UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
National Centers for Coastal Ocean Science
Silver Spring, Maryland 20910

MEMORANDUM FOR: The Record

FROM: Margo Schulze-Haugen
Deputy Director

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SUBJECT: Categorical Exclusion memorandum for RESTORE Act Science Program Project #2772054, "Fire Effects in Gulf of Mexico Marshes: Historical Perspectives, Management, and Monitoring of Mottled Ducks and Black and Yellow Rails"

ENCLOSURES:
1) USFWS Alabama LOC 2020-I-0049
2) USFWS Mississippi LOC 2020-I-0057
3) USFWS Florida LOC 2020-I-0076
4) USFWS Louisiana LOC
5) USFWS Texas LOC 2020-I-0027
6) List of Migratory Birds

NOAA Administrative Order (NAO) 216-6A, Environmental Review Procedures, requires all proposed projects be reviewed with respect to environmental consequences on the human environment. This memorandum addresses the determination that the activities described below for the RESTORE Science Program Project #2772054, "Fire Effects in Gulf of Mexico Marshes: Historical Perspectives, Management, and Monitoring of Mottled Ducks and Black and Yellow Rails" qualified to be categorically excluded from further National Environmental Policy Act (NEPA) review.

Categorical Exclusion Determination

This project's activities are within the scope of the E5 Categorical Exclusion. As Defined in Appendix E of the NAO 216-6A Companion Manual, E5, describes activities involving invasive techniques or methods that are conducted for scientific purposes. This definition covers the proposed survey activities for Black Rails, Yellow Rails and Mottled Ducks before and after prescribed fire activities occurring on federally and state managed lands. This memorandum describes activities such as mapping high marsh habitats to inform bird monitoring; monitoring, banding and sampling from bird species of interest; bird, plant and invertebrate sampling in time periods surrounding prescribed fires and collection of historical and current weather data in the context of prescribed fires. Therefore, project activities are categorically excluded from further NEPA review.

Project Purpose and Need

The mission of NOAA's RESTORE Science Program is to carry out research, observation, and monitoring to support, to the maximum extent practicable, the long-term sustainability of the ecosystem, fish stocks, fish habitat, and the recreational, commercial, and charter-fishing industry in the Gulf of Mexico. The purpose of the proposed action is to fund a five-year project to Mississippi State University researchers to investigate the impact of prescribed fire in Gulf of Mexico high marsh habitats on Mottled Ducks, Black Rails and Yellow Rails.

High marsh is a unique habitat type, imminently threatened by sea level rise and characterized by a community of specialized emergent vegetation that tolerates irregular tidal inundation. Land managers' decisions about prescribed fire in high marsh systems are complicated by uncertainty around the response of birds to the application of prescribed fire. Without an understanding of how prescribed fire impacts high marsh ecosystems, including several high priority bird species, natural resource managers will be limited in their ability to manage and conserve the biodiversity of the Gulf Coast. Black rail, Yellow Rail, and Mottled Duck are birds of concern for many organizations, including all five Gulf of Mexico states, the Gulf Coast Joint Venture, and the National Audubon Society.

Collectively, models of occurrence, distribution, and abundance of these three species will enable assessments of their degree of sympatry and potential trade-offs or synergies from prescribed fire applications. Researchers will monitor the avian response to prescribed fire application in an adaptive management framework, where they will make predictions, monitor the avian response and use that new information to improve models and reduce uncertainty in annual bird distribution predictions.

This project has 2 objectives and 5 sub-objectives.

1. Determine the distribution and abundance of black and yellow rails and mottled ducks in high marsh habitats across the five Gulf states, during the breeding and wintering seasons
    1.1. Map and validate high marsh habitat to inform bird monitoring
    1.2. Estimate the relative proportion of resident versus migratory black rails.
2. Identify prescribed fire practices that support black and yellow rail and mottled duck populations through an adaptive management process.
    2.1. Determine the mechanism of bird response to fire through plants and invertebrates
    2.2. Characterize the appropriate fire return interval variation in high marsh
    2.3. Determine if weather affecting prescribed fire has changed in frequency over time.

Action Areas

Project activities will occur across the five Gulf of Mexico States; Florida, Alabama, Mississippi, Louisiana and Texas. In every state the work will happen in high marsh habitat. Each of the state action areas is described below.

Texas action areas (figure 1)

- Texas Chenier Plain NWR Complex- Chambers and Jefferson Counties, Texas
- J.D. Murphree WMA- Jefferson County, Texas
- Texas Mid-Coast NWR Complex- Brazoria and Matagorda Counties, Texas
- Justin Hurst WMA- Brazoria County, Texas
- Mad Island WMA- Matagorda County, Texas

Louisiana action areas (figure 2)

- Sabine NWR- Cameron Parish
- Rockefeller Wildlife Refuge- Cameron and Vermillion Parishes, Louisiana
- Paul J. Rainey Wildlife Sanctuary- Vermillion Parish, Louisiana

Mississippi action areas (figure 3)

- Grand Bay NERR, Jackson County, Mississippi
- Hancock County Marshes Coastal Reserve, Hancock County, Mississippi

Alabama action areas (figure 4)

- Grand Bay Savanna Forever Wild Complex, Mobile County, Alabama

Florida action areas (figure 5)

- St. Vincent NWR- Franklin County, Florida
- St. Marks NWR- Wakulla County, Florida

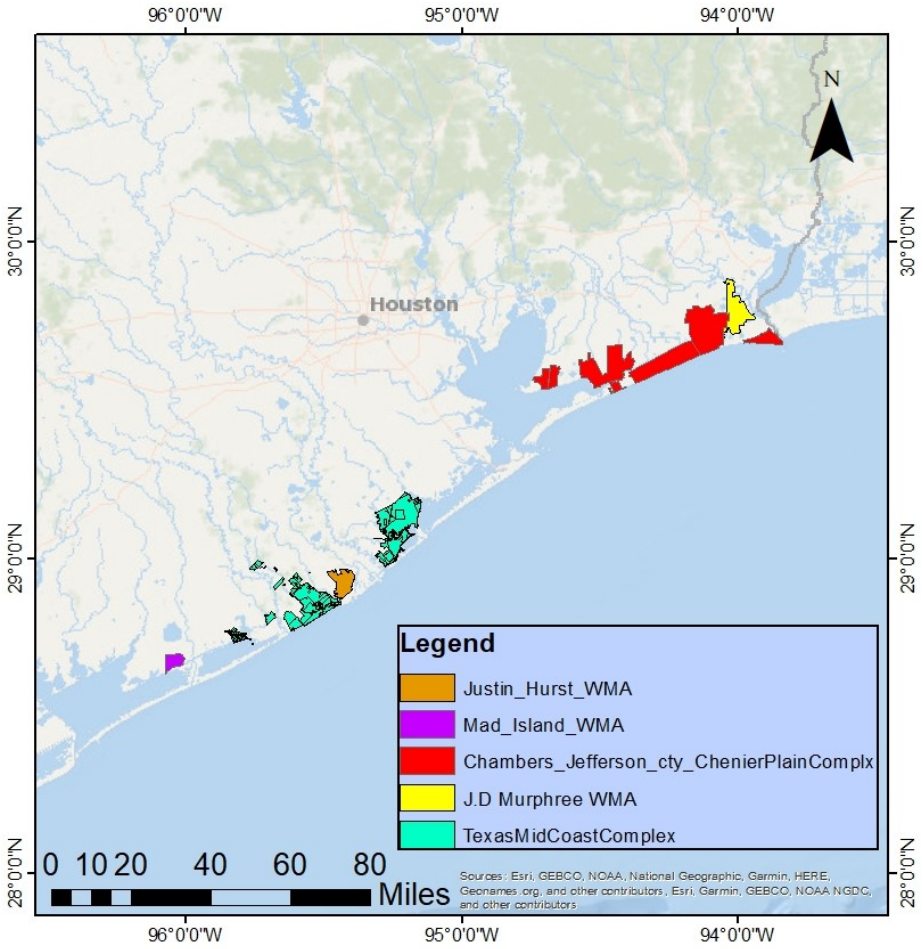


Figure 1 – Project action areas in Texas

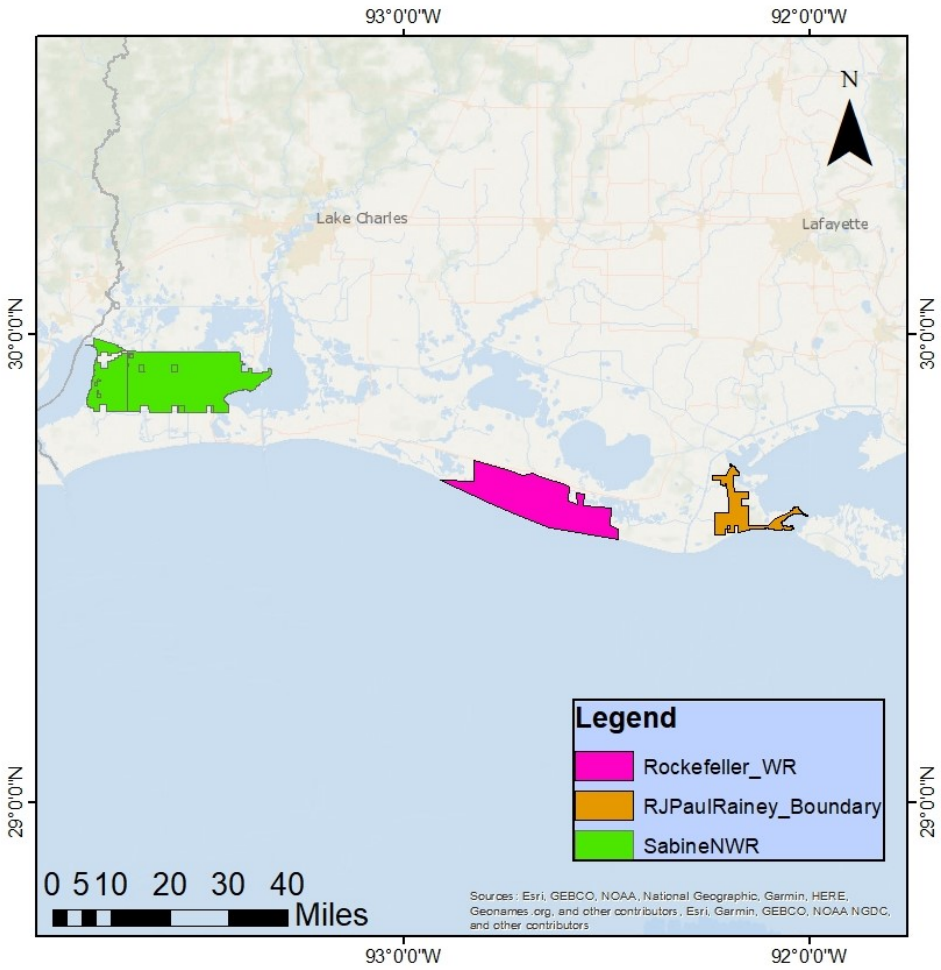


Figure 2- Project action areas in Louisiana

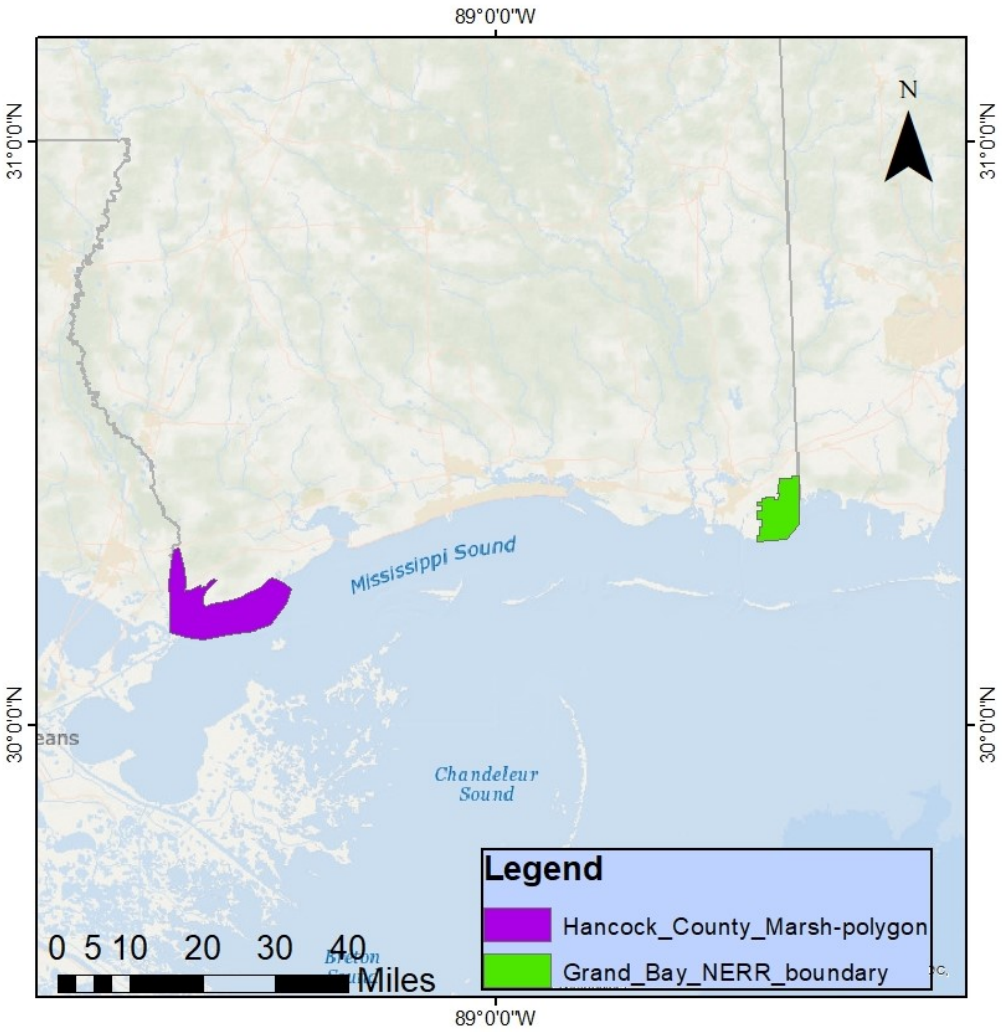


Figure 3- Project action areas in Mississippi

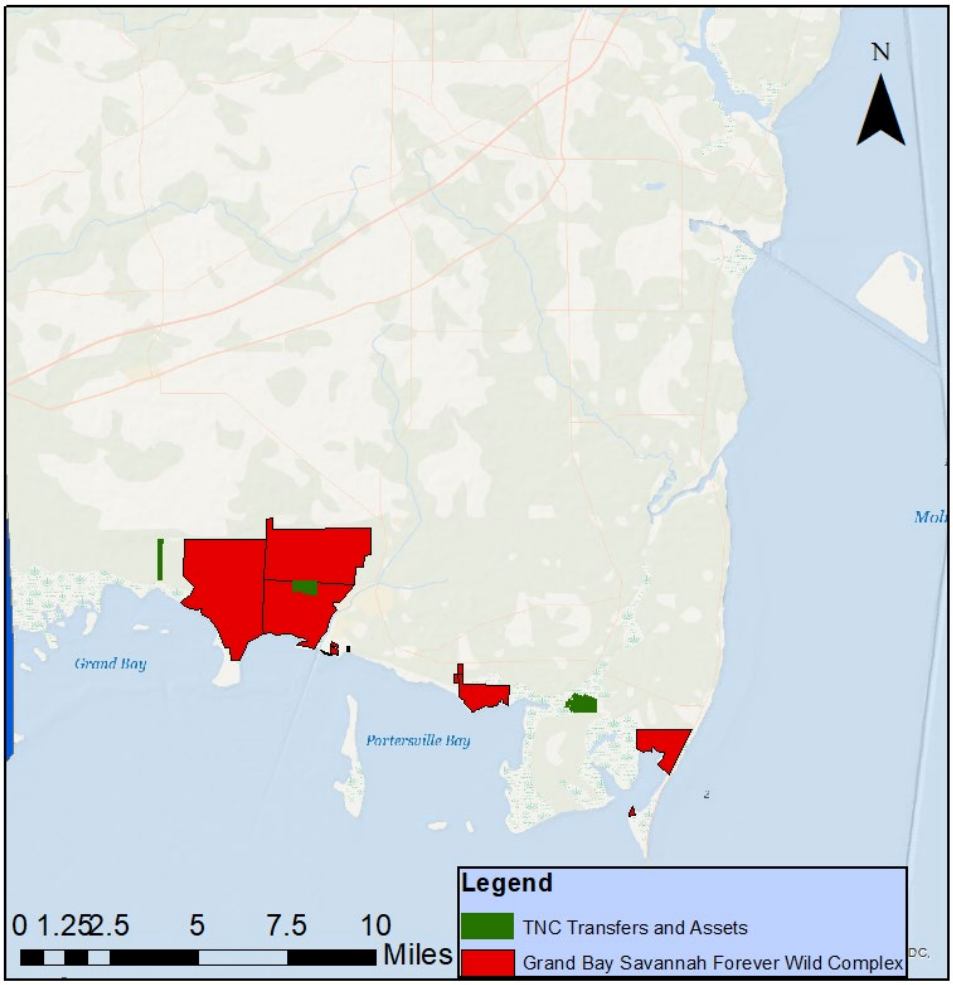


Figure 4 – Project action areas in Alabama

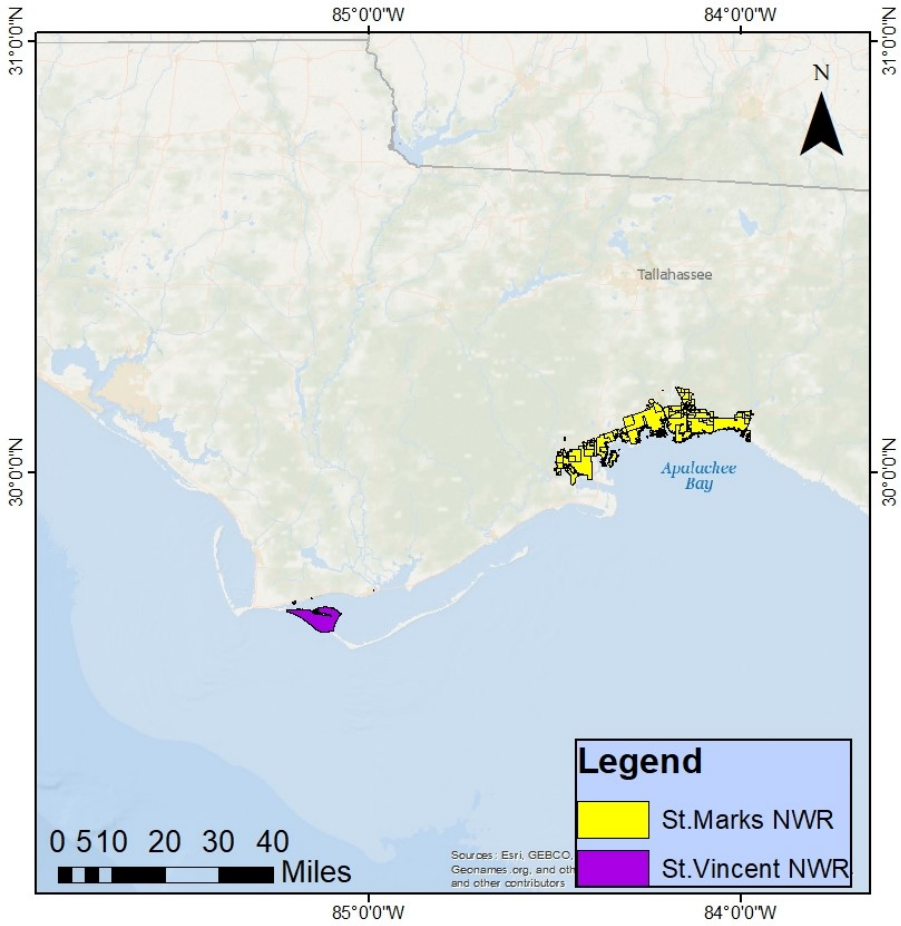


Figure 5 – Project action areas in Florida

Proposed Activities:

The following activities are proposed to address the overarching research question and meet the two project objectives and five project sub- objectives:

Objective 1: Determine the distribution and abundance of black and yellow rails and mottled ducks in high marsh habitats across the five Gulf States, during the breeding and wintering seasons

- Base High Marsh Habitat Map (Office Activity): An initial high marsh habitat layer will be developed from readily available land cover data layers that include the delineation of marsh type, such as U.S. Geological Survey marsh type map (Enwright et al. 2015), U.S. Fish and Wildlife Service's National Wetlands Inventory, and NOAA's Coastal Change Analysis Program land cover, and the Florida Cooperative Land Cover dataset. Generally, high marsh can be separated from low marsh based on elevation and exposure to tidal influence.
- High Marsh Habitat Map Refinement (Field and Office Activity): Researchers will validate the map using on the ground vegetation surveys at selected locations. Researchers will then use previously collected LIDAR and tide data to refine regional high marsh areas from the land cover maps by using Monte Carlo simulations.

- Black Rail, Yellow Rail and Mottled Ducks Monitoring (Field Activity): Each species will be monitored in the selected marshes before and after application of prescribed fire.
    - *Black Rails:* During breeding season, investigators will use broadcast calls to elicit a response from individuals. In the pilot season morning and evening surveys will be utilized across the Gulf Coast, to determine which time period is best in each region. Survey points will be placed at least 400 m apart to avoid double counting, and transects of three to five points will be randomly placed across wetland units. Points will be visited five times per season, to maximize the chance of detection, given an individual is present. Researchers will use the call broadcast sequence used by black rail survey teams across the Atlantic Coast, Florida and Louisiana.
    - *Yellow Rails:* This species will be surveyed using nocturnal draglines, a method used successfully throughout the Gulf Coast. Draglines are long ropes, with weights attached, that are pulled by two people across a wetland through the vegetation, flushing out the birds resting in the vegetation and on the ground. Whenever an individual is detected, the location will be recorded using a global positioning system.
    - *Mottled Ducks:* Spatially referenced surveys spanning several decades (USFWS Division of Migratory Bird Management 2018) will be used to model the distribution and relative abundance of mottled ducks in the WGC. The survey consists of transects oriented perpendicular to the Louisiana and Texas coastlines that encompass 10,111 mi2 in Louisiana and 16,659 mi2 in Texas. Georeferenced breeding season locations of mottled ducks are available for 2010-2018, and additional surveys will be added during the time of this project. These data will also be paired with geospatial data on burn histories to model associations between mottled duck occupancy and fire regimes.
- Black Rail Stable Isotopes (Field and Laboratory activity): Although the interior population of black rails, which migrate annually, are believed to winter in the southeastern U.S., it is unclear whether they occupy the same habitat as the black rails who are resident on the Gulf Coast. To determine what percentage of the Black Rail population are year round residents, researchers will use a dragline (bottle-line) to survey the coastal prairie at night. Birds will be captured using handheld nets. Sampling will begin ~30 minutes after sunset and last for three hours. Researchers will band captured birds and remove the fifth secondary feather for the stable isotope analysis. The sample feather will be analyzed for stable Hydrogen and Oxygen stable isotopes. These feathers will be sent to the University of Arkansas Stable Isotope Lab for analysis.

Objective 2: Identify prescribed fire practices that support black and yellow rail and mottled duck populations through an adaptive management process.

- Adaptive Management Modeling (Office and Workshop activities): Researchers will meet annually with managers and other experts to develop and refine a set of conceptual and quantitative predictive models of high marsh habitats and responses to prescribed fire. Investigators will use information provided by managers to build models and decision support tools, refine these products between meetings, and present a series of prototypes to the management community. The predictive models will be used to find

optimal practices relative to the objectives while balancing tradeoffs among target species.

- Prescribed Fire (Field Activity): This project will monitor before and after prescribed fires. Monitoring and banding protocols are described above. Fire activities themselves are not funded by this project. All prescribed fire activities will follow individual state prescription requirements and employ any best management practices (BMPs) established for wildlife and habitats.
- Plants, Invertebrates and Evaluating Burn Intensity (Field Activity): To better understand why the focal bird species are responding to prescribed fire practices, investigators will collect data on the prescribed fire events, and the plants and invertebrates at each site. Sites will be sampled for plant and invertebrates once each in breeding and non-breeding season, using the protocol used by the Saltmarsh Habitat and Avian Research Program (SHARP, 2013). Briefly, researchers will sample in a 50m radius around each sampling point. Field technicians walk within the circle plot as needed to view the plant communities while minimizing disturbance to the vegetation. They will look for the following plant communities and open water features: Low Marsh, High Marsh, Salt Marsh Terrestrial, Border, Brackish Terrestrial Border, Invasive, Pannes (includes pools and creeks), Open Water, Upland, and Wrack. Each identified community will be assigned a percent coverage using the following cover classes; 0: 0% cover, 0.5: Less than 1% cover , 1: 1% to 5% cover, 2: 6% to 10% cover, 3: 11% to 25% cover, 4: 26% to 50% cover, 5: 51% to 75% cover, 6: 76% to 100% cover. Full sampling details are available at https://www.tidalmarshbirds.org/?page_id=1595.
- Historical Prescribed Fire Frequency Reconstruction (Field Activity): To estimate fire intensity over the past century for our study sites, researchers will use geochronology and paleoecological proxies, including pollen, diatoms, and microscopic charcoal. Multiple short push or piston cores will be collected from marsh study sites to provide sedimentary stratigraphy and the proxy record. Researchers will collect and describe at least 10 sediment cores from each Gulf Coast state (co-located with mottled duck and black and yellow rail survey sites), with a subset (approximately 4-6 sediment cores) undergoing detailed microfossil and gamma spectroscopy analyses to determine paleofire frequency.

Vessel Transit Operations

All proposed action areas will be accessed by land, using existing roads and pathways. When accessing remote locations, researchers will transit by foot carrying the required equipment by hand cart.

Permits and Authorizations

Special use permits may be required to allow rail and mottled duck survey work to take place on each property. Depending on the university's IACUC committee, an IACUC approval may also be needed.

Special use permits may be required for the ground truthing of the high marsh data layer to give field crews access to the necessary locations.

Capturing Black Rails will require a federal banding permit, state capture and handling permits, and special use permits from each property where captures will occur. Researchers currently have federal banding permits for all 5 of the action area states to perform banding and feather extraction on Rails. An IACUC will be obtained from the University of Central Oklahoma, where the Co-PI leading the work is located.

Special use permits may be required for the collection of plant and invertebrate data. These will be coordinated by each the Co-PI leading each state's field work. [Cox, Fl, Woodrey, MS/AL, Johnson, LA, Conway, TX].

As of this writing the USFWS has proposed listing the Black Rail as threatened under the Endangered Species Act. If this proposed listing occurs, additional permitting would be required from USFWS, as well as individual states and PI Fournier would coordinate with the Co-PI leading each state's field work to ensure those were obtained.

Biological Resources and Environmental Statutes

Endangered Species Act (ESA)

Endangered Species Act (ESA) Section 7 (a)(2) requires that each federal agency, in consultation with NMFS and/or the U.S. Fish and Wildlife Service (USFWS), ensure that any action authorized, funded, or carried out by the agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of designated critical habitat.

NCCOS initiated informal ESA Section 7 consultations with US Fish and Wildlife Service offices in the five action area states (Florida, Alabama, Mississippi, Louisiana and Texas) requesting concurrence with our determinations (table 1). NCCOS received letters of concurrence from USFWS state offices with the determination of not likely to adversely affect ESA-listed species or adversely modify designated critical habitat (Encl 1-5). Further consultations on this action are not necessary unless future modifications to activities are proposed that may result in adverse impacts to ESA-listed species or their critical habitat.

Table 1 – Summary of ESA Section 7 state consultation concurrence dates. NLAA or No Effect determinations are listed for each ESA-listed or proposed species that may occur within the action area of that state under the jurisdiction of USFWS (see Table 2).

State	*Concurrence Date*	*Determination*
Florida	November 15, 2019	NLAA or No Effect
Alabama	October 21, 2019	NLAA or No Effect
Mississippi	October 25, 2019	NLAA or No Effect
Louisiana	December 16, 2019	NLAA or No Effect
Texas	December 18, 2019	NLAA or No Effect

Within the GoM, NMFS manages seven (7) species of corals, nine (9) fish species, five (5) turtle species and five (5) marine mammal species that are listed as either endangered, threatened or proposed endangered or threatened species under the ESA (Table 1). None of the NMFS managed species are present in the action area, because the action areas are in the coastal high marshes. Therefore, NMFS managed species will not be analyzed further in this memorandum.

The field research activities potentially occur in the range of one ESA listed marine mammal species under the authority of USFWS. That species is the West Indian manatee (*Trichechus manatus*). The West Indian manatee is currently listed as endangered but is proposed to be downlisted to threatened. However, since project activities will be restricted to areas of high marsh where manatees do not occur there will be no adverse affects to manatees. While the manatee has critical habitat designated in Florida waters in the Gulf of Mexico there will be no sampling in critical habitat areas because the project action areas are high marsh habitats. **Therefore, NCCOS determines that research activities will have No Effect on West Indian manatees and will not destroy or adversely modify designated critical habitat.**

Within the GOM action areas for this project, there are ten (10) bird species, ten (10) reptile species (includes sea turtles), one (1) amphibian species, one (1) fish species, two (2) clam species and six (6) ferns and allies listed as either endangered, threatened or proposed endangered or threatened under the ESA (table 2). The research activities are expected to have no effect on the listed fish and sea turtles as their habitat are outside of the coastal high marsh action areas. Therefore fish and sea turtles will not be analyzed further in this memo.

Table 2 – Threatened and Endangered Species status, critical habitat, state action area presence and NCCOS determination.

Species	Species Name	Status	Critical Habitat	State Present	Determination
West Indian Manatee	Trichechus manatus	Threatened	Final*	FL, AL, MS, LA, TX	No Effect
Birds (10)					
Attwater's Greater Prairie chicken	Tympanuchus cupido attwateri	Endangered	None	TX	NLAA
Eastern Black Rail	Laterallus jamaicensis ssp. Jamaicensis	Proposed Threatened	None	FL, AL, MS, LA, TX	NLAA
Least Tern	Sterna antillarum	Endangered	None	LA	NLAA
Mississippi Sandhill Crane	Grus canadensis pulla	Endangered	Final	AL	No Effect

Northern Aplomando Falcon	Falco femoralis septentrionalis	Endangered	None	TX	NLAA
Piping Plover	Charadrius melodus	Threatened	Final	FL, AL, MS, LA, TX	NLAA
Red-cockaded Woodpecker	Picoides borealis	Endangered	None	FL,MS, LA	NLAA
Red Knot	Calidris canutus rufa	Threatened	None	FL, AL, MS, LA, TX	NLAA
Whooping Crane	Grus americana	Endangered	None	TX	NLAA
Wood Stork	Mycteria americana	Threatened	None	FL, AL, MS, LA	NLAA
Reptiles (11)					
Alabama Red-bellied Turtle	Pseudemys alabamensis	Endangered	None	AL	NLAA
Black Pine Snake	Pituophis melanoleucus	Threatened	None	MS, LA	NLAA
Eastern Indigo Snake	Drymarchon corais couperi	Threatened	None	FL, AL	NLAA
Gopher Tortoise	Gopherus Polyphemus	Candidate	None	FL, MS	NLAA
Green Sea Turtle	Chelonia mydas	Threatened	None	FL, AL, LA, TX	No Effect
Hawksbill Sea Turtle	Eretmochelys imbricata	Endangered	Final*	AL, MS, LA, TX	No Effect
Kemp's Ridley Sea Turtle	Lepidochelys kempii	Endangered	None	FL, AL, MS, LA, TX	No Effect
Leatherback Sea Trutle	Dermochelys coriacea	Endangered	None	FL, AL, MS, LA, TX	No Effect
Loggerhead Sea Turtle	Caretta caretta	Threatened	Final*	FL, AL, MS, LA, TX	No Effect
Yellow-blotched Map Turtle	Graptemys flavimaculata	Threatened	None	AL	NLAA
Amphibians (1)					
Dusky Gopher Frog	Rana Sevosa	Endangered	Final	AL, MS	NLAA
Fishes (1)					

Atlantic Sturgeon (gulf subspecies)	Acipenser oxyrinchus desotoi	Threatened	Final	FL, AL, MS, LA	NLAA
Clams (2)					
Inflated Heelsplitter	Potamilus inflatus	Threatened	None	MS, LA	No Effect
Texas Fawnsfoot	Truncilla macrodon	Candidate	None	TX	No Effect
Ferns and Allies (6)					
Florida Skullcap	Scutellaria floridana	Threatened	None	FL	NLAA
Godfrey's Butterwort	Pinguicula ionantha	Threatened	None	FL	NLAA
Harper's Beauty	Harperocallis flava	Endangered	None	FL	NLAA
Telelphus Spurge	Euphorbia tlelphioides	Threatened	None	FL	NLAA
White Birds-in-a-nest	Macbridea alba	Threatened	None	FL	NLAA
Louisiana Quillwort	Isoetes louisianensis	Endangered	None	AL, MS, LA	NLAA

* indicates critical habitat is not within the project action area.

Birds

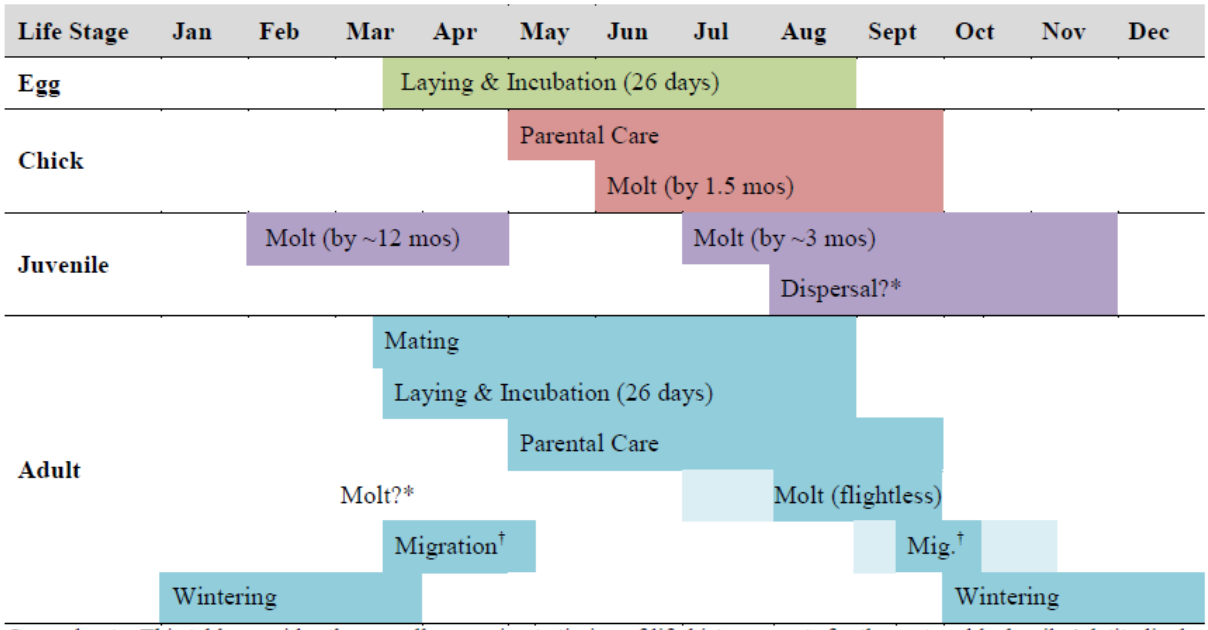
There are 10 bird species that are found in the action areas: Attawater's Greater Prairie Chicken, Eastern Black Rail, Least Tern, Mississippi Sandhill Crane, Northern Aplomando Falcon, Piping Plover, Red-cockaded Woodpecker, Red Knot, Whooping Crane, and Wood Stork (table X).

Attwater's Greater Prairie Chicken *(Tympanuchus cupido attwateri)* (TX) – The Attwater's Greater Prairie Chicken is a small brown bird about 17 inches long, with a short, rounded, dark tail. Project activities will avoid field work during the species lekking, nesting, and brooding season (Mar 1–Jul 15) within 1.25 mi of leks recorded active within the previous five years. If activities are necessary, researchers will not perform any activities between the hours of 3:00am and 9:00 am in areas within 1.25 mi of leks that have been recorded as active within the previous five years. Therefore, project activities may affect but are not likely to adversely affect Attwater's Greater Prairie Chicken.

Eastern Black Rail *(Laterallus jamaicensis ssp. Jamaicensis*) (FL, AL, MS, LA, TX)
One of four subspecies of black rail, the eastern black rail is broadly distributed, living in salt and freshwater marshes in portions of the United States, Central America, and South America. The eastern black rail is a secretive ground dwelling rail that ranges from 10-15cm in length and has a wingspan of 22-28cm. They weigh on average 35g and are black with white spots in adulthood. A life cycle and breeding chart (figure 6) was constructed as part of the listing package and indicates that there are still major gaps in our understanding of the species breeding.

Further, the listing biologist states ‘a lateral gradient exists regarding the timing of events given the large geographic range of the subspecies’(figure 6).
The eastern black rail is proposed to be listed and this species is one of the foci species for this project. Researchers will monitor eastern black rails throughout the study using the methods described above. As the listing is not complete, there are no official best management practices at this time, but the following best management practices were developed by the USFWS listing biologist who has undertaken extensive field studies on the eastern black rail.
Banding and Sampling: - Field work is broken into two phases; 1) detection and 2) banding with feather sampling.

1. Detection - Survey points will be placed at least 400 m apart and transects of three to five points will be randomly placed across wetland units. Points will be visited five times per season, to maximize the chance of detection, given an individual is present. Researchers will use the call broadcast sequence used previously by black rail survey teams in Texas, or use a modified sequence for standardized surveying in conjunction with partners across the Atlantic Coast, Florida Gulf Coast and Louisiana. The Black Rail Working Group is currently working on improvements to black rail survey design and standardizing survey protocols, which may influence the survey design for this project (e.g., survey points may be placed closer than 400m and transects may include more than three to five survey points).
    a. Researchers will perform detection surveys in the early breeding season, in late winter to early spring (see figure, from U.S. Fish and Wildlife Service. 2018. Species status assessment report for the eastern black rail (Laterallus jamaicensis jamaicensis), Version 1.2. June 2018. Atlanta, GA). In the early breeding season the Eastern Black Rails are vocalizing and setting up territories, therefore researchers will perform call-broadcast detection surveys during the breeding and wintering seasons and will follow the National Marsh bird Monitoring Protocol or a similar protocol that has been adapted for black rails by the black rail research community.



General note: This table provides the overall approximate timing of life history events for the eastern black rail. A latitudinal gradient exists regarding the timing of events given the large geographic range of the subspecies, but is not detailed here.
*Dispersal: specific timing of juvenile dispersal is unknown. Molt: it is unknown if eastern black rails undergo a partial pre-breeding molt in the spring; this molt is observed in the California black rail subspecies.
†Not all individuals migrate.

Figure 6 – Annual life cycle of the eastern Black Rail (Laterallus jamaicensis jamaicensis) by life stage. Lighter colored shading indicates off peak times (where life history events may occur, but are outside the timing of the majority of known records. Adapted from "U.S. Fish and Wildlife Service. 2018. Species status assessment report for the eastern black rail (Laterallus jamaicensis jamaicensis), Version 1.2. June 2018. Atlanta, GA."

2. Banding – Banding will occur during the non-breeding season. Dragline (bottle line) procedures will be used to flush birds and handheld nets will be used to capture Black Rails. Sampling will begin ~30 minutes after sunset and continue for 3 hours. Captured birds will be banded and the 5th secondary feather will be taken for stable isotope analysis.

Potential Affects – The project research team has over 20 years of experience performing bird banding, trapping and sampling activities. The table below summarizes banding captures, injuries and mortalities for black and yellow rails sampled in Mississippi, Texas, and Louisiana.

State	Species	Timeframe	Captured	Injured	Mortalities	Reason
Mississippi	Black Rail	2015-2019	8	0	0	NA
Mississippi	Yellow Rail	2015-2019	62	0	1	Bird stepped on in bag after capture
Texas	Black Rail	2003-2019	78	0	2	1 – Person tripped and

						while falling the hand held net hit bird during capture and it died upon impact; 2 – Likely stepped on during bottle line activity
Texas	Yellow Rail	2003-2019	479	0	0	NA
Louisiana	Black Rail	2015-2019	28	0	0	*See Audubon Louisiana document
Louisiana	Yellow Rail	2015-2019	87	0	0	*See Audubon Louisiana document

A Co-PI on the project, Dr. Erik I. Johnson, is a North American Banding Council (NABC) Certified Trainer, operating under USGS BBL permit #23805. He has provided a detailed description of recent banding activities done on rails in Louisiana from 2017-2019. He and his team captured, banded and took blood/feather samples from 28 Black Rails (see table, Louisiana entry). None of the individuals were injured and there were no mortalities. Before each drag-line surveys, researchers ensure that only experienced bird handlers use dip-nets and all field technicians are trained on appropriate techniques for safely using the dip-nets (e.g., use short and smooth movements and do not swoop birds out of the air). Band application and bird data collection are done quickly (< 5 minutes), as long as birds do not show signs of stress such as panting, puffing up, closing eyes and going limp. Birds are immediately released after processing. See BMPs below for a full description. Any capture and banding best management practices developed and adopted by the Black Rail Working Group and/or US Fish & Wildlife Service will be adopted by this project. **Therefore NCCOS concludes that research activities may affect but are not likely to adversely affect eastern black rails.**

Least Tern (*Sterna antillarum*) (LA) – Least Terns nest on sparsely-vegetated sandbars along major rivers in the Central and Southern United States. Nesting occurs in the early spring, and the species prefers nesting sites that are in sandy areas near to ample food supply which includes juvenile shad, carps, minnows, freshwater drum, and various other juvenile finfish. This project will avoid activities during the Least Tern nesting time period, and is unlikely to encounter the species as this project is focused on high marsh habitats. **Therefore, NCCOS determines that project activities may affect but are not likely to adversely affect Least Terns.**

Mississippi Sandhill Crane (*Grus canadensis pulla*) (AL, MS) – Mississippi Sandhill Cranes are critically endangered and only found in and around the Mississippi Sandhill Crane National Wildlife Refuge, where there population is thought to number about 100 individuals. The habitat used by these cranes is wet pine savanna. Currently the Grand Bay NWR has plans to introduce

12-15 Cranes from the Mississippi Sandhill Crane NWR to the Grand Bay NWR. The timing of this introduction would be closely coordinated with other research activities occurring at the Reserve, and would avoid overlap with prescribed fire timing and bird monitoring activities that are part of this project. The goal of establishing a self-sustaining breeding population of Cranes at Grand Bay NWR requires dedicated funding and staffing that are not available at this time, so there is no clear timeline on Crane introduction action. Investigators will not conduct work on the Mississippi Sandhill Crane National Wildlife Refuge or in it's nearby environs, as these areas are inland of the coastal marshes and therefore not suitable habitat for the targeted bird species in this project (Black Rail, Yellow Rail, Mottled Duck). **Therefore the species will not be in the action area. NCCOS determines that project activities will have no effect on Mississippi Sandhill Cranes.**

Northern Aplomado Falcon *(Falco femoralis septentrionalis)* (TX) **-** Aplomado Falcons nest in March and April, with a ~30 day incubation period and an additional 4-5 weeks until fledging. The project will avoid field activities during this nesting and fledging period. All field activities will occur in the fall and late winter. Fire is generally believed to have a positive impact on the Falcon habitat and prescribed fires would occur during non-breeding or nesting times. **Therefore, NCCOS determines that project activities may affect but are not likely to adversely affect Aplomado Falcons.**

Piping Plover (*Charadrius melodus*) and Red Knot (*Calidris canutus rufa*) (FL, AL, MS, LA, TX) – The piping plover is a small (7 inches long), pale, sand-colored shorebird that winters in coastal Louisiana and may be present for 8 to 10 months annually. Piping plovers arrive from their northern breeding grounds as early as late July and remain until late March or April. They feed on polychaete marine worms, various crustaceans, insects and their larvae, and bivalve mollusks that they peck from the top of or just beneath the sand. Piping plovers forage on intertidal beaches, mudflats, sand flats, algal flats, and wash-over passes with no or very sparse emergent vegetation. They roost in unvegetated or sparsely vegetated areas, which may have debris, detritus, or micro-topographic relief offering refuge to plovers from high winds and cold weather. They also forage and roost in wrack (e.g., seaweed or other marine vegetation) deposited on beaches. In most areas, wintering piping plovers are dependent on a mosaic of sites distributed throughout the landscape, because the suitability of a particular site for foraging or roosting is dependent on local weather and tidal conditions. Plovers move among sites as environmental conditions change, and studies have indicated that they generally remain within a 2-mile area. Major threats to this species include the loss and degradation of habitat due to development, disturbance by humans and pets, and predation.
On July 10, 2001, the Service designated critical habitat for wintering piping plovers (Federal Register Volume 66, No. 132); a map of the seven critical habitat units in Louisiana can be found at http://criticalhabitat.fws.gov/crithab. Of these designated units, the action area in RJ Paul Rainy area contains piping plover critical habitat. Their designated critical habitat identifies specific areas that are essential to the conservation of the species. The primary constituent elements for piping plover wintering habitat are those habitat components that support foraging, roosting, and sheltering and the physical features necessary for maintaining the natural processes that support those habitat components. Constituent elements are found in geologically dynamic coastal areas that contain intertidal beaches and flats (between annual low tide and annual high tide), and associated dune systems and flats above annual high tide. Important components (or

primary constituent elements) of intertidal flats include sand and/or mud flats with no or very sparse emergent vegetation. Adjacent unvegetated or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting plovers. Project activities will not occur in piping plover critical habitat, either constituent element or adjacent unvegetated areas, because these areas are not habitat for the three focal species (eastern black rail, yellow rail, and mottled duck) of this study. **Therefore USFWS (Encl 4) and NCCOS conclude that project activities are not likely to adversely affect piping plover critical habitat**.

The federally threatened red knot (*Calidris canutus rufa*) is a medium-sized shorebird about 9 to 11 inches in length with a disproportionately small head, small eyes, short neck, and short legs. The black bill tapers steadily from a relatively thick base to a relatively fine tip; bill length is not much longer than head length. The legs are typically dark gray to black but are sometimes greenish in juveniles or older birds in non-breeding plumage. Non-breeding plumage is dusky gray above and whitish below. The red knot breeds in the central Canadian arctic but is found in Louisiana during spring and fall migrations and the winter months (generally September through May). During migration and on their wintering grounds, red knots forage along sandy beaches, tidal mudflats, salt marshes, and peat banks. Observations along the Texas coast indicate that red knots forage on beaches, oyster reefs, and exposed bay bottoms, and they roost on high sand flats, reefs, and other sites protected from high tides. In wintering and migration habitats, red knots commonly forage on bivalves, gastropods, and crustaceans. Coquina clams (*Donax variabilis*), a frequent and often important food resource for red knots, are common along many gulf beaches.

Monitoring of birds, invertebrates and plants before and after prescribed burns associated with the project would occur in high marsh habitats, therefore, impacts to suitable red knot and piping plover habitats (including piping plover critical habitat) will be avoided. Species in the project area may be temporarily disturbed by the noise and smoke associated with the prescribed fires, but these impacts are of short duration. Further, should piping plover or red knot occur within the project area, individuals are likely to move to adjacent areas of suitable habitat during project implementation. **Therefore, NCCOS determines that project activities may affect but are not likely to adversely affect Red Knot and Piping Plover populations.**

Red-Cockaded Woodpecker (Picoides borealis) (FL,MS, LA) – The Red-Cockaded Woodpecker is species endemic to open, mature and old growth pine ecosystems in the southeastern United States. It is a cooperatively breeding species that lives in family groups. Their preferred habitat is Longleaf pines that can be utilized to create large cavities for nesting. The species is very vulnerable to spatial changes in habitat, and the foremost issue is fire suppression which creates a lack of cavity trees Fire suppression has resulted in the loss of potential breeding groups throughout the species range because the birds cannot tolerate the hardwood encroachment that results from lack of fire. This project aims to promote properly timed application of prescribed fires and therefore will likely benefit this species. Further, this species nests in trees and will not be impacted by bird sampling and monitoring efforts that are part of this project. **Therefore NCCOS determines that project activities may affect but are not likely to adversely affect Red-Cockaded Woodpeckers**.

Whooping Crane *(Grus Americana)* (TX) – Whooping cranes currently exist in the wild at 3 locations and in captivity at 12 sites. The July 2010 total wild population was estimated at 383. There is only one self-sustaining wild population, the Aransas-Wood Buffalo National Park

population, which nests in Wood Buffalo National Park and adjacent areas in Canada, and winters in coastal marshes in Texas at Aransas. Whooping Cranes begin nesting in late April to early – May and successful fledging can take a number of months. Monitoring activities undertaken during this project will occur during the fall and winter time periods, thereby avoiding potential interaction with nesting cranes. Prescribed fire activities will follow BMPs to ensure that timing does not coincide with nesting times, Juvenile fledgling periods or adult molting period. Generally wildfires and prescribed fires are thought to have beneficial effects on crane habitat by recycling nutrients and removing and thinning vegetation, making area more accessible to cranes. [1] **Therefore, NCCOS determines project activities may affect but are not likely to adversely affect whooping cranes.**

Wood Stork (*Mycteria Americana*) (FL, AL, MS, LA) – Wood Storks are large, long-legged wading birds with white plumage except for black primary wing feathers and a black tail. They feed on small minnows and other small finfish. They are a colonial species that nests in large rookeries and feed in flocks. Nesting times vary depending on geographic location, but in north central Florida and along the Gulf Coast, wood storks lay eggs from March to late May and fledging occurs in July/August. This project will avoid prescribed fire activity during wood stork breeding and nesting periods. The project's monitoring activities may disrupt feeding activities on the days of monitoring fieldwork, but this time will be de minimus and only occur a maximum of once per year. Only small sections of coastal marshes will be sampled for the target species (Black Rail, Yellow Rail, Mottled Duck) therefore wood storks will not undergo any banding or feather sampling. **Therefore, NCCOS determines that project activities may affect but are not likely to adversely affect wood storks.**

Reptiles

There are ten (10) reptiles found in the action area; Alabama Red-bellied Turtle, Black Pine Snake, Eastern Indigo Snake, Gopher Tortoise, Green Sea Turtle, Hawksbill Sea Turtle, Kemp's Ridley Sea Turtle, Leatherback Sea Turtle, Loggerhead Sea Turtle, and Yellow-blotched Map Turtle.

All Sea Turtles (Green Sea Turtle, Hawksbill Sea Turtle, Kemp's Ridley Sea Turtle, Leatherback Sea Turtle, Loggerhead Sea Turtle) utilize saltwater habitat or beach shorelines. The project activities will take place inland, in coastal high marsh habitats. There is not any suitable Sea Turtle habitat in the action area. **Thus, NCCOS determines that project activities will have No Effect on any of the five (5) ESA listed sea turtles.**

Alabama red-bellied turtle (*Pseudemys alabamensis*) (AL) - Specimens have been captured within the Fish and Magnolia rivers as well as Weeks Bay proper. Shallow brackish and freshwater marshes and sloughs within the project area provide beneficial forage habitat for Alabama red-bellied turtles. Pockets of suitable nesting habitat (sparsely vegetated, generally sandy soils) can be found along the periphery of waterways in the project area. Proposed prescribed fires are in high marsh habitats and will not impact the riverine habitat areas of this species. Monitoring activities will avoid any turtle nests and the BMPs put in place for Black Rail fieldwork will ensure that fieldworkers move slow while performing bottleline activities and will be scanning the marsh vegetation for any turtle nests, juveniles and adults. **Therefore**

[1] https://www.fwspubs.org/doi/suppl/10.3996/092012-JFWM-088/suppl_file/092012-jfwm-088r1-s09.pdf (pg 17)

NCCOS determines that project activities may affect but are not likely to adversely affect Alabama red-bellied turtle population.

Black Pine Snake (*Pituophis melanoleucus*) (MS, LA) – A large stocky snake that averages 48-64 inches long. They prefer a fire maintained longleaf pine forest habitat with sandy well drained soils. The limited life history data indicates that the species spends most of its time underground in root channels of rotting pine stumps. Its principal prey is small mammals, birds and bird eggs. Prescribed fire is thought to improve this species habitat by maintaining longleaf pine forests, therefore project prescribed fire activities should positively affect the species. Project bird, plant and invertebrate monitoring activities will avoid snake burrows and any live animals that may be encountered. **Therefore, NCCOS determines project activities may affect but are unlikely to affect Black Pine Snake population.**

Gopher Tortoise (*Gopherus Polyphemus*) (FL, MS) and Eastern Indigo Snake (*Drymarchon corais couperi*) (FL, AL) – Previous work investigating impacts on the Gopher Tortoise during prescribed fires finds no negative impact of the fire itself, and generally neutral (Yaeger et al., 2006) to positive benefits (USFWS) post fire. Prescribed fires restore the open canopy, sparse woody midstory and abundant herbaceous vegetation that is optimal habitat for this species. The species utilizes burrows during the fire. Prior to any activity in upland areas suitable for gopher tortoise inhabitation, a visual search for burrows will be conducted. Burrows will be flagged and a five-meter buffer maintained. If active burrows are found a larger no disturbance buffer of ten meters will be implemented from early May through September when eggs or hatchlings may be present. Prescribed fires will benefit Eastern Indigo snake in a similar fashion, and will additionally enhance the suitability of habitat for the eastern indigo snake by restoring a mosaic of native flora diversity, and creating additional hollow logs and root channels. Project activities of monitoring, bird banding and invertebrate and plant monitoring will avoid all Tortoise and Indigo Snake burrows and any animals that are seen during sampling. **Therefore NCCOS determines that project activities may affect but are unlikely to adversely affect Gopher Tortoise and Eastern Indigo Snake populations.**

Yellow-blotched map turtle (Graptemys flavimaculata) (AL) - A medium-sized turtle with olive to light brown shell that has rib-like plates with bright yellow or orange blotches. Its favored habitat is marshes with brackish water or rivers that receive several hours of sun each day, have a moderate current and abundant logs for basking. The species nests on sand or gravel bars along river banks. Its preferred food is snails, insects and small mollusks. Project activities are restricted to coastal high marshes, and all prescribed fire and bird monitoring activities will be away from yellow-blotched map turtle habitat and nesting areas. **Therefore, NCCOS determines that project activities may affect but are unlikely to adversely affect yellow-blotched map turtle populations.**

Amphibians

Dusky Gopher Frog (*Rana Sevosa*) (AL, MS) – The Dusky Gopher frog is a stocky frog colored white with black spots and is distinguished by a loud, guttural call. Gopher frogs prefer longleaf pine forests with abundant shallow ponds, frequently using the same ponds that are crucial for cranes and ducks. Prior to project prescribed fires and bird monitoring activities, shallow ponds located within the action area would be surveyed for frogs and any Gopher Frogs would be

removed and placed in alternate release sites already established in the Grand Bay NWR. **Therefore, NCCOS determines that project activities may affect but are unlikely to adversely affect Dusky Gopher Frog populations.**

Clams

Inflated Heelsplitter (*Potamilus inflatus*) (MS) and Texas Fawnsfoot (*Truncilla macrodon*) (TX) – The Inflated Heelsplitter is a freshwater bivalve mollusk which reaches maximum adult shell size of about 140mm in length. The shell is brown to black and may have green rays in young individuals. The species is found in sand, mud, silt and sandy-gravel substrates in slow to moderate currents and is usually collected on the protected side of bars in water as deep as 20 feet.

The Texas Fawnsfoot is a freshwater bivalve mollusk which reaches a maximum adult size of 55mm and is light brown with spotted black rays on juveniles. The species prefers sandy substrates and its presumed fish host is freshwater drum. Both species are found in water and therefore will not be on land in the action area for prescribed burns or bird monitoring and banding. **Therefore, NCCOS determines that that project activities will have no effect on Inflated Heelsplitter or Texas Fawnsfoot populations.**

Fish

Atlantic Sturgeon (gulf subspecies) (*Acipenser oxyrinchus desotoi*) (FL, AL, MS, LA) – The Gulf Sturgeon is a prehistoric fish that reaches lengths of up to nine feet and can weigh up to 300 pounds. It is armored with rows of heavy plates, a tail like a shark, catfish-like whiskers and a tube-like mouth that projects from the bottom of its head. The Gulf sturgeon lives in the norther Gulf of Mexico bays, estuaries, and major rivers. It spends most of the year in freshwater where it reproduces and migrates to saltwater in the fall. Breeding occurs in the spring when individuals return to their river system in which they hatched. Project activities would have minimal impact on Gulf Sturgeon. Freshwater streams in the action area may be impacted by runoff of prescribed fire debris. This may affect Gulf Sturgeon if they are in the streams during or shortly after the prescribed fire. It is not likely that Gulf Sturgeon will be impacted because the prescribed fires are of short duration and will occur 1 – 2 times during the 5 year time period of the project. Bird monitoring and banding activities will occur on land in coastal high marsh habitat, and therefore have no effect on Gulf Sturgeon. **Therefore, NCCOS determines that that project activities may affect but are unlikely to adversely affect Atlantic Sturgeon (Gulf subspecies).**

Ferns and Allies

There are six (6) Ferns and Allies found in the research action area (table 2). The primary concern is trampling during bird monitoring and banding activities. To avoid damage, researchers will be trained in plant identification of the ESA listed species and will carry visual aid cards to assist in identification during field procedures. Researchers will report locations of ESA listed plants and allies ot USFWS authorities. **Therefore, NCCOS determines that project activities may affect but are unlikely to adversely affect Ferns and Allies.**

Migratory Bird Treaty Act (50 CFR 10.13) makes it illegal to take, possess, import, export, transport, sell, purchase, barter or offer for sale, purchase or barter, any migratory bird or other parts (including feathers), nests or eggs of such a bird except under the terms of a valid Federal permit. Two of the three project target species are listed migratory birds; the Black Rail and the

Yellow Rail. For these species, researchers intend to take the fifth secondary feather for stable isotope analysis to determine the migratory vs non-migratory population sizes according to the terms and conditions of applicable permits. No other migratory birds will be sampled as part of this project. A full list of migratory birds present in the action area for each state is available in enclosure 6.

Magnuson-Stevens Fishery Conservation and Management Act requires that Federal agencies consult with NMFS on actions that 'may adversely affect' Essential Fish Habitat (EFH) (16 U.S.C §188(b)(2))
NCCOS examined two sources from the NOAA Office of Habitat Conservation (OHC) to conduct this analysis of potential impacts to EFH. NCCOS consulted the NOAA OHC, EFH mapper and the 2015 Final Essential Fish Habitat 5-year review for Atlantic Highly Migratory Species. The EFH Mapper sources indicaed that there is no coral EFH within the research activity area. Both sources indicated the following species groups or taxa potentially have EFH designated within the research activity areas (Figures 1-5) as follows:

Species or Taxa	Action area GOM States
Coastal Migratory Pelagics	FL, AL, MS, LA, TX
Red Drum	FL, AL, MS, LA, TX
Reef Fish	FL, AL, MS, LA, TX
Shrimp	FL, AL, MS, LA, TX
Atlantic Sharpnose Shark	FL, AL, MS, LA, TX
Blacktip Shark	FL, AL, MS, LA, TX
Bonnethead Shark	FL, AL, MS, LA, TX
Bull Shark	FL, AL, MS, LA, TX
Finetooth Shark	FL, AL, MS, LA, TX
Lemon Shark	FL, TX
Nurse Shark	FL
Scalloped Hammerhead Shark	FL, TX
Spinner Shark	FL, AL, MS, LA, TX

Based on the planned research action area of coastal high marshes and the planned research activities of bird monitoring and banding, NCCOS determines that there will be no effect to EFH during this proposed research action.

In addition, there are 18 Habitat Areas of Particular Concern (HAPC) within the GOM (see EFH mapper). None of these areas overlaps with the area of research activities (Figures 1 - 5) and NCCOS determines that there will be no effect on GOM HAPCs.

National Marine Sanctuaries Act (NMSA) - Section 304(d) of the National Marine Sanctuaries Act requires the "action agency" to consult with the Office of National Marine Sanctuaries if the action is "likely to destroy, cause the loss of, or injure a sanctuary resource" (16 U.S.C. §1431 et seq.). However, no activities will be conducted within a National Marine Sanctuary; therefore, we will not be requesting a letter of concurrence pursuant to this Act.

National Historic Preservation Act (NHPA) - Section 106 requires Federal agencies to take into account the effects of their actions on historic resources (16 U.S.C. §470 et seq.). After review of

the National Register of Historic Places, NCCOS found no known Historic resources that are within the action areas of research activities.

National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C §668dd et seq.) was passed to ensure that the National Wildlife Refuge (NWR) system is managed as a national system of related lands, waters and interests for the protection and conservation of national wildlife resources. Proposed project activities will take place on the following NWRs.
Florida: St. Vincent NWR and St. Marks NWR
Texas: Texas Chenier Plain NWR Complex (Chambers and Jefferson counties); Texas Mid-Coast NWR Complex (Brazoria and Matagorda counties)
Louisiana: Sabine NWR
All proposed activities will comply with individual NWR comprehensive plans. Researchers will work in coordination with NWR managers to time proposed monitoring activities with prescribed burns. All prescribed burn decision making will be at the sole discretion of the NWR management staff and will follow prescriptions found in the Biological Evaluation forms and will employ any BMPs established for wildlife and habitats.

Coastal Zone Management Act (CZMA) - Federal consistency under the CZMA requires federal actions (inside or outside a state's coastal zone) that affect any land or water use or natural resource of a state's coastal zone, to be consistent with the enforceable policies of the state coastal management program (CMP). The term "effect on any coastal use or resource," means any reasonably foreseeable effect on any coastal use or resource resulting from the activity, including direct and indirect (cumulative and secondary) effects. The type of federal action addressed in this project falls under federal consistency regulations, found at 15 C.F.R. part 930, subpart F. Subpart F applies to federal financial assistance provided to state and local governments. Federal assistance activities (subpart F**)** occur when a state agency or local government applies for federal financial assistance. States list in their CMPs the federal assistance activities subject to federal consistency review (see https://coast.noaa.gov/czm/consistency/states/).

If an applicant is required to submit a Consistency Certification to a state, then the federal agency cannot issue the federal assistance unless and until the state has concurred with the applicant's Consistency Certification or concurrence is presumed. For this project, the proposed activity has not been listed by the states as the type of project that requires a consistency review. Therefore, no Consistency Certification is required and no further CZMA review is necessary for this project.

Determination Summary and Extraordinary Circumstances
Project activities described above would be temporally (less than one month per year) and spatially small in scale. Call and response activities will be done from specific points in the marsh, dragline surveys for targeted bird species would cover small portions of the coastal high marsh, vegetation surveys would cover a 50m radius at each site and insect surveys would cover a similar size area. Collecting permits are required for this sampling from federal agencies, states and to access various field areas. Researchers will maintain these permits throughout the course of the projects field work and would be conducted under the terms and conditions of collection permits. The activities funded under this action, specifically bird, invertebrate and plant

monitoring, are not subject to controversy based on potential environmental consequences and do not establish a precedent or decision in principle about future proposals. There are no uncertain environmental impacts or unknown risks as project activities are routine and will be conducted in coordination with state agencies overseeing the operations. Therefore, there will be negligible impact on geographically or ecologically critical areas (wetlands, watersheds, national wildlife refuges), no adverse impacts to marine mammals, essential fish habitat, or threatened and endangered species or their critical habitat. The proposed activity does not involve air, noise or water quality impacts; and does not otherwise have significant impact on the human environment.

Further, no adverse environmental impacts are anticipated from mapping or laboratory activities. Laboratory activities will follow all appropriate safety and disposal regulations. Waste chemicals from this project will be disposed of through a licensed hazardous waste Treatment, Storage, and Disposal (TSD) facility, transported by a licensed transportation contractor. The proposed project has no potential to generate, use, store, transport, or dispose of hazardous or toxic substances in a manner that may have a significant effect on the environment. The proposed project does not have a disproportionately high and adverse effect on the health or the environment of minority or low-income communities, compared to the impacts on other communities (EO 12898). The project will not contribute to the introduction, continued existence, or spread of noxious weeds or non-native invasive species known to occur in the area or involve actions that may promote the introduction, growth, or expansion of the range of the species. There is no potential to violate Federal, State, or local law or requirements imposed for protection of the environment and there are no highly controversial environmental effects. Thus, there are no extraordinary circumstances present that may require further analysis in an Environmental Assessment (EA) or Environmental Impact Statement (EIS).

Protective Measures and Best Management Practices (BMPs) Incorporated into the Action
Final determinations by NCCOS are ongoing. A special award condition has been placed on this project so that no work can begin until determinations and required consultations (if any) are completed. Once completed this list of protective measures and BMPs will be updated to reflect NMFS and ONMS guidance.

In the event of unauthorized incidental take, the RESTORE Act Science Program would suspend all activities causing such take and immediately contact USFWS biologist office. The RESTORE Act Science Program would request ESA Section 7 initiation in the event of unauthorized take, systematic noncompliance, unanticipated adverse effects, or modification of the action.

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BMPs are required to be incorporated within project instructions and NEPA documentation including financial assistance awards and environmental review memoranda. All applicable BMPs must be communicated to the principal investigators and field staff, and as necessary

between field crew, as appropriate and scientific party in order to explain responsibilities, communication procedures, and operational procedures.

1) Habitat Protection
   a) Avoid unnecessary contact of gear with sensitive marsh habitat.
   b) Avoid unnecessary survey of sensitive marsh areas by vehicle or on foot
   c) Avoid all bird nests, tortoise holes and snake dens.
   d) Utilize a plant identification card to ID threatened or endangered plants.
2) Vessel Transit
   a) Access field sites (all terrestrial) using existing roadways and paths. Avoid all critical habitat during transit to and from field sites.
3) Protected Area and State Collecting Permits
   a) Required protected area access and state collecting permits for each state will be maintained and provided to the Federal Program Officer before field work starts and annually thereafter (as needed) before out-year funds are released.
4) Capture and Banding activities for Black and Yellow Rails
   a) Sample in the dusk/ night time periods.
   b) Avoid capture and banding of birds when temperatures are below 40F
   c) Use bottle line technique for large spatial areas.
      i) Space technicians 5m apart along the bottle line
      ii) Place observers 2m behind the bottle line
      iii) Use vessels made of softer materials (e.g., milk jugs made of thinner plastic) to construct bottle-line
      iv) Travel at slow speeds which permits careful search and scan of the vegetation for rails
      v) Use long-handled bait nets for capture. These nets have a mesh that is very small and soft, which avoids chafing birds and prevents feather damage.
         (1) Netting procedure outline: carefully center the net a few feet above the bird, and lower it to seal the rim of the net to the ground, effectively trapping the bird. The final motion is accelerated as the net is lowered but not done with force. This greatly reduces the likelihood of hurting the birds with the rim of the net.
      vi) Process the caught birds behind the bottle line, thereby eliminating the need to carry the birds in holding bags. This should be done quickly (< 5 minutes).
         (1) Immediately release birds after processing