Missouri State University

2018
Bull Shoals Field Station
Annual Report

1.0 Bull Shoals Field Station Mission

The mission of the Missouri State University (MSU) Bull Shoals Field Station (BSFS) is to provide a location for faculty, students, and visiting scientists to conduct research and educational programs that increase public understanding of southwest Missouri ecosystems.

2.0 Partnerships

BSFS staff correspond with the U.S. Army Corps of Engineers (USACE) and Missouri Department of Conservation (MDC) personnel on research and monitoring questions. USACE also does an annual inspection every year. And MDC and BSFS staff communicate about maintenance issues and the timing of group events at the Drury-Mincy conservation area.

Partnerships have also sprung out of the annual Green Leadership Academy for Diverse Ecosystems (GLADE) program. MDC, BSFS staff (Greene and Prussia), and the Greater Ozarks Audubon Society (GOAS) work together to plan and conduct the event. Additional groups assisting with GLADE include the Springfield Plateau Chapter of the Master Naturalists, James River Basin Partnership, Watershed Committee of the Ozarks, and various university faculty/staff.

The Mincy House is also the host site for GOAS' Taney County Christmas Bird Count. This annual event includes counting birds on the Drury Conservation Area and hosting the compilation dinner in the evening.

3.0 Field Station Resources

3.1 Staff

In 2018, primary BSFS staff consisted of:

- Director - Janice Greene;
- Manager - Celeste Prussia (retired) and Patricia Reed (current); and,
- Environmental Education Program Coordinator - Erica Cox.

Also, Director Greene temporarily hired a graduate student after the previous manager retired at the end of May to help with maintenance of the field station until a new manger could be found. And, student workers were employed to assist with various environmental education program tasks.

3.2 Facilities and Equipment

BSFS consists of two facilities, Drury House and Mincy House. The Drury House property includes a two-story stone house; pavilion; classroom; shed containing a wet lab, office, and maintenance storage; and, a generator/photovoltaic system building. The Mincy House property includes a one-story ranch-style house and a stand-alone garage. BSFS Manager Patricia Reed conducted inventories of both properties in 2018. She will upload summary inventory sheets to the website in 2019.

Planning and design for the Ozark Education Center in Cedarcreek, Missouri began in October 2018. A series of meetings was held with various MSU faculty and staff and the consulting architects, BNIM. This work will continue into 2019.

3.3 Vehicles

MSU Motor Pool has three passenger vehicles and two boats listed for the field station. These include:

- 2008 Chevrolet Uplander van;
- 2007 Ford Ranger pickup;
- 1994 Ford F-150 truck;
- 1999 Lowe 20-foot Suncruiser pontoon boat with a 1999 60 hp Johnson outboard motor; and,
- 1994 10-foot Generation jon boat.

The Uplander is typically stationed at MSU, while the two trucks and the jon boat are at Mincy House. The pontoon boat is kept at the K-Dock Marina.

4.0 Expenditures

4.1 Past Expenses

BSFS has an approximately $75,000 annual budget. The field station's major expense continues to be staff salaries. Other expenses include (1) facilities costs such as maintenance and utilities (e.g. Mincy House electricity and Drury House propane); (2) vehicle maintenance and boat slip rental; (3) travel expenses for conferences and Projects WET, Learning Tree, and WILD workshops; (4) GLADE sponsorship costs; and, (5) membership and conference fees.

4.2 Anticipated Expenses

Potential extra expenses in the upcoming year include purchase of a new motor for the pontoon boat, expenses associated with the Ozarks Education Center, and replacement/update of the solar power system at the Drury House.

5.0 BSFS Use Statistics

BSFS Use statistics are compiled from sign-in sheets at both Mincy House and Drury House. These sheets are combined to calculate the following use statistics. Please note that if an individual visits both houses in the same day (e.g. for maintenance or research) this is only counted as one person-day.

- *Total: 570 person-days*
- Classes: 282
- Meetings/Workshops: 48
- Tours: 7

- Research: 154
- Maintenance/Staff Work Days: 79

Use statistics are lower this year due to a variety of factors. First, the calculation methodology was altered from previous years to better define a "person-day". Second, there will always be some fluctuation as research projects finish. In 2017, we had multiple graduate students staying long periods in the summer conducting their research. This year, students still conducted research but did not stay long periods. Finally, with the retirement of Celeste Prussia, a regular summer class offering was not offered in 2018, and there was one less day with students from Kirbyville Middle School.

6.0 BSFS Activities

6.1 Classes

MSU faculty did not teach any full-time residential classes at the field station. However, field trips for the following MSU classes were held there:

- Identification of Woody Plants (BIO 339);
- Field Ornithology (BIO 597/697);
- Herpetology (BIO 576/676);
- Mammalogy (BIO 577/677);
- Plant Ecology (BIO 436/636); and,
- Plant Taxonomy (BIO 334).

6.2 Meetings, Workshops, and Tours

GLADE continued to meet for its week-long session in June at BSFS. The 10th year of GLADE brought 17 high school students from southwest Missouri to BSFS to learn about biodiversity, conservation, endangered species, water, and habitat restoration. Director Janice Greene helped coordinate speakers, welcome parents and students, and lead students through activities such as bird banding

Also, Kirbyville Middle School spent an afternoon at the field station as part of its summer program for students. This trip included 62 students and accompanying adults who enjoyed activities directed by BSFS Manager Celeste Prussia.

Janice met with, and provided a tour to, Missouri S&T Biology Department Chair Dr. David Duvernell and Dr. Robin Verble, Director of the Missouri S&T research station.

On December 22nd, the Greater Ozarks Audubon Society conducted their annual Christmas Bird Count at the Drury Mincy Conservation Area and held their tabulation dinner at Mincy House.

6.3 Research and Monitoring

Undergraduates

- Alexis Vonbokel and Regan Carter - The effects of prescribe fire history on decomposition rates in Oak woodlands: A test of the mesophication hypothesis
- Sarah White and Jami Baker - Effects of time of day and predator activity on salamander behavior

Graduate

- Megan Mosier – Exploratory behavior of *P. angusticlavius*, examining effects of gravidity and predation
- Casey Adkins - Tick occurrence and environmental predictors

Faculty and Staff

- Ben Dalton – Field activity across *P. angusticlavius* populations
- Ben Dalton - Activity correlation across life stages in *A. Ambystoma*

Long-Term Monitoring

Dr. Janice Greene has been capturing and banding birds for the Monitoring Avian Productivity and Survivorship (MAPS) program at BSFS since 2010. MAPS is a national effort to monitor demographic trends in birds. Dr. Greene's contribution includes setting out ten nets for ten days every summer and capturing required demographic data and banding the birds. Dr. Greene has also spent several years participating in the Northern Saw-Whet Owl monitoring project hosted by Project Owlnet.

Over the past 18 years, Dr. Alexander Wait and numerous graduate and undergraduate students have been collecting leaf litter and acorn production across three BSFS woodland types: (1) not burned in over 60 years, (2) burned every 2-4 years since 1999; or, (3) burned every 2-4 years since 1980. He has also been monitoring spring ephemeral species richness since 2008. The data are used to assess the effects of fire, precipitation, and temperature on community and ecosystem processes in woodlands. For instance, the data indicate:

- The reintroduction of prescribed fire has decreased total overstory leaf production, mostly because of thinning. Overstory cover has decreased from 90% to 80% and 60% for burns since 1999 and 1980, respectively.

- All three woodland types have similar total acorn production, which suggests that the reintroduction of prescribed fire has not increased acorn production, which relates to opportunities for oak regeneration.

- Litter fall is one of the main factors that contributes to nutrient cycling and carbon input into the soil. Prescribed fire decreasing the amount of leaf litter input results in decreases in rates of nutrient and carbon recycling.

Bull Shoals Field Station's phenocamera continues to collect forest canopy pictures every 30 minutes during the daylight hours at Shanda's Point. The phenocam sends these pictures in real-

time to the Phenocam Network (http://phenocam.sr.unh.edu), hosted by Harvard University and the University of New Hampshire. Researchers can use the pictures to monitor canopy phenology (the dates of leaf development and leaf fall every year) and as a link to remote sensing information. Phenology, the study of the annual timing of life cycle events of plants and animals, is a powerful indicator of climate change.

BSFS staff continue to collect long-term data weather station data, which they update on the BSFS website monthly.

Long-term temperature data were collected at four BSFS ponds from May 2011 through June 2017. New temperature loggers were installed July 2017 in Ponds 1, 2, and 4 to continue this process. Summer 2019 the new field station manager will set up the last logger in Pond 3 and upload the most recent data to the BSFS website.

6.4 Facility Maintenance

BSFS staff conduct general home maintenance, cold weather and security checks, mowing, and cleaning throughout the year as necessary. This work makes up about 90% of the maintenance/staff work days. Remaining days are usually spent by the staff troubleshooting emergencies that crop up. In 2018 that included a faulty circuit breaker and broken well pipe at Mincy House and a water leak at Drury House.

7.0 Offsite Activities

7.1 Environmental Education Programs

Missouri State University is the state sponsor of several environmental education (EE) programs, including Projects WET, WILD, and Learning Tree (PLT), Flying WILD, and early childhood education for each major program. Additionally, Janice Greene is the state coordinator for Leopold Education Project, Flying WILD, and the co-state coordinator, along with Erica Cox, for Projects Learning Tree and WILD. Erica is state coordinator for Project WET. Throughout the year workshops are held around the state to introduce these EE programs to Missouri educators. In 2018 a total of 48 workshops for approximately 565 participants were held for the following programs:

- 20 PLT Workshops: 200 participants
- 15 WET Workshops: 200 participants
- 2 Growing up Wild/Early Childhood PLT workshops: 35 participants
- 10 Project Wild: 120 participants
- 1 Flying WILD: 10 participants

Also, five students took the Storm Water Management for Educators course - a two-day field and lecture experience in the Springfield and Greene County area. BSFS Environmental Education Program Coordinator Erica Cox worked cooperatively with Carrie Lamb (City of Springfield Storm Water specialist), Tim Davis (Greene County Storm Water Services), and Tyler Goodwyn (Greene County Storm Water Engineer) to provide the program. As part of this course, participants wrote either a storm water management plan for an area or a unit plan for the classroom.

7.2 Conferences

BSFS staff attended several conferences throughout 2018. They hosted exhibit booths at the Missouri Natural Resources Conference (MNRC) and State Science and Math Teachers Conference (Interface A and B). They also provided a yearly PLT update to the Missouri Society of American Foresters meeting at MNRC, and facilitated a PLT Secondary Module session at Interface B.

7.3 Additional Activities by BSFS Staff

Janice Greene is serving as President of the Greater Ozarks Audubon Society Board until September 2019, and was a member of the Springfield Environmental Advisory Board (term ended at the end of 2018). Erica Cox works with Springfield and Greene County on a variety of stormwater education issues, with the public and private schools to improve water education throughout the state, and, through Project WET, with the James River Basin Partnership on their watershed festivals.

8.0 Publications and Presentations

8.1 Publications

Beasley, E. M. and S. P. Maher. Small mammal community composition varies among Ozark glades. Submitted to Journal of Mammalogy.

Heywood, JS, JS Mikalski, SH King, and WE McClain. History of an old-growth post oak savanna in the Missouri Ozarks and it response to fire management. *In preparation*

Lynn & Mathis. 2017. Territorial behavior in southern red-backed and Ozark zigzag salamanders: effects of sex, species, and ownership. Behaviour. In Press.

8.2 Presentations

Beasley, E.M. (G) and S.P. Maher. 2018. Applying island biogeography to small mammals in the Ozark glades while accounting for imperfect detection. American Society of Mammalogists - Presentation

Dalton, Lynn, & Mathis. 2018. The effects of sex, species, and territorial ownership on the behavior of woodland salamanders. Animal Behavior Society, Milwaukee, WA – Oral Presentation

Greene, J. February 2018. Bird Migration: Anatomy and Physiology that Makes It Possible. Greater Ozarks Audubon Society – Presentation.

Greene, J. March 2018. Resident and Migratory Birds. Tri-Beta, Biology Honor Society. Missouri State University – Presentation.

Greene, J. April 2018. The Geography of Migration: Issues and Partnerships. Missouri State University, Department of Geography, Geology & Planning - Presentation.

Greene, J. May 2018. Project WILD for Pre-service Teachers. National Project WILD Coordinator's Conference. Cleveland, Ohio – Presentation.

Remick, T. J. (G) and S. P. Maher. 2018. The effects of prescribed burning on small mammal and ectoparasite communities in oak hickory forests. MNRC – Poster.

White, Baker, Mathis. 2018. Diel effects on the antipredator behavior of terrestrial salamanders. Missouri Herpetological Association, BSFS – Oral Presentation

9.0 Grant proposals and awards

No one reported submitting or receiving any grant proposals or awards for 2018.

10.0 Goals for 2019

MSU secured funding for an education center on land donated by Terry Chase from the Missouri State legislature and other sources in 2018. Planning for this center began in October 2018 and will continue into 2019, with construction hopefully starting in the late-spring/early summer. Construction of this facility will increase partnerships with Chase Studio and provide an excellent meeting space for groups.

Additionally, our initial focus at the field station has been at the Drury House site getting the house, classroom, and outbuildings functional. Now that these activities are complete, we plan to turn our attentions to the Mincy House property. Plans for the upcoming year include:

1. Removing the dilapidated pigeon coop.

2. Reducing red cedars where appropriate. (Historic aerials display just over 1/2-acre that has filled in with cedars over the last five years in an area that is categorized as dry-mesic oak forest.)

3. Mapping habitats throughout the five-acre property and inventorying trees to establish a baseline.

4. Planning and starting the installation of a small trail network throughout the five-acre property.

Finally, with all the changes occurring recently and in the near future at BSFS (e.g. construction of the new education center and the USACE lease renewal process), BSFS staff need to create a new plan for the field station to help guide upcoming decision-making. It is our goal to start this planning process in 2019.