

A LIFE HISTORY STUDY OF THE WHITE-TAILED KITE

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Since the preparation of an earlier article on the White-tailed Kite (Hawbecker, 1940), it has been found possible to spend more time in the field and consequently to make a more complete study. Easy accessibility to the two pairs most studied has been responsible for this, as these birds have nested for three seasons within a few minutes' drive of my office. Three winter seasons are also covered in this study. It has been found necessary to include some of the data from the first article for comparison, and some points brought out there have been enlarged upon, but generally repetition is avoided. All of the first-hand material included herein was gathered in Santa Cruz County.

Three pairs of kites were studied and shall henceforth be designated by number: No. 1 was situated just west of the small settlement of Corralitos. It was studied through part of the nesting season of 1939 but it left and has not returned, probably because of the interference by man. No. 2 is situated about one mile west of Watsonville, and No. 3 is situated approximately one-fourth mile south of No. 2. A total of seven pairs has been reported within a radius of a few miles of Watsonville, and others have been rumored or suspected, but only four pairs have been observed with any care.

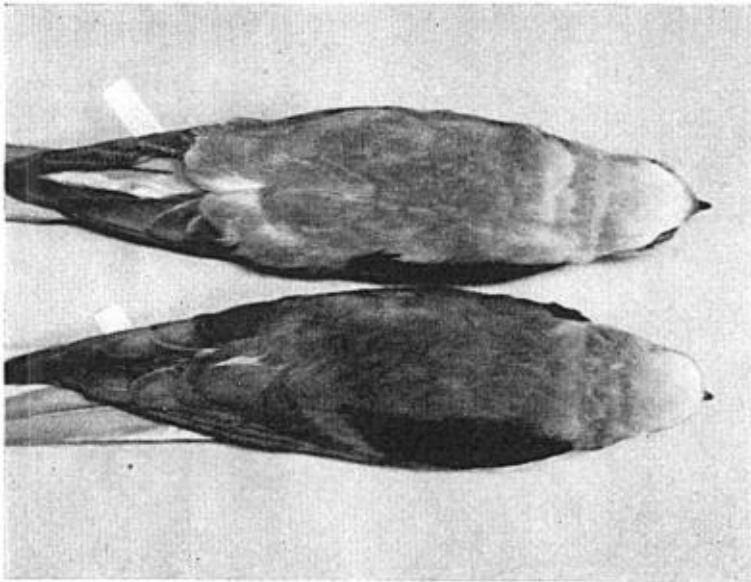


Fig. 82. Skins of White-tailed Kites, showing normal differences in coloration of the sexes: male above, female below.

The White-tailed Kite (*Elanus leucurus majusculus*) has been well described and pictured by others, but sexual differences do not seem to be well understood. Watson (1940) suggests that the female is the larger, but this is not borne out by measurements of nine males and seven females in the collection of the California Academy of Sciences. The following average measurements in millimeters were obtained. Males: wing, 309; tail, 184; tarsus, 42.5; bill (chord of exposed culmen excluding cere), 18.5.

Females: wing, 307; tail, 183; tarsus, 41.3; bill, 19.2. It can be seen that only in bill length is the female larger. Four males and three females in the Museum of Vertebrate Zoology were measured for me by Charles G. Sibley; this material gave the same proportions as that of the Academy. In fact, even in the hand, the sexes appear to be the same size. Watson is correct, however, in stating that the gray of the back and wings of the female is darker (fig. 82). This was brought out by placing side by side three females and two males taken in January and February, but the difference is apparent only when the sexes are directly compared. I was unable to use this character in the field because the birds seldom if ever had their backs to me. Only during actual copulation could I be certain of their sex, except by comparing their actions with those of birds observed by others such as Watson, who had the good fortune to have some other way (such as a missing feather) of telling the birds apart.

Pickwell (1930) has compiled a list of trees used by kites for nesting, in which live oak predominates. Sycamore and maple are also listed. De Groot (1938) reports a nest 75 feet up in a Monterey pine, and Moffitt (MS) gives the distribution of eucalyptus in the marshlands north of San Francisco Bay as a critical factor in the distribution of nesting kites in that area. Pairs No. 2 and 3 nested and hunted in adjacent and similar territories, but nested in different kinds of trees. As the nesting trees of the previous years blew down, pair No. 2 nested in five different willow trees in three years. A short distance away pair No. 3 nested for two years, and probably a third, in the same live oak. It appears that any suitable tree may be used that is adjacent to the required food source.

How a certain nesting locality is originally chosen is not known, but once chosen the birds ordinarily return to it year after year unless interfered with. It can only be assumed, however, that the same individual birds return. I found that when the birds of pair 1 failed to return to their nesting site, no other pair took it over even though the food source was still present. From this I deduce that the birds of pairs 2 and 3 returned to, or within a few yards of, their previous nest trees and that other pairs did not occupy their territories. One pair remained near its nesting site through all the winter of 1939-1940 and nested there the next season. What is believed to be the same pair was seen at intervals around this nesting site in the following two winters. Barlow (1897) records two pairs returning to the same grove of live oaks year after year. Kites have been known to appear suddenly in, or to disappear from, a territory. This, of course, may be due to the state of the food source, or it may be due to the death of the young within the nest. Egg collectors have taken eggs and other eggs have been laid in the territory subsequently. Two times, however, when something happened to young that I watched, the birds failed to return to their territory.

I agree with Watson (*op. cit.*) in believing that the kite pairs for life, as appears to be the case with other diurnal raptors, but this is yet to be proved. I have seen kites in pairs at all seasons despite the apparent weakness of the tie during the fall. When seen together in the winter, they call back and forth, join in the attack of other raptors, as was noted on January 9 and 20, 1940, and dispute over food. This latter action is interesting in that when one bird brings in food the other calls much as at mating time but the food is not shared.

In the pair of birds (No. 2) studied most intensively, copulation began toward the end of February, although either copulation or an attempt at it was seen as early as January 7, 1941. On February 23, 1940, I saw the male attempt to copulate, or appear to, but the female refused. The male made a dive over her and then came back and attempted again, but again she refused. He did this eleven times in 20 minutes but had

no better success. They were so intent on their mating that they ignored two crows perched near by. Finally the male flew off and captured a small animal out of an adjacent field, then flew by the female as if using the food as bait, but she still ignored him. The crows did not, however, and took after him. He did not relinquish his prey but protested so heartily that the female flew to his assistance. Where the food went I never found out, but after pestering the kites for a while the crows moved on. The male resumed his attentions, but as long as I watched he was not successful. Nice (1933, 1939) records something like this in her studies of song sparrows and considered it an "intimidation" performance, calling it "pouncing." By this means the male dominated the female, although the female dominated the male in many more ways. I cannot say that this is the same performance in the kite, although it is similar in many ways. This was the only time the diving act was noted except that occasionally one bird, possibly the male, was seen to swoop over the other during the mating season.

On February 26 copulation definitely took place. The female had been away, and as she perched the male flew over and copulated. Copulation seemed to take place quite often from this time on. From then on the male did the hunting. He would bring in the food and perch, then call much as a domestic rooster only more gutturally, calling the female to him. Apparently they divided the food, although he may have given all of it to her. Once when I hid under the perching tree, the female saw me but the male did not. He perched and called but she refused to come. He gave a rasping note as if in anger, if such a term may be applied, but finally flew away as if responding to the female's frantic calling. At this time, too, the male seems to do most of the fighting with other predators, although the female soon takes it up again. Watson puts the copulation period at about 22 days, which in my birds would have continued up to just about the beginning of incubation. These birds, however, were seen to copulate on April 2, and again an attempt was seen on May 19 of 1940. There was no known second nesting this year.

Little information was obtained on territory. The two pairs (Nos. 2 and 3) most intensively studied nested within 400 yards of each other for three years and only once did I see the male of one pair drive off one of the other pair. Usually the pairs stayed away from each other. Red-tailed, Cooper, and other hawks were fought off fiercely in most instances, but were sometimes ignored. There seems to be considerable variation between pairs in this respect. A pair of crows nested within 50 yards of one of the nests of 1940 and both brought off broods successfully with no fighting being observed. Watson (*op. cit.*) covers the subject of territories, finding that each pair defended an area of about one-half square mile. Several times I saw and followed one of the males half a mile away from the nest on a foraging trip, but I have never seen one farther away than this and they usually hunted closer to the nest. Pickwell's (*op. cit.*) birds were spaced much closer and apparently got along well together. During the winter, territorial lines were still less well defined. The birds wandered a great deal and bothered other predators less within the nesting territory and other kites not at all. Each winter pair No. 2 moved its headquarters about 400 yards to the north of the nesting site, although it was often absent from the vicinity.

The birds of pair No. 2 returned to their nesting site to stay in February. By March 5, 1940, they had settled on a willow as a nesting tree and were circling about it. This was within a few yards of the previous years' site. On March 13, 1940, and on March 10, 1941, the veriest beginnings of their nests were seen. Both sexes worked, bringing dead willow branches that they broke off (whether with bill or feet I could not tell) from neighboring trees, but one bird, which sex is not known, worked harder

than the other. These nests appeared to be roughly completed in seven days, although at no time did the birds appear to be working hard at building. The completed nest is lined with grass. Eggs were not laid in the nest of 1940 until about March 30, or 17 days after beginning the nest. Some authorities describe the nests as flimsy and others as being well built. I found one flimsy nest, apparently that used for a second brood; all others were well built, but they tended to flatten out as the young developed, sometimes spilling them out in a high wind. No nests were ever repaired or used over by pair No. 3, which nested in the same tree for three years. Bent (1937) and Taylor (1887) seem to believe that the nests may be reused, although only Taylor presents any evidence for this. [Since writing the foregoing, I have found pair No. 3 using their nest of a previous year for a second brood.]

The birds of pair 3 were settled considerably earlier in two years, and apparently in a third, than was pair 2. In 1939 they had apparently brought off their second brood before August 11, while the second brood of pair 2 was just hatching. In 1940 their first brood was off by May 14, whereas the first brood of pair 2 did not leave until after June 8. In 1941 the first brood of pair 3 was in the process of leaving the nest on May 17, while the young of pair 2 did not leave until about June 10. It seems, therefore, that pair 3 nested consistently about 24 days ahead of pair 2. Strangely enough, although I looked carefully for pair 3 in 1940, I did not find it until the young were well along. In 1941 I kept closer watch, but still the birds kept so well hidden and they so cleverly concealed their nest that I did not find it until there were three eggs in it. For some reason the birds were able to do their hunting and building without my seeing them. Barlow (1895) found five heavily incubated eggs on March 24, 1895, so his nest must have been started in the latter part of February as was the case with my pair No. 3.

Laying begins soon after the nest is finished. On April 2, 1940, three eggs were found in the nest of pair No. 2, and on April 8 there were four eggs. One egg was pipped on April 30, two were found hatched on May 2, a third on May 4, and the fourth on May 7. The last young had then been hatched two days, judging from its appearance and strength. Thus it appears that eggs are laid on consecutive days and that incubation starts with the first egg, as has been reported for many other raptors. Similar observations on nests of pairs 1 and 3 supported this in that the young were of different sizes: one large, one small, and two intermediate in size. Barlow lists the earliest set known to him as found on March 15, 1890, and the latest on May 17, 1891. Eggs observed by me were a chocolate brown when first laid, but they soon faded out to mottled brown and tan. Bent gives four or five as the usual set, with some of three and one of six. De Groot also records one set of six. The sets I saw varied from three to five, with one second nesting of five, one second nesting of three, and three first sets of four. One nest, undoubtedly a second nesting, was known to contain four young.

As indicated above, the incubation period lasts 30 to 32 days, as nearly as I could determine it. An egg produced by pair 2 on April 3 or 4, hatched on May 5 or 6. Because of press of other work it was not possible to follow other nests carefully enough to determine the incubation period exactly, but none of the observations made seemed inconsistent with a period of 30 to 32 days. Pickwell deduced that the period was 30 days or slightly more.

The hatched eggs give the appearance of having been broken by the parents since they are broken inwardly (see fig. 83). It is possible, however, that this effect may result from the drying and shrinking of the inner membrane. The halves figured were found while fresh; in fact one half of the shell still contained a newly-hatched youngster.



Fig. 83. Eggs of White-tailed Kites, showing manner in which shells are broken open at hatching. The whole eggs are from different pairs of birds.

Infertile eggs seem to be quite common. Of five eggs in one second set, one was known to be infertile and another disappeared soon after the other eggs were hatched. In another second set of three eggs, one was infertile. Both of these were second sets laid following rearing of first broods. When these infertile eggs were blown, they showed no signs of development. Barlow records one case of infertility.

As far as could be determined from pair No. 2, the female does most of the incubating and brooding, while the male perches near by or hunts. Watson also found this to be true. Once when the female left the nest and perched near by for some time, the male flew to the nest and brooded, but the female came in at once and the male left. It appeared that the male was protesting to the female in this way. Both birds came and left by the northeastern side of the nest, even though this might mean turning around to do so. The female would come in and alight on the edge of the nest, look around, and then settle down. The male uttered a note that sounded like *keep* for the first few minutes after arrival near the nest, then continued at about 2-minute intervals after the female went on the nest. She would look this way and that for awhile, then both would quiet down. Both did some preening at such times. The female stayed in the nest exactly four hours at the longest stretch recorded and then left in anticipation of the food that the male failed this time to bring in. In this period she preened and stretched her wings at intervals. This was at a time when she was brooding two newly-hatched young and a third egg that later proved to be infertile.

In the course of an eight-hour period from 8:30 to 4:30, the male went hunting three times. Two of the periods were timed at 16 and 29 minutes each. One expedition was unsuccessful, or possibly the male consumed the prey himself. It seems probable that he may have been out at least once before I arrived to watch and went out once after I left. As the young get older, both parents appear to hunt, but whenever the nest is approached one parent is usually near by. Watson has described the method of food transference from the male to the female and I can but add that this method was used by pairs that I watched. After the transfer the female brings the whole prey back to the nest, stands on the edge and pulls it apart, feeding the smaller portions to the youngsters and eating the larger parts herself. Timed once, this feeding of two very small young took eight minutes. She finished the mouse, taking 10 minutes to tear it apart and devour it. In no instance was the food bolted, as suggested by Miller (1926). Moore and Barr (1941) described interestingly the way in which young learned to tear a mouse apart themselves.

The young at hatching are weak and unable to hold up their heads. The head

appears large in relation to the rest of the body; the eyes are only slits. At this stage they respond to any noise or movement by opening their beaks and peeping weakly. They are covered with a light tan down, with the flesh quite pink beneath. Within a week they are much more vigorous. They hiss somewhat and grasp at twigs when being lifted from the nest. The dark pin-feather sheaths give the birds a bluish cast, and the eyes are a dark brown and are well opened. At two weeks the kites are fairly well feathered on the wings and back. They hiss and scream when bothered.

In three weeks the birds are well feathered throughout. The shoulders are black, the back and breast brown, and the belly white. The eyes are dark brown and the feet yellow. The young react vigorously to handling by opening the beak, grasping with the talons, and screaming loudly. They look much like this when they leave the nest ten days later, except that the brown of the back and breast is then changing to gray and white, respectively. The progress of this change is a matter that will require further study. The eyes do not change from brown to magenta while the bird is still on the nest or immediately thereafter. Just when this change takes place must also be determined by further study.

The young leave the nest gradually. They work out into the branches around the nest and the oldest makes an experimental flight, usually tangling up in branches or blackberries but finally achieving grace. The others follow within a day or two and soon all are able to fly well.

The young apparently return to the nest to feed after they have left it, as the remains of prey were found and the young were seen there, although actual feeding was not seen. They occasionally settled to the ground to rest, an action that was not noticed in adult birds. Four young left the nest of pair 2 on June 8, 1940, and were last seen September 10, when it was noted that the brown breast was almost gone. There was no second nest that year. The young seem to disperse within 45 days and are cared for only for a short time when there is a second nesting. It appears that the first brood may join neighboring broods whose parents are not nesting a second time, since I once found five young kites where there should have been only four. I assume that the young one driven off by its parents joined the other four that were still in the vicinity even though they were much older.

There is some disagreement among observers (Pickwell, Barlow) on the subject of nest protection, but there appear to be differences between pairs which afford grounds for this. Two pairs dived close to an intruder even after the young had left the nest, while one pair made only half-hearted dives at any time. The degree of protection seemed to be correlated with incubation and growth of young, as the old birds' attacks seemed to increase in number and intensity as incubation progressed and reached their height as the young were ready to leave the nest. I was attacked by a pair that was still feeding a brood but had started on a second nest.

Of the number of eggs, which averaged four in five sets, and the number of young hatching, averaging 3.2 in five nests, an average of 1.9 young per nest survived to leave. The total of young raised to this stage by all known pairs (four) in three nesting seasons is 26. Four known pairs produced 15 young in 1939. Two pairs produced 6 young in 1940, and the same pairs produced 5 young in 1941. Thus 1.6 birds per adult have been produced per year. If I had not unknowingly interfered, there probably would have been three more birds to add to the total, and possibly some additional ones.

Deaths of young birds seemed to be due to a number of causes. Several, usually the youngest and smallest, seemed to have been crowded from the nests by the larger young and were found on the ground or hanging from a crotch. One was pushed out

by the female as she flew. Others appeared to fall during high winds after the nest had become flattened. Moore and Barr mention this in relation to the birds they studied. Man was directly responsible for the death of three young. One was found dead in the nest with no cause apparent. Two that disappeared when only a few days old may have been taken by predators, possibly crows. This cause of death may be more serious than previously supposed. One adult bird found along the road appeared to have been hit by a car. Five birds of varying ages were shot by people who thought they were harmful. It is heartening to note that none of the birds banded since 1939 have been reported as shot.

The second nest apparently may be started while the first brood is still in the nest, since the first young of pair 1 left the nest on about May 14, 1939, and the second nest with five eggs that had been incubated from 5 to 7 days was found on June 1. These eggs were hatched by June 25. It is of course possible that the second nest is built much more rapidly than the first. Two certainly known second nests were found, the one mentioned above and one of pair No. 2, found on June 27, 1941. The two young of the latter hatched on July 29 and 30. In 1939, a nest of pair 2 was found on August 11, with the young just hatching. This also was undoubtedly a second nest. Seven young were seen with pair 3 in 1939, so there was possibly a second nesting in this case too. Joseph Dixon tells me that he and his brother found second nests in 1939 and 1941, and Laidlaw Williams says that he has suspected that such occur. Pickwell saw a kite carrying a stick on August 3, 1930, which is late even for a second nest.

After the young leave the nest and disperse, the old birds remain in the vicinity for roughly three months. The young of pair 3 left the nest on May 14, 1940, and May 17, 1941. The adults were not seen as a pair after August 7, 1940, and August 5, 1941. Pair No. 2 behaved similarly, only they were one month later. There is then a period when the birds appear to break up. For instance, in 1940, pair 2 was last seen as a pair, except very rarely, on September 5, and was then seen again more regularly as a pair beginning December 23. The majority of kites seen from August to December appear to be alone, the main exception being the one aforementioned pair seen together all of the fall and winter of 1939. They appear to be still paired, however, and still loosely bound to their nesting site. For, although one can go back time and again to the site and see no birds, other visits will disclose one or both. The kites probably do not stray far since they are seen commonly in the Watsonville area all winter, although somewhat scattered. As mentioned before, pair No. 2 stayed around the nesting site all of the winter of 1939-1940 and much of the winter of 1940-1941. Pair 3 disappeared after nesting and was not seen again until the next nesting season. The birds will be seen more often around the nest site by February and then take up residence. During this winter period each apparently hunts for itself, and when one brings in food the other gutturally "scolds" but has not been seen to obtain food from its presumed mate.

The young birds apparently travel farther and do not return to the place where they were hatched. A bird banded at Corralitos was shot near Salinas, an air-line distance of some 21 miles. Another bird banded at Corralitos was shot near Watsonville, an air-line distance of seven miles. No new nesting sites apparently were taken up in the immediate vicinity of the banding site; therefore it is assumed that the young did not return to nest there.

The White-tailed Kite's method of hunting has been well described by others (Bent, Watson), but authorities disagree on the food itself. Insects, lizards, mice and gophers were apparently surmised by a number of people (Barlow). Fisher (1893) gave *Microtus* as a result of analyzing one stomach, but even later writers (Bailey,

1916; Dawson, 1923) continued to include insects and lizards. Miller gave concrete evidence with his observation of one stomach containing one *Sorex* and four *Microtus*. Pickwell found a *Citellus beecheyi* under the nest and five skulls of *Microtus* in pellets in the nest. Hawbecker adds to this list from three different localities around Watsonville and now adds evidence from 82 pellets. All but one of this latter group contained *Microtus*. One pellet contained three skulls, 12 contained two each, and 68 contained one each. One pellet contained two skulls of *Reithrodontomys*. Many other pellets were examined but records were kept only on the 82. Other pellet analyses now on record (Bond, 1940; Moore and Barr, *op. cit.*) seem to prove that this is the commonest food in all sections. Stoner (1933) records five house mice in one stomach, which may give some clue to an introduced food source. It appears, however, that the White-tailed Kite is nearly as dependent on *Microtus* as a food source as is the Everglade Kite on the snails of the genus *Ampullaria*. The kite's slow, peculiar method of hunting may make it thus dependent. Laidlaw Williams pointed out to me that the last 20 feet of a kite's drop is quite fast, but I believe still not fast enough regularly to catch birds, ground squirrels and rabbits, and other diurnal inhabitants of open ground. The pellets of a Barn Owl (*Tyto alba*) living in the same area were examined and *Microtus* were found present, but many other species, such as *Neurotrichus*, *Peromyscus*, *Reithrodontomys*, and birds were also included, indicating that there are other prey species in the area. Thus, it appears that the Barn Owl, being a nocturnal feeder, has a greater variety of prey to choose from, while the kite is limited almost entirely to one diurnal genus.

Recent sight records of the kite seem to show that it is concentrated chiefly around the San Francisco Bay area. This may of course be due to the greater number of trained, interested observers in this area as compared to others, but it is more probably due to the greater amount of a peculiar type of habitat. The farthest south (in California) whence the kite has been reported is near Tia Juana Marsh, San Diego County (Huey, 1931), whereas the farthest north is at Burney Falls, Shasta County (Ingles, 1937). Another northern record is from Miranda on the south fork of the Eel River (Clay, 1926). Records from the Sacramento-San Joaquin Valley are rare. Mowbray (1941) saw one near Colusa. Neff (1932) and Quick (1937) saw birds near Sacramento. Mailliard (1924) saw kites near Modesto, and Hudson (1920) saw them along the Tule River near Porterville. An interesting record is that of van Rossem (1932), who saw a kite along the Mohave River below Victorville. As he states, this is outside the normal range but the necessary willows and marsh are present. My observations show that kites are seen only in a type of habitat that supports *Microtus*. Plotting all of the available recent records on a map, I find that the recorded range (in California) of the kite coincides roughly with large and small river valleys or the vicinities of bays where there is a great deal of grassy land that can support a large population of meadow mice. In general, the kite seems associated with fairly marshy, willow-covered country at low elevations.

Pickwell and others record what might be called exceptions to this, as I did in my pair No. 1. In the case of my birds there was on the adjacent hillside an abandoned apple orchard that had grown up rank with grass. In this grass were innumerable meadow mouse runways and the foraging was carried on over this hillside even where the grass was quite tall. Pickwell's situation was probably similar. It seems probable that kites nest where food is sufficient, and of late years hillsides have so generally been overgrazed that there is no longer much suitable habitat in these areas; therefore the kites must do their hunting in marshy, non-agricultural areas. One can see a good

example of this in the lands of the East Bay Municipal Utilities District near Berkeley, California. There are overgrazed and undergrazed hillsides side by side, and the former are devoid of grass and mice while the latter support both. The interior valley, according to Cooper (1870), once supported a greater population of kites, but since the most moist valley bottoms are cultivated and the hot dry hillsides are overgrazed, there is no place for meadow mice to breed in numbers. This probably accounts for the few recent records of kites in the Great Valley, as it appears to be good "kite country" otherwise.

In 1936 Moffitt (MS) saw 13 kites perched together in a tule thicket in the marsh area north of San Francisco Bay; therefore kites are probably still numerous where conditions are favorable. In some situations, such as where land has been cleared and allowed to become grassy, as in southern Santa Cruz County, or where alfalfa and pasture have been planted on a large scale, the kite may even increase. Quick (1937) records an instance where kites have been seen for 10 years in small oaks in open alfalfa. Peyton (1939) reports an apparent increase in kites in Ventura County, where the birds were seen over alfalfa fields.

The nesting sites of pairs No. 2 and 3 may be in danger due to the gradual dying out of trees along the marsh where they nest and the possible cultivation of their hunting ground. Thus it appears that possibly agriculture is more responsible for an increase or decrease in kites than increased or decreased shooting. Pickwell (1932) reported, however, that most of the kites he had observed two years before were gone, presumably having been shot.

The question naturally arises as to whether kites are scarce and are getting scarcer, or whether possibly there never was a large population within the range. Taylor (1887) believed that the kite was becoming rarer, and the general tone of all kite articles of that time was that of pessimism regarding the kite's survival. McGregor (1901) gives it the status of rare in Santa Cruz County, mentioning only one pair, whereas now there are at least five pairs in the Watsonville district. Moffitt (MS) does not believe that the pairs noted for many years in the salt marshes north of San Francisco Bay have become depleted. It may be assumed, I believe, that where within its range the kite has come in contact with some factor such as agriculture, it may have either increased or decreased. Up to now it appears to have decreased more than it has increased, but it appears to be holding its own or slightly increasing in favorable localities.

As is the custom at the conclusion of an article on a rare species, I herewith give my ideas on methods of conservation for this bird. The kites' nests that I have seen and those of which I have heard are situated on farms. If some organization, such as the one that issued posters lately, would make a contract with each farmer, giving him fifteen dollars a year for each year the birds nested successfully on his farm, he would very probably keep close watch over the birds. Then there are natural refuges, such as the East Bay Municipal Utilities District, where hunting is forbidden and where there are fine nesting sites where the kite could possibly be reintroduced. Education is the "first line of defense" but action is a close second. We may mourn the passing of our rare birds in our society meetings, but until we do something about it actively, we are not helping much.

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LITERATURE CITED

- Barlow, C.
1895. In the haunts of the white-tailed kite. *Oologist*, 12:97-101.
1897. Some notes on the nesting habits of the white-tailed kite. *Auk*, 14:14-21.
- Bent, A. C.
1937. Life histories of North American birds of prey. Part I. U. S. Nat. Mus. Bull., 167:54-63.
- Bond, R. M.
1940. Food habits of the white-tailed kite. *Condor*, 42:168.
- Clay, C. I.
1926. Unusual visitors in Humboldt County, California. *Condor*, 28:98.
- Cooper, J. G.
1870. Ornithology. Vol. I. Land birds (Geol. Surv. Calif.):488.
- Dawson, W. L.
1924. The birds of California. Book-lovers' Edition (South Moulton Co., San Diego, etc.), 4:1648-1651.
- De Groot, D.
1928. Record sets of eggs of California raptors. *Condor*, 30:360-361.
- Fisher, A. K.
1893. The hawks and owls of the United States in their relation to agriculture. U. S. Dept. Agri., Div. Ornith. Mamm., Bull. No. 3:23.
- Hawbecker, A. C.
1940. The nesting of the white-tailed kite in southern Santa Cruz County, California. *Condor*, 42:106-111.
- Hudson, L. W.
1920. An albino brown towhee. *Condor*, 22:80.
- Huey, L.
1931. Notes on two birds from San Diego County, California. *Auk*, 48:620-621.
- Ingles, L. G.
1937. Occurrence of the white-tailed kite in northern California. *Condor*, 39:222.
- Mailliard, J.
1924. Autobiography of Joseph Mailliard. *Condor*, 26:10-29.
- McGregor, R. C.
1901. A list of the land birds of Santa Cruz County, California. *Pac. Coast Avif. No.* 2:6.
- Miller, L.
1926. The food of a white-tailed kite. *Condor*, 28:172-173.
- Moore, R. T., and Barr, A.
1941. Habits of the white-tailed kite. *Auk*, 58:453-462.
- Mowbray, V.
1941. In minutes of the Cooper Club, Northern Division. *Condor*, 43:208.
- Neff, J.
1932. White-tailed kites near Sacramento. *Condor*, 34:259.
- Nice, M. M.
1933. Relations between the sexes in song sparrows. *Wilson Bull.*, 45:51-59.
1939. The watcher at the nest (The MacMillan Co., New York):9.
- Peyton, S. B.
1939. In minutes of the Cooper Club, Southern Division. *Condor*, 41:224.
- Pickwell, G.
1930. The white-tailed kite. *Condor*, 32:221-239.
1932. Requiem for the white-tailed kites of Santa Clara Valley. *Condor*, 34:44-45.
- Quick, A.
1937. White-tailed kites observed in Yolo County, California. *Condor*, 39:132.
- Stoner, E.
1933. The white-tailed kite at Benicia, California. *Condor*, 35:121.
- Taylor, H. R.
1887. Nesting of the white-tailed kite. *Orn. and Ool.*, 12:135.
- Van Rossem, A. J.
1923. The white-tailed kite on the Mohave Desert. *Condor*, 25:140.
- Watson, F. G.
1940. A behavior study of the white-tailed kite. *Condor*, 42:295-304.

Soil Conservation Service, Watsonville, California, March 28, 1942.