

**Missouri State.**  
UNIVERSITY

**Bull Shoals Field Station  
Annual Report  
2017**



## **Bull Shoals Field Station Mission**

Our mission 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.

We continue to expand programs at the field station and regionally and outreach across the state through sponsorship of 4 statewide environmental education (EE) projects.

## **Expenditures**

We are in our first year of a lower budget due to cuts from the state. One staff member was laid off because of these budget cuts at the end of June. Major expenses continue to be for personnel – Manager, State Coordinator for EE projects, and student workers to assist with EE programs in mailings, webpages, database management, etc. Other major expenses include (1) maintenance of the facilities (utilities for the Mincy House, propane for the heat at the Drury House, boat maintenance and marina rental); (2) travel to conferences and Project WET, Learning Tree, and Flying WILD workshops; and (3) partner of GLADE.

## **Partnerships**

BSFS staff continues to work with the U.S. Army Corps of Engineers and Missouri Department of Conservation staff. We correspond on research and monitoring questions. The U.S. Army Corps of Engineers does an annual inspection every year. The Drury-Mincy staff and the BSFS Staff also communicate about maintenance issues and the timing of group events.

Celeste Prussia worked with the USDA-Forest Service and GLADE graduates on glade restoration and site improvements at the Dabbs Creek Walk-in Area of the Mark Twain National Forest.

The Mincy House is the host site for the Taney County Christmas Bird Count which included counting birds on the Drury Conservation Area and hosting the compilation dinner in the evening. GOAS, MDC, and staff (Greene and Prussia) work together to plan and conduct the Green Leadership Academy for Diverse Ecosystems (GLADE). 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.

Janice Greene is serving as President of the Greater Ozarks Audubon Society Board, starting in September, and is a member of the Springfield Environmental Advisory Board. Beth Bowles serves on the James River Basin Partnership Board to address a variety of watershed issues in the James River basin. Erica Cox works with Springfield and Greene County on a variety of stormwater education issues, with the James River Basin Partnership on their watershed festivals, and with the public and private schools to improve water education throughout the state.

Beth Bowles worked with Pipkin Middle School and the Discovery Center on STEM projects for girls.

## Classes, Workshops, & Meetings held at BSFS

- MSU
  - Identification of Woody Plants
  - Plant Ecology
  - Plant Taxonomy
  - Fisheries Management
  - Mammalogy
  - Herpetology
  - Limnology
  - Stream Ecology
  - Aquatic Entomology
  - Forestry Institute (6 students, 4 volunteers, 2 faculty/staff)
  
- Workshops, meetings, and other academic uses
  - Green Leadership Academy for Diverse Ecosystems (GLADE)
  - Boy Scouts (2 troops)
  - 2 Kirbyville Middle School summer school program (95 stds & adults)
  - Chert Glades Missouri Master Naturalists
  - MDC-AGFC Chronic Wasting Disease Training & Planning

## BSFS Use Statistics for 2017 (person-days): Total = 1302

- Classes (MSU and non-MSU classes): 688
- Meetings and workshops: 94
- Research (Missouri State faculty and staff and non-MSU groups): 373
- Maintenance, security, or staff work day: 145
- Tour: 14

## Research

### *Faculty/Staff*

Colton Lynn – Graduate

Comparison of behavior between two species of *Plethodon* salamanders.

Dylan Maag – Graduate

The Spatial Ecology and Microhabitat Selection of the Pygmy Rattlesnake (*Sistrurus miliarius*) in Southwest Missouri.

Joey Michalski - Undergraduate

Response of an old-growth post-oak woodland to fire management: a 19-year study.

Christine Cornish – Graduate

Atrazine and macrophyte presence in southwest Missouri wetlands.

Miranda Keller – Undergraduate.

“Fire and climate history effects on overstory production in an Ozark woodland”

### **Publications**

Maag DW, SP Maher, and BD Greene. Spatial ecology and habitat selection of the pigmy rattlesnake (*Sistrurus miliarius*) in southwest Missouri. Submitted to Herpetologica.

Heywood, J.S., J.S. Michalski, S.H. King, and W.E. McClain. *In preparation*. Response of an old-growth post-oak woodland to fire management: a 19-year study.

Keller, Miranda (D.A. Wait, Advisor). “Fire and climate history effects on overstory production in an Ozark woodland”. In prep for LOGUS

### **Presentations**

Dalton, Medley, Settle, & Mathis. 2017. When Territorial Salamanders Cheat: A Test of the Dear Enemy Phenomenon. Animal Behavior Society, Toronto, Ontario, Canada – Oral Presentation

Heimbach & Mathis. 2017. Do varying levels of predation risk affect territorial behavior by male and female Ozark Zigzag salamanders? Animal Behavior Society, Toronto, Ontario, Canada – Oral Presentation

Lynn & Mathis. 2017. Influence of Sex, Territorial Ownership, and Species on Aggression in Two Species of Salamander. Animal Behavior Society, Toronto, Ontario, Canada – Oral Presentation

Lynn & Mathis. 2017. Influence of Sex, Territorial Ownership, and Species on Aggression in Two Species of Salamander. Missouri Herpetological Association, BSFS – Oral Presentation

Lynn & Mathis. 2017. Influence of Sex, Territorial Ownership, and Species on Aggression in Two Species of Salamander. Missouri Herpetological Association, BSFS – Interdisciplinary Forum, Missouri State University – Oral Presentation

Medley & Mathis. 2017. When Territorial Salamanders Cheat: A Test of the Dear Enemy Phenomenon. Undergraduate Research Day, Missouri State University – Oral Presentation

Maag, DW. First season results on spatial ecology and habitat selection of pygmy rattlesnakes (*Sistrurus miliarius*) in southwestern Missouri. 2017 MSU Graduate Interdisciplinary Forum.

Maag, DW and BD Greene. Spatial ecology and habitat selection of pygmy rattlesnakes (*Sistrurus miliarius*) in southwestern Missouri. Annual meeting of the Missouri Herpetological Association, September 2017.

Christine Cornish and La Toya Kissoon-Charles. Poster presentation. Atrazine: An inevitable environmental pollutant in wet ecosystems. Great Plains Limnologists Conference, Columbia, MO. September 2017.

La Toya Kissoon-Charles. Wetland plants: what are they good for? University Armchair Series, Library Center, Springfield, MO. (10/2017)

Prussia, Celeste. Oral Presentation: Land Ethic Leaders Workshop at Building a Land Ethic Conference, Baraboo, WI; 6/23/2017. 35 attendees

### **Grant proposals and awards**

Funding from City of Springfield and Greene County for Project WET and Storm Water education position (through BSFS)

Greene, BD. Spatial patterns and habitat selection of pygmy rattlesnakes. Dickerson Park Zoo, 3,115.00. May 2017.

Wetland Foundation Grant (pending), \$1400 – travel

Sigma-Xi Grants-in-Aid-of-Research (declined), \$1,000

Missouri Native Plant Society (declined), \$1,000

Missouri State University Graduate College (obtained), \$500 – research

Missouri State University Biology Department (obtained), \$500 – research

Missouri State University Graduate College (obtained), \$300 – travel

“Assessment of pollinator services and networks in a gradient from urban to rural restored prairies in Southwest Missouri” Prairie Biotic Research, Inc. Declined [Note that one of the rural sites would have been at BSFS].

### **Activity Highlights**

Salamander collection for thesis research. We have collected Ozark zigzag salamanders (*Plethodon angusticlavius*).

B. Greene - GLADE presentation.

### *Long-term monitoring for climate change*

Bull Shoals Field Station's phenocamera continues to collect forest canopy pictures every 30 minutes during the daylight hours at Shanda's Point. These pictures are sent real-time to the Phenocam Network (<http://phenocam.sr.unh.edu>), hosted by Harvard University and the University of New Hampshire. The pictures can be used to monitor canopy phenology (the dates of leaf development and leaf fall every year) and can serve 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.

We continue to collect long-term data weather station data, which is updated on the BSFS website. In addition, A. Wait continues to conduct yearly monitoring for the "Drought Open-Source Ecology" (DOSE) network. The purpose of DOSE is to collect information about the response of plant physiology to drought. Long-term temperature data are being collected from four BSFS ponds and new temperature loggers were installed this year to continue that process.

A thermistor string and buoy were purchased in 2016 to monitor temperature across depth in Bull Shoals Lake at K-Dock Marina and transmit it real-time. We have still been working to find a stable connection to transmit the data near real-time to the BSFS website. We have decided to do manual downloads of data and upload to the BSFS website. This will be initiated this summer.

### *Flying WILD, Project WET, Project Learning Tree and Project WILD*

25 PLT Workshops: 250 participants  
17 WET Workshops: 210 participants  
3 Growing up Wild/Early Childhood PLT workshops: 29 participants  
6 Project Wild: 109 participants  
2 Flying WILD: 14 participants

Total: 53 workshops and approximately 612 participants

### *Green Leadership Academy for Diverse Ecosystems (GLADE)*

The 9th year of the week-long GLADE brought 14 high school students from southwest Missouri to BSFS to learn about biodiversity and conservation, endangered species, water, and habitat restoration. They transplanted giant river cane along Bee Creek. This will provide new habitat for the endangered Swainson's Warbler and other species. As part of the Academy, each could receive up to \$500 to go back into their community and conduct some type of environmental project. Greene helps coordinate speakers, welcomes parents and students, helps lead students through bird banding, etc. Prussia helps prepare facilities and coordinates a lichen presentation. The GLADE website is: <http://www.greenleadershipacademy.org/index.htm>

## *Girl Infinity STEM Program for Girls*

Bull Shoals Field Station (Bowles) launched a STEM program for middle school girls. The program mission is self-efficacy and empowerment for girls in science, technology, engineering, and math. One summer camps were held at the Discovery Center of Springfield (17 girls) and an after-school program was held at Pipkin Middle School on a weekly basis beginning in August (12 girls). Greene also presented at this after school program.

### **Additional BSFS Activities by BSFS Faculty and Staff**

- In 2017, we signed a MOU to be state sponsors for Project WILD; this includes Growing Up WILD, Aquatic WILD, Project WILD, and WILD Aquatic. Janice Greene serves as the State Coordinator for Flying WILD. Janice and Erica Cox are Co-Coordinators for Project Learning Tree and Project WILD, and Erica is the State Coordinator for Project WET. All are national EE programs focusing which use the themes of animals, trees, and water to help youth understand science and the complexity of environmental issues.
- Use of Project Learning Tree and Project WET at teacher conferences (see above for numbers of full workshops) (E. Cox)
- Exhibit at Missouri Natural Resources Conference (J. Greene)
- Exhibited the Projects (WET, Learning Tree and Flying WILD) at the Missouri Interface A and B Conference (E. Cox and J. Greene)
- Monitoring Avian Productivity and Survivorship at BSFS – bird banding and health data collection (J. Greene)
- Northern Saw-whet owl banding (J. Greene, K. Loyd and S. Meilink)
- Greene worked on a set of lessons plans for teachers using the BSFS data. These will be put on the website in 2018.
- Homeschool Outdoor Fair, Springfield Conservation Nature Center; 320 attendees (Prussia)
- Tour: USDA Inspectors (Research Animal Management); 2 inspectors (Prussia)
- Annual Meeting – Organization of Biological Field Stations, Itasca Biological Station and Laboratories, Itasca, MN (Prussia)
- Public Lands Day – Dabbs Creek MTNF with GLADE; 8 in work party (Prussia)
- Homeschool Outdoor Fair, Springfield Art Museum; 362 attendees (Prussia)
- Environmental Data Institute – attend data archival training, University of New Mexico, Albuquerque, NM (Prussia)

### **Goals for 2018**

We are continuing to search for funding opportunities for a dormitory to work with Terry Chase and his land. This would increase partnerships with Chase Studio and provide an excellent meeting space for groups.

Celeste Prussia is retiring (May 31, 2017) so we will be hiring a new Manager.

We will continue the installation of the lake buoy to monitor the temperature gradient and thermocline and the posting of the data to the BSFS webpage. We will advertise this at the K-Dock Marina as well.

The continuation of the GLADE Academy continues to be a priority of BSFS. The 2018 Academy is funded with the fundraising of the Greater Ozarks Audubon Society.

We will continue to recruit additional universities and conservation-related groups to use the field station to increase the usage of BSFS. We continue to update the website as part of this effort.