

KENNEDY ENDOWED PROGRAM

WATERFOWL & WETLANDS CONSERVATION

2018-2019

ANNUAL REPORT

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MISSISSIPPI STATE UNIVERSITY FOREST AND WILDLIFE RESEARCH CENTER

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2018-2019

Kennedy Endowed Program in WATERFOWL AND WETLANDS CONSERVATION

Annual Report

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MISSISSIPPI STATE UNIVERSITY

FOREST AND WILDLIFE RESEARCH CENTER

On the cover: Mr. Fernando Vizcarra

Below: Mottled Duck Capture and banding, Rockefeller Refuge, Louisiana.

> Our waterfowl and wetlands program had one of the busiest years in 2018 for travel and engagement in professional experiences. First, I traveled to Rockefeller Refuge in south Louisiana in early March

2018 to engage with fellow Lower Mississippi Valley and Gulf Coast Joint Venture colleagues to discuss important topics of research, management, and human dimensions related to waterfowl. This initial visit was followed up by a second trip to Rockefeller in mid-June 2018, where Dr. Chris Nicolai of U.S. Fish and Wildlife Service conducted training on how to use geolocators on mottled ducks. These tiny devices hold promise for use on a variety of waterfowl species to examine various aspects of their ecology. Later in June 2018, I participated with the Waterfowl Working Group, led by alumnus Dr. Heath Hagy of the U.S. Fish and Wildlife Service, in its waterfowl field days at Bald Knob National Wildlife Refuge in Arkansas. This was another great consortium of wetland/waterfowl biologists and managers, a local and extremely knowledgeable rice farmer, and graduate student, Terrel Christie. There, we engaged with managers on improved techniques to produce rice in addition to high-quality seasonal wetlands, and management techniques for bottomland hardwood forests. In late July 2018, Mr. Robert Taylor, Commissioner of the Mississippi Department of Wildlife, Fisheries & Parks, hosted us at his amazing Quail Ridge Ranch in Louisville, Mississippi. The waterfowl committee composed of MDWFP staff and



commissioners and other vital partners, convened to discuss a variety of issues including wetlands-waterfowl land management, harvest, and research. This information transfer and networking opportunity was valuable to me professionally and personally, and the Kennedy program is indebted to our partners for their support!

I had the unique opportunity to visit both the Pacific and Atlantic Flyways in December-January 2018-2019. Mr. Paul Bonderson hosted the Kennedy Chair holders and other waterfowl professionals and colleagues at his Birdhaven Ranch in the Sacramento Valley of California in early December 2018. This was a fantastic opportunity to collaborate with an outstanding cadre of fellow waterfowl professionals from universities; Ducks Unlimited, Inc.; Ducks Unlimited Canada; and Delta Waterfowl. Several professors brought at least one graduate student with them on the trip. This was the second year we convened to discuss the future of the Kennedy Waterfowl Chair positions and strategies in North America. Our inaugural 2017 meeting culminated in an article authored by our caucus team entitled, "Who Will Mind the Marsh?"

The heart and soul of the university is of course the undergraduate and graduate student leaders who participate in the waterfowl and wetlands conservation program. We added a Master of Science student, Ms. Madie McFarland, who assumed Fernando Vizcarra's project of working on the marsh terraces in south Louisiana. This research is supported by the National Academy of Sciences and, more recently, the National Fish and Wildlife Foundation. Our postdoctoral research associate, Dr. Jessica Klassen, continued complex analyses of winter duck distribution and development of a water model for the Mississippi Alluvial Valley. All of the graduate students working on these projects are hard-working and fantastic young professionals, and I highlight their abstracts or projects later in the report. Furthermore, we are also proud of the 14 wildlife, fisheries and aquaculture undergraduate students who participated in research and management technician positions in 2018, all of which included some aspect of waterfowl, wetlands, and waterbird-related work. Several of these graduate and undergraduate students worked with the college's marketing team to create a brief duck banding video at Noxubee National Wildlife Refuge in January 2018, included in a college-wide recruiting video.

Lastly, life sometimes presents us with really significant and unexpected events, and it was so true in 2018. Featured on the front cover of this year's Kennedy report is Mr. Fernando Vizcarra, a wildlife, fisheries and aquaculture graduate student who died in an automobile accident in August 2018. Prior to his death, Fernando Vizcarra was working on our transformational marsh terracing project in coastal Louisiana. This annual report is dedicated to Fernando, and I would like to next share some of what made Fernando such an extraordinary young man, who will be missed by everyone that knew him.

Sincerely,

Dr. J. Brian Davis

James C. Kennedy Endowed Associate Professor in Waterfowl and Wetlands Conservation

FWRC

Forest & Wildlife Research Center

A Remembrance: Fernando Rafael Vizcarra (1995-2018)

Fernando was one of three graduate students originally set to conduct waterfowl and wetland research in Puerto Rico under Dr. Francisco Vilella. Unfortunately. Hurricane Maria hit Puerto Rico in September 2017, and with it the research opportunities there disappeared in wake of the devastation on the island. Dr. Vilella and the three young men persevered, with hopes that funding and infrastructure could once again restore their professional aspirations to study abroad. Ultimately, and much to the support and reassurance of Dr. Vilella, the boys had to make a professional move, away from Puerto Rico. Fernando completed my waterfowl ecology and management course in fall 2017 and I took a quick liking to him. Fernando took his studies very seriously; he asked lots of questions and was always curious. He was quick to volunteer his time in and out of class and was always lending a hand to others. Moreover, his realism and innocent disposition were irresistible. Fernando easily earned an A in my class, and I recall thinking how fortunate we were for having such a fine young man in the department. He was so charismatic but also very humble, smart, and inquisitive.

While Hurricane Maria was ravaging the island of Puerto Rico, I and a larger team of fellow researchers, landed a National Academy of Science grant to study the dynamics of marsh terracing in Gulf coastal Louisiana. Terraces are small earthen berms created to help restore marsh, prevent or, at least, lessen the effects of erosion, and they provide other environmental benefits. We needed a master's student in wildlife, fisheries and aquaculture to help lead and cooperate with several other professionals and private landowners involved in this large and complex project. As one door was closing for Fernando due to the hurricane, another would quickly open and we promptly took advantage of his availability for another project. Everyone involved with the terrace project was thrilled with Fernando taking some leadership over the fledgling program.

Sadly, our excitement with him joining our team ended horrifically on August 5, 2018. Fernando was traveling back to MSU from North Carolina, after visiting his sister who just had her baby. He was so proud and happy for his sister and her new family. Unfortunately, inclement weather on Interstate-20 in South Carolina contributed to Fernando colliding with a large truck. We lost him instantly. The grief of that day impacted all that knew him, especially his friends and fellow graduate students who had built special bonds of friendship through their shared enjoyment of being in the outdoors and working with wildlife. In late August 2018, we presented Fernando's parents with a posthumous Master of Science degree that Fernando absolutely earned and would be proud to have known was resting with his family.

Several people expressed their condolences to me upon Fernando's passing. I had a conversation with a young lady who studied with Fernando in Alabama. In short, her memorial went like this: "I was a colleague and have known Fernando our entire four years at Alabama Agriculture and Mechanical University since we both took our first class, Chemistry 101 Lab together. He has always been a great friend to me and an amazing study partner. Fernando helped me land my first study abroad program in Costa Rica. I even remember coming back and being so excited to show him the little Spanish that I learned while I was there. Fernando is an amazing person and a very smart student with a kind heart. My condolences go out to his family and all of the friends that he made along the way." Many other friends, faculty, and students shared similar stories. For months, a lot of us fought the tears. Personally, this is the second instance for me where a student or research assistant passed away while we worked together. These things are not easy, and like it or not, you go through all the stages of grief and questioning.

In memoriam, the wildlife, fisheries and aquaculture graduate students created a Fernando Vizcarra Travel Fund Photo Contest in fall 2018 with the winners receiving a small stipend to attend a conference. The photos submitted are all fantastic and are a tribute to Fernando's love of travel and adventure. One of our waterfowl graduate students. Terrel Christie, won the competition in 2019 with an image of a Wedge-tailed Shearwater. I smile at the symbolic nature of this photo every time I see it. In the picture, we see beautiful blue sky, with a graceful, outstretched shearwater gliding effortlessly on a thermal. Symbolically, Fernando is likely watching us from high above, with his wings spread wide, protecting us along our voyage. God speed and rest well little buddy - we miss vou.

CFR | FWRC











Waterfowl Hunting and a Plea for Hunter Patience

J. Brian Davis

James C. Kennedy Endowed Associate Professor in Waterfowl and Wetlands Conservation

In the 2017–2018 Annual Report, I wrote about waterfowl hunting in a piece titled, "The North American Waterfowl Management Plan, Waterfowl Hunting, and Tragedy of the Commons." In keeping with that theme, I want to re-emphasize some related aspects regarding the 2018–2019 waterfowl hunting season. Despite a cold spell in November, this autumn-winter was relatively mild, and record-setting rainfall and landscape flooding essentially inundated much of the eastern flyways. These environmental circumstances led to ducks. especially large birds like mallards and black ducks, delaying or otherwise not migrating "South" as they might do during colder winters. The mild weather seemed bad enough, but the accompanying widespread water throughout much of the central and eastern United States created further challenges for hunters. dispersing ducks abroad. If I can relate, my busy work only allowed me to hunt nine days this season, but I was lucky to hunt in four states, including California and South Carolina, which gave me some continental perspective. The verbal ring among hunters was similar across these landscapes. In early December, one of our hosts in California remarked that we visited way too early, as most of the "big ducks" were still in Washington and Oregon. I hunted on two legacy plantations in South Carolina on the last weekend of the season in January. and on that Sunday, two of us sharing a typically successful blind didn't fire a shot. One sage plantation owner there remarked that in 60 years of waterfowl hunting, 2018-2019 was by far his worst. Closer to home, hunters scowled at the fact that dozens of acres of unharvested soybeans flooded by the Cache River in Arkansas apparently never had ducks near them. In south Louisiana, some hunters allegedly packed up camp a week or two before season's end. Dozens of similar anecdotes have been shared by hunters across the country this past waterfowl season. One of my messages in this article is the reassurance that we waterfowl biologists hear your concerns and are not dismissing your frustrations.

For fear of sounding like a broken record, as many of you have heard this before, waterfowl migrations and habitat selection across continents or regions

are complex. Waterfowl move across vast landscapes for many reasons. Weather, food, and other habitat components; trends in landscape agricultural grain availability; directed wetland and agricultural habitat management by landowners for purposes of hunting; hunting pressure; ratio of young to adult birds in the populations; and many other factors influence why and when birds move. Each year in North America, waterfowl leave the higher latitudes for southern destinations, yet solving the environmental riddles as to precisely how, when, and why (or why not) birds move across the continent and beyond is complicated.

Relative to the complexities I mentioned, we realize that the answer isn't always just about "the weather." Our weather is highly variable from year-toyear, but our climate is changing over the long term, and so too are other things such as agricultural production, including increased corn production on the family farm. Additionally, interest and ability through improved knowledge to manage quality habitats for waterfowl on both private and public lands; increased



acreage of some conservation programs, such as Wetland Reserve Easement, formerly the Wetland Reserve Program; and loss of historical waterfowl habitats, either naturally or through privatization, further condensing public-lands and moving hunters into remaining quality habitats are just a few of the many factors that impact waterfowl hunting overall. In my opinion, it is not far-fetched to reconcile that in some instances we are perhaps our own worst enemies. That is, we have and continue to work really hard to find and move to habitats that contain huntable numbers of ducks and geese. Not that we haven't always done this, but perhaps the intensity and mobility in which we do it nowadays has increased compared to the past. With increased scientific knowledge produced in recent decades about waterfowl food and other habitat requirements, land managers nationwide are adopting premier habitat management strategies. These habitats are distributed on both private and public lands. Advances in communications technology have now allowed information on waterfowl whereabouts to spread like wildfire. It seems to me that people today seemingly have the time and money to invest in locating and ultimately hunting waterfowl, whether on their own accord or by paying for guide services that seem to be expanding in parts of this country. No one really knows what impact this "melting pot" of variables is having on the ducks, but drum beats among hunters of diminished hunting quality seem to reverberate.

Given these hunter frustrations, many of us from universities, state and federal agencies, and non-governmental organizations concerned with waterfowl banded together with hunters in March 2019, and will re-convene again soon, to explore in detail this issue of "What is going on with the ducks?" Waterfowl hunters are critical wildlife-resource conservationists. Dismissing hunter observations and displeasure would be a tremendous disservice to our collective brood. No doubt, hunters expressing frustration is much easier than for any of us to fully reconcile how to guarantee a quality hunting experience every time we venture out. Fully understanding all of the causes of the apparent "duck mysteries" voiced among hunters nowadays is, admittedly, beyond anyone's grasp right now, but we are motivated to investigate it more thoroughly for the welfare of all of us waterfowl conservationists. I will expand on these notions in the 2019–2020 report. Meanwhile, I encourage you to view and participate in our waterfowl hunting conservation community as one cooperating entity.



"Fully understanding all of the causes of the apparent "duck mysteries" voiced among hunters nowadays is, admittedly, beyond anyone's grasp right now, but we are motivated to investigate it more thoroughly for the welfare of all of us waterfowl conservationists."



Project Update

Long-term influences of winter abundance and distribution of mallards and other ducks in the Mississippi Delta

Dr. Jessica Klassen *Postdoctoral Research Associate*

Dr. Klassen has two primary components to her study. The first is a novel approach where she is developing a water model for the Mississippi Alluvial Valley (MAV). This model will predict winter water locations across the entire MAV in autumn through winter. To date, the model appears to have about 80 percent accuracy in locating water-covered areas down to an area of approximately 30-meter resolution. Preliminary analyses suggest that across land-cover types, the model accuracy ranges from 79 percent to 94 percent. Preliminarily, the model tends to underestimate water cover, but it will be used to denote relative changes in water availability for waterfowl throughout autumn and winter.

In the second objective of her work, Klassen is analyzing longterm duck distribution data in Mississippi and in other MAV states. To make this possible, Dr. Klassen had to first merge the water model information into other statistical methods to generate wetland-availability scenarios to plot with each survey date. This allowed wetland habitat types to be interpreted around the waterfowl detection points. Klassen also incorporated weather data into the model. Thus far, both small and large mallard groups were associated with an increase in inundated crop fields, inundated forested wetlands, and seasonal-emergent wetlands. Both small and large non-mallard dabbler groups were associated with an increase in inundated crop fields, seasonal-emergent wetlands, and aquaculture farms. Further analyses will continue in 2019-2020.



Student Abstracts

Part of the professional training of graduate students is their participation in scientific or other technical conferences and venues. Students of the Kennedy program gave several talks and posters in diverse venues in 2018, and below are abstracts or modifications of them. The complete list is available under the **Presentations** section of this report. Current and former students are highlighted in bold.







Doctoral Student

Joseph D. Lancaster



Mallard Use of Incentivized Conservation Program Wetlands during Winter in Mississippi

Lancaster, J. D., J. B. Davis, and R. M. Kaminski

Despite significant wetland loss and transformation, the Mississippi Alluvial Valley (MAV) remains a continentally important region for wintering mallards (Anas platyrhynchos) and other waterfowl. Targeted management on private lands is vital to satisfying regional habitat goals for waterfowl, because 90 percent of the MAV is privately owned. Whether through targeted objectives or as a side effect of soil and water conservation initiatives, myriad federal, state, and private-sector programs expand waterfowl habitat on private lands through landowner incentives. Incentivized wetland programs are embraced for benefiting waterfowl, but little information exists on waterfowl use of these wetlands in the MAV. We hypothesized that incentivized wetlands are a significant wetland source for female mallards, especially after hunting season when other wetlands are dewatered. We radio-marked 241 female mallards in the MAV of Mississippi in winters 2010-2015 and collected 9,229 locations to examine mallard use of incentivized wetlands representing seven conservation programs, private wetlands managed outside of a program, and public wetlands. We used Dirichlet regression to explore variation in wetland use during and post hunting season and between diurnal and nocturnal periods. Use of incentivized wetlands ranged from 16-35 percent and females used these wetlands 33.2 percent (CI₉₅ = 8.0–64.3 percent) more posthunting season. Incentivized wetlands were used 10.6 percent (-16.3-46.2 percent) more diurnally than nocturnally posthunting season, but 19.0 percent (-18.6-73.9 percent) more nocturnally than diurnally during hunting season. Public wetlands were used more than incentivized wetlands diurnally during hunting season but similarly otherwise. Although variable, private wetlands managed outside of a program were generally used more than incentivized wetlands but never less. Programs, such as the Wetlands Reserve Program, that retire cropland and restore native vegetation and hydrology were most used among the seven incentivized conservation programs. Hunting may decrease mallard use of incentivized wetlands diurnally, but incentivized wetlands are an important wetland source post-hunting season.

Oral presentation at the 78th Midwest Fish and Wildlife Conference, Milwaukee, Wisconsin, January 28-31, 2018.

Master of Science Students



Terrel Christie

Predation Risk of Double-crested Cormorants (*Phalacrocorax auritus*) on Commercial Catfish Production in the Mississippi Delta

Christie, T. W., J. B. Davis, B. S. Dorr, K. Hanson-Dorr, L. A. Roy, A. Kelly, C. Engle

Double-crested cormorants (Phalacrocorax auritus) impact United States commercial aquaculture and are considered the greatest avian predators at catfish (Ictalurus spp.) aquaculture facilities. Cormorants are especially problematic in western Mississippi, the Delta, where catfish production is concentrated providing ideal wintering and foraging areas. Although cormorant/aquaculture dynamics have been studied in the past, recent changes (e.g., decreased overall hectares in production) in aquaculture practices and regulatory policies merit contemporary research. Therefore, we estimated abundance and distribution of cormorants at their night roosts and assessed diet related to catfish consumption. We used aerial point count surveys flown over night roosts from October through April for two winters, 2016 through 2018. Following each survey three active night roosts were randomly selected for harvesting cormorants for later necropsy and stomach contents assessment. We completed 25 total surveys and counted 242,923 cormorants. Mean number of cormorants detected per survey, pooled over years, was 9,717 (range 2,044 to 17,672). We collected 730 cormorants from 27 different night roosts across years. In winter 2016-2017, catfish comprised 55 percent of the prey biomass detected with shad (Dorosoma spp.) being the other predominate prev species. Evidence suggests that the distance between a night roost and the nearest catfish aquaculture facility is an important predictor for a bird's relative amount of catfish consumption. These results will inform wildlife management about relationships between cormorant night roost locations in the Delta and disproportionate consumption of catfish, aiding techniques to help ameliorate fish losses on aquaculture facilities.

Oral presentation at the 2018 The Wildlife Society annual meeting, Cleveland, Ohio, October 7-11, 2018

Stephen Clements



Foraging Ecology and Depredation Impact of Scaup on Commercial Baitfish and Sportfish Farms in Eastern Arkansas

Clements, S. A., J. B. Davis, B. S. Dorr, K. C. Hanson-Dorr, L. A. Roy, A. M. Kelly, C. Engle, S. C. Barras

Research is needed to address the growing concerns of Arkansas' commercial baitfish and sportfish producers regarding the perceived increase in consumption of fish by lesser scaup (Avthva affinis) and greater scaup (Avthva marila), hereafter, scaup. The goals of our study were to estimate the distribution and abundance of piscivorous waterbirds, including scaup, on bait- and sport-fish farms during fall-winters 2016-2017, and compare our contemporary results with unpublished surveys conducted from 2004 to 2005. Additionally, we aimed to estimate the amount of fish consumed by scaup foraging on commercial bait- and sport-fish ponds. We surveyed approximately 800 baitfish and sportfish ponds (n = 15 individual farms) in Lonoke and Prairie Counties, Arkansas in winter 2016-2017. Primary fish species produced on surveyed farms were golden shiners (Notemigonus crysoleucas), fathead minnows (Pimephales promelas), bluegill (Lepomis macrochirus), and goldfish (Carassius auratus). Accompanying these surveys, we also collected 294 foraging scaup from ponds. We removed and identified all food items in the gastrointestinal tract above the gizzard and taxonomically sorted, dried, and weighed each sample. All gizzards were examined for presence or absence of fish parts. We detected fish parts in two percent of scaup examined. A generalized linear mixed model fitted to previous and current survey data showed that scaup abundances were significantly higher on golden shiner ponds than ponds containing fathead minnows, goldfish, or sportfish. Our model indicates a significant decrease in scaup abundances during the contemporary surveys. We attribute the apparent low consumption of fish by scaup and low scaup abundances to the mild 2016-2017 winter. Our data will provide an important framework for developing potential management strategies for reducing fish predation by scaup on commercial aquaculture farms in Arkansas and will inform an estimate of the total economic impact of scaup foraging on Arkansas' bait- and sport-fish producers.

Oral presentation at the 2018 The Wildlife Society annual meeting, Cleveland, Ohio, October 7-11, 2018.

Alexis (Lexi) Firth



Ecological Agriculture Application with Winter Flooding

Firth, A. G., B. Baker, J. P. Brooks, J. B. Davis

Rice is the staple food for more than half of the world's population and has the ability to support more people per unit of land area than wheat or corn because rice produces more food energy and protein per hectare than other grain crops. However, with the human population projected to reach 8.5 billion by 2030, there are major concerns about the sustainability of rice production practices because of its major role in consumption of natural resources, namely water and soil. There is a critical need to identify sustainable production practices that are economically feasible and minimize adverse environmental effects. The purpose of this project is to investigate a potentially sustainable rice production system in the Mississippi Alluvial Valley (MAV) that uses ecological principles to enhance environmental quality and economic gain at the field scale. We hypothesize that the annual flooding of rice fields to create water bird habitat will benefit soil health and water quality and increase avian biodiversity, as well as provide agronomic benefits to the farmer. Soil health, avian biodiversity, and water quality will be quantified to determine the profitability of implementing this system. Proof of concept at the field scale will provide a framework for other producers within the MAV to adopt similar management methods. ultimately improving the overall integrity of soil, water, and environmental quality as well as the farmer lifestyle.

Poster presentation at the Mississippi Water Resources Conference, Mississippi Water Resources Research Institute, Jackson, Mississippi, April 2, 2018.

Margaret (Maggie) Gross



True Metabolizable Energy of Submersed Aquatic Vegetation for Ducks

Gross, M., C. Jacques, H. Hagy, S. McClain, J. B. Davis, J. Simpson, J. Lancaster, A. Yetter

Wetland vegetation communities provide critical foraging habitat for waterfowl and are disappearing at an alarming rate throughout the Midwest. The loss of wetlands and the submersed aquatic vegetation (SAV) they contain is well documented. However, there is a lack of information about the implications of these losses on energetic carrying capacity for waterfowl. Managers can estimate the energetic carrying capacity for a wetland by determining the energetic value (true metabolizable energy; TME) of foods available to ducks. Although energetic carrying capacity models are sensitive to TMEs, very few TMEs are available for SAV. Most available TME values are from plant seeds and have only been estimated from mallards and blue-winged teal, neither of which primarily consume aquatic vegetation. We estimated TME values of eight common species of SAV for mallards (Anas platyrhynchos), gadwall (Mareca strepera), and ring-necked ducks (Aythya col*laris*) in order to parameterize energetic carrying capacity models. We used established TME methods which consisted of fasting, feeding ducks a known amount of vegetation, and subsequently collecting their excreta. Excreta was dried, ground, pressed into pellets, and combusted in a Parr 6050 compensated jacket calorimeter to determine gross energy. We then calculated TME from gross energy of raw vegetation and excreta. Preliminary results for mallards indicate that TME was greatest for Canadian waterweed (Elodea canadensis; 1.69 ± 0.33 kcal/g) and southern naiad (*Najas guadalupensis*; 1.40 ± 0.43 kcal/g) and lowest for Eurasian watermilfoil (Myrio*phyllum spicatum*; -0.53 ± 0.51 kcal/g), which required more energy to process than was assimilated. The TME values for these SAV species will allow wetland managers to more accurately evaluate wetland management practices and refine energetic carrying capacity estimates. Moreover, these values contribute a better understanding of the value of emergent marshes containing SAV for ducks, which potentially could provide as much energy as moist soil wetlands.

Oral presentation at the 110th Illinois State Academy of Sciences (ISAS) meeting, Millikin University, Decatur, Illinois, April 13-14, 2018.

Sharilyn Taylor



Assessing Native Bee (Hymenoptera: Apoidea) Diversity in Natural Wetland Plant Communities of the Mississippi Delta

Taylor, S., J. B. Davis, K. Parys, M. Lashley

The Mississippi Alluvial Valley (MAV) once contained nearly 9.7 million hectares of bottomland hardwood forest and associated habitats. Over 80 percent of the MAV was eliminated or modified for agriculture, flood control, and urban expansion. Loss and fragmentation of herbaceous and riparian-forested plant communities of the Delta could negativity impact native bee populations. Natural plant communities adjacent to agricultural croplands serve as important nesting habitats and provide nutritional resources for native bees. Despite the potential importance of wetland and associated habitats to native bees, there is virtually no historical documentation of bees in these natural landscapes of the MAV. To begin quantifying native bee species abundance and richness, we surveyed Wetland Reserve Program (n = 14) and National Wildlife Refuge (n = 4) lands of the Mississippi Delta, June through November 2017. At each site, we used three standardized collection methods that included bee bowl platform (height-adjustable), malaise, and vane traps to sample bees. We established traps along a line transect, located within 1200 meters from a wetland habitat. We hypothesized that species richness increases with habitat complexity and in early succession (≤ 2 years since last disturbance) vegetation, which would harbor greater bee abundance and diversity than older sites. We collected approximately 30,000 specimens across all 18 research sites. Bee bowl platform and blue-lid vane traps captured the greatest number of native bees compared to malaise and yellow-lid vane traps on our wetlands; yellow-lid vane traps were least effective for captures. Our data represent only one year and are preliminary, but suggest that the number of native bees captured in traps located within wetland habitats increases with habitat complexity and floral availability.

Oral presentation at the 2018 Annual Meeting Alabama Chapter of The Wildlife Society, NaturePlex, Alabama Nature Center, Millbrook, Alabama, July 18-19, 2018.

New Members of Team Duck

Madelyn (Madie) McFarland, Master of Science student

Madie joined "Team Duck" in fall 2018 to assume the role of Fernando Vizcarra. Madie is working on the marsh terracing project in south Louisiana, part of a large grant funded primarily by the National Academy of Sciences. She hails from Baton Rouge, Louisiana, and attained a Bachelor of Science degree in Natural Resource Ecology and Management, with a concentration in Conservation Biology, from Louisiana State University. Madie already has diverse experience in her young career, since she served as a conservation intern for Ducks Unlimited, Inc. in the Great Lakes/Atlantic Region. During her undergraduate training, she worked on various projects involving mottled ducks, brown pelicans, egrets, prothonotary warblers, and other species. Madie enjoys hunting waterfowl and has participated in waterfowl education courses during her internship period with Ducks Unlimited, Inc.



Student Experiences

Research Scholars Program

Undergraduate student, D. ALEX DAVIS, was a recipient of the 2018 College of Forest Resources (CFR)/Forest and Wildlife Research Center (FWRC) Undergraduate Research Scholars Program. As part of this scholarship opportunity, Alex participated in examining a former dataset of Dr. Davis's project on shared use of next boxes by wood ducks and hooded mergansers in Mississippi. Alex helped examine a large dataset



(collected across two sites over four years), participated in analysis of the data, developed drafts of PowerPoint presentations, abstracts, and posters with a manuscript forthcoming in 2019-2020. Alex also gave an oral presentation on this project at the annual Southeastern Association of Fish and Wildlife Agencies (SEAFWA) in Mobile, Alabama, October 21-24, 2018. Alex also presented a poster at MSU's 2019 Spring Undergraduate Research Symposium on April 16, 2019.

Alumni

JESSIE CRITCHER – employed as a wildlife biologist with the Backwater Brake Timber Company in Mississippi

HUNTER PRIDGEN – employed as a regional biologist for MS Ducks Unlimited

Service

Students worked with biologists at the Sam D. Hamilton Noxubee National Wildlife Refuge banding ducks for a promotional video for the College of Forest Resources. https://www.youtube.com/watch?v=E7GqE7sEG6w&sns=em

Students spent a day of volunteer work picking up trash on MSU's campus.

Scholarships

RITA NICOLE SUMEREL, junior wildlife, fisheries and aquaculture major, received the Mark A. Schmoll Memorial Endowed Scholarship. Established by family and friends in memory of Mark A. Schmoll, candidates must be an undergraduate student in Wildlife Science/Management who show promise of an outstanding career in the wildlife profession.

NATHAN HARTSELL, sophomore wildlife, fisheries and aquaculture major, received the James C. Kennedy Scholarship in Waterfowl and Wetlands Conservation. Funded by Georgiabased Tuplagum Farms, LLC, this scholarship is awarded to qualified undergraduates or graduates pursuing a career in waterfowl and wetlands ecology and conservation.

JUSTIN LOWERY, freshman wildlife, fisheries and aquaculture major, received the Scenic Homes-Dr. Richard M. Kaminski Scholarship in Waterfowl and Wetlands Conservation established by Paul Meng.

STEPHEN CLEMENTS, master's WFA student, received the Thomas Plein Foundation Scholarship. This scholarship is awarded to graduate students who are researching or studying waterfowl and wetland resources, exhibit financial need, and have experience with Ducks Unlimited in some capacity through volunteering or work.

Student Organizations



The Ducks Unlimited Bulldog Chapter is an organization dedicated to waterfowl and wetlands conservation. The chapter is currently ranked fifth amongst collegiate chapters in the nation and the number one chapter in the state of Mississippi. Students participated in the fall banquet.

Internships

Seasonal jobs, internships, volunteer positions, or other developmental activities between student and mentors or employers are vital to student growth and success. Dr. Davis actively promotes undergraduate students for summer bio-technician positions and internships when possible. The following undergraduate students worked with waterfowl, waterbird, and wetland related projects in 2018.



CALEB AMACKER (1) – student intern in the Sam D. Hamilton Noxubee National Wildlife Refuge, summer 2018

MOLLY CHAMBLEE – student intern in the Forest and Wildlife Research Center, archiving a waterfowl literature database, spring-summer 2018

ALEX DAVIS – student intern in the Sam D. Hamilton Noxubee National Wildlife Refuge, summer 2018

JACKSON GUENTHER – biological technician in the Sam D. Hamilton Noxubee National Wildlife Refuge and MT7 Ranch, Breckenridge, TX.

NIKITA HINSON – bee lab assistant in the Forest and Wildlife Research Center **RYAN MANN**– assisted master's students Terrel Christie and Stephen Clements with waterbird projects winter-spring 2018; biological technician in Zell, South Dakota, assisting a master's student on a duck breeding ecology project, summer 2018.

ALI MARCHANT – scaup and cormorant research projects technician for the USDA

LOGAN MILLS (2) – biological technician for Mr. Robbie Russell, owner of a 2,000 acre property in Brownsville, Tennessee, summer 2018

LAUREL RIEBOCK (3) – scaup and cormorant research projects technician for the USDA

HADEN ROBERSON (4) – student intern in the Sam D. Hamilton Noxubee National Wildlife Refuge, summer 2018

COLTON RODGERS (5) – biological technician for Mr. Robbie Russell, owner of a 2,000 acre property in Brownsville, Tennessee, summer 2018

EVIE VON BOECKMAN (6) – student intern in the Sam D. Hamilton Noxubee National Wildlife Refuge and volunteer bee lab assistant in the Forest and Wildlife Research Center, summer 2018

COREY YARBER (7) – research technician on the native bee project in the Forest and Wildlife Research Center

Field Trips

Wetlands Ecology & Management, Fall 2018

Coastal Louisiana - Rockefeller Wildlife Refuge, Cameron Prairie NWR, and the rice country (November 8-11, 2018)

Coastal Louisiana is a vast and remarkable place. The sprawling wetlands and cheniers, the Gulf itself, and complexes of rice fields to the north, configure the region into one incredible, interconnected resource. For some of us, it is basically therapy for the soul.

Field trips provide excellent venues for experiential learning. Coastal Louisiana is among those "must experience" places given its history, culture, and biological diversity. I shepherded about a dozen students enrolled in the Wetlands Ecology and Management class in November 2018. This trip has grown in legacy, and one that I eagerly anticipate every year. The partnerships that we have established through the vears with Louisiana Department of Wildlife and Fisheries (LDWF), U.S. Fish and Wildlife Service, Ducks Unlimited, and the Wetlands Center in Lafayette, Louisiana, local rice growers, and other private landowners have been a tremendous asset to us. I usually begin this trip by first stopping at the National Wetlands Research Center in Lafavette to meet our friends and colleagues Dr. Mike Brasher, WFA alumnus and Science Coordinator for the Gulf Coast Joint Venture, as well as Ducks Unlimited conservation staff Mike Carloss and Dr. Aaron Pierce, also a WFA alumnus. The Wetlands center tour provides an important preamble for the students and what they ultimately experience in the field. As usual, these men provided a solid overview of the function, history, and importance of this region. The science and conservation work being conducted through the Wetlands center is beyond impressive. Also, students toured and observed firsthand the ongoing work on sea level rise and subsidence, dynamics of submerged aquatic vegetation, the threat of invasive plants and animals including European Roseau cane and wild hogs, and many other topics. These talks and the tour provided students with an important first impression of the diversity and challenges of this system.

Once again we were privileged to stay at LDWF's Rockefeller Refuge in Grand Chenier. Rockefeller is a 76,000-acre mecca that borders the Gulf. "The Rock" has a legendary history of wildlife professionals, students, and public visitors. Our primary host there was Dr. Joe Marty, WFA alumnus and biological supervisor at Rockefeller. We were also privileged once again to have a fantastic host in Mr. Glenn Harris, USFWS Deputy Project Leader of Cameron Prairie National Wildlife Refuge. Glenn congenially overviewed the history and importance of refuge lands and how they holistically complement the resources of the chenier. Glenn first presented a video to the class on Cameron and associated refuges of the region, and then we went afield where he introduced them to various pieces of equipment used in managing refuge habitats. We also walked the boardwalk and observed birds and discussed the local wetland plant community. We are always indebted to Glenn for all his knowledge and jovial engagement with the students.

Following our tour of Cameron Prairie, we drove through western portions of the rice country to birdwatch. There, I also discussed aspects of rice and crawfish farming and how those influenced the economy. I likewise emphasized the connectivity and importance of the rice fields with the coastal wetlands just to our south.

As motivation to further introduce students to the cultural aspects of this great place, I waterfowl hunted with extended family on the opening Saturday morning near Cameron, Louisiana. We harvested gadwall, northern shoveler, and blue-winged teal, and I returned with nearly a dozen birds. At Rockefeller, I engaged the students in wing and plumage identification, and then cleaned the birds. This was a great learning lesson for those that had never cleaned and prepared fresh birds for supper. Even better, while I hunted that morning, the students made a haul of blue crabs, which made for an extra incredible supper late Saturday evening.

We spent much of Saturday exploring Rockefeller wetlands and riding in the LDWF crew boat south into the Gulf. We really appreciate LDWF's Public Information Officer, Gabe Griffin, for serving as our capable boat capitán. We also experienced porpoises, pelicans, and several other species along the way. Students learned about the importance of restoring breaker walls and saving the local beach fronts from erosion and sea level rise.

Sunday dawn came in a flash. We briefly watched birds, cleaned the dorm, packed, snapped the traditional group photos, and then launched back to campus. The thrill of the trip was all over the students' faces, as it was mine. There is an enduring legacy in these trips, basically initiated by Dr. Rick Kaminski nearly three decades ago. As a graduate student of Rick's, I and others including Mike Brasher got to experience south Louisiana as graduate students, and Joe Marty accompanied me during his MSU graduate tenure. Our web of colleagues and friends in south Louisiana remains vibrant. This trip has become one of the highlights of my year. Many of the students have never experienced some of these things and may never again. It's satisfying knowing they got to see critical ecological resources, such as beach habitat, while they still exist amid the onslaught of subsidence and sea level rise.



York Woods Field Trip – November 15, 2018

In a second rewarding fall field trip, we visited York Woods, an incredible 9,000 mosaic of prime herbaceous wetland, bottomlands and sloughs, and agricultural fields all intensively managed for waterfowl and other wildlife. Located in Tallahatchie county, Mississippi, York Woods, owned by Jim Kennedy, is a premier example of dedicated and high-quality waterfowl/wildlife management.

Boating around the cypress sloughs once again was a highlight of our enjoyment. Biologist and WFA alum Cody Pugh led us through a historic slough and cypress brake that weaves through parts of the property. Students got to experience johnboats with mud motors and see the historic domicile of Mr. York, which still stands firm on its stilts back in the swamp. As a rehearsal of our discussions in the classroom, we overviewed the values of brakes as waterfowl habitats and how they complement management of more seasonal habitats, like agriculture and moist-soil impoundments. These latter habitats carry the bulk of duck-energy-days (DED) or the seed production mostly from annual grass and sedge communities. Cody also explained about their elaborate tailwater recovery systems to recycle agricultural water in and out of wetlands. This was valuable experience for students, as many of them are interested in environmental benefits of reusing water. York Woods provides the proverbial saving. "Pictures speak a thousand words." Students could see firsthand that York Woods is a premier outdoor learning environment.

Former WFA alums Cody Pugh and Andy Wright are full-time wildlife biologists at York Woods and went beyond their call to host our trip. We tip our hats to them and especially Mr. Rance Moring, General Manager at York Woods, for their relentless pursuit of habitat perfection, unwavering support, and education of our students. We can't thank you enough for your dedication and generosity.





Service

Part of the niche of a waterfowl ecologist/conservationist is to help landowners improve their resources for waterfowl and other wildlife. Dr. Davis greatly enjoys opportunities to visit with and assist landowners when possible, especially working long-term with them to monitor changes and improve their habitats. Below is a brief snapshot of some of these working lands monitored in 2018.



Jamie Anderson, Lonoke, Arkansas. Davis provides technical assistance on seasonal moist-soil management to the Anderson Farms family in eastern Arkansas.



Leland Tollett, Hazen, Arkansas. Davis assisted Mr. Tollett and Jeryl Jones with enhancing an agricultural reservoir for improving seasonally-flooded habitats near the historic Bayou LaGrue north of Stuttgart, Arkansas.



Jody Pagan, Little Siberia, near Lodges Corner, Arkansas. Pagan is an accomplished wetland and waterfowl habitat manager and biologist. Pagan designs, develops, and helps showcase habitat restoration efforts to university students and private landowner in the MAV. Davis visited with Pagan in summer 2018 to view recent wetland and bottomland hardwood restoration projects in eastern Arkansas.



Assisting Scott Galloway and Jeryl Jones, Galloway Farms, Stuttgart, Arkansas, 2018. Davis provided technical assistance to MSU alumnus and former Bulldog baseball player, Scott Galloway. Jeryl Jones, near Tollville, Arkansas, has been instrumental in guiding the restoration of wetlands and bottomland hardwood forest on this property for Mr. Galloway during the past few years. Undergraduate students Jessie Critcher, Jacob Jones (Jeryl's son), and Weston Thompson used the property for their semester project/paper in Davis' Waterfowl class in fall 2017, proposing restoration plans for the property. Davis has enjoyed working with these individuals committed to longterm wetland habitat restoration on several hundred acres. Heavy equipment shows ground-level sculpting of former agricultural land that will create wetland diversity, and drone images show the shallow meanders created to restore hydrology and diversity. Hardwood trees will be planted on some sites in winter 2019

Guests of Team Duck

Students of Wetlands Ecology and Management, WFS 340

Department of Forestry, Wildlife and Fisheries University of Tennessee-Knoxville

Dr. Matt Gray, professor, and Chris Graves, lecturer, from the University of Tennessee, co-instruct a course each fall on the basic principles of wetland ecology and management via class lectures, labs, and field experiences. Each autumn, the wetlands class visits east-central Mississippi, residing for a week at Noxubee NWR. Students experienced a variety of field and laboratory activities going afield amid Noxubee wetlands, including learning about seasonal water and vegetation management, estimation of food available to waterfowl, and other biological aspects of wetlands and waterbirds. Davis annually helps co-teach the waterfowl and wetlands program activities. Approximately 40 undergraduate students from the University of Tennessee participated in fall 2018.

Besides us, we especially thank our host and co-teaching assistant, Jacob Gross, wildlife refuge specialist at Noxubee. Jacob is a real innovative wetland manager, aka, "Marsh rat" who works constantly to improve overall functions and values of Noxubee wetlands. We appreciate Jacob's passion for and dedication to waterfowl and wetland resources!



Awards, Presentations & Publications

Awards-Accolades

CALEB AMACKER | *undergraduate student* | One of four students to receive a Mississippi Wildlife, Fisheries and Parks Foundation Scholarship Program award.

TERREL CHRISTIE | *master's student* | placed second in the Graduate student division for his poster presentation entitled, *Predation Risk of Double-crested Cormorants (Phalacrocorax auritus) on Commercial Catfish Production in the Mississippi Delta*. Presented at the Mississippi Academy of Science Summer Student Science Symposium. Starkville, Mississippi, July 26, 2018.

D. ALEX DAVIS | *undergraduate student* | recipient of the 2018 CFR/FWRC Undergraduate Research Scholars Program. Alex is supervised by Dr. Davis. See his story on page 22.

ALEXANDRA (LEXI) FIRTH | Successfully completed and defended her Master of Science thesis entitled, "Investigation of a low-external-input sustainable rice production system to identify ecosystem services towards adoption costs and benefits."

MARGARET (MAGGIE) GROSS | Successfully completed and defended her Master of Science thesis entitled, "True metabolizable energy and energetic carrying capacity of submersed aquatic vegetation in semi-permanent marshes of the upper Midwest." Maggie is attending Western Illinois University. Dr. Brian Davis serves as a committee member

DR. JOSEPH LANCASTER | received his doctoral diploma, Humphrey Coliseum, Mississippi State University, May 4, 2018

Presentations

Scientific or Professional Papers/ Presentations

Invited Presentations (Oral)

CLEMENTS, S. A., J. B. DAVIS, B. S. DORR, K. C. HANSON-DORR, L. A. ROY, A. M. KELLY, AND C. R. ENGLE. 2018. Foraging habits of lesser scaup (*Aythya affinis*) and greater scaup (*Aythya marila*) on commercial baitfish and sportfish farms in eastern Arkansas. 2018 Annual Meeting of the Arkansas Bait and Ornamental Fish Growers Association (ABOFGA), February 2018, Lonoke, Arkansas.

DAVIS, J. B. 2018. Wetlands ecology and management: a 1-hour overview. Invited presentation given to the MSU student chapter of the Soil and Water Conservation Society, October 17, 2018, MSU campus.

DAVIS, J. B. 2018. Invited guest to serve on a professional Caucus to advance endowed university waterfowl and wetlands programs in North America. Birdhaven Ranch, Sacramento Valley of California, 10-12 December, 2018.

DAVIS, J. B., AND R. M. KAMINSKI. 2018. Ecology and management of wood duck ducklings and broods in North America. Invited talk to the Science and Management Needs for Cavity-Nesting Ducks in the Southern United States. Southeastern Association of Fish and Wildlife Agencies annual conference, October 2018, Mobile, Alabama.

KLASSEN, J. A. 2018. Predicting winter water cover across the Lower Mississippi Alluvial Valley. Conservation Lecture Series, Department of Wildlife, Fisheries, and Aquaculture, March 1, 2018. Dr. Klassen is J. B. Davis' Postdoctoral Research Associate.

TAYLOR, S., AND J. B. DAVIS. 2018. Assessing native bee (Hymenoptera: Apoidea) diversity in natural wetland plant communities of the Mississippi Delta. Invited presentation to the 2018 Annual Meeting Alabama Chapter of The Wild-life Society, July 19-20, 2018.

Refereed Presentations (Oral)

CHRISTIE, **T**. 2018. Predation risk of cormorants on commercial catfish in MS. Presented at the MSU 3MT competition under the Life and Biomedical Sciences and Engineering category, November 5, 2018.

CHRISTIE, T. W., J. B. DAVIS, B. S. DORR, K. HANSON-DORR, L. A. ROY, A. KELLY, AND C. ENGLE. 2018. Predation risk of double-crested cormorants (*Phalacrocorax auritus*) on commercial catfish production in the Mississippi Delta." Oral Presentation. Mississippi Chapter of The Wildlife Society Annual Conference. Biloxi, Mississippi. September 13-14, 2018.

CHRISTIE, T. W., J. B. DAVIS, B. S. DORR, K. HANSON-DORR, L. A. ROY, A. KELLY, AND C. ENGLE. 2018. Predation risk of double-crested cormorants (*Phalacrocorax auritus*) on commercial catfish production in the Mississippi Delta. Oral Presentation. The Wildlife Society Annual Conference. Cleveland, Ohio. October 7-11, 2018.

CHRISTIE, T. W., J. B. DAVIS, B. S. DORR, K. HANSON-DORR, L. A. ROY, A. KELLY, AND C. ENGLE. 2018. Predation risk of double-crested cormorants (*Phalacrocorax auritus*) on commercial catfish production in the Mississippi Delta. Oral Presentation. Southeastern Association of Fish and Wildlife Agencies Conference, Mobile, Alabama, October 21-24, 2018.

CLEMENTS, S. A., J. B. DAVIS, B. S. DORR, K. C. HANSON-DORR, L. A. ROY, A. M. KELLY, C. R. ENGLE, AND S. C. BARRAS. 2018. Foraging ecology and depredation impact of scaup on commercial baitfish and sportfish farms in eastern Arkansas. Oral presentation. The Wildlife Society's 25th Annual Conference, Cleveland, Ohio, October 7-11, 2018.

CLEMENTS, S. A., J. B. DAVIS, B. S. DORR, K. C. HANSON-DORR, L. A. ROY, A. M. KELLY, C. R. ENGLE, AND S. C. BARRAS. 2018. Foraging ecology and depredation impact of scaup on commercial baitfish and sportfish farms in eastern Arkansas. Oral presentation. Southeastern Association of Fish and Wildlife Agencies 72nd Annual Conference, Mobile, Alabama, October 21-24, 2018.

DAVIS, D. A., J. B. DAVIS, J. A. KLASSEN, R. M. KAMINSKI, AND S. E STEPHENS. 2018. Nesting ecology of wood ducks and hooded mergansers in nest boxes at Yazoo and Noxubee National Wildlife Refuges. Special session of the Science and Management Needs for Cavity-Nesting Ducks in the Southern United States. Southeastern Association of Fish and Wildlife Agencies annual conference, October 2018, Mobile, Alabama.

GROSS, M. C., C. N. JACQUES, H. M. HAGY, S. E. MCCLAIN, J. B. DAVIS, J. W. SIMPSON, S. E. JENKINS, J. D. LANCASTER, AND A. P. YETTER. 2018. True metabolizable energy of submersed aquatic vegetation for ducks. Oral Presentation, 78th Midwest Fish & Wildlife Conference, Milwaukee, Wisconsin, January 28-31.

GROSS, M. C., C. N. JACQUES, H. M. HAGY, S. E. MCCLAIN, J. B. DAVIS, J. W. SIMPSON, S. E. JENKINS, J. D. LANCASTER, AND A. P. YETTER. 2018. True metabolizable energy of submersed aquatic vegetation for ducks. Oral Presentation, 54th Annual Meeting of the Illinois Chapter of The Wildlife Society, Champaign, Illinois, April 22-24.

GROSS, M. C., C. N. JACQUES, H. M. HAGY, S. E. MCCLAIN, J. B. DAVIS, J. W. SIMPSON, S. E. JENKINS, J. D. LANCASTER, AND A. P. YETTER. 2018. True metabolizable energy of submersed aquatic vegetation for ducks. Oral Presentation, Illinois State Academy of Science Annual Meeting, Decatur, Illinois, April 13-14.

LANCASTER, J. D., J. B. DAVIS, AND R. M. KAMINSKI. 2018. Mallard use of incentivized conservation program wetlands during winter in Mississippi. Oral Presentation, 78th Midwest Fish & Wildlife Conference, Milwaukee, Wisconsin, January 28-31.

Volunteered Presentations (Oral)

CLEMENTS, S. A., J. B. DAVIS, B. S. DORR, K. C. HANSON-DORR, L. A. ROY, A. M. KELLY, C. R. ENGLE, AND S. C. BARRAS. 2018. Foraging ecology and distribution of scaup on commercial baitfish and sportfish farms in eastern Arkansas. Oral presentation. Meeting of Endowed Chairs, Birdhaven Ranch, Butte City, California, December 2018.

DAVIS, J. B. 2018. Guest lectured to Dr. Courtney Siegert's class NREC 4423, Environmental Assessments; topic was wetland ecology and NEPA regulations. February 22, 2018.

DAVIS, J. B. 2018. Guest lectured to Dr. Marcus Lashley's class WFA 4223, Wildlife Plant ID; topic was management of seasonal wetlands in the Mississippi Alluvial Valley. May 23, 2018.

DAVIS, J. B. 2018. The state of the waterfowl program at Mississippi State University. Oral presentation to the Mississippi Department of Wildlife, Fisheries, and Parks Director and Commission and Waterfowl Summit Team. Quail Ridge, Louisville, Mississippi, July 26-27, 2018.

DAVIS, J. B. 2018. Guest lectured to Dr. Sandra Correa's class WFA 3133, Applied Aquatic and Terrestrial Ecology; topic was wetland restoration in the Mississippi Alluvial Valley. November 20, 2018.

Refereed Presentations (Poster)

CHRISTIE, T. W., J. B. DAVIS, B. S. DORR, K. HANSON-DORR, L. A. ROY, A. KELLY, AND C. ENGLE. 2018. Predation risk of double-crested cormorants (*Phalacrocorax auritus*) on commercial catfish production in the Mississippi Delta. Mississippi Academy of Science Summer Student Science Symposium. Starkville, Mississippi. July 26, 2018. (Placed second in the Graduate student division).

CHRISTIE, T. W., J. B. DAVIS, B. S. DORR, K. HANSON-DORR,

L. A. ROY, A. KELLY, AND C. ENGLE. 2018. Foraging ecology and depredation impact of scaup on commercial baitfish and sportfish farms in Eastern Arkansas. University of Arkansas at Pine Bluff Aquaculture/Fisheries Field Day. Pine Bluff, Arkansas, October 4, 2018.

CHRISTIE, T. W., J. B. DAVIS, B. S. DORR, K. HANSON-DORR, L. A. ROY, A. KELLY, AND C. ENGLE. 2018. Predation risk of double-crested cormorants (*Phalacrocorax auritus*) on commercial catfish production in the Mississippi Delta. University of Arkansas at Pine Bluff Aquaculture/Fisheries Field Day, Pine Bluff, Arkansas. October 4, 2018.

CLEMENTS, S. A., J. B. DAVIS, B. S. DORR, K. C. HANSON-DORR, L. A. ROY, A. M. KELLY, C. R. ENGLE, AND S. C. BARRAS. 2018. Foraging ecology and depredation impact of scaup on commercial baitfish and sportfish farms in eastern Arkansas. Mississippi Academy of Sciences Summer Student Science Symposium, Mississippi State University, Mississippi, July 26, 2018.

ENGLE, C. R., L. ROY, B. DORR, J. B. DAVIS, A. KELLY, S. CLE-MENTS, AND T. CHRISTIE. 2018. What do problems with fish-eating birds really cost U.S. catfish and baitfish farms? University of Arkansas at Pine Bluff Aquaculture/Fisheries Field Day, Pine Bluff, Arkansas. October 4, 2018.

FIRTH, A. G. J. P. BROOKS, B. BAKER, AND J. B. DAVIS. 2018. Ecological agriculture: Application of winter flooding. Mississippi Water Resources Conference, Mississippi Water Resources Research Institute, Jackson, Mississippi, April 2, 2018. FIRTH, A. G. J. P. BROOKS, B. BAKER, AND J. B. DAVIS. 2018. Ecological agriculture: Application of winter flooding. Soil and Water Conservation Society Meeting, Albuquerque, New Mexico, July 30, 2018.

TAYLOR, S., J. B. DAVIS, K. PARYS, AND M. LASHLEY. 2018. Assessing native bee (Hymenoptera: Apoidea) diversity in natural wetland plant communities of the Mississippi Delta. Ecological Society of America, New Orleans, Louisiana, August 5-9, 2018.

TAYLOR, S., J. B. DAVIS, K. PARYS, AND M. LASHLEY. 2018. Assessing native bee (Hymenoptera: Apoidea) diversity in natural wetland plant communities of the Mississippi Delta. Crossing Borders: Entomology in changing world. 2018 ESA, ESC, and ESBC Joint Annual Meeting, 11-14 November, 2018, Vancouver British Columbia, Canada.

Publications

FOTH, J. R., R. M. KAMINSKI, J. B. DAVIS, J. N. STRAUB, AND T. D. LEININGER. 2018. Aquatic invertebrate community composition, diversity, and biomass from sweep-net samples in non-impounded bottomland hardwood forests and greentree reservoirs. Journal of the Southeastern Association of Fish and Wildlife Agencies 5:125-135.

TAPP, J. L., M. W. WEEGMAN, E. B. WEBB, R. M. KAMINSKI, AND J. B. DAVIS. 2018. Waterbird communities and seed biomass in managed and non-managed restored wetlands in the Mississippi Alluvial Valley. Restoration Ecology 26:591-599.

Refereed (peer-reviewed/peer edited) Manuscripts (In Preparation)

DAVIS, J. B., M. SCHUMMER, M. GUILLEMAIN, AND J. ELM-BERG. (*Final revision stages*). Fall migration and winter. Book chapter x in, *Migrating and Wintering Waterfowl*, Texas A&M Press, to be published in 2019.

MARTY, J. R., J. B. DAVIS, R. M. KAMINSKI, M. G. BRASHER, AND S. A. RUSH. Submitted, spring 2019. Rice and natural seed biomasses in Louisiana and Texas Gulf Coast Prairies. Target journal, Ecosphere.

NEWCOMB, K. C., J. B. DAVIS, M. J. GRAY, R. M. KAMINSKI, A. MONROE, AND D. L. EVANS. *In review*. Habitat selection by wintering American Black Ducks in Tennessee. To be submitted, spring 2019, Wildlife Society Bulletin.

OSBORN, J.M., H.M. HAGY, M.D. MCCLANAHAN, J.B. DAVIS, AND M.J. GRAY. Habitat selection and available foods for American black ducks in Tennessee. Target journal, *J*ournal of Wildlife Management or Journal of Fish and Wildlife Management (2019).

OSBORN, J.M., H.M. HAGY, M.D. MCCLANAHAN, J.B. DAVIS, C. FERREL, AND M.J. GRAY. Response of vegetation and waterfowl to invasive species management techniques in moist-soil wetlands. Target journal, Journal of Wildlife Management.

Note: Several other scientific/technical papers currently are in various stages of completion

Popular Articles / Outreach-extension

CHRISTIE, T. W., J.B. DAVIS, B. S. DORR. 2018 Cormorant night roost aerial census. Survey maps published for Delta Council.

CHRISTIE, T. W., P. C. BURR, B. S. DORR. 2018. Aerial night roost surveys for double-crested cormorants in the Mississippi Delta. Standard Operating Procedure for USDA Wildlife Services.

CONOCO PHILLIPS. 2018. Restoring coastal wetlands. http://www.conocophillips.com/spiritnow/. Published December 7, 2018.

FOREST AND WILDLIFE RESEARCH CENTER. 2018. New MSU study evaluates wetland restoration efforts along Gulf of Mexico. News Release, February 7, 2018.

HART, D. 2018. Mallard candy: Is hunting flooded corn fair chase? Wildfowl magazine, November 2018.

MARTY, J. R., J. B. DAVIS, AND A. COOPER. 2018. Maximizing waterfowl use of ricelands along the Gulf Coast. Louisiana Farm and Ranch magazine October 14(10):12-13.

NATIONAL ACADEMIES OF SCIENCE, ENGINEERING, AND MEDICINE. 2018. National Academies' Gulf research program awards \$5.3 million to enhance environmental restoration outcomes and improve oil spill risk assessment. News Release, January 18, 2018.

ROY, L. A., A. M. KELLY, J. B. DAVIS, T. W. CHRISTIE, S. A. CLEMENTS, B. S. DORR, M. SCHWARZE, C. R. ENGLE. 2018. Predation risk and economic impact of lesser scaup and piscivorous waterbirds on commercial baitfish and catfish production. Southern Regional Aquaculture Center annual report.

Finances

Waterfowl & Wetland Expenditures					
January 1, 2018 - December 31, 2018					
	KENNEDY FUNDS	MISSISSIPPI STATE UNIVERSITY	CONTRACTS & GRANTS	TOTALS	
Kennedy Coordinator	52,563	56,894	4,269	113,726	
Research Students	19,015		81,326	100,341	
Administrative Support		20,000		20,000	
Contractual & Commodities	10,238		18,392	28,630	
Travel	839		14,677	15,516	
GRAND TOTAL	82,655	76,894	118,664	278,213	

Sponsors

Duck Unlimited, Inc. Jim Kennedy York Woods Karl Karrow, Kansas Wildlife, Parks and Tourism MSU Forest and Wildlife Research Center Robbie Russell (private landowner) US Fish and Wildlife Service US Department of the Interior





FOREST AND WILDLIFE RESEARCH CENTER

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JAMES C. KENNEDY ENDOWED CHAIR IN WATERFOWL & WETLANDS