

SCOTT, E. D.

1888. On the avifauna of Pinal County with remarks on some birds of Pima and Gila counties, Arizona. *Auk*, 5: 31.

STEVENSON, J.

1933. Bird notes from Mount Pinos, California. *Condor*, 35: 79.

SWARTH, H. S.

1914. A distributional list of the birds of Arizona. *Pacif. Coast Avifauna*, No. 10: 64.
1920. Birds of the Papago Saguaro National Monument and neighboring region of Arizona U. S. Dept. Interior, Nat. Park Service: 55-58.

TANNER, V. M.

1927. Notes on birds collected in the Virgin River Valley of Utah. *Condor*, 29: 196.

TOWNSEND, C. H.

1887. Field-notes on the mammals, birds, and reptiles of northern California. *Proc. U. S. Nat. Mus.*, 10: 222.

VAN ROSSEM, A.

1911. Winter birds of the Salton Sea region. *Condor*, 13: 129.
1936. Birds of the Charleston Mountains, Nevada. *Pacif. Coast Avifauna*, No. 24: 44.

WOODS, R. S.

1932. Acquired food habits of some native birds. *Condor*, 34: 238.

WYMAN, L. E.

1919. Notes from southern California. *Condor*, 21: 172.

San Diego State College
San Diego, California

BREEDING NOTES ON THE PHAINOPEPLA¹

BY A. L. AND R. M. RAND

IN Mrs. Bailey's ('Birds of New Mexico,' p. 595, 1928) sketch of the breeding habits of *Phainopepla nitens*, she comments on the variety of its notes, and implies that its melodious song is a conspicuous feature of the bird. She goes on to say that the male often assumes the duties of the female, building the nest and brooding the eggs, while the female flies about with her sisters awaiting the time to care for their young.

Crouch (Abstracts of Dissertations, University Chronicles Series, University of Southern California Press, Los Angeles, 1939), in a summary of his work on the *Phainopepla* in California, says that the song of the male is somewhat subdued and is heard chiefly during the establishment of territory, acquisition of a mate, and nest building.

¹ Contribution from the Archbold Expeditions of the American Museum of Natural History, New York City.

He also says that the male may start several false or 'dummy' nests and that these are torn down and used in the construction of the real nest, built largely by the male. Later he says that male and female share the duties of incubation but that after the young hatch the male shows less interest in the nest.

Our observations on this species, made during the course of other work, near Tucson, Arizona, during the period February to June, 1940, indicated a somewhat different pattern of behavior than that presented in these two somewhat contradictory accounts. Part of these differences may perhaps be due to geographical variation in habits.

Some *Phainopeplas* apparently spend the winter in the Tucson area (Swarth, *Pacific Coast Avifauna*, no. 10: 64, 1914). The first we saw, shortly after our arrival, was a male on February 8; the next record was of a party of four males and two females on February 12. By February 16, the birds were fairly common, and ten or twelve days later the males appeared to have established territories. About March 12, there was another influx of birds into the area, and twelve days or so later these, too, had spread out over the country and occupied territories.

The first nest was found in construction on February 27, the first egg was laid in it on March 3; nests in construction were found through March, April and May, with concentration about the first part and the end of March. The last occupied nest seen was one which the young birds left on June 12. Perhaps some of the later nests were second nests. By the latter part of May, bands of adult and young birds were moving about over the country. Male birds appeared to predominate greatly until late May, when the young birds, resembling females, appeared. Some observations recorded below indicate that the females are more retiring than the males and the discrepancy in the sex ratio may be more apparent than real.

The cottonwood groves along the washes, and the mesquite thickets were favorite habitats, the former being preferred. Here the *Phainopepla's* favorite food, mistletoe berries, occurred in abundance, and here they nested. The nests in mesquite and cottonwood, varying from five to fifty feet above the ground, were typical structures (see Crouch, 1939).

Most of the following observations were made at about fifteen territories; casual observations were made at a number more.

As Crouch has recorded, the *Phainopepla* establishes a territory. It may be small, as some nests were no more than 25 yards apart.

The *Phainopepla* gets much food outside of its territory, even when there is abundant food within it. Our observations indicate that the male advertises himself by making himself conspicuous to the eye rather than by singing. From birds that quickly secured mates we heard no singing, and it was only from males that for some weeks had failed to secure mates that we heard the rather forced, deliberately phrased song, and then only occasionally. The unmated males spent much time on conspicuous perches in their territories, frequently flying sharply upward, swinging about, and flying back to their perches, displaying their white wing-patches, which contrast with their black plumage. Some of these flights may have been to catch insects, as they have been frequently interpreted, and sometimes these birds do take insects on the wing, but most of the flights at this time appeared to be for display.

Females flying over an occupied territory were frequently pursued by the male. Crouch intimates that the male is defending his territory against these females. It seemed to us that the male, on these occasions, was attempting to induce the female to take part in a courtship flight. Sometimes the female joined the male in such a courtship flight; together they rose sharply, the male following the female, in a pattern of circles over the territory which lasted for a half-minute or more. There was no quality of actual hurried chase; it looked more like an aerial dance. These display flights were continued between mated pairs until incubation started, but the female did not necessarily accept the male or the territory after having joined the male in such a flight. At one territory the female flew directly away after such a flight, and though the male stayed in the vicinity for the rest of the day and even worked at a nest there, this territory was abandoned.

The males started nest building before they secured mates. Frequently a building male made high circular flights to the nest with material, apparently to advertise himself. On several occasions we saw a female follow such a building male to his nest. On one occasion the female was driven away from the nest by another female, presumably the male's mate.

A male often made rapid trips to the nest while without a mate; one such male made thirty trips in an hour and could have made more, for the material he was using, the silk of tent caterpillars, was abundant and close at hand, and the male frequently paused and sat quietly for a few moments nearby. Sometimes a male made circular flights out from the nest. The amount of material carried each

time by building birds was usually very small, often only a few strands of tent-caterpillar silk, and it was usually difficult to be sure they were carrying anything. Sometimes a female was in the territory unobserved until the male flew to her. Once we saw a male, building alone, fly to a female we had not observed, and apparently offer her the building material he had in his bill. She opened her bill and quivered her wings; the male then carried the material to the nest. The female paid him no further attention and shortly flew away. One other time we saw a male, building alone, interrupt his building to fly to a female which we had not observed perched low in dense shrubbery, and feed her by regurgitation. The female took no interest in the subsequent nest building of the male and soon left. This male definitely remained unmated for some weeks.

When a female joined a male on his territory, there were sometimes many flights in which both took part; sometimes there were few. The nest was built chiefly by the male, but the female aided in its completion. Sometimes she made trips independent of the male; sometimes he flew to the nest from a nearby perch as she came to it. Once, at least, we saw a female carry material to the nest. At one nest, between 9:20 and 10:20 A. M., the day before the first egg was laid, the male made ten trips to the nest, sometimes with material we could see, and each trip he sat in the nest, moulding it and working at the rim. During this time the female made but one trip to the nest; whether or not she carried material we could not see, but she sat on the nest, moulding it and working at it with her bill.

Sometimes during this period the male flew to the female, which was sitting quietly on a conspicuous perch, and fed her berries by regurgitation. Once a male fed a female in such a situation three berries in succession, the female holding her mouth open for the last two, but not quivering her wings; both birds were silent and then sat quietly. Another time, two days before the first egg was laid by the female of a pair, the male flew to her and perched on her back, attempting copulation while he fluttered his wings. The female did not respond, remaining quiet. The male then perched beside her, and three times regurgitated a berry, each of which he placed in her open bill; she held her bill open for the last two. The female remained silent, while the male soon flew away to the nest. The previous day the male was seen twice to fly to the female, alight on her back, and attempt copulation, without offering her berries. Lack (*Auk*, 57: 169-178, 1940) does not mention courtship feeding in the Ptilonotidae, though Crouch has recorded it.

Frequently a male, perching silently in conspicuous places, nest building and giving display flights, did not secure a mate, though passing females were pursued, sometimes stopped and indulged in a display flight with him, visited his nest, and were fed by him. Sometimes he then forsook the territory or he then built another nest in it. One male, identified by a patch of dull feathers on his flank, built three nests in March without securing a mate; the nests were ten and twenty-five yards apart. It was only during the latter part of this period that this male began to sing occasionally; and it was only in late March that we heard the song of this species, so it seems probable that this is the customary thing here. This is contrary to Crouch's findings, who reported that song was used in establishing territory. Crouch also says that the males build false or dummy nests before they build the real one. In our experience a second nest was built only when the male was unsuccessful in securing a mate while building the first nest. Crouch also records that the 'false' nests are torn down and the material used in the real nest. We saw this twice, but on some other territories it definitely did not happen.

During this period before incubation started, the birds were conspicuous in their territory, especially the male. We saw no fighting, but when a strange male appeared, the resident male flew at him and the stranger retired. When other males flew over the territory the resident bird flew up and pursued them for a distance. The females sometimes drove off other females. The birds sometimes flew at Verdins, House Finches, and Gila Woodpeckers, causing them to move away.

During this pre-incubation period, even in the few days before egg laying, the male did not stay all the time on his territory, but occasionally made flights of several hundred yards, high in the air, to other localities. Sometimes he fed there, but this behavior had nothing to do with available food, of which there was an abundance near the nest. It was rather characteristic that these birds, especially the males, flew high, fifty feet or more above the ground, even when starting from a low perch, going but a short distance and descending to a low perch. The female appeared to feed in the territory more than did the male, but she also left it, though her actions were more secretive and her activity was more difficult to follow.

Incubation started with the first egg; both male and female incubated, but at one nest in the early part of incubation the male incubated more of the time than the female. However, the female spent

the night on the nest, as we found the female incubating at 9:30 P. M. at one nest the night after the first egg was laid. Once, when the female was laying, the male fed her. During a period of 1 hour and 37 minutes of watching a nest containing only the first egg (March 23, 1940) the male incubated for three periods of 1, 6 and 20 minutes; the female was on the nest for one period of 50 minutes, during which she laid the second egg and was fed four times by the male; the male also once chased a Gila Woodpecker from the vicinity of the nest during this time.

One nest was watched for a period of 1 hour and 20 minutes the day after the third egg was laid. The male alone incubated, though the female was about part of the time. During this time the male incubated for five periods of 5, 13, 17, 18 and 20 minutes, and was off, leaving the eggs uncovered, for four periods of 1, 2, 2 and 2 minutes respectively. The next day both male and female incubated; during a period of 1 hour and 2 minutes the male incubated for two periods of 12 and 5 minutes; the female for two periods of 24 and 10 minutes, and the nest was left uncovered for three periods of 2 to 5 minutes each. At another nest, four days after the clutch of three eggs was complete, a watch of 48 minutes showed the male and female incubating in a quicker rhythm; the female incubated for six periods of 1, 2, 3, 5, 7 and 7 minutes and was off for six periods of 1, 2, 2, 3, 7 and 8 minutes, while the male incubated for four periods of 1, 1, 4 and 6 minutes, and was off for four periods of 1, 8, 13 and 14 minutes, leaving the nest uncovered for six periods of 1 to 3 minutes. Thus, different birds spent varying times on and off the eggs. For instance, at one nest both male and female spent very short periods on the eggs—from 1 to 7 minutes; while at another nest the male incubated for as long as 20 minutes at a time.

The male and female frequently gave a little *kuk-kuk* call as one bird returned to brood, and the other often responded as it left the nest. Sometimes the call was given from as far as ten yards away from the nest and continued as the bird approached to take its turn at incubation. Sometimes one bird waited at some distance from the nest, where its mate joined it; sometimes both sat side by side for a time, before the incoming bird went to the nest. Softer *cru-ee* notes were also given when the birds changed places, as they passed each other near the nest itself. No other ceremony of alternation was observed.

Usually there were mistletoe berries growing on the tree containing the nest, and during incubation the female sometimes fed on

them there, only rarely flying a distance to feed. On the other hand the male still often flew off to some distance to feed, though occasionally he fed in the nest tree. Crouch mentions that when the birds are away from the nest they spend their time feeding. Perhaps food was more abundant in the locality where we studied these birds, for often we saw birds sitting quietly, sunning themselves, or preening, before coming back to the nest.

There was little active displaying during this period. No records were made of the high, circular flights so conspicuous during the nest-building time. Nor did the bird sing during this time, though both male and female often sat on high conspicuous perches, the male doing so more often than the female. Neither male nor female paid much attention to Verdins gleaning through the branches near the nests at this time. On one occasion a female *Phainopepla* left the nest where she was incubating and chased a male English Sparrow from the nest tree. At another nest the male left the nest to chase a Gila Woodpecker from the nest tree.

Territory defense evidently weakens during this period as at one nest containing three eggs we saw two males accompanying the female back to the nest from some distance away; a third male soon followed. The female paid no attention to them and went on her nest immediately. The males soon left of their own accord, to fly off toward the cottonwoods 200–300 yards away.

In five nests on which observations were made on the share of the sexes in care of the young, male and female took an equal part in the feeding, sanitation, and brooding. At one other nest, however, discovered when the young were a day or so old, the male alone cared for the young and there was no female about.

The food given the young was berries, and these the adult carried in its throat and regurgitated. One bird fed the young seven berries at one feeding. Both male and female were seen to wait at the nest and, when the young voided, to eat the excrement.

At one nest, when the young were a few days old, in one hour of watching the male fed three times, staying to brood each time for periods of 11, 6, and 13 minutes, respectively; the female also fed three times, staying to brood for 4, 5, and 5 minutes; the nest was uncovered for five periods of 1 to 6 minutes each; at another nest with small young, in 1 hour and 50 minutes the female fed five times, and settled to brood each time for periods ranging from 5 to 12 minutes in length, while in the same period the male fed three times, staying each time to brood for 4 to 8 minutes; the nest was

left unbrooded for six periods of 6 to 17 minutes duration. The same *kuk-kuk* calls were used to signal to each other, as the birds changed places at the nest, as were observed with incubating birds.

At the nest with only the male in attendance, when the young were one day old, he fed in one hour six times, and on five of these occasions after feeding, brooded for periods of 6 to 11 minutes, leaving the nest uncovered for periods of 1 to 10 minutes; five days later, in an hour he came to the nest and fed five times, and brooded three of these times for periods of 3 to 5 minutes, leaving the nest uncovered for periods of 3 to 15 minutes. On several other short visits to this nest no female was seen near it.

There was a decided difference in the general behavior of the birds with young and those that were incubating. While the birds at nests containing eggs did no displaying, these birds were conspicuous about the nest. The male and the female gave display flights in the vicinity of the nest and territory defense became prominent again; when a strange male appeared in the nest neighborhood, he was chased away at once by the resident male. The general behavior was similar to that of birds constructing nests. The birds did not customarily sing during the care of the young, any more than they did when incubating.

Crouch found that the male loses interest in the nest after the young are hatched, but this differs from what we saw. The male and female still shared equally in caring for the young, and in some cases the male was actively defending his territory. In the nest where the male alone was caring for the young, he paid little if any attention to intruders of his own or other species, though he occasionally sat up quietly on some conspicuous perch for minutes at a time.

SUMMARY

Near Tucson there were two influxes of most of the breeding birds, one in February and another in March. The first eggs were seen March 3; the last young in a nest, on June 12. The male *Phainopepla* established territories and advertised themselves visually, by conspicuous perching and display flights instead of singing. Nest building was started by the males before they were mated. Male and female indulged in courtship flights, and there was courtship feeding during pair formation. The female aided in completing the nest. When the male had finished a nest, and still had not secured a mate, he built another nest. Only after a period of displaying and nest building, during which he was unable to secure a mate, did a male sing. Usually male and female shared nest duties, but at

one nest the male alone fed the young. During incubation, territory defense and display flights were lacking, but appeared again after the young were hatched.

American Museum of Natural History
New York City

CANADA GOOSE NESTS AND EGGS

BY CECIL S. WILLIAMS AND MARCUS G. NELSON

ASIDE from Bent's (1925) summarization, few comparative records of Canada Goose nest and egg sizes are found in the literature. It is felt, therefore, that the measurements of 174 eggs and more than 100 nests of geese breeding in northern Utah, and the comments on them, will be of interest.

Approximately 1100 pairs of Canada Geese (*Branta canadensis*) breed in Box Elder County, which is one of the northernmost in Utah. Two of the more productive breeding localities in the county are the Bear River Migratory Bird Refuge and the Bear River Silts lying between Brigham City and the Refuge. It was from nests on these two areas that the data herein presented were obtained. Although they constitute but a very small part of the available breeding grounds in the county, they are quite similar to the others, and it is unlikely that the factors influencing the goose population on the various areas differ markedly.

Studies on and in the vicinity of the Bear River Refuge during recent years have indicated some of the major attributes of good goose-breeding areas. Although these are of little concern to the present discussion, they are briefly enumerated for completeness: (1) a browsing area available to nesting birds and to paired adults prior to the nesting season; (2) an aquatic feeding area during the brooding period; (3) a brooding environment of open water and resting banks; (4) molting cover (emergents); (5) a browsing area for broods after they are on the wing (this may be the same as 1); (6) nesting sites isolated from interference; (7) nesting sites providing firm foundations; (8) nesting sites with good to excellent visibility. All these items seem to be essential, or at least very important, in determining breeding populations. Nesting sites are also selected for their proximity to channels and to open ponds that provide avenues to the brooding areas. Muskrat lodges are influential ecological factors, adding considerably to the nesting value of certain emergent environments, notably cat-tail and alkali bulrush.