

2012 FALL GRADUATES

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



Photo courtesy of Dr. Chris DePerno

THE FALL CLASS OF 2010: Taylor Pardue, Mary Cunningham, Joshua Street, Carolyn Hinshaw, Brittney Brown, Alexander Parker, Casey Williams, Nathan Jasper, Rachel Conley, Cody Stone, M. Eliese Ronke, Dr. Nils Peterson, Lauren Seay, Dr. Chris DePerno, Sharon Hux, Jennifer Powell, Dr. Chris Moorman.

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2012 SPRING GRADUATES

THE GRADUATES

BACHELOR OF SCIENCE IN FISHERIES, WILDLIFE, AND CONSERVATION BIOLOGY

Brittney L. Brown*
Kevin R. Brown*
Danielle Burgess
Rachel E. Conley***
Katie E. Crews+**
Mary E. Cunningham
Jessica C. Goldman
Michael G. Gunn
Carolyn M. Hinshaw
Nathan I. Jasper*
Jodi M. Mitchell**
Asia J. Murphy

Taylor J. Pardue
Alexander L. Parker
Jennifer G. Powell
M. Eliese Ronke***
Meredith G. Schooley
Lauren E. Seay***
Barbara A. Stevens**~
Cody S. Stone
Joshua O. Street
Brittany N. Van Zile
Casey D. Williams

MASTER OF SCIENCE IN FISHERIES, WILDLIFE, AND CONSERVATION BIOLOGY

Shannon A. Bowling/* Chris Moorman &
Chris DePerno
Sharon J. Hux/*Chris Moorman
Justin M. McVey/*Chris Moorman & David Cobb

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

OPENING DAY SUCCESS



Photo courtesy of Jeffrey Ward.

Gene Johnson is a 2011 FWCB alumni. He killed this 18 lb 12 oz turkey on opening day of the 2012 bow season in Alamance County.

ABSTRACT: JACOB BRIAN HUGHES**Combining count data from split-beam and multiple DIDSON sonar techniques to estimate spawning run abundance of anadromous fishes****(UNDER THE DIRECTION OF DR. JOSEPH E. HIGHTOWER)**

Riverine hydroacoustic techniques are a proven and effective method for evaluating abundance of upstream migrating anadromous fishes. I used a combination of side-looking split-beam and side- and down-looking DIDSON sonar count data in a Bayesian framework to assess spawning run size of striped bass *Morone saxatilis*, American shad *Alosa sapidissima*, hickory shad *A. mediocris*, alewife *A. pseudoharengus*, blueback herring *A. aestivalis*, and semi-anadromous white perch *M. americana*, in the Roanoke River, NC during 2010 and 2011. The Roanoke River, renowned for its recovered striped bass fishery, historically supported regionally important fisheries for many of these anadromous species. Today, American shad estimates are but a fraction of historical abundance and a harvest moratorium is in effect for alewife and blueback herring due to low abundance. My goal for this study is to produce reliable run-size estimates that can be used for management and restoration efforts. To gather count data in mid-channel and near-bottom zones of the river, a 430 kHz split-beam transducer was aimed cross-channel. Long range capability is a major advantage of split-beam sonar (relative to the DIDSON sonar), but river bottom unevenness can result in 'blind-spots'. Also, in the near-range (< 10 m from transducer), narrow beam width may reduce the ability to detect fish. I used a down-looking DIDSON sonar technique to address blind-spots in split-beam coverage along bottom and monitor cross-channel and vertical distribution of upstream migrants. Fixed-location, side-looking DIDSON sonar monitored nearshore regions that exhibited higher densities of upstream migrants. Using a Bayesian framework, I modeled sonar counts relative to their spatial distribution, simplified into 4 cross-channel strata. Apportioning hydroacoustic counts by species was done using species proportions from on-site boat electrofishing and gill nets and incorporating survey gill net catch data from North Carolina Division of Marine Fisheries (NCDMF) in western Albemarle Sound as a prior distribution. Using NCDMF data as a prior distribution reduces uncertainty in estimates due to low and



Photo courtesy of Jacob Brian Hughes
Jacob Brian Hughes estimated spawning run abundance of anadromous fishes.

variable sample sizes from on-site species composition sampling. My modeled estimates of total upstream migrants in 2010 and 2011 were 2.4 million and 4.2 million fish, respectively, considerably greater than prior hydroacoustic estimates from 2004-2009. Run-size estimates for alewife and hickory shad were similar to previous estimates, but American shad, blueback herring, striped bass, and white perch were greater. Adding side-looking DIDSON on each bank improved precision of estimates in nearshore regions with high numbers of upstream migrants. Incorporating NCDMF survey data into the model stabilized estimates between years, unlike prior hydroacoustic estimates for the Roanoke that were based on apportioned sonar counts from on-site sampling only. Sonar applications targeting anadromous fish migrations are generally restricted to rivers with relatively few species and ideal bank slope geometry, neither of which is the case for the Roanoke River. This monitoring protocol and model should be widely applicable to other river systems that are not well suited for traditional sonar monitoring.

ABSTRACT: SHANNON A. BOWLING

Influence of landscape composition on northern bobwhite population response to field border establishment

(UNDER THE DIRECTION OF DRS. CHRISTOPHER E. MOORMAN AND CHRISTOPHER S. DEPERNO)

Since the 1960's, habitat loss resulting from cleaner farming, increased urbanization, and maturation of early successional cover has caused rangewide decline of northern bobwhite (*Colinus virginianus*). Although field borders increase useable bobwhite habitat and increase local bobwhite populations, understanding how the surrounding landscape influences bobwhite response to this management practice is critical to efficient implementation. We determined the relative influence of landscape composition and field border implementation on bobwhite densities and occupancy dynamics around crop fields in North Carolina and South Carolina, USA. We used 10-minute distance point counts to estimate density, occupancy, colonization, and extinction rates of male bobwhite around 154 agriculture fields, half of which had a fallow field border. We estimated percent of crop, forest, pasture, early successional, and urban cover within 1-km radius buffers (314 ha) surrounding all point count locations. We conducted linear regression analyses to determine the influence of six predictor variables (landscape composition metrics and field border presence) on bobwhite density and occupancy dynamics. Bobwhite density increased with the presence of field borders. Conversely, bobwhite density decreased as the percentage of urban, pasture, and forest lands increased. The presence of a field border did not influence occupancy, colonization, or extinction rates. However, as the percentage of crop increased within the landscape, bobwhite occupancy increased and as the percentage of pasture increased, bobwhite colonization decreased. As the percentage of forest, urban, and pasture increased, bobwhite extinction rate increased. Our results indicated that local establishment of field borders does not increase bobwhite occupancy rates, but field borders can increase bobwhite densities in suitable landscapes where bobwhite already are present. Habitat restoration for northern bobwhite will most effectively increase population densities if focused in landscapes dominated by suitable cover types, where bobwhite occurrence is high.



Photo courtesy of Shannon Bowling
Shannon Bowling studied the influence of landscape composition on northern bobwhite populations.

ABSTRACT: JUSTIN MATTHEW MCVEY

Assessing food habits of red wolves (*Canis rufus*) and coyotes (*Canis latrans*) in eastern North Carolina

(UNDER THE DIRECTION OF DRS. CHRISTOPHER E. MOORMAN AND DAVID T. COBB)

Red wolves (*Canis rufus*) and coyotes (*Canis latrans*) are recent co-inhabitants with the fauna of eastern North Carolina. The non-native coyote began appearing in the mid 1980's, and red wolves, which were once inhabitants of North Carolina but declared extinct in the wild in 1980, were reintroduced in 1987. The wolf reintroduction in North Carolina offers a unique opportunity to investigate the food habits of the sympatric congeners. Information on the food habits of the two species also will aid in management of coyotes, red wolves, and their prey. Our objectives were to identify and compare food habits of red wolves and coyotes and to determine if food habits of these large canids change seasonally. We also used this opportunity to calculate upper and lower thresholds of scat diameters to distinguish between scats of red wolves and scats of coyotes and red wolf-coyote hybrids. Non-paved roads in agricultural, pocosin, and pine plantation habitats were surveyed once a month for 12 months. We used faecal DNA analysis to identify donor species and multinomial modeling designed of mark-recapture data to investigate diets of co-occurring red wolves, coyotes, and red wolf-coyote hybrids. Red wolf and coyote diets were similar and contained large proportions of white-tailed deer, rabbits, and small rodents. We found no difference in the diet over time when we divided the sampling period into biological seasons related to canid reproduction but did find a difference when we divided time by calendar season. Small rodents were more common in scat in the spring than in the summer, suggesting seasonal differences in prey availability in our study area. We believe that red wolves and coyotes coexist in eastern North Carolina due to temporal and spatial separation of the taxa, high abundance of prey, and high level of management of the coyote population.

Based on normal-distribution probability functions of scat diameters, scats ≥ 29 mm in diameter were at least 95% certain to be of red wolf origin. Conversely, scats ≤ 14 mm in diameter were 95% certain to be of coyote or hybrid origin. Scats >14 mm and <29 mm in diameter could not be identified by diameter alone. We suggest these upper and lower thresholds of scat diameters be used in concert with other



Photo courtesy of Justin McVey
Justin McVey studied food habits of red wolves and coyotes in eastern North Carolina.

methods (e.g., DNA genotyping) to monitor for red wolf, coyote, and hybrid activity to help conserve a lone, free-ranging population of wild red wolves.

ABSTRACT: SHARON BECKER-HUX

Quantifiable long-term monitoring on parks and nature preserves

(UNDER THE DIRECTION OF DR. CHRISTOPHER MOORMAN)

Herpetofauna have declined globally, and monitoring is a useful approach to document local and long-term changes. However, monitoring efforts often fail to account for detectability or follow standardized protocols. We performed a case study at Hemlock Bluffs Nature Preserve (HBNP) in Cary, North Carolina to model occupancy of focal species and demonstrate a replicable long-term protocol that can be used by parks and nature preserves. From March 2010 to 2011, we documented occupancy of *Ambystoma opacum* Gravenhorst (Marbled Salamander), *Plethodon cinereus* Green (Red-backed Salamander), *Carphophis amoenus* Say (Eastern Worm Snake), and *Diadophis punctatus Linnaeus* (Ringneck Snake) at coverboard sites and estimated breeding female *Ambystoma maculatum* Shaw (Spotted Salamander) abundance via dependent double-observer egg mass counts in ephemeral pools. Precipitation influenced detection of all 4 species, and temperature influenced detection of both salamander species. Based on egg mass data, we estimated salamander abundance to be between 22 and 44 breeding females. We detected 43 of 53 previously documented herpetofauna species. Our approach demonstrates a monitoring protocol that accounts for factors that influence species detection and that can be replicated by parks or nature preserves with limited resources.



Photo courtesy of Sharon Becker-Hux

Sharon Becker-Hux studied long-term monitoring protocols for parks and nature preserves.



Members of the current NC Cooperative Fish and Wildlife Research Unit visited with Gene Hester, the first NC Unit Leader, to catch up and share stories. Pictured (L-R), Tom Kwak, Joe Hightower, Gene Hester, Ted Simons, Wendy Moore.

Happy 50th Birthday!

The NC Coop Unit celebrates milestone

The North Carolina Cooperative Fish and Wildlife Research Unit was authorized and established in 1962 as a Cooperative Fisheries Unit. The first Unit Leader was Dr. Gene Hester, who had already been a NCSU Assistant Professor of Zoology after earning his PhD from Auburn University in 1959. Gene conducted research on hybrid sunfish and wood duck reproduction back, and then was called to administrative duty in 1971 as Director of Fisheries Research for the US Fish and Wildlife Service in Washington, DC. This past March, Gene visited with the current NC Unit scientists to review the chronology of the Unit and to share a story or two about the early days.

In October 2012, the NC Unit will recognize this 50th an-

niversary milestone with a reception and gathering of current and past scientists, staff, cooperators, and students. We will have a few photos and stories to share, and we would like yours. If you have a particularly memorable photo or an anecdote you would like to share, please contact Wendy Moore (Program Assistant, wendy_moore@ncsu.edu) or Dr. Tom Kwak (Unit Leader, tkwak@ncsu.edu). We will be glad to scan and return any old photos or slides to incorporate into a slide show that we will share during the reception.

We hope that all NC Unit alumni and friends will be able to join us in this celebration. Please mark your calendars and send us a photo and story — we will announce details of the gathering at a later date. We hope to see you there!



Photo courtesy of Mark Parsons

Trip leader, Heff Hall (far back) and students participate in the herpetofauna identification walk in Pender County.

Leopold Wildlife Club holds herp ID walk

On Friday, April 27th, the Leopold Wildlife Club held a herpetofauna identification walk to Holly Shelter game lands in Pender County. The trip was led by North Carolina Wildlife Resources Commission biologist Jeff Hall and N.C. Aquarium Herpetofauna husbandry expert Keith Farmer. The trip was attended by 13 NCSU students and 2 students from UNCW. A total of 16 herpetofauna species and 48 bird species were observed. The trip was very exciting and successful. The Leopold Wildlife Club intends to make the herpetofauna identification walk an annual affair.



Photo courtesy of Brit Brown

Charlie Sanders



Photo courtesy of Mark Parsons

Kevin Durso and Kelly Taylor

Cope receives Cooperative Extension Award

Dr. Greg Cope, Professor and FWCB faculty member in the Department of Environmental & Molecular Toxicology has been presented with a 2012 North Carolina Cooperative Extension Search for Excellence Award sponsored by the North Carolina State Grange. Dr. Cope was part of the Extension Specialist Team of Dr. Catherine LePrevost and Ms. Julia Storm who were all recognized on April 5, 2012 at an Extension Conference in Kenansville, North Carolina for excellence in program development for the Pesticides and Farmworker Health Toolkit, supported by a grant from the North Carolina Department of Agriculture and Consumer Services' Pesticide Environmental Trust Fund. The Toolkit is a visual and interactive pesticide safety training program for North Carolina's 90,000 migrant farmworkers. The toolkit includes a colorful, illustrated flip chart with leader's guide, a one-page illustrated handout with essential safety information, and interactive activities.

The toolkit is available in English and Spanish for 11 crops: apples, bell peppers, blueberries, Christmas trees, cucumbers, grapes, landscape/turf, sweet potatoes, strawberries, tobacco, and tomatoes. The toolkit was developed with input from farmworkers and farmworker trainers. It was approved by the U.S. Environmental Protection Agency (EPA) for Worker Protection Standard (WPS) training. Through numerous train-the-trainer workshops offered by the team, the toolkit has been widely adopted by Extension agents, outreach workers, growers, and others in North Carolina and be-



NCSU Extension Specialist Team of LePrevost, Cope, and Storm (L to R) Win for Pesticides and Farmworker Health Toolkit

yond. Mr. Jim Burnette, Director of the NCDA&CS Structural Pest Control and Pesticides Division said: "It is my firm belief that there is no better example of professional excellence than that demonstrated by the team of Cope, LePrevost, and Storm. The fundamentals of pesticide safety, risk reduction, and mitigation as required by the EPA WPS are enhanced and expressed in a manner readily acceptable by farmworkers and their families. All of this has greatly advanced our WPS pesticide safety efforts."

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WOOD DUCK BOXES.**

**If you are interested in purchasing a bat box or a wood duck box contact Dr. Chris Moorman
(chris_moorman@ncsu.edu)**



Publications & Presentations



Research Publications

- Blackman, E. B., C. S. DePerno, R. W. Heiniger, M. J. Krachey, C. E. Moorman, and M. N. Peterson.** 2012. Effects of crop field characteristics on nocturnal winter use by American woodcock. *Journal of Wildlife Management* 76: 528-533.
- Golden, K. E., C. S. DePerno, C. E. Moorman, M. N. Peterson, and R. E. Bardon.** 2011. Predicting North Carolina landowner participation and interest in wildlife related fee access. *Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies* 65:21-26.
- Grovenburg, T. W., C. N. Jacques, R. W. Klaver, C. S. DePerno, T. J. Brinkman, C. C. Swanson, and J. A. Jenks.** 2011. Influence of landscape characteristics on migration strategies of white-tailed deer. *Journal of Mammalogy* 92:534-543.
- Karns, G. R., R. A. Lancia, J. W. Bishir, C. S. DePerno, M. Conner, and C. Barker.** 2011. Improvement of a catch-per-unit-effort estimator for white-tailed deer populations. *Proceedings of the Annual Conference of the Southeastern Association of Fish and Wildlife Agencies* 65:15-20.
- Moorman, C. E., L. T. Bowen, J. C. Kilgo, J. L. Hanula, and S. Horn.** 2012. Arthropod abundance and seasonal bird use of forest canopy gaps in a bottomland forest. *The Wilson Journal of Ornithology* 124:31-39.
- Mosher, S., W. G. Cope, F. X. Weber, T. J. Kwak, and D. Shea.** 2012. Assessing accumulation and sublethal effects of lead in a unionid mussel. *Walkerana: the Journal of the Freshwater Mollusk Conservation Society* 15: 60-68.
- Mosher, S., W. G. Cope, F. X. Weber, D. Shea, and T. J. Kwak.** 2012. Effects of lead on Na⁺, K⁺-ATPase and hemolymph ion concentrations in the freshwater mussel *Elliptio complanata*. *Environmental Toxicology* 27: 268-276.
- Pandolfo, T. J., T. J. Kwak, and W. G. Cope.** 2012. Thermal tolerances of freshwater mussels and their host fishes: species interactions in a changing climate. *Walkerana: the Journal of the Freshwater Mollusk Conservation Society* 15: 69-82.
- Raybuck, A. L., C. E. Moorman, C. H. Greenberg, C. S. DePerno, K. Gross, D. M. Simon, and G. S. Warburton.** 2012. Short-term response of small mammals following oak regeneration silviculture treatments. *Forest Ecology and Management* 274:10-16.
- Rudershausen, P. J., J. A. Buckel, G. Bolton, R. Gregory, T. Averett, and P. Conn.** 2012. A comparison between circle and J hook performance in the dolphinfish, yellowfin tuna, and wahoo bluewater troll fishery off North Carolina. *Fishery Bulletin* 110:156-175.
- Sandfoss, M. R., C. S. DePerno, C. W. Betsill, M. Baron Palamar, G. Erickson, and Suzanne Kennedy-Stoskopf.** 2012. A serosurvey for *Brucella suis*, classical swine fever virus, porcine circovirus type 2, and pseudorabies virus in feral swine (*Sus scrofa*) of eastern North Carolina. *Journal of Wildlife Diseases* 48:462-466.

Publications & Presentations



- Smith, J. A., and J. E. Hightower.** 2012. Effect of low-head lock and dam structures on migration and spawning of American shad and striped bass in the Cape Fear River, North Carolina. *Transactions of the American Fisheries Society* 141:402-413.
- Sollmann, R., B. Gardner, and J. L. Belant.** 2012. How does spatial study design affect density estimates from spatial capture-recapture models? *PLoS ONE* 7(4): e34575. doi:10.1371/journal.pone.0034575
- Wuenschel, M. J., K. W. Able, J. A. Buckel, J. W. Morley, T. E Lankford, A. C. Branson, D. O. Conover, D. Drisco, A. Jordaan, K. Dunton, D. H. Secor, R. J. Woodland, F. Juanes, and D. Stormer.** 2012. Recruitment patterns and habitat use of young-of-the-year bluefish along the United States east coast: insights from coordinated coastwide sampling. *Reviews in Fisheries Science* 20:80-102.

Research Presentations

- Archambault, J. M., W. G. Cope, and T. J. Kwak.** 2012. Ecological relevance in freshwater mussel thermal tolerance tests: implications for climate change. *Freshwater Mollusk Conservation Society Biennial Workshop*, Athens, Georgia.
- Archambault, J. M., W. G. Cope, and T. J. Kwak.** 2012. Enhancing relevance to climate change in freshwater mussel thermal tolerance tests. *Annual Meeting of the North Carolina Chapter of the American Fisheries Society*, Raleigh, North Carolina.
- Callihan, J., C. Godwin, and J. Buckel.** 2012. Movement of striped bass inferred from tag-recapture data: effects of abundance and demography. *Tidewater American Fisheries Society*, Beaufort, North Carolina.
- Chitwood, M. C., M. A. Lashley, M. B. Elfelt, C. S. DePerno, C. E. Moorman, and J. C. Kilgo.** 2012. The emerging deer-coyote dynamic: evidence of fawn and adult deer predation in the Southeast. *2012 Southeast Deer Study Group Meeting*, Sandestin, Florida.
- Elfelt, M. B., C. S. DePerno, and C. E. Moorman.** 2012. Coyote habitat use in relation to small mammal availability. *2012 Annual Meeting of the North Carolina Chapter of The Wildlife Society*, Haw River State Park, Browns Summit, North Carolina.
- Fisk, J. M., II, T. J. Kwak, and R. J. Heise.** 2012. Modeling suitable habitat for the robust redhorse in the Pee Dee River: an assessment for reintroduction. *Annual Meeting of the North Carolina Chapter of the American Fisheries Society*, Raleigh, North Carolina.
- Harris, J. E., and J. E. Hightower.** 2012. Migration and mortality of sonic-tagged striped bass in the Roanoke River, North Carolina. *Tidewater Chapter, American Fisheries Society*, Beaufort, North Carolina.
- Harris, J. E., and J. E. Hightower.** 2012. Identification of American shad spawning sites and habitat use in the Pee Dee River, North Carolina and South Carolina. *NC Chapter, American Fisheries Society*, Raleigh, North Carolina.

Publications & Presentations



- Hughes, J. B., and J. E. Hightower.** 2012. Using multiple sonar deployments to improve run-size estimates of anadromous fishes. NC Chapter, American Fisheries Society, Raleigh, North Carolina.
- Kilburg, E., C. Moorman, and C. DePerno.** 2012. Poult or coals? Wild turkey nest survival in the presence of growing-season fire. 2012 Annual Meeting of the North Carolina Chapter of The Wildlife Society, Haw River State Park, Browns Summit, North Carolina.
- Kwak, T. J., W. G. Cope, T. J. Newton, J. D. Bales, J. A. Daraio, C. A. Drew, T. J. Pandolfo, J. M. Archambault, A. M. Ganser, R. J. Heise, R. B. Nichols, T. Augspurger, and B. N. Karns.** 2012. Breaking traditional barriers to model climate change and land use impacts on freshwater mussels. Invited speaker to the Freshwater Mollusk Conservation Society Biennial Workshop entitled "Incorporating Environmental Flows, Climate Change, and Ecosystem Services into Freshwater Mussel Conservation and Management." Athens, Georgia.
- Lashley, M. A., M. C. Chitwood, A. P. Rockhill, M. B. Elfelt, C. S. DePerno, and C. E. Moorman.** 2012. The effects and predictability of solunar activity on deer movements. 35th Annual Meeting of the Southeast Deer Study Group. Destin, FL.
- Leonard, J. A., W. G. Cope, M. C. Barnhart, and R. B. Bringolf.** 2012. Biochemical and reproductive effects of the synthetic estrogen 17- α -ethinylestradiol on the unionid freshwater mussel *Lampsilis fasciola*. Annual Meeting of the North Carolina Chapter of the American Fisheries Society, Raleigh, North Carolina.
- McGaughey, B., J. Garabedian, S. Reutebuch, B. Parresol, J. Kilgo, C. Moorman, N. Peterson, and T. Grazia.** 2012. Quantitative analysis of red-cockaded woodpecker foraging habitat structure using LiDAR. Army-USFWS Red-cockaded Woodpecker Workshop, Callaway Gardens, Georgia.
- Morley, J. W., J. A. Buckel, and T. E. Lankford.** 2012. Relative contribution of summer- and spring-spawned bluefish to the adult population in the southeast U.S. Tidewater American Fisheries Society, Beaufort, North Carolina.
- Palamar, M. Baron, Sandfoss, M. R., C. S. DePerno, C. W. Betsill, G. Erickson, and S. Kennedy-Stoskopf.** 2012. A serosurvey for *Brucella suis*, classical swine fever virus, porcine circovirus type 2, and pseudorabies virus in feral swine (*Sus scrofa*) of eastern North Carolina. 2012 International Wild Pig Conference: Science and Management, Menger Hotel, San Antonio, Texas.
- Pandolfo, T. J., T. J. Kwak, and W. G. Cope.** 2012. Thermal tolerances of freshwater mussels and their host fishes: species interactions in a changing climate. Freshwater Mollusk Conservation Society Biennial Workshop, Athens, Georgia. .
- Pandolfo, T. J., T. J. Kwak, and W. G. Cope.** 2012. Thermal tolerances of freshwater mussels and their host fishes: species interactions in a changing climate. Annual Meeting of the North Carolina Chapter of the American Fisheries Society, Raleigh, North Carolina.

Publications & Presentations



- Prince, A., C. S. DePerno, and C. E. Moorman.** 2012. The influence of prescribed fire on southeastern fox squirrel habitat selection. 2012 Annual Meeting of the North Carolina Chapter of The Wildlife Society, Haw River State Park, Browns Summit, North Carolina.
- Raabe, J. K., and J. E. Hightower.** 2012. Restored habitat use by migratory fishes following complete and partial dam removals. NC Chapter, American Fisheries Society, Raleigh, North Carolina.
- Rudershausen, P. J., T. Dubriel, M. J. O'Donnell, J. A. Buckel, J. E. Hightower, B. H. Letcher, and S. J. Poland.** 2012. Using passive integrated transponder (PIT) tags to estimate movement and survival of mummichog (*Fundulus heteroclitus*) in an estuarine tidal creek. Tidewater Chapter, American Fisheries Society, Beaufort, North Carolina.
- Schmit, B., Palamar, M. B., G. Erickson, C. DePerno, and M. Correa.** 2012. A retrospective serological survey of PRRS and PCV2 exposure in U.S. feral swine. 2012 International Wild Pig Conference: Science and Management, Menger Hotel, San Antonio, Texas.
- Smith, W. E., T. J. Kwak, and P. B. Cooney.** 2012. Tropical island fish assemblages are resilient to flood disturbance mortality. Annual Meeting of the North Carolina Chapter of the American Fisheries Society, Raleigh, North Carolina.

Book Chapters

- Kwak, T. J.** 2012. Fisheries indicators, freshwater. Pages 130-135 in D. Fogel, S. Fredericks, L. Harrington, and I. Spellerberg, editors. Measurements, indicators, and research methods for sustainability. Encyclopedia of sustainability, volume 6. Berkshire Publishing, Great Barrington, Massachusetts.
- Maggi, R. G., C. A. Harms, and E. B. Breitschwerdt.** 2012. Bartonellosis: an emerging disease of humans, domestic animals, and wildlife. In: Aguirre AA, Ostfeld RS, Daszak P (eds). Conservation Medicine: Applied Cases of Ecological Health. New York: Oxford University Press, pp. 239 – 256.
- Millspaugh, J. J., R. A. Gitzen, J. L. Belant, R. W. Kays, B. J. Keller, D. C. Kesler, C. T. Rota, et al.** (2012). Analysis of Radiotelemetry Data. The Wildlife Techniques Manual: Volume 1 Research (pp. 480-501). Baltimore: Johns Hopkins University Press.
- Millspaugh, J. J., D. C. Kesler, R. A. Gitzen, R. W. Kays, J. H. Schulz, C. T. Rota, C. M. Bodinof, et al.** (2012). Wildlife radiotelemetry and remote monitoring. In N. J. Silvy (Ed.), The Wildlife Techniques Manual: Volume 1 Research (7th ed., pp. 258-283). Baltimore: Johns Hopkins University Press.

Extension Presentations

- Chitwood, C., M. Lashley, S. Basinger, and C. Harper.** 2012. 9th Annual Deer and Habitat Management Expo. Hickory Metro Convention Center, Hickory, North Carolina.

Publications & Presentations



Chitwood, M. C. 2012. Coyotes and Deer: Can the two co-exist? Seminar presented to 71 forestry professionals (NC, SC, and VA) attending the Forestry Issues Forum Teleconference entitled “Managing White-tailed Deer in North Carolina.” McKimmon Center, Raleigh, North Carolina.

DePerno, C. S. Coyotes and livestock. 2012. Presented to 90 individuals of the Sampson County Livestock Association, Sampson County Center, Clinton, North Carolina.

DePerno, C. S. 2012. Wildlife questions and answers. Presented to 20 individuals of the Bluebirders of Wake County, Mordecai House, Raleigh, North Carolina.

Moorman, C. E. 2012. Can We Conserve Birds and Birding Opportunities in Urban Landscapes? Wake County Audubon Meeting, Raleigh, North Carolina.

Moorman, C. E. 2012. Ecological Implications of Invasive Plants. Non-native and Invasive Forest Plants Workshop. Greensboro, North Carolina.

Moorman, C. E. 2012. Will Prescribed Fire Remain in Our Toolbox? NCSU Forestry Issues Forum Teleconference.

Media Coverage

Fawn survival research conducted at Ft. Bragg highlighted in the 2012 June-July issue of Quality Whitetails (p. 22)

Sandfoss, M. R., C. S. DePerno, C. W. Betsill, M. Baron Palamar, G. Erickson, and S. Kennedy-Stoskopf. 2012. A serosurvey for *Brucella suis*, classical swine fever virus, porcine circovirus type 2, and pseudorabies virus in feral swine (*Sus scrofa*) of eastern North Carolina. *Journal of Wildlife Diseases* 48:462-466.

Highlighted in

1) North Carolina State University Newsroom, 10 April 2012 (<http://news.ncsu.edu/releases/mk-feral-pig-bacteria/>)



Publications & Presentations



- 2) College of Natural Resources News Central (<http://cnr.ncsu.edu/blogs/news/2012/04/10/study-shows-first-n-c-case-of-feral-pig-exposure-to-nasty-bacteria/>)
- 3) Pork Network (<http://www.porknetwork.com/pork-news/Brucellosis-raises-red-flag-in-NC-feral-swine--147337305.html>)
- 4) Pork Network Editorial (<http://www.porknetwork.com/pork-news/latest/Brucellosis-raises-red-flag-in-NC-feral-swine--147337305.html>)
- 5) Science Newsline (<http://www.sciencenewsline.com/medicine/2012041023160014.html>)
- 6) Phys.org (<http://phys.org/news/2012-04-feral-pigs-exposed-nasty-bacteria.html>)
- 7) e! Science News (<http://esciencenews.com/sources/physorg/2012/04/10/feral.pigs.exposed.nasty.bacteria>)
- 8) JSOnline (<http://www.jsonline.com/blogs/news/147002795.html>)
- 9) Science Daily (<http://www.sciencedaily.com/releases/2012/04/120411131913.htm>)
- 10) North Carolina Health News (<http://www.northcarolinahealthnews.org/2012/04/23/discovery-of-bacteria-in-wild-pigs-prompts-alert-to-farmers-hunters/>)
- 11) News and Observer (<http://www.newsobserver.com/2012/05/06/2047423/a-farmers.html#storylink=misearch>)

Grants

- Gardner, B., and B. Reich.** Mapping the Distribution, Abundance and Risk Assessment of Marine Birds in the Northwest Atlantic. Wildlife Management Institute, 2012-2013, \$115,000
- Gardner, B.** Development of Hierarchical Spatial Capture Recapture Models to Understand the Effects of Fuel Reduction on Small Mammals in the Sierra Nevada. U.S. Forest Service, 2012-2013, \$30,000
- Gardner, B.** Development of a Monitoring Framework for the Island Scrub-Jay. U.S. Geological Survey, 2012-2013, \$39,034



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 Moorman
(chris_moorman@ncsu.edu)

Awards



Tim Ellis (left) and Dr. Christopher Moorman

HIGHTOWER AWARD

Dr. Chris Moorman, right, presents Tim Ellis (FWCB PhD student co-advised by Drs. Hightower and Buckel) with the 2012 Joseph E. and Robin C. Hightower graduate student award. The endowment is used to provide financial awards and educational opportunities for graduate students enrolled in the FWCB Master's and Ph.D. degree programs. Tim will use the award to support travel to present at a symposium hosted by the American Institute of Fishery Research Biologists in June in Massachusetts.



Andrew Isenhower, Rachel Conley, Vic French, and Chris DePerno

NCTWS ANNUAL AWARDS

Congratulations to the 2012 NCTWS award recipients! Awards were presented Thursday at the conclusion of the 2012 NCTWS Annual Meeting.

The Ken Wilson Memorial Award winners were Andrew Isenhower (Haywood Community College) and Rachel Conley (NCSU); Vic French (NCTWS) received the Wildlife Conservation Award; and Dr. Chris DePerno (NCSU) received the Chapter Award.



Michael Waine

STUDENT PRESENTATION AWARD

Michael W. Waine was awarded Second Place, Student Presentation at the 2011 Southern Division Meeting of the American Fisheries Society in Tampa, Florida. Mike's talk, "Assessing spawning runs of anadromous fishes using a Bayesian analysis of split-beam and DIDSON count data" was based on his MS degree research. Congratulations, Mike!



Erik Kilburg

BEST STUDENT POSTER

Eric Kilburg won the Best Student Poster at the 2012 North Carolina Chapter of The Wildlife Society Annual Meeting. The title was "Poults or coals? Wild turkey nest survival in the presence of growing-season fire." Co-authors were Drs. Chris Moorman and Chris DePerno. The meeting was held at Haw River State Park in Browns Summit, North Carolina.

Awards



KENNETH R. KELLER AWARD

Dr. Julie Harris, a 2010 PhD in Fisheries, Wildlife and Conservation Biology, was selected by the College of Agriculture and Life Sciences at NCSU as one of two recipients of the Kenneth R. Keller Award for Excellence in Doctoral Dissertation Research for 2011. The Keller award consists of a plaque and cash award, and is presented each year at the Gamma Sigma Delta Honor Society for Agriculture spring banquet. Julie's dissertation was entitled "Migration and Spawning of Anadromous Shads in the Roanoke River, North Carolina." Her committee members were Dr. Joe Hightower (chair), Jeff Buckel, Tom Kwak, and Ken Pollock. Julie's research dealt with spawning habitat for alosines (shads) and the potential benefits to American shad of "trap and transport" fish passage. Her current position is as a post-doctoral researcher at NCSU, using tags and transmitters to learn about migration and fishing and natural mortality of Roanoke River striped bass.

MORRIS K. UDALL SCHOLARSHIP

The Morris K. Udall and Stewart L. Udall Foundation awarded Gretchen Stokes with the Morris K. Udall Scholarship, which provides an award of up to \$5,000 for educational expenses. The Udall Scholarship is presented to exceptional sophomores and juniors based on a commitment to leadership and academic achievement in the pursuit of a career in the environment, Native American health care, or tribal public policy. A total of 80 individuals were named Udall Scholars from a pool of nearly 600 candidates.

"The seeds for my passion for the environment were planted at a young age but have rooted firmly and blossomed



Gretchen Stokes, Tiffany Kershner, and Brian Schuster.

during college," says Stokes. "Being a Udall Scholar will not only fuel my commitment to the environment, but through collaboration with fellow schol-

ars will provide the opportunity to broaden my environmental perspective and refine my vision for ensuring a sustainable future."

Stokes is majoring in Fisheries, Wildlife, and Conservation Biology with minors in Spanish and biology, and plans to pursue a Ph.D. in conservation biology or fisheries science. Stokes has performed research on the reproductive ecology of native stream fish in Puerto Rico and on the biodiversity and endangered species in Equatorial Guinea. Also, Stokes was recently awarded a National Oceanic and Atmosphere Administration Ernest F. Hollings Undergraduate Scholarship.

QUAY AWARD

Taylor Lansing was awarded the 2012 Thomas L. Quay Wildlife and Natural Resources Undergraduate Experiential Learning Award. Taylor is a junior majoring in Biological Sciences - Ecology, Evolution, and Conservation Biology." This endowment provides support for undergraduate students in environmental sciences and natural resources curricula who plan to participate in an experiential learning opportunity. Recipients must display strong leadership potential, including extensive community or University service, and maintain a high level of academic achievement.



Awards

ENVIRONMENTAL AWARENESS - RACHEL CONLEY

Rachel Conley, president of the NCSU Leopold Wildlife Club, was honored on Tuesday April 24 with the City of Raleigh's 2012 Environmental Award for Environmental Awareness. The award is one of 15 the City presents annually to recognize local individuals and organizations that have demonstrated a commitment to protecting or improving the environment.



<http://www.raleighnc.gov/environment/content/AdminServSustain/Articles/2012EnvironmentalAwards.html>

Featured at the Southeast Deer Study Group

At the 2012 Southeast Deer Study Group meeting, Quality Deer Management Association (QDMA) interviewed Marcus Lashley, a Ph.D. candidate at North Carolina State University, about his research into moon phases and deer movements. Marcus is studying patterns of deer behavior relative to various moon phases. Also, he examined deer movements relative to the predictions of "Solunar Tables," which are supposed to predict feeding and movement times for game and fish.

<http://www.qdma.com/videos/does-the-moon-affect-deer-movement>

If you find the remains of a dead fawn in the woods this summer, could you determine what kind of predator killed it? At the 2012 Southeast Deer Study Group meeting, QDMA interviewed Colter Chitwood, a Ph.D. candidate at North Carolina State University. Colter is studying the effects of coyote and bobcat predation on fawn survival rates at Fort Bragg Military Installation. During his research, Colter has become skilled at reading the signs and determining whether a fawn was killed by predators or merely scavenged after dying of other causes. If predators killed the fawn, Colter can usually determine what kind of predator is guilty based on evidence at the scene.

<http://www.qdma.com/videos/csi-what-killed-this-fawn>

MURPHY AWARDED NSF GRADUATE RESEARCH FELLOWSHIP



Asia Murphy, 2012 spring graduate of the Fisheries, Wildlife, and Conservation Biology undergraduate program, was awarded a prestigious National Science Foundation Graduate Research Fellowship. The fellowships were awarded to 20 students who are NCSU seniors, graduate students, or recipients of bachelor's degrees from the university. Asia will begin her graduate studies at Virginia Tech this fall.



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 stevecallen@nc.rr.com.