Black Skimmer (*Rynchops niger*) Breeding Trends in South Carolina

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Abstract - From 1975 to 2009, 186 surveys for *Rynchops niger* (Black Skimmer) nests were conducted in South Carolina. The state was not thoroughly monitored until 1988, and between 1988 and 2009 nesting numbers were stable. The mean nest count from 1988 to 2009 was 889 ± 55 SE, (n = 21 years). Twenty-six different sites supported nesting colonies with Cape Island, Cape Romain National Wildlife Refuge being used most often (24 years). Publicly owned lands were used more often than privately owned lands, and seabird islands—small ephemeral islands with other species of seabirds nesting on them—supported colonies more often than other habitat types. The number of skimmer nests was much lower than nesting records prior to this study; thus, intensive monitoring during the breeding season should continue to provide managers with information that can assist in increasing fecundity and protect optimal nesting habitat.

Introduction

The North American subspecies of the *Rynchops niger* L. (Black Skimmer) has an extensive distribution across coastal areas of North and Central America. Breeding colonies are observed along the North American Atlantic Coast as far north as Massachusetts and as far south as parts of Mexico (Clapp et al. 1983, Gochfeld and Burger 1994). Adults attempt to nest every year (Gochfeld and Burger 1994) and will re-nest up to three times within a breeding season if nest failure occurs (Clapp et al. 1983, Gochfeld 1976). Black Skimmers nest almost entirely within the coastal zone with few observations inland (Clapp et al. 1983). In New Jersey and New York, Black Skimmers nest on salt marshes, sandy beaches, and barrier islands (Burger and Gochfeld 1990). In the southeastern United States, skimmers nest primarily on barrier island beaches and dredged-material islands (Clapp et al. 1983).

Black Skimmers begin to nest later than other species of seabirds in South Carolina (Blus and Stafford 1980) and often display breeding-site fidelity (Erwin et al. 1981). In South Carolina, they usually arrive at breeding sites in late April or early May, and begin to lay eggs in late May to mid-June. Nesting may continue into August or September (Blus and Stafford 1980, Burger and Gochfeld 1990).

In the 1970s, the Black Skimmer was considered a declining species (Downing 1973). Most survey data on the Black Skimmer was published in the 1970s, and only limited nest count or survey data have been published since then (Gochfeld

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and Burger 1994). Although the population size is considered stable at present, the 2007 Audubon State of the Birds Watchlist lists the Black Skimmer as either declining or rare and of national conservation concern because of relatively low numbers and ongoing habitat loss (National Audubon Society 2007). Currently, the status of the Black Skimmer varies among states. It is listed as endangered in New Jersey (Jenkins and Pover 2003) and Maryland (Maryland Natural Heritage Program 2010), and is a species of special concern in New York (New York Natural Heritage Program 2010), North Carolina (Cameron 2005), and Florida (Clapp et al. 1983, Sprandel et al. 1999). Because of population declines, the status of the Black Skimmer is currently proposed to be upgraded to threatened in Florida (Florida Fish and Wildlife Conservation Commission 2011). Some research indicates declines on the Gulf Coast. Black Skimmer numbers declined on Mustang Island, TX by 71% from 1979–2007 (Foster et al. 2009) and significantly decreased from 1973–1990 in Galveston Bay (Gawlik et al. 1998).

The Black Skimmer is not listed in South Carolina. Surveys there for Black Skimmers during the breeding season have been sporadic since the 1970s. In 1973, a Black Skimmer survey was completed that consisted of two people driving roads that accessed beaches from New Jersey to Mississippi. South Carolina was poorly surveyed probably due to the inaccessibility of outer beaches to vehicles. Only 10 pairs were counted in the Charleston harbor area and 15 pairs on Bird Key-Stono River (Downing 1973). In the last three decades, more thorough surveys of South Carolina were conducted (Blus and Stafford 1980, Post and Gauthreaux 1989, Wilkinson 1997); yet not until the late 1980s were annual, comprehensive surveys conducted statewide (Wilkinson 1997). We examined breeding season counts of Black Skimmers in South Carolina from 1975 to 2009 to detect trends. Additionally, we looked at nest-site characteristics relative to colony presence to determine which habitat types were used most frequently. Identifying characteristics of Black Skimmer nesting sites is useful in prioritizing land conservation and creating seabird nesting areas.

Methods

The South Carolina coast consists of numerous barrier islands, and many of the beaches are accessible only by boat. Black Skimmer colonies were located by visiting previously used sites by boat or on foot, and aerial surveys were used to search the coast for new sites (Wilkinson 1997). From 1975 to 2009, 186 surveys for Black Skimmer nests were conducted from 27 May to 30 August. Statewide counts were not completed in 1977, 1978, 1980, 1981, 1982, 1984, 1985, and 1991. Estimates were either obtained by counting nests or counting adults that were assumed to be incubating or brooding young. Nest surveys were conducted by walking through a colony and counting only nest scrapes that had one or more eggs or chicks. If flushing adults off nests would cause high rates of predation of eggs or chicks, especially from aggressive species like *Leucophaeus*

atricilla L. (Laughing Gulls) (Blus and Stafford 1980, Clapp et al. 1983), adults were counted from a distance. A study correlating the number of adult skimmers to nests in a colony during the incubation period found the ratio to be 2.2 birds per nest (Portnoy 1978). When only adult numbers were recorded (n = 21), the number of adults was divided by two to represent minimum nesting effort, and this number was substituted for a nest count. Site name, latitude and longitude, ownership of site, and date were recorded. Means are reported with ± SE.

Black Skimmer colony locations were categorized as public or privately owned land. Public lands include all federally and state-owned islands, beaches, and dredged-material sites. Some privately owned barrier islands and beaches are urbanized with businesses and homes, while others consist of sparsely developed private residences. Although characteristics of private land are variable in South Carolina, this category is important for management purposes because private-land owners are eligible to receive technical and financial assistance if the habitat is considered important to migratory birds (US Fish and Wildlife Service 2011).

Additionally, colony locations were categorized as seabird islands and non-seabird islands. For our analysis, a seabird island was defined as a small (<100 ha) island surrounded by water, with no trees. Presently, South Carolina's seabird islands range from 2–87 ha. Seabird islands have numerous seabird and wading bird species nesting on them in addition to Black Skimmers. These islands are ephemeral and dynamic, and thus, are under water some years. Non-seabird sites include large barrier islands and mainland beaches, often with forests and mammalian predators. They support low diversities and numbers of nesting seabirds.

All statistical analyses were completed using Minitab Statistical Software for Windows Version 15 (Minitab, Inc. 2010). A simple linear regression was used to detect a change in nest numbers over time. Data used in the regression model included counts from 1988 and later, years when nest counts were conducted consistently (Wilkinson 1997). Because of frequent aerial surveys for wildlife along the South Carolina coast, we think all skimmer colonies were located and visited during 1988–2009 surveys, although effort and the number of visits to each colony was not recorded. Differences between numbers of nests each year on privately owned and public lands, and seabird islands and non-seabird islands were tested separately using a Wilcoxon signed-rank test (Minitab, Inc. 2010). For both comparisons, statistical significance was accepted at $P < 0.05$.

Skimmer Flats was a small seabird island located where the Stono River meets the Folly River, south of Charleston. In 1994, Bird Key-Stono River, a small seabird island adjacent to Skimmer Flats, was severely eroded due to dredging in the surrounding area (Wilkinson 1997). When sediment deposition accreted in the Skimmer Flats location, the resulting island was referred to as Bird Key-Stono River. For our analysis, Skimmer Flats and Bird Key are considered the same island and are referred to as Bird Key-Stono River.

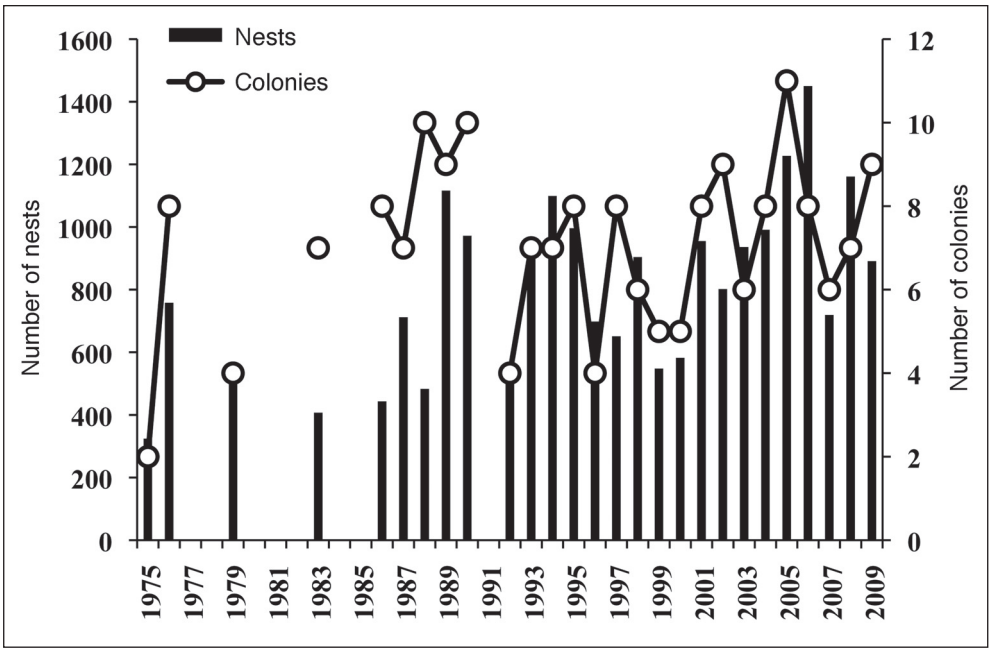

Figure 1. Number of Black Skimmer colonies and number of nests in South Carolina per year. Nest counts were conducted consistently, and the state thoroughly covered only from 1988 to 2009.

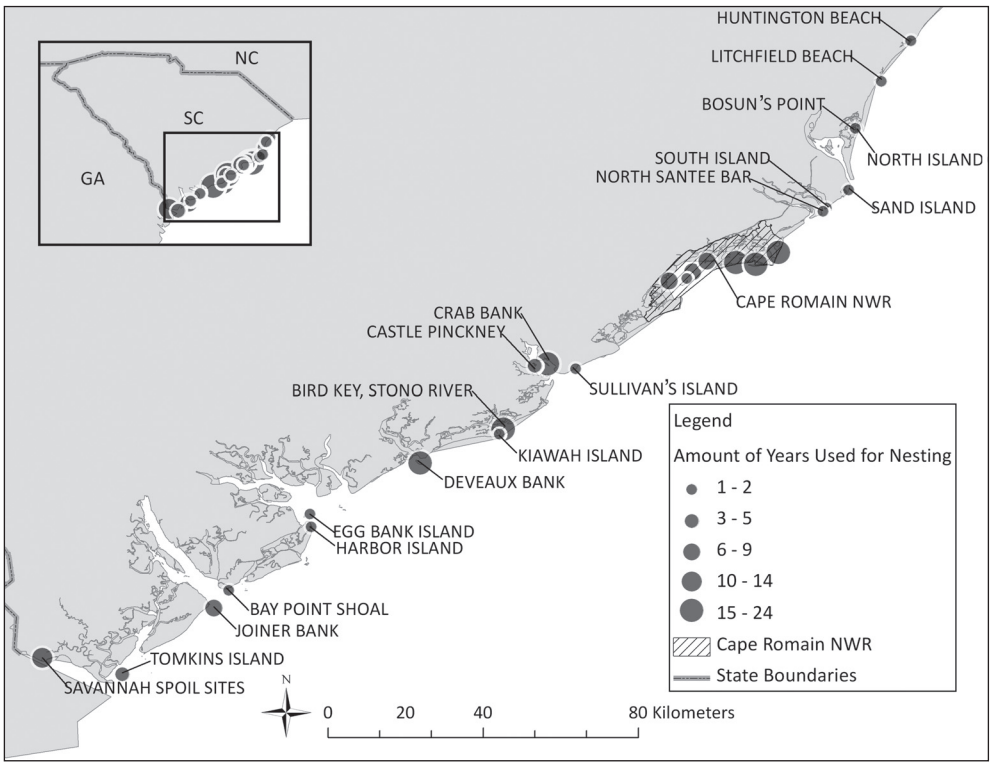

Figure 2. Locations of Black Skimmer colonies in South Carolina from 1975 to 2009.

Results

The mean nest count from 1988 to 2009 was 889 ± 55 (n = 21 years). Nest counts for these years ranged from 483 in 1988 to a maximum of 1450 nests in 2006. Year did not predict numbers of nests during 1988 to 2009, thus we conclude nesting numbers were stable (R^2 = 0.1, P = 0.2). The total number of colonies counted in South Carolina ranged from 2 in 1975 to 11 in 2005 (Fig. 1). Black Skimmer nest locations were distributed throughout coastal South Carolina, from just south of Myrtle Beach, south to the Savannah River (Fig. 2). From 1975 to 2009, 26 locations have supported breeding colonies of Black Skimmers (Table 1). No location in South Carolina had a breeding colony every year. Cape Island, in Cape Romain National Wildlife Refuge (CRNWR), supported a colony most often (Table 1).

Only five privately owned sites supported Black Skimmer colonies (Table 1). The median number of colonies on public land each year (7, n = 184) was greater than that on private land (0, n = 7) (W = 0, P = 0.036). The median number of colonies each year on seabird islands (5, n = 121) was greater than that on non-seabirds islands (3, n = 70) (W = 3.5, P < 0.001; Fig. 3).

Table 1. Number of years that each location in South Carolina supported a Black Skimmer colony (followed by ownership) from 1975 to 2009. Sites are listed from north to south. PR = private, ST = state, CRNWR = Cape Romain National Wildlife Refuge (federal), CORPS = US Army Corps of Engineers (federal).

Colony locations from north to south	Years with a colony (%)
Huntington Beach (ST)	2 (6)
Litchfield Beach (PR)	1 (3)
Bosun's Point (PR)	2 (6)
North Island (ST)	2 (6)
Sand Island (ST)	1 (3)
South Island (ST)	1 (3)
North Santee Bar (ST)	1 (3)
Cape Island (CRNWR)	24 (71)
Lighthouse Island (CRNWR)	17 (50)
Raccoon Key (CRNWR)	18 (53)
White Banks (CRNWR)	7 (21)
Marsh Island (CRNWR)	8 (24)
New Island (CRWNR)	2 (6)
Bird Key-Bull's Bay (CRNWR)	7 (21)
Sullivan's Island (PR)	1 (3)
Crab Bank (ST)	22 (65)
Castle Pinckney (ST)	5 (15)
Bird Key–Stono River (ST)	23 (68)
Kiawah Island (PR)	2 (6)
Deveaux Bank (ST)	23 (68)
Egg Bank Island (ST)	2 (6)
Harbor Island (PR)	1 (3)
Bay Point Shoal (ST)	1 (3)
Joiner Bank (ST)	7 (21)
Savannah Spoil Sites (CORPS)	10 (29)
Tomkins Island (ST)	4 (12)

Discussion

We found the lowest number of Black Skimmer nests recorded in 1975, from only two colonies. Likely, these low numbers were due to inadequate coverage. Our regression model found nest numbers were stable post-1988. Higher counts of Black Skimmer nests in the 2000s are probably due to an increase in effort to document colonies during peak nesting (F.J. Sanders, unpubl. data).

Nest initiation within a colony is asynchronous so multiple visits are necessary to document maximum colony size (Brooks 2011, Gochfeld 1979). Black Skimmer colonies may fail due to predation, overwash, or other factors and skimmers may renest at different sites. Thus, searching for colonies and counting nests during the entire nesting season, may actually overestimate the number of skimmers nesting (Brooks 2011, Gochfeld and Burger 1994). In a 2-year study in South Carolina, the number of Black Skimmer nests at 3 sites was recorded approximately every 3 days. Peak nest counts were not simultaneous at different sites and occurred 16 Jun to 1 July (Brooks 2011). To ensure a more accurate statewide skimmer population estimate, we suggest all potential nesting sites are visited multiple times during these peak nesting dates and peak nesting counts recorded for each site. But nests should not be counted after this 2-week window to avoid recounting skimmers when they move to other sites in renesting attempts.

Breeding Bird Surveys (BBS) compiled by the United States Geological Survey have sparse data on Black Skimmers in South Carolina, although the surveys

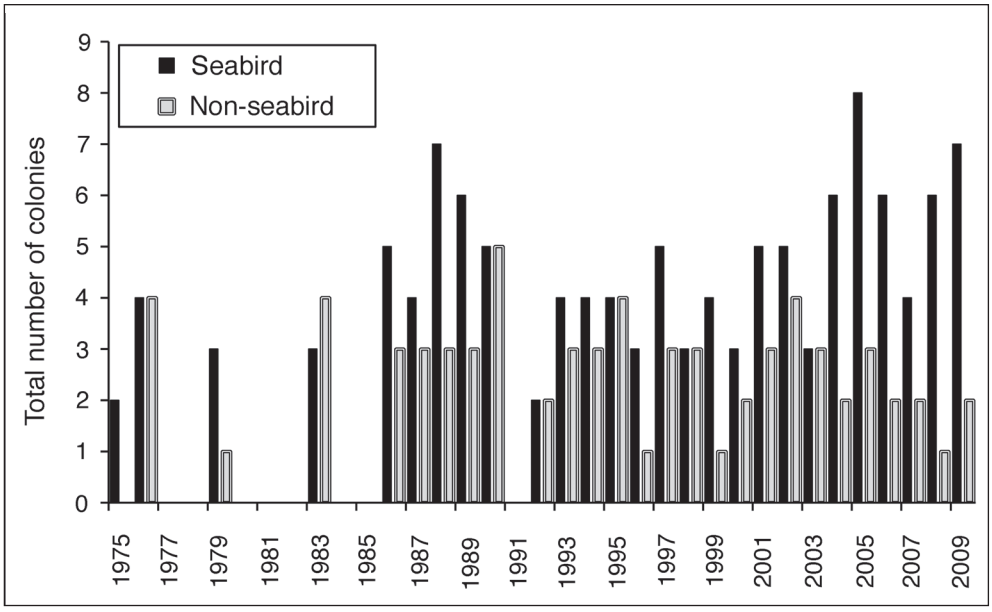

Figure 3. Number of Black Skimmer colonies in South Carolina by habitat type from 1975 to 2009. A seabird island is a small (<100 ha) island that is surrounded by water and does not have trees. Non-seabird islands include large barrier islands and mainland beaches often with forests and mammalian predators.

report Black Skimmer numbers within the southeastern region were stable from 1966 to 2007 (Sauer et al. 2008). Even though historical records are sparse, there is evidence that recent breeding numbers are much lower than historical ones. Based on observations by Reverend John Bachman, 20,000 skimmer nests were estimated in Bull's Bay (now located in CRNWR) in 1870 (Audubon 1870). However, it has been suggested that either this number was overestimated or that Bachman had mistaken other species as Black Skimmers (Blus and Stafford 1980). In 1910, one site in CRNWR had approximately 1000 Black Skimmer nests (Bowdish and Philipp 1910). Documented nest estimates from CRNWR in 1946 and 1947 report the maximum number of nests at 1000 (Blus and Stafford 1980). From 2004–2009, CRNWR had a maximum number of nests of 780 (2005) with a mean of 541 ± 75 nests, (n = 5 years). Although it is difficult to ascertain the accuracy of early Black Skimmer estimates in South Carolina, records of large colonies elsewhere suggest 20,000 nests is possible. In Virginia in 1917, research was conducted on a Black Skimmer colony with a minimum of 4000 pairs (Bales 1919). Kopman (1907) counted 11,000 breeding pairs of skimmers on Timbalier Islands, LA.

Very few privately owned barrier islands support Black Skimmer colonies. When nesting does occur on these private islands, the colonies are located on the ends of the islands where there is minimal development and human disturbance (F.J. Sanders, unpubl. data). Skimmer colonies were detected frequently on seabird islands. Because seabird islands are surrounded by water and do not have woody vegetation, there is minimal threat from large mammalian predators. Barrier islands typically have maritime forests and harbor mammalian predators (Burger and Gochfeld 1990). In studies of Black Skimmer nest-site selection in New Jersey and New York, skimmers avoided islands with upland vegetation because of this risk (Burger and Gochfeld 1990). Seabird islands have little vegetation, facilitating social interaction within the colony (Burger and Gochfeld 1990) and perhaps another reason why seabird islands are a preferred habitat for nesting. Creation of seabird islands using dredged sand and shell material provides nesting habitat for Black Skimmers, and this type of habitat is used frequently (Erwin 1980, Leberg et al. 1995).

Despite the greater number of nests on seabird islands versus non-seabird islands, there are several barrier island beaches that are important breeding sites for this species. These locations are Cape Island, Raccoon Key, and Lighthouse Island in CRNWR. These islands have limited human disturbance and supported Black Skimmer colonies in at least 50% of the years. Nesting was not observed on rooftops as seen in Florida and North Carolina (Cameron 2008) or salt marshes as seen in New Jersey (Burger and Gochfeld 1990).

Although nest numbers in South Carolina appear to be stable, we suspect they are lower than prior to this study, thus nest surveying should continue to provide a better understanding of breeding trends and aid in well-informed management decisions. The loss of nesting habitat due to development and the intolerance of Black Skimmers to human disturbance support the need to

conserve land for nesting for skimmers and other seabird species (Blus and Stafford 1980, Safina and Burger 1983). No site was used all years, so protecting multiple sites is needed to insure adequate nesting habitat. Reduced human disturbance at South Carolina seabird islands is especially important because these islands provide the primary nesting habitat for skimmers and the only habitat type where *Pelecanus occidentalis* L. (Brown Pelican), *Sterna maxima* Boddaert (Royal Tern), and *S. sandvicensis* Latham (Sandwich Tern) presently nest in South Carolina (Jodice et al. 2007). Avian predators, such as gulls and owls, and flooding of nests can be devastating to nesting, and these threats are not absent from seabird islands (O'Connell and Beck 2003). Monitoring reproductive success is also important and can help identify causes of nest loss in all habitat types. Intensive monitoring during the breeding season provides managers with information that allows them to target management actions such as specific predator removal and vegetation control.

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