

The South Dakota Discovery Center facilitated a professional development opportunity for K-12 educators June 18-21, 2018 focused on citizen science field studies. June 19-21 were conducted in Badlands National Park. Two of the field studies, arthropod sampling and water quality monitoring, required collecting specimens. The Arthropod Sampling for Educators project was conducted under the supervision of state urban entomologist Dr. Amanda Bachmann. The water quality sampling project, GLOBE in the Field, was conducted according to GLOBE protocols. GLOBE is an international, school-based, citizen science program sponsored by NASA and NOAA. In addition, participants took pictures of flora and fauna within the park which were upload to the citizen science platform iNaturalist. This report summarizes the citizen science research conducted. You can read about the entire expedition at:

<https://openexplorer.nationalgeographic.com/expedition/exploringbnp>.

Arthropod Sampling for Educators

Dates: June 19-21, 2018

Study#: BADL-00077

Permit#: BADL-2018-SCI-0020

Principal Investigator: Anne Lewis, South Dakota Discovery Center, Co Principal Investigator Dr. Amanda Bachmann.

Arthropod Sampling for Educators is a research project with two main goals: build the capacity of educators to sample and identify arthropods and collect data to populate projects on iNaturalist, a citizen science platform. The permit for this research project allowed for multiple sweeps and temporary capture of arthropods over multiple days in addition to black light trapping in the evening.

The team-consisting of nine educators, principal investigator Anne Lewis, and co-investigator Dr. Amanda Bachmann-sampled for arthropods on June 19 in the afternoon. We used the ten step, double sweep method with a canvas net to collect arthropods placing them in plastic jars for observation. They were released within an hour and often within a few minutes of capture after being identified and photographed.

Some of the participants added their photos to an iNaturalist project *2018 Badlands NP Educator Field Work* which can be accessed at:

<https://www.inaturalist.org/projects/2018-badlands-np-educator-field-work>. The arthropods documented in the iNaturalist project are:

- Two (2) Flower longhorn beetles (*lepturinae*)
- Two (2) Coleoptera
 - One (1) possible blister beetle
 - One (1) possible *Pasimachus*
- Three (3) Plains Lubber Grasshopper* (*Brachystola magna*)

- One (1) *Neurptera*
- One (1) *Coccinellinae*
- One (1) Convergent Lady Beetle (*Hippodamia convergens*)
- One (1) Euthyneran Gastropod
- One (1) ant
- One (1) wolf spider
- Several organisms were added to one observation, making it difficult to identify the organisms.

* indicates research grade, meaning that it has been confirmed by multiple identifiers.

A short video was made of the sampling. You can view it at:
<https://spark.adobe.com/video/ueEzayV8lr5Zp>

Due to thunderstorms, the blacklight sampling did not occur. Weather also shifted the schedule so that the team only sampled for arthropods once instead of at multiple sites.

One of the outcomes of this project is the creation of a Arthropods of Badlands National Park iNaturalist project, accessible at <https://www.inaturalist.org/projects/arthropods-of-badlands-national-park>. This iNaturalist project is administered by the investigators of this research project. This iNaturalist project pulls in all arthropod observations made within the boundaries of Badlands National Park by all observers throughout the year. Current park education staff have been informed of the project.

GLOBE in the Field

Dates: June 19-21, 2019

Study #: BADL-00069

Permit #: BADL-2018-SCI-0008

Principal Investigator: Anne Lewis, South Dakota Discovery Center

The purpose of GLOBE in the Field is to provide educators hands-on field study experience in the unique setting that is Badlands National Park. Educators conducted water quality studies as part of a broader professional development opportunity that will facilitate understanding of and ability to teach about the Park.

The team-consisting of nine educators and principal investigator Anne Lewis-sampled one monitoring site located at 43.88661 -102.41501 in Badlands National Park along the South Fork. This site was sampled twice, once on June 19 and again on June 21. A two inch rain occurred on the interim date. The other sites listed in the permit were not sampled due to lack of time and weather.

The team used Vernier probeware to measure conductivity, pH, and water temperature. A 120 cm transparency tube (t-tube) was used to measure water transparency. The water temperature was measured *in situ*. Samples were collected in 500 mL bottles to bring back to camp to monitor with the probeware and to pour into the tubes. Conductivity had to be measured between 20°C and 30°C and *in situ* water temperature was below that. Sample water was poured out onto the ground.

Data can be accessed at the GLOBE website or at this site: bit.ly/bnpwqmdata (Badlands National Park Water Quality Monitoring Data). The monitoring sites and data can be visualized on this [map](#) also available at bit.ly/bnpwqmdatamap (Badlands National Park Water Quality Monitoring DataMap).

Funding

Activity	Local	Federal	Total
Principal Investigator Time (\$22/hour)	1980.00	660.00	2640.00
Co-PI Time (\$30/hour x 20 hours)	600.00		600.00
Travel (9 x \$0.42/mile x 266 miles)	893.76	111.72	1005.48
Field Outfitting (99.50/day x 4 days)	400.00		400.00
Field Researchers (\$20/hour x 5 hours x 9)	900.00		900.00
Field supplies (\$100/day x 3 days)	300.00		300.00
Total	5073.76	771.72	5845.48

Federal funding is the percentage of time that are paid by a federal grant to fund the position of principal investigator Anne Lewis.