

KENNEDY ENDOWED PROGRAM

WATERFOWL & WETLANDS CONSERVATION

2019-2020

**ANNUAL REPORT** 



**MISSISSIPPI STATE UNIVERSITY**<sub>TM</sub> FOREST AND WILDLIFE RESEARCH CENTER

### 2019 - 2020

### Kennedy Endowed Program in WATERFOWL & WETLANDS CONSERVATION

Annual Report

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**MISSISSIPPI STATE UNIVERSITY** FOREST AND WILDLIFE RESEARCH CENTER



### Greetings from Dr. J. Brian Davis



very three years the North American Duck Symposium rotates between Canada and the U.S. with Winnipeg serving as host for our exciting August 26-30, 2019 meeting. This was the eighth conference of its type, which attracted over 300 academics, government and non-governmental biologists, and other professionals from around the world. Most importantly, it is an incredible venue for graduate and undergraduate students to showcase their research. Fundamental and contemporary issues related to waterfowl conservation, such as climate change, habitat loss, harvest and hunter satisfaction, were just some of the hot topics discussed. Our MSU program was well represented, and we were excited to present nine oral or poster presentations, including several plenary or special sessions, from current and former graduate students. Seeing young professionals, like MSU undergraduate student and waterfowl enthusiast Alex Davis, present a poster at the conference was one of the highlights! Alex was awarded a College of Forest Resources (CFR) Undergraduate Scholars Research Program opportunity in 2018, and presented his work on wood duck breeding biology at both the Duck Symposium and at the Shackouls Honors College on campus in April 2019.

Another exciting highlight for 2019 was the first annual Delta Waterfowl North American University Student Hunting Program. The pilot program began in 2000 at the Delta Marsh, Portage la Prairie, Manitoba and was continued by professors at Louisiana State University who organized similar hunts for their students. Delta Waterfowl more formally implemented the program in August 2017, and MSU joined the Delta program in fall 2019. Mr. Stephen Sowell, Delta's university hunting program coordinator, was hoping we could attract 8-10 students in our inaugural year. Much to our surprise, we had 14 female undergraduates apply. The number of women hunting enthusiasts from the MSU program highlights how the demographics are changing in our hunting communities and undergraduate programs! See the coverage on pages 8-11 of this report. Other travels in 2019 included two field trips with the waterfowl class, one to Rockefeller Refuge in the Chenier, southwestern Louisiana, and a day trip to Mr. Kennedy's York Woods in the Mississippi Delta. These trips are great for experiential learning, particularly given the fundamental differences between these two wetland systems. I also joined other members of the Waterfowl Working Group in May 2019 at the Alabama-based Wheeler National Wildlife Refuge to discuss research and management priorities, communications and human dimensions, among other topics.

And what would universities be without our students? We had another great year for graduate and undergraduate student products and outcomes, including a number of productive internships. First, congratulations to Stephen Clements and Terrel Christie for successfully defending their master's theses and graduating in August and December, 2019, respectively. Both of them were outstanding graduate students and are moving on to successful careers. Second, 12 of our WFA undergraduate students participated in internship/technician positions in 2019, all of which included some aspect of waterfowl, wetlands, or water-bird related research or management. Students worked for federal, state, and private landowners, and their stories appear later in this report (pages 27-29).

One new research direction we are excited to share includes a multi-state study of recruitment of wood ducks from nest boxes over seasons. For this study, eight states (DE, FL, GA, LA, MD, MS, NC, SC) are participating in this research, covering the northeast and southeast region of the country. To support the work, I hired an outstanding new master's student, Taylor Gibson, who graduated from our wildlife program with a bachelor's degree in May 2017. Field work will commence in spring 2020 so you will be reading more about Taylor in next year's report.

Lastly, one rewarding aspect of my position is assisting private landowners with waterfowl habitat management. I had several occasions in 2019 to do just that, and snippets of those interactions appear on page 30 of this report.

As always and with great humbleness, we thank Mr. Jim Kennedy for his support of waterfowl and wetlands in Mississippi and the region as well as state, federal, and non-governmental organizations that all provided generous support toward our conservation efforts and make our work possible! Thank you and Hail State!

## North American Duck Symposium 8



ast year's North American Duck Symposium (Ducks8) was held in Canada in August 2019. This conference always generates tons of energy and important discussion that will impact waterfowl management research for years to come. Waterfowl conservation never lacks for challenges, urgencies, potential crises, and opportunities. Ducks8 included a melting pot of topics, among them discussions on over-abundant or declining populations, threats to our hunting heritage, decline in hunter participation, and policy issues related to massive landscape changes that impact waterfowl and other wildlife. The 2019 Duck Symposium held plenary sessions each morning of the conference, where "big picture" topics were presented, some of which delved into waterfowl distributions and migrations, climate, and subsequent hunter satisfaction. One passionate discussion focused on how climate change and hunter mobility influence waterfowl distribution on the North American continent.

Three months prior to the Duck Symposium, a small committee was convened to address these issues in order to provide some preliminary context for the symposium. We met May 22–23, 2019, at the storied Duck Creek Conservation Area headquarters in Puxico, Missouri, or the Bootheel. Our charge was to summarize what is known about the interactions among waterfowl migration, winter distribution, spatial patterns in harvest, and bird behavior. The goal of this effort was to produce a peer-reviewed synthesis paper.

The specific objectives of our workshop included: 1) investigate waterfowl distribution change, both in the context of the 2018-19 season (warm and wet winter, and rather disenchanted hunter base) and the long-term data that suggests spatial and temporal change by birds, mostly wintering further north and later migrations; 2) discuss short-term factors of weather, flooding patterns, habitat, hunting pressure and techniques, and refuges on waterfowl; 3) examine longer-term ultimate factors, and; 4) openly acknowledge the uncertainties of our suggested recommendations going forward. These topics relevant to waterfowl movement and abundance are dynamic and filled with uncertainties that will need continued investigation in order to support waterfowl populations for generations of enjoyment.

Following our meeting at Duck Creek in May 2019, we wrote an abstract for Ducks8. Our plenary talk in the session on Migration & Winter Distribution Changes, was delivered by Dr. Tom Moorman, Chief Scientist of Ducks Unlimited, Inc., Memphis, Tennessee. Moreover, Dr. Moorman published a similar article on this topic in the March/April 2020 issue of Ducks Unlimited magazine. *(continued on page 6)* 

HIS ABSTRACT CLEARLY REVEALS THE COMplexity of issues influencing waterfowl migrations and landscape use. And similarly for nearly all wildlife, usually there isn't just one explanation. We deal with complexities, and some, such as climate change, are simply out of our immediate control. That said, our waterfowl hunting constituency is a powerful and critical entity. Hunters are the premiere conservationists, and collectively have made a major impact on policy and landscape change to benefit waterfowl. The collective efforts of waterfowl conservation have benefited myriad game and non-game wetland species throughout North America.

#### **Dynamics of Waterfowl Migration and Winter Distribution**

ABSTRACT: Most waterfowl species in North America are highly migratory, an adaptation arising ultimately from pressures exerted by a seasonal climate resulting from annual changes in the tilt of the earth's axis relative to latitude. Migration enables waterfowl to exploit spatially and temporally variable and highly heterogenous landscapes at large geographic scales. While migratory behavior in birds is stimulated by annual changes in photoperiod, on an annual or seasonal basis, proximate factors interact to influence the timing, duration, and distance of migratory movements that ultimately shape the nonbreeding distribution of birds across the continent. Paramount among these proximate influences are weather, habitat quantity and quality, and disturbance. Enduring shifts or expansions in winter distribution are well documented for some species of waterfowl (e.g., Canada geese, greater white-fronted geese, snow geese), likely driven by the interacting effects of a warming climate, landscape-scale changes in habitat resources, and changing anthropogenic pressures (e.g., harvest). Evidence for long-term distributional shifts of other species is emerging at multiple scales and across continents, further exemplifying the remarkable adaptability of waterfowl to an ever-changing environment, but potentially also influenced by poorly understood differential demographics among populations or subpopulations. Long-term changes and inter-annual dynamics of nonbreeding waterfowl, with causes over which we have limited to no management control, have important consequences for North American Waterfowl Management Plan habitat, harvest, and people objectives. Hence, a thorough understanding of long-term change and inter-annual variability in nonbreeding waterfowl distribution is central to the waterfowl conservation enterprise in North America. We examine known and probable changes in distribution of nonbreeding waterfowl, potential implications for the waterfowl conservation enterprise, and call for increased collaboration to address key uncertainties around these issues.



SECOND ISSUE IS INEXTRICABLY HITCHED TO the ecology and behavior of the birds themselves, and that is the human dimension aspects of waterfowl hunters. We want to know what variables really make hunters happy. For example, delayed or diminished waterfowl migrations into southern United States makes for confused and disgruntled waterfowlers. Waterfowl migration ecology and subsequent human dimensions (HD) are indeed linked. This linkage has been the subject of past research at Mississippi State, led by Drs. Rick Kaminski and Mike Schummer, and continues across North America.

Dr. Mike Schummer, Department of Environmental and Forest Biology, State University of New York, presented a plenary paper at Ducks8 that will be published as a full length paper in the Wildlife Society Bulletin, summer 2020.

This plenary was delivered by Dr. Mike Schummer in the Session: Assessing & Adapting Human Dimension Initiatives. In addition to Shummer, authors included John Simpson and Brendan Shirkey, Ohio-based Winous Point Marsh Conservancy; J. Brian Davis, Department of Wildlife, Fisheries & Aquaculture, Mississippi State University; and Kenneth E. Wallen, University of Arkansas System, Division of Agriculture.

#### Balancing Waterfowl Hunting Opportunity and Quality to Recruit, Retain, and Reactivate

**ABSTRACT:** Waterfowl hunter numbers and waterfowl populations were closely correlated until the past two decades when hunter numbers declined despite near record duck breeding population estimates in North America. This apparent decoupling of waterfowl numbers and hunter participation has raised concerns about the future of the hunting tradition and more importantly, the sustainability of the North American hunter-funded game conservation model. As a result, efforts to recruit, retain, and reactivate waterfowl hunters (R3) have been promoted by the North American Waterfowl Management Plan community and many state and federal agencies and non-profit conservation organizations continent wide. Currently, it appears that increasing access and opportunity for hunting is a primary R3 strategy being used across North America by agencies and other non-governmental organizations and this is reflected within many state level R3 plans and recent U.S. Fish and Wildlife Service actions. However, we hypothesize that R3 for waterfowl hunters is substantially driven by hunt quality and that quality and quantity of opportunity may be somewhat mutually exclusive.

Therefore, providing abundant access and opportunity to hunt waterfowl alone, especially if it comes at the expense of hunting quality, will be inadequate and possibly detrimental to retaining, recruiting, and reactivating waterfowl hunters. We advocate for a better understanding of factors motivating R3 among market segments of the waterfowl hunting community, to develop R3 strategies specifically focused on identifying and providing those key factors, and to utilize adaptive feedback to evaluate the success and/or failures of R3 initiatives at achieving stated goals.



## **Delta's** North American University Student Hunting Program









#### Training the Next Generation of Conservation Leaders to Appreciate Hunting

HE HISTORY OF SOME OF OUR CRITICAL WATERfowl organizations in North America is not known by many, including today's university students. Ducks Unlimited Inc. dates back to the 1930's and Delta Waterfowl was rooted as early as 1911.

James Ford Bell of General Mills Corporation is regarded as the founder of Delta Waterfowl. In the early 20th century, Bell was concerned about duck populations, particularly canvasbacks. He wanted to put two ducks back for each one shot by hunters at his club on Manitoba's famed Delta Marsh. Through his passion for waterfowl and wetland conservation, Bell attracted Aldo Leopold, who is well known to university wildlife students as the father of modern wildlife management. Together, Bell and Leopold spawned the notion of a waterfowl research facility. And by 1938, Hans Albert (Al) Hochbaum, one of Leopold's students, became the organization's first scientific director. Hochbaum and his early Delta colleagues pioneered research on breeding duck ecology, making key discoveries on species and their habitats. Since then, Delta has produced many dozens of waterfowl scientists and conservationists, working throughout North America and abroad, mentoring future generations of waterfowl biologists.

Besides being a pillar of the important science of waterfowl and wetland conservation, Delta is also tremendously invested in hunting, and helping younger generations develop a passion and connectedness to these vital resources. The North American Model of Conservation rests on the premise that people who love and use resources are the very ones championing the responsible stewardship of them. Waterfowl hunters are the primary bridge to sustainable use and conservation of this treasured resource. Quite simply, we cannot lose the passion and dedication of this contingent. So, how does looking back help us look forward?

Delta's first mentored hunt occurred in 2000 at the Delta Marsh, Manitoba Research Station area, an important predecessor to the R3 program as we currently know it. After a decade of hosting similar events in Manitoba, Delta expanded and launched their flagship hunter recruitment program in 2011, named the 'first hunt.' Since 2012, Delta's First Hunt program delivered nearly 150 events annually and introduced over 6,000 individuals to waterfowl hunting.

Delta, like many of us in the waterfowl profession, is staring at a looming crisis. That is, many students being recruited into wildlife management programs today, tomorrow's leaders of waterfowl management, have had little or no exposure to hunting. And not surprisingly, these students also lack understanding of the ecological, economic, or recreational importance of hunting. Even in traditional wildlife programs such as Louisiana State University, University of California-Davis, and Cornell University, most of the students in natural resource programs have never hunted. This is a significant change from 25 or so years ago, when most wildlife students hailed from more consumptive backgrounds. Today's wildlife students often come from suburban homes with their interest and knowledge of wildlife and natural resources largely being derived from television and classrooms. As disconnect grows between the reality that hunters are true conservationists, the door widens for growth of anti-hunting beliefs, or at least, less emphasis placed on waterfowl conservation. This new generation of leaders has already begun to attain positions of authority in state, provincial, and federal agencies. Some of these students will eventually make important policy and management decisions, and lack of an inherent appreciation for waterfowl or other game management could be deleterious to conservation. Hence, the rise of waterfowl-based hunter education programs.

Given these critical needs, Delta more formally spawned the University Hunting Program in 2017. Five universities initially stepped forward including the Universities of Nebraska, Manitoba, Arkansas, Delaware, and Colorado State University. Earlier in the 2000s, professors at Louisiana State University and University of California-Davis, and scientists of the California Waterfowl Association turned dreams into realities for students. This passionate and innovative team in California garnered the full support of entrepreneur and ardent waterfowl conservationist, Mr. Paul Bonderson of Bonderson's Bird Haven Ranch in Butte County, California. The UC Davis/CWA College Hunt Camp was hatched. Each year since about 2008, mentors accompany 15 undergraduate or graduate students on their first hunts. Delta's university hunt program was basically modeled from these initial efforts. The UC-Davis and LSU programs remain strong today. This model of success blossomed and by fall 2019, the Delta university program grew to at least 24 universities in the U.S. and Canada, including Mississippi State.

Mississippi State joined the university hunting program in 2018 with the first hunt in 2019. Faculty in the Department of Wildlife, Fisheries and Aquaculture and staff from the Mississippi Department of Wildlife, Fisheries and Park (MDWFP) assisted in the hunt.

In the inaugural year, it was hoped that Mississippi State would have 8-10 student participants. However, 14 female undergraduate students eagerly showed interest and were all accommodated. The students first completed pre- and posthunt surveys and waiver forms, then later participated in two consecutive nights of classroom shotgun training, had two outings to shoot sporting clays, and successfully completed Hunter Education training. By mid-January 2020, the students were ready to go on a waterfowl hunt. The day before the hunt the ladies learned how to assemble and camouflage potable blinds from which they would hunt. A session on waterfowl ID, the importance of wetland conservation and management, and gun handling and safety were discussed the night prior to the hunt. The half-day hunt commenced on MDWFP's Muscadine Wildlife Management Area in the Delta. With the WMA being hunted the prior two days, ducks were relatively scarce. However, the young ladies observed and experienced so many things in the marsh, most of them for the first time.

#### **Bayley Wilmoth**

wildlife, fisheries and aquaculture (May, 2020)

To truly explain my experience with the Delta Waterfowl Hunting Program, I must first discuss my experience with Dr. Brian Davis. Dr. Davis is a professor who goes above and beyond the call of duty for his students every day. He is not only invested in our academic success but also interested in how we will use our degree to fulfill our dreams. My dreams always lived somewhere in the Caribbean on a boat teaching people about the wonders of living with saltwater



in your veins and fish as your friends. Dr. Davis accepted that; he didn't try to change it. But he did express his waterfowl experiences and passions with the utmost gusto whilst teaching the first class I took with him, Wetlands Ecology and Management. That passion and the extra effort he put in to get our class engaged and in the field inspired me to take his second class, Waterfowl Ecology and Management. In that course, my fish scales had to make way for feathers because I fell absolutely in love with waterfowl. I wanted to become a waterfowl conservationist. Dr. Davis invited me and some of my peers to participate in the Delta program, basically going duck hunting for the first time ever. Delta Waterfowl and the Mississippi Department of Wildlife, Fisheries, and Parks, provided us with transportation, gear, food, and housing for the weekend of the camp. The morning of the hunt, the weather was perfect for waterfowlcold, sunny, and a north wind. While I didn't personally harvest my first duck that day, I gained something even more valuable, a passion for waterfowl. When a pair of Mallards came down to visit our forested hunting hole, the hen came down right in front of me. I fired at her and missed. While my lack of follow through was probably due to my limited experience, I'd like to think I missed because I was too busy admiring the pure beauty of seeing these birds. I didn't get another opportunity at my first duck that morning, but I know I will have plenty of chances in the future. Dr. Davis and Delta Waterfowl have turned me into a waterfowl hunter. In fact, I just got my first shotgun as a graduation gift. I am extremely thankful for the opportunity that was provided to me by Delta Waterfowl, and I hope countless more students have the same chance in the future.

## Student Abstracts

Part of the professional training of graduate and undergraduate students is their participation in scientific or other technical conferences and venues. Students of the Kennedy program gave several talks and posters at diverse venues in 2019.







#### Master of Science Students

Terrel W. Christie

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Oral presentation at the 2019 The Wildlife Society and American Fisheries Society joint meeting, Reno, Nevada, September 29-October 3, 2019.

### Depredation Impact of Double-crested Cormorants on Commercial Catfish Production in the Mississippi Delta

#### Terrel W. Christie, J. Brian Davis, Brian S. Dorr, Katie C. Hanson-Dorr, Luke A. Roy, Anita M. Kelly, Carole Engle

**ABSTRACT:** Double-crested Cormorants (*Phalacrocorax auritus*) impact United States commercial aquaculture and are considered the greatest avian predators on catfish (*Ictalurus spp.*) aquaculture facilities. Cormorants are especially problematic in the Delta region in western Mississippi, where catfish production is concentrated providing ideal wintering and foraging areas. Although cormorant/aquaculture dynamics have been studied, recent changes in aquaculture practices, regulatory policies, and decreased overall acres in production merit contemporary research.

Therefore, we estimated abundance and distribution of cormorants at their night roosts and assessed diet related to catfish consumption. Aerial surveys of cormorant night roosts were flown from October through April, 2016-2018. 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 an average of 23,379 cormorants (range 5,026 to 40,535) pooled over years (corrected for observer and method bias). A total of 728 cormorants from 27 different night roosts were collected across years. Survey count models estimated 4.2 and 5 million cormorant forage days in the Delta during winters 2016-2017 and 2017-2018, respectively. Throughout the study, catfish comprised 33% of the prey biomass detected; shad (Dorosoma spp.) also were dominant (58%) prey. Evidence suggests that the area of catfish aquaculture surrounding a night roost within a 30.6-km forage buffer is an important predictor for a bird's relative amount of catfish consumption. According to our bioenergetics model, we estimated that 558.1 and 739.5 metric tons of catfish were consumed by cormorants in winter 2017 and 2018, respectively. These results will inform wildlife managers regarding relationships between cormorant night roost locations in the Delta and disproportionate consumption of catfish, enhancing techniques to reduce fish losses on aquaculture facilities.

#### Stephen A. Clements



Oral presentation at the 2019 The Wildlife Society and American Fisheries Society joint meeting, Reno, Nevada, September 29-October 3, 2019.

#### Dynamics of Fish-Eating Birds on Commercial Baitfish and Sportfish Farms in Arkansas

Stephen A. Clements, J. Brian Davis, Brian S. Dorr, Katie C. Hanson-Dorr, Luke A. Roy, Anita M. Kelly, Carole Engle, Scott C. Barras

ABSTRACT: Arkansas' bait- and sportfish facilities are commonly used by various bird species including great blue herons (Ardea herodias), great egrets (Ardea alba), double-crested cormorants (Phalacrocorax auritus), and lesser scaup (Aythya affinis). These fish ponds are densely stocked with golden shiners (Notemigonus crysoleucas), fathead minnows (Pimephales promelas), goldfish (Carassius auratus), and other fish species. This scenario provides fish-eating birds with a rather easily-exploitable source of food that may inevitably impose economic consequences to producers. To mediate predation, farmers implement costly bird harassment programs.

Therefore, we had two overarching objectives: 1) to more fully understand exploitation of fish ponds by birds on Arkansas aquaculture facilities, and 2) help farmers devise more efficient bird harassment efforts. From November-March in 2016-2017 and 2017-2018 we conducted approximately 1,400 individual pond surveys to estimate the abundance and distribution of fish eating birds on farms. For all survey ponds, we gathered information such as fish species, fish size, and pond size as explanatory variables and developed generalized linear mixed models for analysis. During the two winters, approximately 11,000 individual birds representing 14 species known to consume fish were counted on randomly selected survey ponds. Our models suggest that factors such as pond size and the fish species in production influence distribution of fish-eating birds across Arkansas' aquaculture facilities. We recommend that farm managers use this information to designate resources for bird harassment to particular locations and times during winter when fish eating birds are more likely to negatively impact fish crops.

#### Alexandra (Lexi) Firth



Oral presentation at the 2019 Mississippi Water Resources Conference, Jackson, Mississippi.

### Ecological Agriculture Application with Winter Flooding

Alexandra Firth, Beth Baker, John Brooks, J. Brian Davis, Raymond Iglay, Renotta Smith

**ABSTRACT:** 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, as 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 contribution to water pollution and soil degradation. Thus, there is a need to identify sustainable production practices that minimize environmental damage, while also remaining economically feasible. This study investigated 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. It was hypothesized that the annual flooding of rice fields to create water bird habitat would benefit soil health, and in turn water runoff, providing agronomic benefits to the farmer alongside environmental benefits. Two rice farms were selected that applied different management regimes during the winter: conventional fallow fields and winter flooding. Soil microbial diversity and nutrient content were quantified and compared for a measure of overall soil health. Measured soil health variables linked flooded fields and high bird activity with more nutrient and microbial activity. Evidence from the investigation provided justification for future research, to develop 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.

#### Margaret (Maggie) Gross



Oral presentation at the 2019 Midwest Fish & Wildlife Conference, Cleveland, Ohio, January 27-30, 2019.

### Energetic Carrying Capacity of Submersed Aquatic Vegetation in Semi-Permanent Marshes in the Upper Midwest

#### Margaret Gross, Heath Hagy, Christopher Jacques, John Simpson, Sean Jenkins, J. Brian Davis, Joseph Lancaster, and Aaron Yetter

ABSTRACT: Wetland management efforts often target seasonal wetlands because these habitats are considered the most valuable for waterfowl. Understanding the distribution and availability of waterfowl food resources has become especially important amid the loss and degradation of wetland habitats. Waterfowl managers typically estimate the energetic carrying capacity of a wetland by using bioenergetics models to compare energy demand to energy supply. An efficient method for estimating food density utilizes visual indices and predictive equations, though previous attempts to develop predictive equations to estimate aquatic plant biomass are lacking. Furthermore, aquatic vegetation density estimates are lacking for many of the semi-permanent marshes found throughout the Upper Mississippi/Great Lakes Joint Venture (JV), which could cause slight inaccuracies in bioenergetic model parameters. We estimated the energetic carrying capacity of submersed aquatic vegetation for 20 wetland sites within the JV, which was expressed as energetic use days (EUD). Six of the 20 wetland sites were sampled multiple years and the remaining 14 sites were sampled only once during summer 2015-2017. Additionally, we evaluated a rapid assessment technique to estimate submersed aquatic vegetation biomass using percent horizontal coverage of each vegetation species, water transparency, water depth, and vegetation species specific true metabolizable energy estimates. The average energetic carrying capacity among wetland sites and years was 403,521 ± 139, 356 EUD and ranged from 4,114 EUD to 3,761,747 EUD. The submersed aquatic vegetation rapid assessment technique facilitated the development of a predictive index, which was correlated with estimates of submersed aquatic vegetation biomass (kg/ ha; R2adj = 0.58, P < 0.0001) and EUD (R2adj = 0.64, P < 0.0001). Our results will be useful to conservation planners for estimating energetic carrying capacities of semipermanently-flooded marsh habitats, which will aid in projecting impacts of wetland management alternatives (i.e., semi-permanently-flooded marsh versus moist-soil management).

#### Margaret (Maggie) Gross



Oral presentation at the 2019 Midwest Fish & Wildlife Conference, Cleveland, Ohio, January 27-30, 2019.

#### True Metabolizable Energy of Submersed Aquatic Vegetation for Gadwall

Margaret Gross, Heath Hagy, Christopher Jacques, John Simpson, Sean Jenkins, J. Brian Davis, Joseph Lancaster, and Aaron Yetter

ABSTRACT: Wetland vegetation communities provide critical foraging habitat for waterfowl, but many of the historical wetlands in the United States have been lost throughout the last two hundred years. The loss of wetlands has led to substantial declines in submersed aquatic vegetation species, which are important foods of waterfowl and other wildlife. Unfortunately, there is a lack of information about the implications of these losses on energetic carrying capacity for waterfowl, especially ducks. Waterfowl managers typically estimate the energetic carrying capacity for a wetland by using bioenergetics models. These models incorporate several parameters that predict energy demand, including population size, stopover duration, and the energetic value (i.e. true metabolizable energy (TME)) of foods available to ducks. Of these parameters, energetic carrying capacity models are especially sensitive to TME values, however, very few TME estimates are available for submersed aquatic vegetation. Most available TME values are from plant seeds and have only been estimated for a couple of waterfowl species that do not primarily consume aquatic vegetation. I estimated TME (corrected for non-dietary nitrogenous compounds) values of six common species of submersed aquatic vegetation for gadwall in order to parameterize energetic carrving capacity models and better understand the value of emergent marshes for ducks. Vegetation species was the most important predictor of TME values (mean ± SE; kcal/g[drv]) of submersed aquatic vegetation (Myriophyllum spicatum,  $0.77 \pm 0.32$ ; Elodea Canadensis,  $0.70 \pm 0.31$ ; Ceratophyllum demersum,  $0.55 \pm 0.28$ ; Najas guadalupensis,  $-0.61 \pm 0.34$ ; Vallisneria americana,  $-0.98 \pm 0.39$ ; Stuckenia *pectinata*,  $-1.07 \pm 0.33$ ), but both sex and mass of birds was also influential.

#### Madelyn McFarland



Oral presentation at the 73rd Annual Conference of the Southeastern Association of Fish and Wildlife Agencies, October 27-30, 2019, Hilton Head Island, South Carolina.

#### The Efficacy of Marsh Terraces for Enhancing and Restoring Gulf Coastal Wetlands

Madelyn McFarland, Medhi Armandei, Michael Brasher, J. Brian Davis, Joseph French, Anna Linhoss, Robert Moorhead, Raúl Osorio Morillo, Adam Skarke, Fernando Vizcarra, Mark Woodrey

ABSTRACT: Marsh terracing is a restoration technique that uses in situ sediment to construct segmented ridges in open water areas of coastal wetlands. Marsh terraces are constructed primarily to: 1) reduce wave fetch and associated wave energy; 2) mitigate for marsh erosion; 3) promote growth of submerged aquatic vegetation; 4) create emergent marsh, and; 5) improve marsh conditions and habitat for various wildlife species. Over 81 projects that have constructed >980 km linear feet of terrace in coastal Texas and Louisiana have occurred since 1990. Despite terraces being a potentially viable coastal restoration technique, long-term efficacy of terraces has not been studied. Our project is comprised of a multi-disciplinary team that is using modeling, and field and remote sensing techniques to study winds, waves, sediment transport, shoreline change, submerged aquatic vegetation, and avian species habitat use across multiple marsh terrace sites in coastal Louisiana. Although preliminary, results for some of these variables include: 1) for 20 terraces constructed between 2003-2017, 55% show more cumulative deposition than erosion, and terraces with adjacent channels, that may provide external sediment supply, show more deposition than do terraces within fully enclosed lakes; 2) cold front events generated most of the erosion events observed in marsh terrace sites; 3) terraced fields were used predominantly by non-focal species such as red-winged blackbirds, and there was low use by focal species such as rails; 4) there was generally low use of both terraced and control (unterraced) sites by wintering waterfowl, although species abundances varied spatially and temporally. Our field and other monitoring efforts are ongoing and we will update these preliminary results.

#### Ryo Ogawa

### Bayesian Integrated Population Models for the Effects Of Climatic Changes on the Demography Of Migratory Birds

Ryo Ogawa, Guiming Wang, L. Wes Burger, J. Brian Davis, Bronson K. Strickland, D. Tommy King, Fred L. Cunningham

**ABSTRACT:** Migratory birds manifest unique life history strategies compared to non-migratory birds. Facultative migrants skip migrations depending on endogenous and exogenous conditions. Consequently, facultative migrants may exhibit demographic variation in their annual lifecycle stages. However, how facultative migrants modify their demographic traits under different climates on wintering and nesting grounds still remains unclear. American white pelicans (Pelecanus erythrorhynchos) are facultative migrants during spring. We aimed to determine ecological mechanisms for variation in the agespecific survival and nest success of pelicans marked in Chase Lake, North Dakota. We used banding and encounter data of pelicans from the USGS Bird Banding Laboratory and nest count data in Chase Lake from 1960 to 2014. We classified ages as hatch-year pelicans (0 to 1 yr. old), yearlings (1 to 2 yrs. old), and adults (>2 yrs). We built Bayesian integrated population models by linking mark-resight-recovery models of the banded pelicans with state space models of the nest counts. We examined the effects of seasonal temperature and precipitation on the nest success and age-specific survival probabilities of pelicans. We tested relationships between the adult pelican survival and nest success to examine the trade-offs of demographic traits. We found substantial variation in nest success of pelicans, intermediate variation in survival of hatch-year and yearling pelicans, and relatively stable survival of adult pelicans from 1960 to 2014. Increases in summer precipitation reduced survival of hatch-year pelicans. Flooding from heavy rains in Chase Lake may disturb pelican nest sites. Moreover, flood-induced disturbances could increase mortality of hatchling and nestling pelicans before fledging. Cold temperatures in winter decreased survival of hatch-year and yearling pelicans. Hatch-year and yearling pelicans with small body size could be more susceptible to severe cold temperatures during winter than adult pelicans with larger mass. Neither temperature nor precipitation influenced variability in adult survival or nest success probability of pelicans. However, survival of adult pelicans was inversely related



to nest success probability. The inverse relationship of the demographic parameters may indicate the trade-offs of demographic traits between adult pelican survival and reproduction. We conclude that survival of hatchyear and yearling pelicans could be more susceptible to changes in weather than that of adults. Additionally, adult pelicans may exhibit trade-offs between survival and reproduction to optimize their ultimate fitness.

Oral presentation at The Waterbird Society, 43rd annual meeting, Princess Anne, Maryland, November 6-9, 2019.

#### Sharilyn Taylor



Oral presentation at the 2019 Entomological Society of America annual meeting, November 17-20, St. Louis, Missouri.

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

Sharilyn Taylor, J. Brian Davis, Katherine Parys, Marcus Lashley

ABSTRACT: The Mississippi Alluvial Valley (MAV) once contained nearly 9.7 million hectares of bottomland hardwood forest and associated habitats, including herbaceous and scrub-shrub wetlands. Over 80% of the MAV forest was eliminated or modified for agriculture, flood control, and urban expansion. Fragmentation/loss of herbaceous and riparian-forested plant communities of the region could negatively impact native bee populations. Wetland plant communities adjacent to agricultural croplands likely provide vital nesting and foraging resources for native bees, but virtually no historical documentation exists for bees in these MAV landscapes. Therefore, we studied native bee species abundance and richness in wetlands enrolled in the Wetlands Reserve Program (n=14, WRP) and on National Wildlife Refuges (n=4, NWR) of the Mississippi Delta, June-November, 2017. We used three standardized collection methods at each site that included bee bowls, malaise traps, and vane traps. We placed traps along a line transect, located within 1200 meters from designated wetland types. We collected approximately 25,000 specimens across 18 research sites; an estimated 3,500 specimens were captured in bee bowls. On average, bee bowls at WRP sites captured a greater number of native bees than those on NWRs. Halictidae represent most of the native bees captured with bee bowls. Specimen and data processing are ongoing but indicate that the number of native bees captured in traps located within wetlands increases with habitat complexity and floral availability.

## Student Field Trips

#### Waterfowl Ecology & Management, Fall 2019

*Coastal Louisiana* – Rockefeller Wildlife Refuge, Cameron Prairie NWR, and the rice country (November 21-24, 2019)

IELD TRIPS ARE PERFECT FOR EXPERIENTIAL learning—especially when you can do it from an airboat in coastal marshes, or on a crew boat churning down canals and into the Gulf. This annual MSU field trip continues to be a favorite of students in the MSU waterfowl conservation and wetlands class. The partnerships that we have established over time with the Louisiana Department of Wildlife and Fisheries, U.S. Fish and Wildlife Service, Ducks Unlimited, the Wetlands Center in Lafayette, LA, local rice and crawfish growers, and other private landowners have been invaluable for us. With so much to do and so little time for this class excursion, we try to hit the important highlights.

The first stop of the trip is at the National Wetlands Research Center in Lafayette. The Center is a hub of research on all aspects related to wetlands conservation and stressors. which provides a bit of an awakening to students on coastal conservation efforts. Former doctoral student, Dr. Joe Lancaster, previewed what they were about to experience afield over the next few days. In addition to Joe's impressive presentation, the hallways of the Center are donned with scientific posters, many highlighting the urgency related to coastal degradation from subsidence, sea level rise, invasive plants and animals (e.g., wild hogs), status of submerged aquatic plant communities, and climate effects. The science and conservation work conducted through the Center is impressive, and connected the students with the importance of applied wildlife management. The first evening was culminated with grocery shopping and great cuisine at Shucks Seafood Restaurant in Abbeville, LA.

One of the best parts of this trip is being able to lodge at LDWF's Rockefeller Refuge in Grand Chenier. Rockefeller is a 76,000-acre mecca that borders the Gulf. And it definitely has its own legacy as it celebrated 100 years of operation in 2019. "The Rock" has its own history of wildlife professionals, students, and public visitors working on and around the refuge and the Chenier. We were again in good hands there, with Dr. Joe Marty, another doctoral graduate now serving as biological supervisor. We drove to Cameron Prairie National Wildlife Refuge on Friday morning and were treated with a wonderful tour of the refuge by Ms. Diane Borden-Billiot, one of the park rangers.

We departed Cameron for the next journey, where we spent much of Saturday exploring Rockefeller wetlands by air-boat, and then riding in the LDWF crew boat south into the Gulf. In late November, the marsh was crawling with bird life, and occasional clouds of teal and several other species sprung en masse on our approach. Most of these students have never witnessed anything like it. And in the crew boat in the Gulf, we also experienced porpoises, pelicans, and several other marine species. Students witnessed the intensive and expensive beach restoration with literally tons of riprap or installation of breaker barriers, fighting to slow the local beach fronts from erosion and sea level rise.

As always the trip was over in a flash and it was time to return home. We briefly watched birds at sunup, cleaned the dorm, packed, snapped the traditional group photos, and then launched back to campus. The thrill of the trip was not lost on us. The enduring legacy of these trips and the impact it has on future generations of students, is not lost on me or my own similar experiences. For me, they began with Dr. Rick Kaminski as my mentor while taking his waterfowl class, nearly three decades ago. Admittedly, the baton passing from mentor to student in such field experiences is something irreplaceable and I am proud to see it passed on to my own students. Fortunately, our network 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 this connection with nature, and will likely influence their professional career trajectory and recruitment into natural resources work. Coastal Louisiana is therapy for the soul and the place where dreams begin.

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### York Woods Field Trip – November 14, 2019

SECOND CHANCE FOR EXPERIENTIAL LEARNing came with a visit to Mr. Kennedy's York Woods property, an incredible 9,000-acre mosaic of prime herbaceous wetland, bottomlands and sloughs, and agricultural fields all intensively managed for waterfowl and other wildlife. York Woods is a premier example of intensive, high quality waterfowl/wildlife management in the Mississippi Delta.

One unique and picturesque resource of this property is a slough that weaves through this seemingly "ancient" cypress brake that holds, atop stilts, the historic domicile of Mr. York. We manned small johnboats and alumnus Andy Wright, York Woods biologist, led us through the brake. As a rehearsal of our classroom discussions, we overviewed the values of brakes as waterfowl habitats and how they complement 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. After landing back ashore, students toured the wetland units and learned of the different management approaches to growing agricultural crops, moist-soil herbaceous wetland, and staggered water management strategies to ensure quality habitat is provided from late fall through at least late February, or later. Wright described their elaborate tailwater recovery systems to recycle agricultural water in and out of the wetlands. This was valuable experience for students, as many of them are interested in environmental benefits of reusing water. York Woods certainly provides the proverbial "pictures speak a thousand words" as attempting to describe it hear on paper does not do the natural scenery justice. Management on this property rivals that of any other, state, federal, or other private lands in the region.

Andy Wright is full-time wildlife biologist at York Woods, and went beyond the call to host our trip. We extend our since thanks, to both Andy and Mr. Rance Moring, general manager at York Woods, for their relentless pursuit of habitat perfection and unwavering support and education of our students. As always, we are indebted and grateful.





## Student Experiences

### 2018–2019 CFR/FWRC Undergraduate Research Scholars Program

**U** NDERGRADUATE STUDENT, D. ALEX DAVIS, earned a scholarship through the 2018 College of Forest Resources (CFR)/Forest and Wildlife Research Center (FWRC) Undergraduate Research Scholars Program. Alex is supervised by Dr. Brian Davis and presented his poster at Ducks8 and the Shackouls Honors College in April 2019.



**ABSTRACT:** Use of artificial nesting structures (hereafter, nest boxes) for wood ducks (Aix sponsa) have a storied history in North America. Nest boxes are often used by other species of cavity-nesting birds, including hooded mergansers (Lophodytes cucullatus). Previous experiments using conventional-sized and small experimental nest boxes (approximately half the size of conventional boxes) at two sites in Mississippi documented variable use and wood duck duckling survival relative to box size, study area, time of breeding season, and other factors. Herein, we report preliminary results for shared use of nest boxes by wood ducks and hooded mergansers at Noxubee and Yazoo National Wildlife Refuges, monitoring them at both areas from 1994-1997. At Noxubee, we found 460 unique nests in 122 nest boxes, and 356 (77%) nests were successful. Of the successful nests, 87 (~25%) contained eggs of both duck species. At Yazoo, we found 423 nests in 77 nest boxes, and 259 nests (61%) were successful. Of the successful nests, 25 nests (~10%) contained eggs of both species. These results are preliminary; however, the number of shared nests for these species in this four-year study represents some of the greatest reported in North America. Ongoing analyses will explore clutch sizes and other metrics among all nests, and in large and small next boxes on both refuges. These results will provide some basis for exploring potential consequences of shared use of nest boxes given the differences in life history between these cavity-nesting Anatids in these southern wetlands.

### Undergraduate Student Internships/Research Field Experiences

Seasonal jobs, internships, volunteer positions, or other developmental activities are integral to student growth and success. Students are encouraged to obtain professional experience prior to graduation.



### Congratulations to these undergraduate students on their summer jobs and internships in 2019.

- **Caleb Amacker**: Wetland technician, Barker Ranch, West Richland, Washington, summer 2019
- **Corey Bacon**: Biotechnician, Robbie Russell property (2,000 acres), Brownsville, Tennessee, summer 2019.
- Alex Davis: Intern, Sam D. Hamilton Noxubee National Wildlife Refuge, Mississippi, spring 2019.
- **Emily Douglas**: Intern, Sam D. Hamilton Noxubee National Wildlife Refuge, Mississippi, summer 2019.
- Matt Dziamniski: Intern, Sam D. Hamilton Noxubee National Wildlife Refuge, Mississippi, summer 2019.
- **Nikita Hinson**: Research technician, Department of Wildlife, Fisheries and Aquaculture, Mississippi State, MS, summer 2019.
- Logan Mills: Wetland technician, Barker Ranch, West Richland, Washington, summer 2019.
- Justin Rakestraw: Biotechnician, Robbie Russell property (2,000 acres), Brownsville, Tennessee, summer 2019.
- **Evie Von Boeckman**: Piping Plover and Shorebird Research technician, Delaware Division of Fish & Wild-life, Christiana, DE, summer-fall 2019.
- **Corey Yarber**: Research technician, Department of Wildlife, Fisheries and Aquaculture, Mississippi State, MS, summer 2019.







#### Undergraduate Student Internships/ Research Field Experiences: FROM COAST TO COAST

#### **Caleb Amacker**

*Wildlife, Fisheries and Aquaculture* (December, 2019)

My professional interests have evolved around waterfowl and wetland ecology. In summer 2018, I worked close to home, as a research technician on Dr. Davis' wood duck project at the Sam D. Hamilton Noxubee National Wildlife Refuge. This was a great experience for me and I learned so much. However, by 2019, I was ready for a different challenge. Dr. Davis told me about a summer position working as a wetland manager on the Barker Ranch in Washington. I was intrigued but I also had to contemplate being so far from home.

I accepted the position and went to work in as a waterfowl habitat management technician on the 2,000-acre Barker Ranch in Washington, an intensively managed and well caredfor waterfowl hunting property. Approximately 1,800 acres of the property is enrolled in the USDA Wetland Reserve Program. The property contains over 100 different waterfowl impoundments and hunting blinds. During my internship, we planted several agricultural "hot crops" and managed seasonal herbaceous wetlands, from which we irrigated out of a local river. Because water quantity issues of the Pacific Northwest are concerning, water conservation methods were an important component of my job.

Time in this part of the world gave me fresh experiences related to waterfowl management in a distant and different area of the U.S., a contrast from the swamps and bottomland hardwoods of Mississippi. Water conservation strategies were important in the arid region of eastern Washington, so management strategies differed from the southeastern U.S. Working there also let me experience different culture and wildlife species.

I grew as an individual during this internship. As a young man with few bills and responsibilities, I chose to trek across the country. It was incredible to literally drive across 9 state lines and see just what was out there. The person that I was before and after this summer experience are completely different. I made new lifelong friends and added fellow waterfowlers and ecologists to my list of professional mentors. I learned that when you step out of your comfort zone, like traveling across the country away from friends and family, you grow as an individual. We are only bound by what we allow to bind us. My trip was tough and by no means easy work. But putting myself through such a trial opened my eyes to what I am capable of accomplishing. I live by the reference 'diamonds are built under pressure.' I am thankful for the opportunity to travel and see a different part of the world. I would not be who I am now without taking the journey.





### Evie Von Boeckman

Wildlife, Fisheries and Aquaculture (May, 2019)

Moving to a new place can be daunting, especially if the people have unique and perhaps unrecognizable dialects, totally different foods, and phrases or things you have never before heard or seen in your life. I grew up in a small suburb outside of Memphis. At State, I grew as a person and pursued courses in avian and wetland research, although it took me some time to realize these were my passions. Fortunately, I was mentored by professors that guided me into finding my true professional passions.

And despite all that, I felt like I needed more to become a scientist and really appreciate the bigger world. I was fortunate to be selected to monitor migratory, threatened, and endangered shorebirds, in an unlikely location: Delaware Bay.

The area is a crucial hotspot for shorebirds during their migration, providing them habitats in which to rest, feed, and raise young before winter migration in the Atlantic Flyway. At first, Delaware seemed like a foreign, intimidating place. Yet much to my pleasant surprise, it is one of the most important natural areas for shorebird conservation in the Atlantic flyway.

My first survey in Delaware was eye-opening. I absorbed so much in such a brief span about wildlife and their habitats. I was amazed with not only the beaches that are breath-taking, but the vast number of birds lining the shores. I knew that all the work was finally paying off and that I had found a special place.

I was able to remain in this capacity after my first fall 2019 field season. Now 2020 marks the second year and I have found fulfillment and pure satisfaction in my work. I believe that this is where I was meant to be, and even needed —helping contribute to continental shorebird conservation. I grew to love shorebirds, the coastal systems, the fluidity of the landscape, and technology. While I have a passion for shorebirds, I quickly learned that waterfowl conservation efforts greatly impact shorebirds, wading birds, and marsh birds, and other marsh life. Dr. Davis always told me the marsh is much 'bigger' than just shorebirds. Now I've learned that firsthand.

Most importantly, I learned to challenge myself, seek beyond the 'norm,' and take a risk. This experience has allowed me to grow as a person and scientist. It has also showed me that I should continually challenge myself, ask questions, learn and teach something new every day, build strong bonds with colleagues and friends, and continue to love and be amazed by birds!

## Technical Assistance 2019



**A** S A WATERFOWL ECOLOGIST/CONSERVATIONist, part of our mission is to help landowners improve their resources for waterfowl and other wildlife. The following is a brief snapshot of some of these working lands for which we provided assistance.

#### Jessie Critcher and Tom Tollison

Backwater Brake hunting property

#### John Wilson

Technical assistance on seasonal moist-soil management to the Wilson Farm in central Missouri.

#### Scott Galloway and Jeryl Jones, Galloway Farms

Technical assistance to MSU alum 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. Hardwood trees were planted in winter 2019.

## On the Lighter Side

Have you ever seen an alligator crafted from federal and state duck stamps? Well, now you have, courtesy of Cameron Prairie National Wildlife Refuge! We relive this humor each year during our field trip. It is definitely unique to me, two legendary "animals" in south Louisiana, ducks and alligators, blended so perfectly as only the Cajuns can do!



## Awards-Accolades

**Terrel Christie** was selected and attended the 2019 Graduate Field Course in Waterfowl Breeding Ecology in the Prairie Pothole Region, a 2-week field/classroom course sponsored by Delta Waterfowl.

**Terrel Christie** won a The Wildlife Society (TWS) travel award for his oral presentation entitled, "Predation Risk of Doublecrested Cormorants *(Phalacrocorax auritus)* on Commercial Catfish Production in the Mississippi Delta."

**Terrel Christie** graduated with his Master of Science degree for his study on, "Predation Risk of Double-crested Cormorants (*Phalacrocorax auritus*) on Commercial Catfish Production in the Mississippi Delta," December 2019.

**Stephen A. Clements** graduated with his Master of Science degree for his study on, "Foraging Ecology and Depredation Impact of Scaup on Commercial Baitfish and Sportfish Farms in Eastern Arkansas," August 2019.

**Brian Davis** was invited by the National Academy of Sciences, Engineering and Medicine/Gulf Coastal Research Program to serve as a mentor to their Early Career Research award nominees in 2019.

**Emily Douglas**, is the recipient of the Kennedy Undergraduate Scholarship.

Matt Dziamniski, is the recipient of the Kennedy Undergraduate Scholarship.

**Cole Farris** is the recipient of the James C. Kennedy Scholarship in Waterfowl and Wetlands Conservation.

**Dr. Joe Lancaster**, selected as Science Coordinator of the Gulf Coast Joint Venture, Lafayette, Louisiana in 2019.

**Ali Marcant** is the recipient of the Scenic Homes "Dr. Richard M. Kaminski" Scholarship in Waterfowl and Wetlands Conservation.

**Ryo Ogawa**, won the Best Student Oral Presentation at the 73rd Southeastern Association of Fish & Wildlife Agencies Annual Conference (SEAFWA), Hilton Head, South Carolina, October 27-30, 2019. His talk was entitled, "Movement Strategies of American White Pelicans During the Annual Cycle."

**Ryo Ogawa**, won a travel scholarship to the 73rd Southeastern Association of Fish & Wildlife Agencies Annual Conference



(SEAFWA), Hilton Head, South Carolina, October 27-30, 2019.

**Victoria Starnes** is the recipient of the Sam D. Hamilton Noxubee National Wildlife Refuge scholarship.

**Sharilyn A. Taylor**, won a \$600 MSU travel assistance grant for graduate students to present an oral presentation on native bee use of wetlands in Mississippi, at the Entomological Society of America Conference, November 2019, St. Louis, Missouri.

**Sharilyn A. Taylor** won the 2019 Thomas Plein Scholarship (\$1500) and the Fernando Vizcarra Memorial Photography contest (\$300).

**Ryan Thomason** is the recipient of the Mark A. Schmoll Memorial Endowed Scholarship.

**Spencer Weitzel** received the Thomas Plein Foundation Scholarship.

## Presentations

#### **Oral Presentations**

Brasher, M. G., M. E. Heitmeyer, T. E. Moorman, H. M. Hagy, D. D. Humburg, A. H. Raedeke, **J. B. Davis**, J. C. Feddersen, D. A. Graber, L. W. Naylor, D. C. Osborne, L. A. Reynolds, E. B. Webb. 2019. Distribution dynamics of waterfowl: Are patterns changing in the 21st Century? 73rd Southeastern Association of Fish & Wildlife Agencies (SEAFWA) Annual Conference, Hilton Head, SC, October 27-30.

**Christie, T. W., J. B. Davis**, B. S. Dorr, K. Hanson-Dorr, L. A. Roy, A. Kelly, C. Engle. 2019. Depredation impact of doublecrested cormorants (*Phalacrocorax auritus*) on commercial catfish production in the Mississippi Delta. World Aquaculture Society Annual Meeting, New Orleans, LA, March 7-11.

**Christie, T. W., J. B. Davis**, B. S. Dorr, K. Hanson-Dorr, L. A. Roy, A. Kelly, C. Engle. 2019. Depredation impact of doublecrested cormorants (*Phalacrocorax auritus*) on commercial catfish production in the Mississippi Delta. Proceedings of the 18th Wildlife Damage Management Conference, Mississippi State University, MS, March 25-27.

**Clements, S. A., J. B. Davis**, B. S. Dorr, K. C. Hanson-Dorr, L. A. Roy, A. M. Kelly, C. R. Engle. 2019. Foraging ecology and distribution of scaup (*Aytha* spp.) on Arkansas commercial baitfish and sportfish farms. 2019 Annual Meeting of the Arkansas Bait and Ornamental Fish Growers Association, Lonoke, AR, February.

**Clements, S. A., J. B. Davis**, B. S. Dorr, K. C. Hanson-Dorr, L. A. Roy, A. M. Kelly, C. R. Engle, S. C. Barras. 2019. Foraging ecology and distribution of scaup (*Aythya* spp.) on Arkansas commercial baitfish and sportfish farms. World Aquaculture Society Annual Meeting, New Orleans, LA, March 7-11.

**Clements, S. A., J. B. Davis**, B. S. Dorr, K. C. Hanson-Dorr, L. A. Roy, A. M. Kelly, C. R. Engle, S. C. Barras. 2019. Foraging ecology and distribution of scaup (*Aythya* spp.) on Arkansas commercial baitfish and sportfish farms. Proceedings of the 18th Wildlife Damage Management Conference, Mississippi State University, MS, March 25-27.

**Davis, J. B.** 2019. Waterfowl ecology and management program update. Mississippi Commission on Wildlife, Fisheries & Parks, Mississippi State, MS, October 16.

**Davis, J. B., J. D. Lancaster**, R. M. Kaminski. 2019. Winter ecology of female mallards in Mississippi's Alluvial Valley.

Clemson University, SC, January 24.

**Davis, J. B., J. D. Lancaster**, R. M. Kaminski. 2019. Winter ecology of female mallards in Mississippi's Alluvial Valley. Baruch Institute of Coastal Ecology and Forest Science, Georgetown, SC, January 25.

**Davis, J. B.**, M. Woodrey, A. Linhoss, R. Moorhead, M. Brasher, A. Skarke, A. Mohamedmehdi, **M. McFarland**. 2019. The efficacy of marsh terraces for enhancing and restoring Gulf coastal wetlands. Clemson University, SC, January 24.

**Davis, J. B.**, M. Woodrey, A. Linhoss, R. Moorhead, M. Brasher, A. Skarke, A. Mohamedmehdi, **M. McFarland**. 2019. The efficacy of marsh terraces for enhancing and restoring Gulf coastal wetlands. Baruch Institute of Coastal Ecology and Forest Science, Georgetown, SC, January 25.

**Davis, J. B., S. A. Clements,** B. S. Dorr, L. A. Roy, C. R. Engle, K. H. Dorr, A. Kelly. 2019. Foraging ecology and depredation impact of scaup on commercial baitfish and sportfish aquaculture farms in Arkansas. 8th North American Duck Symposium, Winnipeg, MB, Canada, Aug. 26-30, 2019.

Engle, C. R., L. Roy, B. Dorr, **J. B. Davis**, A. Kelly, **S. Clements**, **T. Christie**. 2019. What do problems with fish-eating birds really cost U.S. baitfish and sportfish farms? 2019 Annual Meeting of the Arkansas Bait and Ornamental Fish Growers Association, Lonoke, AR, February.

**Gross, M. C.**, H. Hagy, C. N. Jacques, J. Simpson, S. Jenkins, **J. B. Davis**, **J. D. Lancaster**, A. P. Yetter. 2019. True metabolizable energy of submersed aquatic vegetation for Gadwall. 78th Midwest Fish & Wildlife Conference, Cleveland, OH, January 27-30.

**Gross, M. C.**, S. E. McClain, **J. D. Lancaster**, H. M. Hagy, C. N. Jacques, **J. B. Davis**, J. W. Simpson, B. T. Shirkey, S. E. Jenkins, A. P. Yetter. 2019. True metabolizable energy of submersed aquatic vegetation for ducks. 8th North American Duck Symposium, Winnipeg, MB, Canada, August 26-30.

**Kneece, M. R., J. D. Lancaster, J. B. Davis**, D. E. Harrigal. 2019. Survival and recovery of mottled ducks in Coastal South Carolina 2008-2018. 73rd Southeastern Association of Fish & Wildlife Agencies (SEAFWA) Annual Conference, Hilton Head, SC, October 27-30.

**Lancaster J. D., J. B. Davis**, R. M. Kaminski, G. M. Street. 2019. Habitat use by female mallards during and after waterfowl hunting season in Mississippi. 8th North American Duck Symposium, Winnipeg, MB, Canada, August 26-30.

Lancaster J. D., M. C. Gross, J. W. Simpson, B. T. Shirkey, S. E. McClain, C. N. Jacques, J. B. Davis, H. M. Hagy. 2019. Energetic carrying capacity of SAV in semi-permanent wetlands of the upper Midwest. Illinois Chapter of The Wildlife Society Annual Meeting, Springfield, IL, April 14.

Lancaster J. D., M. C. Gross, J. W. Simpson, B. T. Shirkey, S. E. McClain, C. N. Jacques, J. B. Davis, H. M. Hagy. 2019. Energetic carrying capacity of SAV in semi-permanent wetlands of the upper Midwest. 13th Annual Emiquon Science Symposium, Lewiston, IL, USA, May 8.

Lancaster J. D., M. C. Gross, J. W. Simpson, B. T. Shirkey, S. E. McClain, C. N. Jacques, J. B. Davis, H. M. Hagy. 2019. Energetic carrying capacity of SAV in semi-permanent wetlands of the upper Midwest. 8th North American Duck Symposium, Winnipeg, MB, Canada, August 26-30.

**McFarland, M.,** M. Armandei, M. Brasher, **J. B. Davis**, J. French, A. Linhoss, H. Masood, R. Moorhead, R. O. Morillo, A. Skarke, M. Woodrey. 2019. Efficacy of marsh terraces for enhancing and restoring Gulf Coast wetlands. 73rd Southeastern Association of Fish & Wildlife Agencies (SEAFWA) Annual Conference, Hilton Head, SC, October 27-30.

**Marty, J. R., J. B. Davis**, R. M. Kaminski, M. G, Brasher, S. A. Rush. 2019. Rice and natural seed biomass estimates for avian habitat conservation in Gulf coast prairie croplands. 8th North American Duck Symposium, Winnipeg, MB, Canada, August 26-30.

**Ogawa, R.**, G. Wang, D. T. King, M. A. Sovada, L. W. Burger, **J. B. Davis**, B. K. Strickland, F. L. Cunningham. 2019. Movement strategies of American white pelicans during the annual cycle. 73rd Southeastern Association of Fish & Wildlife Agencies Annual Conference, Hilton Head, SC, October 27 - 30.

**Ogawa, R.,** G. Wang, L. W. Burger, **J. B. Davis**, B. K. Strickland, D. T. King, F. L. Cunningham. 2019. Bayesian integrated population models for the effects of climate change on the demography of migratory birds. The Ecological Society of America, Louisville, KY, August 11-16.

**Ogawa, R.,** G. Wang, L. W. Burger, **J. B. Davis**, B. K. Strickland, D. T. King, F. L. Cunningham. 2019. Bayesian integrated population models for the effects of climate change on the demography of migratory birds. Waterbirds Society 43rd Annual conference, November 9. Schummer, M. L., J. Simpson, **J. B. Davis**, B. Shirkey, K. E. Wallen. 2019. Balancing waterfowl hunting opportunity and quality to recruit, retain, and reactivate. 8th North American Duck Symposium, Winnipeg, MB, Canada, August 26-30.

Sheehan, K. L., K. C. Hanson-Dorr, B. S. Dorr, **S. Clements, T. W. Christie**, S. Rush, **J. B. Davis**. 2019. Parasites and plastics in waterbirds foraging near aquaculture facilities in the Southeastern US. 80th Annual meeting of the Association of Southeastern Biologists (ASB), Memphis, TN, April 3-6.

#### **Poster Presentations**

**Christie, T. W., J. B. Davis**, B. S. Dorr, K. Hanson-Dorr, L. A. Roy, A. Kelly, C. Engle. 2019. Depredation impact of doublecrested cormorants on commercial catfish production in the Mississippi Delta. American Fisheries Society & The Wildlife Society 2019 Joint Annual Conference, Reno, NV, September 29-October 3.

**Clements, S. A., J. B. Davis**, B. S. Dorr, K. C. Hanson-Dorr, L. A. Roy, A. M. Kelly, C. R. Engle, S. C. Barras. 2019. Dynamics of fish eating birds on commercial baitfish and sportfish farms in Arkansas. American Fisheries Society & The Wildlife Society 2019 Joint Annual Conference, Reno, NV, September 29-October 3.

**Davis, D. A., J. B. Davis**, R. M. Kaminski, S. E. Stephens, J. Klassen. 2019. Nesting biology of wood ducks and hooded mergansers at Noxubee and Yazoo National Wildlife Refuges, Mississippi. 2019 MSU Undergraduate Research Symposium, MS State, MS, April 16.

**Davis, D. A., J. B. Davis**, R. M. Kaminski, S. E. Stephens, J. Klassen. 2019. Use of next boxes by wood ducks and hooded mergansers at Noxubee and Yazoo National Wildlife Refuges in Mississippi. 8th North American Duck Symposium, Winnipeg, MB, Canada, August 26-30.

**Gross, M. C.**, H. M. Hagy, C. N. Jacques, J. W. Simpson, S. E. Jenkins, J. B. Davis, J. D. Lancaster, A. P. Yetter. 2019. Energetic carrying capacity of submersed aquatic vegetation in semi-permanent marshes in the upper Midwest. 79th Annual Midwest Fish and Wildlife Conference, Cleveland, OH, January 27-30.

**Gross, M. C.**, H. M. Hagy, C. N. Jacques, J. W. Simpson, S. E. Jenkins, **J. B. Davis**, **J. D. Lancaster**, A. P. Yetter. 2019. True metabolizable energy of submersed aquatic vegetation for gadwall. 79th Annual Midwest Fish and Wildlife Conference, Cleveland, OH, January 27-30.

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**Firth, A.,** B. Baker, J. P. Brooks, R. Smith, R. B. Iglay, **J. B. Davis**. *In Press*. Low external input sustainable agriculture: Winter flooding for bird use and soil health Agriculture, Ecosystems and Environment.

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# Finances

Waterfowl & Wetland Expenditures					
January 1, 2019 - December 31, 2019					
	KENNEDY FUNDS	MISSISSIPPI STATE UNIVERSITY	CONTRACTS & GRANTS	TOTALS	
Kennedy Coordinator	45,806	67,945		113,751	
Research Students	37,941		58,179	96,120	
Administrative Support		20,000		20,000	
Contractual & Commodities	14,345		9,262	23,607	
Travel			6,277	6,277	
GRAND TOTAL	98,092	87,945	73,718	259,755	

# **Agencies/People**

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Barker Ranch, Washington

Ducks Unlimited Inc.

Delaware Division of Fish and Wildlife

Delta Waterfowl

Delta Wildlife

Kansas Department of Wildlife, Parks and Tourism

James Kennedy

Mississippi Department of Wildlife, Fisheries & Parks

The National Academies of Sciences, Engineering, and Medicine

National Fish and Wildlife Foundation

Natural Resource Conservation Service

Robbie Russell

Sam D. Hamilton Noxubee National Wildlife Refuge

US Army Corps of Engineers

US Department of Agriculture National Institute of Food and Agriculture

US Fish and Wildlife Service



Sarah and Jim Kennedy enjoy a mallard hunt at York Woods with dog Alder.















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JAMES C. KENNEDY ENDOWED CHAIR IN WATERFOWL & WETLANDS