



U.S. Fish & Wildlife Service

National Wildlife Refuge System

Southeast Region Inventory & Monitoring Branch

Spring 2017 Newsletter

Refuge Spotlight

New relations leads to better understanding of South Florida's Ghost Orchids (*Dendrophylax lindenii*)

For the past two summers, Dr. Ernesto Mujica from Cuba's Soroa Orchid Botanical Garden and researchers from Illinois College have worked with Refuge staff to inventory, monitor and ultimately begin a new chapter of critical conservation work for the revered ghost orchid, *Dendrophylax lindenii* at the Florida Panther National Wildlife Refuge (FPNWR).



Dr. Ernesto Mujica and Illinois College students (Jack Waggoner and Adam Herdman) examine a newly discovered ghost orchid on the FPNWR. Photo Credit: Mark Danaher, USFWS

In response to the need for conservation of Florida's native orchids, the FPNWR is collaborating with Illinois College and the University of Florida to improve our understanding of orchids and the complex relationships that exist between orchids and their ecosystems. This collaboration has been ongoing for over 15 years, and has led to numerous awards and publications in peer reviewed scientific journals. Through research on orchid ecology, propagation, and pollination, the collaborative work has begun to establish effective and efficient means for orchid conservation. As with so many other plant and animal species, FPNWR has served as a living laboratory for researchers and conservationists to gain and build upon the knowledge of our native orchids.

While annual orchid research on the Refuge has enhanced science and conservation for these species, the Refuge is especially excited to be collaborating with Dr. Mujica again during July 2017 in order to continue inventory and monitoring efforts for one of the most unique orchids in North America, the ghost orchid. Dr. Mujica is an incredible addition to the orchid research collaboration, which would not have been possible without years of persistence and the recent, history-making improvements in US relations with Cuba.

Dr. Lawrence W. Zettler of Illinois College first met Dr. Mujica at the 4th Andean Orchid Conference where each party presented research on South Florida and Cuba's ghost orchids, respectively. During a lunchtime chat at the conference, Dr. Zettler was very surprised to learn that the orchid's habitat in Cuba was very different from South Florida. Dr. Zettler remembers "I was frustrated the embargo would not allow me to freely enter Cuba to see his orchid sites, and I remember joking about figuring out some way to get to Cuba." What could have been a passing conversation led to a written invitation from Dr. Mujica and Dr. Zettler's first trip to Cuba in 2013. A few months after Dr. Zettler's first trip, a group of Illinois College professors took 18 students to Cuba on an academic trip, including the ghost orchid research site in Guanahacabibes National Park (western tip of Cuba).

After two long years of waiting for Dr. Mujica's U.S. visa, which included enlisting the help of U.S. Senators Dick Durbin and Bill Nelson and Illinois College President Dr. Barbara Farley, Dr. Mujica finally made it into the swamps of south Florida during July 2015 with funding and assistance to the US provided by the Naples Orchid Society. Dr. Mujica has helped to document and monitor approximately 243 ghost orchids on the FPNWR.

This work on the FPNWR parallels the techniques Dr. Mujica uses to monitor ghost orchid populations in Cuba, which has resulted in excellent published papers and vital conservation efforts. "In the future we hope to compare ghost orchid populations in southwest Florida to those in Cuba as a means of better understanding the species' specific habitat requirements and needs for continued survival" explains Dr. Zettler. This groundbreaking research will have long-lasting effects, and is critical for the successful reintroduction and establishment of native orchids.

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The work is also setting a new standard for the kind of conservation advancements that can be a major victory for science as Cuba and the U.S. continue improving their international relations.

“This partnership between Dr. Mujica, ECOVIDA, Illinois College, and FPNWR nicely illustrates how cooperation between our two countries may help at least one rare species in peril” Dr. Zettler summarized.

The ghost orchid, *Dendrophylax lindenii*, is a leafless epiphyte orchid consisting of large masses of photosynthetic roots, anchored to pond apple (*Annona glabra*), pop ash (*Fraxinus caroliniana*) and cypress trees (*Taxodium* spp.). On FPNWR, it has only been documented growing on *A. glabra* and *F. caroliniana*. It is perhaps the most revered orchid in the United States, because it is such a rare and fascinating sight to see in bloom.



No one really knows how many ghost orchids there are, although it is estimated that only 2,000 individual plants reside in vast wetlands South Florida. Of these, approximately 5 to 10% bloom each year, and of those, only about 10% are assumed to be pollinated by the giant sphinx moth, *Cocytius antaeus*.

Before Dr. Mujica’s arrival to the Refuge, only 11 ghost orchids had been documented, and no spatial database existed for these rare orchids.

To date, over 150 individual ghost orchid locations have been identified and 243 individual plants have been monitored on the refuge.

Since 2016, Refuge staff and volunteers have discovered two new populations of ghost orchids on the FPNWR, which likely supports over 40 individual ghost orchids. These will be two of the first sites that Dr. Mujica will monitor this July.

Funding for this partnership has come from a variety of sources including the U.S. Fish and Wildlife Service, National Fish and Wildlife Foundation, Naples Botanical Garden, Naples Zoo, and the Naples Orchid Society, which has repeatedly provided scholarships to the undergraduate researchers of Illinois College and covered the majority of Dr. Mujica’s travel expenses.

For more information on this project, please contact [Mark Danaher](#).

I&M Staff Update

Welcome, Amanda Bessler, Terrestrial Ecologist

Amanda is the newest member of the Region 4 I&M Branch. Amanda comes to the program from refuges, having last worked at Chesapeake Marshlands NWR as a wildlife biologist. She has also worked at Moosehorn and Great Dismal Swamp NWRs, the Region 5 Hadley RO, and various research positions with universities and research centers in Indiana, Virginia, Alabama, Georgia, and Sweden. She brings experience and training in a variety of research and monitoring of organisms (from vernal pools, bats, fox squirrels to birds) to the regional program. She is stationed at St. Marks NWR where she can play with flatwood salamanders and RCWs and benefit from the kind company and vast experience of the staff. Some highlights Amanda has been working on in her first 2 months include: working with coworker Adam Smith as support for marsh bird callback surveys on Florida refuges, working with biologists at St. Marks with the flatwood salamander project, RFPs, RCW, and with St. Vincent refuge in regards to impoundment management strategies and tools. She is working with ecologist David Richardson to develop a regional protocol framework for RCW. She is looking forward to getting to know everyone and understand and assist refuges with inventory and monitoring.



Amanda obtained her B.S. in Biology at Indiana University and M.S. in Biology from William and Mary (Thesis: Effect of Methyl-Mercury on Spatial Memory in Zebra Finches). She loves learning and gaining experience in all areas of wildlife but has a particular interest in birds, traveling to other countries for birding opportunities.

Searching for rare flora along Coastal Refuges

Determining the status and health of rare plants is challenging. Rarity can be attributed to a species' scarcity, its uncommon distribution, or its low degree of detectability—attributes that most of our southeastern plants that are petitioned or candidates for ESA listing (collectively, 'at-risk') share. It often takes a skilled plant ecologist to know the right habitat conditions in order to sharpen the focus of where to look for these rare plants. Furthermore, years of experience and advanced knowledge is needed to pick out those rare plants that blend in with similar looking species, and the willingness to sample in remote, difficult-to-access areas. Of the 46 'at-risk' vascular plant species that have been known to or potentially occur on southeastern refuges, 11 are likely to occur on the Savannah and South Carolina Lowcountry Refuge Complexes of GA and SC. Habitats associated with these species include bogs/seeps, blackwater riparian floodplains, shell middens, wet savannas, and tidal freshwater marshes. In 2016, the I&M Branch funded a joint RFP proposal from the two Complexes to hire botanist Keith Bradley (U. of South Carolina Herbarium) to conduct surveys on seven of the Complexes' refuges. The objectives were to establish occurrence and population estimates of each species, map the spatial distribution, and identify immediate threats to 'at-risk', state rare, and federally listed plants. Field surveys were initiated in September 2016, and to date, a total of 15 rare plants have been located on five refuges. This includes 17 new occurrence observations, detection of a sizeable population of ciliate tick-seed on Ernest F. Hollings ACE Basin NWR, and detection of three disjunct sedge species (Gray's, prune-fruited, and velvet) on Savannah NWR. Many of the 'at-risk' and rare plants targeted in this effort have not been observable over the fall and winter sampling period due to their dormancy (see table below). However, this work is expected to occur throughout the spring and summer of 2017, when the phenology of these plants will lend themselves to identification. Final reports and datasets will be available next year (2018). For more information, please contact [Forbes Boyle](#).

Common Name	Habitat	Savannah Complex			South Carolina Lowcountry Complex			
		Harris Neck	Pinckney Island	Savannah	Cape Romain	ACE Basin	Santee	Waccamaw
Purple Honeycombhead	Bogs/Seeps – Pine Savannas					P	P	
Ciliate Tick-Seed	Blackwater Floodplains	P	P	P		P	P	
Swamp Justiceweed	Cypress Savannas							P
Harper's Fimbristylis	Blackwater Floodplains					P		P
Godfrey's Privet	Shell Middens	P	P	O				
Long Beach Seedbox	Blackwater Floodplains			P	P	P	P	P
Raven's Seedbox	Wet Savannas – Marshes					P	P	P
Carolina's Birds-In-A-Nest	Blackwater Swamps – Pine Savannas					P	P	
Cape Fear Spatterdock	Blackwater Floodplains			P		P	P	P
Carolina Bishopweed	Tidal Freshwater Marshes	P	P	P	P	O		P
Wireleaf Dropseed	Bogs – Wet Savannas							P

The 'at-risk' species that have been documented (O), or have good potential (P) of being found, on coastal Georgia and South Carolina refuges.



Ciliate-leaf tickseed and habitat on ACE Basin NWR
Photo Credit: Keith Bradley, University of South Carolina

Tracking MacGillivray's Seaside Sparrow

Beginning in December 2016, the I&M Branch and Cape Romain NWR and local (Town of Kiawah Island, SC) partners initiated a project to better understand the seasonal movement ecology of MacGillivray's Seaside Sparrow, *Ammodramus maritimus macgillivraii*, a subspecies of seaside sparrows that is currently being evaluated for protection under the Endangered Species Act. MacGillivray's Seaside Sparrow potentially occurs on 10 coastal NWRs between North Carolina and northern Florida. Habitat loss from development and sea level rise threaten the species. We know little about the seasonal connectivity and movements among marshes used for breeding and those used during winter, but banding and survey data suggest that the subspecies uses distinct marshes for breeding and wintering. This study is exploring those connections using GPS logger technology. Between December 2016 and March 2017, we deployed 37 GPS loggers at five sites on Kiawah Island. Most loggers were placed on the MacGillivray's subspecies, although we deployed several tags on the northeastern Maritime subspecies as a control. Seaside Sparrows are very faithful to particular patches of marsh, often returning to the same small area year after year. During the winter of 2017-2018, we will return to these locations and attempt to retrieve the loggers, and the associated movement data, from these individuals. To the best of our knowledge, this is the first attempt to explore songbird movements with GPS technology. If you'd like additional information, contact [Adam Smith](#).



MacGillivray's Seaside Sparrow sporting a 1 gram GPS data logger and ready for release.

Caribbean Island Seabird Monitoring

The Culebra National Wildlife Refuge in Puerto Rico was created in 1909 by President Theodore Roosevelt's Executive Order to provide refuge and breeding grounds for native birds. Fifteen species of seabirds nest on fourteen cays of Culebra NWR. Of these species, one is federally listed (roseate tern), two are listed by Puerto Rico (brown pelican and roseate tern), and six are considered USFWS Birds of Conservation Concern (Audubon's shearwater, masked booby, brown booby, red-footed booby, magnificent frigatebird and American oystercatcher). In 2015, refuge staff developed a request for proposal (RFP) to



monitor seabird colonies in the refuge, including Audubon's shearwater, masked, brown and red-footed booby, white-tailed (pictured to the left) and red-billed tropicbird, royal, sandwich, roseate, bridled and sooty tern, and brown noddy. The RFP was funded by the Region 4 I&M Branch and the project

began in February 2016 by refuge staff and a local NGO (Effective Environmental Restoration, Inc.). Using standardized techniques, the objectives of this effort are to estimate seabird populations, map colony locations, and describe the associated vegetation at each colony.

One of the biggest sooty tern colonies in the Caribbean is located on Culebra NWR. Through this current project's effort, this colony was estimated at 36,000 nesting pairs. Another significant finding to date is the observation of Audubon's shearwater using the refuge offshore cays for nests. The survey participants have found 28 nests of this species in cavities along the coast line.

Finally, an amazing find occurred in one of the cays. Refuge staff believed that the red-footed booby did not nest anymore on refuge lands, possibly due to the destruction caused by Hurricane Hugo in 1989. The last nest was observed in 1989. Because of this current monitoring effort, one red-footed booby chicks has been discovered.

A publication is in process which will include maps of colonies, population estimates for each species, and vegetation descriptions for each nesting site. For more information, please contact [Ricardo Colon-Merced](#).



Lichen Inventory in the Delta

Little work has been done to inventory lichens in the Memphis, TN metropolitan area and the lower Mississippi Alluvial Valley. Most lichens probably go unnoticed despite the intriguing knowledge that they are really two organisms (algae and fungi) symbiotically living together. A biology faculty member from Christian Brothers University in Memphis, TN is currently collecting and identifying lichen species at Wapanocca NWR. The refuge is of interest due to its agricultural and urban proximity, and provides an opportunity to collect baseline data and understand more about the potential anthropogenic effects



Crustose lichen, *Lecanora* sp.
Photo Credit: Lynda Miller, CBU

of pollutants on a variety of species. To date, the team has already identified 20 species. They have found a large number of pollution tolerant species on the trunks of the trees, and a few pollution sensitive species on branches or the canopy. Lichens can be indicators of environmental health as they lack a cuticle (which vascular plants have) so absorption of pollutants is enhanced. This information will be important for future studies on the effects of climate change or air pollution studies. If you'd like more information about this study, please contact [Lynda Miller](#) or [Jared Nance](#).

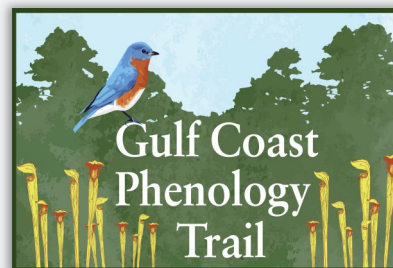
Supporting Science Through the R4 I&M Request for Proposals

Since the inception of the Region 4 I&M Branch in 2011, there has been a strong effort to provide direct funding in support of inventory and monitoring needs on refuges. Over the course of the past seven years, annual solicitation proposal request theme has evolved from open-ended topics in the first few years to more recently targeted themes such as at-risk species in 2016 and basic inventory of biotic and abiotic natural resources in 2017. Examples of local refuge projects include basic taxa inventories of plants and animals, long-term monitoring of water quality, and bird nesting and migration, to larger regional and national efforts associated with bat population monitoring and changes in coastal wetland systems associated with sea-level rise and climate change. All refuge projects share the goal of providing a stronger basis of science for local, regional, and national decisions.

Recently, the I&M Branch has been archiving the project proposals, reports and data sets into the Service Catalog (ServCat) to provide a centralized location for reference (Program Reference in ServCat ([66785](#))). Presently, we have about half of the reports and data sets from projects funded prior to 2015 in the system and are working with refuges to secure the balance of the information. For more information about the RFP process or to provide outstanding materials, contact [David Richardson](#).

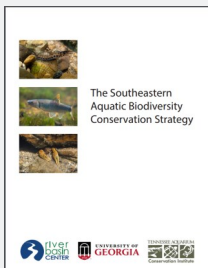
Observation of local phenology through nature walks

The USA-National Phenology Network (USA-NPN) developed Nature's Notebook, a project focused on collecting standardized ground observations of phenology (the study of cyclic and seasonal natural phenomena, especially in relation to climate and plant and animal life) by researchers, students and volunteers. It also fosters phenology communities of practice, and the development of tools and techniques to support a wide range of decisions made routinely by citizens, managers, scientists, and others, including decisions related to allergies, wildfires, water, and conservation. In partnership with the USA-NPN, the Southeast Region Inventory and Monitoring Branch has developed one of the most recent additions to the National Phenology Network, the [Gulf Coast Phenology Trail](#). This trail offers citizen scientists an opportunity to observe nature's story at local phenology stations set up across the Northern Gulf of Mexico from Louisiana to Alabama. Local partners include federal (USFWS NWRs, National Park Service), State (Mississippi State Extension, Mississippi Department of Marine Resources), and non-federal partners (Infinity Science Center, Mississippi Audubon Center). Data is collected from "pheno-walks" weekly and added to the USA-NPN Phenology Database via Nature's Notebook. For the 2017 season so far, we have data collected documenting a three-week early blooming period for plants and early nesting of local bird populations (Eastern bluebirds). These data contributes to a greater understanding of changes occurring over time. The trail is in its first year and we look forward to continued expansion to new partners and a greater knowledge learned from observing Nature's Story. Contact [Sue Wilder](#) or https://www.usanpn.org/natures_notebook/ for more information.



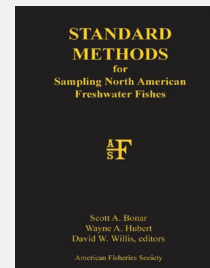
Useful Resources

[The Southeastern Aquatic Biodiversity Strategy](#) provides information on biodiversity through the use of historical distributions of fish, mussels, and crayfishes. In addition, the document provides proposed regional prioritization based on factors such as species richness, imperilment, and endemism. The goal of the reference was to identify and assess areas for conservation opportunities across the region.



Elkins, D.C., Sweat, S.C., Hill, K.S., Kuhajda, B.R., George, A.L., Wenger, S.J. The Southeastern Aquatic Biodiversity Conservation Strategy. Final Report. Athens, GA: University of Georgia River Basin Center; 2016 Dec. 237p.

[Standard Methods for Sampling North American Freshwater Fishes](#) is a reference that provides American Fisheries Society recommended standard sampling methods for monitoring and assessing freshwater fish populations in North America. Contents include information on fish sampling methods as well as statistical and data management for analyses on populations, abundance indices, and condition assessments. For anyone interested in conducting fisheries investigations, this book is a must-have resource.



Bonar, S. A., Hubert, W. A., & Willis, D. W. (2009). Standard methods for sampling North American freshwater fishes.

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