

Missouri State
UNIVERSITY

2021
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 of the Drury House property. 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. 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.

3.0 Field Station Resources

3.1 Staff

In 2021, primary BSFS staff consisted of:

- Director - Janice Schnake Greene; and,
- Manager - Patricia Reed.

The university has yet to hire a new Environmental Education (EE) Program Coordinator. Janice has fulfilled EE program coordinator duties to-date and will continue to do so until someone is hired. Janice retired as BSFS director at the end of 2021, so the university has selected Sean Maher as the incoming director in 2022.

3.2 Facilities and Equipment

At the start of 2021, BSFS consisted of three facilities, Mincy House, Drury House, and the new Ozarks Education Center (OEC). The Mincy House property, which included a one-story ranch-style house and a stand-alone garage, was sold in March 2021. 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 OEC includes a split building with a classroom, kitchen and office on one side and a bunkroom and bath/shower rooms on the other. There are also three cabins with bunks. BSFS Manager Patricia Reed conducted inventories of the Mincy and Drury properties in 2018. She uploaded summary inventory sheets to the website in 2019.

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;
- 1999 Lowe 20-foot Sun Cruiser pontoon boat with a 2019 60 hp Johnson outboard motor; and,
- 1994 Generation III 12-foot Jon boat.

Other field station vehicles and vessels in 2021 include a 2007 Cub Cadet UTV and four aluminum canoes.

The Uplander is typically stationed at MSU and the two trucks are usually stationed at Mincy House. With the sale of Mincy House, the Jon boat and the aluminum canoes were sent to surplus and are no longer available as part of the field station, while the two trucks and the UTV are now at Drury House. The pontoon boat is kept at the K-Dock Marina.

The batteries in the Ford Ranger and Cub Cadet were replaced in March and the Ford F150 had electrical repairs completed in May. Additionally, the Ford F150 and Ford Ranger had oxygen sensor repairs and PM1 services in November.

4.0 Expenditures

4.1 Past Expenses

BSFS has an annual budget just under \$75,000. The field station's major expense continues to be staff salary and benefits. 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 \$10,608 during the last fiscal year. The bulk of expenses incurred (\$7,374) were classified as maintenance. Large facilities maintenance expenses (over \$2,700) included OEC landscaping materials, a dumpster rental for removing the Mincy pigeon coop, and purchase of tools. Large vehicle maintenance costs (over \$3,600) included work on both the Ford Ford F-150 and Ranger and a battery replacement in the Ford Ranger and Cub Cadet UTV (see section 3.3 for a description). The remaining expenses went to supplies (under \$200), pontoon boat slip rental (\$1,200), utilities (about \$1,308), and a course fee (\$550).

University and field station personnel made a decision in 2021 to separate the budgets of the field station and environmental education projects. In the future, the costs of EE personnel and travel expenses for Projects WET, Learning Tree, and WILD workshops will no longer be included in the BSFS annual report.

4.2 Anticipated Expenses

The following projects will require funding next year:

- Repair of the Drury House screened in porch and repainting the house trim;
- Continued work on the OEC landscaping;
- Removal of two dying trees at the field station; and,
- Completion of a fire pit/picnic area at the OEC.

There are also several larger projects that could be completed in 2021, such as an OEC gates and a storage building, if additional funding is possible.

5.0 BSFS Use Statistics

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

Table 1: BSFS Use Statistics				
	2021	2020*	2019	2018
<i>Total</i>	630	897	975	570
Classes	247	558	472	282
Group Meetings/Workshops	121	0	253	48
Tours	16	45	30	7
Research	57	114	83	154
Maintenance/Staff Workdays	171	171	137	79
Contractor Workdays**	18	9	0	0
	*Pandemic rules limited usage **After the OEC was completed in June 2020			

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

6.0 BSFS Activities

6.1 Classes

The pandemic limited class usage of the BSFS to the annual GLADE and MSU mammology and plant ecology classes.

6.2 Meetings, Workshops, Tours, and Other Uses

BSFS staff provided tours to researchers, groups, and impromptu visitors wanting to look at the new OEC facility. Additionally, authorities toured both the OEC and Drury House for Institutional Animal Care and Use Committee (IACUC) purposes.

6.3 Research and Monitoring

Undergraduates

- Grace Hall conducted phenology research.

Graduate

- Akeen Ajao conducted research on Sassafras and Oak Sapling Density.
- Sanjeev Sharma conducted primary productivity research.

Faculty and Staff

- Sean Maher - SnapshotUSA camera traps

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 19 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.

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. In late summer 2020, the cellular modem for the phenocam stopped working. The BSFS manager installed a new modem in early 2021 to get the phenocam back in operation.

BSFS staff continue to collect long-term 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 2022 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. Examples of other work done at the field station include:

- Tearing down the Mincy House pigeon coop;
- Prepping Mincy House for sale including moving/removing all furniture and other items and cleaning out the garage; and,
- Conducting landscaping activities at OEC including building pathways, stairs, and a firepit/picnic area.

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 Projects Learning Tree and WILD. MSU offers training to educators so they may use the activities with students. With the continuation of the COVID pandemic, the number of workshops was down again in 2021.

7.2 Conferences

The pandemic limited conferences in 2021.

7.3 Additional Activities by BSFS Staff

The BSFS manager took the 6-week Ecological Society of America's 2021 Sustaining Biological Infrastructure (SBI) course Strategies for Success.

8.1 Publications and Presentations

8.1 Publications

- Cove et al. (2021) SNAPSHOT USA 2019: a coordinated national camera trap survey of the United States. Ecology. <https://doi.org/10.1002/ecy.3353>
- Kays et al. (In review) SNAPSHOT USA 2020: A second coordinated national camera trap survey of the United States during the COVID- 19 Pandemic. Ecology.
- Maag, Maher, and Greene. (In review) Spatial ecology and micro habitat selection of the Pygmy Rattlesnake (*Sistrurus miliarius*) in Southwestern Missouri. Spatial ecology and microhabitat selection of the pygmy rattlesnake (*Sistrurus miliarius*) in southwestern Missouri. It will be published in the journal Herpetological Conservation and Biology.

8.2 Presentations

The following presentation efforts associated with the field station occurred in 2021:

- Hall, G. and D.A. Wait. 2021. Relationships between primary productivity, precipitation and phenology in an Ozark oak/hickory woodland. Missouri Natural Resource Conference. Virtual. Poster
- Maag, Dylan, Sean Maher, and Brian Greene. “Spatial ecology and habitat selection of the pygmy rattlesnake (*Sistrurus miliarius*) in southwest Missouri”
- Maher, Sean. Small mammal ecology in isolated habitats. Pittsburg State Biology Seminar. (Oral presentation)
- Wait, D.A. 2021. Ozark oak/hickory woodlands as a natural environment: management to maximize ecological functions for generations. Ozarks Studies Association Annual Conference. West Plains, Mo. Oral
- Wait, D.A. and G. Hall**. 2021. Relationships between primary productivity, precipitation and phenology in an Ozark oak/hickory woodland from 2000-2020: making connections with fire management. Ecological Society of America. Virtual. Poster

9.0 Grant proposals and awards

There were no grant proposals and awards associated with the field station in 2021.

10.0 Future Goals

Below is a 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 2022. Any tasks not fully accomplished will be carried into future years.

10.1 Drury House

Plans for the upcoming year at Drury House include rehabilitating the screened in porch and painting all the trim on the house.

10.2 Mincy House

The University sold Mincy House in March 2021 to provide funds for broadband internet at the OEC.

10.3 Ozarks Education Center

Field station staff intend to continue working on the OEC landscaping and complete construction on a fire pit/picnic area. Additionally, BSFS management will start to map out a trail system on the property. With future funding, staff hope to build a storage shed and several additional cabins.

10.4 Research

Research plans for the upcoming year include:

1. Updating pond information;
2. Launching the buoy at K Dock Marina;
3. Erecting a new weather station at the OEC site; and,
4. Developing and implementing a sampling plan for Bull Shoals Lake.

10.5 Administrative

Administrative plans for the upcoming year include:

1. Continue working on a new plan for the field station to help guide upcoming decision-making, including a long-range budget;
2. Implementing a field station application system;
3. Creating a video highlighting field station assets; and,
4. Updating the field station website.

10.6 Fundraising

There are multiple large and small fundraising needs for the upcoming year such as constructing more cabins or installing gates at the OEC. BSFS staff intend to develop and implement a fundraising campaign for field station needs in 2022.