

HANCOCK BIOLOGICAL STATION ON KENTUCKY LAKE SUMMER/FALL 2013

NEWSLETTER

We've come a long way!



500th Cruise crew: Mike Moore, Kirk Raper, Ben Tumolo, and Russell Trites

On November 15th 2013, the Hancock Biological Station, Watershed Studies Institute, Mid-America Remote sensing Center and the Chemical Services Laboratory held a celebration to mark the 500th long-term monitoring cruise. For more details on the monitoring cruises, see the Winter/Spring Newsletter or visit the Station or WSI websites. See Page 4 for a list of the more than 200 participants in the Long-term Monitoring program.



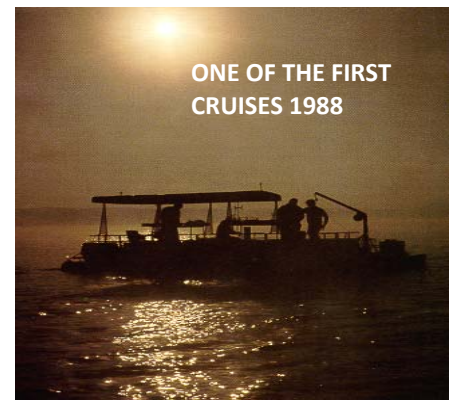
Karla Johnston, Senior Research Technician holding the Murray Ledger & Times story on the 500th cruise and 25 years of Kentucky Lake monitoring. Karla also was recognized for her service to the research programs of the Station and WSI



400th Cruise: Susan Hendricks, Gary Rice, Susan Rice, Kristin Landolt



200th Cruise: Gary Rice, Bobby Lee, Alan Williams, Sheila Bogle



People we can identify in the picture are Dick Marzolf, Alan Groeger, and Mark Schram.

Along with helping us to maintain a world-class facility, gifts to the

HBS Foundation account provide funds to assist deserving graduate and undergraduate students in research and 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 Kentucky Lake Monitoring Program (KLMP) and the Kentucky Lake Geographic Information System (KLGIS) – a Retrospective – Jane Benson

“Maintaining the quality of water is more than just an opportunity. It’s an obligation.”

Dr. G. Richard Marzolf (MSU-Spectrum 1988)

The initial goal of the Center for Reservoir Research (now the Watershed Studies Institute) was to combine the resources of the Mid-America Remote sensing Center (MARC), the Chemical Services Laboratory (CSL) and the Hancock Biological Station to study Kentucky Lake and its watershed. It is astounding to consider all that has changed over the course of 25 years and 500 long term monitoring cruises (KLMP) in terms of data acquisition, management, and methods of analysis.

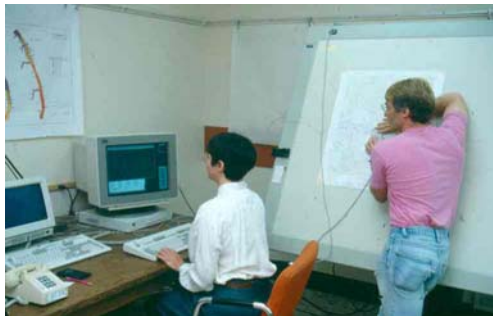


Fig. 2. Digitizing and “interactive” editing

In the early years, basic limnological measurements were entered by hand into database tables (dBase III PLUS) on IBM-PC computers. Many geospatial data layers were digitized point-by-point from topographic and other maps taped to a digitizer table and recorded on magnetic tapes. Tape drives were part of a computer system that had disk packs weighing several pounds and stored data files in kilobytes. The dBase files were interfaced to the KLGIS using ELAS software from NASA. ELAS and PC-ELAS were used to create and manage the imagery (i.e. Landsat data) and vector (line-based) map data (i.e., roads, streams, boundaries) (Figure 1).

The KLMP files were linked to KLGIS through the dBase/DB3X module developed at USACE-Waterways Experimental Station.

The 1990’s brought many technological changes to MARC including an IBM RISC server and AIX (UNIX-based) operating system that allowed networking and access to the World Wide Web and email. Additional image-processing software (ERDAS) and GIS software (ESRI-Arc/Info) were acquired, and faster processing and increased disk storage enabled digitizing directly to disk files. Base map layers were updated as government agencies provided increasingly modernized geospatial data and began making the data available for free (USDA-Soils, Census Bureau-TIGER data, USGS-topographic data). Maps became easier to share with improved plotters (Figure 3) and enhanced digital file formats. With the advancements in PC computing and the introduction of MicroSoft Windows, the KLMP database files were converted to MS-Access (2003) and later became “live” on the MSU Intranet Database (2007). Soon the KLMP data will make another transition and be available through SQL Server (anticipated 2013).

The KLMP Cruise dates have always been scheduled according to the overpass of the Landsat satellites, initially from Landsat 4 and 5 (Thematic Mapper) and continuing with Landsat 8. The Landsat imagery has been used to derive land cover and land cover changes, help predict soil erosion, and develop models for water quality parameters including temperature, turbidity, chlorophyll, and primary productivity for Kentucky Lake. A single Landsat TM scene in 1988 cost \$2000 (and it takes 2 scenes to cover the KLGIS area) and arrived on 7 magnetic tapes. Many scenes have been acquired over the years, and as

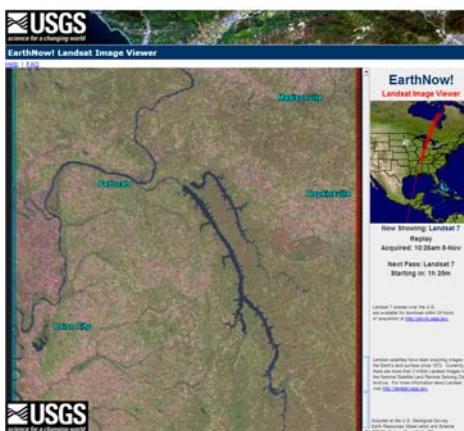


Fig. 4. USGS website for viewing “live” Landsat data

recently as 2007 eight scenes (for 4 dates) were bought at \$600/per scene. In 2008 Landsat data were made available for download at no cost to any user. Now we can watch on a computer as Landsat 7 passes over and see the data that are collected in real-time (Figure 4). The data are available for download for FREE usually within 24 hours of acquisition (<http://glovis.usgs.gov>). Maps and data can be accessed and processed “in the cloud” with ESRI’s ArcGIS Online. With new sensors, some of the KLMP data are continuously collected and transmitted “real-time” to HBS. One can only imagine what changes the next 500 (or even 100) cruises may bring.

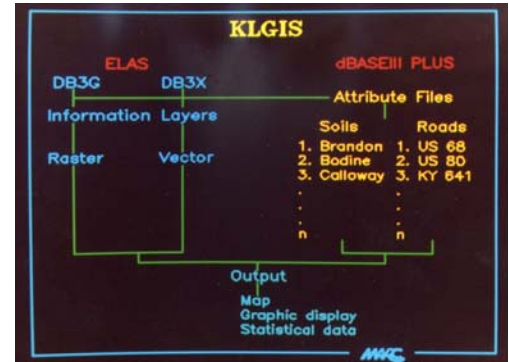


Fig. 1. KLGIS Data Software



Fig. 3. Map products

Dr. Carmen Greenwood, beetle hunter



Photo of *Nicrophorus americanus* by Kyle Risser. Arrow points to red pronotum

Western Kentucky is located in the heart of what used to be the range of the federally endangered American burying beetle (*Nicrophorus americanus*) (Fig. 1). An effort jointly supported between Murray State University, the U.S. Forest Service, and the U.S. Fish and Wildlife Service is currently underway to ascertain the suitability of LBL and other nearby locations as potential re-introduction sites for this rare species of burying beetle. American burying beetles (ABB) used to exist throughout the eastern U.S. but are now limited to a few small populations in Nebraska, Oklahoma and Rhode Island, with sporadic sightings in other locations. Factors contributing to its decline are still not clearly identified although it is likely that multiple stressors played a role. Habitat loss and fragmentation, land use practices, host availability, and competition for hosts are some of the factors currently being investigated by the ABB research team at Murray State University.

Researchers from Murray State University's Department of Biological Sciences and the Hancock Biological Station trapped burying beetles at LBL and on HBS property in the fall of 2013 to quantify both the community composition of closely related species of carrion beetles and the effects of different forest management practices on carrion beetles (Fig. 2). Forest management within LBL is designed to restore natural Oak-Hickory woodlands and native grasslands that were found to be conducive to carrion beetle communities. Approximately 800 carrion beetles were collected in LBL over 12 "trap nights" representing 3 different species of the family Silphidae (Fig. 3), but no ABBs were found. The ABB can be separated from other species by its red pronotum as noted above.



Fig. 2. Graduate student Ann Gilmore and undergraduate researcher Derrick Jent check one of the 5-gallon above-ground pitfall traps used to survey burying beetles in LBL in Fall of 2013. Photo by Carmen Greenwood

Burying beetles in the family Silphidae feed on dead animals and require small animal carcasses (usually rodents or birds) for reproduction. They are strong fliers and can detect dead animals over long distances. Once a suitable carcass is found, the males will call to the females using powerful pheromones. A male and female pair will bury an appropriately sized animal carcass, remove all hair or feathers, coat the carcass with anti-microbial saliva, and use it as a resource for rearing their larvae. The parental pair will stay with the larvae, feeding them regurgitated material from the carcass for an extended period of time. This provides the larvae with gut symbionts they will need for future scavenging. Eventually the larvae migrate away from the carcass to pupate and emerge as adults after several weeks. Plans are underway for an educational exhibit at LBL that will provide visitors with more information about these intriguing and charismatic decomposers.

A meeting of the MSU researchers, the U.S. Fish and Wildlife Service and the U.S. Forest Service is scheduled to take place in December of 2013 to discuss the potential re-introduction of American burying beetles to LBL and other western Kentucky locations.



Fig 3. From Left to right: *Nicrophorus pustulatus*, *N. tomentosus* and *N. orbicollis*. The 3 *Nicrophorus* species were found in LBL in the fall of 2013. Photo credits, from left to right: Betsy Betros, Tom Murray, and Alex Wild

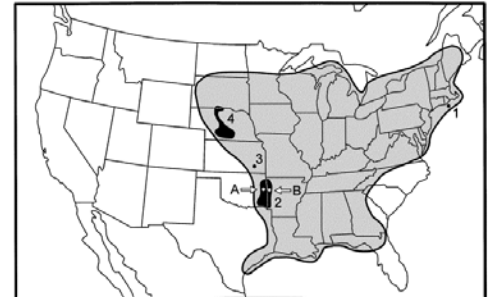


Fig. 1. Area in gray shows the historical range of the American burying beetle with existing populations indicated in black

Preliminary beetle surveys in LBL are scheduled to continue through 2014. Dr. Carmen Greenwood is leading the research effort on ABB. Cooperators include MSU Biology faculty, students, the Hancock Biological Station, the Watershed Studies Institute, and student members of the Murray State University Wildlife society.

Kirk Raper recently graduated from Murray State with his Master’s degree in Water Science. He conducted his master’s research on the effects of glyphosate herbicidal management of invasive *Phragmites australis* on fish communities in a freshwater marsh (Clear Creek Wildlife Management Area), specifically the diet and morphometry of lake chubsucker (*Erimyzon sucetta*). During his residency at Hancock Biological Station, he contributed to the Kentucky Lake Long-Term Monitoring Program (KLMP) as a Laboratory Technician, and more recently as the Field Research Coordinator. In addition to the experience he gained with laboratory equipment and procedures, he participated in more than 40 sampling cruises, developing skills with boating, scientific instrumentation (YSI, pH meters, etc.), and a variety of physical, chemical, and biological analyses. The hand-on research experience he attained through the program helped him to qualify for the next step. He has accepted an exciting research opportunity as the Wetlands Project Coordinator at the Academy of Natural Sciences of Drexel University in Philadelphia. He will be leading field operations investigating plant communities, water quality, and accretion of salt marshes in the Delaware Estuary and Barnegat Bay with implications for sea level rise and urban development.



CRUISERS...PARTICIPANTS IN THE FIRST 500 - 1988 - 2013

PLATINUM GARY RICE 455 CRUISES

GOLD

SUSAN RICE	91
JOHN RUNDLE	85
RUSSELL TRITES	76
SUSAN HENDRICKS	52
DAVID DREVES	50
MARK SCHRAM	45
GERRY HARRIS	44
BRIAN SHARP	39
KIRK RAPER	38
MIKE ARMSTRONG	37
DICK MARZOLF	33
TODD LEVINE	31
BOBBY ANN LEE	28
NATALIE OHL	28
DAVID WHITE	26
JOHN WYATT	26

SILVER

CHAD COLBURN	24
TOM ANDERSON	19
KELLY BUSH	17
KRISTIN LANDOLT	17
CAREY BUSH	16

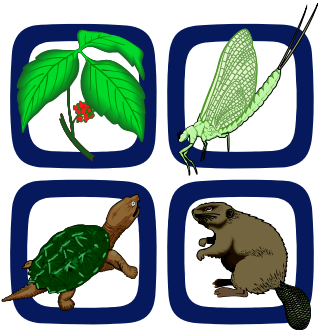
HEATHER HOE-RICHARD	16
CHRISTY MEREDITH	16
MATT WILLIAMSON	16
MARY CHILD	15
CLARK HENDRIX	15
GEORGE KIPPHUT	15
JAMES RAMSEY	15
ALAN GROEGER	13
CHARLIE MORGAN	13
MARK HATFIELD	12
AMANDA NELSON	11
RUSSELL SEITHER	11
PEDER YURISTA	11
ADAM MARTIN	10
GRANGER RIDOUT	10

11

BRONZE

JASON ALBRITTON	9
SHEILA BOGLE	9
CHRIS BROOKS	9
D.J. GARLAND	9
SETH HUNT	9
JOHN MOORMAN	9
KEN WILHELM	9
ALAN WILLIAMS	9

BRETT DAVIS	8
SALLY ENTREKIN	8
KEVIN FREY	8
KARLA JOHNSTON	8
SAM JOHNSTON	8
AMY KRZTON-PRESSON	8
KAMAL MIRIYALA	8
CHRIS ROBINSON	8
AMBER TROUTMAN	8
CHAD LEWIS	7
TERRI MARTIN	7
JASON WALLER	7
EVAN ANDERSON	6
CANDACE BENNETT	6
MARK BROUDER	6
JENNIFER BURCH	6
TYLER FLYNT	6
LAURA FRANCISCO	6
TY HUGHBANKS	6
HWASEONG JIN	6
KELLY JOHNSON	6
DENISE LEEK	6
MANUEL MATOS	6
JARED MILITELLO	6
DARREN REED	6
JULIE SANDERS-TABOR	6



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