

## Swallow-tailed Kite

*Elanoides forficatus*

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### DESCRIPTION

#### Taxonomy and Basic Description

The Swallow-tailed Kite is unmistakable with its long, pointed wings (wingspan of 1.2 m or 4.0 ft.) and long forked tail (32 cm or 12.6 in.). The dorsal coloration is black while the head and underparts are white. Average weight for adults is 440 to 480 g (1 lb.), with females being slightly heavier than males. Swallow-tailed Kites capture most of their food and eat, drink, and bathe on the wing. This bird spends much of the day in flight and feeds year-round on insects (particularly airborne; Meyer 1995, Baird 2011). However, they provision their young mainly with small vertebrates, including anoles, tree frogs, small arboreal snakes, nestling birds, and (roosting) bats (Meyer et al. 2004), all of which they glean from vegetation while in flight.



#### Status

The Swallow-tailed Kite is listed by the South Carolina Department of Natural Resources as an endangered species, and is considered a high-priority species of concern by the other states in which it occurs, the United States Fish and Wildlife Service, Partners in Flight, and national conservation organizations. There are 3 distinct genetic populations that nest from the Southeastern United States to south-central South America (Washburn 2007). The degree of difference between the United States population and the two in Latin America equals or exceeds differences found between taxonomically-recognized species (Washburn 2007).

#### POPULATION SIZE AND DISTRIBUTION

Historically, the United States range included at least 21 states as far north as Minnesota (Cely 1979). The Swallow-tailed Kite is presently found in floodplain forests and other large tracts of forested wetlands and mixed pine habitats (Meyer et al., *in prep*) of the Outer Coastal Plain (OCP) from South Carolina to east Texas, with most of this remnant breeding range occurring in 6 Southeastern states: South Carolina, Georgia, Florida, Alabama, Mississippi, and Louisiana. The disappearance of the Swallow-tailed Kite from three-fourths of its US breeding range between 1880 and 1910 was one of the most dramatic range contractions of any bird before the post-World War II decline of the peregrine falcon. Since about 1940, populations have apparently stabilized with some evidence of a possible reoccupation of former habitat, including parts of South Carolina and small areas in eastern Texas; southeastern North Carolina, where limited nesting may have begun around 2003; and southeastern Arkansas, where a few

unsuccessful nesting attempts were documented in the early 2000s in Arkansas's White River bottoms, over 320 km (200 mi.) north of the nearest nesting population (J. Bednarz, pers. comm.).

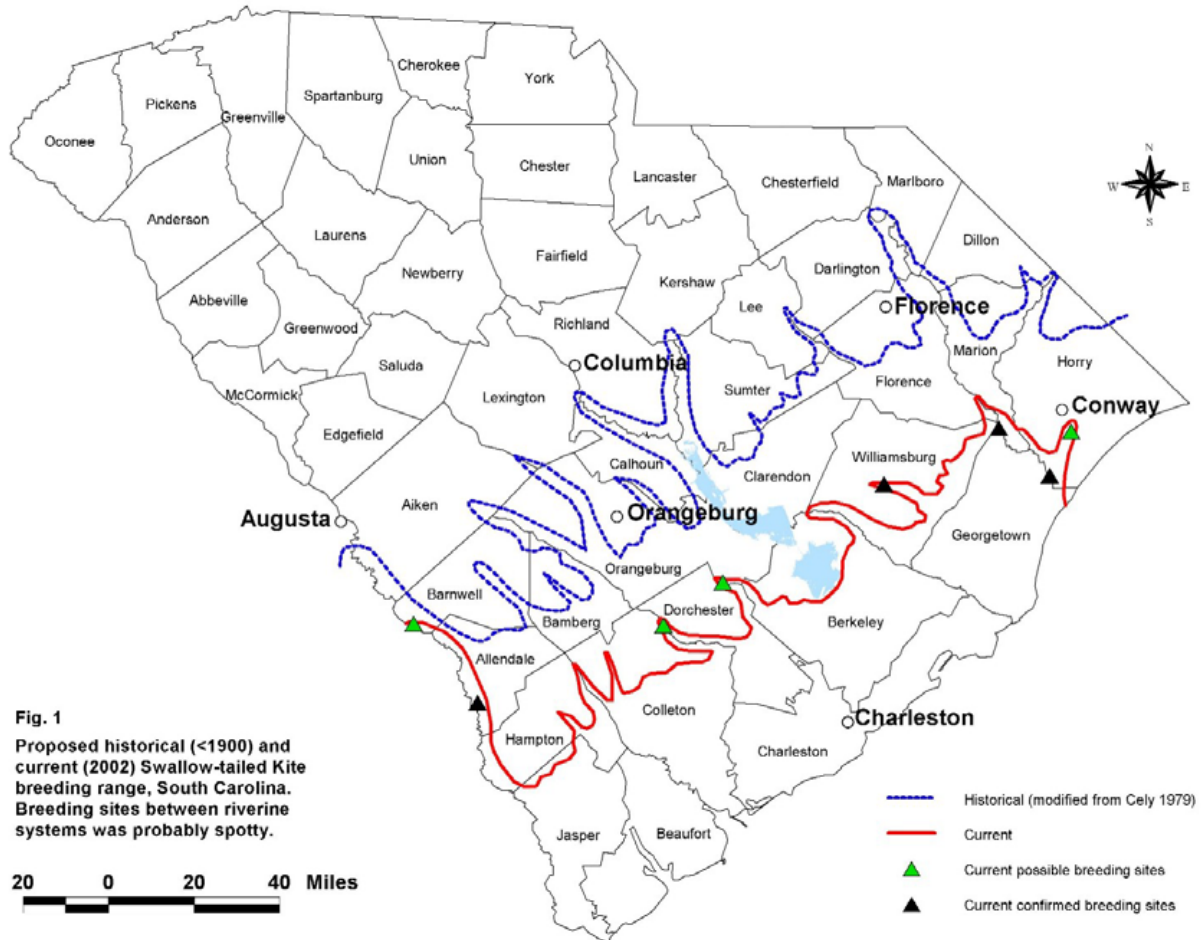
Because Swallow-tailed Kites are so distinctive, noteworthy, and able to range widely in the United States prior to and following nesting, their unexpected or repeated appearance often leads people to believe that they are increasing in number. There are no clear indications from the limited samples of Breeding Bird Survey data or annual counts at large pre-migration roosts (Meyer and Zimmerman 2006; K. Meyer, unpublished data) that the population is presently changing substantially in number or distribution. Until recently, the estimated population for the entire United States was about 800 to 1,150 pairs (Cely and Sorrow 1990), or about 2,500 to 5,000 individuals allowing for sub-adults and juveniles at the end of the nesting season (Meyer 1995). About two-thirds of these birds are thought to reside in Florida (Meyer 1995). However, systematic, synchronized counts at large, pre-migration communal roosts in peninsular Florida since 2004, which have peaked at about 7,000 individuals each year, indicate that the United States population may include as many as 10,000 individuals, or 2,000 to 2,500 pairs (Meyer and Zimmerman 2006; K. Meyer, unpublished data).

The estimated number of breeding pairs in South Carolina is 120 to 170; these are primarily found in large floodplain forests and swamps of the OCP, with significant populations occurring on the lower Great Pee Dee, Santee, Black, Edisto, and Savannah Rivers (and their tributaries), and in the Francis Marion National Forest.

#### HABITAT AND NATURAL COMMUNITY REQUIREMENTS

In South Carolina, the Swallow-tailed Kite is closely associated with large tracts of forested wetlands of the Outer Coastal Plain, such as those found in the Francis Marion National Forest and along the lower Savannah, Edisto, Santee, Black, and Great Pee Dee Rivers. It shows a strong preference for nesting in dominant or co-dominant loblolly pines (*Pinus taeda*) growing within or on the edges of wetland forests. However, kites will regularly use bald cypress (*Taxodium distichum*) when pines are unavailable. Swallow-tailed Kites have also been recorded nesting in water tupelo (*Nyssa aquatica*), sweetgum (*Liquidamber styraciflua*), and willow oak (*Quercus phellos*).

The average dimensions of loblolly pine nest trees in the Francis Marion National Forest were 32 m (104 ft.) tall and 49 cm (19 in.) diameter breast height. Pines were located within stands averaging 13.5 m<sup>2</sup>/ha (60 ft.<sup>2</sup>/ac.) basal area and 61 years of age (Cely and Sorrow 1990). Dimensions for cypress nest trees were similar to the pines; these trees had an average height of 29 m (96 ft.), with a diameter above the swell of 50.5 cm (20 in.) and a basal area of 13.5 m<sup>2</sup>/ha (60 ft.<sup>2</sup>/ac.). Cypress ages were not determined but all were at least second, if not third, growth and probably no more than 75 years of age (J. Cely, unpublished data). Nest trees were only slightly larger than surrounding trees. The average distance to a waterway for kite nests in South Carolina was 135 m (455 ft.), but this distance ranged from 25 to 544 m (82 to 1,795 ft.) (J. Cely and A. Day, unpublished data). As Spanish moss (*Tillandsia usenoides*) is a key component of nest construction, this epiphyte may be a necessary ecological requirement (Meyer 1995).



Based on VHF telemetry research, Swallow-tailed Kites have a large home range that encompasses thousands of acres (Cely and Sorrow 1990; Meyer and Collopy 1995). Foraging birds use a variety of stand types and ages and will often commute long distances, up to 24 km (15 mi.), from the nest site, to feed on various prey (Meyer 2004b). Once nestlings have fledged and are becoming independent, foraging kites gather to prey on beetles, dragonflies and grasshoppers associated with upland fields, pastures and freshwater marshes (Baird 2011). Other Swallow-tailed Kites are attracted to “hot spots” of insect abundance; feeding aggregations sometimes consist of more than 50 birds.

## CHALLENGES

Swallow-tail Kites are highly social in all seasons, foraging, roosting, and migrating in flocks and nesting in loose aggregations (neighborhoods) within sight of each other, often only 60 to 100 m (197-328 ft.) apart. Their social behavior, undoubtedly adaptive, makes them conspicuous, relatively easy to count, and fascinating to observe. Predictably, Swallow-tailed Kites show strong site fidelity when joining in large roosts (Meyer 1998; Meyer and Zimmerman 2006) and especially when nesting, most likely because returning to previously used sites helps ensure that they will encounter conspecifics (Meyer 1995). This provides opportunities for resource managers to focus their attention and protection more efficiently.

Unfortunately, it also means that specific locations become very important to Swallow-tailed Kites. Because most of the United States' breeding population nests on unprotected, private lands, particularly commercial timberlands, human activities that alter or destroy natural habitats or create repeated disturbance will displace not just a single pair or roosting individual, but large numbers of kites (Meyer 2004b). Social bonds, and the benefits that accrue, may be lost, especially if the scale of the intrusion and the subsequent displacement are large. This creates one of the biggest challenges for conserving Swallow-tailed Kites, from local to landscape scales.

There appears to be substantial suitable-but-unoccupied habitat range-wide, including in South Carolina. This can be misleading. Because social needs and attractions result in clumped distributions, they intensify the use of some patches of suitable habitat while leaving other patches vacant. The Swallow-tailed Kite's demography also may contribute to this incomplete use of suitable habitat. Adult survival is relatively low for a bird of this size and general ecology (Meyer 2005). This may stem, at least in part, from the risks of long-distance migration, which also may contribute to the low survival of first-year kites (Meyer 2004a, Meyer and Kent 2012).

Thus, the loss of habitat *is* a serious threat to Swallow-tailed Kites when it is *occupied* habitat. The loss of unoccupied habitat, furthermore, represents a threat when suitable habitat is relatively limited locally, forcing the associated groups of kites to move long distances and, therefore, to risk dissolution. This explains the recommendation that the size of clear-cuts on industrial forests occupied by Swallow-tailed Kites should be limited to allow for relocation of displaced birds within a reasonable distance (Meyer and Kent 2010a, 2011a). It also relates to the recommendation (Meyer and Kent 2011a) that forest managers should maintain a minimum total area of suitable nest trees (mature pines or cypress with open crowns within stands of uneven height and structure) within a specified areas of the landscape at all times. This would allow for flexibility in harvest planning while still accommodating the kites' needs for attractive nest trees within a sufficiently small area to ensure that the social nesting neighborhood can move cohesively when they return to find the previous year's nest trees gone.

Non-sustainable timber management (including short rotations), altered wetland hydroperiods, uncontrolled invasive species, budgetary limitations, or landowner restrictions that preclude appropriate land management, etc. are all forms of habitat loss. Additional factors limiting swallow-tailed kite recovery include shooting (which may have played a role in the decline of the early 1900s; Cely 1979); predation (e.g. where anthropogenic habitat alterations, such as fragmentation, promote unnatural increases in key predators such as Great Horned Owls); and the loss of essential habitats combined with unexpectedly high mortality on the South American winter range, perhaps due to agricultural contaminants.

The Louisiana-Mississippi subpopulation (Coulson 2006; Coulson et al. 2008) appears to be limited by predation. Raptors, particularly great horned owls (*Bubo virginianus*), kill kites of all ages, but especially adult females attending nests, possibly limiting breeding-aged females. During monitoring of 290 nests, recently fledged young, and radio-tagged birds (90 fledglings, 13 adults), such predation accounted for 51 to 57% of mortality. Predation of nestlings and attending adults appears to be increasing in the Eastern portion of the breeding range,

particularly in Florida and Georgia on industrial timberlands experiencing increased harvest rates, and high predation rates by Great Horned Owls have recently been observed in coastal kite neighborhoods (Meyer and Kent 2011b, 2011c). Little is known about the regional ecology of great horned owls, particularly abundance, breeding density, habitat associations, and range sizes. This predator, in particular, also is known to have high impacts on water bird colonies in South Carolina (Goyette et al. 2011).

## CONSERVATION ACCOMPLISHMENTS

Following the example of South Carolina's initial research in the late 1980s, additional efforts have been directed towards the species during the past 15 to 24 years in Florida, Louisiana, Mississippi, and Georgia. Finding and monitoring active nests has yielded data on breeding biology, vegetation features of nest sites, philopatry, group sizes, prey species and feeding rates, estimates of nesting success and productivity, and causes of nest failures (see various references). In South Carolina, research by Cely and colleagues centered mainly on the Francis Marion National Forest from the mid-1980s into the 1990s (Cely and Sorrow 1990; J. Cely and A. Day, unpublished data). Later studies focused more on the Waccamaw National Wildlife Refuge and adjacent areas of the Winyah Bay watershed (Meyer and Kent 2009, 2010b, 2011d).

Long-term studies in Florida, Georgia, and South Carolina have investigated survivorship for large samples of adults tracked by satellite (Meyer 2005) and individuals tagged as nestlings with VHF transmitters, for which first-breeding age, breeding dispersal, and recruitment also were examined (Meyer 2004a; Meyer and Kent 2009, 2010b, 2011d, 2012).

Quantitative descriptions of selected habitats at the forest-stand and landscape scales have been derived from large sets of accumulated nest locations (Meyer et al. *in prep*). These results, in turn, are now being combined with spatially-explicit demographic and land-ownership data to produce a model that will prioritize land protection and management strategies across the Southeast (K. Meyer, G. Kent, S. Beyeler, and J. Cely, unpublished data).

Post-breeding / pre-migration communal roosts of Swallow-tailed Kites probably facilitate foraging efficiency in preparation for migration (Meyer 1995 and 1998). These aggregations, numbering from a few to 100 or more along rivers of the Atlantic and Gulf Coastal Plains and 2,000 to 3,000 at the largest roosts in peninsular Florida, may be used habitually year after year and are sensitive to human disturbance. Communal roosts offer unusually good opportunities for population monitoring (Meyer 2004a; Zimmerman and Meyer 2006). Systematic, synchronized aerial counts were conducted in 2009, 2010, and 2011 in South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas with funding from the United States Fish and Wildlife Service and matching support from cooperating partners (South Carolina Nature Conservancy, Georgia Department of Natural Resources, Avian Research and Conservation Institute, Alabama Department of Conservation and Natural Resources, and The Orleans Audubon Society). The goal of this collaborative project was to refine and recommend population monitoring methods and, combined with concurrent location data from satellite/GPS telemetry (K. Meyer and J. Coulson, unpublished data), to identify previously unknown roost sites and apply occupancy data to systematically estimating national population size. Knowing the locations of pre-migration communal roosts, especially the larger, repeatedly used sites, is the

first step toward land protection, habitat management, and prevention of human disturbance (Meyer 1998; Zimmerman and Meyer 2006).

The long-distance migration pathways (over 17,000 km or 10,563 mi. round trip) and wintering destinations of the United States population of swallow-tailed kites, described from satellite and VHF telemetry from 1996 to 2004 (Meyer 2004a; Meyer 2005; Zimmerman 2004; Zimmerman and Meyer 2004), present international threats, challenges, and opportunities for year-round management and conservation. Particular portions of the migration route appear to pose greater risks based on associated mortality (Meyer 2004a and 2005). In some cases, the causes are natural and unmanageable (e.g. long over-water flights north- and southbound between the United States and Mexico/Central America; and when crossing the Andes Mountains in northwestern South America). However, greater-than-expected mortality (inferred from loss of telemetry signals) on the winter range in central South America may be linked to rapid conversion of traditionally used ranchland habitats to intensive, highly-treated industrial agriculture (Meyer 2004a and 2005). A recently-initiated satellite/GPS telemetry study (see previous paragraph; K. Meyer and J. Coulson, unpublished data), including adults tagged in South Carolina, Georgia, Florida, Mississippi, and Louisiana, will produce much finer-scaled location data over several years and may reveal likely causes of death on the winter range.

In 2007, a partnership, the Swallow-tailed Kite Conservation Alliance, was established to determine priorities for research, monitoring, management, and public education; to share information; and to advance conservation for the species (Zimmerman 2009). The Alliance has functioned mainly through the collaborations and cooperative efforts of sub-groups within the organization, depending on the goals and geographic scope of the respective activities.

In some instances in South Carolina, nest site information has increased land acquisition incentives and protection efforts, such as at the Waccamaw National Wildlife Refuge and the lower Santee/FMNF. Because of the species' large home range, it could serve as an umbrella species for the conservation of other area-sensitive wetland wildlife including neotropical migrants, Barred Owls, Red-shouldered Hawks, Pileated Woodpeckers, river otters, and black bears. South Carolina maintains an unusually active, collaborative approach to Swallow-tailed Kite conservation that is based on the combined interests and efforts of agencies and organizations devoted to land management, land acquisition, research, and public education.

One of the most important endeavors for researchers has been to produce management recommendations, particularly for breeding habitats on both public and private lands. Combined results of studies in 5 states point to favorable silvicultural practices at the nest-site, forest, and landscape levels. This is particularly important given the large proportion of Swallow-tailed Kite nesting territories on corporate and private lands. *Appendix 1* in Meyer and Kent (2010a), *Management recommendations for swallow-tailed kite nesting habitat in Florida*, lists actions that include thinning of even-aged pine plantations, establishment of Streamside Management Zones (SMZs), and maintaining mature pine and cypress stands of uneven age and structure within heterogeneous wetland landscapes. The *Synthesis* section, however, describes an encompassing approach:

*“...our most important recommendation, based on 23 years of direct observation and integration of all available information from over 1,200 nesting attempts, is deceptively simple: Protect nesting swallow-tailed kites where they choose to be. This species, mainly due to its pervasive social nature, is exceptionally persistent in its attachment to place. This affinity, which transcends the short-term behavior of individuals within their relatively brief lifespan, is expressed by a continually shifting succession of pairs (and turnover within the pairs) and their collective return and adherence to locations where they can expect to find other swallow-tailed kites. ‘Occupied habitat’ is not a static, within-year physical condition exploited by a breeding pair. It is set of natural features, some essential, associated with a location that has taken on cultural and traditional importance. There is no question that many of the swallow-tailed kites in our study populations continue to nest where they do – despite local habitat alteration and loss that is often severe – due to this over-riding attachment to location. We do not know if their nesting success, productivity, and survival are compromised as a result... Protecting occupied swallow-tailed kite habitat where we find it is vitally important. This simple expression, however, masks the challenges this concept poses for implementing swallow-tailed kite conservation. The necessary, over-arching strategy will require communication and coordination among public, corporate, and private conservationists and land managers at all levels. The required effort will not be sustained without the active engagement of attentive conservationists from many disciplines. Critical-species leads in state and federal wildlife agencies will be in the best positions to monitor and guide this concerted effort. Favoring success is the unqualified allure of this spectacular bird and the public’s keen interest in its persistence.”*

## CONSERVATION RECOMMENDATIONS

While most of the following recommendations also apply to management of the continental population of Swallow-tailed Kites, we have focused on the highest priority needs for South Carolina’s breeding population.

- Incorporate Swallow-tailed Kite nest locations into management and protection efforts by ensuring that conservation agencies and organizations are aware of this database.
- Continue to participate in the national pre-migration monitoring surveys of Swallow-tailed Kites to protect critical pre-migration communal roost areas and detect population changes.
- Document and mitigate the impacts of avian predators on Swallow-tailed Kite nesting success, particularly for Great Horned Owls, which also are a threat to water bird breeding colonies in coastal South Carolina.
- Document present Swallow-tailed Kite habitat associations and reproduction in the Francis Marion National Forest (FMNF) and compare with 1980s and 1990s data (Cely 1979; Cely and Sorrow 1990) to inform current forest management in and beyond FMNF.

- Document nesting, land ownership, and management potential southwest of Charleston, (particularly the ACE Basin and lower Savannah River drainage), and compare with better-studied areas to the northeast.
- Work with the public, NGOs, volunteers, agencies, timber companies, private landowners, and the Swallow-tailed Kite Conservation Alliance to increase partnerships for the protection of Swallow-tailed Kites.
- Continue to maintain the citizen-science online sightings database for Swallow-tailed Kites; increase applications of this information to address priority management needs.
- Instruct timber managers in practices that increase Swallow-tailed Kite reproduction and promote long-term forest stewardship, with a strong emphasis on conserving presently-occupied Swallow-tailed Kite nesting, foraging, and roosting habitat.

### MEASURES OF SUCCESS

A recovery goal of roughly doubling the United States population has been established, which would require approximately 100 birds per river drainage range-wide (C. Hunter, personal communication). South Carolina's portion of this goal is approximately 400 nesting pairs, or at least twice the present breeding population.

A realistic, but still challenging, goal is to at least maintain the various subpopulations at their present levels by protecting suitable nesting and surrounding foraging habitats that breeding Swallow-tailed Kites have already selected and are using repeatedly. This challenge is compounded by the relatively large portion of nests on private and corporate lands.

Identifying the cause(s), and thereby reducing mortality on the winter range along with establishing long-term protection of privately-owned traditional ranch and farm lands selected by wintering kites from the United States, should increase annual survival. This would thus help to offset, rather than add to, some of the natural mortality associated with long-distance migration and relatively low reproductive rates.

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