The distribution, habitat preference, and status of the Mississippi Kite in Tennessee

Is there an alternative to preservation of the remaining bottomland hardwoods for improving the kite's status in the state?

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INTRODUCTION

REGIONAL POPULATIONS OF the Mississippi Kite *(Ictinia mississippiensis)* are growing and expanding their ranges, and can be expected to do so in the future (Parker and Ogden, 1979). Despite this optimistic national outlook, the Mississippi Kite is considered endangered in Tennessee, owing to a combination of factors including habitat alteration, human interference, and pesticide use (Tennessee State Legislature, 1974; Tennessee Wildlife Resources Commission, 1975). To estimate its present status and aid the development of a plan for its management, we studied the distribution and habitat preference of the Mississippi Kite in Tennessee.

Five decades of field records in the *Migrant* (the quarterly journal of the Tennessee Ornithological Society) show that summering kites are virtually restricted to the floodplain of the Mississippi River and the immediately adjacent hill region. Accordingly, our study area was the six westernmost counties in Tennessee, bordering on the Mississippi River and Reelfoot Lake.

The western third of Tennessee is part of the Gulf Coastal Plain physiographic region. The floodplain adjacent to the river is sharply demarcated from low hills to the east by the Chickasaw Bluffs. The natural vegetation of the area is southeastern deciduous forest, divided into floodplain and upland associations, and has been largely replaced by agriculture.

METHODS

WE MADE A SIMPLE direct census of the study area, beginning in Memphis June 8, 1978 and ending at Reelfoot Lake August 1, 1978. Using *Migrant* records and suggestions from local birders as a guide, we concentrated our effort in the floodplain but were not limited to it. We gave equal attention in terms of distance driven to the entire area within a broad band along the river. The width of this band averaged approximately 25 km (15.5 mi) (Fig. 1). We also used the records of several cooperating observers, whose combined efforts during the summer covered the entire study area.

Our method was to look for birds in the air while driving highways, levee roads, and back roads. We traveled in a vehicle at speeds of 5 to 10 mph, or on foot, depending on the condition of the road. Wherever they were available, we used openings in the bottomland woods and vantage points such as river banks, bluff overlooks, and fire towers to scan the sky with binoculars.

The use of vantage points gave us an idea of the spacing and movements of individuals. The patterns observed helped to suggest when the same bird was being seen twice in areas of restricted visibility. While moving from one such area to another, we never saw kites moving through the intervening territory. These two considerations reduced the chance of counting the same bird twice, but did little to mitigate the potential error inherent in a census such as this. There are no home range data in the literature; kites may wander widely in an area of suitable habitat around the nest and thus be counted twice. On the other hand, the poor visibility in the bottomland forest undoubtedly resulted in many birds there not being seen at all

We conducted a vegetation analysis of the preferred habitat (areas that contained large numbers of kites) in March, 1979. Basal area and density were measured with a tube-type angle gauge having a Bitterlich factor of ten (Dillworth and Bell, 1977). Ten sample points were taken at each location. Canopy height was measured with a hand-held clinometer at 35 paces (30 m) from the tree, and recorded as the average of three representative trees in each location

RESULTS

KITES WERE FOUND in Shelby, Lauderdale, Dyer, Lake, and Obion Counties. Figure 1 shows the locations of all sight records and the number of birds seen. Most records were of one to five individuals. Kites appeared to be concentrated in several areas near the Mississippi River: the southwestern metropolitan Memphis area, Shelby

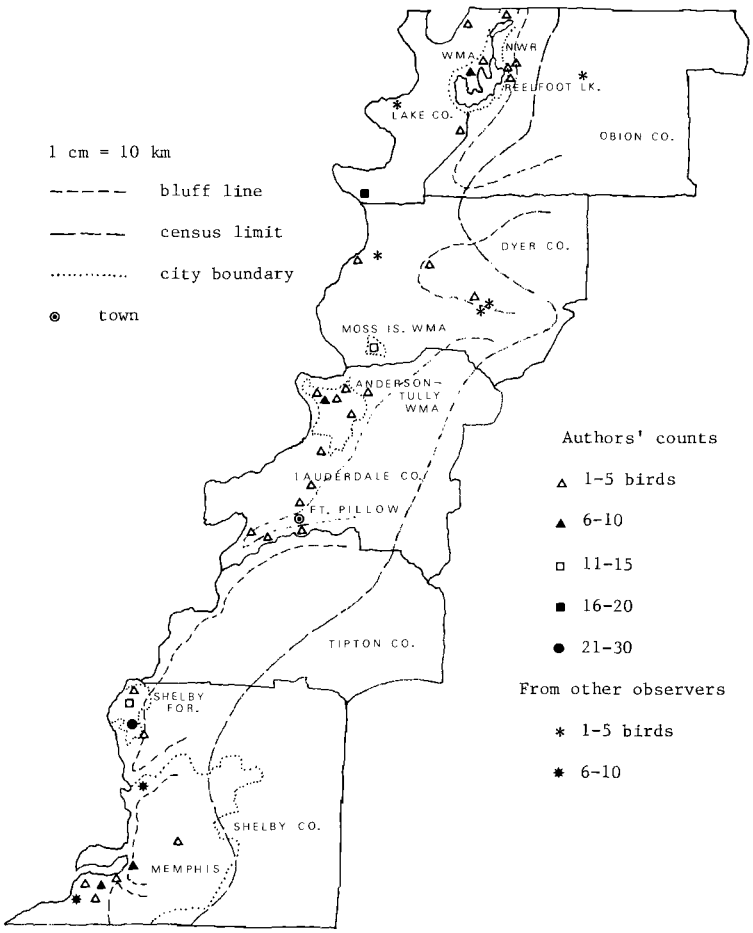

Fig. 1. *Results of Mississippi Kite census in western Tennessee, summer 1978.*

State Forest north of Memphis, Anderson-Tully Wildlife Management Area in Lauderdale County, Moss Island Waterfowl Management Area in Dyer County, southwestern Lake County, and the Reelfoot Lake area.

A total of 162 individuals was counted, certainly a minimum estimate of the number present in western Tennessee in 1978. Table 1 gives the number of kites recorded for each general location in the study area. Based on plumage, adults (birds at least two years old) accounted for approximately 93 percent of those seen; immatures (birds fledged the previous summer) made up the remainder. We could not remain on the study area long enough to get a count of juveniles (fledglings of the season), but July 30 we noted an individual in the southwestern Lake County group that may have been a juvenile.

The Mississippi Kite appeared to be the most common raptor in the floodplain The greatest observed concentration was of 30 birds, in two groups soaring in closely adjacent thermal cells over Shelby Forest. In the center of Moss Island WMA there is a wooded area of 518 ha (1280 a) transected by a 1.6-km (1 mi) road. We recorded 14 birds while surveying this transect on foot. In Anderson-Tully WMA we recorded 19 birds in six hours of surveying in a vehicle.

Kites were found over all large stands of undisturbed, mature bottomland hardwood forest. They were infrequently seen over non-wooded areas or off the floodplain. They were rarely seen over farm fields (which comprised more than 90 per cent of the study area) and logging areas, and were never seen over immature hardwood stands, pine plantations, willow swamps, or field border woods. Seventy-four per cent of the birds were found over wooded areas in the floodplain, 15 per cent were found over wooded areas in the hill region, seven per cent over non-wooded floodplain, and four per cent over non-wooded hills. Six of the seven individuals seen over non-wooded areas in the hill region were soaring high over the bluff. On three occasions single birds were observed flying low over the soybean fields which covered approximately 75 per cent of the floodplain, and these three birds furnished the only records of kites associated with that habitat. The smallest wooded area over which kites were seen was the 75-ha (185 a) Riverside Park in Memphis Other small areas ranged up to 900 ha (2223 a) and averaged 400 ha (988 a) The largest area was 8100 ha (31.26 mi²) at Anderson-Tully. Other large areas were 3400 ha (13.1 mi²) at Shelby Forest, 1800 ha (7 mi²) at Reelfoot Lake, and 15 ha (37 a) at Moss Island. Logging operations were underway when we censused a 7400-ha (28.6 mi²) area in southwestern Lauderdale County. This area also contained extensive Black Willow *(Salix nigra)* swamps and plantations of pine (*Pinus* spp.) and young Cottonwood *(Populus deltoides)*. We saw no kites in the area despite its large size.

Widespread flooding in the spring of 1979 hampered the vegetation analysis, but five representative areas were sampled. The following characteristics were obtained for those areas (range followed by mean): Canopy height, 33-40 m, 35 m; total basal area, 20-26 m²/ha, 23 m²/ha; total density, 358-600 stems/ha, 474 stems/ha. Different tree species dominated in different areas. Of the 17 species found, the following were the most important overall (in descending order): Cottonwood, Sweetgum *(Liquidambar styraciflua)*, Sycamore *(Platanus occidentalis)*, Southern Red Oak *(Quercus falcata)*, Baldcypress *(Taxodium distichum)*, American Elm *(Ulmus americana)*, Red Maple *(Acer rubrum)*, and Tulip-poplar *(Liriodendron tulipifera)*.

Table 1. Numbers of Mississippi Kites sighted in western Tennessee, summer 1978.

Location	*Number of birds*
Memphis area	38
Shelby Forest	30
Ft. Pillow area	7
Anderson-Tully[a]	19
Moss Island	16
Dyer County	8
Lake County	20
Reelfoot Lake[b,c]	20
Obion County	4
TOTAL	162

[a]Upper section only.
[b]State Wildlife Management Area.
[c]National Wildlife Refuge.

DISCUSSION

THE *Migrant* FIELD RECORDS for the years since our census (Alsop, 1979a, b, 1980a, b, c, 1981; Nicholson, 1981a, b; Waldron, *pers. comm.*) follow the pattern of previous years and confirm the distribution we observed. Only five out of 49 records (12 of 311 birds) are from locations other than those where we found kites.

Our census as an index of relative abundance suggests that Mississippi Kites prefer to feed over large undisturbed stands of mature bottomland hardwood forest. No kites were seen in Tipton County probably because the floodplain there is very narrow and almost completely deforested. The paucity of nesting records for other habitats with much better visibility suggests that kites use the bottomland forest for nesting as well.

The vegetation analysis showed that no particular species of tree was more important than others. It is apparently rather that the age of the stand is important to kites. An older forest probably provides more food and nesting security. Although the various seral stages found in the areas sampled are not necessarily the climax type, the canopy height, basal area, and density are generally characteristic of a mature forest stage (Warden, *pers. comm.*).

Unsupported by census data, others have written that throughout the East the Mississippi Kite appears to be closely associated with the coastal plain riparian forest canopy (Bent, 1937; Brown and Amadon, 1968; Parker and Ogden, 1979). This preference has been reported for Alabama (Imhof, 1976), Georgia (Burleigh, 1958), and the Carolinas (LeGrand and Lynch, 1973; Tomkins, 1949), and also for northern Florida (Duncan, Stedman, *pers. comm.*) and eastern Texas (Oberholser, 1974), although in these two states they also frequent coastal pinelands. In 1902 Ganier wrote that in Warren County, Mississippi, kites inhabited "hill-land and swamp country in apparently equal numbers." He found that in the hills of this Mississippi River county they nested in small patches and narrow strips of woods and in well-wooded pastures. At this time kites inhabit the cottonwood floodplain forest in Louisiana (Lowery, 1974) and Kentucky (Barbour *et al.*, 1973). In 1972 (Kleen and Bush) they nested in the Kaskaskia River bottoms in the hill region of southern Illinois, but most recently Hardin *et al* (1977) reported on five nests in the Mississippi River floodplain nearby. They were found in woodlots of at least 80 ha, in habitat that is virtually identical to that preferred in Tennessee.

Parker and Ogden (1979) summarized the widespread decline of the Mississippi Kite across its eastern breeding range in the early 1900s. While recognizing the local impact of egg collecting and alteration of foraging habitat, they attributed the decline largely to shooting. We suggest that, given the apparent habitat preference of eastern kites, destruction of riparian woodlands associated with increasing agriculture was probably also important, and might now represent a threat to some populations.

Since 1973, a multi-million dollar soybean farming industry has developed in western Tennessee, primarily in the Mississippi River bottomland (Breen and Wilhite, 1977). Soybeans are everywhere, and new land is still being cleared for fields (Hobson *et al.*, 1981). United States Department of Agriculture data for the six county area (Breen, 1972; Breen and Wilhite, 1977; Hobson *et al.*, 1977, 1978) show that by 1974 woodland had been reduced to 25,000 ha (98.5 mi^2), less than half of the 1964 area, and that by 1978 soybean acreage had increased to 375,000 ha (1477 mi^2) almost double the 1974 figure.

Other activities that disrupt the bottomland forest are logging, stream channelization, and metropolitan development. Loss of this habitat because of the factors mentioned is increasing throughout the Mississippi River Valley (Watson, 1981).

The Illinois Department of Conservation (1977, *in* Hardin *et al.*, 1977) considers the kite endangered in that state because of continued habitat loss. Those studying the Illinois kites (Evans, *pers. comm.*) believe that clearing for soybeans, and to a lesser extent logging and stream channelization, adversely affect the population. Coffey (1979) regards preservation of the remaining bottomland hardwoods as prerequisite to an improvement of the kite's status in Tennessee, although a population trend will be difficult to document without repeated systematic censusing. *Migrant* records have fluctuated considerably over the past several years.

Ganier's observations confirm the bird's ability to occupy the hill region, suggesting a management alternative to preservation of the riparian forest. Kites could be hacked to other large woodlands in western Tennessee, such as T.V.A.'s Land-between-the-Lakes Recreation Area. These places might then become dispersal centers for the surrounding area. Although distributed widely in the coastal plain in other states, kites are largely absent from that region in Tennessee. The only place outside the study area where bottomland forest occurs is along the Hatchie River, particularly in and around the Hatchie National Wildlife Refuge. There are in fact a few records from this locality (Coffey, 1979; Waldron, *pers. comm.*), and if the regional Mississippi Kite population is expanding, they might occupy that area in greater numbers in the near future.

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LITERATURE CITED

ALSOP, F.J., III, ed. 1979a. The season. *Migrant* 50(3):67.

——. 1979b. The season. *Migrant* 50(4) 86

——. 1980a. The season. *Migrant* 51(1) 15-18.

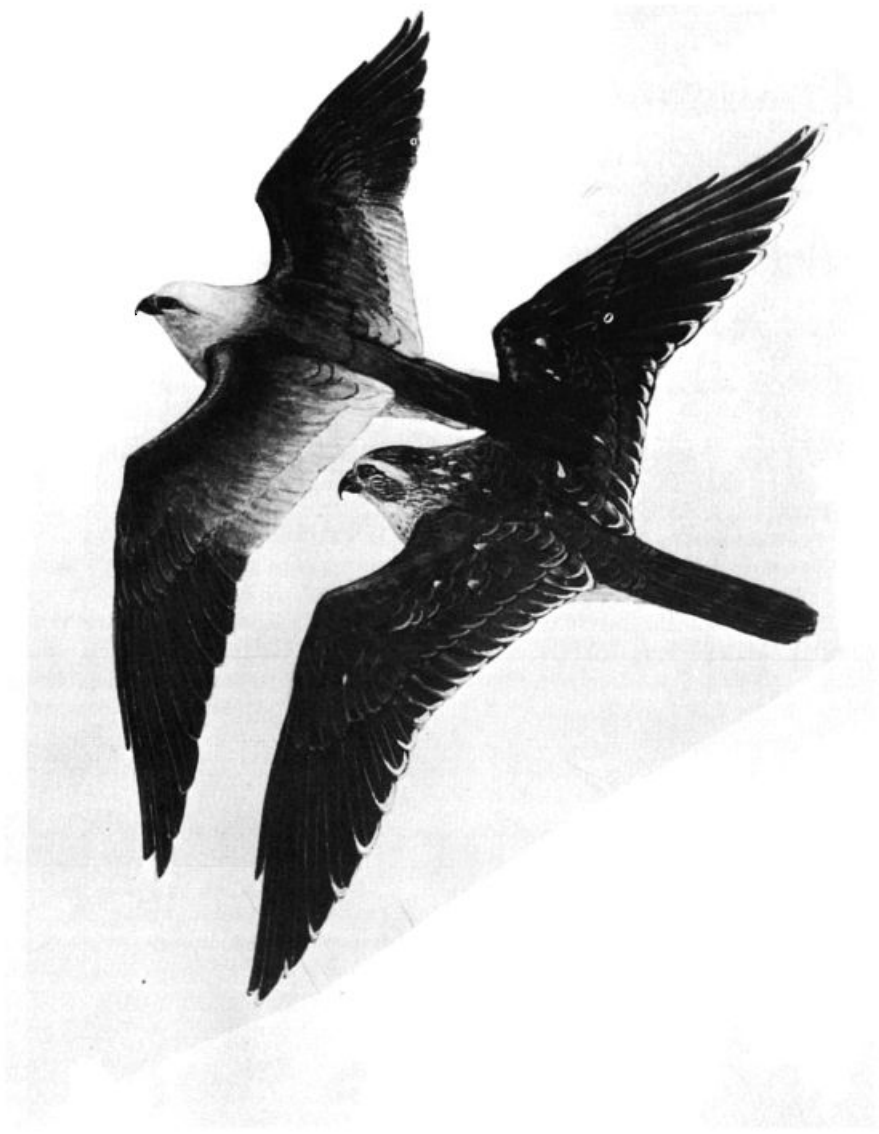
——. 1980b. The season. *Migrant* 51(3) 60-61.

——. 1980c. The season. *Migrant* 51(4) 92

——. 1981. The season. *Migrant* 52(1) 22

BARBOUR, R.W., C.T. PETERSON, D. RUST, H.E. SHADOWEN, and A.L. WHITT, JR. 1973. Kentucky birds. The Univ. Press of Kentucky, Lexington. 306 pp.

BENT, A.C. 1937. Life histories of North American birds of prey, vol. 1 U S Nat'l Mus. Bull. 167. 1961 Reprint Dover Publ., Inc., New York. 409 pp



Mississippi Kite: adult (I) and immature, from a painting by Francis L. Jaques, for Florida Bird Life, by Arthur H. Howell (1932).

BREEN, J.T. 1972. 1969 census of agriculture, vol. 1, part 42. U.S. Gov't Printing Office, Washington, D.C.

——, and O.L. WILHITE. 1977. 1974 census of agriculture, vol. 1, part 42. U.S. Gov't Printing Office, Washington, D.C.

BROWN, L., and D. AMADON. 1968. Eagles, hawks, and falcons of the world, vol. 1. McGraw Hill Book Co., New York. 414 pp.

BURLEIGH, T.D. 1958. Georgia birds. University of Oklahoma Press, Norman. 746 pp.

COFFEY, B.B. 1979. Early records of the Mississippi Kite and a summary. *Migrant* 50(4):83-84.

DILLWORTH, J.R., and J.F. BELL. 1977. Variable probability sampling. Oregon State Univ. Bookstore, Inc., Corvallis. 130 pp.

GANIER, A.F. 1902. The Mississippi Kite *(Ictinia mississippiensis). Osprey* 1(6):85-90.

HARDIN, M.E., J.W. HARDIN, and W.D. KLIMSTRA. 1977. Observations of nesting Mississippi Kites in southern Illinois. *Trans. Ill. State Acad. Sci.* 70(3/4):341-348.

HOBSON, R., F.W. GRIFFITH, G.A. KRULL, and J.K. GEUDER. 1977. Tennessee county estimates—soybeans. Tennessee Crop Reporting Service, Nashville.

——, ——, ——, ——. 1978. Tennessee county estimates—soybeans. Tennessee Crop Reporting Service, Nashville.

——, ——, ——, ——. 1981. Tennessee county estimates—soybeans. Tennessee Crop Reporting Service, Nashville.

ILLINOIS DEPARTMENT OF CONSERVATION. 1977. Endangered and threatened Illinois species. Administrative Order effective December 31, 1977.

IMHOF, T.A. 1976. Alabama birds, 2nd ed. Univ. of Alabama Press, University. 445 pp.

KLEEN, V.M., and L. BUSH. 1972. The nesting season. *Am. Birds* 26(5):864-867.

LEGRAND, H.E., JR., and J.M. LYNCH. 1973. Mississippi kites in northeastern North Carolina. *Chat* 37(4):105-106.

LOWERY, G.H. 1974. Louisiana birds, 3rd ed. Louisiana State Univ. Press, Baton Rouge. 651 pp.

NICHOLSON, C.P., ed. 1981a. The season. *Migrant* 52(3):71.

——. 1981b. The season. *Migrant* 52(4):95.

OBERHOLSER, H.C. 1974. The bird life of Texas, vol. 1, Univ. of Texas Press, Austin, Texas. 530 pp.

PARKER, J.W., and J.C. OGDEN. 1979. The recent history and status of the Mississippi Kite. *Am. Birds* 33(2):119-129.

TENNESSEE WILDLIFE RESOURCES COMMISSION. 1975. Proclamation no. 75-15. Endangered or threatened species (amended by Procedure no. 77-4 May 13, 1977).

TENNESSEE STATE LEGISLATURE. 1974. Tennessee non-game and endangered or threatened wildlife species conservation act of 1974. *in* Tennessee Code Annotated. Tennessee Government Printing Office, Nashville, Tennessee.

TOMKINS, J.R. 1949. The Mississippi Kite along the Savannah River in Georgia and South Carolina. *Auk* 66:82.

WATSON, N.H., ed. 1981. EDF 1980 Annual Report. Environmental Defense Fund, Inc. New York.

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