Collins. While working with these scientists, the intern will develop applied skills vital to a career in geosciences that will ultimately contribute to informed decision making.

**Learning Goals:** This project will allow the intern to gain practical experience in the latter phases of the scientific research process, from data quality control and summary to analysis and reporting. Additionally, the intern will gain competence with a database used by multiple federal agencies (USGS, NPS), as well as state, regional and local water authorities, private businesses, and academic institutions. Finally, the intern will gain experience communicating long-term monitoring results to a diverse audience.

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