

October 2022

FIREBIRD NEWSLETTER

Fire Effects in Gulf of Mexico Marshes –
Historical Perspectives, Management, and Monitoring
of Mottled Ducks and Black and Yellow Rails

Spring and Summer 2022 Updates



Year 3 Annual Meeting Updates

On September 21-22, Firebird colleagues from near and far gathered in coastal Mississippi for the Year 3 Annual Meeting. Nearly 30 people were in attendance, with several others that tuned in virtually.

On the morning of the 21st, we divvied up into 3 Mississippi State University boats that cruised to Point aux Chenes, where Mark Woodrey and Peter Kappes led a field trip to a few of their high marsh sites. This sparked intriguing conversations on comparisons of high marsh among states, soil make up, plant composition, and of course, Black Rail, Yellow Rail, and Mottled Duck ecology. Afterwards, the folks from the field trip headed to the MSU Coastal Research and Extension Center in Biloxi for a group lunch and afternoon presentations. After welcome and introductions,

project updates were given by the various working groups. Dinner followed at Woody's, where we mingled and talked all things marsh! On the 22nd, we met bright and early at the extension center to discuss big picture goals, upcoming work, and outreach opportunities. We also spent some time diving in to each Firebird team member's background and involvement. A portion of the day was dedicated to discussion of one-pagers. The one-pagers are short outlines of projects that have presented by different individuals and groups within Firebird. All in all, 31 papers were reviewed!

The Firebird team brings together a wealth of knowledge through diverse background and experiences, and seeing everyone in person fostered illuminating discussions. We are very excited for the next two years of the project!



Visiting a high marsh site in Mississippi during the Year 3 Annual meeting. Mark Woodrey (center) explains the fire history of the site. Photo by Heather Levy.

Remote Sensing and Habitat Mapping Updates

The NOAA Firebird high marsh data release products have been published as a USGS Data Release. Additionally, the team has developed a draft manuscript titled “Elevation-based probabilistic mapping of irregularly flooded wetlands along the northern Gulf of Mexico coast”. Writing for a second manuscript is underway covering the high marsh and salt panne/flat map development.

This data release includes geospatial data for irregularly flooded wetlands and high marsh and salt pannes/flats along the northern Gulf of Mexico coast from Texas to Florida. Specifically, this release includes six products: (1) a map highlighting the probability that an area is an irregularly flooded wetland; (2) a map delineating high marsh and salt pannes/flats; (3) a map from Lake Pontchartrain, Louisiana to the Florida Big Bend delineating the coverage of irregularly flooded wetlands that have *Juncus roemerianus* (Black needlerush) as the dominant vegetation species; (4) a spatial metadata file showing what elevation data were used for specific locations; (5) a supplemental version of the high marsh and salt pannes/flats map that has a second class for high marsh for parts of Texas where succulents and *Distichlis spicata* were dominant species; and (6) a dataset of supplemental project-specific field reference data collected throughout the northern Gulf of Mexico coast.

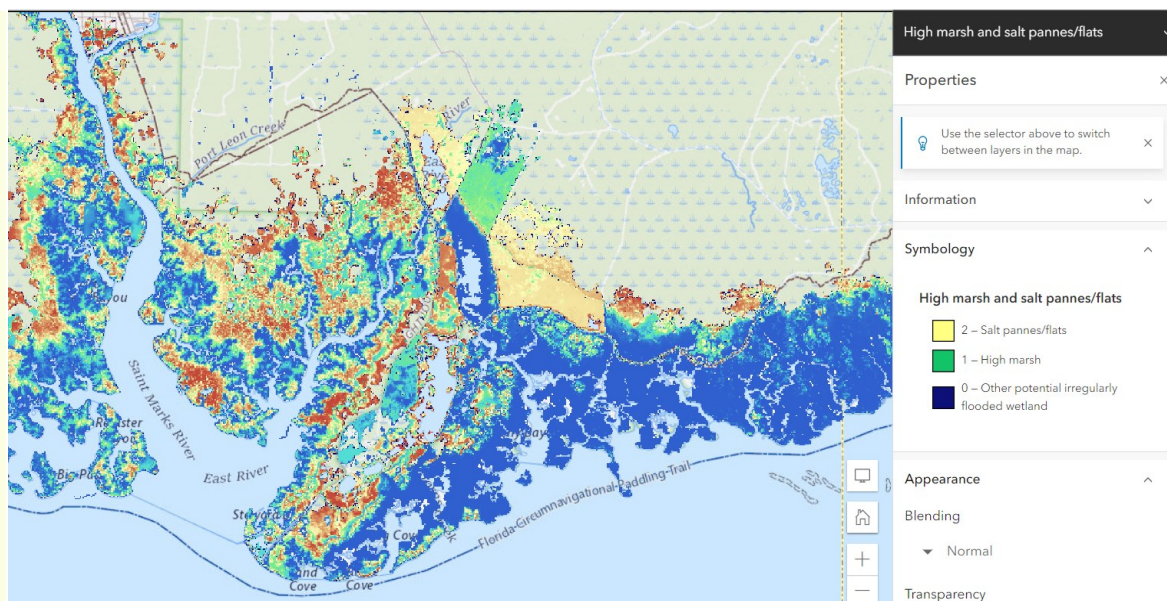
Collectively, the products in this data release were developed using a two-step approach that utilized the best-available elevation data and satellite data from 2018-2020. The first step in the process was to create a probabilistic map of irregularly flooded wetlands using light

detection and ranging (lidar)-derived digital elevation models (DEMs), tidal datums, and nuisance flooding levels. Monte Carlo simulations were used to propagate uncertainty in elevation-based data, and existing land cover data were used to restrict the output to coastal wetland areas. Due to the focus of this study on high marsh, these coastal wetland areas did not include tidal forested fresh wetlands. The second step was to delineate high marsh and salt pannes/flats using reference data which included project specific data collection in collaboration with land managers and other ancillary datasets across the northern Gulf of Mexico coast. These data were combined with Sentinel-1 synthetic aperture radar imagery, multispectral optical satellite imagery from Sentinel-2, DEMs, and the irregularly flooded wetland probability layer to generate a contemporary map of high marsh and salt pannes/flats along the northern Gulf of Mexico coast. This product is the first regional map of these wetland systems across the northern Gulf of Mexico coast.

Citation: Enwright, N.M., Cheney, W.C., Evans, K., Thurman, H.R., Woodrey, M.S., Fournier, A.M.V., Bauer, A., Cox, J., Goehring, S., Hill, H., Hondrick, K., Kappes, P., Levy, H., Moon, J., Nyman, J.A., Pitchford, J., Storey, D., Sukiennik, M., and Wilson, J., 2022, Mapping irregularly flooded wetlands, high marsh, and salt pannes/flats along the northern Gulf of Mexico coast: U.S. Geological Survey data release

Link (DOI): <https://doi.org/10.5066/P9MLO26U>.

An example of the high marsh and salt panne/flat layer in ArcGIS online using St. Marks National Wildlife Refuge in Wakulla County, Florida. Available layers include high marsh and salt pannes/flats, irregularly flooded wetland probability, irregularly flooded *Juncus roemerianus*-dominated wetlands, and elevational data.



From the Field: 2022 Breeding Season Updates

Texas

From March 2022 until August 2022 two field crews (comprised of two individuals each) performed point count surveys for Mottled Ducks and Eastern Black Rails along the upper and mid-Texas coast. Survey sites were located on a mix of public and private lands, with the majority of the work occurring on Anahuac, McFaddin, Brazoria, and San Bernard National Wildlife Refuges in Jefferson, Chambers, and Brazoria counties. Bird surveys were performed at 142 points identified through the high-marsh mapping products, and field crews recorded 212 individual Black Rail and 129 Mottled Duck detections during surveys in 2022.

Florida

From April 4 – July 27, 2022 we completed 672 total call-broadcast surveys for Black Rails (including replicates). Surveys were repeated 6 times at 112-point count locations that spanned across Dixie, Taylor, Wakulla, and Franklin counties. We established 20 routes that contained 4-10-point count locations. All sampling occurred on public lands, and the majority of surveys occurred within management units of Big Bend Wildlife Management Area, St. Marks National Wildlife Refuge, and St. Vincent National Wildlife Refuge. We detected Black Rails at a total of 19 call-broadcast sites, not including incidental detections. Accounting for paired surveys, and not including incidentals, we detected 69 individuals at 51 surveys. This included individuals that were heard repeatedly at a site, thus the figure does not represent unique individuals. We also had at least 34 incidental detections.

Louisiana

Black Rail playback surveys, Mottled Duck surveys, and vegetation surveys were conducted in south-western Louisiana between March 15 and August 2, 2022. Preliminarily (data QA/QC still in progress), a total of 568 Black Rail point count surveys were conducted across 107 points. Black Rails were detected during 10 surveys at 8 points. A total of 267 Mottled Duck surveys were conducted across 54 points. One or more Mottled Ducks were detected during 20 surveys.

Mississippi/Alabama

We had 28 black rail (BLRA) call-broadcast survey locations in MS and 7 in AL. We conducted six replicate BLRA call broadcast and MODU surveys for all locations except for two locations in Mississippi. We missed conducting morning BLRA & MODU surveys at two locations due to a combination of accessibility and weather-related issues. Because field crews in MS/AL operate in teams of 2, at survey location points where MODU surveys were not performed (i.e., survey points too close to satisfy SOP requirement of 1 km between MODU survey points), both technicians performed independent BLRA call broadcast surveys at that same time. This resulted in 94 (72 in MS and 22 in AL) surveys conducted by a single observer and 72 (52 in MS and 20 in AL) paired observer surveys. We conducted a total of 98 (74 in MS and 24 in AL) MODU surveys at 17 (13 in MS and 4 in AL) different survey locations. We detected MODUs during 8 surveys all in Mississippi.



A particularly scenic Black Rail call-broadcast survey conducted in July during sunrise at St. Vincent National Wildlife Refuge in Gulf County, Florida. Photo by Heather Levy

From the Field: Acoustic Recording Unit (ARU) Updates

The ARU work this season focused on 4 field objectives regarding the utility of using ARUs for Black Rails: distance trials, paired call-broadcast surveys, long-term deployment, and scouting. ARUs were added on to the project because they enhance the overall goals of Firebird, and provide a unique opportunity to test the utility of these tools for Black Rails, specifically. The processing and analysis of these recordings is ongoing and we hope to have some preliminary results to report in the next reporting period.

Distance Trials

These trials were aimed at determining how far away different models of ARU can detect vocalizing Black Rails. All units tested, except the Audiomoth, including the Cornell Swift and the Wildlife Acoustics SM2, SM3, and SM4 had detectable Black Rails kickedoo calls broadcast in the 85-95 dB range out to the maximum distance of 200 m. The churt call was a bit more difficult to pick up at the maximum distance, especially there was high ambient noise levels. Because of the small sample size, we did not have enough variation in wind to determine whether it may have affected sound. Based on what we learned from these trials we have revamped the SOP and made it more robust. Additionally, there will be an associated standardized

datasheet created. We will be collecting the data for this objective from November 2022 – January 2023 based on the updated SOP.

Paired call-broadcast surveys

We selected a number of routes in which surveyors would pair a Wildlife Acoustics SM4 unit with the call-broadcast survey. As a pilot test, we selected routes that were typically less labor intensive to reach, as we wanted to ensure the extra work would not interfere with the call-broadcast surveys. These routes included both areas in which we did and did not detect birds. We hope to continue these surveys in the breeding season of 2023 to bolster sample size.

Long-term deployment

We selected sites known to previously have Black Rail detections for long term ARU deployment to assess questions about peak vocalization time and season.

Scouting

At sites where call broadcast surveys were not feasible for logistical reasons but where BLRA may still be found we put out ARUs to scout these sites. ARUs were deployed for roughly a week at a time to provide additional information on the occupancy of these sites.



Kyle Austin assisting with ARU distance trials in Mississippi and Alabama. Photo by Peter Kappes.

Climate Analysis Team Updates

The first NOAA Firebird climate-related paper titled “Atmospheric circulation regimes for prescribed burns along the U.S. Gulf of Mexico coast” was published in 2021 in *Applied Geography* (DOI Link: <https://doi.org/10.1016/j.apgeog.2021.102587>). The second paper titled “Atmospheric circulation associated with favorable prescribed fire burns in the Gulf of Mexico coast, U.S.A.” is in revision at *Fire Ecology*, and we continue to present on this work at conferences and are working to translate the results into useful tools for prescribed fire practitioners.

Atmospheric circulation regimes for prescribed burns along the U.S. Gulf of Mexico coast

Wenjia Cao ^a  , Robert V. Rohli ^a, Fenglin Han ^a, Anthony J. Vega ^b, Nazla Bushra ^a, John A. Nyman ^c

Highlights:

- ◆ Automated synoptic atmospheric circulation classification is conducted.
- ◆ Eight surface and 700-hPa air circulation types prevail over the U.S. Gulf coast.
- ◆ A climatology of circulation type frequencies by month is presented.
- ◆ Several types are likely to be conducive or detrimental to prescribed marsh burning.
- ◆ These results will assist in prescribed burns for restoring Gulf marsh habitats.

Citation:

Cao, W., Rohli, R.V., Han, F., Vega, A.J., Bushra, N. and Nyman, J.A., 2021. Atmospheric circulation regimes for prescribed burns along the US Gulf of Mexico coast. *Applied Geography*, 136, p.102587.

Adaptive Resource Management Team Updates

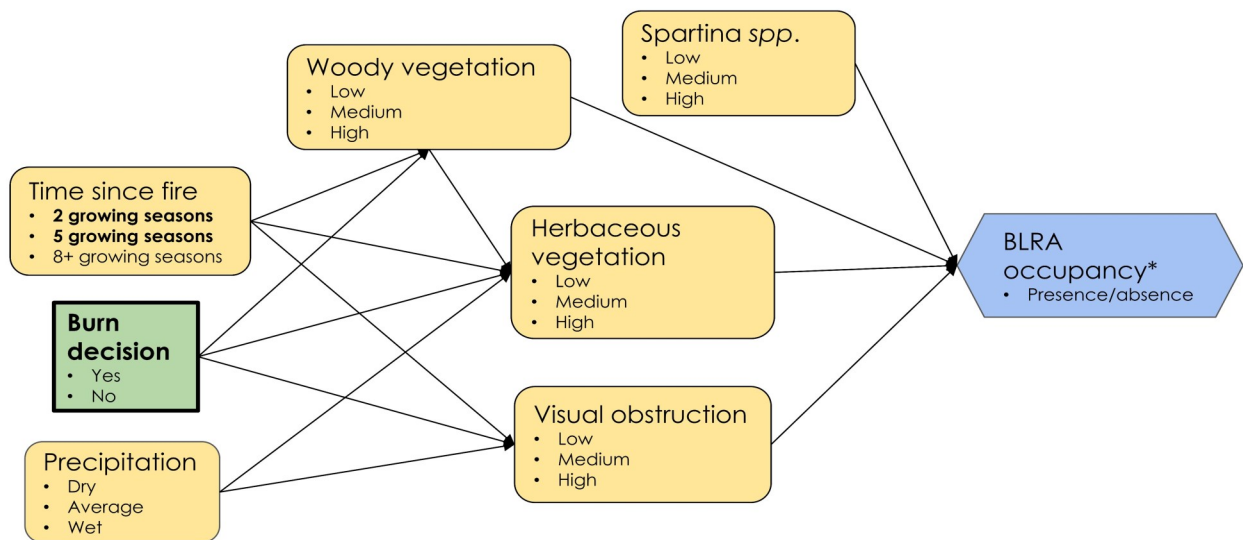
We continued refining the Bayesian Decision Network (BDN) which was finalized at our October 2021 workshop by conducting two peer-reviews (April and May 2022, separately) by outside experts in either rail ecology, fire ecology, or both. Based on the feedback from these peer-reviews, we made changes to the definitions of the nodes and finalized our beta-level BDN for Black Rails. To further explore how we might use the BDN for learning about how Black Rails respond to various fire return intervals, we tested how to update both the conditional probability tables (CPTs) and the model structure using field data. To test how to update the CPTs, we accessed and formatted the pilot season data to fit the requirements of the BDN in Netica, then input the new data to see how the CPTs changed with new information. To test how to update the model structure, we simulated data with to represent strong and weak relationships among the variables to test that the model would change in a predictable way, allowing us to have confidence that updating

the model with real field data would give accurate information regarding the strength of the relationships among the variables.

In March 2022, we conducted a literature review to understand variables influencing Mottled Duck abundance in the high marsh. In April 2022, we began working with Mottled Duck experts within the Firebird team to develop and influence diagram that included several variables which are also present in the Black Rail influence diagram. We then combined the two influence diagrams so that we might examine tradeoffs among the two species for varying fire frequencies

Additionally, the manuscript describing the qualitative value of information (QVoI) analysis from the first annual Adaptive Resource Management Workshop received a minor revisions decision at *Ecological Applications*.

High Marsh Habitat, Dormant Season Burns



*BLRA prototype



This information is preliminary and is subject to revision. It is being provided to meet the need for timely best science. The information is provided on the condition that neither the U.S. Geological Survey nor the U.S. Government shall be held liable for any damages resulting from the authorized or unauthorized use of the information.

Combined Black Rail and Mottled Duck influence diagram depicting the effects of prescribed fire on Black Rails (BLRA) occupancy and Mottled Duck (MODU) abundance in high marsh habitat along the Gulf of Mexico, USA. Green rectangles represent management actions, yellow rounded rectangles represent ecological variables, red ovals represent chance events, and blue hexagons represent fundamental objectives. Arrows represent the direction of cause and effect. **These are preliminary results and are not intended for distribution or reproduction.**

Outreach and Presentations

In the Media



Former Tall Timbers biologist Heather Hill published an article in *Birding* describing her experiences searching for Black Rails as part of our fire in coastal wetlands research. The Black Rail ended up on the cover of the magazine as a result and the information went out to bird enthusiasts throughout the nation.

Link: <https://www.aba.org/birding-online-august-2022/>

Presentations (continued on page 10)

Cox, J.A, Fournier A.M.V, Woodrey, M.S., Levy, H.E. Smoke on the Water. 2022. Fire effects on Black Rails and other coastal marsh birds. Auburn University Water Resources Center. May 25, 2022. Virtual.

Enwright, N.M., Evans, K.O., Cheney, W.C., Thurman, H.R., Fournier, A.M.V., and Woodrey, M.S., 2022, High Marsh and Salt Panne Systems across the Northern Gulf of Mexico, The Gulf of Mexico Conference 2022 Tools Cafe, April 26, 2022, Baton Rouge, LA,.



Heather Levy published an *eJournal* article for Tall Timbers Research Station and Land Conservancy providing updates on the coastal work in July of 2022. This article follows updates from the pilot season that were published in the *eJournal* in 2021.

Link: https://talltimbers.org/wp-content/uploads/2022/06/eJournal_Summer2022_SMALL.pdf

Outreach and Presentations

Enwright, N.M., Evans, K.O., Cheney, W.C., Thurman, H.R., Fourier, A.M.V., and Woodrey, M.S., 2022, Mapping High Marsh Systems across the Northern Gulf of Mexico, The Gulf of Mexico Conference 2022, April 25–28, 2022, Baton Rouge, LA.

Kross, C.S., R.V. Rohli, J.A. Moon, A.M.V. Fournier, M.S. Woodrey, and J.A. Nyman. 2022. Weather is not a primary driver behind changes in prescribed fire management in coastal wetlands across the United States Gulf of Mexico, USA. Gulf of Mexico Conference. April 2022. Baton Rouge, LA.

Fournier, AMV, Bauer, A, Brasher, M, Butler, C, Cheney, WC, Cooper, RJ, Conway, W, Cox, J, Enwright, NM, Evans, KO, Hondrick, K, Johnson, E, Kappes, P, Kross, C, Lancaster, J, Levy, H, Lueck, J, Lyons, JE, Monopoli, L, Moon, J, Nyman, JA, Rohli, R, Schwarzer, A, Soehren, E, Stantial, M, Thurman, HR, Vermillion, B, Wilson, J, Woodrey, MS. NOAA Firebird: Fire Effects in Gulf of Mexico Marshes on Mottled Ducks, Black and Yellow Rails. Gulf of Mexico Conference April 2022. Baton Rouge, LA.

Stantial, M.L., A.J. Lawson, A.M.V. Fournier, P.J. Kappes, C.S. Kross, M.S. Woodrey, and J.E. Lyons. 2022. Informing the use of prescribed fire in an adaptive management framework for Gulf of Mexico high marshes using an expert-based Bayesian Network model. Gulf of Mexico Conference, Baton Rouge, LA.

Enwright, N.M., Evans, K.O., Cheney, W.C., Thurman, H.R., Fourier, A.M.V., and Woodrey, M.S., 2022, Mapping High Marsh Systems across the Northern Gulf of Mexico, Joint Aquatic Sciences Meeting, May 14–20, 2022, Grand Rapids, MI.

Fournier, AMV, Bauer, A, Brasher, M, Butler, C, Cheney, WC, Cooper, RJ, Conway, W, Cox, J, Enwright, NM, Evans, KO, Hondrick, K, Johnson, E, Kappes, P, Kross, C, Lancaster, J, Levy, H, Lueck, J, Lyons, JE, Monopoli, L, Moon, J, Nyman, JA, Rohli, R, Schwarzer, A, Soehren, E, Stantial, M, Thurman, HR, Vermillion, B, Wilson, J, Woodrey, MS. NOAA Firebird: Fire Effects in Gulf of Mexico Marshes on Mottled Ducks, Black and Yellow Rails. Joint Aquatic Sciences Meeting.

Kappes P, Fournier A, Conway W, Cox J, Hondrick K, Johnson E, Kross C, Levy H, Lueck J, Lyons J, Moon J, Stantial M, Woodrey M. NOAA Firebird: Establishing a framework for monitoring Black Rail, Yellow Rail, and Mottled Duck response to prescribed fire in the Northern Gulf of Mexico. Mississippi Coast Audubon Society, Biloxi, MS, 10 May 2022.

Monopoli, L, Benson, TJ, Fournier, AMV, Fire effects on breeding marsh birds in the Gulf of Mexico. Winous Point Great Lakes Graduate Student Symposium

Fournier, AMV, Bauer, A, Brasher, M, Butler, C, Cheney, WC, Cooper, RJ, Conway, W, Cox, J, Enwright, NM, Evans, KO, Hondrick, K, Johnson, E, Kappes, P, Kross, C, Lancaster, J, Levy, H, Lueck, J, Lyons, JE, Monopoli, L, Moon, J, Nyman, JA, Rohli, R, Schwarzer, A, Soehren, E, Stantial, M, Thurman, HR, Vermillion, B, Wilson, J, Woodrey, MS. NOAA Firebird: Fire Effects in Gulf of Mexico Marshes on Mottled Ducks, Black and Yellow Rails. Wilson Ornithological Society Conference. Santa Fe, NM.

Auriel gave an update on the Firebird project to the Mississippi Flyway Council Non Game Tech Section at the August meeting in Orange Beach, Alabama.



Additional Resources: Field SOPs

On our website, you can find the Standard Operative Procedures (SoPs) for every aspect of the Firebird Project. Our hope for making these SOPs available to the public is for creating a standardized methodology for surveying Black Rails and Mottled Ducks across their range.

There are five documents available for download: (1) Winter BLRA Surveys (2) Breeding BLRA Surveys (3) MODU Count Surveys (4) Vegetation Surveys (5) Photography Rules.

Click [here](#) to access our webpage with downloadable SOPs!



Preparing for vegetation sampling in Louisiana.
Photo by Jonathon Lueck.



Peter Kappes climbs a ladder to survey for Mottled Ducks and record their behavior in Mississippi. Photo by Kyle Austin.



Erik Johnson explains molt limits of a captured Yellow Rail in Mississippi during dragline training in 2021.
Photo by Heather Levy