THE UPLAND PLOVER IN THE FLINT HILLS OF KANSAS

by

David K. Goering

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Approved:

Ralph P. Frazier
Approved for the Major Department

Clarence C. Baxter
Approved for the Graduate Office

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INTRODUCTION

A study of the Upland Plover (Bartramia longicauda Bechstein) was conducted in a portion of the Flint Hills near Emporia, Lyon County, Kansas, during the breeding seasons of 1962 and 1963. This paper is a report of that study.

Since the publications by Coues (1874) and Goss (1891) little has been written about the Upland Plover. The studies by Rowan (1927), Bent (1929), Buss and Hawkins (1939) and Buss (1951), have been concerned primarily with the species' breeding behavior. Beck (1926, 1940, 1942, 1949), Musselman (1935) and Orr (1943) have reported on population trends. Ridgway (1919) has provided a detailed description of adult and young birds. Wetmore (1927) has made a significant contribution concerning the Upland Plover on its wintering grounds in South America. Except for published observations made in Kansas by Goss (1891) and in Oklahoma by Sutton (1957), study of the Upland Plover in the southern portion of its breeding range has been almost entirely neglected.

DESCRIPTION OF AREA

The study was conducted in three major areas with incidental observations in widely scattered locations throughout Lyon, Morris, and Chase counties. The three major study areas are designated Area 1, Area 2, and Area 3 (refer to map in Appendix):

Area 1 consisted of rolling upland pasture three miles east of Emporia. This area was open pasture with no woody vegetation except for a few scattered American elm (Ulmus americana), osage orange (Maclura pomifera), and cottonwood (Populus deltoides) trees and some buckbrush (Symphoricarpos orbiculatus). The three dominant plant species were little bluestem (Andropogon scoparius), Indian grass (Sorghastrum nutans), and big bluestem (Andropogon gerardi). The area covered approximately 700 acres, half of which were burned before the arrival of the Upland Plovers in 1962.

Area 2 consisted of 80 acres and adjacent pasture three miles west and one mile south of Americus, Kansas. Nearly one-third of this 80-acre plot was vegetated by woody species, primarily American elm, catalpa (Catalpa sp.) and osage orange. The south half of the 80 acres was an open field which surrounded an abandoned farmstead on three sides. Three plant species comprised the dominant vegetation of the open field. In order of dominance these were: brome grass (Bromus inermis), dropseed (Sporobolus sp.), and little bluestem. The areas adjacent to this 80-acre tract were open pasture with vegetation similar to that of Area 1.

Area 3 consisted of approximately 700 acres eight miles west and one mile north of Americus. This tract was of three different vegetational types, notably ungrazed pasture, grazed pasture, and summer fallowed cropland.

METHODS AND MATERIALS

Blinds, Traps and Flushing Bars

Much of the study consisted of field observations. Upland Plovers show little fear of automobiles or canvas blinds and readily approach these, making close-range study possible.

Two types of traps were used to capture adult birds for banding. The first was a foot snare constructed of loops of monofilament fishline attached to hardware cloth; it was not successful when used in feeding areas or at the nest. The second type was a drop-box made of hardware cloth and suspended by a string from a metal post (see Appendix); it proved successful in catching incubating birds.

Two types of drags were used in unsuccessful attempts to find nests by flushing incubating birds. The first was a 100-foot rope with widely spaced weights. The second type, similar to one used successfully by Buss and Hawkins (1939), was made by fastening five 14-foot bamboo poles together. These poles were arranged so as to overlap each other one-half of their length. The drag was about 35 feet wide, and the loose overlapping ends clattered as the drag was pulled through the grass.

Marking of Eggs and Birds

Eggs were marked with red fingernail polish. This was done not only to distinguish individual eggs but to determine whether the sequence of egg laying influenced the sequence of hatching.

Single individuals and a family group were marked with bright color bands for convenient field identification, but the color banding was not successful in the case of the young.

One adult bird was conspicuously marked by painting its upper breast, lower surface of outer primaries, and upper surface of tail with a pressurized spray of rapid-drying luminescent orange paint. Neither the marked bird not its mate seemed disturbed by the paint.

Confinement of Young Birds in the Field

A pen 25 feet wide, 50 feet long, and four feet high, constructed of half-inch-mesh hail screen and steel posts was used to confine young birds in the field. The pen was erected where the birds were caught.

Banding and Collecting

Thirteen birds were banded with U. S. Fish and Wildlife Service bands. Three of these, all young birds, died in captivity. No other returns have been reported.

A series of specimens was collected for sex determination, measurements, and plumage studies. Intestinal tracts were preserved in 70% isopropyl alcohol (or by freezing) until examined.

Recording by Tape and Film

Photographs were taken of birds, nests, habitats, and equipment. Tape recordings of calls were made for detailed study.

OBSERVATIONS

Pre-nesting Behavior

Arrival

In 1962, the first Upland Plovers were noted near Emporia by Con White (personal communication) on April 9; in 1963, they were first noted there by Parmelee (letter) on April 12. Buss and Hawkins (1939) found that from 1935 through 1939 the maximum variation in arrival time was nine days at Faville Grove Wildlife Area in Wisconsin.

The newly arrived flocks frequented areas of short grass, particularly burned pasture. Here there was a gradual increase in the number of flocked birds until the latter part of April (see Table 1 below).

Date	No. of birds	Date	No. of birds
April 9	6	April 20	8
April 14	2	April 21	3
April 15	3	April 22	9
April 16	6	April 23	7
April 17	5	April 24	7
April 18	3	April 26	19
April 19	9	May 3	12

Table 1. Number of birds seen together in Area 1 from April 9 through May 3, 1962.

Some birds appeared to be mated upon or shortly after arrival. Two days following arrival in 1962, a pair was seen near Area 2. No sexual behavior was observed, but the birds fed and walked about together. On April 19, nine birds fed in Area 1. Of these, one male

and one female remained together (later collected for the study), whereas the other seven birds wandered randomly and may not have been mated.

According to Buss and Hawkins (1939), courtship behavior at the time of arrival indicates that pairs have formed. On April 16, 1962, three birds were observed walking and feeding together in Area 1. One attempted to copulate with another and was immediately attacked by the third. Activity of this sort and general antagonism between birds was observed until May 13. Thereafter, very little fighting was observed and this behavior, according to Buss and Hawkins (1939), indicates that nesting sites are established and all pairing has occurred.

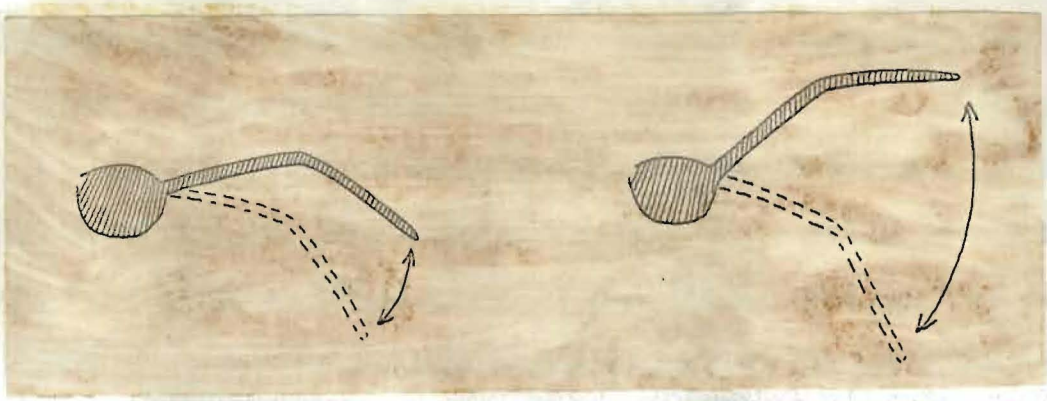
Rivalry between birds (Fig. 1 below) for a mate assumed the following pattern: (a) rivals gave a long, loud, oft-repeated whistle, sometimes with raised wings, (b) with head held high, birds cautiously approached one another, running short distances, stopping abruptly, and running again, (c) the more aggressive bird, with slightly raised wings, spread and erected tail, lowered head, bill parallel to ground, ran rapidly towards its adversary. This behavior did not always follow the above sequence and any phase may occur by itself. A variation of aggressive behavior was observed (May 12, 1963) when one bird flew at another that was on the ground. Actual contact between birds was not observed.

(a) (b) (c)

Figure 1. Attitudes of Aggression

The birds in this study were observed to have two characteristic patterns of flight. During arrival and early nesting periods the birds flew with the "arm" nearly horizontal, the movement somewhat restricted to the "hand." The wing beat was too rapid for an accurate count by eye alone. Buss and Hawkins (1939), who call this flight the "flutter stroke," state that the wing beat has been timed at a speed of from six to nine strokes per second. All birds using the flutter stroke were considered to be in breeding condition.

In the long wing beat, the wing is straighter and passes through a greater arc. The movement is also slower. The long wing beat is usually seen in the post nesting period, but one bird was seen using this flight April 27, 1962.



Flutter Stroke Long Beat

Figure 2. Comparison of Wings in the Flutter Stroke and the Long Beat.

Courtship

The most evident feature of courtship behavior is the long whistle which is given frequently during early spring by both males and females. H. H. Axtell (see Buss and Hawkins, 1939) has described the long whistle as follows:

> "It is introduced by a series of notes, all on about an even pitch, and delivered so rapidly as to form a sort of chatter usually of a throaty quality but sometimes of a purer tone. After a second or so the chatter begins to rise in pitch and almost immediately becomes a smooth, unbroken whistled tone, slurring upward from the chatter which is pitched usually near the third G above middle C, through about three and a half tones to about the D above, where the tone is abruptly cut off with a quick grace note, like a 'catch in the voice.' In about two-fifths of a second the song continues with another gradual upward slur from about B to D where there is a slight break in the voice, scarcely perceptible, after which the pitch descends in a long whistled wail."

During the present study the birds were observed giving this call in flight and on the ground. When in flight the wings were held

motionless while calling. When given from the ground, the birds often displayed their wings.

Another call used in early spring is the "short whistle" (Buss and Hawkins, 1939). The short whistle is a series of rapidly repeated syllables all on about the same pitch. Buss and Hawkins (1939) state that the whistle consists of six to ten syllables. The call has been described as sounding like a bubbly quip-ip-ip-ip-ip-ip-ip-ip-ip (Sutton, 1957; Buss and Hawkins, 1939). This was the call most often heard on the breeding grounds.

A call similar to the short whistle but with more rapidly repeated syllables of a gutteral tone was heard on several occasions during the present study. This call was given in defense of a territory in early spring. Later in the season, it was given when the young were approached. When giving this call the bird crouched, lowered its head and retracted its neck. The gular region was inflated and its entire body vibrated with the intensity of the call. Gangel (1961, unpublished notes) made note of this call but did not offer an interpretation.

Some aerial aspects of courtship have been described by Fred J. Pierce (in Bent, 1929). Pierce interprets the high, circling flight ending with a rapid descent to the ground as part of courtship. During the present study this circling and calling was observed as late as June 20, 1963. Display flight observed by Eddy (1956 unpublished notes) consisted of a twice repeated spiral dive to the ground

from a height of 60 or 70 feet. The dive began directly above a bird on the ground, presumably a female.

A pair of Upland Plovers which had been feeding together rose and flew in unison, their paths sometimes crisscrossing. The aerial route followed a circular path some 200 to 300 yards in diameter at a height of about 100 feet. Within a few feet of each other, they made a rapid, nearly vertical descent to the ground. This flight behavior was observed on four occasions in 1962.

Courtship behavior not observed in the present study was described by Catherine Hunter (1916) as follows:

> "I watched them carry on their odd courtship; hopping toward each other, twittering, flying away, then repeating it all again, the hopping, twittering and retreating."

Copulation

Copulation was observed on four occasions in 1962, respectively on April 22, May 10, 12, and 13. No pre-copulatory ritual was observed. The birds' actions before copulation did not betray their intent. During copulation the mounting bird, using its wings to maintain balance, placed its feet squarely on the others back causing the second bird to crouch in submission. The estimated time required for the act was five seconds. Following copulation both birds preened and resumed feeding.

Size and Color Differences Between the Sexes

According to Rowan (1927) sexes are easily distinguished in the field because of the disparity in size, the females being larger than males. Sutton (1957) states that the males and females are about the same size. Measurements of the exposed culmen, tarsus, and middle toe (see Appendix) of 25 specimens (12 males, 13 females) average greater for males, but large females may be larger than small males. Of 12 specimens (six males, six females) wing chord measurements averaged 5.0 mm longer for females but some males have a longer wing chord than some females. Examination of 30 study skins showed no appreciable differences in either color or pattern between the sexes.

Although copulation was observed, the possibility of reverse mounting cannot be precluded. Therefore, any reference to the sex in the present study is an assumption unless the bird referred to was collected and the gonads examined.

Nesting Behavior

Territory and Nest Sites

Buss and Hawkins (1939) state that each Upland Plover nesting territory consists of a loafing and feeding area in addition to a nest site. The loafing and feeding ground is communal but the nesting site belongs to individual pairs. They state further that Upland Plovers are rarely seen near the nest site but are readily seen in their loafing and feeding areas. Observations during the present study are in accord with those of Buss and Hawkins.

The vegetation of nest sites showed considerable variation. Of three nests found in 1961 (Area 2, by other observers) one was located in heavy ungrazed bluestem, one in wiregrass (Aristida sp.) that had been burned early in the spring, and one in a field of heavily grazed brome grass. The three nests studied by the author in 1962 were situated as follows: Nest I was located in a clump of sweet clover in a weedy, ungrazed field of brome grass; Nest II was in a bluestem meadow that had been burned that spring; Nest III was concealed by a large clump of dropseed in a weedy, heavily grazed, bluestem pasture. Of the five habitats used by the Upland Plover for nest sites, wiregrass and brome grass provided the least cover.

Scrape Building and Egg-laying

Both birds of a pair choose the nesting site and build the scrape. On May 12, 1962, a pair attempting to build scrapes in a loafing and feeding ground were attacked repeatedly by other Upland Plovers in the area. The pair was finally discouraged from nesting there but not before the birds had constructed four scrapes, in two of which had been placed a number of pieces of dry cow manure.

On May 2, 1962, a pair, remaining near each other and calling softly, inspected at least six clumps of grass before making the final choice of a site. When the site had been selected, the birds took turns (three or four minutes each) scratching at one spot of ground. After 12 minutes, when the scrape was finished, one bird displayed its wings by holding them high over its back and gave the long whistle. Both birds then flew from the area.

Examination of the grass where the birds had been scratching revealed a spot of bare earth three inches in diameter. This spot, hereafter designated as Nest I, was nearly surrounded by clover (Melilotus officinalis) and brome grass. The clover at this time was approximately eight inches tall and provided concealment for the scrape.

The first egg was deposited in the unlined scrape on May 7 -- five days after construction had started. The scrape was observed from 0445 hours to 1000 hours on May 8, during which time the birds were absent.

The second egg was laid on May 9. A few glades of dry grass formed a very shallow cup around the two eggs. On May 10 there were still only two eggs in the nest.

On May 11, at 0511 hours, according to Scott Irwin (personal communication), a single bird flew from the nesting area. At 0614 a single bird flew back to the area followed by a second bird three minutes later. Both birds walked toward the nest. One bird entered the nest at 0630, the other walked about and fed a few feet away. At 0644 the bird came off the nest and the pair walked out of the area and disappeared in the grass. The eggs, however, were not checked, but on May 12, at 0505, the nest contained three eggs. More nesting material had been added and by this time there was a neat cup of grass one inch deep. The fourth egg had been laid by 0500 on May 13 and incubation began the same day. It should be noted that seven days were

required to complete the clutch at Nest I. This is not in agreement with the report of Edward R. Ford (in Bent, 1929) who discovered a single egg on the bare ground and returned three days later to find a four-egg clutch in a well defined nest.

Two other nests were found during this study. A complete clutch (Nest II) was found in Area 2 on June 9, 1962, about 100 yards from a lake spillway. This ungrazed area had been burned earlier in the year. The new growth of bluestem in which the nest was situated was about ten inches tall.

Nest III was found July 1, 1962, in a grazed pasture one mile west and three-fourths mile north of Nest II. It was in a large clump of dropseed, about 100 yards from a small pond. One of the eggs had already hatched and the other three were pipped when found. Small red ants had killed the newly hatched bird and those still in the shell. One flying adult was calling excitedly at the time the nest was examined.

Incubation

Hunter (1916) states that both birds of a pair incubate the eggs, but no exchange of birds at the nest was observed during the present study. The incubating bird was captured and banded at Nest I two days before the eggs hatched, at Nest II, two days before the eggs pipped. Only the banded birds at these nests incubated the eggs -- clearly showing that only one bird was on the nest during the last

phase of incubation. Mates of incubating birds were seldom seen during this time.

Buss and Hawkins (1939) found the incubation period to vary between 21 and 24 days. Schwinn (1961, unpublished notes) found that 19 days elapsed between the laying of the last egg and the pipping of the eggs. All eggs were pipped within a twenty-four hour period. The eggs hatched three days after pipping for a total incubation period of 22 days.

At Nest I incubation began at least 13 to 14.5 hours after the last egg was laid. Three eggs were pipped 20 days and seven and one half hours later (plus or minus three and one half hours). All four eggs were pipped within a 12 hour period. Hatching occurred between 67.5 and 79.25 hours after pipping started. Between the onset of incubation and the hatching of all eggs, 23 days and 23.75 hours (plus or minus .75 hours) elapsed.

Apparently the sequence of laying does not influence the hatching sequence. At Nest I the fourth egg hatched first, the third second, the first third, and the second last. This also indicates that incubation does not start before completion of the clutch.

In 1962 the first observance of hatching was June 6, the last, July 1. In Wisconsin, Buss and Hawkins (1939) observed a 30-day interval between first and last-hatches in 1938 and thought the interval to be only 20 days in 1937.

Post-nesting Period

Although both parents care for the young, the male is the more solicitous of the two. When approached by humans, a pair attending young will rise into the air and call repeatedly. If the intruder remains for a time, one bird usually leaves. On one occasion in 1963, the bird that left the young was a female (collected). The collecting of the solicitous adult on two occasions that year disclosed the fact that it was a male in each case. Thompson (1958, unpublished notes) also observed that only one adult bird (sex unknown) attended the young.

At 1100 hours June 26, 1963, a young Upland Plover (thought to be five days old) was captured in a weedy field. At 1500 hours the same day a second bird (perhaps ten days old) was caught within 75 yards of the first. At this time a pen (see Appendix) was erected to confine the two young birds in the field. As soon as the pen-building crew left the area, an adult bird returned to the young.

Observations of the penned birds were made from a blind erected near the pen. It was soon noted that a nearly constant exchange of calls between young and adult took place. The young birds sounded much like young domestic fowl. The parents' answer was the "short whistle" given softly. Buss (1951) refers to this exchange as "contact talk." When the observer left the blind, or in some way frightened the birds, the adult gave an alarm call, whereupon the calls of the young ceased immediately. As soon as the adult gave the soft short whistle, contact talk resumed.

Buss (1951) stated that the actions of the young were controlled by two-syllable calls given by the attending adult. In the present study, however, two-syllable calls were not revealed by tape recordings made at the pen. Invariably they were three- or four-syllable calls.

Neither young nor the adult became adapted to the restricted life of the pen. The young walked along the fence much of the time, and the younger of the two birds died during the second day of captivity. The adult bird became wary of the pen and would not enter it after the second day. On the fourth day of confinement, the second young was found dead against the fence and the adult was nowhere to be seen.

Departure

As the time of departure from the breeding ground nears, Upland Plovers become increasingly wary and no longer can be closely approached. Through late June and early July the number of birds flying with the long wing stroke increased. The short whistle of the breeding season gives way to a three-syllable flight call.

As early as June 21, 1963, the birds were beginning to form small flocks in fields of short grass. Usually less than ten birds were flocked but one group of 25 was seen July 3. After August 1 in both 1962 and 1963 there was a sharp decrease in the number of birds seen. Thompson (1958, unpublished) believed most of the Flint Hills nesting population of the summer of 1958 was gone by the first of August. Observations during the present study indicate an early departure.

SUMMARY

1. A study of the Upland Plover in 1962 and 1963 was conducted in Lyon, Chase, and Morris counties, Kansas.

2. Males and females arrive together at the breeding grounds from early to mid-April.

3. Some birds are already paired on arrival or shortly thereafter, others pair later.

4. Courtship activity was observed from arrival time to early May.

5. Differences in size and coloration between male and female birds is not sufficient for sex determination in the field.

6. At least five different plant species are used for nesting sites by the Upland Plover in the Flint Hills. These are: little bluestem, brome grass, wiregrass, sweet clover, and dropseed.

7. Both members of a mated pair select the nest site. Five days may elapse from the start of scrape building to the laying of the first egg.

8. As eggs were laid every other day, seven days were required to complete a four-egg clutch.

9. Only one bird of a mated pair incubates during the latter part of incubation.

10. Between the onset of incubation and the hatching of all eggs, 23 days and 23.75 hours (plus or minus .75 hours) elapsed.

11. Both sexes attend young, but the male is the more solicitous in care of the young.

12. Young and adult birds call to each other repeatedly in "contact talk." Adult birds use three- or four-syllable alarm calls to warn young of danger. The young become silent after an alarm call and do not resume calls until the short whistle is given by the adult.

13. The Upland Plover's preference for vegetational types changes as the breeding season progresses. The sequence of changes is from short grass (pre-nesting) to clump grass and weeds (nesting) to weeds (post-nesting) and short grass (premigratory).

14. From 21 June Upland Plovers were forming small flocks, the largest being a group of 25 birds.

15. Most locally breeding birds leave the Flint Hills of Kansas by August 1.

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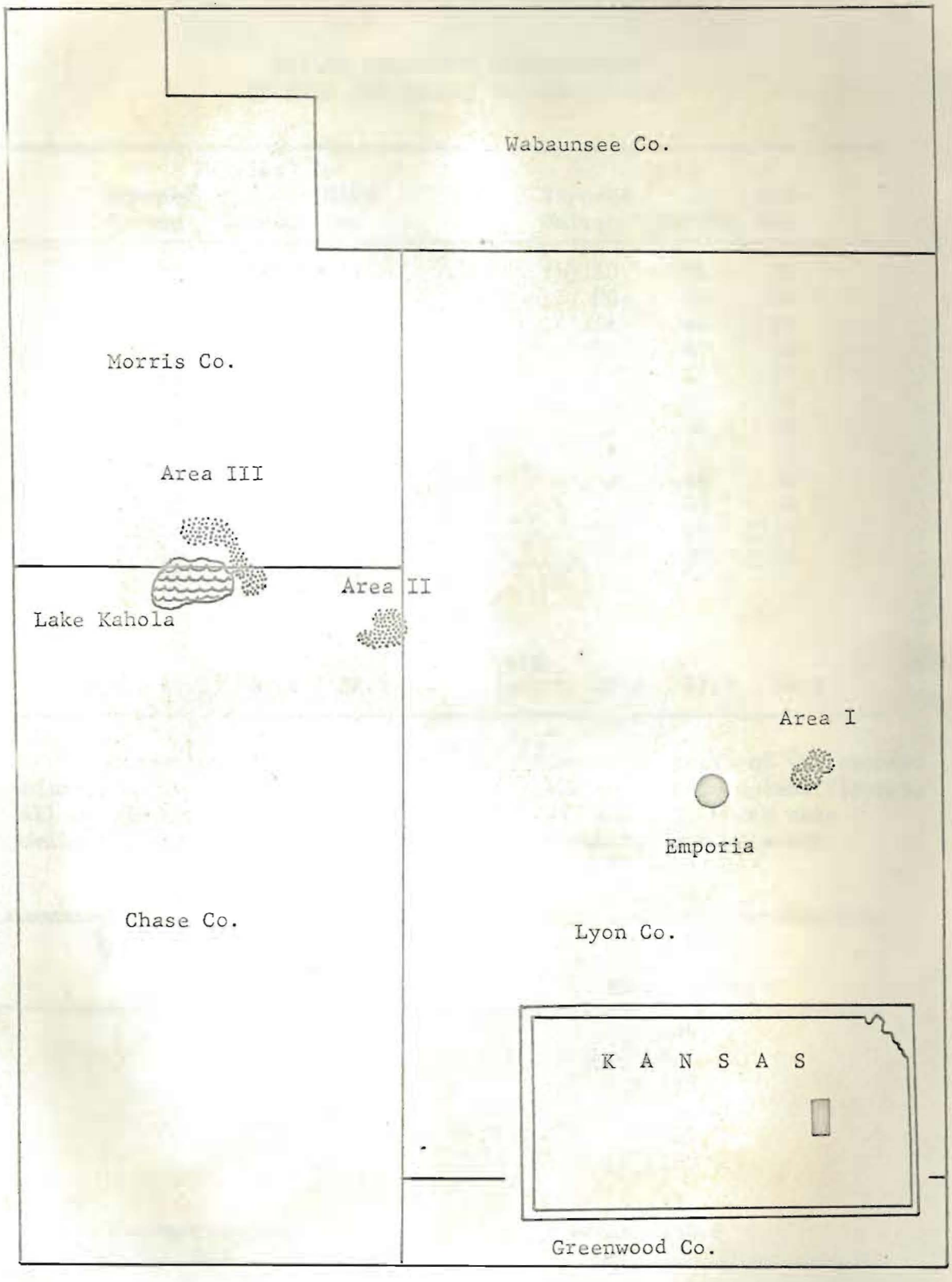
APPENDIX

MAP SHOWING STUDY AREAS



TABLES COMPARING MEASUREMENTS OF MALE AND FEMALE UPLAND PLOVERS

Females			Males		
Exposed Culmen	Tarsus	Mid-toe	Exposed Culmen	Tarsus	Mid-toe
(a) 27	48	31	(b) 30	52	34
30	46	31	30	45	34
30	45	32	36	49	34
30	50	33	29	47	32
30	50	30	28	47	31
29	43	30	(c) 28	47	30
31	49	31	29	46	30
28	50	34	28	51	33
29	47	34	--	45	30
30	45	34	30	48	34
28	46	32	29	49	31
28	48	34	29	49	34
30	49	32			
avg. length 29.2	47.3	32.1	avg. length 29.6	47.9	32.2

Comparison of the average length (in millimeters) of the exposed culmen, tarsus, and middle toe of adult male and female Upland Plovers. All are Kansas specimens excepting (a), (b), and (c), which were collected respectively in Nebraska, Massachusetts, and Missouri.

Females	Males
Wing chord	Wing chord
163	160
170	165
170	145
157	164
165	159
158	160
average 163.8	average 158.8

Comparison of wing chord measurements (in millimeters) of adult male and female Upland Plovers.

PHOTOGRAPHS

Young hatching at Nest I.

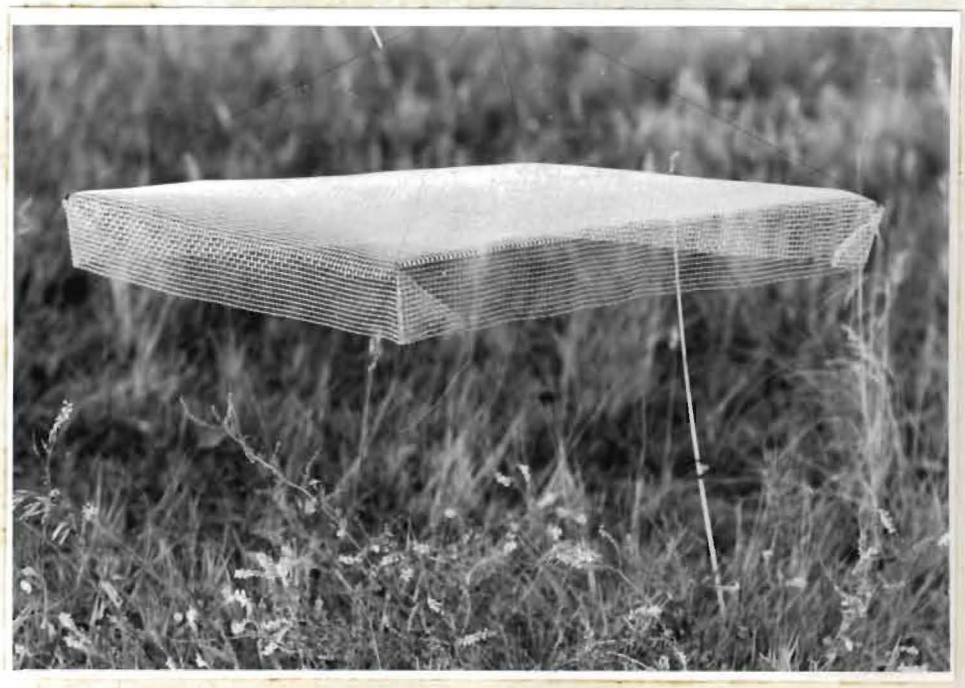
Banding young at Nest I. To the knowledge of the author, this is the second time that Upland Plover young have been banded immediately upon hatching.

PHOTOGRAPHS

Pen in which young were confined in the field.

Adult bird guarding her young.

PHOTOGRAPHS



Drop-box trap used to capture incubating birds. The rod was used to keep the box from swinging in the wind.

This field is a typical premigratory feeding area.