

HANCOCK BIOLOGICAL STATION ON KENTUCKY LAKE SUMMER/FALL 2012 *NEWSLETTER*

HBS AFTER 40 YEARS

The HBS *Newsletter* has returned. We plan to publish the *Newsletter* two times per year – Summer/Fall and Winter/Spring - as a means of keeping students, graduates, and supporters informed on happenings at the Biological Station. HBS was founded by Hunter Hancock in 1966, but the first facilities were not dedicated until 1972; thus, there is some justification in calling 2012 our 40th anniversary. For those who have not been to HBS in quite a while or who are just becoming acquainted, a brief history of the Station is in order.

A successful field station is known by the research, education, and outreach that occur there. Those three components will be only as good as the facilities a station provides its users. The first buildings in the early 1970s did provide a good start, and there were several scientists conducting research along with a number of classes being taught, but beyond the initial buildings, facilities in general were limited.

Through the leadership of Joe King, Biological Sciences Department Chair, MSU was awarded a state-funded "Center of Excellence" in 1987. The center was originally called the Center for Ecosystem Studies, renamed the Center for Reservoir Research, and now is the Watershed Studies Institute. The primary objective was to improve and utilize facilities at the Mid-America Remote sensing Center (MARC), the Chemical Services Laboratory (CSL), and HBS for the study of Kentucky Lake and the surrounding environments. The recurring budget provides for equipment, staff, and student support and the continuation of the Kentucky Lake Long-Term Monitoring program HBS. These and other new facilities allowed researchers and faculty to compete successfully for a wide variety of federal, state, and private grants.

In 1988, there was only limited housing. By limited, I mean two dorm rooms the size of an average bedroom, each with 4 bunk beds and a small bathroom. Then there was the well-used mobile home that we disposed of after the toilet went through the floor. The Station presently houses up to 40 people in student and researcher cabins. On average, 10 undergraduate and graduate students now live at the station the year around while conducting research.

Photo right: the first building at HBS dedicated in 1972

Grants from the National Science Foundation have allowed us to construct several new research buildings including the Mesocosm Facility, a research-grade greenhouse, and the Resource Building that contains an additional classroom, storage, fabrication shop and large indoor work areas. NSF grants also have provided upgrades and remodeling of labs and offices in the Main Building. In a lot of the new construction, particularly student and researcher cabins and the new pavilion, we have remained hands-on. In other words, the staff and students design and build it. I can proudly say that even I pounded a few nails. In a time of limited budgets, we have made our construction funds go much further. Much of this could not have been accomplished without the expertise of Gary Rice who retired this year. (see page 3)

In this and coming *Newsletters*, we will 1) highlight past



accomplishment of researchers, faculty, and students, 2) spotlight new facilities and programs, and 3) discuss future plans.

Daniel S. White

YOU KNOW YOU'RE AT A BIOLOGICAL STATION WHEN.....

...no one removes the dead, extremely stinky fish from the aquarium in the lobby because "it's turtle food!" ...going on a cruise means collecting water samples for work, not sailing around the Caribbean for vacation ...there are frozen animals behind/beneath every freezer door ...there's a dead skink behind the server ...your proper work attire consists of a beat up t-shirt, worn out pants and a good pair of tevas ...all of your work clothes are full of acid holes ...your office mates are mice, wasps, cockroaches, and spiders.

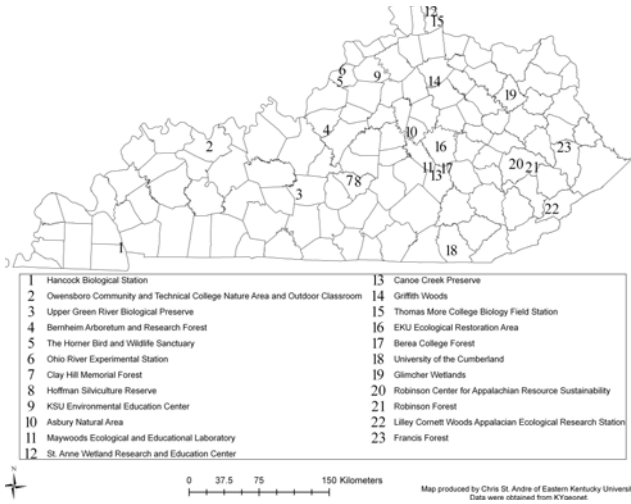
ADD YOUR MEMORY TO THE HBS FACEBOOK PAGE!

www.murraystate.edu/hbs

All gifts to the Station support our education and research programs

FINDING KENTUCKY'S BIOLOGICAL STATIONS

The first annual meeting of Kentucky Field Sites and Stations was held February 10 - 11, 2012, at Eastern Kentucky University's Maywoods Environmental and Educational Laboratory Lodge. The meeting was the result of a survey of Kentucky colleges and universities to determine the number of field station sites available for research, educational, and outreach activities. As a first attempt, information was gathered from 23 sites. Sites range from thousands of acres to just a few. Some have full, year around research and education programs, while others are largely undeveloped. Existing sites are located primarily in the eastern half of the state with only 4 in the western portion, thus some ecoregions have several while others have none. Although not directly surveyed, 200 additional state and federal natural areas were identified Kentucky. It was the hope that the information will stimulate the use of the Commonwealth's field station sites and point out the needs for acquiring and developing others. The data are published in *Richter, S.C., Christopher J., St. Andre, C.J., White, D.S., and Wilder, M.S. 2010. A Field Guide to Kentucky Field Stations Available for Education and Research. Journal of the Kentucky Academy of Science 71(1-2):95-102.*



Map of university-associated field stations in Kentucky

Tobias Landberg has joined the Watershed Studies Institute as a postdoctoral associate and instructor of biology at Murray State University. His research at HBS on amphibian life history uncovers the effects of environmental variables (e.g. oxygen levels, predator presence, larval density and egg size) on individual life history decisions such as the timing of metamorphosis. Landberg received his M.S. at the University of Massachusetts and his Ph.D. at the University of Connecticut. Tobias has begun several new research projects at HBS to investigate our local amphibians. He is using microsurgery techniques to adjust yolk reserves in mole salamander embryos. This technique helps assess how maternal investment in egg size affects larval development. He designed a new mesocosm array to house amphibian larvae in 32-gallon containers. To keep them from overheating in the hot Kentucky sun, eight cans are housed in larger 8-foot diameter cattle tanks. Together with undergraduate assistant Katie Mount, he is also studying the development of locomotion in treefrogs.



Mesocosms (6 and 8-foot blue cattle tanks) at HBS. The nearly 100 similar tanks are being used by a number of post-docs and graduate and under-graduate students studying aquatic organisms. Above is Landberg's design of mesocosms inside mesocosms.

Want to know the latest Kentucky Lake weather and water conditions? Go to our website (www.murraystate.edu/hbs) for updates every 15 minutes. Real-time water quality and weather data have been gathered since 2005. You can have the data returned as a graph or a table if you are interested in long-term patterns.



THE ECOLOGICAL CONSORTIUM OF MID-AMERICA (ecoma) carries out education, research, and service programs through HBS facilities. Member institutions are **Berea College, Indiana State University, Murray State University, St. Louis Community College, University of Kentucky, Vanderbilt University and Western Kentucky University,**

LOOK FOR OUR SUMMER FIELD CLASS SCHEDULE TO BE ON LINE AT THE HBS WEBSITE IN LATE DECEMBER. MANY OF THE CLASS ARE OPEN TO TEACHERS AND



Generous gifts from friends of the station, the Geosciences Department, the College of Science Industry and Technology, and the Office of the Provost have provided funds for the construction of additional student cabins. When completed we will have 14, 2-person cabins and 6, 4-person cabins. During the summer the cabins are used for visiting students. During the academic year they provide housing for 10-12 resident graduate students.

VIRTUAL OBSERVATORY ECOLOGICAL INFORMATION SYSTEM (VOEIS)



Highland Light real-time monitoring platform

In 2009, the National Science Foundation awarded a \$6 million grant to Kentucky and Montana to support an advanced “cyberinfrastructure” project that includes a combination of hardware, software, networking, data storage, computational modeling and human resources. The grant provides end-to-end processes from water-quality sensors in

Kentucky Lake and tributary streams, through data

management to three-dimensional visualizations. The program is managing historical data including our Long-Term Monitoring Program, as well as vast amounts of new data generated by the lake and stream sensor networks. One of the primary products of the grant was the upgrading and implementation of a suite of mobile sensor buoys in Kentucky Lake. The data gathered at Kentucky Lake and Flathead Lake are designed to offer guidance on trends in key climate factors such as temperature, precipitation, the effects of

human demography, land use, and the resilience of lakes and streams to environmental change. Sensors on Kentucky Lake are gathering a broad suite of data, such as temperature, dissolved oxygen concentration, and light penetration. Data are routed via radio and cell phone connections back to the Station every 15 minutes for instantaneous analysis. The real-time data are being used in world-wide collaborations on lake and reservoir ecosystems through the Global Lake Ecological Observatory Network.

For years, the Station’s connection to the outside world has been a very slow T-1 line. As part of the VOEIS grant, we are now hooked up to an optical fiber network that gives us a vastly greater bandwidth and allows us to stream data and pictures for research and education. Also the grant provided for significant upgrades to our data management systems through purchase of an IBM blade center.



Graduate students launch the first water quality monitoring buoy, Pieces I

COMINGS

Angie Hayden joined HBS in July as a Lab Technician. She obtained a B.S. from Kentucky Wesleyan College with a major in Biology and a minor in Chemistry. After college, Angie worked at McCoy and McCoy Laboratories and their subsidiary company Analytical Management Inc. in Paducah, KY. The work involved various analytical methods, ranging from air monitoring to water monitoring. She then worked for various contractors for the Department of Energy at the Paducah Gaseous Diffusion Plant. At the time, DOE was beginning the environmental restoration process at the plant and Angie was involved in surveys and feasibility studies to assess the damage and future needs. She also spent several years in the waste management department classifying and disposing of hazardous waste. After several years at home with her children, she taught high school chemistry and other science courses and received her M.A. from Murray State University in Secondary Education. She hopes to utilize her time here to further her education in aquatic biology in order to enhance her contribution to the work done at HBS and through WSI.



....AND GOINGS



After more than 22 years, **Gary Rice**, our Senior Field Technician, has retired. There is little at the Station that Gary has not repaired, built, or simply improved. Gary joined the staff at the Station in the late 1980s and quickly became the go-to person for every aspect of field research needs. Even the simplest equipment designs were works of art and often more functional than anything that could have been purchased. Beyond equipment, he designed and built student cabins and researcher cabins as well hundreds of improvements throughout the buildings. Gary ran our National Atmospheric Deposition site – Kentucky 99 – located in the Land-Between-the-Lakes National Recreation Area. He ran our long-term monitoring cruises, participating in more than 450 of the 470+ cruises to date. These cruises happen every 16 days over more than 20 miles of Kentucky Lake and have occurred in just about every type of weather. In the lab he kept our zooplankton identifications up to date (nearly 20,000 samples were counted). Equally important, Gary knew where everything was, even a piece of equipment that had not been used in 10 or 15 years. Gary was truly indispensable and will be sorely missed.

NEW SCANNING ELECTRON MICROSCOPE



With funding from Dr. Jesse D. Jones, the College of Science Engineering and Technology, the HBS Foundation account, and several campus departments, a new JEOL scanning electron microscope (SEM) is now available for research and teaching at the Station. The new SEM replaces our ancient JEOL that was no longer functioning. The SEM is open for use by anyone in the College. One unique feature is the ability to remotely operate the stage and magnification power. Now that we have increased computer bandwidth, we plan to provide training to the region's secondary teachers so that they will be able to use it remotely in their science classes. Further, we will be offering a college level course in its use. The SEM is operated by Karla Johnston, our Senior Laboratory Technician.

FIRST SOLAR BUILDING AT MURRAY STATE UNIVERSITY

The Station never had a good outdoor place for students to study, to hold classes, or to host special events; now it does. The HBS Pavilion was designed and constructed by Gary Rice and Russell Trites (Station Manager). It is solar powered and the first solar building at Murray State University. MSU President Dr. Randy Dunn presided at the ribbon cutting. Funding for the facility was provided by gifts from friends of the station and the Hunter Hancock endowment. We especially thank Leon and Eileen Duobinis-Gray for their generous gift of lumber.



A NEW TYPE OF COURSE AT HBS



Ed Zimmerer and snake

Since 1989, the Station has offered a number of field courses in its summer session.

The session usually runs for 5

weeks where classes meet all day, 2 days per week. This summer we offered an intensive BIO 507/607, Field Biology of Amphibians and Reptiles, in a two-week session right before the regular session. The course, taught by Ed Zimmerer, Murray State University, focused on the field identification of local amphibian and reptile species and the methods and techniques of observing, sampling, and estimating population sizes and densities. Field trips covered a wide range of habitats available in our area. Students also designed and carried out short term research projects. Ten students participated in the course. We plan to offer this and similar 2-week courses on a regular basis.

RALPH THOMPSON CELEBRATES 15TH YEAR TEACHING AT HBS



Ralph has been a Visiting Professor at HBS since 1998 and has taught Biology 553/653 Field Botany, for the last 15 summers. Ralph previously taught at three other biological field stations: the Franz Theodore Stone Laboratory, Ohio State University, the Upper Cumberland Biological Station at Tech Aqua of Tennessee Technological University, and the Pymatuning Laboratory of Ecology of University of Pittsburgh. Ralph received his Ph.D. in Botany from Southern Illinois University at Carbondale and joined the Biology Faculty at in the Biology Department at Berea College, Berea, Kentucky, in 1980. He retired after 31 years of service in 2011 as the Charles F. Kettering Chair in Science and Professor of Biology. As Professor Emeritus, he continues as Curator of the Berea College Herbarium (BEREA) where his personal collection numbers are over 43,000 vascular plants. At Berea College, Ralph taught 20 different courses including Botany, Plants for Society, Field Botany, Winter Botany, and Dendrology and Forest Ecology.

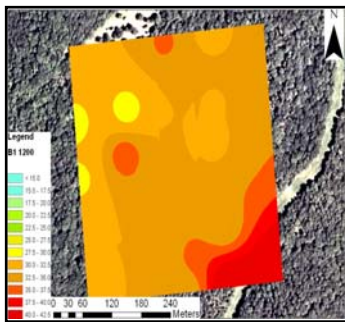
Ralph was awarded the Seabury Award for Excellence in Teaching in 1993 and the Paul C. Hager Excellence in Advising Award in 2008, and the Phi Kappa Phi Professor of 2010-2011. In 2002, he received the Outstanding College and University Teacher Award for Kentucky from the Kentucky Academy of Science. His research has involved students as collaborators with botanical studies ranging from coal surface-mined and limestone-

quarried lands, State and Federal natural areas, to floras of biological stations in Kentucky and Pennsylvania. Many articles have been published with students and university colleagues as coauthors in major regional journals. Ralph continues to pursue research in western Kentucky on the woody flora of Murphy's Pond in Hickman County, a natural area belonging to the Nature Conservancy, and the vascular flora of Wickliffe Mounds State Historic Site in Ballard County.

However, Ralph says that major pride and joy is being remembered by his students and colleagues as a supportive mentor, a dedicated colleague, and, as a true and loyal friend while teaching at the Hancock Biological Station, his favorite teaching endeavor of his long and productive career.

FOCUS ON RESEARCH: CHRIS HOWEY STUDIES THE EFFECT OF PRESCRIBED BURNING ON THE LANDSCAPE, REPTILES, AND THE BLACK RACER

Chris has been using HBS facilities to investigate the effects of prescribed burning since 2010 as part of his dissertation research through Ohio University. His field sites are in the Land-Between-the-Lakes National Recreation Area (LBL). Prescribed fire has become a popular management tool throughout North America; a tool that creates a landscape representing an earlier successional forest. Typically, prescribed fire has very little direct effects on most reptiles; however, after surviving a prescribed fire, reptiles must then interact with this changed landscape. Previous research has focused mainly on the direct effects (surviving the disturbance), but



Distribution of body temperatures in a burn site that a Racer could achieve during mid-summer without having to thermoregulate.



his research goes beyond direct effects and focuses more on how the landscape was altered, how those alterations may affect reptile abundances, and how those alterations may affect the way a reptile interacts with the landscape.

His research is being conducted in eight LBL study sites; four sites in unburned areas and four sites in burned areas. Throughout each year, he and a team of students measure forest characteristics in each study site. They have found that prescribed burning has led to a reduction in leaf litter, overstory trees, and canopy cover but an increase in grasses, forbs, and other new growth. During 2011, 1,913 reptiles, amphibians, and small mammals were captured, and so far this year they have captured over 700. They determined differences in reptile

abundance among each site using nonmetric multidimensional scaling (NMDS). Whereas reptiles were more abundant in burned areas, there was no significant difference in reptile abundance between burned and unburned forests. This suggests that reptiles do not respond to if a forest was burned but whether if specific, favorable, habitat characteristics are present in that forest.

He is using the Black Racer as a focal species to determine how a snake may interact with these differing landscapes and to determine if Racers use burned habitats differently and does this lead to positive or negative effects on their health and energetics? Specifically, he is determining what structural and thermal habitats Racers prefer to use, if movement rates differ, if health of the animals differ, do Racers in burned sites lose more body water, and if Racers expend more energy in burned or unburned landscapes. Collectively, data suggest that burning has a marked change on the landscape, but reptile abundance within a particular landscape is more affected by the presence of preferred structural and thermal characteristics. For the Black Racer, absence of preferred habitat in *unburned* forests led to increased movement rates, changes in habitat use, a decrease body condition/health, and an increase in energetic expenditures. Ultimately, the effects of prescribed fire go beyond the direct effects of the fire itself and can cause long-term changes to communities and how those species interact with the landscape.

Chris and a number of undergraduate assistants from Ohio University conducted most of their lab work in the Station's Mesocosm Facility and their field work in the Land-Between-the-Lakes National Recreation Area (LBL).

Gifts to the HBS Foundation account have provided funds to assist more than 20 deserving undergraduate students in taking summer field courses. For more information on how you can help, contact Gerry Harris at 270-809-2272 or gharris@murraystate.edu



The Delta Mariner, an ocean freight vessel, sits under a collapsed 200-foot segment of the Eggner's Ferry Bridge over Kentucky Lake. On Thursday evening Jan. 26, 2012, the Delta Mariner struck the main span of the bridge closing US Highway 68 and Kentucky Highway 80, said Keith Todd, spokesman for the Kentucky Transportation Cabinet. Text and photo on left: The Murray State News, Kylie Townsend / AP.

Much to the relief of HBS researchers, the bridge reopened May 28th once again allowing easy access to study sites in LBL.