

THE UPLAND PLOVER IN SOUTHWESTERN YUKON TERRITORY

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THE discovery of a breeding population of Upland Plover, *Bartramia longicauda*, in southwestern Yukon Territory in 1943 (Clarke, 1945), was of interest because there is no known breeding population between the Canadian prairie farmlands and the Yukon, and yet there is no morphological difference in the birds themselves. The existence of some northern breeding area had already been suggested by widely scattered records from Canada and Alaska (Cook, 1910; Mitchell, 1924; Rand, 1948; Taverner, 1934). I had previously studied the behaviour of the Upland Plover in Wisconsin (Buss and Hawkins, 1939) and was fortunate in being able to spend July and August 1950 making comparative studies of the same species nesting in subarctic conditions near Burwash Landing, Yukon Territory.¹

Five pair of Upland Plover were studied intensively on a breeding ground along the Duke River, known locally as Duke Meadow, at an elevation of about 2,500 feet. One brood, consisting of two adults with four young, identified as Brood No. 3 in field notes, was located in a clearly defined area where they were seen day after day under especially favourable conditions. Incidental observations were made at two other sites in the same general area, and six pair were studied, and four adults collected, at upper timber-line between 3,000 and 4,000 feet, approximately five miles west of Burwash Landing.

The Duke River rises in the St. Elias Mountains and flows eastward to the Yukon Plateau, joining the Kluane River about five miles north of Burwash Landing. It is a turbid, swift, shallow stream that rises and falls rapidly with variations in temperature and precipitation. Like other glacial streams, it has cut numerous channels through its broad flood plain, forming constantly shifting bars and islands. Approximately three miles upstream from its confluence with the Kluane River, near the Alaska Highway, the channel has shifted to the northern edge of the valley. Along the southern bank of the river and about two feet above the present channel level is a large bar, about four miles long and nearly three-quarters of a mile wide, which is known as Duke Meadow. It is crescent-shaped and consists of sedimentary rock

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covered with a very thin layer of sandy soil with an ashy silt-like texture. The meadow is very flat, and is broken only by the slight depressions left by the former branching channels of the river.

The sparse, relatively short vegetation of Duke Meadow is dominated by six plants: (1) Bluegrass, *Poa glauca*, the most abundant species, which occurs over the entire area; (2) boreal sage, *Artemisia frigida*, nearly as abundant as bluegrass and growing over the entire area except in the bottom of some depressions; (3) and (4) pasque flower and anemone, *Anemone patens* var. *multifida* and *A. multifida*, widely distributed over the area but generally not found in the depressions; (5) milk vetch, *Astragalus alpinus*, also widely distributed and growing most abundantly in the depressions, and (6) bearberry, *Arctostaphylos Uva-ursi*, occurring as solid stands in most depressions and in mats scattered over the rest of the area.

The meadow is almost entirely edged with bush willows, *Salix glauca*, and poplars, *Populus tremuloides* and *P. balsamifera*, which encroach on it farther on the north than on the south side. Near the centre these three invaders succeed in crossing the meadow. Soapollali, *Shepherdia canadensis*, is scattered over most of the area but grows profusely only at the southern edge. The surrounding forest is mainly of white spruce, *Picea glauca*.

The native vegetation of Duke Meadow is similar to typical plover nesting cover in the midwest. Weedy plants are practically non-existent, and although shrubs and trees do occur there are large tracts entirely free of woody species. Since willow and poplars are slowly invading the area, it is apparent that the quality and capacity of Duke Meadow as an Upland Plover breeding range is slowly shrinking.

Feeding behaviour of young Upland Plover: At Duke Meadow a road meandering from the west to the east end of the area made it possible to observe plover with binoculars at close range from an automobile without alarming the birds or apparently creating unnatural behaviour. Feeding activities of young plover were observed intensively and recorded by the minute for 402 minutes on ten different occasions.

On July 4 at 7.10 p.m. two adult plover with four young (Brood No. 3) judged to be one week old were feeding near the road in the northeast part of the area. By 8.30 p.m. the family had traversed an area nearly 500 yards long. During this time the parent birds were continually visible and usually at least two of the young could be seen. The week-old plover were extremely active in their pursuit of food and at no time did a parent bird feed the young nor find food for them. Both adults caught and ate insects and one adult preened at 7.30 p.m. An adult drove off two other adult plover, which alighted close to the feeding family on two occasions, and ground squirrels, *Citellus plesius*, on three occasions. Ground squirrels were very abundant; at one time there were eleven visible in the field of the binoculars when the six plover were seen at approximately 40 yards. These squirrels appeared to cause great concern to the adult plover who did not tolerate them close to their young. At 7.55 p.m. one of the adults drove a squirrel over 25 feet before it reached the safety of a burrow. Throughout the period the adults maintained vigilant watch for enemies. Actually most of their time was spent standing quietly and erectly in the vegetation scanning the sky and nearby area for movements and signs of danger. A Sharp-shinned Hawk, *Accipiter velox*, flew over the nearby woods, and

was watched quietly and without response. However, when it changed course and approached the family both adults crouched in the grass and gave a soft two-syllable call to the young who instantly "froze" low to the ground. After the hawk had passed, another two-syllable call gave the signal for feeding activities to be resumed. The young plover showed a preference for the tallest cover, most of their time being spent in the depressions, which apparently afforded the best concealment and insect food. The adults, however, preferred sparse cover and the highest sites from which the best command of the territory could be maintained, and they moved rapidly through low areas or dense vegetation. The observations of July 4 proved to be typical except that the area covered in feeding was much less at mid-day.

By July 11 unknown mortality had reduced this family to one adult and two young. The adult was an exceptional bird, allowing an automobile to drive within 20 feet of the group without flushing or becoming excited. Thus it was easy to obtain close-range observations which proved that one of the young was larger and more aggressive than the other.

On July 13 at 1.39 p.m. the adult was seen standing guard by the two young which were resting in the grass about four feet distant. The adult chased and caught insects, preened, and teetered frequently during resting moments. By 1.59 p.m. the chicks and adult were within 12 feet of their original position. By 2.24 p.m. the adult had chattered five times, and the young had given a very low single-syllable call note three times. At 2.30 p.m. when a Goshawk, *Astur atricapillus*, flew out of the woods the adult gave a two-syllable alarm call twice (whi-whip, whi-whip) but did not move. The hawk flew along the edge of the woods and turned back into the trees. At 2.34 p.m. a Golden Eagle, *Aquila chrysaetos canadensis*, flew out of the woods. The adult crouched quietly in the grass until the eagle flew by then stood up and ruffled its feathers. The adult did not move, but at 2.44 p.m. a chick shifted about three feet, scratched itself and sat down. At 2.54 p.m. the adult sat down, got up at 2.55 p.m. and again sat down ruffling its feathers. In two minutes it stood up and started preening, and at 2.59 p.m. it ceased preening and took three steps towards the tall grass. All three birds started moving slowly and feeding, and by 3.40 p.m. all were feeding actively and independently, having moved about 30 yards in two hours, mostly during the last half hour of observation.

The frequency of "contact talk" between young and adult Upland Plover was probably much greater than the records at Duke Meadow indicate. During numerous observations the adult's bill was seen moving, but only when either young or adult birds were close could the soft call-notes be detected.

Collectively these and other similar observations show that: (1) adult Upland Plover do not feed their young; (2) young plover range widely during active feeding time and remain within very restricted limits during resting periods; (3) adults control the movements of their young; (4) adults guard and warn their young against enemies, and (5) protective coloration provides the principal protection for both adult and juvenile plover.

Although an adult Upland Plover has never been observed brooding young, it is without doubt an important role of the parent, or parents, during cool weather, evenings, and rain-storms. Observations were purposely avoided during these times for fear of loss of chicks from unnatural exposure.

Production and mortality. One of the five pair of Upland Plover at Duke Meadow either failed to hatch its clutch, or its brood was lost at an early age. When this pair was first seen on July 2 they were quiet, flushed without

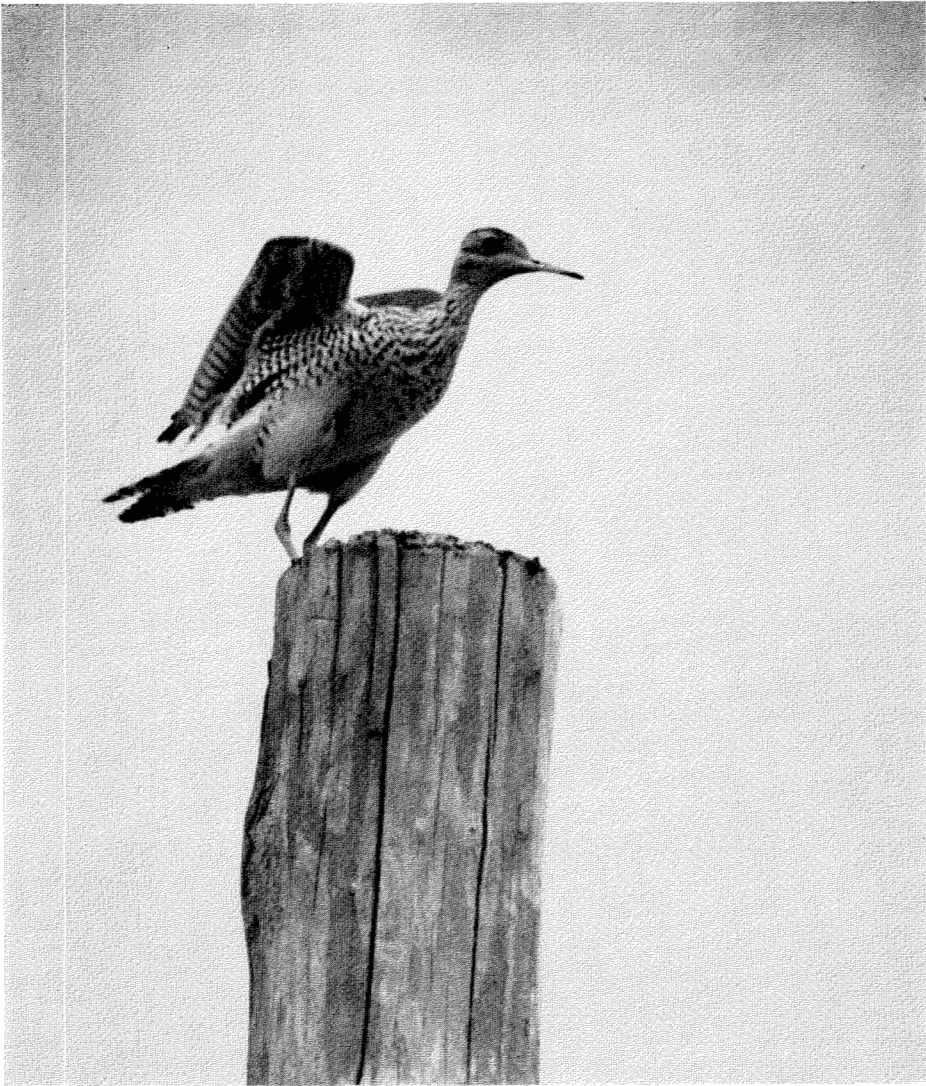


Fig. 1. Upland Plover lowering its wings in characteristic manner after alighting.

feigning injury, and showed no attachment to a particular site. They were observed three times after July 2 and consistently showed behaviour typical of birds without young. Evidently these birds started migrating southwards on July 7, on which date a pair of plover was seen perched on spruce snags near the highway about half a mile south of the study area. At no other time were plover seen at this site, and on no subsequent date were five pair seen on Duke Meadow.

One or two young from each brood were caught, banded, and examined carefully for age determination. On July 2 at 9.45 a.m. a week-old plover was banded near the centre of the area (Brood No. 1). One of the parents

had a lame right leg. At 1.20 p.m. a three-day-old plover was banded about quarter of a mile farther east (Brood No. 2). Since neither parent was lame, and since the chicks were of different age, two broods were represented. On July 4 a brood of four young observed in the northeast sector (Brood No. 3) proved to be unbanded, and on July 17 a juvenile plover was caught and banded from a brood of at least two young near the centre of the meadow (Brood No. 4). Its development indicated that it had hatched earlier than any of the other three broods; hence four different broods were accounted for by this date. The four broods consisted of a minimum of eight young (actually counted) and a maximum of sixteen as deduced from the breeding potential of four eggs per clutch (Buss and Hawkins, 1939), and were all hatched during the last eight days in June:

Brood no.	Date first observed	Estimated age	Hatching date
1	July 2	7 days	June 25
2	July 2	3 days	June 29
3	July 4	7 days	June 27
4	July 17	24 days	June 23

On August 1, when all young on the area were able to fly, a careful census showed two banded birds-of-the-year on the east sector, an unbanded juvenile nearby, and a fourth juvenile (also unbanded) near the centre of the meadow. At this date the juveniles were practically full-grown and could be distinguished from the adults only by their flight behaviour, bands, or the presence of down on their necks. One unbanded juvenile had a striking cinnamon colour, which distinguished it from all others. It was evident that four young had reached mature size and doubtless later migrated from the area.

After July 11, by which date Brood No. 3 had lost one adult and two young, seven adults were observed on many occasions. These seven adults plus the pair that failed in their nesting attempt and the four juvenile survivors resulted in a fall population of thirteen plover. The increase of three birds over the spring population of ten adults represents a 23 per cent increase. These data and similar unpublished data from the United States indicate that this increase is typical for Upland Plover but is much lower than rates of increase for gallinaceous birds, which show up to 81 per cent juveniles in fall populations (Buss, Meyer, and Kabat, 1951). Lack (1943, p. 215) states that: "If the British Lapwing population is stationary every 100 adults must each year produce on the average 33 young which survive to breed." Kraak, Rinkel and Hoogerheide (1940) studied the returns from 1,333 lapwings banded in Europe and calculated that 40 per cent died each year. The higher rate of increase for lapwing compared with plover in the Yukon is doubtless due to hunting pressure on the lapwing. Calculation of data presented by Drost and Hartmann (1949) on the European Oystercatcher, *Haematopus o. ostralegus*, shows an annual increase of 11 per cent for this species.

From these data, and considering clutch size, it is logical to postulate a low natural turnover rate in Upland Plover and other shore birds after they reach mature size, and a turnover rate for passerine birds (Farner, 1949) somewhere between the low rate of shore birds and the very high rate for gallinaceous birds (Leopold, Sperry, Feeny and Catenhusen, 1943).

Territory, home range, and movements. On arrival from the south most Upland Plover are paired and go directly to their nesting range. In some cases plover arriving on the same range are promptly driven away, but in other cases they are tolerated in close proximity. In southern Wisconsin I found up to eight nests per 50 acres, and their arrangement in some years suggested communal nesting. At Duke Meadow three pair nested near the centre of the area leaving the entire east half to one pair and the west quarter to a fifth pair. These data do not support either territorial or communal behaviour.

Immediately after hatching, adult Upland Plover are very much on the defensive and will drive away other plover, and in many cases other animals, that approach their young, for instance ground squirrels. There is a gradual diminution of defensive force until the young birds are able to fly. By this time families and individuals begin to mix and form flocks.

At Duke Meadow the home ranges of Upland Plover were up to two miles in diameter. Brood No. 3, however, could be found nearly every day in an area not over half a mile long and usually within one quarter of a mile in diameter. The loss of one adult and two young by July 11 did not appear to alter the size or centre of their home range, and they were frequently seen on this restricted area until July 19 when they were 22 days old. On July 22 all three birds were seen and the two juveniles were caught and banded at a point one and three-quarters of a mile southwest of their July 19 position. By July 31, when they were 34 days old, they could fly short distances and were back at their original home range in the northeast. This continued to form the centre of their range from which the birds flew more frequently until August 10, when they were last seen on Duke Meadow.

The relatively large home range of the Upland Plover is indicative of its mobility and is essential for suitable breeding or summer range. Many apparently ideal habitats within the breeding range of this species in North America are too small to be acceptable. A small grassy meadow or hayfield might suffice for a nesting site providing there is an extensive feeding and loafing area nearby. If either is missing, the range will not be occupied.

Departure from breeding ground. Evidence obtained at Duke Meadow and elsewhere in the Yukon indicates that Upland Plover depart soon after their young can fly or after their nesting attempts fail.

The pair of plover at Duke Meadow which failed in their nesting attempt left the area on July 7, while the adults and young of the other four pair were still there on July 25. On this date a flock of six plover judged to be adults flushed from the central part of the meadow. They were difficult to approach, gave both breeding and post-breeding call notes, and used long powerful wing strokes characteristic of fall behaviour. On July 31 only two full-grown juveniles were found near the centre of the meadow, but three adults and two full-grown banded juveniles were observed in the northeast sector. Two of the adults were repeatedly driven away by the third adult, which obviously was the parent of Brood No. 3. These observations suggest that four adults

had departed from the central locality, two juveniles remained on their central home ranges, and two adults had moved and attempted to flock with the family of three in the northeast. By August 5 two more adults had left. The parent of Brood No. 3 was still with its two young (banded) and all left the area on August 10 together with the other two plover-of-the-year.

These data show that: (1) the longest time any juvenile remained on the area was approximately 10 days after it began to fly; (2) adults that lost their young flocked and soon left the area, and (3) some adults departed ahead of their young. It is not known whether these were females that departed and left their young with the parent males, but the last adult seen in the Yukon with a full-grown juvenile plover proved to be a male when it was collected at timber-line on August 12. Rowan (personal communication) has found that adult female Dowitchers, *Limmodromus griseus*, desert their young, leaving them to the care of the males. Brooks (1937, p. 177) states that there is a migration of Golden Plover, *Pluvialis dominica fulva*, "down the Pacific Coast in the fall, the adults preceding the young as is usual in the Limicolae."

The direct observations of departure from Duke Meadow did not show whether this behaviour was typical for Upland Plover or whether some environmental factor hastened their departure. Examination of four adult males collected from timber-line range about four miles from Duke Meadow indicates that environment affected their physical condition and probably hastened departure. The following are some of the findings from these examinations:

Specimen	Date collected	Weight in grams	Deposition of fat	Trematodes	Cestodes
626	July 15	135	none	3	6
631	July 24	159	none	13	35 scolices and 20 fragments
632	July 24	154	none	10	47 scolices
649	Aug. 12	157	none	900-1000	105 scolices in 4 cm.

The data show that helminth infections increased with the advancement of the season. It is likely that the wet muskeg areas from which these birds were collected resulted in higher infections than would be found in the dry habitat more typical of plover range. The data also show that these four adults weighed from 135 to 159 grams; postmortem examinations showed no fat deposition. Upland Plover collected in southern Wisconsin at the time migration was beginning showed abundant fat stores and weighed up to 226 grams. This contrast in weight raises the questions whether optimum food conditions prevailed at Duke Meadow, and whether these food conditions were associated in any way with departure.

Since insects comprise an important part of the Upland Plover's food, weekly samples were made of insects on Duke Meadow. Three points were selected at random near the centre of the area where the home ranges of Brood Nos. 1, 2, and 4 overlapped. Fifty sweeps with a standard sweep-net were made while the sampler was walking east from point 1, fifty while walking northeast along the bottom of a depression from point 2, and fifty

while walking north from point 3. On completing fifty sweeps, the top of the net was closed and the contents were sprayed with an Aerosol Bomb to prevent small winged insects from escaping. The insects were then removed and placed in a labelled container to be counted later (see Table I).

Date	Plot 1	Plot 2	Plot 3	Total
July 4	71	34	43	148
July 11	146	122	60	328
July 18	174	115	88	377
July 25	118	171	113	402
Aug. 1	71	170	59	300
Aug. 8	46	98	16	160
Aug. 15	40	59	12	111
Aug. 22	15	17	28	60
Aug. 29	7	30	1	38
Sept. 4	1	5	3	9
Total	689	821	423	1,933

Table I. Insects collected in 1950 on Upland Plover breeding range, Yukon Territory.

Plot 1, the transect walked from point 1, yielded the most insects during the first three weeks of sampling, after which time Plot 2 produced the largest numbers. By July 25 most plants of the area were beginning to dry up, and the dense stand of *Astragalus* in the depression of Plot 2 was the most attractive place for insects. Plot 3 was consistently the lowest producer. It is considered that the samples are a good indication of the insect population trend in the area since the numbers of each plot rose and fell together, and when a species was abundant on one plot it was invariably abundant on the others.

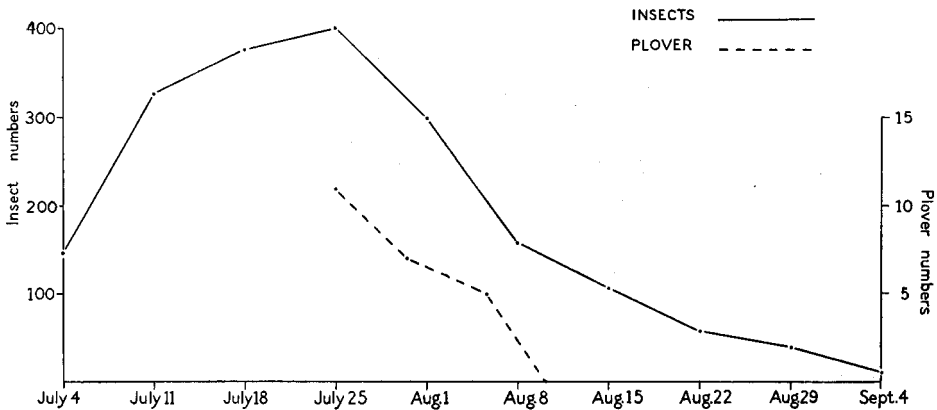


Fig. 2. Insects collected in 1950 on Upland Plover breeding range, Yukon Territory.

The weekly totals shown in Table I are presented graphically in Fig. 2, which also shows when plover left the area. Figure 2 indicates that numbers of insects and plover both declined after July 25, and that a direct correlation existed between decreasing insect numbers and plover migration. It is probable that this correlation is significant since it parallels the data on physical condition, and it has been found that Upland Plover seek good feeding areas during their late summer and early fall migration (Bates, 1907).

Observations on plover in other Yukon areas. Upland Plover were seen in two other localities at elevations of about 2,500 feet near Duke Meadow. A very small colony was recorded on the flood plain of the Donjek River about six miles upstream from the Alaska Highway. This site is similar to Duke Meadow except that it lacks good stands of bluegrass. Plover have been seen at this place in other years, and they doubtless nest here regularly.

The second recorded site below timber-line was near the Alaska Highway about eight miles southeast of Donjek River Bridge No. 1. The habitat in which these birds were seen should unquestionably be classed as Sharp-tailed Grouse, *Pedioecetes phasianellus caurus*, range, and was the most incongruous surroundings imaginable for Upland Plover. Fifteen years ago this part of the valley was a nearly solid stand of white spruce averaging between twenty and thirty feet in height. In 1937 fire swept the area, leaving snags and naked spruce skeletons standing or prostrate with shallow roots heaved skyward. Fireweed, *Epilobium angustifolium*, now grows profusely throughout the charred "jungle", with occasional patches of other weeds, shrubs, and grass. On July 26, when a pair of Upland Plover was seen at this site, both birds called excitedly, feigned injury, and returned repeatedly to the same locality where they apparently had young. A visit to this area on July 30 yielded no further observations.

Unquestionably there are small colonies of plover scattered widely over the Yukon plateau at lake and stream levels, but the total number of plover in these colonies is small compared with those living at timber-line. The wet muskeg habitat sprinkled with dwarf spruce, willow, and bog birch, *Betula glandulosa*, at upper timber-line is obviously not high quality plover range. The lower limit of occupation is probably governed by the density of trees, but the causes determining the upper limit are not so apparent. The decrease of willow and bog birch, and the better drainage with increasing elevation appear to render the higher slopes more habitable than those actually occupied. It is possible that a phenological factor governs the upper threshold of the range, such as snow, ice, or lack of vegetation at the time plover arrive in the spring. This could be determined by studies made during the spring migration and arrival period.

The use of marginal habitat in the Yukon does not alone suggest an expanding, static, or shrinking plover population. Neither does it indicate whether the species spread into this region from the south during a period of population increase, or adapted itself to a change in habitat. The unoccupied extensive prairie parklands in the Takhini-Dezadeash valley in the Yukon (Clarke, 1945) and the irregular distribution of plover in other parts of Canada where more nearly typical range exists suggest the unlikelihood of a northward spread into the Yukon. Furthermore, if the population in the Yukon were expanding it is probable that the parklands and timber-line ranges farther south would be populated by reproductive overflow. Guides who have resided in this region for many years observed plover as long ago as they can remember on timber-line ranges, but they have not noticed an increase in their numbers.

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