



U.S. Fish & Wildlife Service

National Wildlife Refuge System Southeast Region Inventory & Monitoring Branch

Fall 2017 Newsletter

Refuge Spotlights

Saving a listed species: The Frosted Flatwood Salamander *Ambystoma cingulatum* recovery effort at St. Marks NWR

Recovery of the threatened frosted flatwood salamander is making strides with recent efforts to prevent this species from extinction. Through a long-term partnership project between St. Marks NWR and USGS with collaboration and logistical support from other NWRs, Ecological Services, and the I&M Branch, efforts to enhance the local breeding population of the salamander seem to be making strides. The refuge has been actively using prescribed fire in seasonally flooded ponds located within longleaf stands in order to manipulate vegetation along pond edges and control invasive species with the ultimate goal of increasing breeding success. Perhaps more important in the short-term, the refuge has been using head-starting of larval salamanders (including some egg masses) to bolster breeding success. Under this approach, egg masses and larval salamanders are captured in natural ponds and transferred to rearing tanks. This is done to increase the number of salamanders surviving through metamorphosis to adulthood. Once they are “all grown up,” the salamanders are then released back into the wild in areas adjacent to unoccupied breeding ponds.



Adult frosted flatwood salamander captured along a drift fence erected adjacent to a breeding pool at St. Marks NWR. Photo: J. Chandler

17 they used 40. Working with partners, the refuge conducted a week long salamander surveying blitz in February 2017. Over 500 salamander larvae from 32 ponds were caught, about 80% of these individuals metamorphosed, and most were returned to their natal ponds. Remaining salamanders were transferred to a partner, Blue Heron Nature Center, for captive propagation.

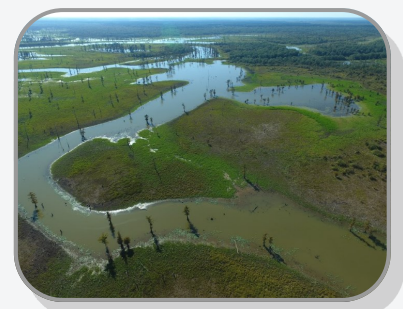
During the February 2017 larval sampling period, there were significant sampling difficulties due to ponds being drier than anticipated, and too shallow to effectively sample via traditional minnow traps. To combat this, the refuge developed bucket traps that worked well in very shallow conditions. Drift fences are currently set for the 2017-18 season for capture and tracking of adult males and gravid females.

For more information on recovery efforts please contact Refuge Biologist, [Jonathan Chandler](#).

The development of the Felsenthal Dam in 1985 as part of the Ouachita-Black River Navigation Project by

Using UAS to explore vegetative response in pool drawdown at Felsenthal NWR

the U.S. Corps of Engineers (USACE) created a wetland of some 15,000 acres. In 1995, the refuge and USACE agreed to lower the pool during the summer months by a foot in an effort to stimulate moist-soil plant seed production for migrant and wintering waterfowl. Following drawdown, USGS scientists published results of the vegetation response indicating some 4,000 acres of mudflat had developed moist-soil vegetation, amounting to nearly 7.5 million duck-energy-days (DEDs).



Ouachita River Channel within Felsenthal Pool during drawdown. Photo—ULM

Two decades of negotiation and planning with USACE and development of the Felsenthal Habitat Management Plan in 2015 has enabled the refuge to begin a process of conducting 1-foot drawdown every 3 years. In July 2017,



Tanks where salamanders were kept through metamorphosis. Photo: J. Chandler

After a successful 2015-16 season in which over 140 adult salamanders were released via winter sampling efforts, the 2016-17 season was even more successful. For a visual, the refuge used 20 tanks in the 2015-16 season for “growing” salamanders, and in 2016-

the refuge began the drawdown over several weeks. To evaluate the moist-soil productivity, monitor woody vegetation encroachment and challenges with American lotus, the refuge developed a novel approach to integrate old-school plot sampling and remote sensing technology to assess the 4,000 acres interspersed with drainages and sloughs. The refuge decided to partner with the Geoscience Department at the University of Louisiana Monroe (ULM) to start exploring the possibility of monitoring with Unmanned Aircraft System (UAS) technology.



Quad-copter with gimbal mounted sensor

With some guidance from the Regional Inventory and Monitoring Branch, the refuge designed a strategy that uses near infrared (NIR) and multispectral aerial imagery to determine plant species composition and abundance within the area of the drawdown. Aerial photographs were collected using a Parrot Sequoia multispectral sensor camera mounted on a DJI Phantom 4 quad-helicopter. All mission flights were flown by ULM.

Trying to differentiate plant species from reflectance

pixel values of an image is the challenge. Plants grow with various amounts of vigor and are photosynthesizing at different rates, and infrared color bands are reflected from each plant or plant species differently depending on its vigor. The UAV-mounted camera collects that information across a spectrum of wave-lengths including NIR. Because application of this technology is relatively new, the team collected ground-based field data for comparison. Therefore, plant species composition and abundance was estimated within field-based, one-meter square quadrats along transects flown by the UAS. During the analysis process, field sampling data will be compared to the results of the UAS sampling data to determine accuracy, efficacy, and a future direction for vegetation monitoring of the pool.

During fall, the refuge and ULM staff completed two rounds of field-based and drone-based vegetation sampling and are now processing the data. As of October 16, 2017, the USACE began raising the water one foot to reach normal pool. For more information about this project contact Refuge Biologist, [Nick Wirwa](#).

I&M Branch Staff Coming and Going

Looking Forward to Visiting

I&M ecologists will soon be setting up meetings with refuge staff within their zones for an annual visit. Although individual refuge biological and I&M Branch staff may interact throughout the year on specific refuge projects, these visits are intended to ensure that there are more broad conversations regularly. We look forward to discussing local staff's interests, joint projects or news from elsewhere in the region, as well as identifying specific science needs that we can assist with or support. Refuges without a zone ecologist in the vicinity (South Florida, Caribbean, Appalachians) can arrange a similar visit - Contact Branch Chief, [Janet Ertel](#)

Staff Transitions

During the past 8 months the R4 I&M Branch has seen the transition of staff to new opportunities. Steven Holzman, Data Manager, was a founder of the R4 I&M Branch when it was formed in 2011 and supported regional and national data management initiatives (e.g., Endangered Species, Planning and Review of Monitoring on Refuges, ServCat, and FWSpecies). His passion and focus has been on bird related priorities. As such, it is fitting Steve found an amazing opportunity to work as the Data Manager for the Pacific Seabird Program with the FWS in Oregon.

Nicole Rankin, Coastal Ecologist, was also a startup I&M team member. Her primary responsibility was the development of Coastal Wetlands Elevation Monitoring on refuges along the Atlantic coast to assess long-term changes in coastal marsh habitats attributed to sea-level rise. Nicole has transferred to the Ecological Services (ES) Branch of Conservation and Classification as a Fish and Wildlife Biologist in the Regional Office in Atlanta. She is working with ES field offices to conduct species status assessments.

With the I&M Branch for just a year, Hydrologist Grant Graves separated from the Service in October. Grant has been a huge asset and brought a unique perspective to abiotic monitoring of water resources and related issues on refuges. He created a more streamlined approach to the Water Inventory and Resource Assessment (WRIA) process and facilitated data management for regional stream temperature monitoring. Grant moved back to his home state of Oklahoma to work as a Research Coordinator on multiple state water quality issues and will pursue a PhD at Oklahoma State University. The loss of these very talented folks from the Branch will be challenging to backfill.

Amanda Bessler, Terrestrial Ecologist stationed at St. Marks NWR, joined the Branch this spring and is already actively working to support the RCW Population Protocol Framework and Coastal Wetlands Elevation Monitoring. She looks forward to working on several bird related monitoring projects with refuges over the next year.



Natural Wetland Vegetation Buzzing with Bees

The extensive die-off of the European honey bee and the economic concerns to agriculture for pollinating crops has largely overshadowed any issues with regards to the status and distribution of native bees in North America. With some 4,000 native bees scattered across North America, only recently has the conservation of these insects and their importance for pollination of native flowering plants begun to receive significant investigation.

At the University of Arkansas, USGS scientist David Kremenetz and graduate student Phillip Stephenson have recently completed a study unraveling the response of native bees to managed and unmanaged emergent wetland plant communities (i.e., moist-soil vegetation). Their work centered on wildlife conservation areas in the state including work at Bald Knob, Cache River, and White River National Wildlife Refuges. Through intensive seasonal sampling in 2015 and 2016, they were able to show bee species richness of 69-84 within both habitat types. The estimated bee species richness was 108 with the passively managed sites having slightly higher diversity. Though they collected 17,454 individual bees, the majority of the species had less than 20 detections. A difference in seasonal flowering plant availability seems to have influenced bee abundance in managed units.

In a companion study, Mississippi State University Professor Brian Davis and graduate student Sharilyn Taylor are doing similar work to establish baseline bee diversity associated with natural wetland systems and in non-commercial agricultural landscapes (i.e., wetland reserve program). Inventories of bees on Mathews Brake, Panther Swamp, Tallahatchie, and Yazoo NWRs are still on-going in this first year of the project which is slated for completion in 2019. Through intensive observations of bees pollinating plants, active sweep netting, and passive collections using various insect traps following procedures outlined in the [National Protocol Framework for Inventory and Monitoring of Bees](#), they are building substantially on the work of Kremenetz and Stephenson. To date they have already sorted over 17,000 specimens, though species identifications are yet to be determined.

The challenge with both projects has been the huge number of detections and the pain-staking process of determining the species based on diminutive identify features. In many cases, specimens may need to be sent to species experts or to the USDA Agricultural Research Service's Bee Biology and Systematic Laboratory for positive identification. These inventory based projects are building on the foundation to understand the biological integrity, diversity, and environmental health of Service lands and wetlands ecosystems which are vital to waterfowl and other wildlife trust resources.

For more information about either of these projects: Contact researchers, Bdavis@msstate.edu or Kremenetz@uark.edu.



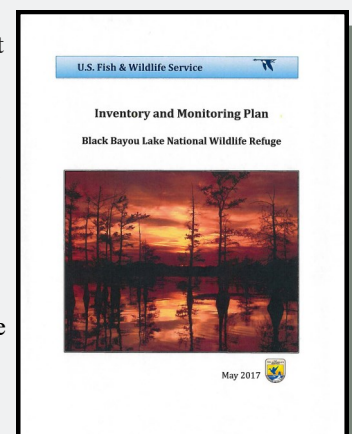
Native bee on *Ludwigia* spp. Photo: P. Stephenson
Phot



Sweep net sampling in an emergent wetland

Progress on Development of Refuge Inventory and Monitoring Plans

As 2017 comes to a close, it does so on the heels of a banner year in Region 4 for development and completion of Inventory & Monitoring Plans (IMPs). Through a landscape-approach process which began in 2016, the I&M Branch and refuges have finalize IMPs and associated Initial Survey Instructions for Black Bayou Lake, Felsenthal, Overflow, and Pond Creek NWRs. The remaining three refuges involved in this new approach - D'Arbonne, Sam D. Hamilton Noxubee, and Red River should be finalizing their plans by the end of the calendar year. Outside of the Gulf Coastal Plain, this year also saw the completion of the IMP for Carolina Sandhills NWR. In the Southeast, IMP development has truly become a collaborative process with I&M ecologists and refuge staff. Working together, they critically evaluate past, present, and potential natural resource surveys and develop an IMP based on management objectives and prioritization of those surveys while recognizing staffing constraints and other logistical issues. These documents will serve these refuges well for years to come in regards to informing resource management decisions and conservation delivery. For more information on the IMP process in Region 4, or if you're interested in starting an IMP for your refuge in 2018, please contact I&M Ecologist, [Forbes Boyle](#)

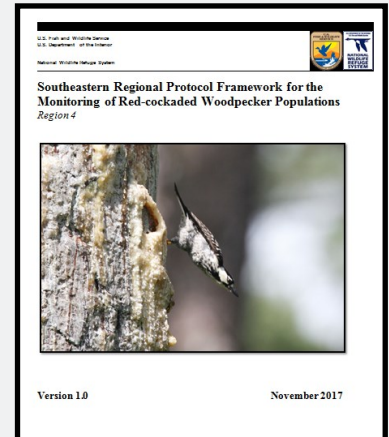


Southeast Region Refuge System Developing Inventory and Monitoring Protocols

SE Region refuge biologists, foresters, and I&M Branch staff teamed up earlier this year to begin development of two Regional Protocol Frameworks for high priority biological surveys common to many refuges: Red-cockaded Woodpecker Population Monitoring and Inventory and Monitoring of Forested Habitats. These two surveys are included as Tier 1 (highest priority) in several approved refuge inventory and monitoring plans and are being conducted on dozens more. These regional frameworks will provide refuges with much of the content needed to create a site-specific protocol (SSP) for these surveys for their station. The frameworks will also provide guidance and examples for filling in the information needed for a SSP that is unique to each station, like sample design. This will increase the efficiency of each refuge creating these important documents. Having these protocols for the SE Region will help refuges improve coordination, documentation, and data management through a standardized approach for these high priority resources we manage.

Both protocol development teams have been working

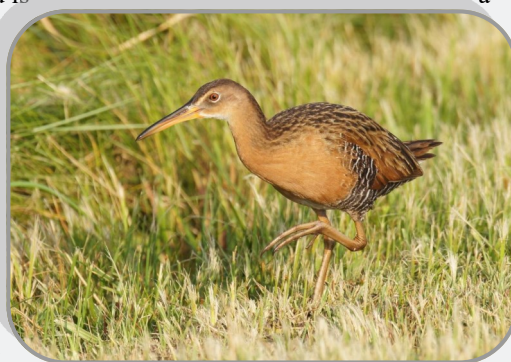
over seven months to coordinate with all stakeholders for these refuge resources. Objectives have been discussed and serve as the guidance for development of protocol components such as sampling design, field methods, and data management. Each team has drafted several sections of the protocol frameworks along with standard operating procedures. We anticipate that these two frameworks will be completed and out for review to a wider audience in early 2018. The emphasis will then shift to creating SSPs, for those stations that need them. For more information about these protocols, contact I&M Branch Ecologist, [Tim Fotinos](#).



Species Highlight & Species Beware!

King Rail (*Rallus elegans*)

The King Rail is the largest North American rail typically inhabiting freshwater emergent marsh systems at relatively low densities. The species summers throughout most of the eastern United States from the Upper Midwest to Florida and is a year-resident along the Atlantic coast and most southerly states. King rail populations have declined significantly over much of the range, though not to an extent to list the species. At Mackay Island NWR this rail is abundant and has been identified as an important resource of concern along with several other secretive marshbirds including Virginia rail (*Rallus limicola*) and sora (*Porzana carolina*), which also frequent the freshwater marshes.



King Rail foraging in marsh

No!! It is not an evil amphibian. It just one of

Woolly Frogs Mouth (*Philydrum lanuginosums*)

the newest non-native plants arriving from tropical Asia, being first reported in NC in 2013. This is an herbaceous, perennial, aquatic plant with multiple yellow flowers which grow 50 - 180 cm tall. Leaves are two-ranked and linear, relatively flat, and grow 30 - 70 cm long. The plant grows in shallow water (<2ft) and can reproduce from seeds that are submerged or on dry land. The risk of this plant to native flora communities is not presently understood but it should be treated as an invasive species. This plant is currently undergoing a weed risk assessment, and has been more recently found in the states of SC, FL, and potentially GA.



Photos: A. Koop

Project Updates

East Coast Refuges Begin Using the IWMM Protocol

The Integrated Waterbird Management and Monitoring Program ([IWMM](#)) was started as a grassroots effort developed through structured decision-making workshops. The approach resulted in an operational framework for management and standardized monitoring of nonbreeding and migrating waterfowl, shorebirds, and long-legged wading birds (i.e., waterbirds) and evaluation of habitat conditions. The local-scale monitoring component allows managers to assess effectiveness of management actions to meet refuge objectives by monitoring habitat conditions and waterbird use within units. In addition, this approach provides an adaptive feedback loop to adjust management actions to address deficiencies in meeting waterfowl objectives and the quality and quantity of habitat conditions.

IWMM is a collaborative effort with the USFWS, USGS, States, and other NGOs. Recently, the second version, currently under review, of the National Protocol Framework was released. This framework includes the information from the approved National Protocol Framework and additional information and methodology for the online [IWMM centralized database](#). The database was developed as a node of the Avian Knowledge Network (AKN) and provides informal local decision support, tracking management actions, and reporting tools for waterbird use data, management unit condition data, and vegetation data.

Recently, site-specific protocols were completed for Mattamuskeet NWR and Pocosin Lakes NWR. Several other refuges across the region are exploring the use of this monitoring approach to integrate assessments of waterfowl use to habitat conditions across the winter period. Various IWMM training webinars and newsletters are accessible at the [IWMM website](#). For more information about IWMM and its application contact I&M Ecologist [Wendy Stanton](#) or Waterfowl Ecologist [Heath Hagy](#).



Tundra Swans at Mattamuskeet NWR - Photo: D.



Moist-soil habitat survey - Photo: USFWS

New I&M Tools

FWSpecies Documents Species Occurrence and Status on Refuges

The I&M Branch within the Natural Resource Program Center (NRPC) located in Ft. Collins, Colorado has recently constructed the FWSpecies centralized database module to document our knowledge about the occurrence and status of species on National Wildlife Refuge System lands. The database is modeled after a similar effort of the National Park Service (NPSpecies). The module gives refuges a way to build, manage, and share refuge species information and is part of the Integrated Refuge Information System (IRIS) located in the Environmental Conservation Online System ([ECOS](#)). The Southeast I&M Branch is currently amassing observations to populate our portion of the FWSpecies database.

To date, we have collected observations from internal records (e.g., refuge bird lists and species inventories) and external documents (e.g., publications). These documents resulted in an initial database of nearly 28,000 records on 122 southeastern refuges. In addition, we have harvested species occurrence records from online biodiversity repositories (e.g., eBird, iNaturalist, Bison) using a custom program ("fwspecies") in the popular R software. This program located more than 24,000 new observations on 125 refuges. All 130 Southeastern refuges will be represented in FWSpecies. Refuge-specific observations have been distributed to I&M Ecologists for initial quality control and assessment. After this initial review, I&M Ecologists will work with individual refuges to conduct a final review of occurrence records prior to submission to NRPC. Over the next year, I&M Ecologists will continue to work with refuges to secure other sources of information that are in ServCat or gray literature (e.g., thesis and dissertations) that can be used to further validate species occurrences on refuges. Through an annual process of periodic updates and direct inquiries to refuges, the FWSpecies database will provide the most definitive source of biological occurrence and status information on NWRs. This resource database will fill a gap that has precluded us from conducting systematic analysis of species occurrence and status across the refuge system.

Contact an I&M Ecologist or Quantitative Ecologist [Adam Smith](#) for more information about how you can contribute to this effort.



Southern prairie crayfish *Procambarus hagenianus*
Photo: G. Schuster

New I&M Tools - continued

iNaturalist - Virtual Vouchering of Biodiversity



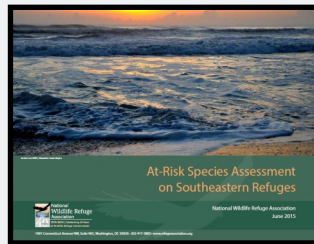
iNaturalist is a popular citizen science platform interface to easily log and archive biodiversity observations with associated photographic evidence. Paired with the smartphone app or the web, iNaturalist provides an efficient way to document field observations for citizens and professionals alike. A recent initiative from the Natural Resource Program Center (NRPC) has established an iNaturalist Project specifically for observations on National Wildlife Refuge System holdings. The Southeast I&M Branch is exploring iNaturalist and the NWRS project as an important way to encourage refuge staff, visitors, and partners to log biotic observations on refuges that are not part of formal surveys. In particular, iNaturalist makes it relatively easy to create a photo record of anecdotal biotic observations that would otherwise never be recorded. Moreover, even if you do not know the correct species, the application uses other citizens and professionals to provide identification of those observations.

Towards this end, the Southeast I&M Branch has created a program ("fwsinat") in the popular R software that retrieves iNaturalist observations for each refuge and exports them to refuge-specific spreadsheets. Our hope is that by returning those observations to the refuge via easily filterable spreadsheets with links to the observations, we can encourage and facilitate refuges' ability to share those observations, as needed, with partnering naturalists and experts to improve and validate their quality. We will be exploring the usefulness of this functionality with a few refuges in 2018. The "fwsinat" program also identifies observations on NWRS properties and harvests them to the NWRS iNaturalist project. NRPC will present this functionality at a regional data managers as well as highlight Region 4's proposed usage of the project to document refuge biota. For more information contact Quantitative Ecologist, [Adam Smith](#).

Useful Resources

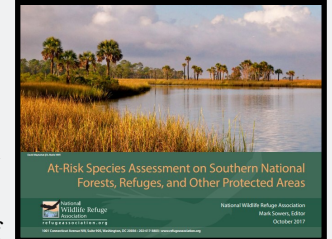
At-Risk Species Assessment on Southeastern Refuges 2015. National Wildlife Refuge Association, Washington DC, 34 pp.

This resource provides an overview of the known or probable occurrences of 376 unique at-risk species across 129 NWRs. Based on subject matter experts, the report identified 89 refuges supporting one or more occurrences of 367 at-risk species. Of those occurrences, 17 refuges were identified as providing a pivotal role in species conservation. This is a significant resource to identify at-risk species information gaps on refuges within the Southeast.



At-Risk Species Assessment on Southern National Forests, Refuges, and Other Protected Areas 2017. National Wildlife Refuge Association, Washington DC, 87 pp.

Building on the at-risk species assessment on NWRs, this report provides a larger perspective of species occurrences on all federal and state protected landholdings in the southeast. Moreover, the report identifies key focal areas based on aggregations of at-risk species and relates suites of species with habitat management from which to consider prioritization for conservation. For more information contact Refuge Biologist, [Mike Chouinard](#).



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