



The NREM Newsletter

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Dr. Owen's Departmental Update

Summer is here, although it is quiet around the department, things haven't slowed down. There are a number of infrastructure projects underway that will benefit our research and teaching programs including the Aquaculture Ponds, a new boat storage facility for the fisheries and aquatic ecology program, and a renovated student computer laboratory and resource center.

NREM is experiencing more changes in our faculty this year. Dr. Terry Bidwell retired in June, Dr. Tom Hennessey will retire August 8, Dr. Larry Talent on September 10, and Dr. Ed Miller on October 10. This represents over 125 years of cumulative academic experience and they will be sorely missed. Please refer to the NREM webpage (nrem.okstate.edu) for plans to celebrate their service. The department is hopeful to be able to refill these positions soon to continue successful programs.

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Dr. Dave Engle received the Sustained Lifetime Achievement Award from the Society for Range Management, recognizing his contributions and expertise in grassland ecology and management. Dave stepped down as the Director of the Water Center and joined our department in July.

The search for a new Vice President and Dean is finished, Dr. Tom Coon began with DASNR on July 1. Dr. Coon has a lot of administrative experience, as he was the Director of Extension at Michigan State University for the past 9 years.

Finally, the department awarded about \$44,000 in scholarships this year at the awards banquet. I would like to thank all of the donors who make this possible. In May, more than 30 undergraduate students and 10 graduate students graduated from our program.

NREM Faculty Members Contribute to Advance Water and Climate Change Research

By - Dr. Dave Engle

Faculty members in NREM are positioned to lead significant advances in understanding the state's water budget and to develop sophisticated technologies for managing the water resources. The ongoing drought has accentuated the importance of water to Oklahoma and the state's vulnerability to climate variability.



Dry stream in Oklahoma.

and research technicians. Enhancing preparation for careers in the STEM fields and achieving greater work-place diversity also will be important outcomes of the project. NREM faculty members contributing to the project include Duncan Wilson (OSU science lead), Chris Zou, and Sam Fuhlendorf.

The USDA-Agricultural and Food Research Initiative designated OSU's Division of Agricultural Sciences and Natural Resources as the lead institution in a Coordinated Agricultural Program grant through their Regional Approaches to Climate Change program. The project is titled "Resilience and Vulnerability of Beef Cattle Production in the Southern Great Plains under Changing Climate, Land Use and Markets." This project was one of two funded nationally in the 2012 competition. The Water Resources Center directs the project of six collaborating institutions: the Noble Foundation, The University of Oklahoma, Kansas State University, Tarleton State University, and the USDA-Agricultural Research Service laboratories at El Reno, Oklahoma and Bushland, Texas. Outcomes from this project will include a coordinated functional research and Extension network capable of developing and delivering science-based information that addresses climate adaptation and mitigation. Optimizing water use in forage-based beef production and adapting to drought also will be key outcomes of the project. Dave Engle will continue to serve as project director through July.

A grant funded by the Joint Fire Science Program, and now in the third year, will enhance the utility of Oklahoma Mesonet, and specifically OK-FIRE (<http://okfire.mesonet.org/>). Which is an online fire management decision support tool acknowledged widely as the world's foremost fire-related decision support tool. Sam Fuhlendorf and Dave Engle collaborate with a team of scientists in the Division of Agricultural Sciences and Natural Resources including J.D. Carlson from Biosystems & Agricultural Engineering, Tyson Ochsner and Erik Krueger from Plant & Soil

Sciences, and Dirac Twidwell from the University of Nebraska-Lincoln. The enhancements to OK-FIRE will combine soil moisture data from Oklahoma Mesonet with remotely sensed data of grassland fuels to model fuel moisture and fuel load, both of which are more-or-less static in the current version of OK-FIRE.

Finally, the Oklahoma Water Resources Center announced projects funded for 2014 by the Water Resources Research Act. The nonfederal portion of the 2:1 nonfederal:federal funding match required by the 104b program was provided by the Oklahoma Agricultural Experiment Station. One of the projects funded was proposed by NREM faculty member Chris Zou. The project is titled “Increasing water yield and quality through redcedar removal and establishment of herbaceous biofuel feedstock production systems: Effect of vegetation on groundwater recharge in upland ecosystems.” Congratulations Chris.

All-star Stream Fish: Uncovering the Qualities of Successful Competitors

By - Robert Mollenhauer and Dr. Shannon Brewer

What are the defining qualities of great athletes that allow them to excel? Obviously, they must possess the necessary physical traits, but success takes more than physical prowess. They must also have the determination to develop their physical traits through intensive training and be a fierce competitor. Possessing the entire combination of necessary athletic traits is the difference between success and failure. A person will not succeed in sports, despite being physically gifted, if important behavioral qualities are lacking or if they have inherent physical limitations.



A school of cardinal shiner, common to Ozark streams of northeast Oklahoma

are altering stream environments too fast for many fishes to adapt, leading to major losses in diversity. Stream researchers and managers are presented with the challenge of understanding why some fish species continue to succeed in this rapidly changing environment and why so many others fail.

By studying trait combinations possessed by different stream fishes, sampling methods can be improved, relationships between life-history strategies and the stream environment can be determined, and predictions made regarding future species of concern. We are conducting research on the underexplored use of traits for stream-fish conservation by standardizing surveys. To maximize management efforts, optimal survey methods with groups of stream fishes that possess unique combinations of behavioral and physical traits are being matched. The second part of our research examines how trait combinations explain life-history strategies that ultimately either succeed or fail against different environmental stream conditions. Finally, predictive scenarios to develop more proactive conservation strategies by simulating future changes in stream-fish assemblages under different climate-change and land-use scenarios are being used.

The Crucial Role of Higher Plants in Ponds

By - Marley Beem



Higher pond plants provide many benefits.

Few pond owners appreciate the importance of the plants growing in their ponds. Many regard any amount of pond plants as an unaesthetic weed problem. On the contrary these unnoticed or reviled plants are a good thing. The functional benefits of moderate amounts of plants include:

- Shelter for small fish to hide and escape predation by large bass
- Insects for small fish to feed upon
- Protection against wave erosion of shorelines and dams
- Production of dissolved oxygen in the water column
- Competition with algae

Pond plants fall into two broad categories: higher plants and algae. There are exceptions but in general, a pond plant with stems and leaves is a higher plant. A pond is balanced when it has moderate amounts of higher plants. Twenty percent coverage by higher plants is an often cited guideline, when good fishing is the objective.

Higher plants are relatively slow growing, taking time to develop stems and leaves and reproductive parts. Not so algae - they have an explosive capacity to reproduce. Give them high light and nutrient levels and they will predominate, outcompeting higher plants by reducing available light and gobbling up scarce phosphorous, in a process known as luxury uptake. When algae are present in moderate amounts, they too provide vital benefits like oxygen production and food for smaller pond organisms.

There are three problem scenarios in which unbalanced ponds suffer from excessive growth of algae:

- Excess runoff of nutrients into pond from livestock wastes, well-fertilized lawns or other nutrient sources. The solution is often difficult, especially if other people are responsible for the nutrient source. Reduce or eliminate nutrient sources.
- Ponds in which higher plants have been mostly or entirely eliminated intentionally by herbicide applications. The most practical solution is to allow higher plants to reestablish on their own.
- Droughts can lower pond levels eliminating emergent higher plants and increasing nutrients through the aerobic decomposition of organic matter in exposed pond bottom areas. Given a few years, such ponds should recover. After refilling, they will come back into balance as higher plants reestablish.

As long as a pond is not overly shallow, it probably will be free from excessive growth of higher plants, allowing the pond owner to appreciate them.

AWARDS & RECOGNITIONS



Drs. Dwayne Elmore and Craig Davis have been appointed as the Bollenbach Chair holders in Wildlife Biology. These endowed chairs in wildlife management are named in honor of Irvin Bollenbach, Kingfisher rancher and long-time leader in wildlife management and conservation in Oklahoma.



Dr. Sam Fuhlendorf has been awarded the Groendyke Chair for Wildlife Conservation. This endowed chair, established at Oklahoma State University, is funded by Enid, Oklahoma native John Groendyke, Oklahoma's longest-serving wildlife commissioner.

AWARDS & RECOGNITIONS Continued

Adam Maggard, forestry Ph.D. student, won 1st place and Casey Ausmus, forestry M.S. student, won 2nd place out of 30 participants in the graduate student poster competition at the Pine Integrated Network: Education, Mitigation, Adaptation Project (PINEMAP) annual meeting at the University of Georgia in May. Adam's presentation was titled "Physiological Mechanisms Related to Drought Mortality of Mid-Rotation Loblolly Pine (*Pinus taeda* L.)" and Casey's presentation was titled "Response of Soil CO₂ Efflux of Mid-Rotation Loblolly Pine (*Pinus taeda* L.), Exposed to Extreme Drought Conditions." Adam's advisor is Dr. Rod Will and Casey's advisor is Dr. Tom Hennessey.

NREM Awards Banquet

The NREM awards banquet was held last spring where many students received awards. Some of the award recipients are listed below.



Stowers award- Brandon Miller



Weyerhaeuser award-
William Harges and Reilly Cloud



Waters award- Elizabeth Pope



Engle award, James Craun



Scheidt award, Trevor Yarborough



Jarman award, Katelynn Gifford



Brown Foundation Summer Camp Scholarships

Greater Prairie-Chickens Seek Cooler Areas for Nesting

By - Dr. Torre Hovick

This study examined Greater Prairie-Chicken (*Tympanuchus cupido*; hereafter prairie-chicken) thermal habitat use in tallgrass prairie that is managed in a way that restores the interaction of fire and grazing. The prairie-chicken represents an ideal case study for examining thermal habitat use because of its conservation status, potential role as an indicator species, and evolutionary lineage from cold adapted ancestors thereby leaving it potentially sensitive to rising global temperatures and thermal extremes. The main objective was to measure thermal environments at nest sites and sites within two meters of the nest (i.e., micro-sites) relative to the broader landscape. This was done across a range of available vegetation patches that result from the fire-grazing interaction.



Black spheres used to collect operative temperature data.

The study took place at The Nature Conservancy's Tallgrass Prairie Preserve where prairie-chickens were trapped during the spring of 2011-2012 using walk-in funnel traps. Operative temperature was recorded by measuring air temperature inside the center of a black steel sphere (15 cm diameter) placed at ground level. Operative temperature incorporates energy flow between an animal and the environment and is primarily dependent upon radiation, air temperature, wind, and humidity. Sampling periods were weeklong and conducted twice during the breeding season (i.e., early May and mid-July) in 2011 and 2012 and at all prairie-chicken nest sites.

The study found that heterogeneous grasslands have high thermal variability with operative temperature ranging as much as 23°C across the landscape when air temperatures are > 30°C. Operative temperatures in all environments increased linearly with air temperature, but the rate of increase varied among patches, micro-sites, and nests. On average, prairie-chicken nests were in environments that averaged 21.4 (SE ± 1.8) months post fire and were 4-6°C cooler than the surrounding environment. Measurements of vegetation at nest sites and the micro-sites were similar for all parameters with the exception of vegetation height, which was significantly taller at nests than micro-sites and suggests that shading from vegetation could be driving operative temperatures at nest sites. Additionally, thermal environments were significantly cooler at successful nests than failed nests with successful nests being up to 6° C cooler.

These results elevate the understanding of the importance of heterogeneity of thermal environments across multiple scales and demonstrate the importance of understanding habitat heterogeneity from a thermal perspective in the face of climate change. The results show that heterogeneous prairie with interacting fire and grazing had high amounts of variation in the thermal environment and that reproduction of imperiled grouse is correlated with thermal properties. Additionally, the study illustrated the complexity of thermal environments in plant communities that are often viewed as structurally simplistic (i.e., grasslands).

NREM Alumni Bio {Jeri Irby}



After graduating from Oklahoma State University in May, 2011, I began working as an Environmental Education Intern at Shangri La Botanical Gardens and Nature Center in Orange, Texas. During my internship, I facilitated environmental events to the public as well as developed environmental education curriculum for school groups from grades pre-K through high school. I was the first intern at Shangri La with a Forestry degree so I was a great asset to the staff in helping them understand that cutting a tree down was not a bad thing.

After my husband took a position with the Natural Resources Conservation Service, we moved back to Oklahoma and after a 4-month job search and attending the University of Oklahoma for two weeks as a graduate student in the Microbiology and Plant Biology department, I stumbled upon the Education Coordinator

position with the Oklahoma Forestry Services. I interviewed in August and was offered the position in September 2012. I now oversee the Oklahoma Project Learning Tree program and all forestry education for youth in the state. I serve on environmental education boards and committees throughout the state and am the Director of the Oklahoma Youth Forestry Camp, which celebrated its 58th year this month. I am also a staff forester and participate in many statewide forestry management opportunities like prescribed fire, stewardship plans and timber cruising. I am so blessed to be able to work with the best OSU forestry graduates out there as well as help educate the future leaders of Oklahoma on the importance of forestry in our state.

I am also continuing to build my professional networks and furthering my education by being a Society of American Foresters member and working towards earning my M.S. in Environmental Science from Montana State University.

Events

- **Quail Symposium**, Crowne Plaza, OKC - August 23, 2014. centralokquailforever.org
 - **Wildlife Expo**, Lazy E Arena - September 26-28, 2014, wildlifedepartmentexpo.com
 - **Push Field Day**, Pushmataha - October 7, 2014
contact: john.weir@okstate.edu
 - **SEAFWA**, Destin, FL - October 9, 2014
www.seafwa.org/conferences/2014/index.html
 - **Quail Field Day**, Packsaddle - October 11, 2014
contact: dwayne.elmore@okstate.edu
 - **TWS National Meeting**, Pittsburg, PA - October 25-30, 2014, wildlifesociety.org
 - **SRM National Meeting**, Sacramento, CA - January 31 - February 6, 2015
rangelands.org/sacramento2015/index.html
 - **TWS State Meeting**, Arcadia Education Center - March 5-6, 2015,
contact: dwayne.elmore@okstate.edu
 - **Society of American Foresters annual meeting**, Salt Lake City, www.xcdsystem.com/saf/site14
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