UF | IFAS Research
UNIVERSITY of FLORIDA

NATURAL RESOURCES

AGRICULTURE

HUMAN SYSTEMS

ECOSYSTEM HEALTH

Native peoples began settling in Florida perhaps 15,000 years ago and the first European explorers reached her shores circa 1500, but it has only been in the past century that the state has begun to support large numbers of human inhabitants.

Those 100 years of development and commerce have left their marks on Florida, sometimes triggering or accelerating changes to the state's terrestrial, freshwater and coastal ecosystems. These changes may be carried out deliberately or they may be the results of accidents, such as inadvertent releases of pests or pathogens that arrive with international travelers or cargo shipments.

As they have done for more than a century, researchers with the University of Florida Institute of Food and Agricultural Sciences are seeking answers to help people understand ecosystem changes, adapt to them and find opportunities to benefit from them. Among the projects under way now are efforts to characterize the functions of isolated wetlands, protect native species threatened by development and invasive organisms, reduce collection pressure on highly prized ornamental fish and unlock methods for cultivating pine trees more efficiently.

Ongoing Research

DISEASE PREVENTION

Florida has 400 commercial facilities that breed deer for hunting and venison production, creating about 1,700 jobs in rural counties. One challenge to the industry is epizootic hemorrhagic disease, responsible for more than $32 million in losses in 2014. The disease is caused by viruses in the *Orbivirus* genus and spread by biting midges ("no-see-ums"), though it is unclear which midge species pose the greatest threat. In 2015, the Florida Legislature appropriated $2 million in annual funding to address deer health in captive breeding facilities. A research team led by Samantha Wisely, an associate professor with the UF/IFAS Department of Wildlife Ecology and Conservation, will pinpoint the virus(es) and midge species involved, develop best management practices, create a model to predict future outbreaks, and lay the groundwork for vaccine development.

CAPTIVE REPRODUCTION

Worldwide, about 1,800 species of marine fish are sold through the pet trade, and virtually all of them are wild-caught, says ornamental aquaculture expert Matt DiMaggio, an assistant professor with the UF/IFAS Fisheries and Aquatic Sciences Program. In some regions, collection pressure has negatively impacted populations of highly prized fish. DiMaggio leads a research team that is developing protocols for breeding several in-demand species at the UF/IFAS Tropical Aquaculture Laboratory in Ruskin. One such species is the Pacific blue tang, *Paracanthurus hepatus*, that was animated in the Disney film "Finding Nemo" and will be portrayed again in the upcoming sequel, "Finding Dory." Captive breeding offers a way to supply the market with fish while protecting natural populations important for reef health, and the Ruskin lab is a global leader in this field.

ISOLATED WETLANDS

Scientists often find that seemingly separate natural systems actually influence one another. Forest hydrologist Matt Cohen, an associate professor with the UF/IFAS School of Forest Resources and Conservation, believes that small, sometimes temporary marshes and pools known as geographically isolated wetlands help buffer water flow in nearby creeks and promote better water quality downstream. Cohen and his colleagues developed computer models showing that when rainfall is abundant, isolated wetlands hold excess water until it seeps into shallow, sub-surface aquifers; under dry conditions, these aquifers supply nearby creeks and lakes with the stored water. Cohen plans to investigate whether small isolated wetlands filter contaminants more efficiently than their larger counterparts because, acre-for-acre, smaller wetlands have a greater proportion of extremely shallow water, where chemical reactions are often markedly enhanced.

UF | IFAS Research
UNIVERSITY of FLORIDA

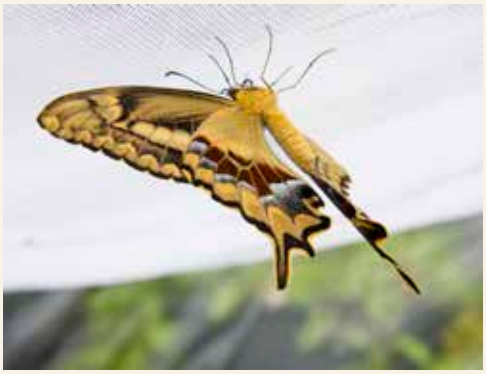
Research with Impact

INVASIVE SPECIES

The barn owl, *Tyto alba*, is a vital component of the rodent-control routine at many sugarcane and vegetable farms within the Everglades Agricultural Area (EAA), thanks to a UF/IFAS program that promotes construction of nesting boxes in crop fields. In recent years, the boxes have attracted unwanted tenants – swarms of Africanized honeybees, *Apis mellifera scutellata*. These insects aggressively defend their nests from perceived threats, a trait that endangers owls and agricultural workers who encounter the bees. Entomologist Bill Kern, an associate professor with the UF/IFAS Fort Lauderdale Research and Education Center, leads a team that developed an effective solution: They use an insect repellent to divert bees from nesting boxes and instead lure them to nearby traps scented with a chemical attractant. Growers are already adopting the practice.

GENOME SEQUENCING

In 2014, a team of scientists completed genome sequencing for the loblolly pine tree, *Pinus taeda*, the most economically important pine species in the Southeast. John Davis, a professor and associate director with the UF/IFAS School of Forest Resources and Conservation (SFRC), was part of the team. Davis says the sequencing has yielded much-needed information on disease resistance genes. The team and industry collaborators have made great strides in managing fusiform rust, a fungal disease that is the primary threat to Southern pine production. This disease was a negligible concern for producers throughout most of the 20th century and unexpectedly became a challenge to the planted-pine industry in the 1960s and 70s; additional sequencing could help breeders produce new loblolly varieties with improved resistance to fusiform rust.



AUGMENTING POPULATIONS

The Schaus swallowtail, *Heraclides aristodemus ponceanus*, is one of Florida's rarest butterflies and the only swallowtail nationwide that is federally listed as endangered. Its entire native range covers only small portions of Southeastern Florida and the Keys. By the early 1990s, hurricanes and loss of habitat almost drove the species to extinction. A captive breeding program at UF's Florida Museum of Natural History, led by associate professor Jaret Daniels of the UF/IFAS Entomology and Nematology Department, saved the species by raising and then releasing thousands of adults. By 2012, wild populations had declined again, so the breeders renewed their efforts. Now, butterfly numbers are increasing and researchers plan to continue the conservation effort and investigate how environmental factors influence population dynamics.

Unit Leaders

Eric Hellgren
Chair and Professor
Wildlife Ecology and Conservation
352-846-0643
hellgren@ufl.edu

Craig Watson
Director
Tropical Aquaculture Laboratory
813-671-5230
cawatson@ufl.edu

Timothy White
Director and Professor
School of Forest Resources and Conservation
352-846-0850
tlwhite@ufl.edu

Robin Giblin-Davis
Interim Center Co-Director and Professor
Ft. Lauderdale Research and Education Center
954-577-6333 • giblin@ufl.edu

Blair Siegfried
Chair and Professor
Entomology and Nematology
352-273-3970
bsiegfried1@ufl.edu

Researcher Contacts

DISEASE PREVENTION
Samantha Wisely
Associate Professor
Wildlife Ecology and Conservation
352-846-0643
wisely@ufl.edu

CAPTIVE REPRODUCTION
Matthew DiMaggio
Assistant Professor
School of Forest Resources and Conservation
Tropical Aquaculture Laboratory
813-671-5230
mdimaggi@ufl.edu

ISOLATED WETLANDS
Matthew Cohen
Associate Professor
School of Forest Resources and Conservation
352-846-3490
mjc@ufl.edu

INVASIVE SPECIES
William Kern, Jr
Associate Professor
Entomology and Nematology
Ft. Lauderdale Research and Education Center
954-577-6329
whk@ufl.edu

GENOME SEQUENCING
John Davis
Professor
School of Forest Resources and Conservation
352-392-1784
jmdavis@ufl.edu

AUGMENTING POPULATIONS
Jaret Daniels
Associate Professor and Associate Curator
Entomology and Nematology
Florida Museum of Natural History
352-273-2022
jdaniels@ufl.edu