October 13-14, 2017

Hosted by:
MU Limnology Lab
School of Natural Resources
University of Missouri, Columbia
Program Agenda

Friday October 13:
Registration and social mixer starting at 6:30 pm at Shakespeare’s Pizza South (3911 Peachtree Drive, Columbia, Missouri 65203). Pizza and beverages will be provided.

Saturday October 14:
8:00 Registration, poster set-up, load presentations, coffee and light breakfast provided
8:45 Welcoming from the Director of the School of Natural Resources - Shibu Jose
8:55 Introductions by everyone in the room
9:15 Principal Investigators give 3-minute summaries of research interest
10:00 Break
10:15 History of Great Plains Limnology by Jack Jones
10:20 Plenary by John Downing – The Global Importance of Great Plains Limnology
11:20 Presentation by Eric Moody on Zooplankton stoichiometric traits
11:35 Presentation by Patrick Lind on Dietary effects of P and Fe on Daphnia
11:50 Presentation by Ryan Sherman on P use in resurrected Daphnia
12:05 Lunch (provided)
12:45 Poster Session
1:15 Presentation by Ted Harris on Cyanobacteria blooms
1:30 Presentation by Dan Obrecht on Chlorophyll sensitivity
1:45 Presentation by Matt Combes on Substrate-invertebrates interactions
2:00 Presentation by James Guinnip on Nitrogen in prairie streams
2:15 Presentation by Rebecca O’Hearn on Stream recovery after a fish kill
2:30 Break
2:50 Presentation by Chuck Mordhorst on Limnological assessment of reservoir coves
3:05 Presentation by Jacob Gaskill on Impacts of zebra mussels on reservoirs
3:20 Presentation by Grace Wilkinson on Organic carbon burial
3:35 Presentation by Dan Allen on Meta-ecosystem perspective to land-water linkages
3:50 Presentation by Michael Simpson on High resolution precipitation data
4:05 Wrap-up
**Conference Location:**
123 Anheuser-Busch Natural Resources Building, School of Natural Resources, University of Missouri, Columbia

**Parking information:**
The closest parking structure is Virginia Avenue ([901 Virginia Ave](http://www.google.com/maps/place/901+Virginia+Ave+Columbia,+MO+65201)) – A 3 minute walk to the conference location. Parking is free on Saturday.

**Presenters instructions:**
Oral presentations: Oral presentations should be no longer than 12 minutes + 3 minutes for questions. Please send your presentation to MULimnology@gmail.com by the end of the day Thursday, October 12 or bring it in a USB between 8 am and 8:30 am on Saturday, October 14.

Posters: Poster dimensions should be no larger than 4 feet high by 4 feet wide and fasteners will be provided. Posters may be presented in either landscape or portrait format.

**Organization committee:**
Jack Jones, Rebecca North, Dan Obrecht, Tony Thorpe, Alba Argerich; Graduate students: Freya Rowland, Jacob Gaskill, Erin Petty; Undergraduate students: Matt Sauer, Josh Hagerty, Jaylen Bragg, Jannice Newson, Cody Kimbell; Staff: Cindy Greenwood, Karen Decker, Carol Pollard

**Funding**
The Center for Watershed Management and Water Quality in the College of Agriculture, Food and Natural Resources at the University of Missouri ([http://snr.missouri.edu/waterquality/about.php](http://snr.missouri.edu/waterquality/about.php)) is sponsoring this event.
Oral Presentation Abstracts

Zooplankton stoichiometric trait responses to hypereutrophication
Eric Moody (Iowa State University)
We examined the impacts of extreme high phosphorus concentrations on stoichiometric traits of zooplankton communities and individual Daphnia. We find that zooplankton communities and individual responses to dietary P shift with increasing total phosphorus up to 400 μg/L, indicating that hypereutrophication selects for elevated P requirements in primary consumers.

Interactive effects of dietary phosphorus and iron on Daphnia life history
Patrick Lind (Oklahoma State University)
We investigate the impacts of P and Fe on Daphnia life history traits, and measure changes in Fe kinetics in response to dietary P and Fe. Our findings where that P had the largest influence on growth rate, while Fe was particularly important in reproductive traits.

Identifying QTLs underlying phosphorus use in a resurrected Daphnia pulicaria mapping population
Ryan Sherman (Oklahoma State University)
Resurrecting diapausing eggs of Daphnia preserved in lake sediments has revealed striking shifts in nutrient use physiology. Here, we use QTL mapping to identify genomic regions underlying phosphorus (P)-use variation. Daphnia genotypes are being sequenced to identify loci underlying P-use variation to understand the genomic basis of adaptation to eutrophication.

Harmful cyanobacterial bloom research at the Kansas Biological Survey Field Station
Ted Harris (Kansas Biological Survey)
Past, current, and future research on harmful cyanobacterial blooms at the Kansas Biological Survey Field Station will be discussed. This included on-going research in large-scale experimental mesocosms (11 m^3) and ponds (~450 m^3) on Microcystis and Dolichospermum cyanobacterial species from Milford (KS) and Marion (KS) reservoirs, respectively.

Roxanne, you don’t have to put on the red light...to process your chlorophyll filters
Daniel Obrecht (University of Missouri)
Three experiments were conducted to see how sensitive chlorophyll was to: 1) sample bottles not being stored in the dark immediately after collection, 2) processing of filters in various light-environments, and 3) long-term storage.
Substrate Macroinvertebrate Community Interactions Downstream From a Hydropower Reservoir
Matt Combes (Missouri Department of Conservation)
Reservoir dams affect stream communities both upstream and downstream from the dam. One issue is that substrates from upstream do not pass through the reservoir, but small substrates downstream from the dam continue to be carried away. We report the effects of this transport interruption on substrates and macroinvertebrate communities downstream from a reservoir in the Missouri Ozarks.

Decadal trends of nitrogen concentration in protected prairie streams
James Guinnip (Kansas State University)
Long-term water chemistry data from Konza Prairie allow examination of decadal trends in nutrient concentrations. Results show an increasing trend for NH4+ at all sampling locations, and a decreasing trend of NO3- at a lowland site. A variety of environmental data will be used to elucidate drivers of these patterns.

Remediation and recovery of an Ozark stream after a significant fish kill
Rebecca O’Hearn (Missouri Department of Conservation)
Missouri Department of Conservation staff documented elevated ammonia levels and significant fish mortality throughout five miles of an Ozark stream. Survey strata were established to quantify mortality and fish recovery in the affected area. This talk will discuss the chemistry behind the fish kill and recovery rates of the fishery.

A limnological Assessment of the Coves of Harlan County Reservoir
Chuck Mordhorst (University of Nebraska at Kearney)
This presentation is a project update for the limnological assessment of Harlan County Reservoir. The current objective is to evaluate the differences in physicochemical attributes, zooplankton, fish and algal communities between the main reservoir and coves, which are either permanently, intermittently, or rarely connected to it.

Examining the Impacts of Invasive Dreissenid Mussels in Missouri Reservoirs
Jacob Gaskill (University of Missouri)
Missouri reservoirs differ from most dreissenid-infested natural lakes due to their high turbidity, warm water temperatures, and anoxic hypolimnions. The purpose of our study is to examine impacts of invasive dreissenid mussels in Missouri using long-term (1978-2016) chlorophyll-a concentrations and indicators of transparency. Understanding how dreissenids influence variable systems is crucial as this invader spreads across North America.
A synthesis of modern organic carbon burial rates in coastal and inland ecosystems
Grace Wilkinson (Iowa State University)
Organic carbon burial in the sediments of inland and coastal ecosystems is an important process in the global carbon budget. We synthesized over 450 modern burial rates which spanned four orders of magnitude. These new burial estimates are an important step for constructing carbon balances and predicting future change.

Towards a meta-ecosystem perspective of aquatic-terrestrial linkages
Dan Allen (University of Oklahoma)
A "meta-ecosystem" as a set of isolated ecosystems that exchange energy, materials, and organisms. Here we argue that new insights can be gained by examining aquatic-terrestrial linkages in a meta-ecosystem perspective. We present a theoretical meta-ecosystem model and examine the effects of cross-ecosystem fluxes with and without feedbacks.

High spatio-temporal resolution quantitative precipitation estimation data for water resources studies
Michael Simpson (University of Missouri)
Many water resources related studies need high resolution datasets, one of the most important of variables being precipitation. This talk will encompass the availability of quantitative precipitation estimation (QPE) data at the University of Missouri for anyone interested.

Poster Abstracts

Intra-lake variation in internal phosphorus loading potential
Ellen Albright (Iowa State University)
Internal nutrient loading can fuel harmful algal blooms in lakes. We compared organic matter and phosphorus content in sediments at 24 locations in a hypereutrophic lake. The organic matter content was highly variable across sites. We expect the labile phosphorus to be similarly variable, revealing potential hotspots for internal loading.

Influence of landscape on water chemistry in Missouri streams
Alba Argerich (University of Missouri)
Here we analyze water chemistry data from 191 streams spread over the state of Missouri to identify relationships with historical and contemporary land uses. Results from this study can help with the establishment of stream nutrient criteria by identifying potential stream reference conditions.
Multivariate analyses of phytoplankton pigment fluorescence from a freshwater river network  
Ruchi Bhattacharya (University of Missouri)  
Application of phytoplankton pigment fluorescence as an effective ecological monitoring approach was explored. Multivariate analyses of fluorescence excitation and emission matrices indicated that urban and agricultural streams were phytoplankton and organic matter rich, while light-limited wetland streams were less productive with high herbivory. Our approach’s monitoring potential was highlighted.

Dietary preferences among juvenile and adult river herring in freshwater lakes  
Steven Bittner (University of Oklahoma)  
We sampled river herring (Alosa pseudoharengus & Alosa aestivalis) from two lakes in Massachusetts (Whitman’s Pond in Weymouth and Upper Mystic Lake in Arlington). We describe differences in dietary preferences among juvenile and adult river herring and use an electivity index to assess selectivity for certain prey items. If juveniles and adults are consuming the same resources, there is potential for intraspecific competition while adults reside in the system.

Atrazine distribution in wetland sediments: relationship with aquatic plant communities  
Christine Cornish (Missouri State University)  
Few studies have reported on the distribution of land applied herbicides in wetlands and their effects on aquatic vegetation. Our research will go beyond lab studies to look at the occurrence of atrazine in wetlands. The outcome of our study will expand the knowledge of the relationships between herbicides and aquatic plants in southwest Missouri.

Water quality effects of dredging on Iowa lakes  
Rachel Fleck (Iowa State University)  
Dredging is a common, expensive practice used to improve water quality. This study examines water quality indicators before and after dredging events on Iowa lakes. Results indicate dredging only improved water quality on some lakes. A deeper understanding of dredging effects on water quality parameters will improve future management strategies.

Comparison of thermal tolerances of Central and North American aquatic macroinvertebrates  
Carissa Ganong (Missouri Western State University)  
We determined critical thermal maximum (CTmax) values of stream insects at one Costa Rican site and two Missouri sites to test whether CTmax varied significantly with latitude and/or
taxon. Tropical insect orders had significantly lower CTmax values, and the rankings of insect orders’ CTmax values remained the same between sites.

**What explains the sudden decrease of percent cyanobacteria in Iowa lakes?**
**Haley Grigel (Iowa State University)**
Cyanobacteria as a percentage of phytoplankton biomass informs lake management in Iowa. We observed a decrease in median percent cyanobacteria from 85% in 2009-2012 to 63% in 2013-2015. We studied environmental variables like water temperature, habitat volume, total P, and total N to identify possible drivers of this community shift.

**Environmental changes affect stream biofilm nutrient limitation and enzyme activity**
**Janaya Hanschu (Kansas State University)**
As the global environment changes, understanding microbial biofilm contribution to lotic carbon and nutrient flux with different surrounding land-use is essential. I measured epilithic biofilm enzyme activity to show that microbial communities from urban and agricultural streams differ from reference streams in their enzyme production to acquire limiting nutrients.

**The role of stream network geometry and climate on the spatial extent of aquatic-derived resources in terrestrial environments**
**Darin Kopp (University of Oklahoma)**
We estimated the terrestrial area potentially receiving aquatic inputs for ~1,300 stream networks across the contiguous US and tested the relative roles of network geometry and several hydroclimate variables in defining these patterns. Given high in-stream productivity, we found up to 36% of the watershed could be subjected to a quarter of the subsidies exported form a stream and the spatial extent was strongly related to stream network drainage density.

**Range extension and habitat characteristics associated with occurrence of *Palaeomonetes kadiakensis* (Decapoda: Palaeomonidae) in wadeable streams in Missouri**
**Bill Mabee (Missouri Department of Conservation)**
We found specimens of the decapod Palaeomonetes kadiakensis in aquatic macroinvertebrate community samples collected from reaches of wadeable streams in Missouri as part of the Resource Assessment and Monitoring Program. Our records for this species in Missouri extend the International Union for The Conservation of Nature range documented for P. kadiakensis in Missouri into northwestern drainages of the Osage River Basin and northwestern drainages in the Central Dissected Till Plains. The range extension and habitat characteristics found associated with occurrence of P. kadiakensis in Missouri are presented.
Archives in the sand: what crustacean egg banks can tell about the influence of heterogeneity of metacommunity biodiversity  
Bill Mausbach (Oklahoma State University)  
We used crustacean egg banks from wetlands across the Nebraska Sandhills to determine how the westward increase in landscape-level environmental heterogeneity influenced species richness and composition at local and regional scales.

Shifting peaks: when are our lakes the greenest?  
Rebecca North (University of Missouri)  
In this poster we will explore the understudied phenomena of winter algal peaks. We hypothesize that rapidly changing seasonal physical factors may be facilitating algal growth in this typically dormant season. Canadian water bodies had year-round maximum Chla peaks occurring under-ice. In the US mid-west, winter peaks occurred half of the times measured.

De-stratification from aeration: oxygen redistribution or metabolic reduction?  
David Ortiz (Iowa State University)  
The utility of aeration to prevent summer fish kills in large, hypereutrophic complex lakes is unclear. We paired manipulation of aerators in Swan Lake with an oxygen mass balance. The aerators reduced diel variance and overall DO due to homogenization throughout the water column.

Using Climate Model Output for Ecological Experiments: A Great Plains Case Study  
Rachel Owen (University of Missouri)  
In order to quantify the effects of temperature and precipitation changes associated with global climate change on ecosystem processes, ecologists must take advantage of available climate data. Our objective was to develop techniques for utilizing downscaled global climate model projections to create realistic treatments for experiments measuring ecological responses to projected climate change. Great Plains playa wetlands were used as an example ecosystem.

Casting a Light on Phytoplankton Control in Missouri Reservoirs: Is There a Light Limitation Gradient?  
Erin Petty (University of Missouri)  
With global occurrences of harmful algal blooms increasing, we are seeking to understand the role of light in controlling phytoplankton communities in freshwater reservoirs. This poster examines the range of phytoplankton light limitation in 66 Missouri reservoirs, which vary from oligotrophic to hypereutrophic. We hypothesize that light limitation will exhibit a gradient
based on land-use and trophic status. Preliminary data suggests a wide range of light availability to phytoplankton in these reservoirs.

**Nutrient deficiencies vary with seasonality in sub-tropical lakes of Nepal**

Freya Rowland (University of Missouri)

We assessed nutrient status over more than a decade in two Nepal lakes using in situ stoichiometry of N and P as well as nutrient stimulation experiments (NSEs). N-deficiency was common (>60% of water samples and ~90% of NSEs) during monsoon season, but P-deficiency occurred twice as often as N-deficiency during drier seasons (pre- and post-monsoon). Thus, there were significant differences in phytoplankton nutrient status between seasons. These findings provide perspective for the ongoing debate over limiting nutrients and implications for nutrient management by incorporating seasonality.

**Citizen Scientists monitor cyanotoxins in Missouri**

Anthony Thorpe (University of Missouri)

In late summer 2015, citizen scientists and laboratory staff with the University of Missouri, though a combined effort, monitored 92 lakes for microcystin concentration. The proportion of samples with microcystin values greater than 1.0 µg/L was 3 times larger in 2015 (12%) than similar statewide inventories conducted during 2004-2006 (average = 4%).