

Fisheries, Wildlife, and Conservation Biology

Program Information and Faculty Achievements



ONLINE at http://cnr.ncsu.edu/fer/news/FWCB_newsletter.php ◆ VOLUME 10, ISSUE 2 JULY 15, 2013



Photos courtesy of Gretchen Stokes

Back row standing (left to right) - Tanner Stanfield, Nathan Howell, Ben Kornegay, Matt Stillwell, Chris Moorman, Kevin Durso. Front row standing (left to right) - Kelley Taylor, Brittany Hoffman, Kim Porter, Julia Babuin. Kneeling (left to right) - Adam Keene, Charles Sanders.

2013 SPRING GRADUATES

22 STUDENTS RECEIVE BACHELOR OF SCIENCE DEGREES;
2 GRADUATE DEGREES AWARDED

SEE FULL LIST OF GRADUATES, PAGE 2



Dr. Chris Moorman and Kelley Taylor.

INDEX

2013 Spring Graduates.....	2	Research Spotlight.....	6
Alumni Profile	3	Graduate abstract	9-10 ▶
Study abroad in SE Asia.....	5	Duke Marine Lab field trip.....	8



Research Publications	9
Research Presentations	10
Student Awards	12

2013 SPRING GRADUATES

BACHELOR OF SCIENCE IN FISHERIES, WILDLIFE, AND CONSERVATION BIOLOGY

Julia Elisabeth Babuin~
Richard Keith Chesnut
Charles Mcmillan Davis III
James Tyler Dickson
Alexandra Elizabeth DiGiacomo*
Kevin Pau I Durso
Meredith Janelle Grady
Brinany Hoffman**
Nathan Devane Howell**
Adam Ellison Keene
Benjamin James Kornegay

Lauren Kelly Parker
Charles William Sanders II
Jordan Brooks Siminitz
Erin R. Squier
Tanner Massengill Stanfield
Allison G. Stewart
Matthew James Sti llwell
Matthew Thomas Supple
Kelley Curtis Taylor
Christian Daniel vose
Stephanie L Wage

MASTER OF SCIENCE IN FISHERIES, WILDLIFE, AND CONSERVATION BIOLOGY

Kimberly Marie Porter / Dr. Christopher DePerno

PH.D IN FISHERIES, WILDLIFE, AND CONSERVATION BIOLOGY

Will Smith/ Dr. Tom Kwak

+Co-major *Cum Laude **Magna Cum Laude ***Summa Cum Laude /Major Advisor ~ Student Ambassador

SNAPSHOT: NATIONAL BISON RANGE, MONTANA



Photos courtesy of Steve Allen

An American bison photographed at the National Bison Range in Montana. Find out more about the National Bison Range at http://www.fws.gov/refuge/National_Bison_Range/about.html. Share your best wildlife photos with the FWCB Newsletter. E-mail high resolution images to Steve Allen at stevecallen1@gmail.com.

ALUMNI PROFILE: JASON RIDDLE

Assistant Professor of Wildlife Ecology at the University of Wisconsin-Stevens Point

I grew up in Mecklenburg County, VA in a very rural area. Our home was surrounded by forests, pasture, tobacco fields, and Kerr Lake. As kids, we would spend hours roaming the woods, fishing, and swimming. My folks became interested in bluebird conservation when I was in middle and high school. Their interests in conservation and my constant exposure to the outdoors lead me to pursue a B.S. in Biology at The College of William and Mary. As an undergraduate, I was fortunate enough to be part of several research projects with shorebirds in the Chesapeake Bay area. This sparked my interest in research and I knew I wanted to initiate a study of my own. However, I was ready to leave the sandy shores of VA for more rugged terrain. I soon found myself working with songbirds in Linville Gorge Wilderness Area in the NC mountains as a M.S. student in Biology at Appalachian State University. My preservationist views were in full force as I hiked and counted birds each day in a relatively “untouched” and pristine environment. All was well in my wilderness world until a 5,000 acre wildfire burnt the understory out of half my study site. In the two field seasons that followed that fire, my preservationist views were challenged. As I dug deeper in the history of the Southern Appalachians, I was surprised to learn that fire had played an important cultural and biological role in promoting habitat and animal diversity. Moreover, reintroducing fire to the mountains likely would require some tree harvest and



Photo courtesy of Jason Riddle

Jason Riddle is an Assistant Professor of Wildlife Ecology at the University of Wisconsin-Stevens Point.

perhaps chemical preparation. Hard news for a preservationist. But, as a budding scientist, I had to be willing to throw away my environmental paradigms and follow the evidence. To make ends meet, I picked up some contract and seasonal work with the

US Forest Service and eventually did some timber cruising and logging with my father-in-law. The exposure to applied management techniques and the smell of a freshly bucked log

Please see, **Riddle** Page 4

RIDDLE

Continued from page 3

made NCSU an attractive choice for a Ph.D. and Dr. Christopher Moorman agreed to be my advisor. We were both interested in how natural disturbances, such as fire, were important to many animals in the Southeast. We embarked on a project to determine how to best promote northern bobwhites and songbirds along the edges of row crop fields on hog farms in eastern NC. My transition from a preservationist to a conservationist was complete. My path from Mecklenburg County to NCSU was one marked with self-discovery and exposure to many different environments.

The impact of the FWCB program on my experience at NCSU and my path since leaving is impossible to quantify. I suppose a whole book could be written about the wonderful lab mates I had, the undergraduates I met, the courses I took, and all the great experiences I had doing research and meeting people in the Coastal Plain of NC. As an Assistant Professor of Wildlife Ecology at the University of Wisconsin-Stevens Point, it is hard for me to imagine getting to this place in my career without each experience and minute I was given in the FWCB program. However, there are two themes and three people that most contributed to my professional development. The themes are 1) teaching experiences and 2) a deep love of statistics.

The three individuals that helped support and promote these themes are Drs. Christopher Moorman (Chris), Kenneth Pollock (Ken), and Theodore Simons (Ted). They did this by creating space and opportunities for me to grow as an instructor, a researcher, and a professional. Chris encouraged me to seek out teaching opportunities and participate in the Preparing the Professoriate Program. By the time I finished at NCSU, I had been a Teaching Assistant and/or co-instructor for Dendrology, Natural Resources Advocacy, and Urban Wildlife Management. In particular, Chris mentored me as a co-instructor for Urban Wildlife Management over the course of a year. Chris also recognized my developing love of statistics and gave me the freedom to work on a number of experimental sampling methods as part of the field border project that was the main focus of my research. His philosophy was that I could try anything as long as we didn't go over budget and we met the primary objectives of the original proposal. My interests in sampling methods resulted in adding Ken to my PhD committee. Ken was very supportive of our methodological work. When the PhD work was finishing up, Ken and Ted invited me to work with them on a Postdoc project that involved potential sampling methods for the Breeding Bird Survey. They were extremely flexible and allowed me to wrestle with the methods and approaches we would eventually take. They also allowed me to develop important side

projects and engage in grant writing for other potential projects. All three individuals always were available to chat about research ideas or discuss life in general. I still seek their advice on professional and personal matters.

As part of the Preparing the Professoriate Program, I had to develop a teaching philosophy. In doing so, I relied heavily on two quotes from Henri Nouwen, a Catholic priest and Psychologist: "One of the greatest problems of education remains that solutions are offered without the existence of a question" and "that the teacher is called upon to create for his students a free and fearless space where mental and emotional development can take place" (from *Reaching Out: The Three Movements of the Spiritual Life*). My first encounter with these words was in a book, but Chris, Ken, and Ted made these words come alive in the way they lived them out in the classroom, the field, and one-on-one interactions. As such, the FWCB program at NCSU has been so formative to me not because of course material or seminars, but because it created a space where I could grow, develop my own questions, and press into our world to look for answers. As an Assistant Professor in a Wildlife Ecology program with graduate students and more than 500 undergraduates, I hope to create the same free and fearless space for my students that my mentors did for me in the FWCB program.



Wildlife stickers

Show your support for the N.C. State Leopold Wildlife Club by purchasing a sticker for all of your vehicles. Stickers are \$7.

If interested contact Dr. Chris DePerno
(chris_deperno@ncsu.edu)



Photos courtesy of Gretchen Stokes

Gretchen Stokes traveling on a traditional reed boat through the Van Long Nature Reserve in search of the rare Delacour's langur. Part of her studies focused on understanding how natural resources can be managed with the help of local people and for these projects to be locally sustained, while still maintaining cultural practices. This nature reserve does just that, and the small profits go back into protecting the very endangered primates that inhabit the cliffs.

STUDY ABROAD IN SOUTHEAST ASIA

GRETCHEN STOKES CONDUCTED AN INDEPENDENT STUDY ABROAD STUDYING FISHERIES AND NATURAL RESOURCE USE AND MANAGEMENT IN VIETNAM AND CAMBODIA.



Wildlife of Cuc Phuong National Park in northern Vietnam. Tortoise and tarantula (species unknown)

RESEARCHER SPOTLIGHT

<http://theglobalchangeforum.org/researcher-spotlight-sarah-fritts/>

Global Change Fellow 2012: Sarah Fritts

PhD student, Department of Forestry and Environmental Resources
Fisheries, Wildlife, and Conservation Biology Program

Co-Advisors: Drs. Chris Moorman & Dennis Hazel, Department of Forestry and Environmental Resources

My research focus is on alternative energy and wildlife. Specifically, I study population responses of amphibians, reptiles and small mammals to woody biomass harvests. Woody biomass has substantial potential to provide renewable energy, heat, and biofuels to meet United States' mandates such as the Energy Independence and Security Act of 2007 and Renewable Energy Standards. Although economic and environmental benefits exist in replacing coal and petroleum-based products with renewable sources, harvesting woody biomass for energy and fuel production could lead to environmental changes. Downed woody debris (DWD) is important for a variety of forest ecosystem services including wildlife habitat. Wildlife use DWD for nesting, feeding, travel, and refugia.

I monitor wildlife population responses to varying volumes of debris retention following woody biomass harvests and the spatial allocation of retained woody debris. I use a variety of capture, tagging, and statistical techniques to estimate abundance and demographics of amphibian, reptile, and small mammal species across study sites in the southeastern coastal



Photo courtesy of Sarah Fritts

Sarah Fritts is studying responses of amphibians, reptiles and small mammals to woody biomass harvest.



plain. Furthermore, I am using passive implant transponder tags and radio telemetry to gather data on fine scale use of woody debris by amphibians. I hope to use the empirical data to guide development of Biomass Harvesting Guidelines which aim to ensure the forest can support wildlife,

provide clean water, sequester carbon, and protect forest soil productivity following woody biomass harvests.

Questions

How did you come to study conservation biology?

After graduating from the University of Georgia with a degree in wildlife biology and management, I worked several field jobs around the country with a variety of wildlife taxa. I then went back to school for my Master's degree and worked with fish populations impacted by farming practices at the landscape level. I came to North Carolina State University because I wanted to continue researching ways that people could ad-

Please see, **Fritts** Page 7



Photo courtesy of Sarah Fritts

Sarah Fritts is studying responses of amphibians, reptiles and small mammals to woody biomass harvest.

FRITTS

Continued from page 6

vance agricultural and forestry practices to sustain or improve wildlife populations.

What is the threat of global change that you are most concerned about?

The threat of global change that I am most concerned about is how fast the climate is changing, which is leaving little time for wildlife to adapt. The timing of natural events such as migration, reproduction, metamorphosis, and hibernation is essential for wildlife survival and evolved with the timing of all other biotic and abiotic processes in the ecosystem. Climate change, however, is affecting the timing of some species' life events which could result in a lack of food or other resources and increased predation and/or competition and during critical life-history stages.

What is the most unusual "tool" you

use in your research?

The most unusual tools I use in my research probably are toad belts that I make with copper wire and PVC tubing. I attach radio transmitters by fitting each toad with a custom-made belt. I have been to numerous craft and home improvement stores searching for materials that will be robust to inclement field conditions while remaining non-abrasive to amphibian skin. Explaining to the store assistants my plans for the materials always results in very inquisitive expressions.

Where did you grow up? What was the ecological environment like around you when you were growing up?

I grew up in a neighborhood south of Atlanta and was always outside catching frogs and snakes and climbing trees. When I was small, I often rehabilitated wildlife that had been injured by cars or neighborhood pets. My father and grandfather regularly took me fishing, and my uncle and I went on numerous camping trips in

the Appalachian Mountains. I continued spending a lot of time outdoors through high school and college before finding the wildlife biology and management degree program.

Do you have a species whose fate you are particularly attached to or concerned about?

I do not have a particular species whose fate I am particularly concerned about because all species are intertwined and important components of their ecosystems. However, as ectotherms, amphibian and reptile distribution, diversity, and activity are more limited by temperature than those for endothermic species. Amphibians and reptiles have evolved temperature optima based on exposure to surrounding temperatures; and therefore, likely will be more sensitive to climatic change than other wildlife taxa. Although several factors contribute to declines of amphibians and reptiles, issues associated with climate change are leading causes.



Photos courtesy of Gretchen Stokes

Fisheries and Wildlife students examining their catch from a bottom trawl aboard the R/V Susan Hudson. The students spent a weekend at the Duke Marine Lab for their fisheries lab class, led by Jared Flowers, including one day on the vessel and in the labs at both Duke's and NC State's coastal facilities.

DUKE MARINE LAB FIELD TRIP

FISHERIES, WILDLIFE, AND CONSERVATION BIOLOGY STUDENTS PARTICIPATED IN A FIELD TRIP TO DUKE MARINE LAB



Fisheries student Erica Brown intrigued by the the pigment changes in a squid.



Fisheries student Kaleb Smith assisting with the nets from the otter trawl.

ABSTRACT: WILLIAM EVERETT SMITH

Reproductive Ecology of Caribbean Amphidromous Fishes

(UNDER THE DIRECTION OF DR. THOMAS J. KWAK)

As they migrate between marine and freshwaters, diadromous organisms cross jurisdictional borders, perform unique functions in ecosystems, and are often the target of important fisheries. The management of many tropical diadromous fishes is limited by a lack of quantitative demographic information; however, the management of data-limited species can be informed by a general understanding of life history patterns and dynamics. I quantified the migratory dynamics and population parameters of Caribbean diadromous fishes using a combination of intensive tagging and telemetry in a single river, extensive otolith microchemistry sampling in multiple rivers, and a broad scale survey of the reproductive characteristics of native stream fishes on the Caribbean island of Puerto Rico. My findings indicate potential conservation and fishery management strategies for assemblages of tropical diadromous fishes.

Fish tagging and telemetry data collected in Río Mameyes before and after a major flood disturbance event indicated that fish populations were temporarily restructured by abiotic events; however, the fish assemblage was resilient to disturbance, due to rapid recovery processes within populations. The stochastic high flow events that characterize tropical streams may structure diadromous fish assemblages by limiting invasions of exotic species and facilitating the evolution of flood resilient life his-



Photo courtesy of Thomas Kwak

William Smith studied the reproductive ecology of Caribbean amphidromous fishes.

stories.

Long-term fish tagging data were used to fit a multistate capture-recapture model to estimate survival rates and changes in the spatial and temporal distributions of tagged stream fishes. Tagged fishes did not aggregate in the lowest reaches of Río Mameyes during two consecutive spawning seasons, directly confirming that two Caribbean stream fishes, bigmouth sleeper *Gobiomorus dormitor* and mountain mullet *Agonostomus monticola*, followed an amphidromous life history, with the adult life stage completed within freshwaters. Further, otolith microchemistry indicated that in early life stages, most native stream fishes followed the amphidromous larval pattern of dispersal from fresh to marine waters after hatching, but a small pro-

portion of populations were non-amphidromous with larval development completed in freshwaters. Of four native amphidromous fishes, bigmouth sleeper, mountain mullet, sirajo goby *Sicydium* spp., and river goby *Awaous banana*, the otoliths of only a few individuals of one species, bigmouth sleeper, contained evidence of a partially amphidromous adult return to marine or estuarine conditions, but this pattern was not detected among tagged bigmouth sleeper monitored during the spawning season. Otoliths integrated continuous migratory information throughout a fish's life that was not detected by directly monitoring a sample of fish. While substantial dispersal of amphidromous fishes occurred at the

Please see, **Smith** Page 11

ABSTRACT: KIMBERLY MARIE PORTER

Vegetative Impact of Feral Horses, Feral Pigs, and White-tailed Deer on the Currituck National Wildlife Refuge.

(UNDER THE DIRECTION OF DR. CHRISTOPHER S. DEPERNO)

The Currituck National Wildlife Refuge (CNWR), located in the northern most part of North Carolina's Outer Banks, is inhabited by populations of feral horses (*Equus caballus*), feral pigs (*Sus scrofa*), and white-tailed deer (*Odocoileus virginianus*). Concern has been raised about the potential impact of these species on the vegetation of the Outer Banks. To assess impact, we created two replicate exclosure plots within maritime forests, brackish marshes, maritime grasslands. Within each habitat, an electric fence divided each habitat into two sections: including or excluding horses. Feral pigs and white-tailed deer were present on both sides of the electric fence. On each side of the electric fence within each habitat, we created and sampled from three different 5 x 5 m plots for a total of 36 plots. The first plot was a fenced exclosure 3 m high that excluded all wildlife. The second plot was a fenced exclosure that was raised 1 m above the ground and extended to a height of 3 m, allowing feral pigs and deer to enter but excluding horses. The third, a control plot, was not fenced. Within each plot we created two 1 m transects, and randomly selected and tagged grasses, forbs, shrubs and trees with numbered zip ties. Each month from May 2010 through May 2012 we measured the distances from base to tip of tagged herbs and the distance from branching point to terminal bud on branches of shrubs to quantify grazing and browsing. We investigated plant growth in the presence and absence of horses,



Photo courtesy of Kimberly Porter

Kimberly Porter studied the vegetative impact of feral horses, feral pigs, and white-tailed deer.

and examined the relationships between animal disturbances on various plant taxa or in various habitat types. We used a linear model to analyze plant growth rate. We used length ratio adjusted by the number of days as the response variable, and we used a base-10 log transformation to normalize the response variable. Also, we investigated plant length reduction caused by wildlife disturbances. Out of 1105 tagged plants, we detected 87 disturbances; 80 where horses were present and 7 where horses were excluded, which was a significantly different ($p < 0.001$). Overall, horses were responsible for 84% of disturbances. Most disturbances occurred in brackish marshes on *Schoenoplectus pun-*

gens. We detected a significant positive effect of treatment on plant growth where horses were present ($P = 0.035$), but not where they were excluded ($P = 0.32$). The total length reduction for *Schoenoplectus pungens* was 443cm which equated to a 39 - 100% loss in biomass and the total length reduction for *Vaccinium* spp. was 58.5 cm, equating to a 2.4% - 12.5% biomass loss. Based on our research, at current population levels, feral horses, feral pigs, and white-tailed deer have a negative effect on the vegetation of the Currituck National Wildlife Refuge. We recommend this study be continued to further monitor the exclosures and determine wildlife impacts on the CNWR.

SMITH

Continued from page 9

larval stage during recruitment to freshwater, few adults dispersed long distances; thus, successful conservation of diadromous fauna on tropical islands requires management at both a broad, basin scale for recruitment processes and a localized scale for adults.

A survey of reproductive traits in

three broadly-distributed Puerto Rico rivers indicated that amphidromous fishes spawned from late spring through early fall, and that bigmouth sleeper, mountain mullet, and sirajo goby were capable of maturation at small sizes. Life history parameters (survival, size at maturation, and fecundity) indicated that amphidromous fishes followed an intermediate periodic-opportunistic life history strategy. Populations with these life history traits can be successfully

managed by maintaining abiotic conditions that structure populations and communities. We conclude that the amphidromous fish assemblages examined are robust to low to moderate exploitation of adults, and conservation measures, such as maintenance of stream habitat quality, environmental flows, and ecosystem connectivity may be the optimal approach to conserving native community structure and sustainable amphidromous fisheries.



Enhance wildlife habitat



\$50

**Bat boxes and wood duck boxes
proceeds benefit the Leopold Wildlife Club**

If interested contact Dr. Chris DePerno (chris_deperno@ncsu.edu)

Publications & Presentations



Research Publications

- Blackman, E. B., C. S. DePerno, C. E. Moorman, and M. N. Peterson.** 2013. Use of crop fields and forest by wintering American woodcock. *Southeastern Naturalist* 12:85-92.
- Chitwood, M. C., R. G. Maggi, S. Kennedy-Stoskopf, M. Toliver, and C. S. DePerno.** 2013. *Bartonella vinsonii* subsp. *berkhoffii* in free-ranging white-tailed deer (*Odocoileus virginianus*). *Journal of Wildlife Diseases* 49: 468-470.
- Choi, K., W. G. Cope, C. A. Harms, and J. M. Law.** 2013. Rapid decreases in salinity, but not increases, lead to immune dysregulation in Nile tilapia *Oreochromis niloticus* (Linnaeus). *Journal of Fish Diseases*. 36:389-399.
- Golden, K. E., M. N. Peterson, C. S. DePerno, R. E. Bardon, and C. E. Moorman.** 2013. Factors shaping private landowner engagement in wildlife management. *Wildlife Society Bulletin* 37:94-100.
- Grovenburg, T. W., C. N. Jacques, R. W. Klaver, C. S. DePerno, C. P. Lehman, T. J. Brinkman, K. A. Robling, S. P. Rupp, and J. A. Jenks.** 2013. Effects of plant phenology and vertical heights on accuracy of radio-telemetry locations. *Wildlife Biology* 19:30-40.
- Hazelton, P. D., W. G. Cope, S. Mosher, T. J. Pandolfo, J. B. Belden, M. C. Barnhart, and R. B. Bringolf.** 2013. Fluoxetine alters freshwater mussel behavior and larval metamorphosis. *Science of the Total Environment*. 445-446:94-100.
- Kays, R., M. E. Rodríguez, L. M. Valencia, R. Horan, R. Adam, and C. Ziegler.** 2012. Animal Visitation and Pollination of Flowering Balsa Trees (*Ochroma pyramidale*) in Panama., *Mesoamericana* 16.
- LePrevost, C. E., K. M. Gray, M. Hernandez-Pelletier, B. D. Bouma, C. Arellano, and W. G. Cope.** 2013. Need for improved risk communication of fish consumption advisories to protect maternal and child health: influence of primary informants. *International Journal of Environmental Research and Public Health*. 10:1720-1734.
- Moorman, C. E., C. J. Plush, D. Orr, C. Reberg-Horton, and B. Gardner.** 2013. Small mammal use of field borders planted as beneficial insect habitat. *Wildlife Society Bulletin* 37:209-215.
- Moreno, R. S., R. Kays, J. Giacalone-willis, and E. Aliaga-rossel.** 2012. Ámbito de Hogar y Actividad Circadiana del Ocelote (*Leopardus pardalis*) en la Isla de Barro Colorado, Panamá. *Mesoamericana* 16 30–39.
- Pandolfo, T. J., W. G. Cope, G. B. Young, J. W. Jones, D. Hua, and S. F. Lingenfelter.** 2012. Acute effects of road salts and associated cyanide compounds on the early life stages of the unionid mussel *Villosa iris*. *Environmental Toxicology and Chemistry*. 31:1801-1806.
- Prochazka, S. T., W. G. Cope, and L. Recio.** 2012. Genotoxic response of unionid mussel hemolymph to hydrogen peroxide and polycyclic aromatic hydrocarbons. *Walkerana: The Journal of the Freshwater Mollusk Conservation Society*. 15:113-125.

Publications & Presentations

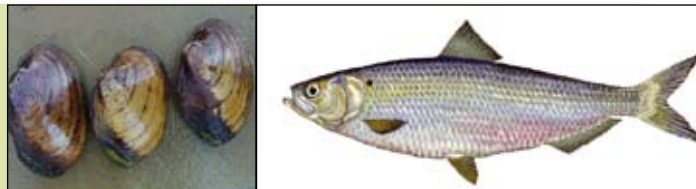


- Sackett, D. K., W. G. Cope, J. A. Rice, and D. D. Aday.** 2013. The influence of fish length on tissue mercury dynamics: implications for natural resource management and human health risk. *International Journal of Environmental Research and Public Health*. 10:638-659.
- Sackett, D. K., D. D. Aday, J. A. Rice, and W. G. Cope.** 2013. Validation of a predictive model for fish tissue mercury concentrations. *Transactions of the American Fisheries Society*. 142:380-387.
- Sackett, D. K., W. G. Cope, J. A. Rice, and D. D. Aday.** 2013. The influence of fish length on tissue mercury dynamics: implications for natural resource management and human health risk. *International Journal of Environmental Research and Public Health*. 10(2):638-659.
- Stevenson, K.T., M.N. Peterson, H.D. Bondell, A.G. Mertig, S.E. Moore.** 2013. Environmental, Institutional, and Demographic Predictors of Environmental Literacy among Middle School Children. *PLoS ONE* 8(3): e59519. doi:10.1371/journal.pone.0059519

Research Presentations

- Archambault, J. M., W. G. Cope, and T. J. Kwak.** 2013. Thermal sensitivity of freshwater mussels: incorporating benthic ecology into laboratory mesocosm experiments. 8th Biennial Symposium of the Freshwater Mollusk Conservation Society, Guntersville, AL, March 10-14, 2013.
- Archambault, J. M., W. G. Cope, and T. J. Kwak.** 2013. Burrowing, byssus, and biomarkers: behavioral and physiological indicators of sublethal thermal stress in freshwater mussels. 8th Biennial Symposium of the Freshwater Mollusk Conservation Society, Guntersville, AL, March 10-14, 2013.
- Archambault, J. M., W. G. Cope, and T. J. Kwak.** 2013. Burrowing, byssus, and biomarkers: behavioral and physiological indicators of sublethal thermal stress in freshwater mussels. Annual Meeting of the Carolinas Chapter of the Society of Environmental Toxicology and Chemistry, Raleigh, NC, March 7-9, 2013.
- Archambault, J. M., W. G. Cope, and T. J. Kwak.** 2013. Changes in burrowing behavior and byssus production indicate sublethal thermal stress in freshwater mussels. Annual Meeting of the North Carolina Chapter of the American Fisheries Society, Burlington, NC, February 26-27, 2013.
- Bergeron, C. M., M. Johnson, A. White, J. Rogers, P. R. Lazaro, J. W. Jones, B. Beaty, B. Evans, S. Alexander, and W. G. Cope.** 2013. Recent precipitous declines of freshwater mussels in the Clinch River: influence of sediment and water quality stressors. 8th Biennial Symposium of the Freshwater Mollusk Conservation Society, Guntersville, AL, March 10-14, 2013.
- Bringolf, R. B., A. C. Fritts, M. C. Barnhart, and W. G. Cope.** 2013. Is glochidia viability indicative of infectivity, the ability to attach and metamorphose? 8th Biennial Symposium of the Freshwater Mollusk Conservation Society, Guntersville, AL, March 10-14, 2013.

Publications & Presentations



- Leonard, J. A., W. G. Cope, M. C. Barnhart, and R. B. Bringolf.** 2013. Disrupting the steroid hormone cascade: effects of the aromatase inhibitor fadrozole hydrochloride on the unionid mussel *Lampsilis fasciola*. 8th Biennial Symposium of the Freshwater Mollusk Conservation Society, Guntersville, AL, March 10-14, 2013.
- Leonard, J. A., W. G. Cope, M. C. Barnhart, and R. B. Bringolf.** 2013. Assessing acute and chronic biochemical and reproductive effects of the synthetic estrogen 17 α -ethinylestradiol on the unionid mussel *Elliptio complanata*. 8th Biennial Symposium of the Freshwater Mollusk Conservation Society, Guntersville, AL, March 10-14, 2013.
- Leonard, J. A., W. G. Cope, M. C. Barnhart, and R. B. Bringolf.** 2013. Metabolomic, behavioral, and reproductive effects of the synthetic estrogen 17 α -ethinylestradiol on the unionid mussel *Lampsilis fasciola*. 8th Biennial Symposium of the Freshwater Mollusk Conservation Society, Guntersville, AL, March 10-14, 2013.
- Leonard, J. A., W. G. Cope, M. C. Barnhart, and R. B. Bringolf.** 2013. Linking classical and emerging toxicity endpoints to assess the effects of 17-alpha-ethinylestradiol on native freshwater mussels. Annual Meeting of the Carolinas Chapter of the Society of Environmental Toxicology and Chemistry, Raleigh, NC, March 7-9, 2013.
- Pandolfo, T. J., T. J. Kwak, W. G. Cope, R. J. Heise, and R. B. Nichols.** 2013. Modeling environmental effects on the occupancy of common and imperiled freshwater mussels at multiple spatial scales. 8th Biennial Symposium of the Freshwater Mollusk Conservation Society, Guntersville, AL, March 10-14, 2013.
- Rogers, J., W. Henley, A. Graumann, J. W. Jones, and W. G. Cope.** 2013. Assessing the sublethal effects of chloride on adult *Villosa iris* using histological evaluations. 8th Biennial Symposium of the Freshwater Mollusk Conservation Society, Guntersville, AL, March 10-14, 2013.
- Smith, W. E., T. J. Kwak, and P. B. Cooney.** 2013. Tropical insular fish assemblages are resilient to flood disturbance. Annual Meeting of the Tidewater Chapter of the American Fisheries Society, Solomons, Maryland.

Extension Presentations

- Kays, R.** eMammal, Zoological Society of London's symposium on: New Technology and Biodiversity monitoring.
- Kays, R.** Coordinated movement in animal groups at the NC Museum of Natural Science's Teen Science Cafe

Other news

- Dr. Greg Cope**, Professor of Environmental Toxicology, was elected and assumed the Office of President of the North Carolina Chapter of the American Fisheries Society at the Annual Meeting held in Burlington, NC, on February 26-27, 2013.

Publications & Presentations



FER Graduate Awards

Charles B. Davey Fellowship for Excellence in Biological Sciences
Steven Grodsky, PhD, Fisheries, Wildlife, and Conservation Biology

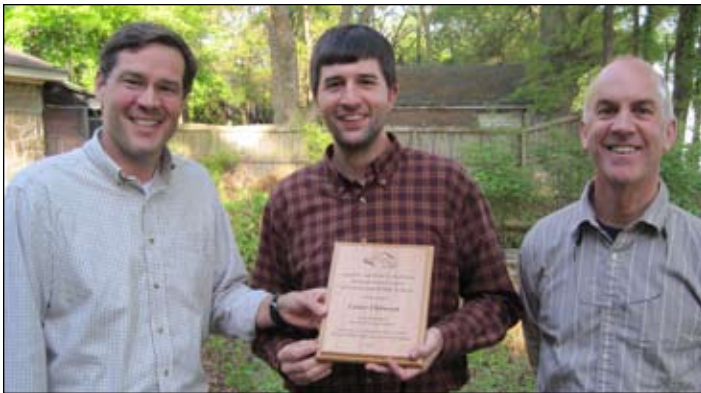
Namkoong Family Graduate Fellowship for Excellence in Conservation and Ethics
Marcus Lashley, PhD, Fisheries, Wildlife, and Conservation Biology

Awards and scholarships

Ethan Greene was selected to receive the Wildlife Leadership Award from the Rocky Mountain Elk Foundation. As a recipient of the award he will receive a \$2,000 scholarship and a one-year membership in the Rocky Mountain Elk foundation.



Donna MacLennan was presented the 2013 North Carolina Chapter of The Wildlife Society Chapter Award



HIGHTOWER AWARD

Dr. Chris Moorman (left) and Dr. Joe Hightower (right) present Colter Chitwood (FWCB PhD student at center) with the 2013 Joseph E. and Robin C. Hightower Graduate Student Award. The Hightower endowment provides financial awards to foster educational opportunities for graduate students enrolled in the FWCB Master's and Ph.D. degree programs.

OTHER NEWS



BIRD MIGRATION VIDEO

A New video showing how we study bird migration with Untamed Science is available on youtube.
<http://www.youtube.com/watch?v=m-IH3txbGA8>
 (or search on: How we know birds migrate!)

LEOPOLD WILDLIFE CLUB ELECTION RESULTS

President: Michael Biggerstaff
 Vice President: Alex Morrison
 Secretary: Sam Freeze
 Treasurer: Jacob Pearce
 Fundraising Coordinator (joint): Park Watson/Julie Savage
 Activities Coordinator: Matthew Strickland
 CNR Rep: Josh Grimes
 Education & Publicity Coordinator: Joshua Simkins

Leopold Award: Charles Sanders



READ BACK ISSUES ONLINE

If you missed the last issue of the Fisheries and Wildlife newsletter you can catch up on back issues on the department's Web site under the news tab.

<http://www.cnr.ncsu.edu/fer/fishwild>

ORGANIZATIONS AND OPPORTUNITIES

North Carolina State University Fisheries, Wildlife, and Conservation Biology students and faculty are active in a number of peer and industry organizations devoted to aspects of Fisheries, Wildlife, and Conservation Biology.

The Leopold Wildlife Club offers students the opportunity to network and learn from professionals in wildlife science and management. Meetings are held twice a month and typically feature speakers on a variety of topics. Past speakers have included falconers, fishing guides, taxidermists, decoy carvers and more.

The Student Fisheries Society is a sub-unit of the North Carolina Chapter of the American Fisheries Society. It encourages the exchange of fisheries and aquatic science information among students, faculty and regional professionals while also providing career guidance to students. The American Fisheries Society is the oldest and largest not-for-profit professional society for government, academic and industry scientists associated with conservation, development and management of fishery resources in North America.

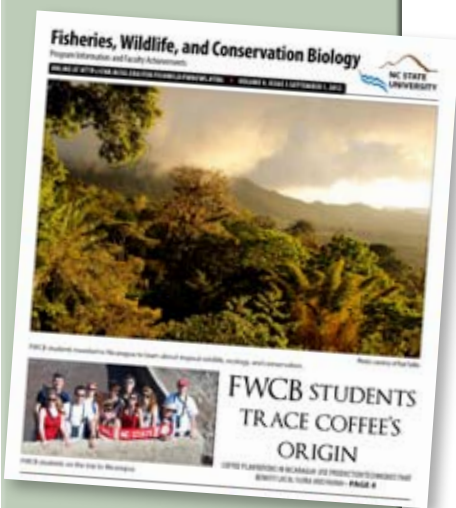
The NC Chapter of The Wildlife Society provides a forum for wildlife professionals and others to interact to improve wildlife conservation and management while fostering high professional standards and ethics within all related fields. It is an acknowledged source of current scientific information and expertise and acts as a collective voice on matters relating to wildlife biology, management, education and policy.

SUMMER CAMP STUDENT ENDOWMENTS

Please consider giving to our two Summer Camp student endowments. These endowments help undergraduate students attend the Fisheries and Wildlife Summer Camp. For more information on how to contribute, contact **Dr. Chris Moorman** at 919-515-5578 or chris_moorman@ncsu.edu

PHIL DOERR ENDOWMENT FUND

Also, you may consider giving to the **Phil Doerr Endowment Fund**. The endowment, established with the North Carolina Natural Resources Foundation, will be used to fund an annual award to assist undergraduate or graduate student(s) in gaining valuable field experience. For more information on how to contribute, contact **Dr. Chris Moorman** at 919-515-5578 or chris_moorman@ncsu.edu



THE NEWSLETTER

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Got a story idea or a great photo?

Send your article submissions or pictures of North Carolina's native wildlife to stevecallen1@gmail.com.