TABLE 1

POPULATION DATA FROM A BANK SWALLOW COLONY NEAR PRESQUILE NATIONAL WILDLIFE REFUGE, CHESTERFIELD CO., VIRGINIA

Year	Number of burrows	Date of earliest activity	Number of adults	Number banded	Recaptures from previous years
1975	435	19 April	927	222	—
1976	388	24 April	875	87	15
1977	71	6 May	160	29	1

other colony sites in nearby gravel pits where they produced young, as postbreeding aggregations estimated at 1800 individuals were observed in late summer.

It is obvious that the location of Bank Swallow nests is a critical factor in the success of their reproduction. Failure of the present colony gives us evidence to apply to theories of some of the benefits of coloniality. First, I believe the desertion was largely due to the alteration of the structure and texture of the riverbank and/or subsequent increased predation by snakes. This supports the idea that coloniality is a response to localization of a critical resource, in this case appropriate nesting sites which are easily excavated and also inaccessible to most predators. It is possible that the swallows are proximately influenced by the physical nature of the cliff and fail to nest or abandon sites before intrusion by predators. The nesting attempts in 1977 may have been made by inexperienced birds born the previous season. This is supported by the lack of recovery of birds banded previously as adults. At any rate, mobbing appeared to be ineffectual in the defense of nest sites against the most common predator, the black rat snake, and only steepness of the riverbank seemed to discourage invasion by the snakes. It appeared to me that snakes were actively drawn to nest sites. Snakes may find nest sites as a result of their foraging activities along such areas, activities of the birds themselves, or olfactory attraction to snakes which previously had found the colony. If single snakes found the colony, predator-swamping would be of benefit, as individual snakes are capable of eating several swallows in a short period of time, but then would be no threat for several days. However, if the presence of a snake increases the probability of conspecifics locating the nest sites, as appears likely, this hypothesis becomes untenable.

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Summer range and migration routes of Florida wintering Greater Sandhill Cranes.—Previously, Williams and Phillips (Auk 89:541–548, 1972) reported on sightings and recoveries of 169 Greater Sandhill Cranes (*Grus canadensis tabida*) banded and

color-marked while wintering in northern Florida. Marking efforts have continued and recent reports have increased our knowledge of the summer range and migration patterns for cranes that winter in Florida.

In addition to the 169 cranes previously marked (Williams and Phillips, op. cit.), 148 wintering cranes have been banded and distinctly color-marked from widely separated capture sites in Florida. One hundred and fourteen birds were captured on Paynes Prairie, Alachua Co. and 34 birds were captured on "KD Ranch" in southern Highlands Co. (Fig. 1A). Paynes Prairie is in the northern part of the Greater Sandhill Crane's winter range in Florida, and the Highlands Co. site is near the southern limit.

Since the 1972 accounting of Williams and Phillips (op. cit.), 150 marked cranes have been reported. The reports were grouped by season of observation and banding location (Fig. 1). Many of the sightings were from areas where cranes are known to concentrate during migration or where extensive fieldwork was being done and probably represent repeated sightings of the same individuals. An effort was made to eliminate re-sighting of the same individual birds during the same day, though in most cases, it was not possible to separate repeated sightings of an individual on subsequent days unless the bird was a member of a known pair.

The distribution of winter reports (Fig. 1A) shows dispersal of birds outside the general capture vicinity. Cranes wintering in south Florida were less likely to return to the same wintering areas than those using Paynes Prairie. Six of 34 birds banded in south Florida were re-sighted in subsequent years outside the capture area. Only 3 of 114 birds banded on Paynes Prairie were sighted outside the capture area. Loyalty to winter range probably is dependent on local land use practices and habitat conditions. The movement of the Paynes Prairie marked birds outside the general capture area occurred in 1975 and 1976 following changes in land use practices there (Nesbitt, Fl. Field Nat. 5:16–17, 1977).

Spring migration of cranes from Florida occurs between late February and early April with most birds leaving during early March (Nesbitt, Wilson Bull. 87:424–426, 1975). Reports of marked birds north of Florida were not numerous until they reached concentration points in southern Michigan (especially Jackson Co.) and at Jasper-Pulaski Fish and Wildlife Area in northwestern Indiana. Reports between northern Florida and these concentration areas usually resulted from band recoveries. Spring migration reports of northern Florida marked cranes (Fig. 1B) came from Tennessee (1), Kentucky (2), northwestern Indiana (34), and 2 birds were reported from Ohio. "KD Ranch" marked birds were reported during spring migration (Fig. 1B) from northwestern Indiana (5), central Wisconsin (2), and northern Wisconsin (1).

Summer records (Fig. 1C) of Paynes Prairie banded birds were concentrated in southern Wisconsin (3), southern Michigan (16), and 1 reported from northern Michigan. This is the same pattern reported by Williams and Phillips (op. cit.). Cranes banded in southern Florida were reported summering in northern Michigan (1), northern Wisconsin (1), Minnesota (1), and Manitoba (2) (Fig. 1C).

These data suggest differences in summering areas for cranes which winter at the 2 extremes of their range in Florida. Cranes banded in north Florida were reported summering in Michigan and southern Wisconsin while those banded at the southern end of their range were reported summering from northern Michigan and northern Wisconsin to Minnesota and Manitoba. At this time we have no information for the cranes breeding in Ontario.

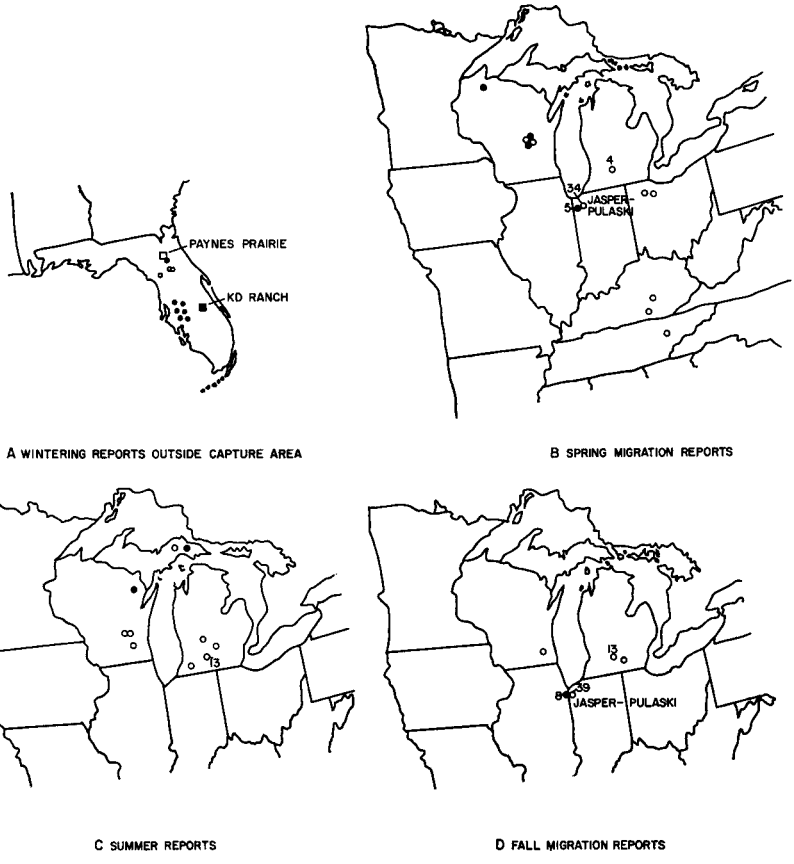

FIG. 1. Location of sightings of Greater Sandhill Cranes marked in Florida. Closed circles are birds captured at "KD Ranch." Open circles are birds captured at Paynes Prairie. (Exact location of sightings are available from the authors.)

Fall migration of cranes to Florida is more protracted than spring migration extending from September through December. The fall movement pattern (Fig. 1D) appears almost identical to spring migration with concentrations of birds again occurring in northwestern Indiana at Jasper-Pulaski and southern Michigan.

Cranes that winter in Florida and summer in Wisconsin, northern Michigan, Minnesota and eastern Manitoba concentrate during the fall and spring migration in northwestern Indiana at Jasper-Pulaski. Additionally, cranes that summer in Michigan and winter in northern Florida concentrate in southern Michigan, Jackson Co., during fall and spring migration. Walkinshaw (Wilson Bull. 72:358–384, 1960) suggested that these cranes fly from southern Michigan to Florida and do not concentrate again at the Jasper-Pulaski staging areas in Indiana. The 2 birds reported from Ohio and additional sight records in Ohio (Walkinshaw, op. cit. and Perkin, Sandpiper 9:5–7, 1966) substantiate

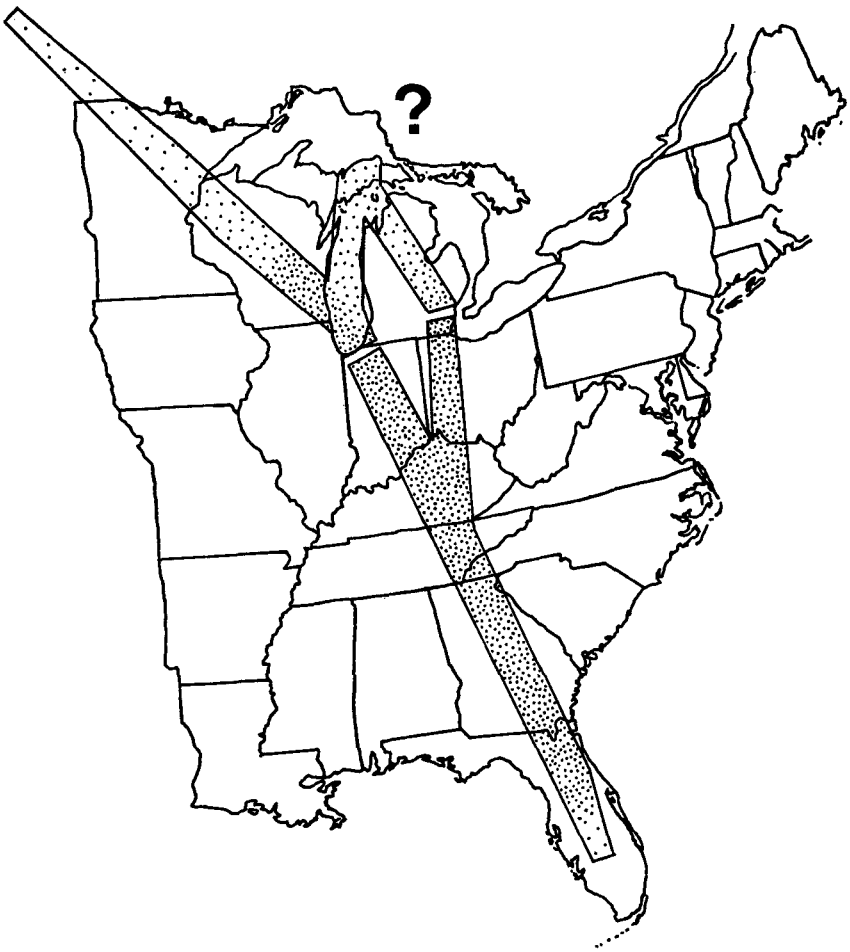

FIG. 2. Greater Sandhill Crane migration routes to and from wintering grounds in Florida.

the existence of a straight Michigan–Florida route. Numerous spring and fall reports of Sandhill Cranes over eastern Tennessee (Devore, The Migrant 43:29–34, 1972), Kentucky (Larson, Ky. Warbler 47:31, 1971; Maslowski, Ky. Warbler 44:57, 1968; Guthrie, Ky. Warbler 42:52, 1966) and Georgia (Walkinshaw, op. cit.; Fink, Oriole 31:12–13, 1966) further delineates the route used by cranes migrating to and from Florida (Fig. 2).

Except for overnight stops (Crete and Toepfer, U.S. Fish and Wildlife Serv. Mimeo. Rept., Twin Cities, Minnesota, 1978), spring and fall migration of cranes south of the northern Indiana and Michigan region is fairly direct with little extended stopping be-

tween those areas and Florida. The fact that no reports occurred between northern Indiana–southern Michigan and Florida during fall migration (0 of 62) while several (5 of 53) occurred during spring migration, suggests marked cranes migrating in spring are more likely to encounter adversities than when flying south in the fall. Williams and Phillips (1972) reported 1 spring observation and 2 fall observations between north Florida and the Great Lakes region.

The tendency for cranes summering in northern Michigan, northern Wisconsin, Minnesota, and Manitoba to winter principally in south-central Florida and cranes summering in Michigan (mostly the southern part of the state) and Wisconsin to winter primarily in north and central Florida, needs further study, especially the influences local habitat conditions have on wintering range in Florida.

We wish to express our appreciation to the many individuals who reported sightings of color-marked cranes. Principal among these were: G. Belyea, Mrs. M. Flagg, Mrs. M. Hall, R. Hoffman, W. Hummon, B. John, A. King, J. Lamendoler, J. Lasso, Mrs. J. Manita, S. Melvin, G. Nielsen, R. Rollo, D. Shroufe, D. Switzer, W. Taylor, H. Troth, H. Wing, R. Windingstad, and F. York. We also appreciate the help of W. J. D. Stephen in locating one of the Manitoba sightings. The manuscript benefited from the sound advice of J. C. Lewis and L. E. Nauman. We thank the Division of Recreation and Parks, Florida Department of Natural Resources for permission to trap on Paynes Prairie.

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Olfactory guidance of Leach's Storm Petrel to the breeding island.—This report presents the first experimental evidence for olfactory navigation in Leach's Storm Petrel (*Oceanodroma leucorhoa*) during the terminal approach to a breeding island. Colonies of this species are found on 5 islands of the 200 km^2 Grand Manan Archipelago in the Bay of Fundy. Nest burrows in the larger colonies on Outer Wood, Hay, and Kent Islands are predominantly found under a thick canopy of spruce (*Picea* spp.), balsam fir (*Abies balsamea*), and mountain ash (*Sorbus americana*).

Like most other small procellariiforms, Leach's Storm Petrels typically arrive and depart from their colonies only in darkness, generally between 22:30–23:00 and 04:00–04:30 during the summer months at Kent Island. Visual cues alone seem insufficient for the birds to find and distinguish among the islands since arrival is not retarded under heavy cloud cover or in thick fog. Gannet Rock light, 2 km south of Kent Island, might be a useful reference to the general vicinity when visibility is not unduly impaired by fog. Sound cues likewise seem inadequate for use by the petrels. Thousands of Herring Gulls (*Larus argentatus*) nest on Kent Island, but their vocalizations, normally few and muted after dark, virtually cease on murky, foggy nights. Because gull colonies are also found on other islands of the archipelago, gull noises alone would not serve to distinguish a particular island in any case.

One potential navigational cue of value to the birds might be the distinctive, musky odor of petrels which is apparent to the human nose at considerable distance. Bang (Acta Anat. 65:391–415, 1966), Stager (Am. Zool. 7:415–419, 1967) and others have