



MSU RESEARCHERS MAP GENETIC DEER STRUCTURE IN SOUTHEASTERN U.S.

By Sarah Buckleitner | Photo by Steve Gulledge

It is well understood by hunters and biologists alike that deer vary in body and antler size across the state. Larger deer are thought to be the descendants of the Northern deer that were released in the state during restoration efforts in the 1900s.

Mississippi State University scientists are using genetics to determine the true lineage. Steve Demarais, wildlife, fisheries and aquaculture professor in MSU's Forest and Wildlife Research Center, collected samples from throughout the United States to gain insight into which restoration efforts were most successful, and whether or not Northern deer survived long enough to pass on their lineages.

"There is a biological need to genetically differentiate deer throughout the country. This need led to Louisiana, Mississippi and Alabama state wildlife agencies cooperatively funding this project," Demarais said.

Gaining a clearer picture of the genetic breakdown of the deer population will provide scientists with an idea of how earlier restoration efforts played out genetically in the population. It

will also validate or invalidate common school of thought in the Southeast, including the perception that larger deer in specific areas have northern lineages.

"A landowner recently mentioned to me that in certain areas of Mississippi there are markedly larger deer than the average regional body and antler size. He stated that the area had initially been stocked with northern deer, and as they tend to be larger, those genetics still influenced modern herds. This project will help address the accuracy of those beliefs," Demarais said.

Stocking efforts occurred in the early 1900s, when deer were scarce on the southeastern landscape—mostly due to habitat loss and unregulated hunting. In order to repopulate the popular game species, state agencies obtained deer from around the Southeast, but also as far as Michigan and Mexico, and released them throughout the region.

This restoration effort was one of the most successful of all time—and now deer are plentiful throughout Alabama, Mississippi and Louisiana, said graduate student Jordan Youngmann,

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who works with Demarais.

“This is heralded as one of the best restoration stories out there: there were almost no deer in the early 1900s, and clearly there is a bounty of deer now. These deer are genetically robust and have not suffered any problems often associated with restoration efforts,” Youngmann said.

Restoring a population can be very difficult—without careful

consideration of the stock sources, a restoration effort is likely to fail.

This research will allow scientists to examine what the genetic structure of a successfully restored population looks like. This will provide clues for other species restoration efforts—particularly in terms of which source populations work best, Youngmann added.

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NATIONAL TRAINING ACADEMY AT MSU

A new partnership between Mississippi State University and the U.S. Department of Agriculture’s APHIS Wildlife Services program has made the university home to a national training academy for wildlife professionals.

APHIS – the Animal and Plant Health Inspection Service – provides a wide range of functions, including protecting and promoting U.S. agricultural health, regulating genetically-engineered organisms, administering the Animal Welfare Act, and carrying out wildlife damage management activities.

The Wildlife Services National Training Academy, or NTA, is the country’s first academy dedicated to training, instruction and safely resolving human-wildlife conflicts and safety-related risks. The academy, headquartered at Mississippi State in the Center for Resolving Human-Wildlife Conflicts, will be responsible for training approximately 1,200 personnel of USDA’s Wildlife Services currently tasked with responding to human-wildlife issues across the U.S.

Human-wildlife conflicts occur in all 50 states and cause an estimated \$22 billion dollars in damage annually to agricultural crops and man-made infrastructure. That number will only climb as human populations continue to increase.

Human-wildlife conflicts present an intricate challenge. Person-



MSU President Mark E. Keenum and USDA APHIS Wildlife Services Deputy Administrator William H. Clay signed a “Resolution for Collaboration” to create a national training academy housed at Mississippi State. (Photo by Beth Wynn)

nel responding to conflict often must consider multiple factors and provide a solution in a short span of time, sometimes within a setting that potentially could pose safety risks. For that reason, training is paramount, according to Clay, who has served as deputy administrator of the USDA APHIS Wildlife Services since 2000.

“In many cases, professionals in wildlife services are first responders in these scenarios. Ongoing and consistent training in human-wildlife conflicts at the national level promises to provide these professionals with the tools they need to continue to serve in this capacity,” Clay said. “For decades, Wildlife Services has worked to build a trained and professional workforce. The National Training Academy will further promote a culture of excellence in wildlife damage management by integrating and enhancing safety, communications and administrative and technical skills.”

humanwildlifeconflicts.msstate.edu

MSU CATFISH VACCINE REPORT GETS NATIONAL SPOTLIGHT



David Wise and Terrance Greenway work on the catfish vaccine in the Thad Cochran Warmwater Aquaculture Center at the Delta Research and Extension Center in Stoneville. (Photo by Kenner Patton)

CATFISH

by the numbers

150 operations

35,000 acres of production

\$169 million value of production in 2016

Mississippi is **#1** state in the nation for production of catfish

\$30-40 million annually is the cost of reduced production caused by ESC.

Mississippi state researchers with the Thad Cochran National Warmwater Aquaculture Center at MSU's Delta Research and Extension Center in Stoneville are receiving a major honor from the American Fisheries Society.

Professor David Wise and four university collaborators, Todd Byars, Terrence Greenway, Matthew Griffin and Lester Khoo, are winners of the organization's 2016 Robert L. Kendall Award for their research report featured in the *Journal of Aquatic Animal Health*. Wise, Greenway and Byars work for the Department of Wildlife, Fisheries and Aquaculture in the Mississippi Agricultural and Forestry Experiment Station, and Griffin and Khoo work for the College of Veterinary Medicine.

The MSU report details development of a vaccine to protect fish against enteric septicemia of catfish, a bacterial disease caused by *Edwardsiella ictaluri*. This is the most commonly reported disease affecting catfish and can cause catastrophic losses if left untreated.

Final trials of the MSU-developed oral vaccine currently are taking place, with hopes for commercial release in the near future. Last year's trials involved some 90 million catfish, and researchers anticipate doubling that number this year.

"Better disease management increases production efficiency," Wise said. "That gives Mississippi producers a competitive advantage."

"We want to deliver this technology right into the hands of the producers," he said, noting that "the work we are doing now will show us the resources we need to make this a viable commercial product."

Wise also said the "vaccination platform has tremendous potential for increasing the profitability of catfish farming."



WIPING OUT INVASIVE WILD HOGS

It is estimated that non-native, invasive wild hogs cause \$1.5 billion dollars in damage in the U.S. annually. Researchers in the Department of Wildlife, Fisheries and Aquaculture hope to shed light on the wild hog problem in Mississippi.

Bronson Strickland and Jessica Tegt, associate and assistant extension professors, respectively, hope they can determine exactly how much hog damage and control currently cost Mississippi producers. They also hope to learn about the public's knowledge and attitudes toward wild hogs.

Researchers sent surveys to 4,900 agricultural producers and timberland owners across the state with 500 responding to the survey. Of those, 305 people agreed to participate with follow up phone calls or onsite surveys. The survey included questions about the presence and frequency of wild hog sightings. It also asked about damage tolerance and control methods. Seventy-five of those landowners were randomly selected for site visits.

"We evaluated landscape characteristics with GPS data and verified the damage. The wild hog damage experienced by those landowners alone totaled one million dollars," Tegt said.

Researchers also sent surveys to 5,000 randomly-selected homeowners across Mississippi to determine public attitudes and knowledge of wild hogs. More than 800 homeowners responded. Only 39 percent of participants said they were somewhat fa-

miliar of wild hogs, while 50 percent said they had a negative attitude toward the species. More than half of the respondents thought wild hogs should be hunted to reduce damage.

"This survey showed us that there is an opportunity for education and outreach," Tegt said. "While the data are still being analyzed, the initial results have taught us a lot.

"We have a lot more hogs in Mississippi than previous data suggest. We're at a tipping point in the state. If we don't take action soon, we may never eradicate the wild hog population from Mississippi, Tegt added."

Tegt said the next steps include developing recommendations to minimize the negative effects of wild hog damage on agricultural and forestry productivity. Part of that plan includes an outreach program to educate law enforcement officers about wild hogs. Researchers also plan to replicate the surveys nationally.

"Forty-seven states have reported a presence of wild hogs," Tegt said. "This issue reaches well beyond our region."

Conducted in the Forest and Wildlife Research Center, this research is funded by the Mississippi Department of Agriculture and Commerce Land, Water and Timber Resources Board and the USDA APHIS Wildlife Services Feral Swine Mitigation Program.

THE CORMORANT'S CATCH

Dr. Bronson Strickland, associate extension professor in the Department of Wildlife, Fisheries, and Aquaculture, is working to develop strategies that will prevent double-crested cormorants from eating catfish farmers out of house and home.

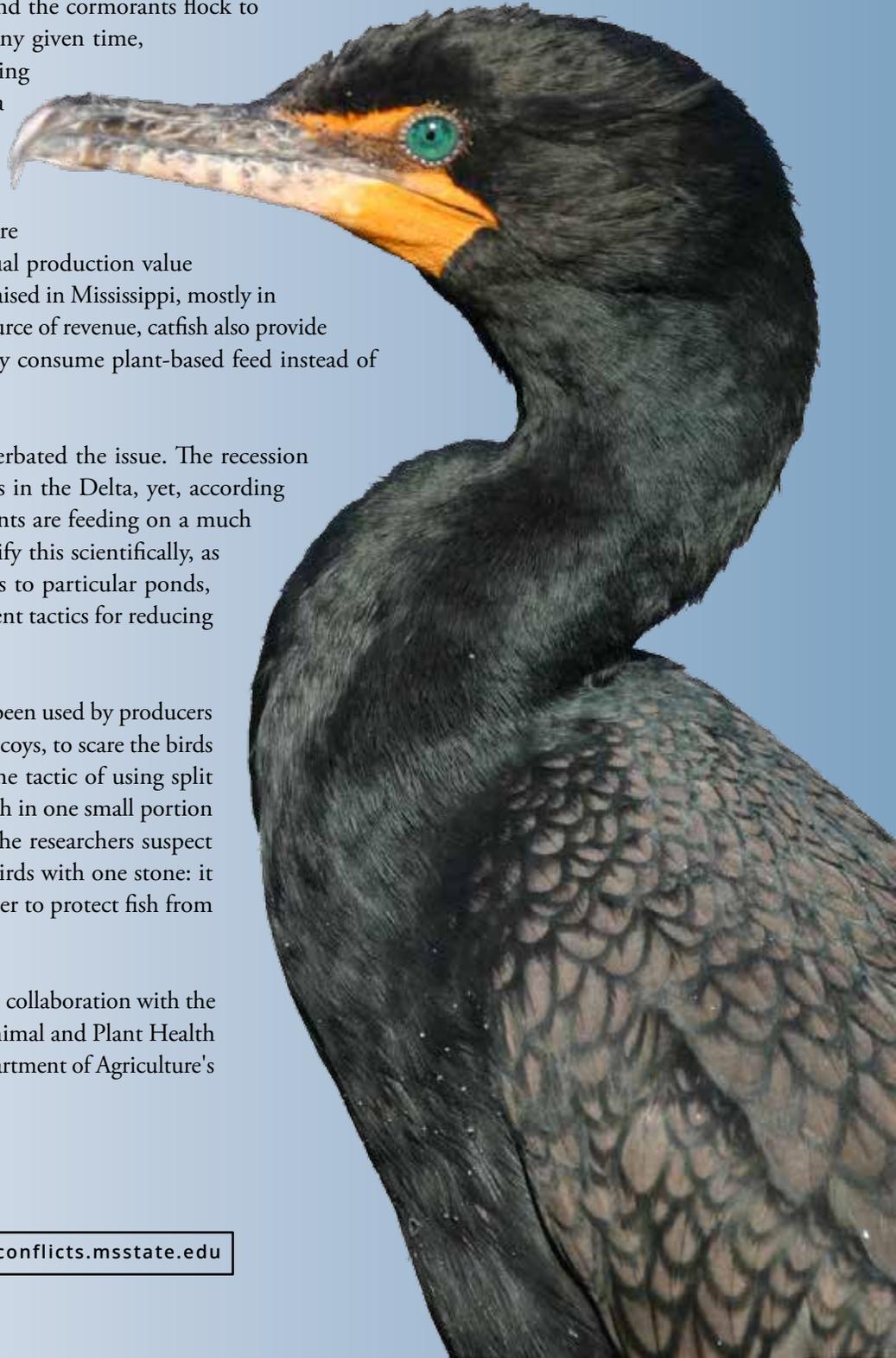
Cormorants are large waterbirds that migrate south each winter to roost. While they have been making the long journey from the northeastern United States to Mississippi for eons, the birds recently developed a taste for farm-raised catfish. The shallow ponds and plentiful fish provide a much easier meal than most natural waterways, and the cormorants flock to catfish aquaculture in the thousands—at any given time, 50,000 to 60,000 cormorants will be gulping fish out of ponds in the Delta. This creates a huge economic impact; for the Delta region alone, between \$5 and \$12 million worth of damage are caused each year.

The catfish industry is the largest aquaculture industry in the United States, with an annual production value of \$450 million. Over half of those fish are raised in Mississippi, mostly in the Delta. Aside from being an important source of revenue, catfish also provide an eco-friendly option for consumers—they consume plant-based feed instead of meat-based feed and are native to the area.

The larger economic climate has also exacerbated the issue. The recession of 2008 halved the acreage of catfish ponds in the Delta, yet, according to producers, the same number of cormorants are feeding on a much smaller population. Strickland hopes to verify this scientifically, as well as to identify what attracts cormorants to particular ponds, and to examine the efficacy of past and present tactics for reducing predation.

Some strategies for reducing predation have been used by producers for ages, such as putting up scarecrows, or decoys, to scare the birds away. More recent developments, such as the tactic of using split pond production, which concentrates the fish in one small portion of the pond, may prove to be successful. The researchers suspect that this method metaphorically kills two birds with one stone: it makes production more efficient, and is easier to protect fish from cormorants.

This project was funded by and conducted in collaboration with the United States Department of Agriculture Animal and Plant Health Inspection Service, and the United State Department of Agriculture's National Wildlife Research Center.



UNDERGRADUATE RESEARCH SCHOLARS



ISABELLE DURHAM

Hometown: Prattville, AL

Isabelle is a sophomore majoring in wildlife, fisheries and aquaculture. She is studying how foraging animals select for perceived or actual habitat selection. Durham will design and conduct experimental trials wherein fruit flies select breeding and foraging habitat from equally available resources of variable actual and perceived quality. Her research may inform use of habitat selection for wildlife management and conservation. Mentors include Dr. Garrett Street and Dr. Marcus Lashley, who are both assistant professors in Department of Wildlife, Fisheries, and Aquaculture and Dr. Natraj Krishnan, an assistant professor in the Department of Biochemistry, Molecular Biology, Entomology, and Plant Pathology in the College of Agriculture and Life Sciences.



JACOB JONES

Hometown: Humnoke, AR

Jacob is a junior majoring in wildlife, fisheries and aquaculture. He is studying the Gulf killifish, a hardy baitfish which moves easily between fresh and saltwater. For the killifish to be produced commercially, researchers have to address specific issues that are preventing the commercial culture of the species. These issues include developing protocols to establish enough spawning females to produce and care for the young, and establishing egg collection and incubation methods that can be implemented in commercial hatcheries. In addition to measuring individual female egg output, Jones will test different spawning substrate materials. Jones is under the direction of Dr. Peter Allen, associate professor in the Department of Wildlife, Fisheries, and Aquaculture.

CONSERVING AMUR LEOPARDS IN CHINA

In China, Amur leopard and tiger populations have dwindled due to habitat loss, human encroachment, and illegal poaching. The Amur leopard is categorized as critically endangered by the International Union for Conservation of Nature, and, in 1998, scientists estimated there were fewer than 100 individuals in the wild.

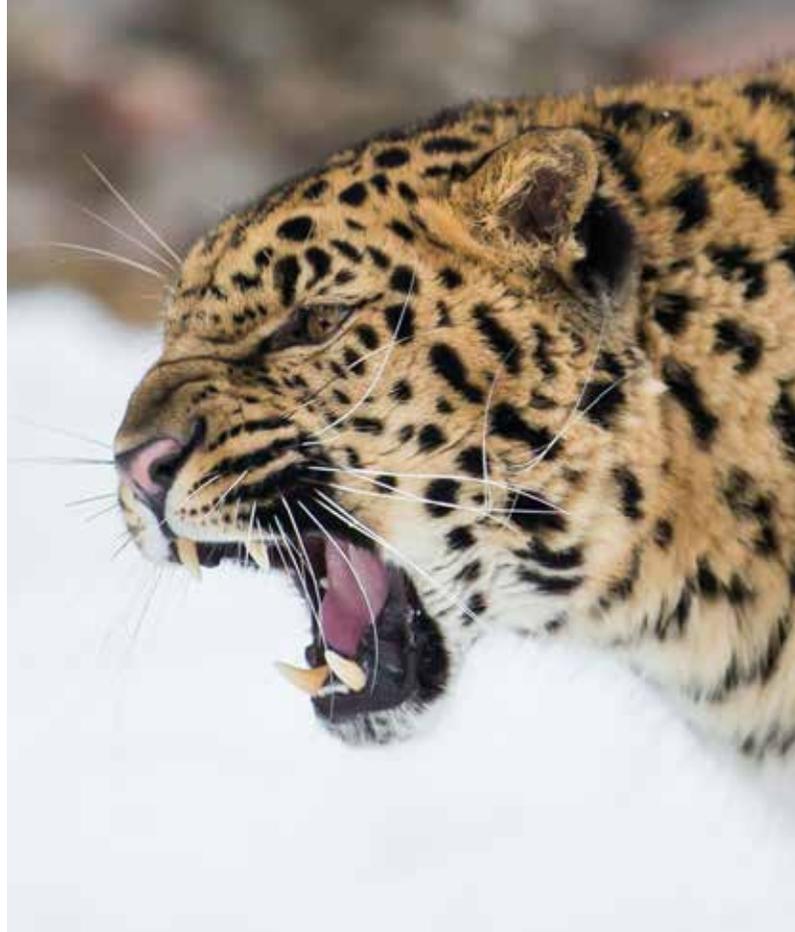
Dr. Guiming Wang, associate professor in the Department of Wildlife, Fisheries and Aquaculture, is involved in a project designed to pinpoint the number of Amur leopards in China, track the rise and fall of populations over time, and identify management tactics to increase the population. Wang hopes his research will help guide a recovery plan. However, China's population density has made conservation difficult.

“Two models have been implemented around the world. Land sharing is where wildlife lives among people and wildlife populations are influenced by landscape management and conservation. Land sparing is where part of the land is set aside in wilderness areas and reserves,” Wang explained. “Land sparing, which is used in the United States and Africa, is difficult to implement in the crowded landscapes throughout Asia and Europe.”

The Amur leopard's chance at recovery came after a flood in 1998 prompted the Chinese government to rethink how they use natural resources. They instituted the National Forest Protection program, which included the relocation of many people who lived in forested regions in the northeastern part of the country.

The government built homes and offered jobs to individuals who were relocated away from the forest, which allowed the wildlife habitat in the northeast to increase. They also offered monetary compensation for livestock killed by big cats, which helped change farmers' attitudes and reduce illegal hunting. This, in turn, took pressure off the leopards.

“The government decreased the human population in the area by half through relocation and used education to change attitudes and perceptions toward the predators.”, Wang said. “If they had just tried to improve leopard population numbers, the conflicts between cats and humans would have increased.” These improved conditions led to the second part of Wang's research.



“My next question was how the improved habitat impacted leopards. I wanted to know which dysfunctional ecological processes had been restored. In the short term, I hope to be able to track their progress,” Wang explained.

The Amur leopard is very shy, so the researchers' best chance at estimating population numbers is through trail cameras. Movement and body heat trigger the special cameras, and scientists are able to distinguish individuals by the unique patterns of their coats. So far, they have determined a few factors that impact leopard populations, including the presence of humans, habitat types, and quantity of prey.

“One challenge of sustaining the large cats is food. The data reflects this, showing that Amur leopards tend to be found where prey, especially roe deer, are plentiful,” Wang said.

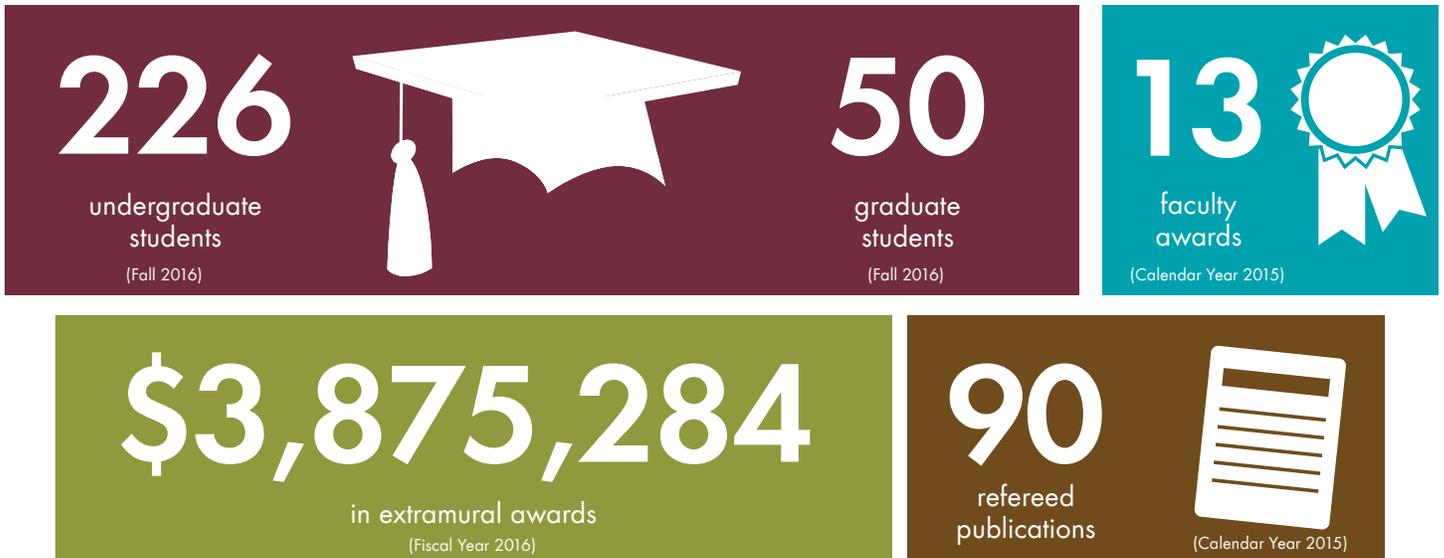
Conservation of the Amur leopard is part of a flagship species project that the Chinese government is implementing throughout the country. Because Amur leopards act as indicators of whether an ecosystem is healthy, their conservation requires restoration of the forest, water, and prey species, as well.

Find us on the web

cfr.msstate.edu/wildlife



Wildlife, Fisheries and Aquaculture: By the Numbers



OPPORTUNITIES

There are numerous ways to support the Department of Wildlife, Fisheries and Aquaculture. Research and extension activities mentioned in this newsletter need your support.

- \$5000** - to radio-collar a lion in Tanzania
- \$300** - sponsor a youth for summer camp
- \$100** - feed a deer for a month

No amount is too small to support research and education. Contact Charlsie Halford at 662.325.5548 or c.halford@msstate.edu.