Recovery Outline
for the
Eastern black rail
(*Laterallus jamaicensis jamaicensis*)

Current Classification: Threatened

Photo courtesy of Christine Hand, South Carolina Department of Natural Resources

U.S. Fish and Wildlife Service

Charleston, South Carolina Ecological Services Field Office

Species Name:

Eastern black rail (*Laterallus jamaicensis jamaicensis*)

Species Range:

Alabama, Arkansas, Colorado, Connecticut, Delaware, Florida, Georgia, Illinois, Indiana, Kansas, Kentucky, Louisiana, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Nebraska, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Puerto Rico, Rhode Island, South Carolina, Tennessee, Texas, Vermont, Virginia, Virgin Islands, West Virginia, Wisconsin; and Wherever found

Recovery Priority Number:

3; *explanation provided below; Recovery Priority Number, Pg. 8*

Listing Status:

Threatened; November 9, 2020

Lead Regional Office:

South Atlantic-Gulf Region

Lead Field Office/Cooperating FO(s):

South Carolina Ecological Services Field Office/Arkansas Ecological Services Field Office; Florida Ecological Services Field Office; Georgia Ecological Services Field Office; Illinois-Iowa Ecological Services Field Office; Indiana Ecological Services Field Office; Kansas Ecological Services Field Office; Louisiana Ecological Services Field Office; Missouri Ecological Services Field Office; Raleigh Ecological Services Field Office; Arlington Ecological Services Field Office; Austin Ecological Services Field Office; Corpus Christi Ecological Services Field Office; Houston Ecological Services Field Office; Texas Mid-Coast Refuge Complex; Mountain-Prairie Region Refuges-Region 6; Madison, Wisconsin, National Wetlands Inventory

Lead Contact:

Lindsey Troutman, 843.727.4707 Ext. 228

1) Background

The purpose of this recovery outline is to provide an interim strategy to guide the conservation and recovery of the eastern black rail until a final recovery plan is completed. Meeting the recovery needs of the subspecies will require cooperation among the U.S. Fish and Wildlife Service (Service), and other Federal and State agencies, Tribes, and the public. An outline of potential recovery actions for the eastern black rail may help interested stakeholders understand

how we envision its conservation proceeding until a recovery plan is finalized. The eastern black rail (*Laterallus jamaicensis jamaicensis*) was published in the Federal Register on October 8, 2020 (https://www.govinfo.gov/content/pkg/FR-2020-10-08/pdf/2020-19661.pdf#page=1) and listed as a threatened species on November 9, 2020. The current outline is based on the final Species Status Assessment Report for the Eastern Black Rail (SSA) (https://ecos.fws.gov/ServCat/DownloadFile/186791; https://ecos.fws.gov/ecp/species/10477), as well as preliminary objectives and actions needed for recovery. The Service highly encourages readers to review the SSA, as this recovery outline does not include all pertinent information about the eastern black rail and is not written to serve as a summarizing document. This preliminary recovery strategy is based on the most current and highest quality information.

Type and Quality of Available Information to Date:

Important information gaps:
There are several areas where information on the eastern black rail is unknown, or very little information exists. Data in the following areas may provide knowledge to understand and improve recruitment and recovery:

- Site fidelity
- Lifespan
- Migration routes and linkages needed to ensure required habitat is available temporally and spatially across its range
- Juvenile behavior and ecology across the range, e.g., dispersal, survival, demographics, and colonization rates
- Factors that influence why the subspecies appears to be distributed as aggregates or clumps of individuals across a landscape, i.e., individuals select their home ranges or territories within a broad high marsh complex where several territories may be contiguous, yet similar habitat of apparent equal quality nearby may remain unoccupied
- How the subspecies responds to habitat management practices and disturbances, e.g., fire, water depths, vegetation densities, etc.
- Vocalization rates and patterns across the range
- Survey methods and designs for various habitats across the range

Uncertainties for recovery:

Though there are many issues and uncertainties that will influence recovery for this subspecies, following are several of the most apparent and prominent issues currently contributing to recovery uncertainty:

1. The wide geographic range results in regional differences in the factors that affect viability and contribute to population declines (USFWS 2019). While some approaches to support recovery may be similar across the range, regionally tailored approaches may be required to support recruitment and population growth.

2. The indirect or direct processes affecting recruitment and persistence are currently unknown and may differ across the range.

3. The ability to monitor and track recruitment of this cryptic species is difficult, making use of this demographic parameter for assessing and improving recovery actions challenging.
4. The ability to maintain long-term management that replicates the natural processes that are key to sustaining the habitats that support recovery goals.
5. The commitment to adaptive management and associated failures, as few examples of successful habitat restoration efforts targeting eastern black rails exist.

Brief Life History:
The eastern black rail is a subspecies of black rail, a secretive marsh bird and the smallest rail species found in North America (Eddleman et al. 1994). Adults are typically 10-15 centimeters (cm) in length with a wingspan of 22-28 cm and weigh an average of 35 grams (Eddleman et al. 1994). Males and females are similar in size, and adults are generally pale to blackish gray, with a small blackish bill and bright red eyes. Black rail chicks are covered in black down with an oily greenish sheen and have dark-gray or dark brownish olive eyes upon hatching (Bent 1926; Eddleman et al. 1994).

Eastern black rails forage on a variety of small (<1 cm) aquatic and terrestrial invertebrates, especially insects, and seeds (e.g., *Typha, Scirpus, Spartina* spp.). Its habitat can be tidally or non-tidally influenced, and range in salinity from salt to brackish to fresh. It requires dense overhead perennial herbaceous cover with underlying soils that are moist to saturated (occasionally dry) interspersed with or adjacent to very shallow water (typically ≤ 3 cm) (Flores and Eddleman 1995; Legare and Eddleman 2001; Haverland 2019).

The eastern black rail occurs across a relatively larger geographic range and exhibits latitudinal variation in the timing of certain life history events, such as the onset of breeding, across this range. The Service encourages review of the SSA to understand the life history phenology and local breeding season, especially in the latitudinal context (relevant SSA figures for guidance are 2-1 and 2-2 and their text discussion). Eggs are laid in a nest bowl constructed of live and dead fine-stemmed plants, with a canopy and a ramp (Harlow 1913, Davidson 1992). Average clutch size is seven eggs (Legare and Eddleman 2001). Nests are well hidden in a dense clump of vegetation over moist soil or shallow water. Both sexes incubate and provide parental care to precocial (young are relatively mature and mobile from the moment of birth or hatching) chicks, indicating the subspecies is monogamous (Harlow 1913, Flores and Eddleman 1993, Eddleman et al. 1994, Legare and Eddleman 2001).

Life History Characteristics Important to Recovery:
Several characteristics important to the eastern black rail recovery as described in the SSA (USFWS 2019) are summarized below:

Eastern black rails require dense overhead cover and are primarily associated with herbaceous, persistent, emergent wetland plants (Cowardin et al. 1979). Plant structure is considered more important than plant species composition in predicting habitat suitability since this species requires dense vegetative cover that allows movement underneath the canopy and are found in a variety of marsh habitats with a large salinity range (Flores and Eddleman 1995). Eastern black rails depend

on this dense cover throughout their life cycle and is their primary strategy to avoid predation. Researchers working long periods (months to years) at locations where the species is present rarely see birds. This behavior can become a handicap when density independent factors such as fire and or flooding force birds to move to new locations. Their reluctance to fly, which has been observed in both types of events, may place them at increased risk.

Because nesting sites are selected near or over water, flooding can be a significant cause of nest failure for eastern black rails. Where water levels are managed, they should be kept lower than nest elevations during the nesting and brood rearing periods. At locations where water levels are not managed, sufficient habitat should be available to support enough nesting birds such that a portion are not inundated. Transition areas, the ecotone between wetlands and uplands, should support enough vegetative cover for the subspecies to avoid predation. During flooding events, refugia areas should extend into adjacent uplands (Evens and Page 1986).

Eastern black rails occur across an elevational gradient that lies between the lower and wetter portions of estuarine and palustrine marshes and the higher and drier adjacent uplands (Eddleman et al. 1988; Nadeau and Conway 2015). Individual movement across this gradient depends on hydrologic conditions. These habitats have gentle slopes that have large areas of shallow inundation (sheet water) which can shrink and expand based on hydrologic conditions, providing dependable foraging habitat across the dampened areas and wetland-upland transition zone. There are very few examples of habitat enhancement or restoration projects that intentionally and successfully targeted black rails (Nadeau and Conway 2015; Richmond et al. 2010). Most estuarine marsh restoration efforts have focused on restoring regularly flooded tidal marshes and these are too wet to support the species.

Adults undergo a complete post-breeding molt each year (Pyle 2008) and are temporarily unable to fly for approximately three weeks at the end of the breeding season (Flores and Eddleman 1991, Eddleman et al. 1994). California black rails experienced a drop in body weight during this time, indicating that the metabolic costs of performing a complete molt may outweigh an individual's ability to replenish energy reserves (Flores and Eddleman 1991). Therefore, it is not unreasonable to assume that eastern black rails are also vulnerable during this period of flightlessness and have lower body weights (Flores and Eddleman 1991). Incompatible land management techniques and stochastic events can have significant impacts on populations of eastern black rail during this time.

Several positive biological attributes are very important to recovery. The subspecies has a very high reproductive potential. Clutches average 6 to 8 eggs and the subspecies likely can produce two broods in a nesting season especially in warmer latitudes. The amount of habitat required to support a home range and breeding territory (<2 ha) is relatively small for an avian vertebrate. Individuals from non-migratory populations may have a high degree of site fidelity. These attributes are highly advantageous for developing recovery actions and managing existing populations.

Primary Threats:
Eastern black rail populations are affected by a variety of factors. However, due to its wide geographic range, the suite of factors affecting the subspecies may vary regionally (USFWS 2019). Despite these regional differences, their numbers are impacted by the loss, degradation,

and fragmentation of wetland habitats resulting from conversion of wetlands to agricultural or urban land uses, sea level rise along the coast, and ground- and surface-water withdrawals across the range. Incompatible land management practices may also have negative impacts on the eastern black rail, i.e., poorly timed and planned prescribed fires, excessive grazing, and/or certain mechanical treatments, particularly when they are conducted during the breeding season or the flightless molt period. Stochastic events, such as flood events and hurricanes, may have significant impacts on populations of eastern black rail. For example, extensive flooding from major hurricanes has been documented at occupied sites during the subspecies' flightless molt period, potentially impacting multiple individuals. When considering the future risk factors to the eastern black rail, there is a complex interaction of threats and other factors having synergistic effects on the subspecies.

Current Biological Status of the Species:

Overview:
The eastern black rail is a widely distributed, secretive marsh bird with little known about its population structure and dynamics. Based on the available data, subpopulations occur across the landscape as small (single pairs) to relatively large (multiple pairs) population centers in a clumped distribution. Birds from northern latitudes migrate south and winter in warmer climates among year-round resident subpopulations. However, we do not understand how these subpopulations may be different, the proportion of migrants versus residents, if there is any separation between migrant and resident populations geographically, or how dispersal among population centers might occur or how often. We also recognize across the range of the subspecies, factors affecting these subpopulations may differ based on geography, land use practices, etc. Since clear differentiation between populations across the range is difficult for the subspecies, environmental and occurrence point data from across the range were used to develop analysis units (AUs) to inform our assessment of current and future conditions. Five AUs (Central Lowlands, Great Plains, Mid-Atlantic Coastal Plain, Southeast Coastal Plain, and Southwest Coastal Plain) exist for eastern black rails. Historical data and a few current records indicated the Appalachians and New England encompassed part of the range of the eastern black rail; therefore, we identified two additional units (Appalachians and New England) for a total of seven AUs. However, three of the AUs (New England, Appalachians, and Central Lowlands) are extirpated.

The best available scientific data suggest that the remaining strongholds support a relatively small total population size across the contiguous United States, e.g., an estimated 1,299 individuals on the upper Texas coast within specific protected areas prior to Hurricane Harvey, and an estimated 355 – 815 breeding pairs on the Atlantic Coast from New Jersey to Florida (including the Gulf Coast of Florida) prior to multiple recent major hurricanes (Watts 2016; Tolliver et al. 2017). The subspecies likely occurs throughout the Caribbean, Central America, and Brazil, but given that we do not have consistent monitoring or survey results for these areas we have no information to indicate whether the bird is present in large numbers.

The future condition analysis indicated a high probability of extirpation under all scenarios. In the next 25 years (by the year 2043), the Great Plains AU will likely be extirpated, leading to the loss of the only remaining high latitude unit for the eastern black rail. In addition to this loss, the

three remaining AUs (Mid-Atlantic Coastal Plain, Southwest Coastal Plain, and Southeast Coastal Plain) will likely be lost within the next 50 years (USFWS 2019). Thus, the eastern black rail will likely have zero representation in the United States by approximately 2068 (USFWS 2019).

3 Rs:

- **Resiliency:** We expect all eastern black rail AUs to have no resiliency by 2068, as all are likely to be extirpated by that time. We have no reason to expect the resiliency of eastern black rail outside the contiguous United States to improve in such a manner that will substantially contribute to eastern black rail viability within the contiguous United States portion of the range. Limited historical and current data, including nest records, indicate that resiliency outside of the contiguous United States will continue to be low into the future, or decline if habitat loss or other risk factors continue.
- **Representation:** In terms of habitat variability, the eastern black rail has some adaptive capacity to changing environmental conditions because it uses similar habitat elements across different wetland types (salt, brackish, and freshwater). Despite this adaptive capacity, in the next 25 years (by the year 2043), the Great Plains AU will likely be extirpated (or effectively extirpated) leading to the loss of the last high latitude representative unit for the eastern black rail. In addition to this loss, the three remaining AUs (Mid-Atlantic Coastal Plain, Southwest Coastal Plain, and Southeast Coastal Plain) will likely be lost within the next 50 years. Thus, the eastern black rail will likely have no representation by approximately 2068
- **Redundancy:** The four AUs that currently contain extant populations of eastern black rails will have zero redundancy under all plausible scenarios by 2100. In fact, the Great Plains AU will likely be extirpated in 15 to 25 years leading to further reduction (from a current low condition) in redundancy by 2043 and resulting in only coastal populations of the eastern black rail remaining. By only having coastal AUs remaining (and in even lower resiliency than current condition), this will further limit the ability of the eastern black rail to withstand catastrophic events such flooding from hurricanes and tropical storms. By 2068, we expect all eastern black rail AUs to be extirpated.

Understanding these projected estimates for resiliency, representation, and redundancy as they apply within the geographies of regional populations will be important during development of the recovery plan for this species. Conservation actions may focus on building resiliency in one region, while another may wish to emphasize actions enhancing redundancy.

Conservation Actions to Date:

Out of 35 states, Puerto Rico and the Virgin Islands within the range of the eastern black rail, 7 have listed the black rail species as Endangered (USFWS 2019). The species was formerly listed as Endangered in Connecticut but was considered extirpated during the last listing review based on extant data and subsequently delisted (Connecticut Department of Energy and Environmental Protection 2015). These designations have different meanings for each state respectively, however, in most cases the subspecies is protected from take by state laws in addition to take associated with the federal protections of the Migratory Bird Treaty Act. With the notable exception of several refuges and conservation areas, there have been few management actions that have been implemented to directly target eastern black rail conservation. The eastern black

rail has been included in proposals for land conservation and/or habitat enhancement; however, there has been minimal verification of how the bird responded to the actions taken.

There are significant landscape-level opportunities to implement conservation actions that support the eastern black rail. A conservation plan recently finalized by the Atlantic Coast Joint Venture (ACJV) Black Rail Working Group targets six priority conservation strategies for the bird in the Atlantic Flyway (ACJV 2020). In the Gulf of Mexico, a multi-partnership team was recently awarded $4.0 million through the National Oceanic and Atmospheric Administration's RESTORE Act Science Program to evaluate black rail, yellow rail, and mottled duck use of high marsh with a focus on their respective responses to prescribed fire in an adaptive management framework. Additionally, similar conservation actions and approaches used to benefit cover-dependent grassland and secretive marsh bird species already exist that can be tailored to the specific habitat requirements of the eastern black rail. Examples include ensuring dense overhead cover is present, improving prescribed fire and grazing practices, and conserving and restoring wetland and grassland habitats.

Recovery Priority Number:
The first step to recover a listed species is to prevent its extinction. In order to balance the risk of extinction and available resources, the Service assigns a Recovery Priority Number (RPN) to listed species. Three criteria are used to evaluate the risk of extinction: threat magnitude, immediacy, and the biological uniqueness of the listed species. The rankings range from 1 to 12 for the Service. The eastern black rail is assigned a recovery priority of 3, which indicates the subspecies faces significant and imminent threat. The degree of threat is considered high because the rail populations in most of the Atlantic coast states – already low (<500 birds; ACJV 2020) – show continued declines since 2016 (Watts 2020, pers. comm.). Populations on the upper Texas coast appear to be somewhat more substantial, but still number just over a thousand birds (USFWS 2019). There have been discoveries of sub-populations in south Texas and in coastal Louisiana; however, abundance estimates are low, and all Gulf of Mexico sub-populations are at significant risk from tropical systems, sea level rise, and extreme flood events. While the interior populations, specifically in Colorado, appear to be stable, they are at risk from interruptible flows in the Arkansas River that support the localized wetland sites where rails are found.

2) Interim Recovery Program

Interim Recovery Strategy:
The ultimate goal of the recovery effort is to ensure the long-term survival of the eastern black rail by implementing conservation actions that result in populations that are self-sustaining (have sufficient redundancy, representation and resiliency) such that protections afforded by the Endangered Species Act are no longer required. The initial plan is to continue our engagement with partners, landowners, and stakeholders to circumvent, manage, and alleviate threats to the eastern black rail. We plan to work cooperatively with Joint Ventures, states (prioritizing the States where current populations exist or are nearby in adjoining States), federal agencies, non-governmental organizations, and private landowners to protect habitat that currently supports or could support the subspecies. Specifically, conservation agreements and funding opportunities will be promoted through the Service's various voluntary programs such as the Coastal and Partners for Fish and Wildlife Programs to encourage partnerships in habitat conservation and

enhancement efforts, improving our knowledge and understanding of the subspecies, and refining best management practices (BMPs) to support the recovery of the species. We will work with partners to assess habitat and threats to determine the recovery potential in geographic areas of the historic range. We will also support community-based watershed stewardship planning and action, as well as land acquisition and protection to benefit the subspecies.

An effective recovery strategy for eastern black rail is contingent upon natural resource management that promotes population stability and growth, while minimizing threats and causes of decline.

Action Plan:
Recovery Actions (not in priority order) include the following:

Science and Monitoring Actions

- Support inventory and monitoring efforts to improve our understanding of the distribution and abundance of existing eastern black rail populations.
- Improve eastern black rail survey techniques.
- Support research on the relationship between land management practices and its effects on survival, recruitment, and reproduction.
- Develop more efficient and effective approaches to habitat assessment (e.g., the use of advanced spatial technologies to develop improved techniques in the identification of wetland types or characteristics preferred by the subspecies at a regional or landscape scale).
- Support research that improves our understanding of the dispersal, migration, distribution, occupancy, and behavior of subpopulations.
- Continue research into regional phenology of breeding and molt periods.
- Study factors that affect abundance of sub-populations to develop strategies and actions to ameliorate the negative effects.

Habitat Management Strategies and Actions

- Encourage and work with public and private land managers including non-profit organizations and landowners to protect, restore, enhance, and manage habitat to maintain and expand suitable habitat for the eastern black rail, particularly within and adjacent to occupied areas.
- Create or restore eastern black rail habitat in palustrine and estuarine environments to bolster existing populations and increase the potential for new populations. Examples include a wide range of restoration approaches where the appropriate hydrology, vegetation structure, and micro-topography are established to meet the bird's habitat requirements.
- Strategically secure suitable habitat patches through conservation easements and/or land acquisition from coastal to inland areas to offset the effects of sea level rise and to facilitate marsh migration.
- Promote wetland impoundment management practices and schedules that support eastern black rail occupancy where appropriate.

- Develop and promote the use of regional prescribed fire BMPs and agricultural BMPs such as for grazing, haying, mowing, and other mechanical treatments and activities that reduce adverse impacts to eastern black rail and associated habitat.
- Develop Safe Harbor Agreements, Habitat Conservation Plans, and other mechanisms of voluntary habitat improvements with non-Federal landowners. Work with existing conservation programs to encourage inclusion of eastern black rail and its habitat in those efforts.
- Support development of a landscape conservation plan(s) for the subspecies and its habitat.

Communication Actions

- Develop, maintain, and implement a strategy for disseminating information, such as scientific research, incentives, BMPs, and monitoring methods and results, for appropriate use by the public, government agencies, and non-government organizations.
- Coordinate to ensure that this subspecies and associated habitats are recognized during regulatory review of permit applications.
- Incorporate regional differences into recovery planning to better target recovery actions within regions and across the broad geographic range of the subspecies.

3) Preliminary Steps for Recovery Planning

Will a recovery plan be developed?
We will prepare a recovery plan for the eastern black rail using the detailed science identified in the SSA (USFWS 2019) and any new information since its most recent published version.

Type of recovery plan:
The recovery plan will be a single subspecies plan and include objective and measurable criteria which, when met, will ensure the conservation of the species. Recovery criteria will address all meaningful threats to the subspecies, as well as estimate the time and the cost to achieve recovery.

Who will develop the recovery plan?
The South Carolina Ecological Services Field Office will lead the recovery planning effort, with support from Service programs and conservation partners across the subspecies range.

Plan for stakeholder role/involvement:
During the recovery planning process, input, comments, and review will be sought from multiple stakeholders within States where recovery actions are most likely feasible. These will include State and Federal agencies, industrial and agricultural groups, research universities, and conservation organizations. Many stakeholders are currently cooperating in ongoing conservation planning and other working groups associated with the eastern black rail.

Recovery Planning milestones:
The draft plan should be finalized and sent to the Regional Office for review by April 2022. The final recovery plan should be finalized and sent to the Regional Office for review by April 2023. These timelines may change as affected by available resources and regional priorities.

Signed: JOHN TIRPAK Digitally signed by JOHN TIRPAK Date: 2021.03.18 15:59:06 -05'00' Date: _____

Assistant Regional Director, South Atlantic-Gulf & Mississippi-Basin (Regions 2 & 4)

REFERENCES

Armistead, G. L. (2001). Rails, Gallinules, and Coots. In C. Elphick, J. B. Dunning Jr., & D. A. Sibley, The Sibley Guide to Bird Life & Behavior (pp. 246-250). New York, New York: Alfred A. Knopf.

Atlantic Coast Joint Venture (ACJV). (2020). Eastern Black Rail Conservation Plan for the Atlantic Coast. Hadley, Massachusetts: Atlantic Coast Joint Venture. https://acjv.org/black-rail-conservation-plan/

Bobay, L. R., Taillie, P. J., & Moorman, C. E. (2018). Use of autonomous recording units increased detection of a secretive marsh bird. Journal of Field Ornithology, 89(4), 384-392.

Butler, C. (2017). Personal communication to W. Woodrow, W. Wiest, and J. Wilson. Professor, University of Central Oklahoma. Edmond, Oklahoma.

Butler, C. J., Tibbits, J. B., & Wilson, J. (2015). Assessing black rail occupancy and vocalizations along the Texas Gulf Coast. University of Central Oklahoma and U.S. Fish and Wildlife Service. Edmond, Oklahoma: U.S. Fish and Wildlife Service.

Connecticut Department of Energy and Environmental Protection. (2015). 2015 Update to State Listed Species. Hartford: Connecticut Department of Energy and Environmental Protection, Bureau of Natural Resources, Wildlife Division.

Cowardin, L. M., Carter, V., Golet, F. C., & LaRoe, E. T. (1979). Classification of Wetlands and Deepwater Habitats of the United States. Washington, D.C.: U.S. Department of Interior, Fish and Wildlife Service.

Davidson, L. M. (1992). Black Rail, *Laterallus jamaicensis*. In K. J. Schneider, & D. M. Pence, Migratory nongame birds of management concern in the Northeast (pp. 119-134). Newton Corner, Massachusetts: U.S. Fish and Wildlife Service.

Eddleman, W. R., Flores, R. E., & Legare, M. (1994). Black rail (*Laterallus jamaicensis*), version 2.0. (A. F. Poole, F. B. Gill, Editors, & Cornell Lab of Ornithology, Ithaca, New York). Retrieved January 2, 2017, from The Birds of North America: https://doi.org/10.2173/bna.123

Eddleman, W. R., Knopf, F. L., Meanley, B., Reid, F. A., & Zembal, R. (1988). Conservation of North American rallids. The Wilson Bulletin, 100, 458-475.

Evens, J., & Page, G. W. (1986). Predation on black rails during high tides in salt marshes. The Condor, 88, 107-109.

Flores, R. E., & Eddleman, W. R. (1991). Ecology of the California black rail in southwestern Arizona: Final report. U.S. Bureau of Reclamation, Yuma Projects Office, and the Arizona Department of Game and Fish. Interagency Agreement No. 7-AA-30-05910. Phoenix: Arizona Game and Fish Department.

Flores, R. E., & Eddleman, W. R. (1993). Nesting biology of the California black rail in southwestern Arizona. Western Birds, 24, 81-88.

Flores, R. E., & Eddleman, W. R. (1995). California black rail use of habitat in southwestern Arizona. The Journal of Wildlife Management, 59, 357-363.

Hand, C. (2017). Personal communication to W. Wiest. Wildlife Biologist, South Carolina Department of Natural Resources. Green Pond, South Carolina.

Hand, C. (2017). Assessing the status of the black rail (Laterallus jamaicensis) in South Carolina. Green Pond: South Carolina Department of Natural Resources.

Harlow, R. C. (1913). Nesting of the black rail (*Creciscus jamaicensis*) in New Jersey. Auk, 30, 269.

Haverland, A. A. (2019). Determining the status and distribution of the eastern black rail (*Laterallus jamaicensis*) in coastal Texas. Doctoral dissertation. San Marcos: Texas State University.

Johnson, E. I., & Lehman, J. (2019). Understanding winter movement and fidelity of black rails in coastal high salty marshes in Cameron and Vermilion Parishes. 7th interim report. Baton Rouge: Audubon Louisiana.

Kellogg, P. P. (1962). Vocalizations of the black rail (*Laterallus jamaicensis*) and the yellow rail (*Coturnicops noveboracensis*). The Auk, 79, 698-701.

Legare, M. L., & Eddleman, W. R. (2001). Home range size, nest-site selection and nesting success of black rails in Florida. Journal of Field Ornithology, 72, 170-177.

Legare, M. L., Eddleman, W. R., Buckley, P. A., & Kelly, C. (1999). The effectiveness of tape playback in estimating black rail density. The Journal of Wildlife Management, 63, 116-125.

Nadeau, C. P., & Conway, C. J. (2015). Optimizing water depth for wetland-dependent wildlife could increase wetland restoration success, water efficiency, and water security. Restoration Ecology, 23, 292-300.

Pyle, P. (2008). Identification Guide to North American Birds. Part II: Anatidae to Alcidae. Point Reyes Station, California: Slate Creek Press.

Richmond O, Chen S, Risk B, Tecklin J, Beissinger S. 2010. California black rails depend on irrigation-fed wetlands in the Sierra Nevada foothills. Calif Agr 64(2):85-93. https://doi.org/10.3733/ca.v064n02p85.

Robbins, C. S., Brown, B., & Zim, H. S. (1983). A Guide to Field Identification: Birds of North America. New York, New York: Golden Press.

Root, T. R. (1988). Atlas of Wintering North American Birds: An Analysis of Christmas Bird Count Data. Chicago, Illinois: University of Chicago Press.

Taylor, B., & van Perlo, B. (1998). Rails: A Guide to the Rails, Crakes, Gallinules and Coots of the World. New Haven, Connecticut: Yale University Press.

Todd, R. L. (1977). Black rail, little black rail, black crake, Farallon rail (*Laterallus jamaicensis*). In G. C. Sanderson (Ed.), Management of Migratory Shore and Upland Game Birds in North America (pp. 71-83). Washington, D.C.: International Association of Fish and Wildlife Agencies.

U.S. Fish and Wildlife Service (USFWS). (2018). Endangered and Threatened Wildlife and Plants; 12-Month Petition Finding and Threatened Species Status for Eastern Black Rail With a Section 4(d) Rule. Federal Register 83: 50610-50630.

U.S. Fish and Wildlife Service (USFWS). (2019). Species status assessment report for the eastern black rail (*Laterallus jamaicensis jamaicensis*), Version 1.3. August 2019. Atlanta, GA.

U.S. Fish and Wildlife Service (USFWS). (October 8, 2020). Endangered and Threatened Wildlife and Plants; [https://www.federalregister.gov/public-inspection]. Federal Register Docket No. FWS–R4–ES–2018–0057

Watts, B. D. (2016). Status and distribution of the eastern black rail along the Atlantic and Gulf Coasts of North America. Williamsburg: College of William and Mary and Virginia Commonwealth University.

Watts, B. D. (2020). Personal communication to Atlantic Coast Joint Venture Adaptive Management Workshop participants. Director, Center for Conservation Biology of the College of William and Mary & the Virginia Commonwealth University. Williamsburg, Virginia.

Weske, J. S. (1969). An ecological study of the black rail in Dorchester County, Maryland. Master's thesis. Ithaca, New York: Cornell University.