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MIGRATION AND NESTING OF NIGHTHAWKS IN NORTHERN IDAHO

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Observations on the Pacific Nighthawk (*Chordeiles minor hesperis*) have been made by the writer at or near the city of Coeur d'Alene, Idaho, for the past 36 years. The size of the area where nesting was watched is approximately 36 square miles, and it lies at elevations of from 2200 to 2600 feet. The area where practically all of the data on migration were recorded is a rectangle 1200 feet wide by 2400 feet long in a portion of the business and residential section of the city.

Spring arrival.—In 1911, when I began keeping annual records of the arrival and departure of the Pacific Nighthawk, I expected to find considerable yearly variations in these two occurrences. Such has not proved to be true. The first noted arrivals of the spring migrants were recorded as follows: May 29 to June 3, inclusive, eight seasons or 22 per cent of the total observations; June 4 to June 10, inclusive, 24 seasons or 67 per cent; and June 13 to June 18, inclusive, 4 seasons or 11 per cent. These records show a range of 20 days, with 89 per cent occurring within a period of 13 days, May 29 to June 10, and with a general average around June 9. In view of the long distance these birds travel from their wintering locations in Central and South America to reach their breeding range and the difficulties of securing sufficient food and of passing storms on their spring migration journey, it seems remarkable that so many are able to return year after year to the same nesting sites and not show greater variations in arriving than has been recorded.

My experience has been that the females arrive from one or two days to possibly a week in advance of the males. The first arrivals of the males can be determined by their rapid flight over the area and their constant call of *be-erd* or *bay-ard*, as it seems to sound from a distance in the air. The first presence of females on the area can only be satisfactorily determined by many miles of tramping over the low foothills, gravelly flats and pasture land which they are known to select as preferred nesting sites and where one may occasionally flush a female from her roost on the ground. Such encounters constitute with one exception the earliest arrival records of females for the last week in May. Only one record was secured of the spring arrival of either males or females in groups of more than three in number. This was a short observation at 6:50 p.m. on the evening of June 4, 1942, at which time a group of seven females in close formation were flying rapidly 150 feet above the ground. They passed over the observation area in a northwesterly direction. The presence of either sex becomes more noticeable when the evening feeding period begins in early June.

Nesting.—The mating period starts shortly after the arrival of the males and the duration of the activity depends on the time of arrival and the proportion of the sexes. A shortage of females often appears as evinced by the continued calling of one or several males during the evening feeding period and occasionally during the night and at the

break of day. As the season advances and males fail to find mates, the call notes become much harsher and often are uttered at intervals of three seconds repeated ten to fifteen times. The female invariably selects the nesting area, which before the eggs are laid may be from one-half to one acre in extent. These areas are situated in the low foothills or the extreme ends of the lower ridges or benches in openings not far from trees. Sites on low flats or pasture land free from dense grass or thick weed beds are also selected. When mated, the male selects a roost in a near-by tree.

After some years of experience trying to locate the selected nesting sites by walking back and forth over suitable areas and keeping a close watch for a short flight of a female from the ground, I found that by observing various possible nesting sites in the evening



Fig. 29. Low bench land overlooking Coeur d'Alene Lake. Nesting area of Nighthawks.

I could locate those selected by watching the male nighthawk dive and boom over them. Almost invariably I was able to flush the female from some portion of the area thus pointed out. Once located, continued daily visits were necessary to secure information on egg laying. In one instance after a number of dives by the male over a certain area, I finally located the female which had apparently been dead for several days as most of the flesh had been eaten from the body either by ants or some small mammal. On another occasion after watching a number of dives I was unable to locate any female. During the evening feeding period many observations were made of males making long or short dives in the direction of possible females, but distances were then too great to be certain of the location of nest areas.

The egg-laying period was found to extend from the middle of June until the middle of July. Unusually late dates could have been caused by late spring arrivals or by the destruction of the first set of eggs. Of 24 sets of two eggs and three sets of one egg each



Fig. 30. Female Pacific Nighthawk incubating.



Fig. 31. Nighthawk eggs in nest site in open cultivated land.

of which a record was kept, the dates varied from June 16 to July 15, the average being June 30. Of five sets for which I was able to record the exact dates of egg laying, three sets showed a lapse of one day between the laying of the eggs and two sets showed a lapse

of two days. With reference to the proximity of nests, four sets of eggs or nests were found in one pasture of twenty acres; two sets were found on a low ridge 210 yards apart and two nests were found on a low hillside 52 yards apart. These are the closest nestings of which I have record.



Fig. 32. Female nighthawk walking up to cover single egg. The egg had been moved somewhat as the female flushed earlier.



Fig. 33. Young nighthawk less than one hour old, with down still wet.

Measurements of sixteen sets of two eggs each gave a range of 19×29 and 20×30 to 22×32 and 23×34 mm., with an average of 21.6×30.7 and 22.2×31.6 mm. Three sets of one egg each gave a range of 19×30 and 22×32 mm., with an average of 21×31

mm. Measurements of two sets of two eggs each of the smaller eggs showed no significant difference between members of the set in size. They may have produced females as the larger eggs were found to give rise to males.

Before any eggs are laid, the female when disturbed rises a short distance and flies a few yards and alights on the ground. After one or both eggs are laid, she rises just above the ground, with the body nearly vertical and the tail spread and almost dragging, and flaps slowly away for a distance of five or six yards. She then settles down on the ground and if slowly followed will at times offer the only sign of resistance ever noted in the female nighthawk. The wings are fully extended on the ground with the tips of the primaries pointing forward and with the mouth fully opened. A hissing sound is given and the inner lining of the mouth shows bright red, probably from an increased amount of blood reaching this lining, which when normal appears white, particularly at night. When these slight evidences of resistance are not shown, the female will at times simulate crippling by fluttering the wings on the ground. If closely followed she begins to take short flights and alights on the ground or on a boulder or old log if present. When all signs of danger are past, the female will readily return and cover the eggs.

Incubation was found generally to last eighteen days; there were a few instances of nineteen days. All my observations tended to show that incubation was performed entirely by the female and that the eggs were never moved from the slight nest depression.

Young.—The young can be heard peeping a few hours prior to hatching. The empty shells are carried a short distance away by the female. The newly hatched young are covered with a light colored down. Their eyes are open when newly hatched and when considerably disturbed, the young will move about quite rapidly. When three or four days old they raise their small wings and run over the ground almost as fast as the female. When disturbed while brooding, the female will fly a few yards near the ground, then alight and give a few low clucks such as given by domestic hens. The young readily respond and if disturbed no further will follow after and move under the female's wings. If continually disturbed, the female will draw the young away for a considerable distance.

The following example is given of a portion of the early life of a pair of young nighthawks at a site on the south slope of a small open wooded hill 300 feet high. On July 14 the first egg was laid; on July 15, the second egg. The first young hatched from the smaller of the two eggs on August 2. On August 3 the young bird in the remaining egg could be heard peeping and pecking away at the shell, and it hatched late on the same day. The first young to hatch was measured on August 3 and had a total length of 48 mm. The second young was measured on August 4 and was 55 mm. in total length; this one proved to be the male. On August 4 at midday the female was brooding and facing north with wings spread over the young which were both facing northeast. On August 5 at 11 a.m. the female was brooding and facing south, and she flushed when I approached to within eight feet. The young male was on the right side facing north, the female on the left side facing south. Measurement of the young at this time were: total length of female 55 mm.; male, 63 mm,

On August 9 the two young were found eight feet east of their original location and in some shade provided by a small pine tree. Both young were lying flat, side by side, and facing east. The primary sheaths were now 10 mm. in length. The female measured 70 mm. and the male 79 mm. in total length. While I was measuring the young, the female flew close and uttered a shrill call—*quirk, quirk*—keeping closer to the young than on any previous visit. On August 12 the young nighthawks were 52 feet from their original location. The young were side by side and facing west. The female now measured 80 mm. and the male 94 mm. in total length. The wing sheaths now measured

13 mm. and the tail 11 mm. The mother remained at a distance of about twenty feet and fluttered her wings to attract me away from the young. On my next visit a few days later I was unable to locate the young nor the parent female and they were not seen



Fig. 34. Young nighthawks with sheaths of wing feathers beginning to show peripherally. Female at left, male at right; note difference in size.

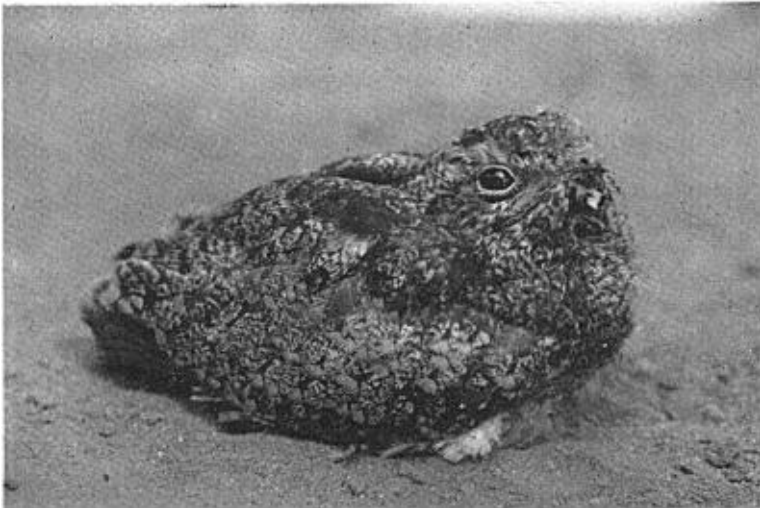


Fig. 35. Young female nighthawk 14 days old.

again. Development and measurements of other young which were handled gave a total length of 130 mm. for females and 141 mm. for males at the age of 14 days and 172 mm. for females and 184 mm. for males at the age of 30 days.

Young nighthawks at the age of 16 days start to raise their wings and hop up six or more inches from the ground; this is the first indication of the beginning of flight. At

the age of 18 days they are able to fly short distances and can fly well at the age of 25 to 30 days, although the primaries are not yet fully developed. From 45 to 55 days are required for full development. I have observed females remaining with their young until they were able to fly considerable distances and have flushed nearly full grown young from their roosts on the ground where they were resting during the daytime side by side, but with no parent bird in evidence.

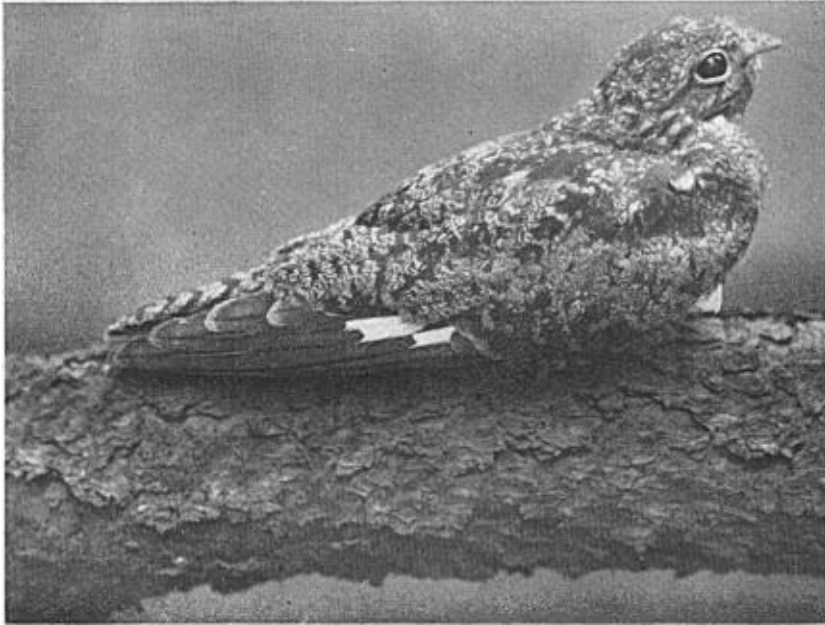


Fig. 36. Female nighthawk 31 days old. This bird could fly although the wing and tail feathers were not fully developed. Shows typical horizontal perching position on limb.

Food.—Stomach analyses of 11 nighthawks collected in northern Idaho as determined by the United States Fish and Wildlife Service showed the contents of 75 per cent of the total number submitted for examination to be composed of 100 per cent animal matter. The remaining 25 per cent varied from 60 to 90 per cent animal matter, with vegetable matter and gravel making up the difference. The animal matter consisted entirely of numerous species of insects and the vegetable material consisted of plant fragments, small bits of wood and various seeds. Insect life as well as plant development, on which many of the insects depend for food, is closely correlated with the weather conditions. Insects in the region under consideration show little activity when maximum daily temperatures are under 70° F. Temperatures of this order are usually attained by the time of arrival of the first migrant nighthawks. In examining the temperatures shown on the chart for the spring migration (fig. 37), it will be seen that in the 36 seasons that observations were recorded there were but six instances when the arrival of the first nighthawks occurred when the maximum was under 70° F. and in these instances increased temperatures were reached a day or so later.

The area over which the study was conducted consists of part of a large strip of open agricultural land lying between low hills and extensive forests. A considerable portion, from 50 to 75 per cent, of the insects taken by the nighthawks during July consisted of

various beetles, order Coleoptera. Many of these were of good size and were species that are commonly known as flat- and round-headed woodborers that develop in decaying trees, stumps or old logs. The balance was composed of soft-bodied species of different orders. The flight habits of many of the western species of insects are little known and much of the available information has been obtained from stomach analyses of various species of insectivorous birds, particularly the nighthawks. All during the sum-

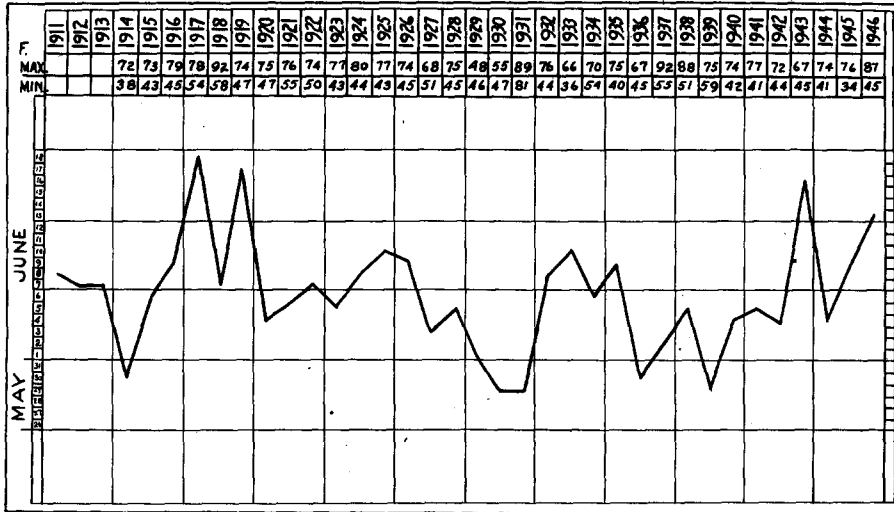


Fig. 37. Dates of spring arrivals of Nighthawks in Coeur d'Alene area, Idaho.

mer and early fall various flights of insects take place. The elevation and direction is governed to a great extent by air temperatures and prevailing air currents. For example, the numerous species of ants soar in the air on their nuptial flights in immense numbers making great feasts for the nighthawks when thus encountered. After losing their wings they become established in colonies on the ground and furnish food for the nighthawks during stormy weather later in the season. Several species of western grasshoppers reach maturity during the warmest part of the summer and can be found in large numbers on the ground until the heavy frosts occur. These constitute at times during stormy weather in September and early October the entire food of nighthawks that remain late. They are taken by ground feeding.

In June when the evening feeding period gets under way around 6:45 p.m., the male nighthawks in the vicinity of the incubating females begin to call from their roosts in near-by trees. Soon they take wing and begin circling over their respective nesting sites, where they execute from three to six or more dives (see Miller, Condor, 27, 1925: 141-143). After the dives are over, the males wing their way out over the feeding areas. Continued observation showed that birds from certain nesting sites could be seen coming from a regular direction each evening up to the time of migration. The gathering of the nighthawks from the various nesting locations from all directions for the evening feeding was found to be remarkably regular, although changing in time with the shortening of the days from June to early October. The fact that they are gregarious feeders would have a tendency to induce this regularity which was most noticeable with the males, as they were usually the first to appear over the feeding area under observation.

The periods when the greatest number of nighthawks were observed were, for June, 6:45 to 8:00 p.m.; July, 7:10 to 8:30 p.m.; August, 5:50 to 7:30 p.m.; September, 5:15 to 6:30 p.m.; October, 5:00 to 5:45 p.m. Records taken over a number of years show that the greatest per cent of the minimum temperatures in the Coeur d'Alene region occur between 4 and 6 a.m., the lowest reading usually occurring at or quite near 5 a.m., Pacific standard time. I have never observed the nighthawks feeding in the air at this period of the day over the Coeur d'Alene area. The only daytime feeding recorded was on occasion when a severe rain storm had prevented the regular evening feeding; on the following day, if the storm had ceased, feeding would occur any time from 10 a.m.

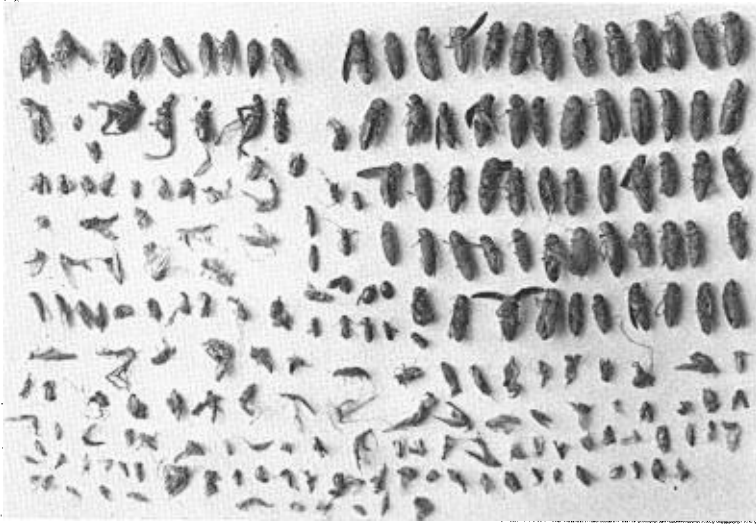


Fig. 38. Gullet contents of a male nighthawk taken over open pasture land on July 21, 1920. Note large proportion of beetles.

to 3 p.m., often in company with Violet-green Swallows. Feeding would be resumed again in the evening, weather permitting.

Shortly after the males leave for feeding, they are followed by the incubating females, which leave their eggs for a brief period and join the feeding group. A record of a visit to one nesting site during the evening follows. On July 24, 1919, I arrived at a nesting site on the east slope of Tubb's Hill at 5 p.m.; a thermometer carried on the trip registered 90° F. The female was spread out quite flat covering the eggs. At 6 p.m. the temperature had dropped two degrees and the rays from the sun had just passed, leaving the occupied portion of the site in the shade. At 6:35 p.m. the male began calling *bay-ard* from his roost in a near-by tree and was soon answered by other males. The temperature now had dropped to 80° F. At 6:55 three male nighthawks were observed circling close together and flying rapidly, repeatedly calling, seemingly as if the parent male were driving away the other males from his nesting site. At 7:30 the temperature had dropped to 72°. The female was still covering the eggs and only the parent male was now circling over the site. At 7:42 the female arose suddenly from the eggs, circled low and then flew away in the direction of the feeding area. I now felt sure that the male was aware of my presence, as he began diving and circling close to where I was trying to hide. At 8:11 the female returned over the site and at 8:22 settled down near the eggs, having been absent forty minutes. The temperature was still at 72° and it was growing quite dark.

I now came out of my hiding place among some bushes as I felt sure both parent birds were aware of my presence. I started to return down the hillside and was closely followed by the male and female circling just over my head, the male continually calling and making some dives very close. There was nothing in these observations that gave me any clue as to the time nighthawks depart to feed other than perhaps the approach of the evening shadows.

In all the years of study I have been unable to observe the feeding of the young by the parent birds. Numerous methods were tried but it was found that the nighthawks were very suspicious after dark, their eyesight at night being remarkably keen as shown by their ability to locate their eggs or more particularly the young when it would be impossible for a human observer to see them even at a very short distance. I even tried hobbling the young to prevent them from moving away in answer to the clucking call of the mother. This resulted in a close-up view of the female trying to protect the young by coming to them and covering them with her outspread wings. The male parent came to the group while the young were thus under cover and permitted a close enough approach for me to observe that no attempt was made to feed them, although it was thought that such was his intention. It was at this time that I heard the male utter a peculiar deep, low call, *aud-aud-aud*, closely resembling a sound of a frog. An interesting account of the feeding of young Pacific Nighthawks by both parent birds on a high flat roof was published by Bowles (*Auk*, 38, 1921:203-216).

Flight.—The first flight habit to be observed in early summer is that of the migrating males as they travel over the area at moderate heights in a fast irregular manner, continually calling and seemingly having no particular course to follow. This method of flight usually extends over much of the early mating period and in males that fail to mate, it is continued throughout the summer.

The flight of mated males to the feeding area is fairly rapid and direct, and they reach their regular feeding range at heights of four to five hundred feet above the ground. They then begin flying in large circles and gradually descend to lower levels until they encounter insects in flight and then begin feeding. If a large swarm of insects is found, all the nighthawks present over the area will concentrate in a close group and move in small circles in a rather slow flight with considerable flapping of wings, at times darting to the right or left or straight up in the air. The females soon join the males and feeding is continued until they are satisfied or consume the insect life present over the area. When insufficient food has been obtained in the air, they will do some feeding on the ground or in the vicinity of their nesting sites.

As soon as the young nighthawks are able to fly well, they begin to appear among the adult birds at feeding time and can be readily recognized by their darker colored plumage and short irregular flight. At certain times in the summer, from July 17 to August 22, the young congregate in a large flock in fairly close formation and exercise and feed just above the ground, darting up to 20 or 30 feet in the air and then down again. This flight is continued for 15 or 20 minutes and then the young rise and mingle with the adults.

The adults also have a group flight in which they engage several evening before the migration flight. This gathering is somewhat similar to that of the young but at much greater heights. All the adults feeding over the area at the time gather in a close formation, spaced eight to ten feet apart vertically and horizontally. They then begin to make short vertical flights. This flight is continued for ten to fifteen minutes at each gathering and was observed on four different evenings between August 15 and 22, twenty times between August 23 and 31, and six times between September 1 and 12 in the 36 seasons of observation.

under way, the flight is quite rapid with the wing beats appearing in unison. There seems to be no leader. When the group starts to move on, it takes a direct course west, having come in from the east.

An interesting feature of these migration gatherings is that not all the local birds that take part in the migration maneuvers are included in the migration group. This can

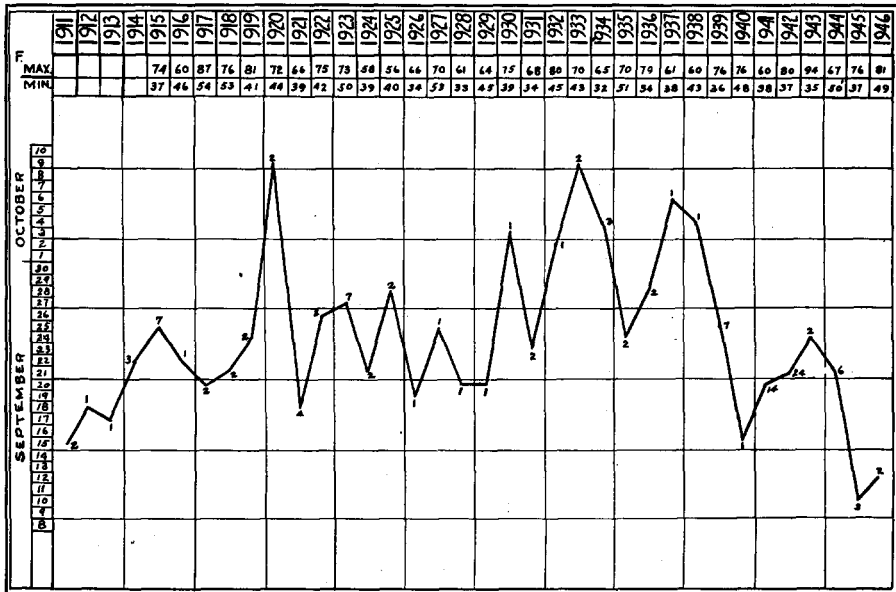


Fig. 40. Dates and numbers involved in final appearance of Nighthawks in Coeur d'Alene area in autumn.

be determined after the large flock moves on its way, as there are usually from three to seven individuals left and these keep on feeding and make no attempt to follow the departing group. These remaining nighthawks presumably are the ones to be noted on the final migration flight (fig. 40). Their departure late in September or early October is difficult to observe as in many seasons there were just one or two individuals involved, the largest numbers recorded being 14 and 24. Final departure can only be ascertained for certain after absence is noticed for at least a week or ten days; little feeding in the air is done at these times owing to long spells of cool, stormy weather.

In seven seasons from one to three remained until as late as October 9, at which time there might be snow on some of the foothills and temperatures might be down to freezing. Just what becomes of many of these stragglers it is hard to say. It would seem that it would be difficult for them to reach their wintering range alone, as they appeared to be young birds chiefly. In order to secure some information as to this delay, I collected three specimens on September 26. Two which were roosting near together on the ground proved to be an adult female and a young female, probably a mother and her young; the other specimen proved to be a young female. The adult female showed no defects which would cause her to remain, but the young with her lacked an inch in full primary wing development. Both were fat and their stomach contents showed an exclusive diet of grasshoppers. The other young female also lacked full wing development and was in poor physical condition.

Coeur d'Alene, Idaho, February 25, 1947.