



USGS NSF GRIP Opportunity

- USGS Center:** Wyoming-Montana Water Science Center
- Project Title:** Biogeochemical cycling of mercury, selenium, uranium, and nitrogen at selected field sites in Arizona, Montana, Utah, Wyoming, and British Columbia.
- Project Hypothesis or Objectives:**

Ongoing applied research projects currently being led by the WY-MT WSC include: (1) development of a site specific water quality standard for selenium that is protective of aquatic life, Lake Koocanusa, MT/BC; (2) biogeochemical cycling of mercury in large western reservoirs, Bighorn Canyon and Glen Canyon National Recreation Areas, MT/WY/AZ/UT; (3) nutrient cycling in Great Salt Lake, UT; and (4) quantifying environmental impacts of ongoing and legacy uranium mining, WY/AZ.

Each of the individual projects listed above have specific research objectives and are at various stages of completion. The combination of these projects will provide the graduate research fellow with outstanding exposure to a wide variety of geochemical issues in the context of issue driven, applied research conducted by the operational program of the USGS (WY-MT Water Science Center). The study sites range from pristine freshwater reservoirs in northwestern Montana impacted by coal mining in southeastern British Columbia to active uranium mines on the north and south rims of Grand Canyon National Park. The graduate research fellow will have opportunities for data collection/analysis; data interpretation; contributing to journal publication(s); and exposure and meaningful interactions with state, federal, university, and other USGS researchers.
- Duration:** Minimum of 6 months
- Internship Location:** Helena, Montana
- Area of Discipline:** Geochemistry, Limnology, Hydrology, Biology
- Expected Outcome:** The intern will gain extensive field experience in a variety of hydrologic and geographic settings. The graduate fellow will have excellent opportunities to apply statistical, modeling, and

biogeochemical tools in the interpretation of issue driven research while gaining an appreciation of how applied research is conducted in the operational program of the USGS. The student will also have the opportunity to gain experience in the use of novel environmental tracer and isotopic techniques to better constrain biogeochemical processes through collaborative interactions between the USGS and University of Montana. Plentiful opportunities will exist for authoring and/or co-authoring a variety of peer-reviewed information products as well as presenting the research results to peers.

Short-term USGS benefits will include project contributions from a highly motivated and well trained graduate intern to accomplish the various research objectives described previously. The USGS will also benefit from newly acquired skills and the "cross fertilization" of these skills and technical insights to USGS scientists in MT and WY. This "cross fertilization" is particularly relevant to the USGS office in Helena, because of the absence of a major university in town. The internship will also provide an opportunity to determine how well the intern can perform under a variety of field and project settings in the USGS.

**● Special skills/training
Required:**

Formal training (senior- or graduate-level courses) in hydrology, aquatic chemistry, geochemistry, biology, chemistry, and limnology. Basic computer skills. Strong oral and written communication skills. Fitness levels that allow the intern to perform physical activities (i.e. hiking, canoeing, backpacking) at high elevations, as well as working in temperature extremes (-10 to 110 deg. F) for prolonged time periods (5 to 10 days). Flexibility for travel to remote field sites for two to three weeks per month.

● Duties/Responsibilities:

The intern will assist with data collection, laboratory analysis, and interpretation associated with four ongoing biogeochemical projects currently (2016) being conducted by a senior research hydrologist (geochem) in the USGS WY-MT WSC located in Helena, MT. Specific intern roles and associated responsibilities will include: (1) collecting and interpreting data from Lake Koocanusa in northwestern MT to support the development of a site-specific water quality standard for selenium that is protective of aquatic life; (2) assisting with water, sediment, and biological sample collection within Bighorn National Recreation Area to understand selenium/mercury interactions and biogeochemical cycling; (3) assist with the interpretation of geochemical data collected during two USGS synoptic sampling campaigns associated with mercury cycling in Lake Powell, Glen Canyon National Recreation Area; (4) assist with surface water/groundwater data collection and interpretation along the Little Wind River in western Wyoming to identify ecological impacts associated with the discharge of groundwater with elevated uranium levels; and (5) soil sampling and interpretation of multivariate data sets associated with uranium mines in proximity to Grand Canyon National Park, AZ.

● **Point of Contact or Mentor:** David Naftz

● **Point of Contact e-mail:** dlnaftz@usgs.gov