

**Missouri State**  
UNIVERSITY

**2019  
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. Moreover, 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, 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 2019, primary BSFS staff consisted of:

- Director - Janice Schnake Greene;
- Manager - Patricia Reed; and,
- Environmental Education (EE) Program Coordinator - Erica Cox (until August 2019).

The university has yet to hire a new EE Program Coordinator.

### **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 uploaded summary inventory sheets to the website in 2019.

Planning and design for the Ozark Education Center in Cedar creek, Missouri was completed in early 2019. The university put the project out for bid, and Branco Enterprises was selected for the job. The contractor began construction in early summer 2019. The facility should be complete in spring 2020.

### **3.3 Vehicles and Other Vessels**

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; and,
- 1999 Lowe 20-foot SunCruiser pontoon boat with a 2019 60 hp Johnson outboard motor.

Other field station vehicles and vessels include a 2007 Cub Cadet UTV, and 4 aluminum canoes.

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

As part of maintenance checks on both Ford trucks, auto shops conducted several larger repairs in 2019. On the Ford Ranger, the ball joints, front brake pads, and calipers were replaced, and rotors were turned. On the Ford F-150, the right front wheel bearing was replaced.

## **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.

The BSFS Manager spent approximately \$9,000 was spent last year. The bulk of expenses incurred (just over \$5,000) were classified as maintenance. Large facilities maintenance expenses (over \$1,600) included tree removal at Drury House, a pipe repair at Mincy House, a dumpster rental at Mincy House, and purchase of tools such as a Dewalt Drill and Driver kit and tire inflator. Large vehicle maintenance costs (over \$1,500) included work on both the Ford Ranger and Ford F-150 (see section 3.3 for a description). The remaining expenses went to supplies (about \$550), pontoon boat slip rental (\$1,200), and utilities (about \$2,300).

### **4.2 Anticipated Expenses**

The following projects will require funding next year:

- Reconstruction of the outdoor shower and sink at Drury House
- Repairing the Mincy House deck

- Renting a dumpster to complete removal of the Mincy House pigeon coop and begin cleanout of the Mincy House sink
- Outfitting the new Ozarks Education Center
- Acquiring a portable weather station and water quality monitoring equipment (already funded through a Delta Foundation grant); and,
- Implementing additional fundraising efforts for the new OEC, such as developing a promotional video

## 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 pays a visit to both houses in the same day (e.g. for maintenance or research) this is only counted as one person-day.

<b>Table 1: BSFS Use Statistics</b>		
	<b>2019</b>	<b>2018</b>
<i>Total</i>	975	570
Classes	472	282
Meetings/Workshops	253	48
Tours	30	7
Research	83	154
Maintenance/Staff Workdays	137	79

As a reminder, the calculation methodology was altered last year to better define a “person-day” so any usage comparisons can only be made between 2018 and 2019.

## 6.0 BSFS Activities

### 6.1 Classes

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

- Plant Taxonomy (BIO 334);
- Identification of Woody Plants (BIO 339);
- Plant Ecology (BIO 436/636)
- Special Topics in Biology (BIO 499);
- Herpetology (BIO 576/676);

- Mammalogy (BIO 577/677); and,
- Place-Conscious Reading and Writing (ENG 564/664).

Additionally, the College of the Ozarks booked MSU's pontoon boat for a limnology class field trip and MSU's own Limnology class (BIO 562/662), also spent a Saturday conducting an outdoor lab on the lake.

## 6.2 Meetings, Workshops, and Tours

The field station had an active 2019 for meetings workshops and tours. GLADE continued to hold its weeklong session in June at BSFS. The 11th 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

In addition, Kirbyville Middle School spent two afternoons at the field station as part of its summer program for students. These trips included up to 40 students and accompanying adults who enjoyed activities directed by volunteers and BSFS staff.

Janice met with, and provided tours to:

- Virgil VanTrease and Regina Mossotti from the Endangered Wolf Center;
- Tyler Anderson, a University of Missouri researcher;
- Cathie English, an MSU English professor; and,
- Individuals from MDC to plan an upcoming meeting.

In June, the North American Dipterists Society (NADS) held its annual meeting at BSFS. Eighteen dipterists spent a week at the Drury House collecting flies, giving presentations, and holding meetings. Greg Courtney and David Bowles provided a write up on the gathering for the *Fly Times* volume 63, fall 2019 (<http://www.nadsdiptera.org/News/FlyTimes/Flyhome.htm>).

The Wildlife Society MSU student chapter also spent two weekends, one in April (10 members) and one in September (eight members), camping at BSFS.

Scout Troop 111 spent a weekend in June staying at Drury House. This group consisted of 12 scouts and 3 adults. As part of their stay, they volunteered for several projects at the field station. The scouts helped remove a dilapidated boardwalk from Pond 4, stacked all firewood at Drury House on a newly constructed firewood rack, and helped cut a fallen tree into firewood.

The Missouri Department of Conservation used the Drury classroom to conduct a meeting discussing wildlife issues such as chronic wasting disease in deer. Forty-one people attended the gathering including MDC personnel, Skaggs ranch staff, and the BSFS director and manager.

About 25 people either volunteered to help with or visited the field station for a 20<sup>th</sup> Anniversary Open House held on November 2<sup>nd</sup>.

On December 14th, 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. This year 15 individuals conducted bird counts.

## 6.3 Research and Monitoring

### Undergraduates

- Grace Hall. Phenology and leaf production. (undergraduate)

### Graduate

- None

### Faculty and Staff

- Sean Maher - SnapshotUSA camera traps (<https://emammal.si.edu/snapshot-usa-2019-home-page>).

### 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 a Northern Saw-Whet Owl monitoring project.

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.

Dataloggers collected long-term temperature data at four BSFS ponds from May 2011 through June 2017. Researchers installed new temperature loggers July 2017 in Ponds 1, 2, and 4 to continue this process. Summer 2020 the new field station manager intends to 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 the bulk of maintenance/staff workdays. The staff spend the remaining days troubleshooting emergencies that crop up and working through a list of larger home maintenance tasks. The only emergency in 2019 involved leaking pipes in the Drury House ADA bathroom. Other work done at the field station included:

- Felling a large, leaning oak tree at Drury House;
- Repairing non-working electrical outlets at Mincy House;
- Replacing solar batteries and panels at Drury House;
- Shock-treating the Mincy House well; and,
- Construction of firewood racks at both Mincy and Drury Houses.

In addition, as part of replacing the solar panels, the solar company sealed a large hole around the vent pipe with spray foam.

The BSFS Manager added a set of boards to Drury House's sign so that it now reads "Missouri State University, Bulls Shoals Field Station, Drury House". The manager constructed and erected a similar sign at Mincy House.

A workday was held spring 2019 in which volunteers began removing cedars and tearing down the old pigeon coop at the Mincy House property.

Additionally, two chairs from MSU's surplus were delivered to Mincy House. Eventually the couch and recliner will be removed. Two MSU surplus chairs were also delivered to Drury House and the couch and recliner were removed. Moreover, an outdoor furniture set was purchased for the Mincy House deck, and two sets of bistro table and chairs were purchased for the Drury House porch.

## **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 2019, 44 workshops and facilitator trainings for approximately 379 participants were held for the following programs:

- 1 WET Facilitator Training: 9 participants
- 2 Undesignated Facilitator Trainings: 10 participants
- 7 PLT Workshops: 42 participants
- 2 Early Childhood PLT Workshops: 25 participants
- 14 WET Workshops: 111 participants
- 1 Getting Little Feet WET Workshop: 15 participants
- 1 Growing up WILD Workshop: 21 participants
- 10 Project WILD Workshops: 102 participants
- 2 Flying WILD Workshops: 10 participants
- 3 Aquatic WILD Workshops: 10 participants
- 1 WILD about Elk Workshop: 24 participants

## **7.2 Conferences**

BSFS staff attended several conferences throughout 2019. They hosted exhibit booths at the Missouri Natural Resources Conference (MNRC), State Science and Math Teachers Conference (Interface A and B), and Young Years conference. They also attended the national WET and Project WILD coordinator conferences.

## **7.3 Additional Activities by BSFS Staff**

Janice Greene served as President of the Greater Ozarks Audubon Society Board until September 2019. 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 watershed center and all school groups that visit.

## **8.0 Publications and Presentations**

### **8.1 Publications**

Beasley, E.M. and S. P. Maher. 2019. Small mammal community composition varies among Ozark glades. *Journal of Mammalogy*. 100: 1774–1782.

<https://doi.org/10.1093/jmammal/gyz102>

Maag, D.W., S.P. Maher, and B.D. Greene. Spatial Ecology and Microhabitat Selection of the Pygmy Rattlesnake (*Sistrurus miliarius*) in Southwestern Missouri. *Herpetologica*. (submitted)

### **8.2 Presentations**

Maag, D., S. Maher and B. Greene. Spatial ecology and microhabitat selection of pygmy rattlesnakes in southwest Missouri. *Biology of Pitvipers 3*, Rodeo, NM. July 2019. (poster)



Wait, D.A. 2019. Spring Ephemeral Forbs, Mesophication and Prescribed Fire in a Missouri Oak-hickory Woodland: Implications for Management, Restoration and Conservation. Missouri Natural Resource Conference. Osage Beach, MO. (Poster)

## **9.0 Grant proposals and awards**

Director Janice Greene submitted a grant to the Delta Foundation for weather station and water quality monitoring equipment. The \$8,800 grant was chosen for funding in December 2019. BSFS staff will purchase the equipment in 2020.

## **10.0 Future Goals**

Below is a long list of future goals for the field station. It is the intent of the BSFS staff to accomplish as many of these goals as possible in 2020. Any tasks not fully accomplished will be carried into future years.

### **10.1 Drury House**

Plans for the upcoming year at Drury House include reconstructing the outdoor showers and sink area and constructing a canoe storage rack.

### **10.2 Mincy House**

Plans for the upcoming year at Mincy House include:

1. Replacing the deck boards and handrail on the back deck.
2. Finish removing the dilapidated pigeon coop and start clearing debris from the sinkhole.
3. Continue to reduce red cedars where appropriate.
4. Make strides on the installation of a small trail network along the edge of the five-acre property and to the sink in the middle of the property (approximately 1600 feet of pathway).

### **10.3 Ozarks Education Center**

Construction of the Ozarks Education Center started in early summer 2019, with a completion date of spring 2020. After completion of the initial phase of the project, field station staff intend to construct several tent platforms, a fire pit area, and, with future funding, several additional cabins.

### **10.4 Research**

Research plans for the upcoming year include:

1. Making strides on mapping habitats throughout the five-acre Mincy property and inventory trees to establish a baseline.
2. Updating pond information.
3. Launching the buoy at K Dock Marina.

4. Purchasing equipment with Delta Foundation funds and erecting a new weather station at the OEC site.
5. Developing and implementing a sampling plan for Bull Shoals Lake, including the purchasing of equipment with Delta Foundation funds.

### **10.5 Administrative**

Administrative plans for the upcoming year include:

1. Start on the creation of a new plan for the field station to help guide upcoming decision-making.
2. Create a new rate schedule for the field station.
3. Implement a field station application system.

### **10.6 Fundraising**

The primary fundraising need for the upcoming year is to construct more cabins at the OEC. BSFS staff intend to develop this fundraising campaign in 2020.