

## **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) internship program as a pathway for exemplary students in higher education (advanced undergraduate students and graduate students) to apply their skills and ideas to park-based challenges and solutions. The program 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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### **Map Visitor Use Impacts & Assess Interaction with Atmospheric Nitrogen Deposition and Climate Change**

Rocky Mountain National Park/Resource Stewardship Division  
Estes Park, CO

#### **PROJECT SUMMARY**

Investigate, map, and analyze resource impacts associated with increasing visitor use at the third most visited National Park in the country, Rocky Mountain National Park. Support park management by determining the relationship of these impacts with other stressors including atmospheric nitrogen deposition and climate change to inform future management decisions and protect valuable resources.

#### **INTERNSHIP PROJECT BACKGROUND**

Rocky Mountain National Park experienced a 42% increase in visitation from 2012 to 2018, exceeding 4.5 million visits annually and earning the title as the third most visited National Park. Park management has been grappling with how to respond and has begun steps toward developing a Day Use Visitor Access Strategy (DUVAS). The park also has implemented a few experimental pilot projects aimed at reducing parking and traffic congestion and associated visitor experience, safety, and operational challenges in the Park's "front country". These pilot projects have not reduced visitation or its impacts to popular backcountry destinations where the increase in social trailing, vegetation/soil loss, and human waste deposits raise important aesthetic, sanitary, and ecological concerns. These high-elevation watersheds also are very sensitive to excess atmospheric nitrogen (N) deposition and rising temperatures. It is hypothesized that the interaction of these stressors has amplified eutrophication of lakes to the point that visible algal blooms are now a common occurrence. The Park is actively working with regional partners, including agriculture to reduce N deposition. This project will answer the begging question of whether visitor impacts internal to the Park also are contributing to these eutrophication effects.

## **INTERNSHIP PROJECT DESCRIPTION**

The FLP Intern will conduct an independent project to understand how visitor use affects popular backcountry destinations and if these impacts contribute to lake eutrophication in the Loch Vale Watershed. Loch Vale Watershed is an ideal study location due to its high visitor use level and being a long term research and monitoring site for nitrogen deposition. Information gained from the project will be used to inform park management and build upon an NPS-USGS-University research collaboration.

The intern will develop research methods to measure and map social trailing, soil loss from erosion or trampling, and human waste. They will collect and analyze data to inform park managers about their aesthetic, sanitary, and ecological effects on park resources and visitor experience. The methods developed for this project will inform future development of a long-term visitor use and impacts monitoring protocol as part of DUVAS. The intern will serve as the field lead for some of these measurements, organize citizen science campaigns to map social trailing, soil loss, and human waste, and be trained to lead the installation and calibration of trail counters. The intern also will be part of a collaborative team studying N cycling from both human waste and atmospheric deposition - and interactive effects with climate change. They will collect water, soil, and algae samples and travel to CSU to learn about and conduct sample analysis.

### **Internship Tasks**

- Meet with RMNP staff and collaborators about existing data and findings.
- Participate in RMNP backcountry training (safety). Participate in intro field trip with collaborators.
- Receive trail counter training, develop a plan to deploy 6 trail counters to understand visitor use levels and patterns in the Loch Vale Watershed, and analyze trail counter data.
- Collect water, soil, and algae samples as part of research team.
- Develop and test methods to map social trailing, soil loss, and human waste deposits using GPS-enabled tablets and GIS technology. Develop and test various condition classes to understand level of impacts.
- Design and lead at least two citizen science campaigns to collect data and produce maps of social trailing, soil loss, and human waste deposits. Calculate social trailing density and estimated soil erosion loss or compaction from spatial data collected.
- Contribute trail count data to collaborative research effort, which will estimate N input from human waste compared to contribution from atmospheric deposition.
- Conduct data analysis and write a report about visitor use levels and patterns, social trailing, soil loss, and human waste, including recommendations for long-term monitoring and other potential park management needs.
- Present a seminar to Park staff and collaborators about their internship findings and recommendations.

### **Internship Products**

- Social trailing, soil loss, and human waste database and maps
- Trail counter database
- Electronic file of material produced to organize citizen science program

- Scientific report (background, methods, results, conclusions) about visitor use levels, social trailing, soil loss, and human waste data collection, including recommendations for long-term monitoring.
- Seminar presentation

## **QUALIFICATIONS**

The most qualified applicants will have, or be pursuing, a degree in ecology/biological sciences, aquatic ecology, and/or human dimensions. Applicant should possess an understanding of climate change science and water quality, have experience collecting data in the field using GPS units, experience mapping and analyzing spatial data in ArcGIS, and have the ability to write a scientific report including basic data display and analysis. Additionally, applicants should: 1) have and demonstrate the ability to carry out research independently; 2) have good communication and basic leadership skills to organize and implement volunteer citizen scientist campaigns; 3) possess backcountry and off-trail hiking experience (preferably in mountainous terrain) and; 4) be attentive to safety while working in the field.

The most qualified applicant will possess:

- Advanced coursework in ecology, GIS, water quality, aquatic ecology, and human dimensions.
- Experience collecting data using GPS and mapping/analyzing spatial data in ArcGIS
- Ability to write a scientific report including basic data display and analysis
- Good communication/leadership skills to organize and implement volunteer citizen scientist campaigns
- Backcountry/off-trail hiking skills and experience in mountainous terrain with adverse weather conditions
- A valid driver's license

## **LEADERSHIP DEVELOPMENT**

Dr. Koren Nydick (Chief of Research Stewardship, RMNP) and Dr. Jill Baron (USGS/CSU) will work closely with the intern to provide technical and project management guidance and mentoring. We also have asked Dr. David Pettebone (NPS Social Science Program) to join our team and help mentor the intern (response pending). It will be a terrific and somewhat unusual opportunity to integrate ecological and social science in the service of informing management. The intern will be integrated with and hosted by the Resource Stewardship Division of RMNP, including opportunities to participate in a variety of training and interactions with other park staff as well as the WASO Social Science Office in Fort Collins. They also will work side by side with graduate students and CSU research technicians and travel to CSU to network and learn about facilities there.

## **DATES OF POSITION**

Approximate dates of internship: 06/15/2020 – 09/15/2020. Dates are flexible; the time frame for project completion is between 06/01/2020 and 09/30/2020.

## **COMPENSATION**

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

## **HOUSING & TRAVEL**

The FPL provides a travel stipend to all interns to supplement the cost of student travel to the park site.

Housing would be in a seasonal housing unit, shared with other staff or interns, on the eastern side of Rocky Mountain National Park near Estes Park, CO. Housing unit would be minimally furnished (bed, dresser/closet, desk, chairs), however the intern will need to provide bedding, cookware, and other personal items. The nearest community is Estes Park, CO. Due to its proximity to the Colorado Front Range Estes Park receives high visitation during the summer months. Estes Park is a great community with access to many outdoor recreation opportunities. Estes Park has K-12 schools, a public library, a post office, restaurants, medical facilities, and grocery stores and is 10 minute drive from housing area. Denver, CO which has a major airport, cultural events, and several professional sports teams is a two hour drive away.

## **WORK ENVIRONMENT**

Work will involve both office and field work. This includes hiking in steep, mountainous terrain up to 12,000 feet elevation with possible exposure to inclement weather (hot or cold temperatures, wind, rain, snow, and lightning). Intern could encounter wildlife such as elk, moose, and black bear. Office will be at Park Headquarters adjacent to Estes Park, CO. Will include visits to WASO NPS office and Colorado State University in Fort Collins which is 35 miles away from Estes Park.

## **CONTACT INFORMATION**

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