

# Bull Shoals Field Station Newsletter

Winter 2015-16

## BSFS Notes

### Inside this issue:

Burn Research	2
Stone Shed Construction	2
Insects Around Us	3
Life Beneath a Log	3, 4
Mammal Class Trips	4
GLADE 2015 Highlights	5
UW Researcher at BSFS	5
Kirbyville Middle at BSFS	5
Homeschool Outreach	6
Become Our Friend	6
BSFS Phenocam Views	6

### Class/Events in 2015

- Winter Ecology (J. Greene, Prussia), Jan 6
- Plant Taxonomy (Bowe), Apr 12 & 26
- Fisheries Mgmt (Maher), Mar 20, 21, 22
- MSU West Plains Bio Class (J. Greene, Prussia), Apr 9
- Herpetology (B. Greene), Apr 18
- Kirbyville Middle School Field Days (Prussia), Jun 8, 15
- GLADE (J. Greene, Prussia), Jun 21-27
- Plants & Ozark Culture (Prussia), W,R Jul 15-30
- BSA Troop 111, Aug 21-22
- Woody Plants ID (Bowe), Sep 5, Oct 4
- Mammalogy Weekends (Maher), Sep 18-20, Oct 2-4
- Plant Ecology (Wait), Oct 1
- 3-State EE Field Trip (Greene) & Dutch Oven Dinner (Prussia), Oct 26
- GLADE Reunion, Nov. 14
- Christmas Bird Count (J. Greene), Jan 2-3, 2016



*Educators learn about glades at Henning SF*

Missouri Project Learning Tree, Project WET and Flying WILD hosted the Tri-State Projects Facilitator Workshop in October. The theme was Fragile Ecosystems and Endangered Species. During the workshop, participants from Oklahoma, Arkansas and Missouri visited the Shepherd of the Hills Trout Hatchery to learn about the propagation of the endangered Hellbenders and learned about glades at Henning State Forest. In addition, they spent a day at the field station learning about freshwater mussels and experiencing new Project activities. It was a fun weekend!

We have beautifully printed copies of the Common Ozarks Lichens brochure available by request. Let Celeste know if you need one.

As usual, we are always happy to show the field station to you if you're in the area.

Janice Schnake Greene

BSFS welcomes a new course offering at the station in Summer 2016: **Conservation and Land Ethics, BIO 597/697**. This course, taught by Celeste Prussia, is based on the writings of Aldo Leopold and other place-based writers. It offers to blend philosophical essays and reflective exercises with the Land Ethic Leaders (LEL) program (see related article below), activities from the Leopold Education Project (LEP), and the values-based problem-solving of Investigating and Evaluating Environmental Issues and Answers (IEEIA). Suitable for college students, teachers, volunteers and anyone interested in the natural sciences and conservation.

## Collaborative Grant Writing Wins Big Check for Land Ethic Workshop

BSFS and the Watershed Center have wanted to bring the Land Ethic Leaders (LEL) program to southwest Missouri since Celeste Prussia, Leopold Education Project State Coordinator, attended the workshop in 2010 and Mike Kromrey and Rob Hunt attended in 2014 at the Aldo Leopold Center in Baraboo, WI. These three educators put their heads and hearts together and submitted a funding proposal to the Community Foundation of the Ozarks (CFO) through its Community Innovations Grants program. The October 2015 award of \$11,000 was made to The Watershed Center in support of two-day workshops; one targeted toward municipal leaders held in Springfield; the other to NGO staff and volunteers held at the field station, both in Fall 2016. Participants will increase their facilitation skills and learn how to engage audiences with the Observe-Participate-Reflect framework.



*Celeste, Mike and Janice with staff from CFO and the big check.*

## Burn, Burn, Burn: Fire Management Effects in Ozark Places with Trees

By Alexander Wait, MSU Biology Professor

Prescribed fire is used to manage Ozark woodlands for wildlife. Alexander Wait, with the help of many undergraduate and graduate students has been monitoring net annual above ground primary productivity since 2001 at the Drury Conservation Area and 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.

Prescribed fire keeps the canopy open, and is hypothesized to increase understory species diversity. Woodlands that are not burned succeed into forests, which are often referred to as “degraded” woodlands. Leaf litter is an estimate of net annual above ground primary productivity (growth) and is used for two purposes: 1) estimate growth of trees and relate it to burn history, precipitation and temperature; and 2) relate amounts of leaf litter inputs to community structure and ecosystem processes (e.g., soil moisture, temperature, nutrient content and respiration rates; regeneration of trees species, understory species richness, and abundance of red cedar). The data also provide insights into how woodlands will grow and capture carbon in the future.

The sophisticated tool used for the productivity project is 80 laundry baskets that are placed in three woodland areas that have different burn histories (they are held in place using re-bar). Leaves are collected in baskets in the fall from woodlands that have not been burned for over 60 years, woodlands that have been burned every 2-4 years since 1999, and woodlands that have been burned every 2-4 years since 1980 (Figure 1). The leaves are sorted according to species, and then dried and weighed. Productivity has not decreased in recently burned woodlands compared to unburned woodlands, and the variability in growth from year to year (figure 1) is correlated with precipitation.

The spring ephemeral guild is an important component of Ozark woodlands. However, there are no long-term studies documenting the effects of prescribed fire management for wildlife on this plant guild. Spring ephemerals provide nectar and pollen to pollinators early in their above ground season when few other plants are in bloom, and they function as a “vernal dam” by temporarily sequestering nutrients and preventing leaching from forest systems during a period of high nutrient availability. Species richness has been declining over time in the woodlands at the Drury Conservation area; and, in years with little precipitation or burns in March, richness is low.

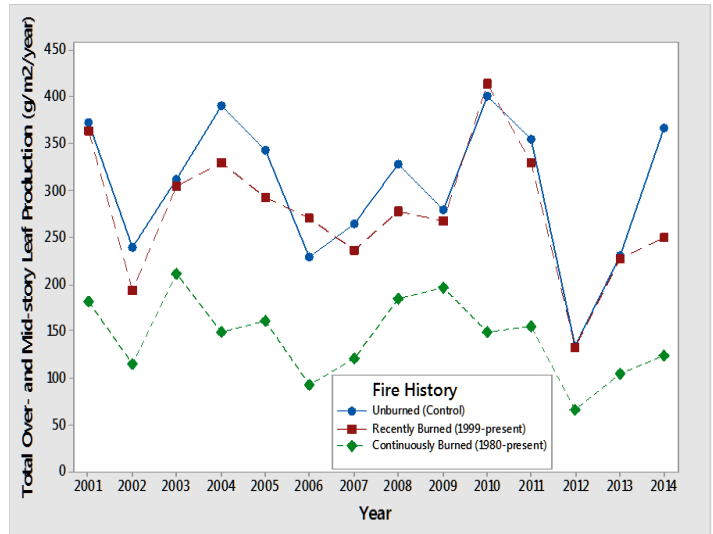


Figure 1: Total annual over- and mid-story leaf production in woodlands with different burn histories.

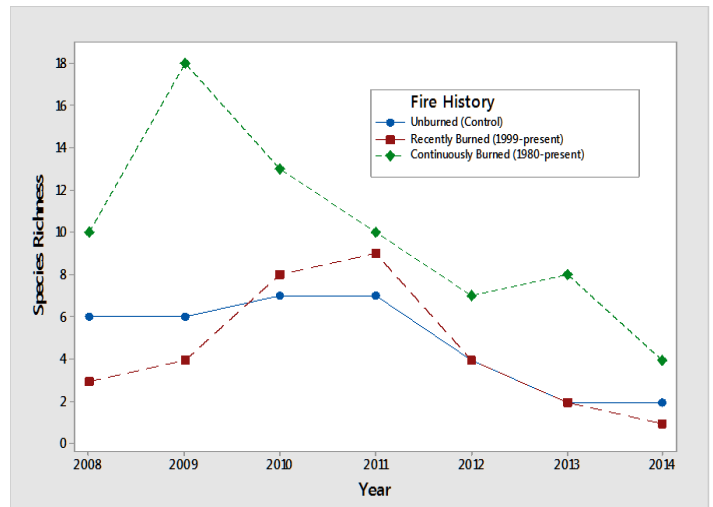


Figure 2: Number of spring ephemeral species in woodlands with different burn histories. Burns in 2008 and 2013 occurred in March, and in 2010 occurred in February. 2012 was a year of very low precipitation (drought year).

### Construction Started on Stone Shed

The dream of office and storage space at the Field station is becoming reality. After a long application and review process with the US Army Corps of Engineers (COE) and the Missouri State Historic Preservation Office (MSHPO), permission was granted for the project.

Thanks to Jerry Compton, MSU Architect with Planning Design & Construction, who drew up the plans for the infills and Andy Smith, Construction Foreman with Facilities Management, who is coordinating the work effort. Campus Construction Team (CCT) project staff include Andy Cooper, Jon Crocket, and Bill Sampson who have specialties in concrete, carpentry, and electrical work, respectively.



East elevation walls with windows and doors close in the stone shed wings

## Insects Around Us *By Kendell Loyd, MSU Biology Graduate Student*

When one thinks of insects, a vision of creepy-crawlies that need eradication or stomping usually comes to mind. Insects are the most abundant group of organisms on the planet: about 40% of documented species belonging to the class Insecta. So it is not surprising that we come into contact with these 'pests' so often. In fact, it has been estimated that the 2 million insect species known, may only be a tiny portion of the estimated 10-30 million species that are yet to be discovered. It should be no surprise that our world is shaped so strongly by these small beings. They inhabit every ecosystem and can be found from the tops of the trees to the depths of lakes to the dark abyss of caves. Insects compose an indispensable level of the food chain that is essential for life itself.

The Ozarks are no exception to insect diversity, and the Bull Shoals Field Station is a beautiful representation. With its arid glades, tall forests, grassy fields, placid lake shore, shaded ponds, and babbling streams, the Field Station harbors a plethora of insect species: from the giant Cecropia Moth (*Hyalophora cecropia*) with a 6-in wingspan (the largest moth in North America) that eat almost nothing but the leaves of maple trees, to the nearly microscopic parasitic wasps (*Trichogramma* spp.) that are about the size of the eye of a needle and lay their eggs inside the eggs of butterflies and moths. Such an array offers many opportunities for education and research.

Insects are easy to collect, relatively easy to identify, and very common. These traits make them ideal for judging environmental condition. A high number of insect species alludes to the health of the ecosystem, showing that it is in a state to support an array of species. At first, it may seem odd to look at insects for clues to other species, but one must remember the large influence these creatures have on other organisms. For instance, clean water can be evaluated by sampling for pollution-sensitive, aquatic insects. The variety and abundance does not only show appropriate parameters for insect life, but for species that directly depend on them, such as Largemouth Bass.

Insect sampling is an excellent way to not only assay the environment, but also to use as an outreach method and educational pathway to environmental awareness. The Bull Shoals Field Station uses its thriving insect population for these purposes with groups such as the GLADE program (Green Leadership Academy for Diverse Ecosystems) where insects are just one facet of students' immersion into nature. At this week-long camp, students experience all the Field Station has to offer, and insects are constant participants. Since

insects make up such a large food source for so many species, it is vital to understand their purpose in each environment. The students who attend GLADE are encouraged to question what they see and to never accept nature at face value. They are exposed to a side of nature that isn't always glamorous. Sometimes one is crouching knee-deep in pond water holding a Water Boatman (Family: Corixidae) that decided to painfully puncture a finger with its straw-like mouth, but continually stared in amazement at its perfectly adapted oar-shaped legs. Other times, all are standing in a yard around a Mercury-vapor lamp well after dark with thousands of tiny flying things buzzing past our ears, only to catch a glimpse of those beautiful mint-green wings of the Luna Moth (*Actias luna*). These students know that to see the true beauty of nature—to not only see, but to know and understand—one must endure a bit of discomfort, but the results rarely disappoint.

Our knowledge of insects and their role is obviously incomplete. Locations like the Field Station are essential in the continuing of education of scientists, citizens, and students alike. Knowledge of the natural world around us is indispensable for educated decisions dealing with our planet, and insects are a wonderfully accessible avenue.



*Giant Leopard Moth (Hypercompe scribonia) appears at the BSFS. Photo Credit: Chris Bamhart*

*Insect sampling using a mercury vapor light trap and bed sheets for nocturnal insects is an easy way to collect during GLADE 2014.*

## Life Beneath a Log *by Ben Dalton, MSU Biology Lab Supervisor*

Bull Shoals Field Station is nestled in the Ozarks of southwestern Missouri. The Ozarks boasts a great biological diversity, including hardwood forests, glades, and caves. The field station promotes habitat diversity, and many of the species that make their home among these environs. Forest ponds speckle the landscape while creeks and seeps trickle out of the hillsides. Such areas are hotspots for amphibians of many kinds, including several species of salamanders.

Amphibians are all tied to water in their own way. Some, like mole salamanders of the genus *Ambystoma*, return to their ponds every year to breed and deposit great masses of eggs. The eggs hatch into larvae that will spend months in the ponds, feeding and growing, until they undergo metamorphosis and begin their life on land. Others, like the forest salamanders of the genus *Plethodon*, lay their eggs under rocks and logs. Their young hatch as miniature versions of the adults, living their entire lives on land. While they have decreased their reliance on water, these salamanders still need to keep their skin moist because of a rather astonishing adaptation: Plethodontid salamanders have no lungs! Without lungs, *Plethodon* must keep their skin moist to better transport oxygen from the air across their skin to the capillaries near the surface.



*Ozark Zigzag Salamander (Plethodon angusticlavius)*

I work in the lab of Dr. Alicia Mathis, who is a Behavioral Ecologist at Missouri State University, and has a long history of salamander research and conservation. Specifically, she has worked extensively with *Plethodon angusticlavius*, the Ozark Zigzag Salamander, and three species of *Ambystoma*: *A. annulatum*, the Ringed Salamander; *A. maculatum*, the Spotted Salamander; and *A. opacum*, the Marbled Salamander.

*Continued on bottom of Page 4*

## Mammal Class Weekend Field Trips by Sean Maher, MSU Biology Assistant Professor

As part of the Mammalogy class, students are required to participate in an overnight field trip. This year, both field trips occurred at BSFS, on 18-20 September and 2-4 October. Goals of these trips include introducing students to the basic techniques used in assessing small mammal populations, and an understanding of the different habitats that these animals use. Many of the students took the opportunity to break out their tents or hammocks during the weekend.

This year, the weather was very cooperative and students were able to set traps at several sites, 3 of which were sampled during both trips. The first trip was a bit warmer than the second trip, but we had plenty of sun on both. Generally, students set 50 pairs of traps, each pair separated by 8-10m, baiting them with either sunflower seeds or the seeds in addition to a ball of peanut butter and oats. Traps were opened in the evenings and checked in the mornings.

During the first weekend, students had 36 captures at 4 sites, mostly Hispid Cotton Rats (*Sigmodon hispidus*). A major highlight was a Southern Short-tailed Shrew (*Blarina hylophaga*), as these are hard to capture in live traps. Additional captures included White-footed Mice (*Peromyscus leucopus*) and Eastern Woodrats (*Neotoma floridana*).

The second weekend was a bit more productive as students had 51 captures at 5 sites. Besides plenty of Hispid Cotton Rats, Eastern

Woodrats, and White-footed Mice, students picked up several Fulvous Harvest Mice (*Reithrodontomys fulvescens*) and even a Southern Flying Squirrel (*Glaucomys volans*). On Friday night, the group spotted a Southern Flying Squirrel in the pavilion, and we were transfixed for about 2 hours watching it. On the second night, a Nine-banded Armadillo (*Dasyurus novemcinctus*) was spotted near the house, and the TA and an intrepid student ran after it but the animal was too elusive.

Later in the semester, students analyzed the data collated from field notes of both trips in a computer based lab. They were able to show that mammals tended to be caught more often in the larger traps, even though we set fewer of them. Additionally, traps that were baited with the peanut-butter and oat ball were more successful on the second night of trapping. The data also showed that there was the greatest number of small mammal species in the glade as compared to the forest and food plots.

Last year, we only took one field trip to BSFS and students captured many of the species we found this year (minus the shrew and the flying squirrel), but also a Pine Vole (*Microtus pinetorum*) and a few Texas Mice (*P. attwateri*). By taking these field trips to BSFS in future Fall semesters, future students should be able to examine changes in small mammal populations over many years.



Southern Flying Squirrel in rafters of BSFS Pavilion



Mammalogy class students checking small mammal traps during field trip to BSFS

### Life Beneath a Log (continued from Page 3)

In the lab, we study the territorial behavior of the Ozark Zigzag Salamander, and how they use pheromones to convey complex information to other salamanders, including info such as body size, sex, diet quality, and parasite load. Pheromonal communication isn't limited just to other salamanders, but can be used across other species as well. These salamanders can detect natural predators, such as the Ring-necked Snake, or predators that have recently expanded into the area because of climate change, like the Nine-banded Armadillo. Ozark Zigzag Salamanders can even communicate with other species with pheromones, such as earthworms, about common predators. Ringed Salamanders are quite interesting, even as larvae and embryos. Since the eggs and larvae must spend their

lives in a confined area, often with predators around, we are interested in how early a salamander can respond to the pheromones of a predator. Sometimes these predators can even be other salamander larvae! Since salamanders will eat almost anything small enough to fit in their mouths, it should be advantageous for smaller larvae to detect when larger predators are around. It turns out they have that ability, and it's so important that still-developing embryos will increase their heart rate to the scent of a potential predator.

While this is just a small portion of the work done in our lab, you can see just how interesting are these little creatures. Most people can walk through the woods, and not even realize just how complex is a life beneath a log.



Ringed Salamander (*Ambystoma annulatum*)

# GLADE at BSFS



2015 class, alumni, staff & MDC partners after Giant Cane Restoration

**G**reen  
**L**eadership  
**A**cademy for  
**D**iverse  
**E**cosystems



Spring planting and habitat improvement team at Dabbs Creek (photo by Prussia)

Bull Shoals Field Station hosted its seventh week long residential program June 21-27, 2015 with 16 motivated southern Missouri high school students who desired to impact their communities in the areas of environmental sciences and conservation leadership. The GLADE project developed as a collaborative effort between the Greater Ozarks Audubon (GOAS) and Missouri State University.

A BSFS Wish List item was fulfilled this year during the GLADE reunion which is held annually prior to the November GOAS member meeting so the GLADE alums can practice their PowerPoint presentations. Twelve Leopold benches were constructed by the GLADE alums, volunteers, and

staff from kits. The back panel of each bench is engraved with the logos of major GLADE sponsors.

GLADE continued its involvement in glade restoration and habitat improvement projects with the USDA-Forest Service staff of the Mark Twain National Forest. A spring day at Dabbs Creek to remove cedar and install native plants in the sign bed was followed by a fall day on the Glade Top Trail to re-plant *Echinacea purpurea* roots that had been illegally dug in the MTNF and confiscated by a federal agent. We began 2016 with a New Year Day seed bombing and litter pick at Dabbs Creek.



Native plants in sign bed at Dabbs Creek

Thanks to ALL our students, funders, presenters, organizers and volunteers!!!

## University of Wisconsin Researcher at BSFS

Jesse Miller, a NSF graduate research fellow at the University of Wisconsin in the Zoology Department, made use of the residential accommodations of the BSFS during some of his collection trips in 2012-2014. He has completed his research on how plant communities respond to landscape structure and prescribed burns on Ozarks glades, and gave a nod to BSFS in his acknowledgements.

The research of Miller, et. al. was published by the Ecological Society of America: *Ecology*, 96(12), 2015, pp. 3323-3331

You can download the Adobe .pdf of this paper at <https://jesseedmiller.files.wordpress.com/2011/12/miller-et-al-2015.pdf>

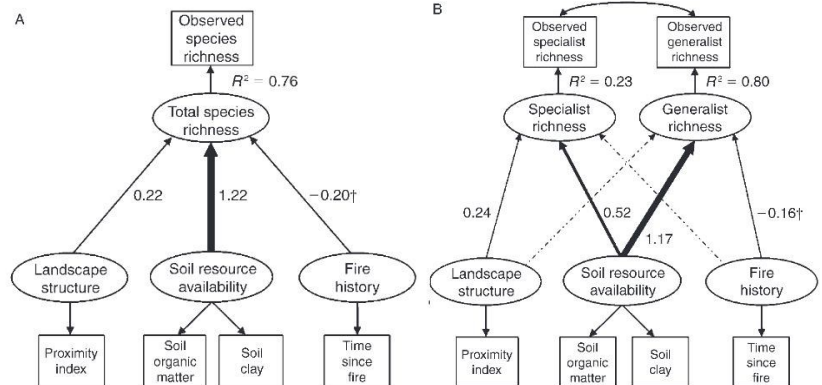


Fig. 1. A diagram of structural equation model for (A) total species richness and (B) richness of generalist and specialist species from Miller et. al., 2015.

## Kirbyville Middle Summer School Field Days at BSFS

We are delighted that the summer school classes of KMS returned to BSFS in 2015 with the theme of Survival. On June 8 we engaged the children with activities from Flying WILD addressing flight, migration, and bird adaptations with help from Grant Dickerson (MSU grad student), Sherryl Walker, Hammons and Nancy Schanda (MO Master Naturalists and returning BSFS volunteers). The next week, our

Survival studies included live snakes brought in by Master Naturalist, Melvin Johnson, and his home-schooled assistants, Deah Powell-Seiferd and Branden Powell. The Schanda's led the children through Survival Dilemma problem solving while Sherryl and Celeste challenged the students to use their noses to find partners and determine attraction and aversion reactions to different types of scents.



Prairie King Snake

Bull Shoals Field Station  
Missouri State University  
901 S. National Ave—Biology  
Springfield, MO 65897

Visit us on the web...  
[bullshoals.missouristate.edu](http://bullshoals.missouristate.edu)  
Or Like us on facebook at MSU  
Bull Shoals Field Station

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.

Dr. Janice Greene, BSFS Director  
Dr. Beth Bowles, BSFS Research Specialist  
Erica Cox, Project WET Coordinator  
Theresa Johnson, BSFS Research Specialist  
Celeste Prussia, MS, BSFS Manager

417-836-5306  
417-836-3731  
417-836-4337  
417-836-5912  
314-313-6694

JaniceGreene@MissouriState.edu  
BethBowles@MissouriState.edu  
EricaCox@MissouriState.edu  
TheresaJohnson@MissouriState.edu  
CelestePrussia@MissouriState.edu

## BSFS Increases Outreach Support for Homeschool Families

BSFS is delighted to have hosted a field day on site for six home school families. Our lichen missionary volunteers, Hammons and Nancy Schanda, joined us to help guide the children through lichen identification, morphology terms and a field foray to view lichens in situ and recall information from the table-top session. One five year old even applied the term "apothecia" correctly during our foray. They were a great group!

May 8th and October 1st marked the sixth and

seventh semi-annual Homeschool Outdoor Fairs in 2015. The spring event was hosted by The Botanical Center and the Springfield Conservation Nature Center hosted the fall fair. Over 250 attendees came to each of the fairs. Environmental and conservation educators from throughout the Springfield area presented a wide array of activities, tours, demonstrations, and exhibits to showcase the rich diversity of outdoor educational opportunities that exist in our area.



Homeschool students learned about lichens at BSFS

## Friends of Bull Shoals Field Station

Are you interested in the protection of southwest Missouri's unique ecosystems? Do you have a love of the outdoors? Did you do field research as a student at MSU? Have you shared your excitement about nature with others? If you answer yes to any of these, then you're a perfect fit to be a **Friend of Bull Shoals Field Station**, and we're still looking for a few good friends..

Membership donations support projects such as: *Undergraduate and Graduate research, education, ongoing research and long-term monitoring*  
Membership benefits include: *Newsletters, invitations to special member events; Corporate sponsorship (gains your logo on BSFS publications)*  
Membership levels range are: *\$25 (Individual), \$40 (Family), \$100 or more (Sustaining); and \$200 (Corporate)*  
A donation of any amount may be made in honor or memorial to someone for whom you care

You can give online today at [www.missouristate.edu/giving](http://www.missouristate.edu/giving) (enter Bulls Shoal Field Station in search bar) or contact Janice Greene to learn more.

## A Year of Views from the BSFS Phenocam

If you don't follow MSU Bull Shoals Field Station on Facebook, then you missed seeing some of the landscape changes from the BSFS Phenocam. The image to the right represents each day as a vertical sliver of the noon landscape viewed by the Phenocam; the entire landscape view is the horizontal composite. It's easy to see more snow fell in March than the prior two months and the green swath in the center is the 2015 growing season. What percentage of blue sky days do you estimate?

The latest image capture can be seen in your Internet web browser at this URL:

<https://phenocam.sr.unh.edu/data/latest/bullshoals.jpg>

