

NOTES ON BREEDING ACTIVITIES AND ON GULAR SACS  
IN THE PINE GROSBEEK

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The literature on breeding of Pine Grosbeaks (*Pinicola enucleator*) is scant, probably because the birds are seldom common even in their known breeding range. The writer was afforded an unusual opportunity in the summer of 1953 to witness the activities of these birds in the breeding season in the Uinta Mountains of northeastern Utah, and from June 10 until July 30, 1953, observations were made almost daily at 10,500 feet elevation approximately 20 miles east of Kamas, Summit County, Utah, and in adjoining portions of Duchesne and Wasatch counties. Rocky Mountain Pine Grosbeaks (*P. e. montana*) were regularly seen and twelve specimens were collected during this period. The two dominant trees in the region are Engelmann spruce, *Picea engelmanni*, and alpine fir, *Abies lasiocarpa*. In an extensive wet meadow *Carex* was dominant.

Upon first arrival at the area on June 10 there was a uniform cover of snow at least three feet deep. Local drifts were, of course, many times this depth. The first Pine Grosbeaks were seen on June 11 when a red male and a typical female were seen feeding with a mixed flock of birds composed of at least a dozen Red Crossbills (*Loxia curvirostra*), two Pine Siskins (*Spinus pinus*), a single Gray-headed Junco (*Junco caniceps*), and a single male Black Rosy Finch (*Leucosticte atrata*). These birds were feeding on the snow among scattered debris of the spruce trees. On June 15 a male grosbeak was collected and found to have enlarged testes (11 mm.). On June 20 another male had testes measuring 12 mm. On July 4 a nest was found containing two young. The young were last seen in the nest on July 14. Juveniles accompanied by adults were collected on June 30 and July 13. The bird taken on the former date was still being fed by a parent. After the latter date young birds were frequently seen.

From these records it appears that the breeding of Pine Grosbeaks in this region begins, on the average, by the end of the first week in June and the young are out of the nest after the first week in July. There is considerable variation, however, some individuals beginning prior to this time and some carrying over to a later date. Twomey (Ann. Carnegie Mus., 28, 1942:461) recorded Pine Grosbeaks in this area as being in post-nuptial molt when he was there July 17 to 20, 1937. In two instances he saw adults feeding fully developed young.

The seeds of the Engelmann spruce seemed to be the main food for adult Pine Grosbeaks. In all specimens examined except one, spruce seeds were present. In one exception the esophagus was filled with tender new growth from the tips of spruce branches. Of three filled gular sacs examined, one contained 100 per cent spruce seeds, the second contained primarily spruce seeds with some new growth, and the third contained primarily seeds of *Silene acaulis* with some spruce seeds and insect parts. The young birds are probably on a diet of seeds by the middle of their nest life. On one occasion a pair of birds was seen eating the ovaries of glacier lilies, *Erythronium grandiflorum*.

Gular sacs in small passerine birds have been reported previously for only one species, *Leucosticte tephrocotis* (see Miller, Condor, 43, 1941:72-73). It was no surprise, then, when similar structures were found in the Black Rosy Finch. However, it was found that the Pine Grosbeak also makes use of such a special food-carrying device. This first came to my attention on June 30 when a male was collected. This bird had the throat very much distended with food. When skinning the specimen it was found that the structure was the same as that in the *Leucosticte*. Comparison of sketches from my field notes and of preserved material with Miller's figure (*op. cit.*) show that the structure is identical in the two genera. When fully distended in the Pine Grosbeak the sacs extend far

back under the skull. The opening of each sac extends for a full centimeter or more along the side of the tongue. As in *Leucosticte* it is found in both sexes and only for a brief time during the breeding season when the birds are feeding young. Examination of a specimen taken at an earlier date, June 20, and preserved in formalin disclosed that this bird, too, had gular sacs but they were apparently not in use at the time. They were 2 or 3 mm. in depth and extended back only as far as the posterior margin of the glottis. The tissue forming the pouches was highly folded, however, and undoubtedly would have extended into a sizable structure. It is believed that this specimen was breeding but was not yet feeding young. Examination of the preserved carcass of another specimen taken on June 15 shows unmistakable indications of gular sacs, perhaps somewhat less



Fig. 1. Pine Grosbeak territories showing location of nest (x). The approximate mean diameter of territory number 1 was 1200 feet.

developed than the last. This bird when collected was accompanied by a female. A *Leucosticte* taken in winter shows no indication of the sacs. It is believed that there is a proliferation of the tissue of the floor of the mouth beginning just prior to the breeding season, perhaps concomitant with the enlargement of the gonads, and under similar control.

On July 4 my attention was drawn to a wooded island in a wet meadow by a pair of grosbeaks. The female was singing and doing a great deal of fly-catching. The insects it caught could be plainly seen in the late afternoon sunlight. Only once was the male observed carrying on this activity. The nest containing two young was located the following day. It was situated in a spruce tree about twenty feet from the ground near the end of a sloping branch. It was a coarse structure of twigs, well concealed from the sides and top by foliage but was visible from below.

The nest was observed on five mornings between the hours of 5:00 and 8:00 a.m. It seemed unusual to see the adults constantly traveling together. Both birds would approach the nest at the same time with their throats noticeably distended due to filled gular sacs. One bird would arrive at one side of the nest and the second would perch on the opposite side. The first bird might be either sex and might choose either route. Generally, the first to arrive was the first to feed the young but even this was not constant. The second bird would sit patiently until the first had completed the feeding process. After feeding, the first bird might remove a fecal sac from the nest and fly to a nearby tree or wait at varying distances from the nest or at the nest itself while its mate fed the young. After this they would depart together, one or both carrying fecal sacs. They left the "island" together, except on three occasions when the female stayed to brood. The

departure frequently involved a chasing ceremony in which one bird would dive at the other on its perch, forcing it to fly, and would continue to chase it across the meadow. Either sex might be the chaser.

Their absences from the nest averaged 25 minutes (extremes, 20 and 30 minutes). Approximately three minutes were required at the nest for both birds to feed the young. Their leisurely and quiet attitude was impressive. Even the young birds could seldom be heard. On only two occasions were sounds from them heard by me at a distance of fifteen feet from the nest.

After the young had left the nest the birds gathered in small flocks, possibly family groups, which persisted as long as this area was under observation. They were frequently seen feeding together on the ground or upon the new growth of the spruce branches.

A bird believed to be the male of the nest described was seen on numerous occasions. Prior to the discovery of the nest it was seen singing or sometimes feeding in company with the female. On the basis of these observations the territory was outlined (fig. 1, number 1). The approximate territories of three other pairs are partially shown and are numbered. These territories (2, 3 and 4) were defined on the basis of pairs seen repeatedly or adults with young seen or collected. There may have been some overlap between territories 1, 2 and 3 but there were no observations to indicate this. Territory 4 may have extended more in the direction of territory 1.

On two occasions strange Pine Grosbeaks were tolerated by the nesting pair. Once a foreign pair was feeding with the resident pair in a small spruce less than thirty yards from the nest tree. At another time the resident pair feeding in the meadow about fifty yards from the nest tree was joined by a strange male. This bird was tolerated for several minutes until it flew to within three feet of the resident female, upon which it was driven away by the resident male. Both of these occurrences were rather late in the nest history, the territorial drive probably having waned by that time.

Of the six males collected two showed no red in the plumage. One of these was taken June 30 while feeding a juvenal bird. The left testis measured 9 mm. The second, taken on the same date, had a left testis which measured 7 mm. in length. Two males taken show some yellow in the plumage. In the first of these the yellow is primarily on the sides of the breast and the upper tail coverts. In the second bird small yellow areas are found in front of and behind each eye as well as on the upper tail coverts. The symmetry of this distribution suggests the possibility of diet during the period of the molt as a contributing factor. Twomey (*loc. cit.*) suggests the loss of feather barbules as the cause.

A pair of Gray-headed Juncos nested near the base of the same tree in which the grosbeaks were nesting. The grosbeaks sometimes alighted low in the tree and worked up to their nest. The juncos invariably came into the tree and worked down to their nest. As a result the paths of the birds sometimes crossed. When a junco was on a perch and one of the grosbeaks came toward it the junco immediately flew, usually to a lower perch in the tree. Generally, the matter ended at this point. At times, however, the grosbeak continued to pursue the smaller bird. This may have been due to my presence at the base of the tree and hence was not typical behavior. Under similar conditions the same attitudes were taken, though less frequently, when the grosbeaks met White-crowned Sparrows (*Zonotrichia leucophrys*) which nested ten yards from the base of the nest tree. When a large hawk flew over some distance away both grosbeaks flew to the top of a tree and sang. One bird that was not tolerated in the vicinity was the Canada Jay (*Perisoreus canadensis*). When one of these appeared both male and female attacked it violently. The male once gave fierce chase to a Red Squirrel (*Tamiasciurus hudsonicus*) which was in a dead tree near the nest tree. The bird drove the intruder around the top of the tree and ceased chasing only when the squirrel had returned to the ground.

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