

FINAL REPORT
South Carolina State Wildlife Grant SC-T-F18AF00961
South Carolina Department of Natural Resources
October 1, 2018 – September 30, 2020

Project Title: Conservation of seabirds, shorebirds, wading birds, and marsh birds in South Carolina II

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Objective 1:

Seabird and Shorebird Components

- a) Reduce disturbance of beach nesting seabirds and shorebirds on public and private islands.
- b) Annually assess population trends for colonial nesting seabirds: Black Skimmer, Brown Pelican, Gull-billed Tern, Least Tern, Sandwich Tern, Royal Tern, Forster's Tern, and Common Tern. This information is essential for oil spill, wind energy, and sea-level rise planning.
- c) Increase nesting productivity, especially for Least Terns.
- d) Assess migratory shorebird trends in South Carolina, especially for listed species (Red Knot and Piping Plover).

Accomplishments:

- a) Reduce disturbance of beach nesting seabirds and shorebirds on public and private islands.

Coordinated with private, federal, state, and county owned beach managers to close part of the beach for nesting seabirds and shorebirds. This involved 2-10 site visits at each property, depending on the partnership with the land manager. Site visits included meeting with managers to discuss the importance of nest protection and monitoring; visits to place, maintain, and remove signs; and nest monitoring. Educational signs were placed at boat ramps and on some beach entrances. We placed closure signs at nesting sites on 21 beaches and at 2 beaches during the winter to protect roosting migratory shorebirds (Figure 1).

- b) Annually assess population trends for colonial nesting seabirds: Black Skimmer, Brown Pelican, Gull-billed Tern, Least Tern, Sandwich Tern, Royal Tern, Forster's Tern, and Common Tern. This information is essential for oil spill, wind energy, and sea-level rise planning.

To determine the abundance and distribution of nesting populations of seabirds in South Carolina, all active seabird colonies were surveyed over the study period. Some nest estimates were a result of an actual count of nests. Counts occurred during the peak incubation period for each species. Ground counts consisted of staff and volunteers slowly walking transects through the colonies and tallying nests of each species. To minimize disturbance to nesting birds or if ground counts were not possible, staff used binoculars or spotting scopes to count the number of adults sitting in incubation postures as a proxy for nest counts.

Nest counts that are conducted while walking through colonies can be disruptive, especially to larger seabirds such as Brown Pelicans, which have the potential to dislodge eggs from their nests or to become entangled in dense vegetation when flushing from the nest. To reduce the amount of disturbance to Brown Pelicans and crested terns, these species were counted using aerial photographic surveys of colonies. Flights were conducted by SCDNR Law Enforcement pilots in a twin engine fixed-wing Partenavia aircraft. Two SCDNR biologists accompanied the pilot: one to help direct the pilot over pelican colonies and the other to take photographs of the colonies through bomb bay doors in the aircraft. Survey altitude was primarily 1,000 ft. – 700 ft. and the aircraft often made several passes over the colonies to ensure complete photographic coverage. Photographs were taken using a Canon EOS 7D Mark II digital SLR camera.

Unmanned Aerial Vehicles (UAVs or Drones) were also used for surveying colonial seabirds. UAVs have the potential to capture superior aerial imagery compared to photographs taken from fixed-wing manned aircraft and may be able to collect data with less disturbance to the birds than ground counts.

Counts from digital images were made using Image J, an image processing program which allows the user to tag items (nests) for automatic count tallying. The number of nests counted or estimated in 2019 and 2020 are reported in Table 1.

c) Increase nesting productivity, especially for Least Terns.

In South Carolina, Least Terns nest on natural beach sites and a variety of artificial sites including gravel roof tops, dredge spoil islands, an adapted pier, and industrial sites. The variable nesting habitats require unique management strategies. Ground sites are defined as sites on natural beaches. Artificial sites are manmade and require management such as intensive vegetation control or fences at the edge of a roof to prevent chicks from falling off the building. Each year, SCDNR estimates the number of Least Tern nests in South Carolina to monitor population trends and to guide management strategies of nesting sites.

In 2019, the nest estimate for Least Terns in South Carolina was 1,185 (Table 2). 515 (44%) nests were on beaches (Table 3) and 670 (56%) were at artificial sites (Table 4). In 2020, the nest estimate for Least Terns in South Carolina was 1,235. 679 (55%) nests were on beaches and 556 (45%) were at artificial sites. All beach sites (8 in 2019 and 15 in 2020) were accessed by boat except for Kiawah Island, Seabrook Island, Huntington Beach State Park, and the Dunes West site which were accessed by vehicle and foot. All artificial sites (16 in 2019 and 19 in 2020) were accessed by vehicle over a 4-county area comprising of Charleston, Berkeley, Georgetown, and Horry counties.

In 2019, 221 (43%) nests at beach sites were successful (>50% of the nests in a colony survived) and 294 (57%) nests were unsuccessful (< 50% of the nests survived). In 2020, 366 (54%) nests on beaches were successful and 313 (46%) nests were unsuccessful. Negative impacts on failed colonies included human/dog disturbance, predation, and tidal wash over. In 2019, 400 (60%) nests at artificial sites were successful, and 270 (40%) nests were unsuccessful. In 2020, 19 (3%)

nests at artificial sites were successful, and 537 (97%) nests were unsuccessful. Colony failure at artificial sites was primarily due to avian predation.

- d) Assess migratory shorebird trends in South Carolina, especially for listed species (Red Knot and Piping Plovers).

Red Knot

We continued to capture Red Knots in 2019. The purpose of the capture was to retrieve previously placed geolocators and to place 73 nanotags on knots. Unfortunately, no geolocators were retrieved in 2019. The nanotags are a type of small radio transmitter. The tag's frequency can be picked up by Motus Towers. The nanotags help us understand northern migration routes and time of departure from South Carolina. Location data from nanotagged knots suggest that two-thirds of the knots in SC fly directly to the Arctic after leaving SC beaches in the spring. Red Knots were not captured in 2020 due to Covid-19 restrictions.

Ruddy Turnstone

We captured 29 Ruddy Turnstones in spring 2019 and placed nanotags on them. They were primarily captured eating horseshoe crab eggs at Turtle Island WMA. All Ruddy Turnstones from this capture flew directly to Arctic habitat from South Carolina.

Whimbrel

In May 2019 and 2020 SCDNR organized dusk counts of Whimbrel at Deveaux Bank. We discovered that a large portion of the estimated total population of east coast Whimbrel use Deveaux Bank as a nocturnal roost during northward migration from Brazil to nesting grounds in the Arctic. This discovery is of great conservation value for this declining shorebird. We partnered with Cornell University, Lab of Ornithology Conservation Media staff to also document this Whimbrel night roost with video. Additionally, we partnered with USC researchers to track Whimbrel's (that are using Deveaux at night) daily movements by use of solar powered 3.7g GPS PinPoint transmitters. The collaborative team received funding from NFWF and NSF for a master's research project using this technology. In 2020 we placed 2 transmitters on Whimbrel for a trial study. The tags were successful and more will be purchased and deployed spring 2021 with funds from these additional grants.

International Shorebird Surveys

International shorebird surveys (ISS) are surveys of shorebird numbers at designated sites conducted monthly year-round or every 10 days during migration. ISS are conducted at important shorebird areas across North, Central and South America. The purpose of these surveys is to describe shorebirds' distribution, abundance, and habitat relationships; monitor trends in shorebird population size; monitor shorebird numbers at stopover locations; and assist local managers in meeting their shorebird conservation goals. Shorebird surveys were conducted monthly at Capers Island Heritage Preserve and at Bird Key Stono Seabird Sanctuary (Table 5).

Significant deviations:

None.

Objective 2:

Wading Bird Components

- a) Assess population trends for Wood Storks.
- b) Annually assess Wood Stork nesting success.
- c) Monitor the distribution of active egret and heron colonies and maintain current records that can be considered by planners, managers, and property owners.

Accomplishments:

- a) Assess population trends for Wood Storks.

Aerial Wood Stork Surveys and Ground Counts of Nests

The SCDNR Wading Bird Project surveyed all Wood Stork colonies that were known to be active during 2019 (Table 6, Figures 2 and 3). Aerial surveys were used to locate the nesting colonies. Stork nests were counted during ground surveys or, when ground surveys were not possible, from photographs taken during aerial surveys. Point-to-point flights were used to survey wading bird colonies of the coastal region and coastal plains where suitable stork nesting habitat was known to exist. We counted 3,075 Wood Stork nests during 2019, far exceeding the previous record high count of 2,515 nests during 2016. We were unable to complete Wood Stork colony surveys during 2020 due to COVID-19 restrictions, but SCDNR Pilot Ryan Wilbanks was able to record low resolution video footage of major colonies, allowing us to confirm a subset of colonies were active.

State Wildlife Grant SC-T-F16AF00707 and state funding provided the salary for a technician to assist the project biologist with surveys, nest monitoring, and management activities. Flights were funded through USFWS Grant Agreement F16AC00912 during 2019 and by this grant during 2020 (recon flights by pilots to determine if large rookeries were active). Surveys were conducted from fixed-wing aircraft (Cessna 206, Cessna 210, and Vulcan Air P68) owned and operated by the SCDNR Law Enforcement Division.

Wood Stork Nestling Banding Project

Beginning during 2013, SCDNR banded Wood Stork nestlings as part of a regional project. During 2019 and 2020, SCDNR banded 23 and 24 stork nestlings, respectively, bringing the 2013-2020 total to 368 banded nestlings (344 banded with metal USGS and field-readable orange and black plastic auxiliary bands). SCDNR collected feather samples during 2019 for a genetic study led by Dr. Kristina Ramstad, Assistant Professor at the University of South Carolina, Aiken. Nesting was very asynchronous during both years, so we were only able to access the rookery during a portion of the period when stork chicks were at the optimal age for banding due to concerns about causing Great Egret and older stork chicks to prematurely leave their nests.

- b) Annually assess Wood Stork nesting success.

Wood Stork Colony Fate Surveys

During mid-June 2019, additional point-to-point flights were used to determine if storks were successful at raising chicks or if the colonies had failed during the nesting season. Colonies were considered to be successful if large stork chicks and/or recent fledglings were observed in the majority of the number of nests counted during the annual census. Due to limitations in flight availability during June 2019, colonies northeast of Charleston were not resurveyed during 2019, resulting in nine colonies without known fates. Storks successfully fledged chicks in all of the colonies (n=17) that were resurveyed. During 2020, Wood Stork Colony Fate Surveys were not completed due to COVID-19 restrictions.

Wood Storks typically nest in trees in flooded forests or on small islands surrounded by water. If there is adequate water, alligators below the nests deter predators such as raccoons from swimming to the nesting trees and eating stork eggs and/or chicks. Mammalian predation is believed to be the primary cause of reproductive failure at unsuccessful colonies where storks nest in shrubs along the edges of ponds in residential communities. Other potential causes of colony failure for Wood Storks include inadequate or inaccessible food during the chick rearing period and disturbance. If adult storks are disturbed and leave their nests, crows and other predators have the opportunity to depredate eggs and small chicks. Even where predators are not a threat, disturbance can result in nest failure because eggs and small chicks are vulnerable to overheating when adults are not able to shade their nests.

Wood Stork Nest Monitoring

During 2011, SCDNR began monitoring a sub-set of the stork nests in index colonies to determine how successful the storks are at raising young in South Carolina. During 2019, SCDNR staff and a trained volunteer monitored nests at six colonies located between Savannah and Charleston. Two of the index colonies are on land managed by SCDNR (Donnelley Wildlife Management Area and Dungannon Plantation Heritage Preserve), and the other four colonies are on private land. Four of these colonies were monitored by SCDNR staff and partners during 2020.

At each colony, individual stork nests were mapped as they were initiated and were monitored from a distance (using a spotting scope or binoculars) approximately once per week from the time that egg laying began until the chicks reached fledging age (mature enough to fly, which is about 7-8 weeks after hatching). The average number of chicks that survived to fledging age per nest was determined for each colony. A detailed protocol was used to standardize monitoring techniques (protocol available by request).

During 2019, a total of 268 stork nests were monitored in seven colonies. An average of 2.0 chicks fledged per nest site and 2.4 chicks per successful nest site (Table 7). During 2020, a total of 139 nests were monitored in four colonies. An average of 1.6 chicks fledged per nest site and 2.4 chicks per successful nest site (Table 8). Table 9 provides a comparison of nest monitoring data from 2011 – 2020. The federal recovery goal for Wood Storks is an average of 1.5 fledglings per nest. During the 10 years when nest monitoring was completed in South Carolina, the annual average met or exceeded 1.5 fledglings per nest in all but two years (2012 and 2013).

- c) Monitor the distribution of active egret and heron colonies and maintain current records that can be considered by planners, managers, and property owners.

Point-to-point aerial surveys of a subset of the known wading bird colonies in South Carolina were used to monitor the distribution and relative size of wading bird colonies during 2019. In 2019, only coastal colonies were surveyed and in 2020, aerial surveys were not completed due to COVID-19 restrictions. During surveys, we focused our efforts on the areas that were most likely to have Wood Stork colonies. In addition, we resurveyed the South Coastal and North Coastal Aerial Transect Plots, which were designated during 2012 for more intensive periodic surveys. The flights were timed to coincide with peak nesting for Wood Storks and great egrets in the coastal region. Nest numbers were estimated, and all species seen in each colony were recorded during the aerial surveys. Aerial photographs, which were later used to determine species and approximate nest numbers, were taken of all active colonies.

During 2020, we identified the first documented Roseate Spoonbill nest in the state in a rookery on a private property in Charleston County. A manuscript providing documentation for this record was published in *The Chat* journal during October 2020. The number of roseate spoonbills in South Carolina during the post-breeding season was known to be increasing, and nesting was suspected/expected; however, nesting previously had not yet been confirmed in the state. Many of the spoonbills seen in South Carolina are immature individuals. No Reddish Egret nests were found during the 2019 surveys. Yellow-crowned Night Herons and Green Herons often nest in small inconspicuous colonies and were rarely located during surveys.

Conclusions from Wood Stork Surveys and Nest Monitoring

Wood Storks appeared to have an exceptionally productive nesting season during 2019. The number of nests counted (3,075 nests) far exceeded the previous record high count of 2,512 nests set during 2016. During 2020, although a statewide stork census could not be completed, our general impression—based on ground counts and the review of video footage—was that nest numbers were probably within the same range as annual nest counts during the past decade (2,000 – 3,000 nests). During both years, the average number of fledglings from monitored nests exceeded the recovery goal of 1.5.

South Carolina stork colonies continue to play an important role in the recovery of the species. The diverse and extensive wetlands in the coastal region of South Carolina provide more consistent prey throughout the nesting season compared to most of the Southeastern U.S. Managed tidal impoundments provide concentrated prey as water levels are lowered, and tidal creeks concentrate prey during low tides due to the high tidal amplitude along the coast.

Significant deviations:

None.

Objective 3:

Marsh Bird Components

- a) Determine if Black Rails are present in substantial numbers in coastal South Carolina during the nonbreeding season. Document timing of arrival and departure of wintering rail species.

Accomplishments:

- a) Determine if Black Rails are present in substantial numbers in coastal South Carolina during the nonbreeding season. Document timing of arrival and departure of wintering rail species.

To determine the timing of arrivals/departures and the seasonal presence of Black Rails (*Laterallus jamaicensis jamaicensis*), Sora (*Porzana carolina*), Virginia Rails (*Rallus limicola*), and Yellow Rails (*Coturnicops noveboracensis*) in coastal South Carolina, three to twelve arrays of five camera traps were deployed and maintained throughout October 2018 – August 2020. In preparation for hurricanes and following fires, camera arrays were temporarily removed from the field, resulting in periods of lower sampling effort during the early fall and early spring. Sampling effort and species detections are summarized in Table 10. Figures 4 and 5 include all data collected using this study design (October 2017 – August 2020) to provide a more complete picture of seasonal presence of the four small rails species in South Carolina.

Black Rails were detected in South Carolina during every month of the year; however, it is unclear if some or all of these individual rails are year-round residents or migrants from northern states. Virginia, Sora and Yellow Rails were also detected by camera traps during the nonbreeding season. Virginia Rails, which previously were not known to breed in South Carolina, were documented breeding in Georgetown County, South Carolina during 2018 and 2019.

Significant deviations:

None.

Objective 4:

Components for All Species Groups

- a) Build awareness in South Carolina of shorebird, seabird, wading bird and marsh bird conservation needs.
- b) Link regional and local conservation goals.
- c) Provide guidance about waterbird conservation needs and opportunities to public and private landowners and managers.

Accomplishments:

- a) Build awareness in South Carolina of shorebird, seabird, wading bird and marsh bird conservation needs.
- SCDNR was contacted by city, county, state, and federal employees, as well as private companies and contractors, who requested information about wading bird colony locations and statuses. This grant allowed SCDNR to collect data about wading birds and to provide it to a variety of organizations. Detailed information about colony boundaries is provided to organizations working near specific stork colonies to ensure compliance with the Endangered Species Act.

- SCDNR maintains a webpage for the Wading Bird Program. The webpage includes information about species and statuses, an overview of SCDNR's projects, guidance about viewing wading birds, and management recommendations for nesting and foraging areas. Private land managers are encouraged to contact SCDNR for additional guidance. The biologist responded to various inquiries from the public about wading bird ecology throughout the year.
- SCDNR maintains a webpage about seabirds and shorebirds. The webpage includes information about species and statuses and an overview of SCDNR's projects. The web site also includes resources such as educational signs and brochures, links to partners and ways for the public to get involved.
- Updated Wading Bird Rookery data in the SCDNR Heritage Trust Database used by land managers, permit reviewers, power companies, and other organizations to plan projects. The database provides portals to state and federal partners as well as to consultants and other individuals involved in making land management decisions. Colony locations are not available to the general public due to concerns about the privacy of the property owners and potential disturbance to the birds.
- Worked with Joe Lemeris, SCDNR Heritage Trust Database Manager, to incorporate Eastern Black Rail distribution data into the SCDNR Heritage Trust Database. Inclusion of these data will facilitate consideration of the species during regulator decisions and permit review. The subspecies was given federal protection under the Endangered Species Act during November 2020, resulting in new requirements for evaluating potential impacts.
- Gave presentations about the status, ecology and conservation needs of Black Rails at numerous meetings including the 2018 Clemson University and SCDNR Cooperative Programs Meeting, November 2018 ACE Basin Task Force Meeting, 2019 Southeastern Association of Fish and Wildlife Agencies Conference hosted on Hilton Head Island by SCDNR, 2019 SCDNR/USFWS/NCRS/SCDHEC/EPA/USACE/SHPO/NMFS Interagency Workshop, 2020 South Carolina Chapter of Wildlife Society Meeting, and 2020 ACE Basin Research Symposium. Audiences included state and federal biologists and regulators, university faculty and students, nonprofit conservation organization members, and private landowners.
- Gave presentation about the ecology and status of wading birds in South Carolina to Harbor Island Community in Beaufort County, SC and educated visitors to Dill Sanctuary Open House on James Island, SC about the importance of providing rookery and roost habitat for wading birds.
- Worked with Tony Bartelme (Post and Courier newspaper) and Erin Weeks (SCDNR Marine Division) to provide material for an article about status of the Eastern Black Rail in South Carolina and SCDNR's work to understand and protect the subspecies. It was published as a long-form feature article on the front page of the 13 September 2020 Post and Courier newspaper.
- Organized a booth about shorebird conservation at the SEWE (Southeast Wildlife Expo) in downtown Charleston in February of 2019 and 2020. This expo is attended by tens of thousands of people from across the nation.
- Attended Bird Fest at Santee Canal Park in October 2019; distributed educational materials and discussed issues and items related to conservation of shorebirds with the public; 250 people attended this festival.

- Distributed SC Best Management Practices (BMPs) for Use of Vehicles especially used for Sea Turtle Nest Protection projects. Presented seabird and shorebird conservation message at sea turtle nest protection meetings that were attended by 100s of volunteers and by staff at beach sites, such as county and state parks, USFWS and private islands. We worked with sea turtle projects at some locations to delineate areas of the beach to avoid driving because of the high concentrations of nesting birds.
- At the International Sea Turtle Symposium held February 1 – 6, 2019 in Charleston, SC, a poster of the SC Best Management Practices (BMPs) for Use of Vehicles on Sea Turtle Nest Management projects was presented. This poster served to inform people from all over the world about ways to conserve seabirds and shorebirds while performing sea turtle nest management activities.
- Began development of seabird stewardship program in Cape Romain National Wildlife Refuge, which annually hosts 30% of SC's seabird nesting, in May 2019. A presentation was given regarding seabird and shorebird nesting in the refuge and ways to effectively steward the sites to minimize disturbance and facilitate reproduction. A manual was written describing sites, species behavior, and stewarding roles. Participants were taken at least 4 times to sites and accompanied by staff. Additionally, developed a Shorebird Steward program targeting protection of migratory Red Knots on Seabrook and Kiawah Islands.
- Presented an overview of SCDNR's shorebird program to SCDNR's Board at the September 2019 Board meeting held in Columbia.
- Held a training for USFWS LE officers in CRNWR in April 2019 prior to the nesting season. Informed the officers of specific nesting sites (providing maps), instruction in bird behaviors/responses to disturbance, and identified the highest visitation areas of the refuge.
- Participated in a tour of the ACE Basin region of the South Carolina coast with Senator Campsen and Wall Street Journal reporters. A portion of the tour included Deveaux Bank Seabird Sanctuary and the importance of the SC coast to the survival of a multitude of waterbird species.
- Instructed Wildlife majors at Horry-Georgetown Technical College about shorebird conservation and SCDNR research on migratory shorebirds.

SCDNR Press Releases

- August 31, 2020 - South Carolina sees average Least Tern nesting season
- June 24, 2020 - S.C. Coastal Bird Conservation program focus turns to new protection and conservation efforts
- December 17, 2019 - South Carolina sees record number of wood stork nests in 2019
- November 13, 2019 - Return of nesting birds to Crab Bank Seabird Sanctuary one step closer
- October 29, 2019 - Seabird nesting season update for 2019
- August 2, 2019 - Black skimmers and other nesting shorebirds need your help!
- December 21, 2018 - South Carolina Ducks Unlimited contributes \$25,000 to Crab Bank conservation initiative

Publications

- Hand, C. E. and R. E. Bonafilia. 2020. First Record of Roseate Spoonbills (*Platalea ajaja*) Nesting in South Carolina. *Chat* 84: 103–104.
- Hand, C. E., E. Znidersic, and A. K. Tegeler. 2019. First Documentation of Eastern Black Rails (*Laterallus jamaicensis jamaicensis*) Breeding in South Carolina, USA in More Than a Century. *Waterbirds* 42: 237-241.
- Hand, C. E., W. Gabel, G. R. DiPetto, R. E. Bonafilia, and E. Znidersic. (undergoing peer review). A Window into the Breeding Ecology and Molt of the Eastern Black Rail (*Laterallus jamaicensis jamaicensis*). (Undergoing peer review for inclusion in a special Eastern Black Rail section in the *Waterbirds* journal, details forthcoming).
- McGowan, C. P., N. F. Angeli, W. A. Beisler, C. Snyder, N. M. Rankin, J. O. Woodrow, J. K. Wilson, E. Rivenbark, A. Schwarzer, C. E. Hand, R. Anthony, R. K. Griffin, K. Barrett, A. A. Haverland, N. S. Roach, T. Schneider, A. D. Smith, F. M. Smith, J. D. M. Tolliver, and B. D. Watts. 2020. Linking monitoring and data analysis to predictions and decisions for the range-wide eastern black rail status assessment. *Endangered Species Research* 43: 209-222.
- Von Holle, B., J. L. Irish, A. Spivy, J. F. Weishampel, A. Meylan, M. H. Godfrey, M. Dodd, S. H. Schweitzer, T. Keyes, F. Sanders, M. K. Chaplin and N. R. Taylor. 2019. Effects of future sea level rise on coastal habitat. *Journal of Wildlife Management* 83: 694-704.

b) Link regional and local conservation goals.

- Participated as state Black Rail expert in meeting to educate the Atlantic Coast Joint Venture about Black Rail ecology and land management in South Carolina. The Atlantic Coast Joint Venture has adopted the Eastern Black Rail as one of their three flagship species and are working to determine how they can be involved in Black Rail conservation efforts.
- Participated in the development of the Black Rail Conservation Action Plan by the ACJV Black Rail Working Group. Participated in over 9 hours of conference calls focused on the development of the Conceptual Model and Results Chains (Fire Management, Habitat Creation, Landowner Assurance Program Development, Impoundment Management) that will form the basis for the conservation plan. Shared data and information about Black Rails in South Carolina and ensured that considerations specific to South Carolina are being incorporated into the frameworks for the development of Better Management Practices.
- Participated in annual Wood Stork Working Group meetings. South Carolina nesting data and an overview of the current management projects were presented to the group of researchers who make decisions about future priorities to promote the recovery of the species.
- In December 2018 and 2019, met with biologists from South Carolina, Georgia and Florida to form the Southeast Red Knot Working Group. The working group's goals are to prioritize research, monitoring and conservation actions for Red Knots in the southeast.
- Participated in 43rd annual Waterbird Society Conference in Princess Anne, Maryland. Gave oral presentation titled, "Eastern Black Rails in managed tidal impoundments: challenges and opportunities" (coauthors: Daniel Barrineau, Jamie Dozier, Mark McAlister, Joseph Woods) during Black Rail Ecology and Conservation Symposium and presented poster titled, "Breeding phenology and chick development of Eastern Black Rails in the Southeastern USA" (coauthor: Gabriella DiPetto).

- Contributed to the development of the ACJV Eastern Black Rail Species Distribution Model. Formatted South Carolina black rail survey data and provided to modeling PIs (Courtney Conway and Bryan Stevens).
 - Participated in three-day ACJV Black Rail Adaptive Management Workshop in Titusville, FL. Shared data and information about Black Rail ecology and management in South Carolina and ensured that considerations specific to South Carolina are being incorporated into the project frameworks.
 - Partnered with Canadian researchers at Trent University to study migratory shorebirds at Bulls Island in Cape Romain NWR. A graduate student's Masters Thesis was completed titled, "Shorebird habitat use and foraging ecology on Bulls Island, South Carolina during the non-breeding season."
 - Partnered with Southeastern Cooperative Wildlife Disease Study (SCWDS) to study avian influenza in Ruddy Turnstones. Assisted SCWDS researchers in acquiring cloacal and fecal samples from Ruddy Turnstones to track this disease.
- c) Provide guidance about waterbird conservation needs and opportunities to public and private landowners and managers.
- SCDNR owns two properties with consistently active Wood Stork rookeries: Dungannon Plantation Heritage Preserve (Dungannon HP) and Donnelley Wildlife Management Area (Donnelley WMA). The wading bird biologist worked closely with the SCDNR biologists managing the properties and with the SCDNR Aquatic Nuisance Species Program staff to manage nesting habitat and provided guidance about repairs to a spillway damaged by Hurricane Matthew.
 - SCDNR owns and manages the two properties with the greatest number of Black Rail detections in South Carolina during surveys in the 1990s and 2010s. Two or more impounded wetlands on each property have been identified for Black Rail focused management, which has been initiated and is expected to continue and improve as infrastructure repairs are completed and invasive (Chinese Tallow, *Triadica sebifera*, trees are removed. SCDNR secured cost-sharing grants with the USFWS Coastal Program to support these repairs and invasive species removal.
 - During 2019, SCDNR began partnering with the USFWS Coastal Program, USFWS Partner Program and Ducks Unlimited to identify opportunities for Black Rail focused management on private properties. Using information learned through studying Black Rails, SCDNR is providing technical assistance and guidance about Black Rail ecology and habitat management needs in this partnership. Site visits and consultations with landowners were completed at two properties in the ACE Basin during 2019 – 2020.
 - Shared information about Black Rail occurrence and ecology with a private landowner who has Black Rails on their property. Management options are limited due to tidal influence, and current management practices appear to be appropriate for maintaining Black Rail habitat.
 - SCDNR staff led an effort to fund-raise money for coastal bird conservation and the restoration of Crab Bank Seabird Sanctuary. The effort was initiated because funds are needed to use dredge material from the deepening of Charleston Harbor to restore and enlarge the much-eroded Crab Bank. The money was deposited in the SCDNR South Carolina Coastal Bird Conservation account. The team of conservation organizations, businesses, and citizens successfully raised enough funds to restore Crab Bank. This

collaborative effort to raise money also served as an opportunity to educate the public about coastal bird conservation. Some of the funds from the program were used to hire a shorebird steward for the Cape Romain Region.

- Organized shorebird/seabird workshops held at Ft. Johnson for beach managers, volunteers and biologists that work on conservation of beach-nesting birds. Presentations were focused on management techniques, shorebird and seabird research, public engagement, and project updates. This workshop also served as a networking opportunity for people working in remote areas of the SC coast. Presentations were posted to the SCDNR Coastal Birds webpage.
- Co-organized a two-day workshop with Manomet's shorebird biologist at Yawkey Wildlife Center and Santee Coastal Reserve about managing impounded wetlands for shorebirds. The workshop discussed management techniques and benefits of providing habitat for a diverse waterbird assemblage. The goal was to build a larger network of managed impoundments that can provide habitat during fall and spring migrations. Managers from Georgia and South Carolina attended.
- Provided guidance to reduce disturbance to nesting seabirds for an archaeological dig conducted on Castle Pinckney. Worked with project leads from USC, SC Institute of Archaeology and Anthropology, and University College London to protect pelican and tern nesting sites on the top of the structure during the excavation.

Significant deviations:

None.

Literature Cited:

Krogh, Michael G. and Sarah H. Schweitzer. 1999. Least terns nesting on natural and artificial habitats in Georgia USA. *Waterbirds* 22(2): 290-296.

Znidarsic, E. 2017. Camera traps are an Effective Tool for Monitoring Lewin's Rail (*Lewinia pectoralis brachipus*) *Waterbirds* 40: 417-422.

Federal Cost: \$ 273,508.00

Recommendations: Close the grant.

Acknowledgments:

This project could not have been completed without the work of many SCDNR biologists, technicians, pilots, administration staff and volunteers. We also received support from staff at USFWS, County and State Parks, Clemson University, University of South Carolina, Audubon Societies, private landowners, and many other organizations.

Special thanks to the seasonal technicians (Constance Powell, Ella DiPetto, Carissa Adams and Maina Handmaker), long-term volunteers (Debbie Albanese and Buddy Campbell), and SCDNR pilots (Owen Baker) who dedicated their time and talents to the waterbird project.

We also wish to thank Elizabeth Znidersic, who provided valuable information about the technique of using camera traps to study rails and helped SCDNR to incorporate this technique into our project during the spring of 2015. During 2016, Elizabeth spent three months in South Carolina volunteering for SCDNR as a surveyor and collecting acoustic and camera trap data at the Tom Yawkey Wildlife Center as part of her PhD project at Charles Sturt University, Albury, Australia.

Figures and Tables:

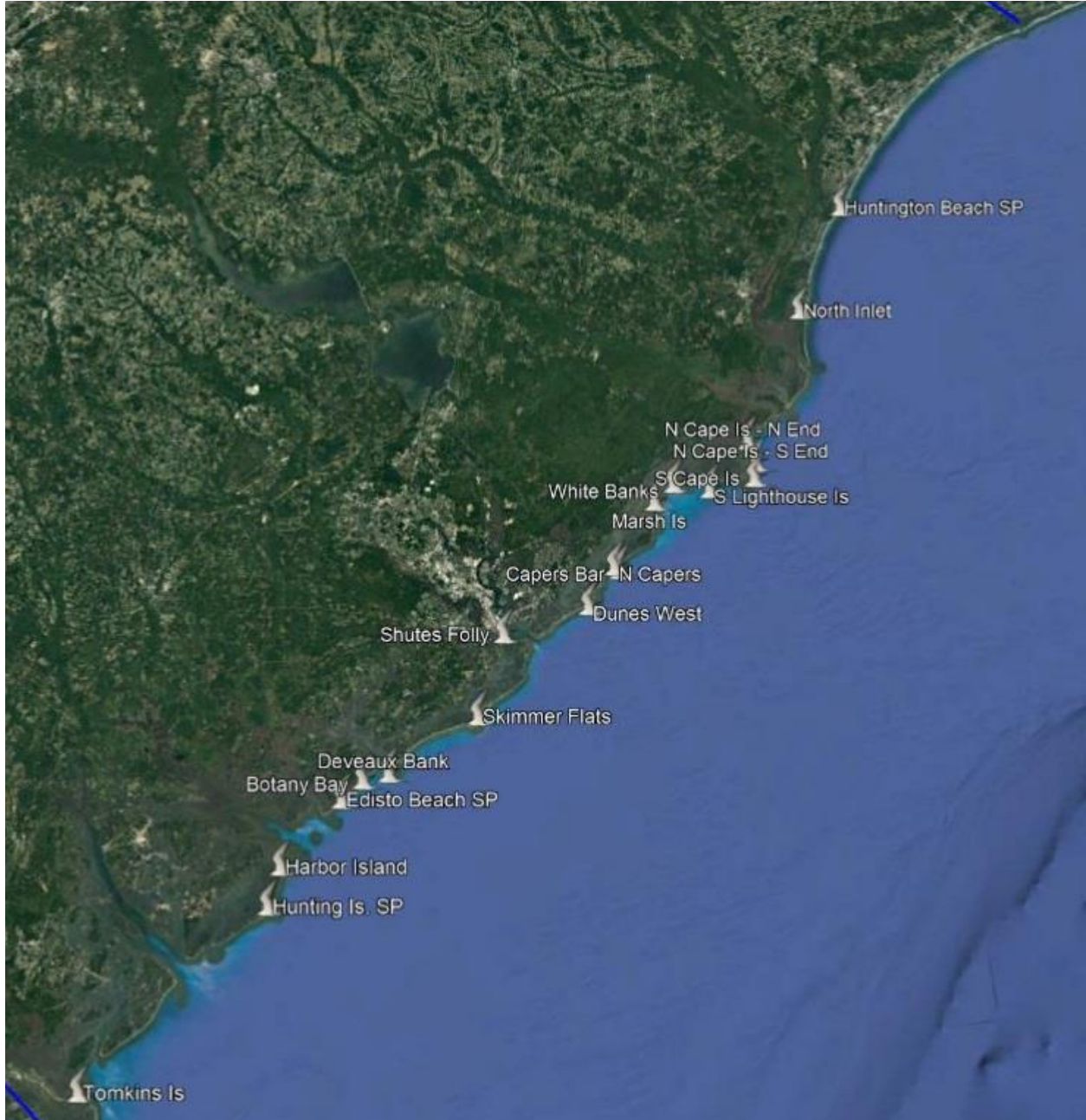


Figure 1. Locations of 21 sites (indicated by bird icons) in South Carolina where signs were placed in 2019 and 2020 to indicate beach closures. Closures help minimize human disturbance to beach-nesting birds and migratory shorebirds.

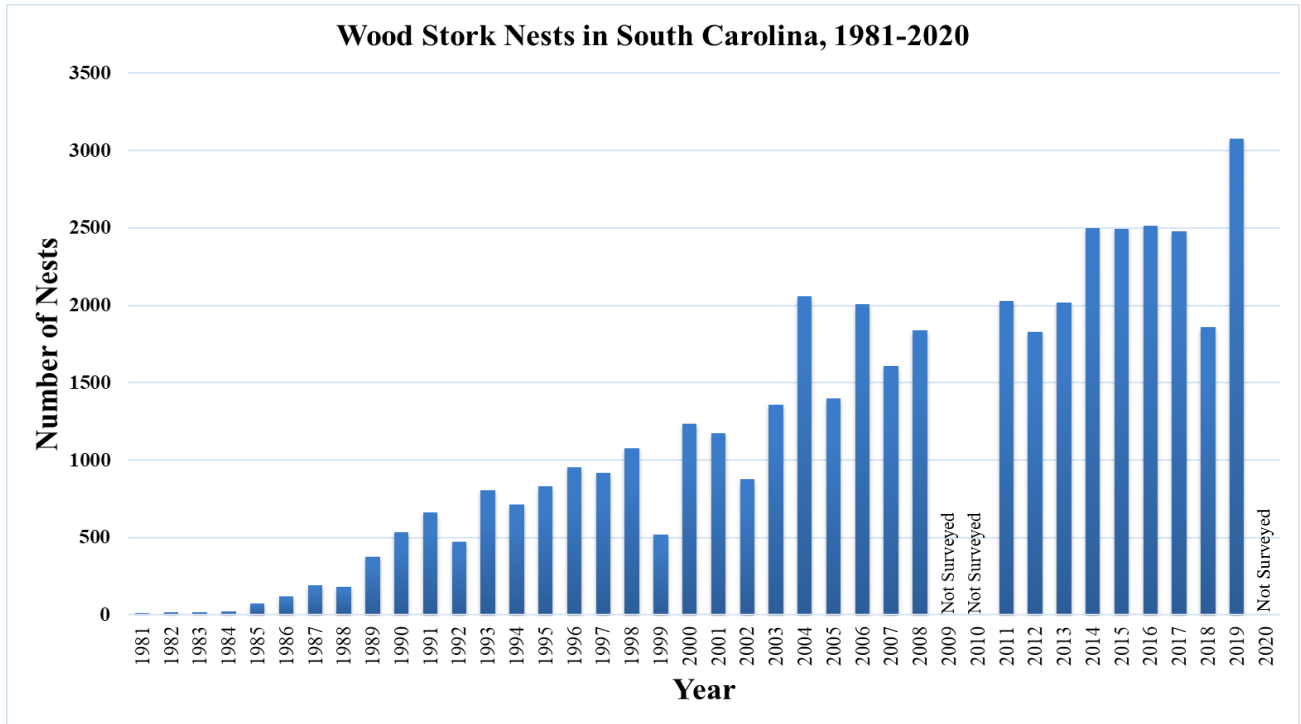


Figure 2. Number of Wood Stork (*Mycteria americana*) nests counted in South Carolina during annual censuses from 1981 – 2020. Statewide surveys were not conducted during 2020 due to COVID-19 restrictions.

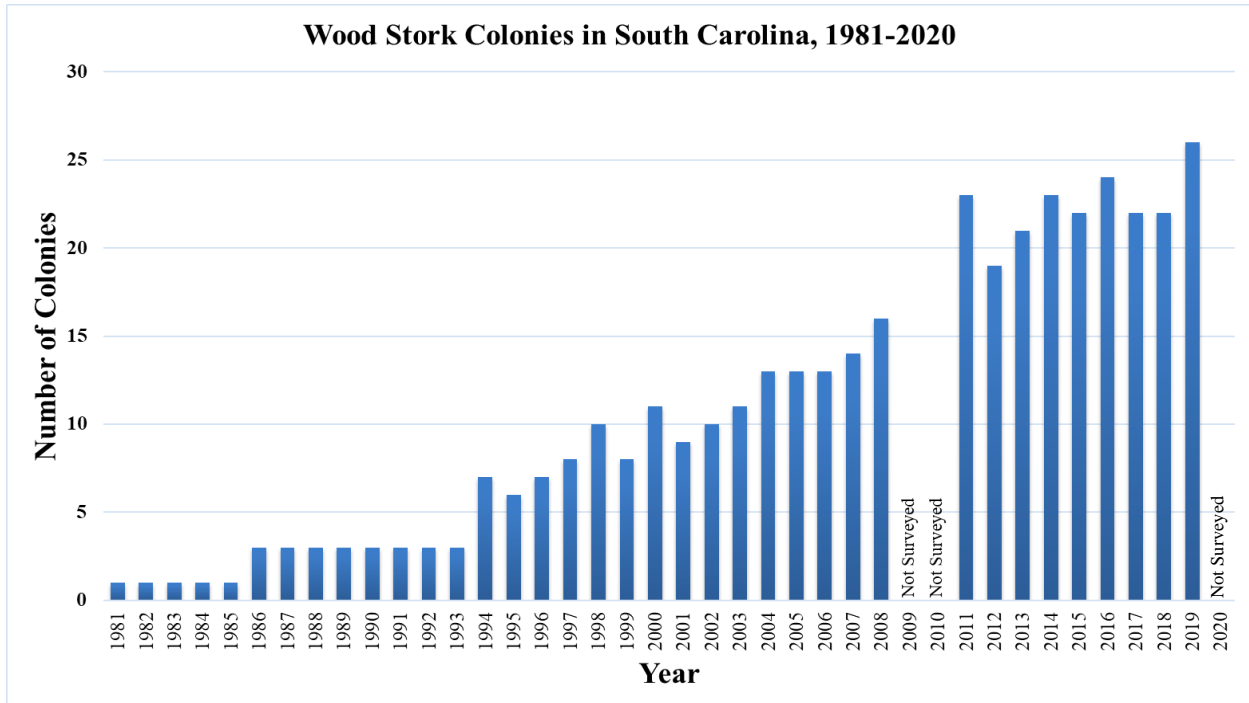


Figure 3. Number of colonies in which Wood Storks (*Mycteria americana*) nested in South Carolina from 1981 – 2020. Statewide surveys were not conducted during 2020 due to COVID-19 restrictions.

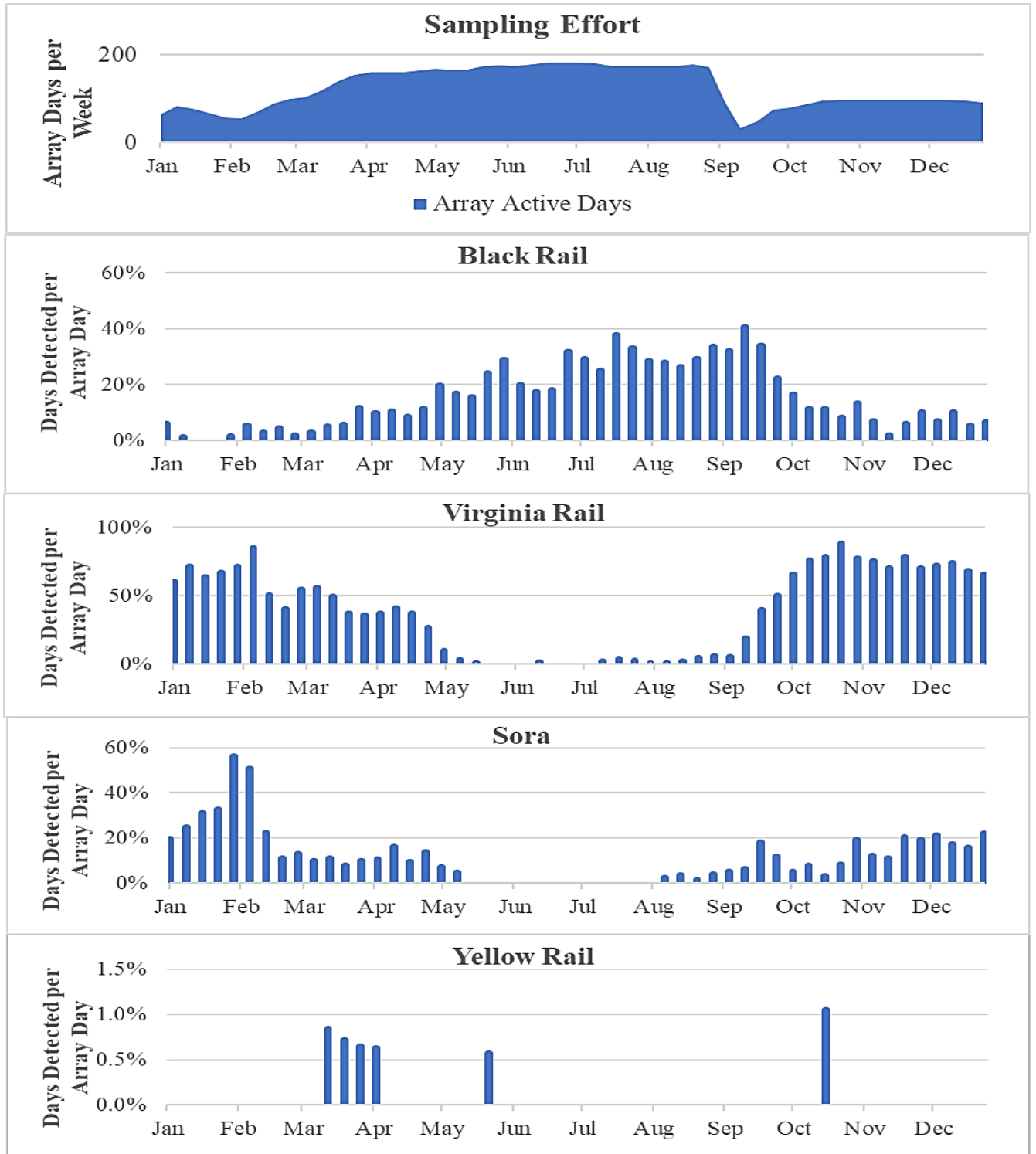


Figure 4. Seasonal occurrence of Black, Virginia, Sora, and Yellow Rails in Colleton County, South Carolina. Arrays of five camera traps were deployed in four wetlands periodically between September 2017 – September 2020. Sampling effort varied within and among years, and detections are presented as a percentage of days a species detected within each array divided by the cumulative number of days each array was active within the week.

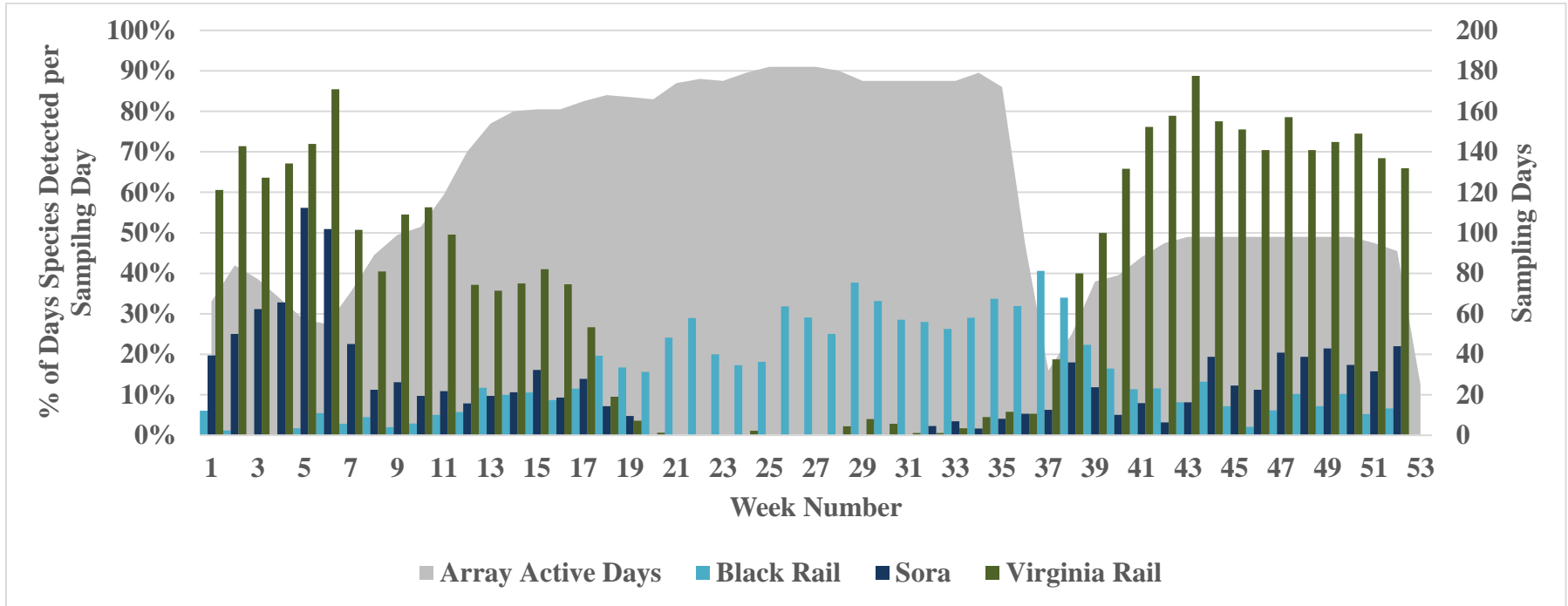


Figure 5. Relative frequency of Black, Virginia, Sora, and Yellow Rail detections in Colleton County, South Carolina. Arrays of five camera traps were deployed in four wetlands periodically between September 2017 – September 2020. Sampling effort, which was greatest during the breeding season and varied among years, is represented in area with gray fill. Yellow Rails were detected on less than 1% of sampling days and are not included in this graph.

Table 1. Number of nests at all known seabird colonies in South Carolina for 2019 and 2020. Data were collected during peak nesting dates. Numbers are from ground counts except for Brown Pelican, Royal Tern and Sandwich Tern nest numbers. These species were counted from digital images from aerial flights in a SCDNR law enforcement aircraft or unmanned aerial vehicle (drone). Least Tern nests are reported separately.

SPECIES SITE	2019 NESTS	2020 NESTS
BLACK SKIMMER	1049	491
CASTLE PINCKNEY	112	116
DEVEAUX BANK	255	
LIGHTHOUSE ISLAND		215
MARSH ISLAND	228	
NORTH CAPE ISLAND	219	
SAVANNAH SPOIL SITE	130	
WHITE BANKS	105	160
BROWN PELICAN	6109	5535
CASTLE PINCKNEY	733	359
DEVEAUX BANK	1701	2537
MARSH ISLAND	727	684
SKIMMER FLATS	2770	1955
TOMKINS ISLAND	178	0
COMMON TERN	8	9
NORTH CAPE ISLAND	4	1
WHITE BANKS	4	8
FORSTER'S TERN	12	10
MARSH ISLAND	12	
MARSH ISLAND		10
GULL-BILLED TERN	154	182
CASTLE PINCKNEY	32	35
DEVEAUX BANK	60	
LIGHTHOUSE ISLAND		38
MARSH ISLAND	23	40
NORTH CAPE ISLAND	21	6
NORTH LIGHTHOUSE ISLAND		1
WHITE BANKS	18	62
ROYAL TERN	12983	8217
CASTLE PINCKNEY	694	579
DEVEAUX BANK	1815	1463
MARSH ISLAND	6114	6175
SKIMMER FLATS	0	
TOMKINS ISLAND	4360	0
SANDWICH TERN	3562	2402
CASTLE PINCKNEY	41	1
DEVEAUX BANK	360	487
MARSH ISLAND	2556	1914
SKIMMER FLATS	0	
TOMKINS ISLAND	605	0
SOOTY TERN	1	
DEVEAUX BANK	1	

Table 2. Least Tern nests in 2019 and 2020 in South Carolina. “GRD SITES” are natural beach nesting sites. “ART SITES” are artificial nesting sites such as flat gravel-covered roofs and dredge spoil islands. Success is defined by >50% of the nests in a colony surviving. Fail is defined by < 50% of the nests surviving.

YEAR	TOTAL NESTS	GRD SITES	ART SITES	NUMBER OF SITES	SUCCESS	FAIL
2019	1,185	515 (44%)	670 (56%)	24	52%	48%
2020	1,235	679 (55%)	556 (45%)	34	31%	69%

Table 3. Least Tern nesting in 2019 at 9 beaches and in 2020 at 15 beaches. 7 sites were in Cape Romain National Wildlife Refuge, a federally managed property. 4 sites were on state owned properties: Deveaux Bank and Botany Bay are managed by the South Carolina Department of National Resources, and Huntington Beach and St. Phillips Island are managed by South Carolina State Parks. Lighthouse Inlet is part of the Lighthouse Inlet Heritage Preserve owned by the Charleston County Parks. Capers Bar is under the authority of the South Carolina Department of Administration. The remaining 4 sites were located on privately owned islands.

SITE NAME	LOCATION	2019 NESTS	2020 NESTS
Huntington Beach-North	Huntington Beach State Park	31	61
North Cape Island-North	Cape Romain National Wildlife Refuge	63	67
North Cape Island - Midway	Cape Romain National Wildlife Refuge	12	30
North Cape Island - South	Cape Romain National Wildlife Refuge	178	20
North Cape Island - Sandbar	Cape Romain National Wildlife Refuge		16
Lighthouse Island – North	Cape Romain National Wildlife Refuge		28
Lighthouse Island – South	Cape Romain National Wildlife Refuge		98
White Banks	Cape Romain National Wildlife Refuge	101	25
Capers Bar	Price’s Inlet	42	4
Dunes West	Isle of Palms	3	
Lighthouse Inlet	Folly Island		32
East Kiawah	Kiawah Island		145
Deveaux Bank	North Edisto River	42	13
Seabrook Island - North	Seabrook Island	43	
Botany Bay Plantation	Edisto Island		80
Harbor Sandbar	Harbor Island		40
St Phillips Island	Beaufort County		20

Table 4. Least Tern nesting at 15 artificial sites in 2019 and at 17 artificial sites in 2020. 16 sites are flat gravel-covered roofs; one site is a pier with gravel (Pier Romeo); 2 sites are gravel-covered dikes around impoundments at industrial sites (Williams Station and British Petroleum Plant); one site is gravel-covered construction for a new port terminal (Hugh Leatherman Terminal); and the Savannah Spoil Sites are 3 dredge spoil areas. In 2020 access to British Petroleum Plant was denied due to COVID-19 restrictions. Blank cells indicate sites were checked but were inactive. The roof at Garden City Chapel changed to poly-membrane covering prior to 2020 nesting season and is no longer available as a nesting site.

SITE NAME	SUBSTRATE	2019 NESTS	2020 NESTS
Carolina Forest Kroger	Gravel Roof	94	61
Georgetown-Horry Tech	Gravel Roof	28	26
Dunes Reality	Gravel Roof	7	3
Pavilion Roof	Gravel Roof	5	9
Garden City Chapel	Gravel Roof	11	
Dollar General	Gravel Roof		98
Sun News	Gravel Roof	11	
Blue Cross-Blue Shield	Gravel Roof		8
Grand Coastal Belk	Gravel Roof		25
Georgetown High School	Gravel Roof		16
Summerhouse Condos	Gravel Roof	19	43
4750/4760 Goer Dr.	Gravel Roof	104	81
Burke High School	Gravel Roof	22	
Pier Romeo	Adapted Old Pier	15	22
Hugh Leatherman Terminal	Gravel Construction	15	4
British Petroleum Plant	Gravel Dike	22	Unknown
Century Aluminum	Gravel Roof	108	4
Sedgefield Middle School	Gravel Roof	11	
Williams Station – Dominion Energy	Gravel Dike		34
Berkeley High School	Gravel Roof		9
Savannah Spoil Sites (3 areas)	Dredge Spoil Site	198	113

Table 5. The mean and range of shorebirds counted during International Shorebird Surveys on Capers Island and Bird Key Stono Seabird Sanctuary in South Carolina. Capers Island surveys only covered the beach on the north end and the sandbar in front of the north end of the island. Surveys were conducted once a month from September 2018 to September 2020. Fall is defined as September and October; winter is November, December and January; and spring is February and March.

Location	Number of Shorebirds (Fall)	Number of Shorebirds (Winter)	Number of Shorebirds (Spring)	Red Knots	Piping Plovers
Capers Island	961 (713 -1,042)	3,599 (2,772 - 5,535)	2,451	22	1-5
Bird Key - Stono	800 (626 - 1,039)	1,273 (1,090 - 1,396)	1,976	259 (169 - 370)	6-7 spring and fall; 1-2 winter

Table 6. Numbers of Wood Stork (*Mycteria americana*) nests counted in South Carolina during April – May 2019 and 2020. Colonies are listed in the order that they were first known to be active. Colonies that have not been active since the 1990s were not surveyed. During 2020, SCDNR pilots assisted the project by determining the status of known Wood Stork colonies (active or inactive) but passengers were not allowed in the planes due to COVID-19 restrictions, resulting in an incomplete nest count. Each year, a subset of the active colonies were also surveyed from the ground so nests could be counted more precisely, providing the only nest count data for 2020. Late season flights to determine if Wood Storks nested successfully (old chicks and/or fledglings present) were limited during 2019 and were not conducted during 2020, so the outcome of some colonies during 2019 and most colonies during 2020 is unknown.

Colony Name	County	2019 Nest Count	2019 Outcome	2020 Nest Count	2020 Outcomes
Colony 01	Colleton	No Survey		No Survey	
Colony 02	Colleton	No Survey		No Survey	
Colony 03	Hampton	333	Successful	Active, not counted	Unknown
Colony 04	Colleton	0		0	
Colony 05	Colleton	No Survey		No Survey	
Colony 06	Colleton	429	Successful	324	Unknown
Dungannon Pltn HP	Charleston	73	Successful	No Survey	Successful
Washo Reserve	Charleston	197	Unknown	Active, not counted	Unknown
Colony 09	Hampton	No Survey		Active, not counted	Unknown
Colony 10	Bamberg	165	Successful	No Survey	
Colony 11	Jasper	No Survey		No Survey	
Colony 12	Georgetown	No Survey		No Survey	
Colony 13	Horry	17	Unknown	Active, not counted	Unknown
Colony 14	Berkeley	No Survey		No Survey	
Colony 15	Colleton	No Survey		No Survey	
Wannamaker CP	Charleston	0		No Survey	
Colony 17	Horry	No Survey		No Survey	
Colony 18	Charleston	No Survey		No Survey	
Colony 19	Georgetown	233	Unknown	Active, not counted	Unknown
Colony 20	Colleton	312	Successful	300	Successful
Colony 21	Georgetown	257	Unknown	Active, not counted	Unknown
Colony 22	Beaufort	No Survey		No Survey	
Colony 23	Charleston	222	Successful	198	Successful
Colony 24	Beaufort	5	Successful	0	
Donnelley WMA	Colleton	121	Successful	20	Successful
Hunting Island SP	Beaufort	27	Successful	Active, not counted	Unknown
Colony 27	Horry	No Survey		No Survey	
Colony 28	Charleston	120	Successful	Active, not counted	Unknown
Colony 29	Beaufort	0		No Survey	
Colony 30	Jasper	39	Successful	Active, not counted	Unknown
Colony 31	Beaufort	0		No Survey	
Pinckney Island NWR	Beaufort	0		No Survey	
Colony 33	Horry	0		No Survey	
Colony 34	Beaufort	56	Successful	Active, not counted	Successful
Colony 35	Charleston	15	Successful	Active, not counted	Successful

Colony Name	County	2019 Nest Count	2019 Outcome	2020 Nest Count	2020 Outcomes
Colony 36	Williamsburg	No Survey		No Survey	
Colony 37	Jasper	0		No Survey	
Colony 38	Beaufort	10	Successful	No Survey	
Colony 39	Beaufort	62	Successful	Active, not counted	Unknown
Colony 40	Berkeley	0		No Survey	
Colony 41	Beaufort	3	Unknown	No Survey	
Colony 42	Beaufort	0		0	
Colony 43	Beaufort	0		No Survey	
Colony 44	Beaufort	0		Active, not counted	Unknown
Colony 45	Beaufort	0		No Survey	
Colony 46	Beaufort	No Survey		No Survey	
Colony 47	Horry	189	Unknown	Active, not counted	Unknown
Colony 48	Horry	77	Unknown	Active, not counted	Unknown
Colony 49	Berkeley	85	Unknown	Active, not counted	Unknown
Colony 50	Charleston	16	Unknown	Active, not counted	Unknown
Colony 51	Jasper	10	Successful	Active, not counted	Unknown
Colony 52	Beaufort	2	Successful	Active, not counted	Unknown
Colony 53	Beaufort	Active, not counted		No Survey	
Colony 54	Beaufort	No Survey		3	Successful
Statewide Total		3,075		Not Available	

Table 7. Summary of Wood Stork (*Mycteria americana*) nest monitoring data collected by South Carolina Department of Natural Resources staff, US Fish & Wildlife Service staff, and volunteers during 2019.

Colony Number and County	Colony 6 Colleton	Colony 7 Charleston	Colony 20 Colleton	Colony 23 Charleston	Colony 28 Charleston	Colony 34 Beaufort	All Monitored Colonies
Ownership	Private	Dungannon HP***	Private	Private	Private	Private	
Total Number of Stork Nests in Colony*	429	73	312	222	120	56	1212
Number of Monitored Nest Sites	97	3	51	38	45	34	268
Average Fledglings per Nest Site	1.9	0.0	2.1	2.4	2.7	1.7	2.0
Average Fledglings per Successful Nest Site	2.4	--	2.4	2.7	2.8	2.1	2.4
0 Fledglings	19	3	7	4	2	7	42
1 Fledgling	12	0	9	2	0	8	31
2 Fledglings	28	0	15	13	9	9	74
3 Fledglings	28	0	14	11	32	10	95
4 Fledglings	6	0	6	6	2	0	20
% Successful**	80%	0%***	86%	89%	96%	79%	84%

*Total number of nests counted in the colony during the annual colony survey.

** Number of successful nest sites divided by the total number of nest sites that were monitored.

Successful is defined as producing at least one fledgling. A chick was considered to be a fledgling if it survived to at least 7 weeks of age.

*** Storks abandoned the majority of the nests initiated in the nest monitoring plot at Dungannon HP before they met the criteria for a "nesting attempt". In a different area of the colony, storks were documented nesting successfully later during the nesting season but these nests were not included in the nest monitoring project.

Table 8. Summary of Wood Stork (*Mycteria americana*) nest monitoring data collected by South Carolina Department of Natural Resources staff and volunteers during 2020.

Colony Number and County	Colony 7 Charleston	Colony 20 Colleton	Colony 23 Charleston	Colony 34 Beaufort	All Monitored Colonies
Ownership	Dungannon HP	Private	Private	Private	
Total Number of Stork Nests in Colony*	No Count	300	198	>50	>548
Number of Monitored Nest Sites	17	48	34	40	139
Average Fledglings per Nest Site	0.7	1.9	2.1	1.4	1.6
Average Fledglings per Successful Nest Site	2.2	2.4	2.5	2.3	2.4
0 Fledglings	12	11	6	15	44
1 Fledgling	1	4	4	2	11
2 Fledglings	2	15	9	13	39
3 Fledglings	2	17	11	9	39
4 Fledglings	0	1	4	0	5
% Successful**	29%	77%	82%	63%	68%

*Total number of nests counted in the colony during the annual colony survey.

** Number of successful nest sites divided by the total number of nest sites that were monitored.

Successful is defined as producing at least one fledgling. A chick was considered to be a fledgling if it survived to at least 7 weeks of age.

Table 9. Summary of Wood Stork (*Mycteria americana*) nest monitoring data collected by South Carolina Department of Natural Resources staff and volunteers during 2011-2020.

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	All Years
Number of Monitored Colonies	2	7	9	8	7	7	6	4	6	4	
Number of Monitored Nest Sites	81	311	427	396	412	322	232	153	268	139	2741
Average Fledglings per Nest Site	1.6	1.1	1.4	2.2	2.3	1.7	1.7	1.7	2.0	1.6	
Average Fledglings per Successful Nest Site	2.1	1.9	2.0	2.6	2.5	2.3	2.0	2.2	2.4	2.4	2.2
0 Fledglings	18	122	144	49	48	88	52	37	42	44	600
1 Fledgling	11	53	55	28	26	42	23	12	31	11	281
2 Fledglings	38	107	163	126	144	98	100	64	74	39	914
3 Fledglings	14	28	59	163	168	73	51	39	95	39	690
4 Fledglings	0	1	6	30	29	21	6	1	20	5	114
% Successful*	77%	61%	66%	88%	89%	74%	79%	76%	84%	68%	77%

* Number of successful nest sites divided by the total number of nest sites that were monitored. Successful is defined as producing at least one fledgling. A chick was considered to be a fledgling if it survived to at least 7 weeks of age.

Note: These data were collected as part of an ongoing monitoring project by the South Carolina Department of Natural Resources (SCDNR). Data are preliminary and may be revised. Please contact Christy Hand at SCDNR prior to using these data in reports or publications.

Table 10. Summary of sampling effort and rail detections using arrays of camera traps between October 2018 – August 2020 in Colleton County, South Carolina.

Year and Month	Active Arrays	Sampling Days	Detection Days and % of Sampling Days Detected			
			Black Rail	Sora	Virginia Rail	Yellow Rail
2018						
October	7	217	31 (14.3%)	10 (4.6%)	166 (76.5%)	0 (0.0%)
November	7	210	3 (1.4%)	15 (7.1%)	149 (71.0%)	0 (0.0%)
December	7	205	8 (3.9%)	24 (11.7%)	155 (75.6%)	0 (0.0%)
2019						
January	6	161	2 (1.2%)	36 (22.4%)	119 (73.9%)	0 (0.0%)
February	7	62	7 (11.3%)	24 (38.7%)	55 (88.7%)	0 (0.0%)
March	9	157	10 (6.4%)	28 (17.8%)	147 (93.6%)	0 (0.0%)
April	10	240	14 (5.8%)	46 (19.2%)	131 (54.6%)	0 (0.0%)
May	12	256	71 (27.7%)	6 (2.3%)	2 (0.8%)	0 (0.0%)
June	11	270	70 (25.9%)	0 (0.0%)	2 (0.7%)	0 (0.0%)
July	10	280	109 (38.9%)	0 (0.0%)	15 (5.4%)	0 (0.0%)
August	11	269	92 (34.2%)	12 (4.5%)	14 (5.2%)	0 (0.0%)
September	4	71	40 (56.3%)	10 (14.1%)	31 (43.7%)	0 (0.0%)
October	3	93	16 (17.2%)	15 (16.1%)	70 (75.3%)	0 (0.0%)
November	3	90	9 (10.0%)	21 (23.3%)	69 (76.7%)	0 (0.0%)
December	3	93	4 (4.3%)	32 (34.4%)	71 (76.3%)	0 (0.0%)
2020						
January	3	71	0 (0.0%)	38 (53.5%)	62 (87.3%)	0 (0.0%)
February	7	139	1 (0.7%)	13 (9.4%)	45 (32.4%)	0 (0.0%)
March	7	217	12 (5.5%)	3 (1.4%)	35 (16.1%)	1 (0.5%)
April	8	219	30 (13.7%)	4 (1.8%)	15 (6.8%)	0 (0.0%)
May	10	250	47 (18.8%)	1 (0.4%)	5 (2.0%)	0 (0.0%)
June	8	240	72 (30.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
July	8	248	87 (35.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
August	9	248	80 (32.3%)	1 (0.4%)	0 (0.0%)	0 (0.0%)
Total		4,312	815 (18.9%)	339 (7.9%)	1,358 (31.5%)	1 (0.0%)