

Hancock Biological Station



CONFLUENCE



WINTER 2021/2022



"Shout Out" Section

A big thanks J&J Marine on Pottertown Road and K&M Boat Service in Aurora for servicing our boats. Both crews have been tremendous in their support and have helped us with our motor repair issues on moments notice over the years. On weekends and holidays they are dependable and go above and beyond to help us out!

Many thanks to our residents for reporting issues during all of the inclement weather and Campus closings. A big shout out to Jason Harris for his dedication and quick response to the issues reported.

Highlights

This Edition features:

- *Post Doctorate Mark Kirk
- *Graduate Student Nathan Klein
- *HBS Staff Xulong Peng
- *Highlights from Mayfield High School Class
- *HBS Christmas Luncheon
- *HBS Winter Projects

More Information

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Featured Post Doctorate: Mark Kirk

Climate change is having a profound effect on the biodiversity of our planet. Changes in temperature and precipitation across the globe are altering the distribution, phenology, and physiology of many species. These species-level impacts have consequences at higher ecological scales, resulting in the formation of novel communities and changes in ecosystem properties. My research has sought to address the potential for climate-induced changes in these biological responses of fish and amphibians; two groups of ectothermic animals that are highly sensitive to climate change.

With regards to fish-based research, my dissertation focused on how climate change will alter stream fish communities along elevation gradients of the Rocky Mountain – Great Plains continuum (USA). The majority of my projects focused on climate-induced range shifts, with specific objectives being: 1) determining what biological traits explain whether species exhibit range expansions or range contractions, 2) evaluating whether environmental barriers to movement along elevation gradients may limit species climate tracking abilities, and 3) evaluating the performance of different quantitative approaches for assessing climate-induced range shifts. Additional work from my dissertation, as well as from long-term research on stream fish communities in Pennsylvania, has been evaluating the extent to which species interactions between native and non-native trout will be altered from climate change. This work has provided managers and conservationists with valuable insight into the role that climate refugia plays in protecting stream fish species from future climate change.

My postdoctoral research is building off previous questions that I explored regarding climate-induced demographic changes for amphibians. Temperature and precipitation have a strong effect on not only the breeding migrations of many amphibians, but their life history strategies as well. Using long-term datasets on salamander species from high alpine populations in Colorado and deciduous forests of Pennsylvania, I have been exploring the extent to which migration timing, body size, and morph development of these salamanders is explained by annual variation in climate. From these observations, we can make predictions about how future climate change will alter the biology of these species.

Photo left: Stream backpack electroshocking for trout populations in Northwest Pennsylvania Photo right: Brook trout



Featured Graduate Student: Nathan Klein



Kentucky Lake and Lake Barkley are home to many species of fish, but the most ecologically important may be the Gizzard Shad. Gizzard Shad are a member of the herring family and are commonly found in waterbodies throughout the Midwest and Southeastern United States. Gizzard Shad are an important forage fish that feeds on both plankton and detritus. This gives them the ability to alter the food web by transferring energy and nutrients to and from multiple trophic levels.

One current challenge that Gizzard Shad may face in these two reservoirs is competition with the invasive Silver Carp for food resources. However, quantifying the impacts of this competition may be difficult because of limited baseline population data for Gizzard Shad in these two reservoirs. This is where my research comes in.

Beginning in the spring of 2021 and continuing into the fall, we collected Gizzard Shad during nighttime electrofishing and surface trawling surveys. All shad were enumerated and measured, and sagittal otoliths were used to age Gizzard Shad collected in the fall. From those measurements, size structure, condition, age structure, growth rates, mortality, and spawning potential of Gizzard Shad for each reservoir was calculated. The results show that there are unique populations of Gizzard Shad in each reservoir and that both are in relatively good condition. We plan on continuing sampling starting in the spring and continuing throughout the growing season of 2022.

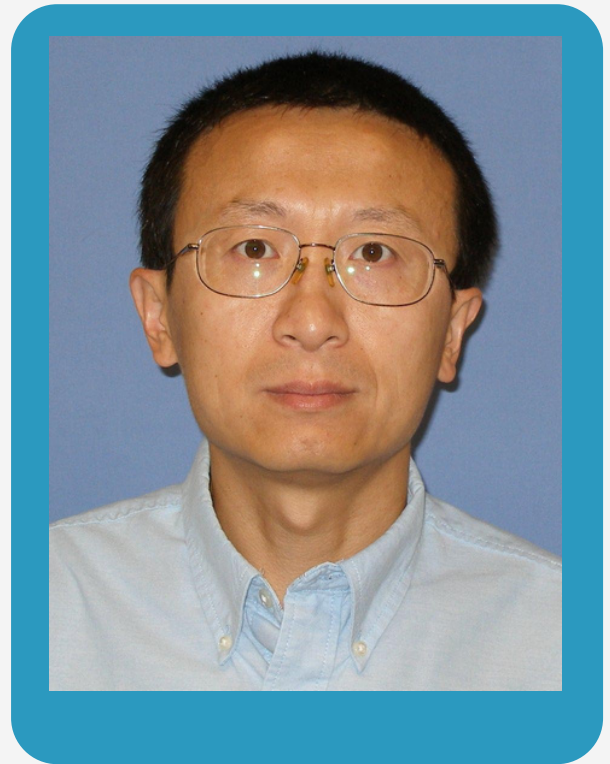
Results from this study will be used as a baseline for future monitoring of Gizzard Shad populations in Kentucky Lake and Lake Barkley and hopefully will reveal the impacts of invasive carp on Gizzard Shad.

Picture above: Nathan Klein. Picture below: *Dorosoma Cepedianum*, Gizzard shad, from Kentucky Lake



Featured Staff: Xulong Peng

As a Database Manager at HBS, I manage, maintain, monitor, and update HBS environmental databases and servers, design and develop application programs that interact with the databases and servers, assist in data analysis, maintain the HBS website, and provide IT system support to HBS staff and students. Currently, I manage three virtual servers that contain the Kentucky Lake Long-term Monitoring Program (KLMP) databases, the real-time (with 15-minutes interval) Kentucky Lake Environment databases, and the Web server databases. My daily tasks include monitoring these virtual servers, backup and restoring databases, and developing and updating systems and application programs. I design and develop a complex web-based KLMP database management system valued at millions of dollars to accommodate a variety of user needs using ASP.NET, C#, and T-SQL Programming.



This system has greatly improved the efficiency of KLMP management and application and secured over 30 years of cruise data samplings at Kentucky Lake to be effectively stored and applied to teaching and research. I am also responsible for real-time database creation and management, through extracting, transforming, and loading field data from the data loggers mounted on the Kentucky Lake monitoring sites. It includes the new databases for the SENSE grant funded by the National Science Foundation that will continue to collect data at Highland Light, Ledbetter, and Panther sites. So far, we have collected and stored millions of environmental data records including water quality and atmospheric conditions. I develop, implement, and maintain database backup and restore procedures, user stored procedures, and user-defined functions to collect and store these data effectively. I also develop, upgrade, and maintain real-time Kentucky Lake Monitoring data reporting services (update every 15 minutes), and maintain HBS's active web pages for the public audience including researchers, engineers, and anglers.

In addition, I also develop software apps for projects that save money and resource and improve efficiency. Maintaining and upgrading the server systems on a regular basis is a very important task as HBS databases rely on effective, secure, and stable system support. During my years at the HBS, I have upgraded all SQL Servers from SQL Server 2005 and 2008 R2 to 2012, to 2016, and to 2019 via installing new SQL licenses and migrating the databases and application programs to the new SQL Servers. Furthermore, I provide other technical supports to HBS staff and students including electric devices, network, security, and computer troubleshooting. I also provide data query support to users and help cruise sampling data collection when needed.

My role as Database Manager gives me many technical challenges for me to continue to develop professionally, and it also helps HBS's mission of research and outreach. I am proud to be a part of what we do at HBS.

Winter Projects



Pictured above: At our main lake remote monitoring site (Highland Light), Clark Hendrix, Senior Field Technician, was actually on the roof of the SeaArk boat replacing a bad data logger that is housed inside of that box. The data logger is used to operate and send data back to us from a variety of sensors on that platform such as the YSI EXO2, pyranometer and weather station. The box is attached to a daymark pole on the edge of the river channel, and with the reservoir at winter pool, the height of the box is nearly 15' above the water level.

Pictured below: Staff cleaning out Resource building (left) and one of the forest areas undergoing savanna restoration (right).



Christmas Luncheon

December 2021



The HBS Christmas Luncheon was on December 10th from 11am to 2pm. We were pleased that around 50 people attended. Lunch was provided by HBS staff and students. We prepared 4 turkeys, 2 hams and numerous side dishes and desserts. With Covid-19 procedures in place, the extra time for drop-ins and widespread tables gave us the opportunity to keep the tradition going.



WATER QUALITY PRESENTATION

for the Mayfield High School Seniors



WATERSHED BOARD GAMES

Rhonda Lamb (pictured) is giving the students directions for the Watershed board game. This game has a series of active, hands-on simulation activities that help participants learn how land use affects water quality and natural resources. HBS staff Clark Hendrix and Angie Hayden provided technical expertise for the water quality presentation.

SAVE THE DATE

Watershed Sustainability Festival

5TH

Family Day

AT THE ABORETUM
TUESDAY, APRIL 5TH
10AM TO 2:30PM

22ND

Summit

AT THE CURRIS CENTER
FRIDAY, APRIL 22ND
9AM - 3PM

23RD

Beast Feast

BAILEY PAVILLON AT CITY PARK
SATURDAY, APRIL 23RD
MEAL FROM 4PM TO 6PM

30TH

Trash Pick Up

SATURDAY, APRIL 30TH
LOCATION AND TIME TBA

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WSI Foundation

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