Missouri State
UNIVERSITY

Bull Shoals Field Station
Annual Report
2014

March 2015

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.

Overview of yearly activities

Our major goal continues to be to increase the number of users. This year our total number of person days increased to 1073. The increase was primarily due to a high number of meetings and workshops held at BSFS, including GLADE, the Central Plains Mammal Society, and the Missouri Herpetological Association.

Expenditures

The major expenses continue to be for personnel: ¾ time Manager (C. Prussia), ¾ time Research Specialist (B. Bowles), State Coordinator for Project WET (E. Cox), and student workers. Other major expenses include (1) maintenance of the facilities (utilities for the Mincy House, maintenance agreement for the solar power system, propane for the heat at the Drury House, boat maintenance and marina rental); (2) travel to conferences and Project WET workshops; and (3) partner of GLADE. We have also purchased basic equipment for our new laboratory.

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 Drury-Mincy staff and the BSFS Staff also communicate about maintenance issues and the timing of group events.

J. Greene again this year worked closely with the Greater Ozarks Audubon Society (GOAS) on the Christmas Bird Count for Taney County serving as the host site for the compilation event, as well as J. Greene counting on the Drury Conservation Area. 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.

Beth Bowles and Janice Greene submitted a proposal to the National Science Foundation in collaboration with Adena Young-Jones, Assistant Professor in the Psychology Department. If awarded, the grant will fund the planning and implementation of a new after-school STEM program for girls that will engage the girls in engineering, coding, and bioacoustics projects that will benefit bird populations at the field station and in the local community.

J. Greene and B. Bowles continued to serve on the James River Basin Partnership Board to address a variety of watershed issues in the James River basin. Janice Greene also serves on the Greater Ozarks Audubon Society Board.

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.

Classes, Workshops, & Meetings held at BSFS

- MSU
  - Identification of Woody Plants
  - Plant Ecology
  - Plant Taxonomy
  - Mammalogy
  - Advanced Limnology
  - Ozarks Lichen Ecology
  - Herpetology

- Workshops and meetings
  - Green Leadership Academy for Diverse Ecosystems (GLADE)
  - Boy Scouts
  - Kirbyville Middle School summer school program
  - Missouri Master Naturalist retreat
  - Organization of Biological Graduate Students retreat
  - Central Plains Mammal Society meeting
  - Missouri Herpetological Association meeting

BSFS Use Statistics for 2013 (person-days): Total = 1073

- Classes (including students and faculty): 208
- Meetings and workshops: 610
- Research (Missouri State faculty and staff and non-MSU groups): 164
- Maintenance, security, or staff work day: 91

Research

Faculty/Staff

Bowles, B.D. and D. Bowles. Biodiversity of Ozark springs.

D. Bowles. BSFS insect biodiversity.

Greene, J.S. Monitoring Avian Productivity and Survivorship at BSFS – bird banding and health data collection

Graduate and undergraduate students

Kayla Shelton (G) is studying cannibalism in several Ambystoma species, namely the ringed salamander and marbled salamander. Her research goals as of now are to identify if salamanders that are known cannibals consume kin vs non-kin.

Abbie Knudsen (G) is studying Ambystoma, and is aiming to identify if larvae have behavioral syndromes ("personalities") that are consistent across multiple contexts, and whether or not those syndromes are also consistent across different life stages.

Cathy Combs (G). Residential education: Impacts on long-term knowledge, attitudes, and environmental behavior.

Kelsey Rumley (U). An overview of bird banding at the Bull Shoals Field Station.

Brad Wakefield (U). A 2015 comparison to previous bird banding data at BSFS.

Allison Jones (U). A survey of northern saw-whet owls at BSFS.

Joey Michalski and Tessa Middleton (U). Effects of fire management on the age structure and species composition of on old-growth post-oak woodland.

Eric Green (U). Armadillo monitoring.

Avery Casey (G). Overstory production responses to fire.

Cody Loucks (G) Spring ephemerals responses to fires.

Kendell Loyd (U). Honors Project: Ratios of native to non-native species as a function of fire.

Research use outside of the university

College of the Ozarks students are conducting a deer population survey at BSFS.

Nicole Soper Gordon. Project Baseline seed collection.

Kathryn Womack. University of Missouri. Bat Project.

Manuscripts and educational materials

Bowles, D.E. and B.D. Bowles. Non-native species of the major spring systems of Texas, USA. Texas Journal of Science. *In press*.

Bowles, D. E., and R. W. Sites. Alderflies, fishflies and dobsonflies (Insecta: Megaloptera) of the Interior Highlands, U.S.A.. Transactions of the American Entomological Society. *In final prep.*

Dalton & Mathis, 2014. Identification of sex and parasitism via pheromones by the Ozark zigzag salamander. Chemoecology, 24: 189-199.

Wait, D.A. and D.P. Aubrey. 2014. Prescribed fire and oak sapling physiology, demography and folivore damage in an Ozark woodland. Proceeding of Central Hardwood Conference. *United States Department of Agriculture, NRS-P-142*: 109-121. http://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs-p-142.pdf.

Presentations

Bortosky & Mathis, 2014. Honest signaling in aggressive contests between Ozark zigzag salamanders (*Plethodon angusticlavius*). Missouri Herpetological Association.

Combs, C., and J. Greene. October, 2014. Residential education: impacts on long-term knowledge, attitudes, and environmental behavior. Poster. North American Association for Environmental Education annual conference. Ottowa, Canada.

Cox, E. and Theresa Johnson. October 2014. Partnerships in the Midwest: Project WET and Project Learning Tree Workshops at National Parks. Poster. North American Association for Environment Education annual conference. Ottawa, Canada.

Cox, E. and Theresa Johnson. November 2014. Partnerships in the Midwest: Project WET and Project Learning Tree Workshops at National Parks. Poster. National Association of Interpreters. Denver, Colorado.

Wait, D.A. and D.P. Aubrey. 2014. Physiologial, demographic and folivore effects on seedlings and saplings as a function of fire history in an Ozark woodland. Central Hardood Conference. University of Illinois, Carbondale, IL. (oral)

Grants

Bowles, B.D. Oklahoma phytoplankton survey. Subcontract from Oklahoma State University. Awarded December, 2014 Funded for $31,840.

Bowles, E. and J. Greene. 2014, submitted. Adolescent girls making a difference: A STEM after-school program emphasizing altruistic goals. National Science Foundation Advancing Informal Science Learning.

Cox, E., and J. Greene. 2011-2015. $103,383. Improving nonpoint source pollution education through Project WET workshops. Missouri Department of Natural Resources.

Project WET is in year 4 of 2- 4 year grants—DNR 319 grant for Project WET—Statewide Workshops and as part of the DNR 319 grant for the Big Urbie Storm Water Improvement grant.

Activity Highlights

Long-term monitoring for climate change

Bull Shoals Field Station 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.

New and updated equipment was installed BSFS weather station. 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. Also, long-term temperature data are being collected from four BSFS ponds.

Project WET

This year was Year 3 of the 4-year grant 319 grant from Missouri DNR. WET workshops are now finished and the research phase of the grant began by contacting all past workshop participants to find out how many are using WET activities, which activities they are using and what they hope to use in the future. We did get a short extension of the grant to complete projects and the grant concludes by April 30, 2015.

As Project WET Coordinator, Erica Cox is also involved with the large local grant, which is another 319 funded project--it is for Storm Water improvements in the Springfield area and the Watershed Committee of the Ozarks, James River Basin Partnership, City of Springfield, Greene County and Project WET are all involved. I did the second, 2-day teacher workshop in June 2014, called Storm Water Management for Educators. We traveled around the city and county, looking at some of the 319 storm water projects, as well as prior projects and the impacts now. The classroom component focused on engineering practices for K-12 as part of the new Next Generation Science Standards. Both Storm Water courses for educators in June 2013 and June 2014 were a success.

In 2014, I continued to work with Greene County and the City of Springfield Storm Water and Environmental Services groups, providing education to classrooms and groups.

Flying WILD and Project Learning Tree

This is the 2nd year that Janice Greene has been the state coordinator of Flying WILD. Four workshops were held throughout Missouri in 2014 training approximately 30 teachers in Flying WILD.

MSU became the state sponsor for Project Learning Tree in 2014 with Erica Cox and Janice Greene sharing the state coordinator position. We held a facilitator training for all three projects in January 2014. We are also working with the Society of American Foresters to increase forestry education of facilitators.

Green Leadership Academy for Diverse Ecosystems (GLADE)

The 6th year of the week-long GLADE brought 16 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. The GLADE website is: http://www.greenleadershipacademy.org/index.htm

Oklahoma Phytoplankton Survey

Beth Bowles received a third subcontract from Oklahoma State University to process phytoplankton samples collected by the Oklahoma Water Resources Board. Processing includes counting and identifying the algal taxa, as well as measuring cell biovolume.

Additional BSFS Activities by BSFS Faculty and Staff

- BSFS became the state sponsor for Project Learning Tree in 2014
- Janice Greene served as the State Coordinator for Flying WILD, an environmental education program focusing on birds which works to engage youth in science
- Exhibited WET, Learning Tree and Flying WILD at the Missouri Natural Resources Conference, Interface A and B Conference, Missouri Gifted Association Conference (E. Cox and J. Greene), and the Ozark STEAM Conference.
- Conducted a lichen field day and an aquatic biology field day for 52 students and teachers from Kirbyville Middle School (C. Prussia, assist by B. Bowles)
- Conducted a bird presentation at Kirbyville Elementary School for 90 students (J. Greene)
- Taught Ozarks Lichen Ecology course for seven students (C. Prussia)
- Homeschool Outdoor Fair (spring), 5/1 - The Equestrian and Watershed Center – Papermaking; 4 hours (C. Prussia)
- Project WET & WILD – The Watershed Center, 6/3; 4 facilitators; 20 educators
- Homeschool Outdoor Fair (fall), 10/2 – Springfield Conservation Nature Center – For the Birds; 4 hours (C. Prussia)
- Using the Schoolyard for Science-based Field Trips, 7/24 – MSU West Plains (for the 4 E's grant of Jill Black and Diann Thomas) (C. Prussia)
- Assisted with Advanced Limnology field trip to BSFS (C. Prussia)
- Science Olympiad – Wheeled Vehicle – Assembled & led judging team, Feb. 22 (C. Prussia)
- Ozarks Science & Engineering Fair – Judge, April 1 (C. Prussia and E. Cox)

- Represented BSFS at OBFS meeting, Marine Biological Laboratory, Woods Hole, MA, 9/20-23 (C. Prussia)
- BSFS Dutch Oven Demonstration – The Watershed Center, 10/4; 30 attendees (C. Prussia)
- GLADE graduates & USDA-Forest Service at Dabbs Creek, 4/5 & 9/2 (glade restoration and habitat improvement project) (C. Prussia)
- Hosted a GLADE reunion (J. Greene and C. Prussia)
- Interface Conference presentation and exhibit of the Projects (E. Cox)
- Bird banding research and Northern saw whet owl survey (J. Greene)
- Bull Shoals Lake sampling on two sites every three weeks for core water quality parameters, phytoplankton, and zooplankton (B. Bowles and C. Prussia)
- Assisted the James River Basin Partnership with River Jam Celebration (B. Bowles)
- Guest lecturing for Science Education and Limnology classes (B. Bowles)
- Elementary school presentations on Animal Survivors and Ozarks Aquifers (B. Bowles)

Facilities

We are continuing to search for funding opportunities for a dormitory or, at a minimum, a facility with a common room, kitchen, and bath facilities. This would provide an excellent meeting space for groups. Cabins or another housing facility could be added at a later date.

Goals for 2015 and list of needs for the future

We are planning to renovate the sides of the laboratory into an office space and a secure storage space in 2015. We also need to renovate the main bathroom in the Mincy House.

We continue to work on increasing long-term monitoring stations including those for climate, lake conditions, and phenology.

The continuation of the GLADE Academy continues to be a priority of BSFS. The 2015 Academy is funded. We will continue to work with the Greater Ozarks Audubon Society for long-term funding sources.

We would like to recruit additional universities and conservation-related groups to use the field station to maintain the record levels we experienced in 2011. We upgraded the BSFS website this year with help from Ken McCrory. We want to continue upgrades which include an online calendar and education resources.