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# SOUTH CAROLINA COOPERATIVE FISH & WILDLIFE RESEARCH UNIT

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## ANNUAL REPORT

2017

In 2017, The South Carolina Cooperative Fish & Wildlife Research Unit continued to engage our cooperators to address emerging natural resource issues. Unit scientists continue to advise and mentor graduate students in both M.S. and Ph.D. programs, teach graduate classes, and provide technical assistance to cooperators.

# South Carolina Cooperative Fish & Wildlife Research Unit



Brown Pelican chicks in the Gulf of Mexico--Rochelle Streker, 2017

260 Lehotsky Hall  
Clemson University  
Clemson, SC 29634

Phone: 864-656-0168  
[www.coopunits.org/South\\_Carolina](http://www.coopunits.org/South_Carolina)

**Cooperators:**  
U. S. Geological Survey  
Clemson University  
South Carolina Department of Natural Resources  
U. S. Fish and Wildlife Service  
Wildlife Management Institute

# TABLE OF CONTENTS

<b>COOPERATORS AND PERSONNEL .....</b>	<b>4</b>
COORDINATING COMMITTEE .....	4
UNIT PERSONNEL .....	5
COLLABORATORS.....	7
<b>GRADUATE EDUCATION.....</b>	<b>9</b>
CURRENT STUDENTS.....	9
RECENT GRADUATES.....	9
<b>CURRENT RESEARCH .....</b>	<b>10</b>
<b>PUBLICATIONS.....</b>	<b>29</b>
JOURNAL ARTICLES 2016-2017 .....	29
THESES AND DISSERTATIONS 2016-17.....	30
TRAINING .....	31
PRESENTATIONS AND SEMINARS .....	31
SERVICE.....	34
AWARDS AND HONORS .....	34
PRESS/PUBLIC OUTREACH.....	35

## COOPERATORS AND PERSONNEL

### COORDINATING COMMITTEE

#### United States Geological Survey

**John Organ**, Chief, Cooperative Research Units, 12201 Sunrise Valley Drive, Reston, VA 20192

**Barry Grand**, Southern Supervisor, Cooperative Research Units, 1454 Beri Barfield Drive, Dadeville, AL 36853

#### South Carolina Department of Natural Resources

**Alvin A. Taylor**, Director, South Carolina Department of Natural Resources, PO Box 167, Columbia, SC 29202

**Emily Cope**, Deputy Director for Wildlife and Freshwater Fisheries, South Carolina Department of Natural Resources, PO Box 167, Columbia, SC 29202

**Derrell Shipes**, Chief of Wildlife Statewide Projects, South Carolina Department of Natural Resources, PO Box 167, Columbia, SC 29202

**Breck Carmichael**, Special Assistant to the Director, South Carolina Department of Natural Resources, PO Box 167, Columbia, SC 29202

#### Clemson University

**George Askew**, Vice President, Public Service and Agriculture, and Dean, College of Agriculture, Forestry and Life Sciences, Clemson University 101 Barre Hall, Clemson, SC 29634

**Greg Yarrow**, Chair, Forestry and Environmental Conservation, Clemson University, 261 Lehotsky Hall, Clemson, SC 29634

#### Wildlife Management Institute

**Steve Williams**, President, Wildlife Management Institute, Gardners, PA 17324

## UNIT PERSONNEL

### Scientists

*Patrick Jodice*, Unit Leader, U.S. Geological Survey, and Professor,  
Department of Forestry and Environmental Conservation

*Beth Ross*, Assistant Unit Leader-Wildlife, U.S. Geological Survey, and  
Assistant Professor, Department of Forestry and Environmental  
Conservation

*Juliet Lamb*, Post-Doctoral Research Associate, South Carolina  
Cooperative Fish & Wildlife Research Unit and Department of  
Forestry and Environmental Conservation

### Staff

*Carolyn Wakefield* (retired), Administrative Assistant

*Brenna Byler*, Administrative Assistant

*Yvan Satgé*, Research Specialist



## Happy Retirement, Carolyn Wakefield!

The SC Unit is grateful for the 20 years that Carolyn served as our Administrative Assistant. During that time Carolyn worked with 6 different scientists and provided support, guidance, and friendship to approximately 60 graduate students. Carolyn had as much to do with the success and productivity of our Unit as anyone – she kept the Unit running through many transitions and we always knew we could count on her. She also was well-known and well-liked throughout the University, and her reputation for kindness and caring was a hallmark of her time here. Our Federal support team at headquarters also thought highly of Carolyn and appreciated her work ethic and her diligence. Her retirement is well-earned and all of us associated with the SC Unit wish her a relaxing and enjoyable retirement. She will always be an integral member of the SC Cooperative Fish and Wildlife Research Unit.

## Welcome, Brenna Byler!

The SC Unit is pleased to introduce our new Administrative Assistant, Brenna Byler. Brenna started in the job in early August 2017 and is already proving herself to be a valued member of our team. She comes to us from Converse College, where she earned BA degrees in Psychology and Philosophy. She served as the Faculty Assistant and Student Tutor for the Department of Psychology before moving to the Department of Biology, Chemistry, and Physics, where she assumed the roles of administrative assistant, the NIH's SC IDeA Networks for Biomedical Research Excellence program manager, and departmental grant writer. She brings with her skills in grant management, budget management, editing, research design, and even some teaching. Welcome Brenna, we are excited to have you join us and all of the cooperators here at the SC Cooperative Fish and Wildlife Research Unit.



## COLLABORATORS

### Clemson University:

**Robert Baldwin**, Department of Forestry and Environmental Conservation  
**Kyle Barrett**, Department of Forestry and Environmental Conservation  
**William Bridges**, Mathematical Sciences  
**Saara DeWalt**, Biological Sciences  
**Patrick Gerard**, Mathematical Sciences  
**Cathy Jachowski**, Department of Forestry and Environmental Conservation  
**David Jachowski**, Department of Forestry and Environmental Conservation  
**Laura Jodice**, Parks, Recreation and Tourism Management  
**Rick Kaminski**, James C. Kennedy Waterfowl and Wetlands Conservation Center  
**Robert Powell**, Parks, Recreation and Tourism Management  
**Thomas Rainwater**, Department of Forestry and Environmental Conservation  
**John Rodgers**, Department of Forestry and Environmental Conservation  
**Shari Rodriguez**, Department of Forestry and Environmental Conservation

### South Carolina Department of Natural Resources Cooperators:

**Jay Butfiloski**, Wildlife Biologist  
**Tanya Darden**, Marine Resources Research Institute  
**Jamie Dozier**, Tom Yawkey Wildlife Center  
**Amy Fowler**, Marine Resources Research Institute  
**Christy Hand**, Wildlife Biologist  
**Mary Catherine Marin**, Wildlife Biologist  
**Felicia Sanders**, Wildlife Biologist  
**Mark Scott**, Fisheries Biologist  
**Amy Tegeler**, Bird Conservation Coordinator  
**Janet Thibault**, Wildlife Biologist

### Federal Agency Cooperators:

**Laurel Barnhill**, USFWS  
**Sarah Dawsey**, USFWS Cape Romain Natural Wildlife Refuge  
**Deborah Epperson**, BSEE  
**Jeff Gleason**, USFWS  
**Rebecca Green**, BOEM  
**David Haukos**, USGS Kansas Cooperative Fish and Wildlife Research Unit  
**Mike Hooper**, USGS  
**Scott Johnston**, USFWS  
**Susan C. Loeb**, Southern Research Station, USFS  
**Clint Moore**, USGS Georgia Cooperative Fish and Wildlife Research Unit  
**Dave Moran**, BOEM  
**David Shelly**, National Parks Service

**Emily Silverman**, USFWS  
**John Stanton**, USFWS  
**Melanie Steinkamp**, USFWS  
**Edward (Jerry) Tupacz**, USFWS, Wildlife Biologist  
**Craig Watson**, USFWS Ecological Services, Charleston, SC  
**Tim White**, BOEM  
**Randy Wilson**, USFWS  
Bureau of Ocean Energy Management  
USFWS Region 4, Cape Romain Natural Wildlife Refuge  
USFWS Migratory Bird Program  
USFWS Ecological Services  
USFS Southern Forest Experiment Station  
National Park Service, Congaree National Park  
Smithsonian Migratory Bird Center

**Private Sector Cooperators:**

Biodiversity Research Institute  
International Crane Foundation  
Jost Van Dyke Preservation Society  
National Fish and Wildlife Foundation  
Nemours Wildlife Foundation  
Society for the Conservation and Study of Caribbean Birds  
Terra Mar, LLC

**Cooperating Scientists from other Colleges, Universities, and Institutes:**

**Lisa Ferguson**, Wetlands Institute  
**Christine Fiorello**, Oiled Wildlife Care Network  
**Peter Frederick**, University of Florida  
**Christian Hagen**, Oregon State University  
**Chris Haney**, Terra Mar, LLC  
**Autumn-Lynn Harrison**, Smithsonian Institute  
**Mevin Hooten**, Colorado State University  
**David Koons**, Colorado State University  
**Anne Lacy**, International Crane Foundation  
**Stacey Lance**, University of Georgia  
**William Mackin**, Terra Mar, LLC  
**Hannah Madden**, Ecological Professionals, St. Eustatius National Parks  
**Adriana Mancada**, El Colegio de la Frontera Sur Unidad Campeche, Mexico  
**Ken Meyer**, Avian Research Conservation Institute  
**Darshan Narang**, Environmental Management Authority, Trinidad & Tobago  
**Hannah Nevins**, American Bird Conservancy

**Katie O'Reilly**, University of Portland

**Ben Parrott**, University of Georgia

**Richard Philips**, British Antarctic Survey

**James Pitman**, Western Association of Fish and Wildlife Agencies

**Daniel D. Roby**, Oregon Cooperative Fish and Wildlife Research Unit

**Rob Ronconi**, Acadia University

**Adam Rosenblatt**, University of North Florida

**Ernst Rupp**, Grupo Jaragua

**Robert Suryan**, Oregon State University

**Susan Zaluski**, Jost van Dyke Preservation Society, BVI

**Michael Ziccardi**, Oiled Wildlife Care Network

## GRADUATE EDUCATION

### CURRENT STUDENTS

**Sarah Kimpel**, M.S. Wildlife & Fisheries Biology (Advisors: Jodice & Loeb)

**Abigail Lawson**, Ph. D. Wildlife & Fisheries Biology (Advisor: Jodice)

**Hannah Plumpton**, M.S. Wildlife & Fisheries Biology (Advisor: Ross)

**Alexander Schindler**, M.S. Wildlife & Fisheries Biology (Advisor: Ross)

**Rochelle Streker**, M.S. Wildlife & Fisheries Biology (Advisors: Jodice & Lamb)

**Hillary Thompson**, M.S. Wildlife & Fisheries Biology (Advisor: Jodice)

**Bradley Wilkinson**, Ph.D. Wildlife & Fisheries Biology (Advisor: Jodice)

**Jesse Wood**, M.S. Wildlife & Fisheries Biology (Advisor: Ross)

### RECENT GRADUATES

**Leanne Burns**, M.S. Wildlife & Fisheries Biology (Advisors: Jodice & Loeb)

**Hannah Madden**, M.S. Natural Resources, University West Indies (Advisor:  
Jodice)

**Fumika Takahashi**, M.S. Wildlife & Fisheries Biology (Advisor: Jodice)

## CURRENT RESEARCH

### *Spatial and Reproductive Ecology of Brown Pelicans in the Gulf of Mexico*

Investigators: Patrick Jodice (SC CRU) and Juliet Lamb (Clemson University)

Student: Rochelle Streker (M.S., Clemson University)

Sponsors: Bureau of Ocean Energy Management and USGS

Dates: 2012-2018

### *South Carolina Alligator Adaptive Management Strategies: Population Dynamics, Habitat Utilization, and Threats to Conservation*

Investigators: Patrick Jodice (SC CRU), Derrell Shipes (SC DNR), Jay Butfiloski (SC DNR), and Clint Moore (Univ. Georgia)

Student: Abby Lawson (Ph. D., Clemson University)

Sponsors: SCDNR and USGS

Dates: 2013-2017

### *Nonbreeding Habitat Assessment of Whooping Cranes in a Reintroduced Population*

Investigators: Patrick Jodice (SC CRU), and Anne Lacy (international Crane Foundation)

Student: Hillary Thompson (M.S., Clemson University)

Sponsors: Nemours Foundation

Dates: 2014-2017

### *Reproductive Ecology of Red-billed Tropicbirds*

Investigators: Patrick Jodice (SC CRU)

Student: Hannah Madden (M.S., University West Indies)

Sponsors: St. Eustatius National Parks Foundation, NuStar Energy L.P., and SC CRU

Dates: 2015-2017

### *Assessment for the Potential for White-nose Syndrome in Bats of Congaree National Park*

Investigators: Susan Loeb (USFS), and Patrick Jodice (SC CRU)

Student: Sarah Kimpel (M.S., Clemson University)

Sponsors: National Park Service

Dates: 2015-2017

### *Spatial Ecology and Movement Patterns of Brown Pelicans in the South Atlantic Bight*

Investigators: Patrick Jodice (SC CRU)

Student: Bradley Wilkinson (Ph. D., Clemson University)

Sponsors: USGS and Bureau of Ocean Energy Management

Dates: 2017–2020

### *Gulf of Mexico Marine Assessment Program for Protected Species*

Investigators: Patrick Jodice (SC CRU), Jeff Gleason (US FWS), and Chris Haney (Terra Mar LLC)

Sponsors: US FWS and Bureau of Ocean Energy Management

Dates: 2017-2021

*Innovative Approaches to Monitoring Success of Farm Bill Incentive Programs in Conserving Avian Wildlife on Private Lands*

Investigators: Beth Ross (SC CRU), Amy Tegeler (SCDNR), and David Jachowski (Clemson University)

Student: Jesse Wood (M.S., Clemson University)

Sponsors: USDA NRCS

Dates: 2016-2018

*Habitat Use and Species Distribution of Wintering Black Scoters in the Atlantic Flyway*

Investigators: Beth Ross (SC CRU), and Emily Silverman (USFWS)

Student: Hannah Plumpton (M.S., Clemson University)

Sponsors: USGS and Clemson University

Dates: 2016-2018

*A Multi Species Approach to Managing the Effects of Weather and Land Cover on Upland Game Birds*

Investigators: Beth Ross (SC CRU), and David Haukos (KS CRU)

Student: Alexander Schindler (M.S., Clemson University)

Sponsors: USDA NRCS and Pheasants Forever

Dates: 2017-2019

## ***Spatial and Reproductive Ecology of Brown Pelicans in the Gulf of Mexico***

Patrick Jodice, Juliet Lamb, and Rochelle Streker

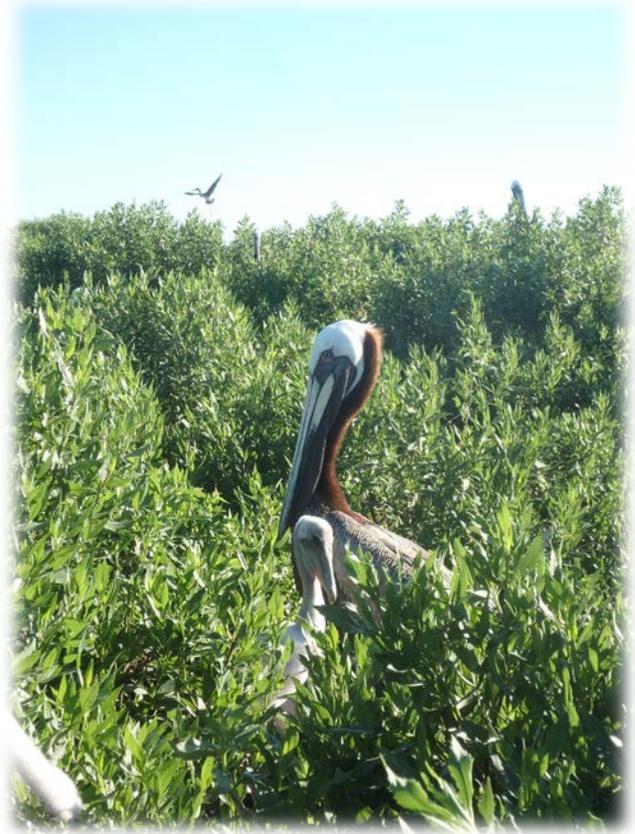


Color-banded Brown Pelican chicks on Gaillard Island, AL (R. Streker, 2017).

This project focuses on providing baseline information about populations of Brown Pelicans across the northern Gulf of Mexico. This new stage will address information gaps relative to the reproductive ecology of Brown Pelicans (*Pelecanus occidentalis*) on Gaillard and Cat Islands, in Mobile Bay, AL, within the Gulf of Mexico. Study objectives are to document (1) the relationship between environmental variables, nest site characteristics, and nestling survival, and (2) when productivity is lost during nestling maturation to fledging. This project's research builds from and

complements previous research efforts of the PI and J. Lamb across the northern Gulf of Mexico and coastal SC.

To date, habitat characteristics were measured and recorded at four separate intervals across the breeding season from 99 nests at both colonies in coastal Alabama: 73 nests on Gaillard Island and 26 nests on Cat Island. We collected breeding data at each colony including chick survival from hatch to fledge, chick body condition, chick diet composition, and nestling provisioning rates. To date, we have color-banded 145 pelican nestlings at colonies on both islands. These chicks, along with the 600 pelican nestlings previously banded at colonies throughout the northern Gulf by J. Lamb, are part of an ongoing citizen science effort to re-sight color bands and investigate the dispersal patterns of juveniles.



Nesting Brown Pelicans on Gaillard Island, AL  
(R. Streker, 2017).



**Rochelle Streker**

## **South Carolina Alligator Adaptive Management Strategies: Population Dynamics, Habitat Utilization, and Threats to Conservation**

Patrick Jodice, Derrell Shipes, Jay Butfiloski, and Abby Lawson



The American Alligator (*Alligator mississippiensis*) is an iconic species in South Carolina, of ecological and economic importance. This study is investigating alligator population ecology using multiple analytical methods to establish an adaptive management framework for harvest

decision-making. The primary study objectives are to (1) improve the study design of alligator monitoring programs to best reflect annual variation in alligator specific size-class abundance, (2) identify factors that influence said variation, and (3) evaluate the influence of

**South Carolina Cooperative Fish & Wildlife Research Unit**

alligator habitat-use patterns on management decisions.

We concluded fieldwork in 2016 for objectives 1 and 2, following three years of intensive nightlight survey efforts. In the last year, we began constructing population models using a long-term mark-recapture dataset from the Tom Yawkey Wildlife Center. The model will serve as the basis to evaluate population-level responses to management or harvest decisions (objective 3) and to determine the intensity of monitoring required to produce reliable population estimates (objective 1).

In summer 2017, we initiated a pilot nightlight survey study to evaluate alligator occupancy patterns and abundance at their inland

distributional limit in Congaree National Park. Little demographic information exists for inland alligator populations, and this study marks the first alligator research ever conducted in Congaree National Park. Lastly, we installed a single additional satellite transmitter on an adult male alligator at Hobcaw Barony in Georgetown SC.

**Abby Lawson**



Previous page: (top) American Alligator in natural light; (bottom) Instrumented alligators. This page: Ph.D. candidate Abby Lawson and her field crew prepare to release a 12-foot alligator with a satellite transmitter (P. Wilkinson, 2017).

## ***Nonbreeding Habitat Assessment of Whooping Cranes in a Reintroduced Population***

Patrick Jodice and Hillary Thompson



The reintroduced Eastern Migratory Population (EMP) of Whooping Cranes (*Grus americana*) has reached recovery goals of 25 breeding pairs and 100 individuals in the population, but is not yet reproducing successfully to be self-sustaining. Unlike the growing population of Whooping Cranes in the central flyway that winter in coastal marshes of the Gulf of Mexico, the EMP has an expansive winter range that includes many agricultural areas in the eastern United States. It is unclear if quality of winter habitat is contributing to the population's lack of reproductive success. The general winter and migratory range of this population is known, but the specific habitats, behaviors, and patterns of movement are not well-understood. The goals of this study are to assess (1) daily movements and habitat characteristics of wintering areas, and (2) migration routes and habitat characteristics of stopover sites.

Field data were collected during winters 2014-15 and 2015-16, and were analyzed during 2016-17. On average, Whooping Cranes used a daily home range of 3.4 km<sup>2</sup> during winter 2014-15, and 4.1 km<sup>2</sup> during 2015-16. Whooping Cranes were most often observed using open landscapes including cultivated crops for foraging, and open water habitats for foraging and loafing. Protected areas and areas with hydric soil were favored by wintering Whooping Cranes, while forested areas were avoided.

Preliminary analyses of satellite telemetry data collected during migration show similar habitat preferences on stopover sites. Additionally, Whooping Cranes do not seem to use the exact migration routes from year to year, but may show fidelity to stopover sites. Ongoing analyses will investigate differences in migration timing, distance, and use of stopover sites. A better understanding of the winter and migration habitat used by Whooping Cranes in the EMP will aid in

**South Carolina Cooperative Fish & Wildlife Research Unit**

management of current wintering areas, direct conservation efforts of unprotected lands, and will inform future research on the overall success of this population.



Previous page: Satellite-tracked Whooping Cranes in flight. This page: (top and center) Whooping Cranes during migration; (bottom) M.S. Student Hillary Thompson with a satellite-tracked juvenile Whooping Crane. (H. Thompson, 2017).



**Hillary Thompson**

## Reproductive Ecology of Red-billed Tropicbirds

Patrick Jodice and Hannah Madden



In the western North Atlantic, the Caribbean Region represents a rich and diverse seabird community. The region supports ca. 25 species of breeding seabirds on over 900 colonies. One of the primary threats to seabirds in the region on the breeding grounds has been the introduction of invasive mammals such as black rats. We examined the reproductive ecology of Red-billed Tropicbirds (*Phaeton aethereus*) on St. Eustatius, with a specific focus on predation at the nest site. Regionally there are estimated to be 2,000 pairs of Red-billed Tropicbirds, however population sizes are difficult to assess due to the species' preference for inaccessible, remote, and scattered nesting sites. We monitored 265 nests over three breeding seasons. Hatching success ranged from 57 - 64%. Nest survival was influenced by the elevation of the nest, but not by nest cavity dimensions, site, or year. Predation of eggs by invasive Black Rats appeared to be responsible for a substantial proportion of nest loss. This study provides the first detailed information on the reproductive ecology of Red-billed Tropicbirds on St. Eustatius, and offers conservation opportunities for this species based on the data collected.

(top) Red-billed Tropicbird, St. Eustatius, Patrick Jodice; (bottom) Red-billed Tropicbird nesting area, St. Eustatius (P. Jodice, 2010).

## Assessment for the Potential for White-nose Syndrome in Bats of Congaree National Park

Susan Loeb, Patrick Jodice, and Sarah Kimpel



Southeastern Myotis captured for tissue sampling, (S. Kimpel, 2017).

The Southeastern Myotis (*Myotis austroriparius*) is a rare and sensitive species that is associated with mature bottomland forests. Little is known about the ecology of this species, particularly its roosting habits. Furthermore, White Nose Syndrome (WNS), a disease caused by the fungal pathogen, *Pseudogymnoascus destructans* (*P. destructans*) which kills bats during their winter hibernation period, was recently found in Richland County, home of Congaree National Park. Thus, our objective is to determine the roosting habits of Southeastern Myotis in Congaree National Park and to assess their susceptibility to WNS. To this end, we are examining southeastern myotis torpor patterns, tree microclimates, roost selection, roost fidelity, and roost networks.

Since October 2016 we located 46 roosts of myotis through opportunistic cavity searches or radiotelemetry. We also conducted weekly

netting at roost trees from November through March. Initial results suggest that Southeastern Myotis select winter roosts with larger cavity interior volumes than random tree cavities, in stands with higher percentage of surrounding basal area attributable to *Nyssa spp.* than random stands. We deployed temperature and relative humidity dataloggers into cavities in roost trees, reference trees, and at ambient points to investigate the difference in microclimate between roost and non-roost trees. We also conducted vegetation plot surveys to understand the effect of plant community structure on roost site selection.

During Winter 2016-2017 and May 2017, we collected tissue samples from Southeastern Myotis and Rafinesque's Big-Eared Bats, respectively for Jessi West, a Ph.D. student at Tennessee Tech University. West's research examines population genetics of bats throughout the southeast.

## ***Spatial Ecology and Movement Patterns of Brown Pelicans in the South Atlantic Bight***

Patrick Jodice and Bradley Wilkinson



As a nearshore marine predator and species of conservation concern, Brown Pelicans (*Pelecanus occidentalis*) in the southeastern United States constitute a valuable study population for investigating coastal ecological systems. Despite occupying a highly visible and elevated trophic position in estuarine and oceanic ecosystems, movement parameters describing habitat use patterns, foraging behaviors, and migratory corridors are undeveloped at multiple spatial and temporal scales. This study aims to address these information gaps by outfitting breeding adult pelicans with high-resolution GPS satellite

transmitters, which will provide accurate locational data throughout the annual life-history cycle.

In addition to assessing seascape use patterns, anthropogenic sources of interaction will also be investigated to provide baseline risk assessments. These may include potential interactions with offshore energy development along the southeastern coastline and the magnitude of influence on individual pelicans posed by foraging at active fisheries vessels.

To date, 28 adult pelicans have been equipped with satellite transmitters breeding at four colonies

**South Carolina Cooperative Fish & Wildlife Research Unit**

in South Carolina. We expect to also deploy transmitters at locations in Georgia and northern Florida. Upon the completion of various life-history stages, maps will be generated showcasing breeding ranges, migratory pathways, wintering locations, and site fidelity at

colonial, subpopulation, and population structures. This information will greatly expand our knowledge of this charismatic species in the Atlantic, and complement prior research recently conducted on Brown Pelicans in the Gulf of Mexico.



**Bradley Wilkinson**

Previous page: A Brown Pelican takes off after being outfitted with a satellite transmitter. This page: Bradley Wilkinson with a Rhinoceros Auklet (*Cerorhinca monocerata*) during his M.S. study, (B. Wilkinson, 2016-2017).

## Gulf of Mexico Marine Assessment Program for Protected Species

Patrick Jodice, Jeff Gleason, and Chris Haney



Limited information is available regarding the species composition, distribution, and abundance of seabirds using the nearshore and offshore waters of the Gulf of Mexico. For example, to date there have been only three standardized and/or repeatable surveys for pelagic seabirds in the Gulf. The sparse data available on distribution and abundance of seabirds in the Gulf hinders both our understanding of seabird ecology and our ability to plan for or respond to data needs during oil and gas activities. Our goal is to conduct vessel-based surveys for pelagic

seabirds in the northern Gulf. The research will satisfy a portion of the newly initiated Gulf of Mexico Marine Assessment Program for Protected Species (GoMMAPS). The study area includes the northern portion of the Mexico Basin which represents the approximate location of the EEZ of the USA. Beginning in 2017, we conducted surveys using NOAA vessels to assess the abundance and distribution of birds utilizing the pelagic environment. We are also developing additional components that would, if fully funded, use telemetry to document movement patterns of seabirds from both the nearshore and pelagic environments. Collectively, these data will permit spatially-explicit modeling of seabird abundance and distribution across the Gulf and provide a critical basis for understanding and addressing potential impacting factors in the region.

*Approximate bounds of the study area for seabird surveys in the northern Gulf of Mexico. The red outlined polygon represents the area targeted for aerial surveys (not included as an objective in this proposal). The three large areas labeled Western, Central, and Eastern represent the three BOEM Planning Areas within the Gulf. Vessel-based surveys will occur throughout each planning area.*



Brown Booby (*Sula leucogaster*),  
Northern Gulf of Mexico, (S. Geist,  
GoMMAPPS, 2017).

## ***Innovative Approaches to Monitoring Success of Farm Bill Incentive Programs in Conserving Avian Wildlife on Private Lands***

Beth Ross, Amy Tegeler, David Jachowski, and Jesse Wood



A primary focus of Farm Bill conservation incentive programs is to promote habitat conservation for at-risk species. Given that over 77% of land in South Carolina is under private ownership, conservation of the many at-risk bird species in the state requires effective design and implementation of habitat conservation incentive programs on private lands. However, feedback on whether Farm Bill habitat conservation incentive programs such as the Environmental Quality Incentives Program (EQIP) have been successful has largely been limited to anecdotal evidence and informal feedback from program participants and partners.

We initiated a research project in the spring of 2017 to assess the conservation impact of Farm



Bill programs in SC. The objectives of this project are to 1) evaluate the effectiveness of Farm Bill programs (e.g., EQIP) at conserving habitat and wildlife, and 2) assess the use of audio recorders as a tool for monitoring bird species of conservation concern on private lands. In particular, we are examining prescribed burning and herbicide spray practices to understand how forest stand management affects avian species composition in loblolly pine stands enrolled in EQIP programs.

Working with regional representatives of the Natural Resource Conservation Service and local landowner organizations, we obtained permission to conduct bird and vegetation surveys at 51 sites in 8 counties of the Piedmont to Midlands of South Carolina. From May-July 2017, we conducted 213 point count surveys and deployed 8 Wildlife Acoustic recorders which captured 828 GB of audio data from 29 sampling sessions. Analysis will begin in the fall of 2017. Findings will not only provide guidance on improved monitoring effectiveness of incentive programs and habitat management, but will also provide unique insights into how such technology can be used to identify areas of future focus.



Commonly heard birds during this field research: (left to right) Brown-headed Nuthatch, Pine Warbler, Yellow-breasted Chat, and Prairie Warbler, Cornell Lab of Ornithology



**Jesse Wood**

Previous page: (left) Loblolly pine stand, (J. Wood, 2017); (right) Pine forest burn (USFS).

## Habitat Use and Species Distribution of Wintering Black Scoters in the Atlantic Flyway

Beth Ross and Hannah Plumpton



Sea ducks are a poorly understood species. While it is thought that populations are declining, developing an effective way to track abundance and long-term trends has remained a challenge. Currently, the best information on sea duck abundance is based on aerial surveys conducted by the U.S. Fish and Wildlife Service during the 2008-2012 winters along the Atlantic Flyway. The goal of this project is to quantify habitat use and species distribution of Black Scoters (*Melanitta americana*) in the Atlantic Flyway during winter using existing aerial survey data from U.S. Fish and Wildlife Service (U.S. FWS). The results of the project will help to describe the ecology of Black Scoters, to develop future aerial surveys for sea ducks, and to evaluate how off-shore wind energy development will affect Black Scoter populations. The project began in August 2016.

Along the Atlantic coast of the United States there has been an increase in human activity. This includes energy production, sand mining, aquaculture, shipping, and coastal development, activities that all have the potential to greatly impact sea ducks throughout their migratory cycle. Of the sea ducks wintering along the Atlantic coast, the Black Scoter has the largest and most variable range, encountering the effects of global change throughout migration.

Initial results of the aerial surveys conducted by the U.S. FWS showed that the core wintering areas used by Black Scoters varied each year and that Black Scoters could be found as far north as Boston Harbor and as far south as the Georgia coast. We build on this previous work to further describe the species distribution during winter, and to assess the factors influencing their annual distribution in the southeastern United States.

In an effort to learn about Black Scoters throughout their migratory cycle, satellite telemetry transmitters were placed in 57 scoters at a migratory stopover site in 2009 and 2010 by the Sea Duck Joint Venture. We will use the telemetry data to examine the arrival and departure dates at the wintering grounds, as well

as the number of wintering sites used throughout the non-breeding season. This study will increase knowledge on the wintering ecology of Black Scoters, aid in the development of future aerial surveys to better quantify abundance, and aid in identifying areas of potential overlap with energy development.



**Hannah Plumpton**

Previous page: Waterfowl aerial survey in coastal South Carolina, (N. Masto, 2017). This page: (left) male Black Scoter, (right) Flock of Black and Surf Scoters (Cornell Lab of Ornithology).

## ***A Multi-Species Approach to Managing the Effects of Weather and Land Cover on Upland Game Birds***

Beth Ross, David Haukos, and Alexander Schindler



Incorporating the projected effects of climate and land use change into management actions is critical for ensuring the viability of future populations. As many species are affected by these changes, managing for multiple species rather than single species can maximize limited resources. Grasslands of the Great Plains provide an ideal opportunity to study the effects of changing weather and land cover on several species of management interest.

We are conducting a study to quantify the effects of weather and land cover on three species of upland game birds in Kansas: Ring-necked Pheasant (*Phasianus colchicus*), Northern Bobwhite (*Colinus virginianus*), and Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*). We will combine historic survey data with weather and land cover data in a hierarchical modeling framework. Variations of this model will include threshold models, allowing us to estimate threshold points at which species respond to changes in land cover.

Through our approach, we will better understand how to manage multiple species to optimize

conservation and management efforts.



***Alec Schindler***

Previous page: (top) Ring-necked Pheasant, (bottom left) Northern Bobwhite, and (bottom right) Lesser Prairie-Chicken (Cornell Lab of Ornithology).

## PUBLICATIONS

### JOURNAL ARTICLES 2016-2017

\* = graduate student author

- Azad, S.\*, T. Wactor, and D. Jachowski. 2017. Demographic trends of a harvested black bear population in northwestern South Carolina. *Ursus* 28: 56-65.
- Azad, S.\*, T. Wactor, and D. Jachowski. 2017. Relationship of acorn mast production to black bear population growth rates and human-bear interactions in northwestern South Carolina. *Southeastern Naturalist* 16: 235-251.
- Barzen, J.A., A.E. Lacy, H.L. Thompson\*, and A.P. Gossens. In press. Assessing habitat use for the reintroduced Eastern Migratory Population of Whooping Cranes. *In The Biology and Conservation of the Whooping Crane (Grus americana)*. Eds S.J. Converse and J. French.
- Collins, S.A.\*, F.J. Sanders, and P.G.R. Jodice. 2016. Assessing conservation tools for an at-risk shorebird: Feasibility of headstarting for American Oystercatchers. *Bird Conservation International* 26: 451-465.
- Haney, J.C., P.G.R. Jodice, W.A. Montevecchi, and D.C. Evers. 2017. Challenges to oil spill assessment for seabirds in the deep ocean. *Archives of Environmental Contamination and Toxicology*.
- Lamb, J.S.\*, K.M. O'Reilly, and P.G.R. Jodice. 2016. Physical condition and stress levels during early development reflect feeding rates and predict pre- and post-fledging survival in a nearshore seabird. *Conservation Physiology* 4 (1).
- Lamb, J.S.\*, Y.G. Satge, C.V. Fiorello, and P.G.R. Jodice. 2016. Behavioral and reproductive effects of bird-borne data logger attachment on Brown Pelicans on three temporal scales. *Journal of Ornithology*.
- Lamb, J.S.\*, Y.G. Satge, and P.G.R. Jodice. In Press. Nestling diet composition and provisioning rates determine reproductive success in a subtropical nearshore seabird. *Marine Ecology Progress Series*.
- Lamb, J.S.\*, Y.G. Satge, and P.G.R. Jodice. 2017. Influence of density-dependent competition on foraging and migratory behavior of a subtropical colonial seabird. *Ecology and Evolution* 2017; 00:1–13.
- Lawson, A.J.\*, J.S. Sedinger, and E.J. Taylor. 2017. Life history patterns, individual heterogeneity, and density dependence in breeding common goldeneyes of the northern boreal forest. *Journal of Avian Biology* 45:597–610. (Cover article)
- Lawson, A.J.\*, J.S. Sedinger, and E.J. Taylor. In press. Identifying demographic and environmental drivers of recruitment and population growth in a cavity nesting sea duck population. *Journal of Avian Biology*.

- Poli, C.L.\*, A-L. Harrison, A. Vallarino, P.D. Gerard, and P.G.R. Jodice. 2017. Dynamic oceanography predicts fine scale foraging behavior of Masked Boobies in the Gulf of Mexico. *PLoS ONE* 12(6).
- Quinn, J.E. and J.M. Wood\*. 2017. Application of a coupled human natural system framework to organize and frame challenges and opportunities for biodiversity conservation on private lands. *Ecology and Society* 22:39
- Ramos, R., N. Carlile, J. Madeiros, I. Ramirez, V. Paiva, H. Dinis, F. Zino, M. Biscoito, G. Leal, L. Bugoni, P.G.R. Jodice, P.G. Ryan, and J. Gonzalez-Solis. 2017. It is the time for oceanic seabirds: tracking year-round distribution of gadfly petrels across the Atlantic Ocean. *Diversity and Distributions*.
- Ross, B.E., D. Haukos, C. Hagen, and J. Pitman. *In review*. Combining multiple sources of data to better inform conservation for Lesser Prairie-Chickens. *Auk*.
- Ross, B.E., D. Haukos, and P. Walther. *In review*. Quantifying Changes and Drivers of Mottled Duck Density in Texas. *Journal of Wildlife Management*.
- Thompson, H.L.\* and A.E. Lacy. 2016. Winter and migratory habitat use of six Eastern Greater Sandhill Cranes. *Proceedings of the North American Crane Workshop* 13: 47-53.
- Wilkinson, B.P.\*, J. Jahncke, P. Warzybok, R.W. Bradley, and S.A. Shaffer. *In review*. Variable utilization of shelf break associated habitats by a small generalist seabird in the California Current System. *Marine Ecology Progress Series*.
- Zinsser, E.\*, F.J. Sanders, P. Gerard, and P.G.R. Jodice. 2017. Daily survival rate and habitat characteristics of nests of Wilson's Plover. *Southeastern Naturalist* 16:149-156.

## THESES AND DISSERTATIONS 2016-17

- Leanne Burns, Department of Forestry and Environmental Conservation, M.S., December 2016: *Seasonal Habitat Use and Activity of Bats in Relation to Prescribed Fire and Environmental Conditions* (Co-advised w/ Dr. S Loeb, USFS)
- Fumika Takahashi, Department of Forestry and Environmental Conservation, M.S., December 2016: *Use of Horseshoe Crab Spawn by Migratory Shorebirds*
- Hannah Madden, University of West Indies, M.S., May 2017, *Reproductive Ecology of Red-billed Tropicbirds*

## ACTIVITIES

### TRAINING

Beth Ross participated in an “Intermediate R” workshop at The Wildlife Society Conference in 2016. The workshop reached a wide audience including state and federal biologists as well as NGO employees.

Beth Ross participated in a workshop entitled “Social Networking for Scientists” at the North American Ornithological Conference in 2016.

Sarah Kimpel attended basic wildland fire training at Kings Mountain National Military Park, Blacksburg, SC. Courses completed include: Basic Wildland Fire Training (S-130 and S-190), Human Factors on the Fireline (L-180), Introduction to ICS for Operational First Responders (ICS-100), National Incident Management System (NIMS), An Introduction (IC700)

Abby Lawson is the Instructor of Record for “Introduction to Natural Resources” for the Fall 2017 semester at Clemson University

Abby Lawson attended the “Data management fundamentals for long-term wildlife studies” workshop at The Wildlife Society Conference in 2016 in Raleigh, NC.

Hannah Plumpton attended The Wildlife Society’s Quantitative Analysis of Satellite-Derived Data for Animal Ecology and Conservation in Raleigh, NC.

Hannah Plumpton attended The Wildlife Society’s Managing Wildlife Conservation and Management Conflicts through Formalized Conservation Action Planning in Albuquerque, NM.

Rochelle Streker led an Ornithology Lab for the Dauphin Island Sea Lab at Gaillard Island, Alabama

### PRESENTATIONS AND SEMINARS

Abby Lawson co-organized a symposium at the 24<sup>th</sup> Annual Wildlife Society Conference entitled “Structured Decision Making: A Vehicle for Navigating the Crossroads of Cultures in Wildlife Management”. The symposium featured 10 invited speakers, including two USGS CRU scientists.

Abby Lawson was the lead organizer for a symposium at the 23<sup>rd</sup> Annual Wildlife Society Conference entitled “Applications of Decision Analysis in Wildlife Population Management”. The session included 10 invited speakers, including four USGS CRU scientists.

### INVITED PRESENTATIONS

Lamb, J.S. and P.G.R. Jodice. 2017. Developing ecologically-motivated risk assessments for marine birds in the Gulf of Mexico. University of Georgia Seminar Series, Athens, GA.

Lamb, J.S. and P.G.R. Jodice. 2017. Evaluating year-round seabird habitat needs in the Gulf of Mexico to improve oil pollution risk assessment and mitigation. Queen’s University, Kingston, Ontario, Canada.

Lawson, A.J.\*, P.G.R. Jodice, T.R. Rainwater, M.P. Guillette, K.W. McFadden, and P.M. Wilkinson. 2016. Interannual variation in American alligator home ranges in impounded wetlands. Biology and Ecotoxicology of the American Alligator Biennial Symposium, NASA Kennedy Space Center, FL.

Lawson, A.J.\* 2017. South Carolina alligator population ecology: abundance estimation and monitoring. Natural Resource Measurements, Clemson University, Clemson, SC.

**CONTRIBUTED PAPERS / PRESENTATIONS / POSTERS**

- Burns, L.\*, S.C. Loeb, W.C. Bridges, and P.G.R. Jodice. 2016. Following the flames? Bat Occupancy in Cumberland Plateau Forests Managed by Fire. North American Society for Bat Research, San Antonio, Texas.
- Ferguson, L., Y. Satge, J. Tavano, and P.G.R. Jodice. 2016. Seabird Colony Registry and Atlas: South Carolina, Georgia, northern Florida. The Waterbird Society, New Bern, North Carolina. *Poster*.
- Kimpel, S. P.\* and S. C. Loeb, 2017. Roost Network of Southeastern Myotis in an Old-Growth Bottomland Hardwood Forest. 97th Annual Meeting of the American Society of Mammologists, Moscow, ID
- Kimpel, S. P. \*and S. C. Loeb, 2017. Roost Network of Southeastern Myotis in an Old-Growth Bottomland Hardwood Forest. Graduate Research and Discovery Symposium, Clemson, SC. *Poster*.
- Kimpel, S. P. \*and S. C. Loeb, 2017. Roost Network of Southeastern Myotis in an Old-Growth Bottomland Hardwood Forest. 22nd Annual Meeting of the Southeastern Bat Diversity Network & 27th Annual Colloquium on the Conservation of Mammals in the Southeastern U.S., Asheville, NC. (*Best Bat Presentation*)
- Kimpel, S. P.\*, S. C. Loeb, and P. G. R. Jodice. 2016. Canopy Roosting Southeastern Myotis: An Anomaly? 46<sup>th</sup> Annual Meeting, North American Society for Bat Research, San Antonio, TX.
- Lamb, J.S.\*, Y.G. Satgé, and P.G.R. Jodice. 2017. Movement patterns and habitat selection of Brown Pelicans in the Gulf of Mexico. Pacific Seabird Group Annual Meeting, Tacoma, Washington.
- Lamb, J.S.\*, Y.G. Satgé, and P.G.R. Jodice. 2017. Movement patterns and habitat selection of Brown Pelicans in the Gulf of Mexico. Waterbird Society Annual Meeting, Reykjavik, Iceland.
- Lamb, J.\*, K. O'Reilly, and P.G.R. Jodice. 2016. Longterm physiological responses of nestling seabirds to variation in prey availability and nest site characteristics. The Waterbird Society, New Bern, North Carolina.
- Lamb, J.\*, K. O'Reilly, and P.G.R. Jodice. 2016. Longterm physiological responses of nestling seabirds to variation in prey availability and nest conditions. Society for Integrative and Comparative Biology, Portland, Oregon.
- Lawson, A.J.\*, P.G.R. Jodice, T.R. Rainwater, and K.W. McFadden. 2017. Evaluating American alligator home range and site fidelity patterns in artificial wetlands. International Congress for Conservation Biology, Cartagena, Colombia.
- Lawson, A.J.\*, P.G.R. Jodice, T.R. Rainwater, and K.W. McFadden. 2017. Seeya later Alligator? Evaluating home range and site fidelity patterns of a keystone predator. Clemson Biological Science's Annual Student Symposium, Clemson, SC.
- Lawson, A.J.\*, C.T. Moore, P.G.R. Jodice, and K.W. McFadden. 2016. Optimizing American alligator population survey design to improve management decision-making. The Wildlife Society, Raleigh, NC.

- Lawson, A.\*, P.G.R. Jodice, T.R. Rainwater, M.P. Guillette, K.W. McFadden, and P.M. Wilkinson. 2016. American Alligator Home Range and Movement Patterns in Coastal South Carolina. Crocodylian Specialist Group, Cape Town, South Africa.
- Lawson, A.J.\*, P.G.R. Jodice, and P.M. Wilkinson. 2017. Long-term survival patterns in South Carolina's top predator: the American alligator. Clemson University Graduate Research and Discovery Symposium. Clemson, SC. *Poster*.
- Levac, A., H.L. Thompson\*, and M.J. Fitzpatrick. 2017. Examining Whooping Crane foraging efficiency in the Eastern Migratory Population. North American Crane Workshop, Chattanooga, TN.
- Mackin, W., D. Narang, and P.G.R. Jodice. 2016. Incubation and diving depths of Audubon's Shearwaters and Red-billed Tropicbirds at Little Tobago Island, Trinidad and Tobago. The Waterbird Society, New Bern, North Carolina.
- Plumpton, H.M.\*, E.D. Silverman, and B.E. Ross. 2017. Annual Factors Affecting the Wintering Distribution of Black Scoters. 6<sup>th</sup> International Sea Duck Conference, San Francisco, CA. *Poster*.
- Plumpton, H.M.\*, E.D. Silverman, and B.E. Ross. 2017. Annual Factors Affecting the Wintering Distribution of Black Scoters. The Wildlife Society Annual Meeting, Albuquerque, NM.
- Ross, B.E., M. Hooten, and D. Koons. August 2017. Evaluating the inference from dynamic occupancy models relative to population abundance. American Ornithologists' Society Conference. East Lansing, MI.
- Ross, B.E. D. Haukos, C. Hagen, and J. Pitman. August 2016. Combining multiple data sources to determine drought and land-use impacts on lesser prairie-chickens. North American Ornithological Conference. Washington, D.C. Organized symposium on integrated population models in avian systems.
- Satgé, Y., J. Wilder, J. Sorber, and P.G.R. Jodice. 2016. An automated alert system to help with the recovery of archival loggers deployed on seabirds. The Waterbird Society, New Bern, North Carolina. *Poster*.
- Takahashi, F.\*, P.G.R. Jodice, and F. Sanders. 2016. Shorebird utilization of horseshoe crab eggs at Cape Romain National Wildlife Refuge, South Carolina. The Wildlife Society, Durham, North Carolina. *Poster*.
- Takahashi, F.\*, P.G.R. Jodice, and F. Sanders. 2016. Shorebird utilization of horseshoe crab eggs at Cape Romain National Wildlife Refuge, South Carolina. The Waterbird Society, New Bern, North Carolina.
- Thompson, H.L.\*, P.G.R. Jodice, and A.E. Lacy. 2016. A day in the life of a Whooping Crane: habitat use and movements on the wintering grounds. North American Ornithological Conference, Washington, DC.
- Thompson, H.L.\*, P. Jodice, and A.E. Lacy. 2017. Local scale habitat use and daily movements of wintering Whooping Cranes in the Eastern Migratory Population. The Waterbird Society, Reykjavik, Iceland.

Thompson, H.L.\*, P. Jodice, and A.E. Lacy. 2017. Local scale habitat use and daily movements of wintering Whooping Cranes in the Eastern Migratory Population. North American Crane Workshop, Chattanooga, TN.

Wood, J.M.\*, A.K. Tegeler, and B.E. Ross. September 2017. Quantifying the effects of Farm Bill cost-share conservation practices on avian species on private lands in South Carolina. 24<sup>th</sup> Annual Conference of The Wildlife Society. Albuquerque, New Mexico. *Poster*.

## SERVICE

Beth Ross, Kennedy Center Advisory Council

Beth Ross, committee member, Fisheries Ecologist Search, Dept. of Forestry and Environmental Conservation

Beth Ross, committee member, Boone & Crockett Chair Committee, Dept. of Forestry and Environmental Conservation

Beth Ross, Board Member (elections), The Wildlife Society, Biometrics Working Group

Beth Ross, Associate Editor, Wildlife Society Bulletin

Patrick Jodice, Chair, World Seabird Union: 2015 – 2020.

Patrick Jodice, Steering Committee Member, Gulf of Mexico Avian Monitoring Network

Patrick Jodice, Steering Committee Member, Atlantic Marine Bird Cooperative

Juliet Lamb, elected board member, Waterbirds Society: 2016-2018.

Abby Lawson, Ecology and Natural Resources Speaker Series Coordinator, Clemson University. 2017-2018

Abby Lawson, Fisheries Ecologist Faculty Search Committee Graduate Student Representative. 2017.

Abby Lawson, IUCN SSC Crocodile Specialist Group. Ongoing.

Hannah Plumpton, Natural Resources Graduate Student Association Secretary/Treasurer, Clemson University. 2017-2018.

Hillary Thompson, North American Crane Working Group Board Member. 2017 – present.

Jesse Wood, Natural Resources Graduate Student Association, Vice President, Clemson University. 2017-2018.

## AWARDS AND HONORS

Beth Ross, The Wildlife Society Leadership Institute Class of 2017

Patrick Jodice, USGS Annual Performance Award, 2016

Sarah Kimpel, Marion E. Bailey Assistantship for Research in National Parks, 2017-2018

Sarah Kimpel, Graduate Research and Discovery Symposium First Place Poster for the College of Forestry and Life Sciences, 2017

Sarah Kimpel, Southeastern Bat Diversity Network Best Bat Presentation February 2017

Sarah Kimpel, Clemson University Professional Enrichment Grant April 2017

Sarah Kimpel, Natural Resources Graduate Student Association Travel Award April 2017

Sarah Kimpel, Clemson University Professional Enrichment Grant September 2016

Abby Lawson, Clemson University Professional Enrichment Grants, 2017

Abby Lawson, Stephen L. Potts Memorial Award, 2017

Abby Lawson, Marion E. Bailey Assistantship for Research in National Parks, 2017-2018

### **South Carolina Cooperative Fish & Wildlife Research Unit**

Abby Lawson, South Carolina Wildlife Federation Graduate Student Scholarship 2016

Abby Lawson, Wade Stackhouse Fellowship, 2017-2018

H. Thompson, North American Crane Working Group Student Travel Award, 2017

H. Thompson, Waterbird Society Student Travel Award, 2017

## **PRESS/PUBLIC OUTREACH**

Outreach: Jesse Wood, Greenville County Forestry & Wildlife Society. Greenville, South Carolina. February 28, 2017

Outreach: Guest on SciCommMonday, a weekly live Periscope broadcast show featuring biologists and science communicators. Abby Lawson, 2017.

Outreach: Hosted 'SciParty' (@SciParty), a rotating curator, science-focused Twitter account, to discuss alligator ecology and behavior. Abby Lawson, 2017

Outreach: Project Pelican Presentation. Buccaneer Yacht Club, Mobile AL. Rochelle Streker. 2017.

Outreach: A conservation success story: Keeping a rare crane common in Wisconsin. Philanthropic Educational Organization of Door County Lunch Speaker Series. Hillary Thompson. 2016

Outreach: Wintering Whooping Cranes in the Eastern Migratory Population. Nemours Wildlife Foundation Spring Friends Event. Hillary Thompson. 2017

Outreach: Presentation to the Carolinas Nature Photography Association – Midlands Chapter. November 2016 Roosting Habits of Southeastern *Myotis* in an Old-Growth Bottomland Hardwood Forest. Sarah Kimpel.

Outreach: Roper Mountain Science Center Second Saturday Programs October, 2016 community outreach event. Sarah Kimpel.

Press: Parent-reared Whooping Cranes starting their first migration. International Crane Foundation website. Hillary Thompson, 2016.

Press: Whooper Whereabouts: 2016 Parent-reared Whooping Crane Cohort. International Crane Foundation: The Bugle. Hillary Thompson, 2017

Press: Xploration: Awesome Planet Season 3 Episode 15 "Taking Flight" Aired December 2016. Sarah Kimpel.

Press: Alligator crushed by tree—here's how it happened. National Geographic, Abby Lawson. 2017.

Press: 35-year South Carolina alligator study uncovers mysteries about growth and reproduction. Clemson University Press Release. Abby Lawson, 2017.

Press: Clemson student finds alligator movements may be related to water drawdowns. Clemson University Press Release. Abby Lawson, 2016

Press: Study shows how Savannah area alligators get around. Savannah Now. Abby Lawson, 2016.

Press: Gators gagging on chemical contaminants? Charleston Post and Courier. Abby Lawson, 2016.

Twitter:

SC CRU: @SCCoopUnit

Beth Ross: @betheros

Brenna Byler: @philopsyche

Abby Lawson: @AbsLawson

Yvan Satgé and Juliet Lamb: @project\_pelican

Hillary Thompson: @HillLThompson



# Notes





