

# 2019 Cooperative Summer Field Training Program

● <b>Project Title:</b>	Brook trout vulnerability to drought: eastern component of USGS national integrated ecohydrological research and monitoring plan
● <b>Project Scientists:</b>	Craig Snyder
● <b>USGS Center:</b>	Leetown Science Center
● <b>Location:</b>	Field sites in Shenandoah National Park, VA

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## Project Description:

### **Background Information:**

The increased frequency of extreme events, including both droughts and flooding, has emerged as one of the most consistent predictions of future climate change. Droughts, in particular, have become a critical threat to stream and river ecosystems. Despite the importance of drought as a significant driver of ecological and evolutionary dynamics, current understanding of drought consequences for biodiversity in streams and rivers is limited, particularly in headwater streams and for the salmonid fish populations these systems support. This study is part of a larger national effort to develop an integrated ecohydrological research and monitoring network in headwater basins across the United States designed to assess drought impacts and improve conservation and management.

### **Objectives:**

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The objectives described below are specific to selected basins within Shenandoah National Park and led by scientists from Leetown Science Center. However, similar objectives and methods will be replicated in four other basins representing different ecohydrologic landscapes throughout the United States.

1. Develop cost-effective, novel tools and technologies for collecting ecohydrological data in headwater stream habitats;
2. Assess flow variation and derive drought relevant flow statistics within selected basins;
3. Link drought vulnerability to spatial and temporal trends in brook trout population abundance;
4. Use modeling and simulation approaches to forecast vulnerability of brook trout populations to increasing drought frequencies and flow disturbances;
5. Synthesize datasets derived from Shenandoah National Park streams with datasets developed in other watersheds across the United States

### **Intern Tasks:**

1. Work as part of field teams to collect hydrological and ecological data in selected basins. Hydrological data will include data derived from new and innovative approaches such as nested salt dilution and electromagnetic imaging to assess groundwater-surface water interactions. Similarly, we are developing new approaches for assessing fish population abundance and behavior that are based upon innovations in video camera technologies, as well as genetic tools including eDNA.
2. Assist with data summaries, including deriving relevant summary statistics from raw data and providing preliminary analysis and summaries. Here we can be flexible around the primary interests of the intern (i.e., working with either hydrological or ecological datasets).

***Expected Outcomes:***

Selected interns will benefit from working on this project in several important ways. First, she/he will be afforded the opportunity to be part of a team of scientists and technicians from various disciplines including Ecology, Hydrology, Genetics, and Geographic Information Systems (GIS). Thus, the experience will provide a broad, multidisciplinary research experience that will foster a foundational understanding of scientific research. Second, the successful applicant will gain experience using some of latest technologies and instrumentation used in field sampling and monitoring stream ecosystems. Finally, the intern will work with a variety of data sources and will participate in data summarization and preliminary analysis using GIS, statistical software programs and spreadsheets. As a result, the applicant will be exposed to both data collection and analysis activities that together will provide a well-rounded research experience.

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**Details for Matching:**

**Type of Project:** Field Work

**Project Discipline:** Ecology, Field Mapping, Groundwater, Surface Water, Climate Science, Fisheries/salmonid Ecology and evolutionary biology

**Project Start Date:** Mon Jun 03 2019 00:00:00 GMT-0400 (EDT)

**Project Duration:** Three months

**Level of Physical Demand:** Level 8-3: The work requires considerable and strenuous physical exertion such as frequent climbing of tall ladders, lifting heavy objects over 50 pounds, crouching or crawling in restricted areas, and defending oneself or others against physical attack.

**GIS Training:** ESA

**Special Skills and Interests:** Applicants should have strong academic background in Biological and/or Physical sciences. Students with strong interests in pursuing advanced degrees and careers in Aquatic Ecology, Fisheries Biology and/or Hydrology will receive preference.

