2014 SPRING GRADUATES

24 STUDENTS RECEIVE BACHELOR OF SCIENCE DEGREES; 3 GRADUATE DEGREES AWARDED

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Amy Starke, Erika Dinkler, Danielle Neujahr, Alexandra Morrison, Erica Brown, Summer Higdon, Keleigh Yelverton, and Elizabeth Van Meter.

Ben Patterson, Sterling Fulford, Michael Biggerstaff, Alex Chappell, Steven Schutz, and Jacob Pearce.
2014 SPRING GRADUATES

BACHELOR OF SCIENCE IN FISHERIES, WILDLIFE, AND CONSERVATION BIOLOGY

Trevor Scott Andrews
Andrew David Arbes
Michael T. Biggerstaff*
Erica Lauren Brown
Adrianna Cardinal-De Casas
Preston Alex Chappell *
Jennifer L. Dalton
Erika Leighann Dinkler *
Sterling Jarret Fulford
Richard Garrett Fumarola
Andrew Daniels Gay
Summer D. Higdon +***

Derrick T. Holloman
Kyle Joseph Hussey
Alexandra J. Morrison~
Danielle Marie Neujahr *
Alexander Wayne Padgett
Benjamin Clark Patterson
Jacob William Pearce *
Steven John Schutz *
Amy Kristin Starke
Andrew Taylor Walters
Elizabeth I. Van Meter
Keleigh C. Yelverton

DOCTOR OF PHILOSOPHY IN FISHERIES, WILDLIFE, AND CONSERVATION BIOLOGY

Neil A. Chartier/* Richard Lancia
Ernst Frederick Hain/* Stacy Nelson/James Gilliam
Marcus A. Lashley/* Chris Moorman/Chris DePerno

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

SLIDESHOW ONLINE

Alex Morrison and Julie Savage put together an awesome slideshow for this year’s graduates, their classmates, and their teachers. Check it out at the link. Great job, Alex and Julie! http://youtu.be/ik7YGoUpYI8
ASHEVILLE – An impressive male black bear that biologists captured and fitted with a GPS collar last week just east of Asheville likely didn’t care much for the experience.

But his participation in an intensive new study will help researchers learn more about the city’s growing population of urban and suburban bears.

State researchers hope the four-year study, the first of its kind in the Southeast, will shed new light on how bears survive and even thrive in populated areas — where they frequent, what they eat and about reproduction and mortality patterns. Knowledge gained will help researchers map out strategies for how bears and humans can better coexist.

The study, a collaboration between N.C. State University and the N.C. Wildlife Resources Commission, kicked off earlier this month, with a focus on attaching collars equipped with GPS devices on bears.

“Hopefully, we can learn what these bears are doing — where, when and why they are using Asheville,” said N.C. State University wildlife researcher Nick Gould, who’s leading the project.

Biologists have set out a dozen baited culvert traps — large metal containers with a doors that slam shut when a bear goes inside — in and around Asheville, all on private land with landowners’ cooperation. Captured bears are tranquilized to allow researchers to attach the collars, then released unharmed a short time later. Biologists plan to keep collars on about 40 bears.

MORE ONLINE
“I’ve never seen a better response from landowners,” Gould said. “There’s just been overwhelming support.”

He said Asheville is the ideal site for the study. “There are a lot of bears and a lot of people who like seeing bears,” Gould said. “People want to live with bears. We just want to make sure we’re living with them correctly.”

The GPS collars are programmed to automatically unclasp and fall off collarled bears after three years, or collars can be unclasped by biologists remotely at any time.

STUDY OBJECTIVES

Data from the collars will allow researchers to get an in-depth look at the habits of city bears, which despite their size are elusive and difficult to study. The collars will update biologists about a bear’s location every 15 minutes.

“It’s as close to real time as you can get,” Gould said.

Researchers will be able to determine whether bears spend all of their time in the city or come and go depending on food supplies. It will tell them what bears eat, including whether they are supplementing natural foods by raiding garbage cans, bird feeders and other human sources of food.

“I have a feeling we’re going to find these bears are near peoples’ homes, and they don’t know it,” said Wildlife Resources Commission biologist Colleen Olfenbuttel. “The information we get from the study is going to provide us the science to make management decisions here but also in any developed area where bears are starting to populate.”

Biologists also will be able to track female bears to their dens to learn more about den sites and reproduction rates, getting a better idea of the number of bears in the city.

Managing bears could come in the form of minimizing human food sources, or by changing hunting rules to allow more bears to be harvested, among other options. But researchers said it’s too early to say what findings may come from the study because the data haven’t been collected yet.

Most nuisance bear problems stem from people either intentionally or inadvertently providing food for the animals, Olfenbuttel said.

While a few other states, including Pennsylvania, have conducted studies on urban bears, the Asheville project is considerably longer in duration and should yield more conclusive information, she said. It will be the longest-running study of its kind yet in the eastern U.S.

WHY SO MANY BEARS?

The bear comeback story in North Carolina began in 1970, when the Wildlife Resources Commission established a number of bear sanctuaries, where hunting isn’t allowed, on national forest land. At the time, bear numbers had dwindled to as few as 1,500 animals statewide.

“There were very few bears,” Wildlife Resources Commission biologist Mike Carraway said. “People wondered if they would disappear.”

Today the state’s bear population is estimated at 17,000-20,000, most of them in rural eastern North Carolina. Western North Carolina has an estimated 6,500-8,000 bears.

Bear numbers slowly began to increase after 1970, then accelerated about a decade ago partly because of increased land development, Carraway said. New housing developments create de facto sanctuaries, he said.

“It’s counterintuitive because typically development is bad for wildlife,” Carraway said. “Development actually is protection for bears because it creates bear sanctuaries.”

Bears are opportunistic omnivores, quickly learning how to take advantage of any food source available and how to live in close proximity to humans, he said. The animals can live...
Bears
Continued from page 4

up to 30 years, with the main causes of mortality being hunting and vehicle collisions.

“Over time, we found that bears are much more adaptable to human population than we ever thought they were,” Carraway said.

LOCAL ACTIONS

At least one Buncombe municipality, Montreat, has taken proactive steps to prevent bear problems. Town officials in 2003 approved an ordinance that requires residents to wait until the day of garbage collection to place trash at the curb, unless they have a bear-proof metal container. Town leaders also launched a public education effort about bird feeders and other sources of food.

“A lot of people were putting their garbage out the night before, and that was causing a problem,” Montreat town manager Ron Nalley said.

Town residents today have few problems with bears, he said.

“It’s the exception rather than the rule now,” Nalley said.

Retiree Betty Andrews, a longtime resident of the Bent Creek area on the southern outskirts of Asheville, didn’t need a municipal directive for her and her husband, Dan, to change some of their habits.

The couple have learned to live with bears, putting out their garbage on the morning of pickup instead of the night before. They also now use a rope to hoist a bird feeder high into a tree, which the bears haven’t been able to reach.

Andrews, an Asheville native, said she’s seen firsthand the spike in bear numbers. Bear sightings increased in her neighborhood about five years ago, she said.

“I really don’t remember bears coming around before then,” she said.

“They’ve crushed every bird feeder we’ve ever put out.”

Despite those issues, Andrews said she doesn’t mind the bears.

“This used to be all forest before they built the houses here,” she said. “We’re not afraid, but some people with little kids are concerned about it.”

Garbage collection in her neighborhood is on a Tuesday, but don’t tell the bears.

“They haven’t figured out trash day yet or they could make a killing,” she said.

A black bear fitted with a GPS collar.

A black bear fitted with a GPS collar.
FWCB hosts animal movement symposium

From 5-8 May 2014, FWCB hosted a symposium on Animal Movement and the Environment at the North Carolina Museum of Natural Sciences. The event was hosted by NCSU Professor Roland Kays, attracted 175 scientists from 11 countries, including numerous FWCB staff and students. The meeting included research talks on movement ecology and statistical tutorials meant to help scientists keep pace with the rapid development of techniques being developed to understand animal movement. Video recordings of all presentations are available at http://amovee2014.com.
Coyotes (*Canis latrans*) recently expanded into the eastern U.S. and potentially have caused localized white-tailed deer (*Odocoileus virginianus*) population declines. As novel predators, coyotes are exerting a pressure on deer that has been absent for nearly 100 years in many areas of the southeastern United States. Recent research indicated neonatal fawns may be particularly vulnerable to coyotes, so understanding survival rates is crucial for managing deer populations in the presence of coyotes. In 2011 and 2012, we radiocollared 65 neonates at Fort Bragg Military Installation in North Carolina, monitored them intensively for 16 weeks, and assigned mortality causes. We determined survival and evaluated the impact of covariates on survival (Chapter 1). Additionally, we relocated neonates to quantify space use and movement, particularly in the context of avoiding predation risk. We used movement and bedsite cover data to evaluate the possibility that coyotes and cover conditions at Fort Bragg were creating an evolutionary trap for neonates (Chapter 2). We used locally derived vital rates to build a population model and perform sensitivity analysis and manipulated vital rates to explore potential effects of management actions under “what if” scenarios (Chapter 3). Results indicated that neonate survival was low and coyote predation was the leading source of mortality. Selection analysis provided support for an evolutionary trap because neonates with greater movement rates and bedsites in less dense cover were more likely to escape predation by coyotes. These results are counter to the expected hider strategy common among ungulate neonates. Population modeling revealed a declining deer population, and proposed management scenarios resulted in various population trajectories (subject to model uncertainty). We concluded that reducing adult female harvest was the least expensive, most effective strategy to mitigate negative effects of coyotes on deer populations. Overall, results indicated that coyotes can have profound impacts on white-tailed deer population dynamics in the southeastern U.S.
Practitioners have espoused the emerging paradigm of ecosystem-based land management to restore and maintain functioning ecosystems. As a result, management prescriptions often are based on historical and empirical references of keystone ecological processes. A keystone process in the longleaf pine ecosystem is fire disturbance, which historically occurred most frequently during the growing season. Currently, the emphasis in this ecosystem is on frequent early growing-season fire disturbances. Hence, land managers have applied fire based on average historical frequencies and primarily during the growing season. However, little is known about the effects of this fire regime on native plants and wildlife sensitive to fire season and frequency, particularly when natural stochastic variability is ignored. Therefore, I measured plant distributions, growth, and reproductive allocations (fruit production) of native fire-adapted flora, hypothesizing differing fire seasons and fire-return intervals would be necessary to maximize heterogeneity on the landscape. During the 2011 and 2012 growing seasons, I assessed the distribution of important hard and soft mast producing tree species, understory vegetative biomass, and overstory and understory fruit production of native plants in relation to fire frequency and seasonality in the longleaf pine-wiregrass ecosystem at Fort Bragg Military Installation, North Carolina. Also, I used compositional analysis to measure the influence of time-since-fire and fire season on deer selection of burned areas and the impacts of burning on 95% home range and 50% core area space used and site fidelity. Understory plant biomass was greatest following dormant-season fires. Wiregrass biomass was greatest in upland pine stands, but was unaffected by season of burning. In longleaf pine stands, 94% of the fruit was detected 2 years after growing-season fire and 6% one year after growing-season fire. Fruit

**ABSTRACT: MARCUS ALAN LASHLEY**

The importance of including natural variability in fire prescriptions: fruits, forages, and white-tailed deer space use

(UNDER THE DIRECTION OF CHRISTOPHER MOORMAN AND CHRISTOPHER DEPERNO)
LASHLEY
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Production was greater in July following dormant-season fire and in September following growing-season fire but was greatest in upland hardwood stands because of the mosaic in fire spread in the vegetation type. Unnatural distributions of important hardwood mast producers near man-made firebreaks and variability in fruiting response and plant biomass to timing and frequency of fire, indicate stochastic variability in fire season and frequency is essential to the maintenance of landscape heterogeneity, high plant diversity, and abundant fruit production. Further, our compositional analysis showed that deer selected unburned drainages and areas that had been burned ≥2yr previously, while avoiding areas that had been burned more recently. Individuals with greater percentage of their home range burned increased the size of their core area during the same year of the fire, but not their overall home range area. Furthermore, site fidelity across years decreased as the percentage of the core area in the previous year was burned. Guided by our best knowledge of variability in historical fire regimes, varying fire applications should include growing- and dormant-season fires, incorporating shorter and longer fire-return intervals, incorporating a variation in firing techniques, and avoiding burning adjacent areas in the same year. These recommendations will better emulate historical fires and, therefore, cater to a larger array of native taxa, including threatened and endangered flora and fauna.

SNAPSHOT: ENO RIVER STATE PARK

A northern water snake (*Nerodia sipedon*) basks in the sun on a rock in the Eno River at the Eno River State Park. Share your best wildlife photos with the FWCB Newsletter. E-mail high resolution images to Steve Allen at stevecallen1@gmail.com.
Research Publications


**Research Presentations**


Mills, L. S. 2014. Can camouflage keep up with climate change? Seasonal coat color confronts a globally decreasing snowpack. Fondazione Edmund Mach, Trentino, Italy.


Extension and Outreach


Popular Press


Student Awards

Daniel L. Morina, 1st Place Student Poster; Annual Meeting of the NC Chapter of TWS.

Daniel L. Morina, 2nd Place Student Poster; Annual Meeting of the Southeast Deer Study Group.
Student awards

W. DON BAKER MEMORIAL AWARD FOR THE BEST PLATFORM PRESENTATION

Jennifer Archambault was awarded the W. Don Baker Memorial Award for the Best Platform Presentation given by a Professional Member at the 25th North Carolina Chapter American Fisheries Society Annual Meeting held February 18-19, 2014 in Durham, North Carolina.

Jennifer's winning presentation was entitled “Sensitivity of Freshwater Mollusks to Hydrilla-Targeting Herbicides”. The paper was co-authored by Christine M. Bergeron, W. Gregory Cope, Rob Richardson, Mark Heilman, Michael D. Netherland, Ryan Heise, and J. Edward Corey. The research that Jennifer presented has already been used by natural resource managers to help guide aquatic herbicide applications to control Hydrilla, a highly invasive aquatic weed, in Lake Waccamaw, North Carolina, which supports a number of rare, endemic fish and mollusk populations.

Jennifer is a 2004 alumnus of the NC State University Fisheries and Wildlife Program and received her M.S. degree with a major in Zoology and minor in Environmental Toxicology in 2012 from NC State University. Her thesis research assessed the thermal sensitivity of native freshwater mussels and was co-advised by Drs. Greg Cope and Tom Kwak (both FWCB Faculty and Professors of Applied Ecology). Jennifer is currently a Research Associate in the Department of Applied Ecology, and previously worked as a Wildlife Biologist at Dr. J.H. Carter III & Associates, Environmental Consultants, in Southern Pines, North Carolina.

HIGHTOWER AWARD

Dr. Chris Moorman (left) and Dr. Joe Hightower (right) present Steve Grodsky (FWCB PhD student at center) with the 2014 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.
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