Transcriber's Notes

Typographical Corrections:

With the exception of the five typographical corrections listed below, the text of this file is that which is contained in the original printed volume:

Page 505:	misspelling	misisippiensis => mississippiensis
Page 505:	missing period	op cit. => op. cit.
Page 510:	missing period	op cit. => op. cit.
Page 514:	misspelling	sqeaking => squeaking
Page 515:	misspelling	harrassed => harassed

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Observations on the Mississippi Kite in Southwestern Kansas

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HENRY S. FITCH

The Mississippi kite (*Ictinia mississippiensis*) is one of the common raptors of Kansas, occurring regularly and abundantly in summer in that part of the state south of the Arkansas River. In 1961, in an attempt to find out more about the ecology of the species in Kansas, I made several trips to parts of the state where kites could be found in numbers, notably to Meade County State Park in the southwestern part of the state, 7½ miles south and five miles west of Meade. Little has been written regarding the species in this extreme northwestern part of its breeding range, where it thrives under ecological conditions much different from those that prevail elsewhere in its range. Also, the social behavior and food habits have been given relatively little attention.

In my field study I was helped by my son, John H. Fitch, who climbed to many kite nests and spent many hours observing in the field. My daughter, Alice V. Fitch, likewise aided me by keeping nests under surveillance. Dr. Claude W. Hibbard of the University of Michigan and Mr. Harry Smith, superintendent of Meade State Park, also kindly provided much useful information concerning the history of the colony of Mississippi kites at the Park. Mr. William N. Berg analyzed pellets, and Dr. George W. Byers kindly checked many of the identifications, and provided generic and specific determinations for some of the insects.

In general, the range, habits and ecology of the Mississippi kite are already well known through the publications of Audubon (1840), Chapman (1891), Bendire (1892), Ganier (1902), Wayne (1910), Nice (1931), Bent (1936), Sutton (1939) and Eisenmann (1963). The breeding range is the southeastern United States, chiefly within the Austroriparian Life-zone, but extending northwest through much of Oklahoma and into southern Kansas. The species is highly migratory. Wintering Mississippi kites are known from Argentina and Paraguay (Eisenmann, *op. cit.*:74), and most of the population probably winters in southern South America, but records outside the breeding range are few.

The Mississippi kite is perhaps one of the most social raptors. It is highly gregarious, not only in its migrations but in breeding colonies. All breeding pairs seen were closely associated with other [Pg 506] individuals, with no territorial hostility; signs of intraspecific intolerance are rare, even where the kites are abundant. In the nesting season many of both sexes perch together in the same tree, and groups tend to keep together as they forage.

Secondary sexual differences are slight. Seven males in the University of Kansas Museum of Natural History collection average 351 (342 to 360) millimeters in length, and six females average 361 (348 to 370) millimeters. Sutton (*op. cit.*:44) collected 16 breeding kites near Arnett, Oklahoma in 1936 and 1937 and recorded that eleven males averaged 245 (216 to 269) grams and five females averaged 311 (278 to 339) grams. As indicated by Sutton, the head is paler in

the adult male than in the female, and at close range this difference will serve for identification of the sexes. The difference in size is scarcely noticeable in the field.

Habitat

In Kansas this kite seems to prefer open and even barren terrain, in contrast with its habitat in forests of the southeastern states. Typical habitat of Kansas is that of the High Plains, dominated by a short-grass climax of blue grama (*Bouteloua gracilis*) and buffalo grass (*Buchloë dactyloides*), with sagebrush (*Artemisia* sp.), prickly pear (*Opuntia* sp.) and other somewhat xerophytic vegetation. In the Gypsum Hills of south-central Kansas near the Oklahoma border, the Mississippi kite finds habitat conditions exceptionally favorable. This is an area of broken topography, dissected by small steep-sided ravines, often with brush and scrubby trees on the slopes.

At Meade County State Park groves of cottonwoods (*Populus deltoides*) provided abundant places for perching and nesting. At this locality an artesian well provided an abundant year round water supply, which was impounded into an artificial lake half a mile long and a little less than a quarter mile wide. Water was also impounded in a series of small ponds maintained for the benefit of fish and waterfowl. Along with other improvements extensive plantings of cottonwoods and other trees were made with relief labor in the nineteen thirties. Trees were scarce on the area originally, but by 1961 there were almost continuous groves in an area nearly two miles long and three quarters of a mile wide encompassing the lake and ponds and adjacent areas. In conversation at the Park in August 1961, Dr. C. W. Hibbard told me of his observations on the colony of kites since 1936 when his paleontological field work in that area was begun. He [Pg 507] indicated an area of less than two acres west of the artesian well to which the colony had been limited in its nesting in 1936, because at that time few trees were available as nest sites. In subsequent years, as the trees in the artificially established groves increased in size and height, and other trees became established naturally where the impoundments had created favorably moist conditions, the nesting colony expanded in all directions, and the number of kites increased tremendously. When my observations were made in 1961, the nesting area was co-extensive with the cottonwood groves, and there were literally thousands of trees within the area that provided adequate sites for nests.

Numbers

The maximum number of kites seen flying at one time at the Park was 44, on August 22, 1961. Probably almost all there were adults, because fledglings, even though able to fly strongly by this date, were still spending most of their time perched. The colony of kites was usually scattered over at least two square miles, and at most times some were perched, others were flying low and solitarily, hence it is improbable that the total population or a high percentage of it could be seen together at any one time or place. More than 40 nests were located in 1961, and probably at least as many more were overlooked. There must have been a breeding population of at least 100 kites, and probably as many as 150 in the Park in 1961. H. B. Tordoff recorded on the label of K. U. Mus. Nat. Hist. no. 30514, taken on September 1, 1951, in Barber County, Kansas, that it was one of at least 200 at a communal roost.

Feeding

The Park and its vicinity stood out as a veritable oasis in an almost treeless region of open rolling topography, with a short-grass type of vegetation dominating. The kites displayed versatility in their choice of places to forage. Often they soared over the cotton-*wood groves, the lake, or the ponds, but at other times they flew far out over the plains, and seemed to prefer such open situations. A small herd of buffalo was maintained at the Park, and their closely grazed pastures of several hundred acres were favorite foraging grounds for the kites. Often the kites and buffalo were seen in close association, and at times the kites must have benefited from the movements of the buffalo, serving to flush certain insects such as grasshoppers. The latter were probably the chief food source of the kites in the heavily grazed pastures. Bent (1936:67) stated: "A flock of [Pg 508] from 3 to 20 will sail about a person, a horseman or a team, traveling through grassy flats or bushy places, and seize the cicadas as they are scared up." Dr. Hibbard told me that on one occasion when he had caught a number of cicadas, he fed them to a pair of kites by tossing them into the air one by one, and each was seized by a kite which was flying nearby waiting expectantly.

Mississippi kites are noted for their buoyant and seemingly almost effortless flight, and their prey is caught while they are on the wing. In extended flights the kites soar, drift and circle with frequent easy flapping, at variable heights. Sometimes they are several hundred feet above the ground. Doubtless the height is influenced by the types of insects that are flying, and where they can be found most readily. Even at close range the catching of prey by a kite is likely to be overlooked by an observer. After being snatched from the air, the prey is usually eaten while the kite is still in flight, and the movements of the head in pecking at the objects held in the talons are much more noticeable than the slight veering from the course of flight that signals the actual capture. Kites were often watched while they were hunting in the open areas around the Park. On June 1, 1961, my son and I observed 16 perched together in a small tree. From time to time

each kite would leave the tree in a short flight low over the surface of a nearby pool, where it would snatch up prey, probably a dragonfly in many instances, and would return to a perch to feed. Most of the time one or several kites were in flight while the majority were perched. Similar observations were made on smaller groups perched on fence posts along the edges of large pastures. Gregarious tendencies were evident from the fact that two or more of the kites perched fairly near together on separate but sometimes adjacent fence posts. Each kite in turn would glide from its post, skim low over the ground surface for a few seconds, seize its prey with a sudden slight swerving, and return to the fence (usually to a different post from the one it had left) to feed upon the insect captured. Grasshoppers of many species were abundant in the area. It seemed that grasshoppers were flushed from the ground by the bird flying near them and were picked off before they were well underway. In any case the prey was taken from the air rather than from the ground in all observed instances. Ganier (1902:86) mentioned seeing one of these kites alight on the ground in a cotton field, where it stayed for more than a minute, but perching on the ground is unusual.

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Most often kites that were catching their prey by skimming close to the ground did not return to a perch but ate while they were flying. Associations of groups on posts at edges of fields, in trees or in flight were ephemeral as each bird seemed driven by a restless urge to be in motion. The kites generally gave the impression of catching their prey effortlessly and casually in the course of their flights. However, on July 20, 1961, one flying over a pond was seen to swoop three times in rapid succession at a dragonfly without catching it. The kite then flew higher, circled, and swooped three times more at the dragonfly, catching it on the last attempt. Most of the insects preyed upon are slower and less elusive than dragonflies, which are largely immune to the attacks of flying predators because of their great prowess in flight.

Only on rare occasions could the kind of prey captured be observed in the field. Food habits were studied by collecting pellets of the kites at the Park, and analyzing them. The pellets were usually disgorged early in the morning while the kites were still on their night roosts in large cottonwoods. Often several kites roosted in the same tree. The pellets were of characteristic appearance, elliptical, approximately 15 millimeters in diameter, 30 millimeters long, pinkish or purplish, composed of insects' exoskeletons compacted, and comminuted to about the consistency they would have after passing through a meat grinder.

A total of 205 pellets was collected—37 on August 20, 1960; 56 on July 18, 1961; 60 on August 4 and 5, 1961, and 52 on August 21 to 23, 1961. A total of 453 separate items was tentatively identified. Obviously the material was far from ideal for the identification of prey, which had to be reconstructed from minute fragments. The kites are dainty feeders and discard the larger and less digestible parts such as wings, legs, and heads. Often it was uncertain how many individuals or how many kinds of insects were represented in a pellet. Probably most pellets contained many individuals of the same species, but these were not separable. Hence, only 2.2 items per pellet were found, whereas Sutton found an average of 22.2 items in each of the 16 stomachs that he examined.

Best information concerning kinds of prey utilized was obtained soon after the fledglings had left the nest; on various occasions these still clumsy young dropped nearly intact insects that were delivered to them by the adults. These insects, recovered from beneath the perches, were the basis for all specific and generic determinations; other material was determinable only to order or to family.

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One of the most significant outcomes of the examination of pellets was the finding that vertebrates were scarcely, if at all, represented in the food. Three pellets contained shreds that seemed to be mammal hairs, but in the absence of other remains, the diagnosis is somewhat doubtful. Many species of small mammals, birds, reptiles and amphibians were common in the Park or its vicinity, but insects made up nearly all the recorded prey. Audubon (1840:73) mentioned lizards and small snakes in the food and gave a dramatic but perhaps imaginative account of a kite swooping and snatching a lizard (anole) from the topmost branch of a tree. Goss (1891:251) stated: "I have seen them swoop down, and, with their claws, snatch lizards from the ground, rocks and old logs, sometimes stopping to eat them, but, as a rule, feeding on the wing." Bendire (1892:179) stated that the food was mostly insects "probably varied with a diet of small rodents, lizards and snakes." Wayne (1910:71) stated that the food consisted almost entirely of insects and lizards. Bent (1936:67-68), after stating that small snakes, lizards and frogs were sometimes taken, cited a statement in the notes of G. W. Stevens that the latter had found the remains of toads, mice and young rabbits in nests with young. However, Sutton (*op. cit.*:51) in a detailed analysis of the stomach contents of 16 kites in Oklahoma, found only insects and remains of one small fish among a total of 358 prey items. Predation on vertebrates must be rare, and perhaps requires further verification in view of the rather vague character of the records so far published.

The following list includes both the prey found beneath perches of fledglings and that identified from pellets, the latter mostly from adult kites.

coleopteran		orthopteran	
unspecified	187	unspecified	120
carabid	39	locustid	
cicindelid		unspecified	34
unspecified	18	*Arphia crassa*	1

Cicindela sp.	2
hydrophilid	
unspecified	18
Hydrous sp.	1
scarabaeid	
unspecified	1
Canthon sp.	3
silphid	
Necrophorus sp.	1
Melanoplus cf. *differentialis*,	2
Schistocerca cf. *lineata*	1
Xanthippus corallipes	2
tettigoniid	
unspecified	3
Daihinia sp.	1
homopteran	
cicadid	
unspecified	15
Tibicen cf. *pruinosa*	1
lepidopteran (unspecified moth),	3

At Meade State Park I gained the impression that much of the foraging is carried on near the [Pg 511]
nest. The short time lapse between successive feedings was one indication, and from time to time while keeping nests under observation, I saw kites that were individually recognizable as the owners coursing back and forth in the vicinity. However, only a few individuals were recognizable. For several minutes before and after delivering food, such an adult was often seen soaring within 200 to 300 yards of the nest, or sometimes much closer. A somewhat different impression was received on August 23, 1961, at Natural Bridge, south of Sun City, Barber County, Kansas, where I observed two pairs of kites feeding fledglings. One fledgling was seen to be fed ten times in a 1½ hour period. The transfer of food from the adult usually required less than a minute. Then the adult would leave the tree, in a ravine, and drift away. Circling and soaring, it seemed to be wandering aimlessly, but within two or three minutes it was usually out of sight over the horizon. In what appeared to be slow, lazy, flight it usually drifted off to the west, to more upland areas of short grass and sage brush. Once, watching from a high knoll I succeeded in keeping it in view for almost five minutes, and during most of this time it appeared to be between one and two miles away, but it finally moved off even farther. Dr. Hibbard mentioned seeing kites in the vicinity of the Jinglebob Ranch eight to ten miles from the Park, and he believed that these individuals had come from the Park since there was no suitable habitat in the intervening areas. Actually, the distance could have been covered in a few minutes' flying time, but it is unlikely that these individuals were feeding young at the Park, else they would not have wandered so far. On several occasions groups of from three to 20 individuals were seen in open terrain as much as four or five miles from the Park.

Breeding Cycle

Probably kites arriving from their northward migration are already paired. In those observed at the Park in the first week of June, there was no indication of courtship, or of sexual rivalry. On June 1, 1961, incubation had begun. The birds had arrived some three weeks earlier, according to Smith. Although arriving from the south long after most raptors have begun their nesting, the kites are not further delayed by establishment of territories and choosing of mates, and nesting is underway soon after their arrival. According to Sutton (1939:45) the nest-building is an [Pg 512]
exceedingly leisurely process. In the first two weeks after their arrival he observed that the kites only occasionally bring a twig to the nest, usually repairing last year's structure rather than starting a new one. Sutton recorded egg-laying on May 17 and 18 and hatching on June 18 in northwestern Oklahoma, and the timing of these events must be similar in Meade County, Kansas.

Shortly before sunset on June 1 a pair was observed at close range from a parked automobile as the kites perched on roadside fence posts about 50 feet apart at the Park boundary. At this time the birds lacked their usual restlessness and were perching quietly, neither preening nor attempting to find prey. With no preliminaries the male flew to the female and lit on her back to copulate. The female was receptive but did not crouch in a horizontal position. The mounting lasted for approximately a minute. During the first 30 seconds the male was fully occupied with balancing and positioning himself, and copulation occurred only during the latter half of the mounting. During this interval cloacal contact was effected three times, but was only momentary each time. The birds were silent. After the male left, the female continued to perch until flushed by my movements.

Judging from the nests that were examined, the kites of the Meade Park area are well synchronized in their nesting, as all arrive at approximately the same time. Bent (1936:66) stated that if a kite's nest is robbed, the birds will lay a second set, either in the old nest or a new one, about two weeks later. All young seen at Meade State Park seemed to represent an age range of considerably less than two weeks, and, presumably, no renestings were involved.

Nests were variable in size. Some were remarkably small in relation to size of the kites, and would scarcely have been credited to this species, had not the kites been seen sitting on them. Nests were from 10 to 18 (average 14) inches long and from 10 to 14 (average 11.7) inches wide, in forks or crotches of branches. The branches supporting the nests were from 1½ to 10 inches in diameter. The nests were constructed of twigs of approximately pencil size. Of 37 nests at the

Park, 29 were in cottonwoods, six were in willows, and two were in elms. The figures probably reflect the relative numbers of each of these species of tree rather than any clear-cut preference of the kites. By the time nesting has begun the trees have leafed out, and the nests are well concealed.

At the time of my visit to the Park, July 18 to 22, nestlings were well grown, and were beginning [Pg 513] to feather out. On August 4 and 5 the young were well feathered, but flight feathers were not fully grown and the young remained in the nest or perched on nearby branches. On August 21 to 24 the young were fully fledged, and were able to fly strongly but they still spent most of their time perching and those of a brood tended to stay near together, usually in the nest tree.

In a total of 26½ hours of observation, 148 feedings were observed—on the average one per 10.7 minutes. The interval changed from an average of 12.8 minutes for 62 feedings on July 19 to 21, to 8.5 minutes for 59 feedings on August 4, and to 10.8 minutes for 27 feedings on August 21. The longer interval on July 19 to 21 may have resulted from the greater furtiveness of the adult kites at this stage in their nesting cycle. Nests usually were watched through field glasses at distances of 50 to 100 feet. Ordinarily kites are not disturbed by the presence of a person at these distances, but when delivering food to the nest they seemed somewhat distracted and sometimes stopped only momentarily then left, still carrying the food. Usually they swooped at the observer when leaving; rarely they swooped at him as they approached the nest. All observations were between 10 a.m. and 5 p.m., and there was no obvious trend according to time. Earlier and later in the day the rate of delivery is probably less. The kites are notably late risers, and their activity increases gradually after sunrise; in late afternoon activity tapers off again. In 89 feedings, the average visit to the nest lasted 51 seconds but this average included a few relatively long stops, up to four minutes in length, and 60 per cent of the visits were for intervals of 30 seconds or less.

Insects often protruded from the bills of the adult kites delivering food, but most of the food was carried in the throat. Sometimes the gorge was much distended, although nothing protruded from the mouth. The adult upon alighting sometimes would pass food to the nestling, and sometimes would disgorge a mass of food in the nest in front of the nestling. When the young were small, the adult after having disgorged a food mass, remained to pick up the food, bit by bit, and place it in the mouth of the nestling. However, after the young were partly feathered out the adult merely left the food for them. The nestling sometimes would peck at the disgorged material for several minutes after the adult left before all of the food was eaten.

The small nestlings are generally silent, but when handled or otherwise disturbed, they give soft [Pg 514] lisping peeps. By early August, when the young have ventured from the nest bowl to nearby branches, they become vocal and their calls can be heard more often than those of the adults. The call of the adult has been well rendered by Sutton (1939:43) with the syllables "phee phew"—a whistle in which the first syllable is short (lasting only about one-fourth of a second) with a rising inflection, clipped off short, while the second syllable has a downward inflection, and is drawn out to two or three times the length of the first syllable. The call of the fledgling is soft, with a lisping quality; that of the adult is much like it but is sharper and more piercing. Fledglings call frequently while waiting to be fed, but as an adult approaches with food, the calls are given in rapid succession and slurred to a high thin squablike squeaking or squealing.

When fledglings are able to fly and have left the nest, the adults generally pass food to them directly, rather than dropping the regurgitated mass, which might fall to the ground and be lost. On August 22 a fledgling was seen following an adult in flight, and was also seen to eat while it was flying. At this stage, when an adult fed one young of a brood, the other would sometimes fly to the spot in an attempt to share the meal. However, the transfer of food was usually rapid and the adult would leave within a few seconds. Young often were seen to fly out from the nest tree and maneuver in the vicinity, flying in a roughly circular course perhaps 100 feet in diameter and then returning to the nest tree, thereby familiarizing themselves with their surroundings.

According to the consensus of published accounts, there are usually two eggs per clutch, occasionally one or three. However, Ganier (1902:89), who studied the species in Mississippi, wrote: "Of all the nests I have examined [number unspecified] only one was found to contain more than a single egg." Nice (1931:69) recorded 19 sets of two each and seven of one each in Oklahoma. In the course of my observations, 12 clutches of two were recorded. A group of four fledglings were observed concentrating their activities at a nest more than 200 feet from any other known nests; possibly all belonged to the same brood, but this was not definitely determined.

Many of the nests that were in use in 1961 appeared to be relics from earlier years, as the material was darkened and disintegrating, but probably a new layer of sticks had been added on the top. Bent (*op. cit.*:65) mentioned this kite's habit of frequently using the same nest in [Pg 515] successive years. On one occasion as I drove over a little-used road in the Park and passed a cottonwood grove where kites were nesting, one of the birds swooped down and struck the top of the automobile. In a subsequent conversation, Harry Smith asked me if this had happened, and said that this particular kite had struck his truck frequently when he drove past its nest. This had occurred at the same place in three successive years, and Smith was convinced that the same kite had used the nest each year, although the bird was not recognizable except by its unusually aggressive behavior. On dozens of occasions in the course of my observations kites swooped at me when I was near their nests, but, except for this one individual, they always veered away at a

distance of several feet or several yards.

At the time of my visit to the Park in early June, kites were relatively silent and secretive in their behavior. Approximately half of those that were incubating flushed when a person walked near the tree, but others continued to sit on their eggs until a person had climbed to within a few feet of the nest. Upon being flushed, such a kite, in 50 per cent of observed instances, swooped at least once at the intruder, but some of the kites would soar overhead, watching without making any active defense. At the time of my next visit, July 18 to 21, when the kites were feeding well grown nestlings, behavior at the nest was much different. As soon as a nest was located the parents began scolding and swooping. At the first nest observed, a group of eight kites had congregated within two minutes to scold and harass the intruders. Even kites whose nests were kept under observation frequently, never became fully reconciled to the intrusion but there was much difference between individuals in this respect. Some were reluctant to deliver food and, having secured prey, would fly about in the vicinity without coming to the nest.

Mortality Factors and Defense

Joint defense against a common enemy was noted on July 21, 1961, when 21 kites were seen swooping at a Swainson's hawk perched near the top of a large cottonwood, where it was partly protected by foliage and branches. When I flushed the hawk, it was pursued and harassed by the kites, some of which followed it for nearly a quarter mile although there were no nests of the kites nearby. On August 4 a group of six kites was seen heckling a fledgling Swainson's hawk, [Pg 516] which crouched among thick foliage in the top of a tall cottonwood, as the kites swooped at it, sometimes brushing it with their wings when they swept past. Dr. Hibbard mentioned an instance in which a horned owl was flushed, and was chased and heckled by a red-tailed hawk and by a group of kites. The latter seemed to regard the owl as the greater enemy, but ordinarily any large raptor arouses their hostility.

Because of their exceptionally swift and skillful flight, the adult kites have few natural enemies, but the eggs or nestlings are vulnerable to such enemies as crows, jays, the larger hawks and owls, and to certain mammalian predators, notably raccoons. Also, many nests probably are destroyed by the sudden and violent summer storms that are characteristic of the High Plains. Bendire (1892:178) cited observations by Goss that in a hailstorm in Barber County, Kansas, eggs were destroyed in many kites' nests and some of the nests were almost completely demolished. Several nests found by me to have incubating eggs in the first week of June were abandoned or had disappeared completely by July 18, but the cause was not evident. One nest that was under observation on July 22 had nestlings approximately two-thirds grown on that date, but on August 4 only a few sticks remained, and the carcass of a fledgling dangled from a limb ten feet below the nest. Even at the Park where firearms are prohibited, kites are sometimes shot by ignorant or malicious persons. In general, Kansas ranchers recognize the harmless and beneficial habits of kites, appreciate their esthetic appeal and protect them, but many persons use them as convenient targets, with utter disregard for the Federal laws protecting them. Because of the strong popular prejudice against raptorial birds in general, laws protecting them are usually not enforced. Law enforcement officers do not take action even when clear-cut violations come to their attention. Arrest and prosecution for the killing of any kind of raptor is almost out of the question in Kansas.

Ratio of Immatures to Adults

In the juvenal plumage flight feathers of the kites are brown, barred with white, much different in appearance from the dark, slaty plumage of adults. Bent (*op. cit.*:67) stated that these barred flight feathers are retained through the second summer, and he quoted Mr. G. W. Stevens as having found kites breeding in this immature plumage. On June 2, 1961, I attempted to determine the ratio of these yearling kites to others in the population at the Park. Most of the [Pg 517] kites seen were in flight too far away to discern definitely whether or not they were juveniles, and records were limited to those seen at relatively close range. In a total of 108 records only 11 pertained to these yearlings and the remaining 97 were identified as of adults. Beyond doubt in the course of my counts some individuals were recorded repeatedly, therefore the counts are not entirely acceptable. However, on each occasion that kites were seen in numbers in early summer, the adults greatly outnumbered the juveniles. The approximate nine to one ratio of adults to yearlings seems much too high. Even if the difference is much less than indicated, the high ratio of adults to yearlings would seem to imply that the adults have a long life expectancy. A rather improbable alternative is that some of the yearlings remain in winter quarters or wander elsewhere rather than accompanying the adults on the return migration to their breeding grounds. Still another alternative is that the breeding season of 1960 was relatively unsuccessful, but this idea is negated by my own observations at the Park in late 1960, as recently fledged young were numerous then.

At the time of my visit to the Park August 21 to 24, 1961, all young had recently left the nests and were able to fly. However, their behavior was so much different from that of the adults that a reliable ratio could not be obtained. The fledglings tended to remain in the nest tree, or to make relatively short flights near it, while the adults occupied with catching of prey for themselves and their young, spent much of their time aloft. The adults were hence far more conspicuous than the fledglings. However, it is my impression that the fledglings were from one-third to one-fourth as

numerous as the adults. If this ratio is correct, and if all adults had bred, from two-thirds to three-fourths of the eggs and/or nestlings must have been destroyed. This rate of loss seems reasonable in view of the known histories of nests observed in June and again in July, and of the fates of birds' nests in general.

Summary

Mississippi kites were studied in southwestern Kansas in the summer of 1961, at various localities, especially at Meade State Park. At this locality, near the northwestern limit of the breeding range, the kite thrives in typical High Plains habitat dominated by a short-grass type of vegetation, but availability of trees suitable for nests is a limiting factor. Since maturing of extensive groves of cottonwoods and other trees planted at Meade State Park, the colony of kites has increased tremendously and the breeding population probably exceeded 100 in 1961.

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The kites are social in all their activities and do not maintain territories. The sexes differ little in appearance, but males are slightly smaller than females and have paler heads. Food consists almost entirely of flying insects, and these are usually eaten while the kite is in flight. Kites that are feeding nestlings may travel up to two miles from the nest or perhaps considerably farther in the course of their foraging. For 148 feedings of nestlings the observed intervals averaged 10.7 minutes. Most published references to the food habits mention predation on small vertebrates, especially lizards, but including also snakes, toads, rodents, and even rabbits. In my study a total of 205 pellets were collected and 453 insects were tentatively identified but the total number of insects in the pellets was much larger. No vertebrates were identified from this sample and among 358 prey items identified from kite stomachs collected in Oklahoma, by Sutton, vertebrae of a small fish were the only vertebrate remains. Further verification of predation on mammals, reptiles and amphibians by this species is needed. Of the insects distinguished in pellets, beetles including carabids, cicindelids, hydrophilids, scarabaeids, and silphids were most numerous (270) and grasshoppers (164) were second; also there were 16 cicadas and three moths.

Kites arrive in Kansas about the second week in May. Often old nests are repaired and used over again. Hatching is about mid-June. Normally there are two eggs per clutch. By mid-August the fledglings are learning to fly. By the latter part of August they are learning to capture their insect prey, and in early September southward movement of the entire population begins.

Eggs and/or young in many nests are destroyed by hail or high wind in the sudden violent storms that are characteristic of the High Plains. Mississippi kites are often shot by misguided persons, and benefit little from the protection supposedly provided by Federal law. However, the adults probably have few natural enemies. The high ratio of older adults to yearlings indicates that the life expectancy is long. Through their second summer the kites retain their barred immature plumage, and can be readily distinguished from adults. Only ten per cent of the kites recorded in 108 June sight records at the Park were in juvenile plumage.

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[The End]

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