

A STUDY OF THE NESTING ACTIVITIES OF THE
ROSE-BREASTED GROSBEEK

by

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This nesting study of the Rose-breasted Grosbeak (Pheucticus ludovicianus) was made at the University of Michigan Biological Station at Douglas Lake in Cheboygan County, Michigan. Observations on behavior were recorded for 42 hours from June 30 to July 18, 1948.

These observations were made from a 12-foot tower with a canvas blind secured at the top to cover a four-foot square platform. The blind was placed eight feet to the south of the nest, which was 10 feet from the ground. The nest was tilted away from the blind which made it necessary to use a mirror on the end of a pole to look into the nest at the time of hatching.

I am indebted to Dr. Olin Sewall Pettingill, Jr. who found the nest and sincerely acknowledge his valuable suggestions regarding study of this species and his reports of certain incidents he observed at the nest while photographing. To Fern Brooks and Ernest P. Edwards credit is due for certain reports on nest activities during my absence.

ENVIRONMENT

The area under observation was on Pine Point east of North Fishtail Bay in a second growth aspen association, with relic pines scattered throughout. A road was cut through the forest about 200 feet from the lake and the nest was located about 200 feet south of the road in an Alder thicket.

The thicket was mainly composed of saplings of Alder (Alnus incana) and Black Ash (Fraxinus nigra). It was located in a small, moist depression in which the soil was black muck and supported little ground vegetation. This area was surrounded by large trees of White Pine (Pinus strobus), Red Maple (Acer rubrum), Quaking Aspen (Populus tremuloides), and Black Ash (Fraxinus nigra). At the high shrub level Alder (Alnus incana), Black Alder (Ilex verticillata), Willow (Salix sp.), and Red-osier Dogwood (Cornus stolonifera) are the dominants. The low shrub level was made up of Leather Leaf (Chamaedaphne calyculata) and Bracken Fern (Pteris aquilina), while the few ground plants were Jewel Weed (Impatiens biflora) and seedlings of alder.

Because of the proximity of the lake there was usually some breeze in the area though in early afternoon it became extremely warm. The foliage was dense and offered some protection to the nest but the blind was on a level with the tops of the alders. Many low shrubs below the larger trees and alders about thirty feet from the nest served as good cover when the birds left the nest.

Two Rose-breasted Grosbeaks were seen in the area, one an immature male was similar to the adult male in summer but his wing quills and some tail feathers were brownish as in the female, (Chapman, 1912:505). The other a female may have been a first year bird since she differed from the adult female by having more buffiness in a band on the breast and the white markings were indistinct. Other

species of birds seen and heard in the area include the Crested Flycatcher (Myiarchus crinitus), Nashville Warbler (Vermivora ruficapilla), Chestnut-sided Warbler (Dendroica pensylvanica), Black and White Warbler (Mniotilta varia), Black-capped Chickadee (Parus atricapillus), Red-eyed Vireo (Vireo olivaceus), Baltimore Oriole (Icterus galbula), Catbird (Dumetella carolinensis), Brown Thrasher (Toxostoma rufum), American Redstart (Setophaga ruticilla), Flicker (Colaptes auratus), and Veery (Hylocichla fuscescens). Some of these species were more aggressive than others and would enter the nesting area in such a way that the male would leave the nest to drive them from the area.

Two mammals were seen in the vicinity. The Raccoon (Procyon lotor lotor), was walking around the clump of alders, in which the nest was located, beneath the blind about 7:00 P.M. on July 13. A Red Squirrel (Tamiasciurus hudsonicus loquax) climbed up the frame of the blind but I frightened him off when he reached the platform. This was at 10:45 the same morning on which we found the nest upset with all four young on the ground, July 16. I strongly suspect that this was the predator who destroyed the nest.

TERRITORY AND TERRITORIAL DEFENSE

The male bird defends an area around the nest from intruders but the extent of the area was not determined because only one nest was found. Intraspecific fighting

was observed on two occasions when the first year male grosbeak appeared near the nest. However, when a first year female grosbeak appeared at the nest neither the male or female seemed the least bit concerned. Several instances of interspecific fighting were noted when the male drove away a Catbird, Red-eyed Vireo, and Crested Flycatcher. According to Gabrielson (1915:368) both male and female drove away a Bronzed Grackle and the male drove away a Red-winged Blackbird, but, in my study the female was a calm bird very attached to the nest and not easily disturbed from it.

The male bird became wary as soon as the blind was set up and continued to be startled at the least sound in the blind or at a flutter of wings as another bird entered the area. This wariness persisted throughout incubation and for the first several days of brooding and feeding. As the young grew older he was a little less hesitant in his approach to the nest and on a few occasions went at once to the nest without stopping at a perch. While on the nest his eyes were shifting constantly as he looked about him in the shrubs near the nest and, particularly when he seemed to look through the opening in the blind and suspected that it was occupied.

The singing and guarding area usually used was in a 30 foot radius of the nest away from the blind. At no time did I observe the bird in the eight foot area between the blind and the nest or in the area behind the blind.

The male preferred the higher perches in Black Ash for his guarding and singing positions and was most frequently found perching about 15 to 20 feet from the ground.

The female rarely used a high perch but flew directly from the low shrubs to the branches below the nest.

NEST AND NEST BUILDING

The completed nest was found in an alder thicket in which a dead sapling with two branches crossed an Alder sapling making two forks, this was crossed by a small tree of Black Ash to make a group of five supporting branches. These branches swayed irregularly on a windy day and probably explained in part why the nest continued to tilt. The nest was constructed of loosely placed twigs with about 50 larger twigs of Black Alder (Ilex verticillata) at the bottom making a rough platform and a few smaller twigs of the same species placed on top of them. A small depression was loosely lined with about 100 fine twigs of Hemlock (Tsuga canadensis) and Blueberry (Vaccinium sp.). There were four culms of unidentified grass in the loose construction. The twigs varied in size from two to six inches in length and from one-sixteenth to one-eighth inch in diameter.

The overall measurement of the nest was eight by six inches with an inside diameter of three inches and a depth of one to two inches varying with the irregularity in construction. According to Allen (1916:53) construction of this flimsy nest was carried on by the female entirely

and was completed in five days. Ivor (1939:94) with his birds in semi-captivity found the birds used twigs of Hemlock in preference to others provided. The female during incubation was often seen tugging at the twigs and rearranging the smaller pieces in the nest.

The nest with eggs on June 30 and 8-day young on July 17 is a rather late nesting record for this bird. Allen (1916:53) found a nest with eggs on May 28 and young on June 14 in West Roxbury, Massachusetts, Esten (1925:397) found one with four young on June 26 in Winona, Indiana, and the Biological Station records show one nest with three young on June 23, 1941 near North Fishtail Bay on Douglas Lake. On July 10, 1942 a young fledgling with wing coverts just opening was fed for several days by a student but its age was not known.

INCUBATION

The nest was found on June 30 and contained four eggs of which the first hatched on July 8. The incubation period could not be determined on the basis of this nine day observation, Burns (1915:285) reports 14 days and for birds in semi-captivity Ivor (1944:96) reports 12 and 13 days.

The male was incubating at the time the nest was discovered but flushed as the observer came into the area. Table I shows the relative amount of time the adults spent in incubation attentiveness. In a total of 1217 minutes of observation the female spent 768 minutes in

23 periods on the nest and the male 117 minutes in 16 periods at the nest. On the basis of this observation the average attentive period for the female was 33 minutes as compared to seven for the male. The shortest attentive period by the female was eight minutes and the longest 109 minutes, while the shortest of the male periods was but a few seconds and the longest 56 minutes.

There were 332 minutes in 20 inattentive periods or an average of almost 17 minutes, the shortest period was 16 minutes and the longest 97 minutes. Table I indicates inattentiveness, time during which no bird was at the nest, for 27.3% of the time and attentiveness by the female 63.1%, by the male 9.6% of the total time of observation during the incubation period. Allen (1916:53) found that the male assisted his mate in incubation but she appeared to do most of it. However, Ivor (1944:94) found both sexes participated in incubation with one bird leaving the nest as the other one was arriving. Figure 1 shows a decrease in attentiveness by both male and female just before hatching. Both sexes took part in the incubation of the eggs and their behavior was similar in many respects. They both used the indirect approach method whereby they would fly to a perch near the nest and then hop to the rim, so they were facing the blind, from that position directly on the eggs. Some of the events at the nest are significant in that they explain in part the interruptions in the incubation rhythm which makes any estimate of the length of time

TABLE I. Observations on incubation.

Date	July 2	July 3	July 4	July 6	July 7	Totals
Hour of day	PM 1:45- 4:47	AM 8:00- 1:45	AM 6:30- 8:00	AM 4:50- 11:10	PM 1:00- 4:40	
Minutes	183	345	90	380	220	1217
Air Temp. (degrees F.)	69-65	70-82	70-75	63-70	80-75	
Wind Velocity (mph)	5-15	0-5	5	10-15	0-5	
Weather conditions	Clear	Cloudy, rain	Clear	Clear, humid	Clear	
<u>Attentiveness</u>						
<u>Female</u>						
Number of periods	2	6	2	8	4	23
Length of periods (Total minutes)	124	215	61	245	123	768
Average	62	36	30.5	30.5	30.7	33
Per cent	68	61	67	65	56	63.1
<u>Male</u>						
Number of periods	5	5	1	5	0	16
Length of periods	22	43	13	39	0	117
Average	4.4	8.6	13	8	0	7.3
Per cent	12	12	14	10	0	9.6
<u>Inattentiveness</u>						
Number of periods	3	4	1	8	4	20
Length of periods	37	87	16	96	97	332
Average	12	22	16	12	24	16.6
Per cent	20	25	18	25	44	27.3

between attentive periods purely an approximation. These observations are listed in the supplementary table.

BEHAVIOR AT THE NEST

On July 2, at 2:04 P.M. the first year male entered the area just as the female gave several call notes from the nest. The adult male signal song was heard some distance away but the female stayed on the nest until he approached and then she flew away. The male flew above the low shrubs in the area directly to an alder tree in the clump supporting the nest. From this perch he hopped to the nest and sat on the eggs. The intruding male came in a little closer and the adult male darted from the nest and drove the intruder into the low bushes at the edge of the area. This was repeated more viciously the second and third time before the intruder did not return. After this the male sat on the nest for seven minutes but appeared nervous. When the wind blew a branch against the bird he flushed from the nest to a perch and then sang softly with his bill closed.

While incubating, the female on July 2 at 3:05 sang a soft warbling song of short duration. It was shorter and not as clear as the ordinary song (Allen, 1916:54), she sat in the same position and scarcely opened her bill as she sang. This song was similar to the signal song used by the male just before he entered the area. It was also used in answer to the call notes of the female from the nest, and sometimes while sitting on a perch guarding the area.

The female on July 3 was shaping the nest by pushing aside twigs with her feet and tugging at others with her bill. She was most always completely at ease on the nest exhibiting none of the nervous head cocking and eye blinking habits of the male. On July 5 at 9:30 A.M. while Dr. Pettingill was photographing the nest he observed the male feeding the female on a small perch about two feet away from the nest. This occurred just after her attentive period before ^{the male} (he) began his incubation period. On July 6, at 6:10 A.M. the female without warning darted from the nest just as the male flew into the area with food in his bill. He looked about and then hopped on a perch near the nest and ate the larva. This may have been an attempt at feeding the female but is the nearest approach I saw him make. The female on July 7 arrived at the nest at 1:50 P.M. with a green larva in her bill but she hopped right into the nest, ate the larva and then settled down on the eggs.

Other activities at the nest include occasional preening by the female, the male usually left the nest for this purpose, and frequent turning of the eggs. Both birds did this by using their feet and their bills and by a rolling motion of the body.

YOUNG AND THEIR DEVELOPMENT

Hatching of all the eggs did not take place at once therefore the nest contained young of different ages. Development of the young is measured in terms of days with

the day of hatching (called 0-day) until they are independent of parental care.

The first indication of young in the nest was evidenced by the increased attentiveness of the adults at the nest on July 9. The male and female both visited the nest and peered into it before pushing at the eggs with their bills. Later I saw two young in the nest, one partially covered with moist, matted down (the 0-day bird) and the other with soft, white down covering its head (the 1-day bird). The afternoon observation showed the female very attentive standing for long periods with her feet straddling the nest and her wings held slightly away from her body. It was an extremely warm day and both adult birds were panting much of the time.

These altricial young are psilopaedic with down feathers, neosoptiles, present on the capital tract and partially covering the spinal tract. The 1-day bird was able to hold up its head and reach for food thus showing its red throat lining. The 0-day bird was almost motionless in the bottom of the nest. A third young hatched on July 10, and the fourth on July 12. The first cries from the nest were heard on July 13 just before feeding but they were not distinct enough to describe. One young stood higher in the nest with his mouth near the rim of the nest and so he received food first on almost every trip. The first indication of preening appeared July 16 when one young began to rearrange the short wing teleoptiles, this was

apparently the first bird hatched.

The nest was disturbed by a predator on July 16 and all four young were found on the ground. Two of the birds were able to stand and flutter their wings while they gave continuous calls of "hū'ee", (Allen, 1916:56). The younger birds, not as well feathered, were dead. While I held the birds to replace them in the nest they struggled to get free and called rather frantically. Then, when replaced in the nest they continued the shrill cries.

I brought one bird into the laboratory for further study and found it comparable to the third stage of development (see Nice, 1941:14). The teleoptiles on the capital tract were out of their sheaths and on the superciliary line the neosoptiles were still attached to the teleoptiles. The neosoptiles were also attached to the teleoptiles on the dorsal and pelvic regions of the spinal tracts, and to those of the humeral and femoral tracts. The crural tract was only slightly developed. On the caudal tract the sheaths were about .5 cm. long with the rectrices just appearing out of them. Sheaths of the primaries were 1.8 to 2.5 cm. long, the first primary .3 cm. and the last .7 cm. out of their sheaths. Sheaths of the secondaries ^{were} ~~are~~ about 1.9 cm. long, the first secondary .7 cm. and the last .4 cm. out of their sheaths. The marginal coverts inserted on the patagium ^{were} ~~are~~ just coming out of their .3 cm. sheaths and have a bright rose color. They also extend along the lower surface of the manus along the extreme anterior border. The young bird weighed 21.6 grams, length 9.2 cm., extent 15.5 cm. wing 4.4 cm., tail .5 cm., bill 1.2 cm.

and tarsus 2.2 cm. which data is here given for later comparative studies.

BROODING

The female was brooding when I arrived at the blind but flushed from the nest. In the total observation time of 1357 minutes the female brooded 231 minutes in 15 periods or an average of 16 minutes; while the male brooded for 163 minutes in 9 visits or an average of 18 minutes. The amount of brooding was closely correlated with air temperature since both birds brooded more often on July 13 and 14 when the days were cooler. When the air temperature increased as it did on July 9 and 10, Figure 2, the birds would stand in the nest or on the rim of it and shade the young. The female could easily straddle the nest, lift her wings and then remain in this position while shading. One such attentive period continued for 51 minutes. The male seemed too restless or shy to sit in the nest and brood for the first three days but later shared the brooding time with the female. Table III.

On July 14 the birds both brooded during six visits to the nest but the male averaged 19 minutes and the female 14 minutes per visit. Gabrielson (1915:359) found the male did none of the brooding and gave little evidence of possessing this instinct but throughout this study the male continued brooding and guarding of the nesting area. Table II indicates the 72 inattentive periods of the male

Table II. Observations during nestling stage.

Date	July 9	July 11	July 12	July 12	July 13	July 14	July 16	Total
Hour of Day	P.M. 1:45- 4:30	P.M. 1:03- 4:15	A.M. 7:45- 11:15	P.M. 7:30- 8:33	P.M. 3:00- 8:12	A.M. 5:35- 9:00	A.M. 8:10- 11:30	
Minutes	165	192	210	63	312	215	200	1357
Air Temp. (degrees F.)	90-85	90-80	75-85	78	77-70	61-70	70-80	
Wind Velocity (mph)	0-5	0-	0-5	0-	5-10	0-5	10-	
Weather conditions	Clear, hot	Clear hot	Clear	Clear	Clear	Clear cool	Clear cool	
<u>Attentiveness</u> <u>Female</u>								
Number of periods	6	3	7	3	6	6	0	31
Length of periods	58	82	139	19	133	82	0	513
Average	9.6	27	19.5	6.3	22.2	13.6	0	Av. 16.5
Per cent	35	42.7	66.2	30	42	38	0	38%
<u>Male</u>								
Number of periods	0	1	2	2	5	6	2	18
Length of periods	0	5	22	42	67	116	10	262
Average	0	5	11	21	13	19.3	5	Av. 17
Per cent	0	0.26	11	66	21	54	5	19%
<u>Inattentiveness</u> <u>Female</u>								
Number of periods	6	8	9	3	15	8	11	60
Length of periods	92	110	71	44	179	123	200	819
<u>Male</u>								
Number of periods	11	10	15	4	15	8	9	72
Length of periods	85	187	188	21	245	89	190	1085
<u>Inattentiveness</u> <u>(No bird in area)</u>								
Number of periods	2	2	2	1	2	1	3	13
Length of period	27	30	10	2	29	37	65	200
Average	13.5	15	5	1	14.5	37	21.7	15.4
Per cent	16	16	5	3.3	9	17	10.8	14%

Table III. Brooding and Feeding Observations

Date	July 9	July 11	July 12	July 12	July 13	July 14	July 16	Total
Hour of Day	P.M. 1:45- 4:30	P.M. 1:03- 4:15	A.M. 7:45- 11:15	P.M. 7:30- 8:33	P.M. 3:00- 8:12	A.M. 5:35- 9:00	A.M. 8:10- 11:30	
Minutes	165	192	210	63	312	215	200	1357
<u>Brooding</u>								
<u>Male</u>								
Number of periods	0	0	0	2	2	5	0	9
Length of periods	0	0	0	42	42	79	0	163
Average	0	0	0	21	21	19.4	0	18
Per cent	0	0	0	66.6	13.4	36.7	0	12%
<u>Female</u>								
Number of periods	2	0	2	2	4	5	0	15
Length of periods	16	0	42	17	80	78	0	231
Average	8	0	21	8.5	20	15.6	0	15.4
Per cent	9.7	0	20	27	6.4	36.3	0	16.3%
<u>Feeding</u>								
<u>Male</u>								
Number of visits	0	0	2	2	3	3	1	11
<u>Female</u>								
Number of visits	0	2	3	1	4	5	0	15

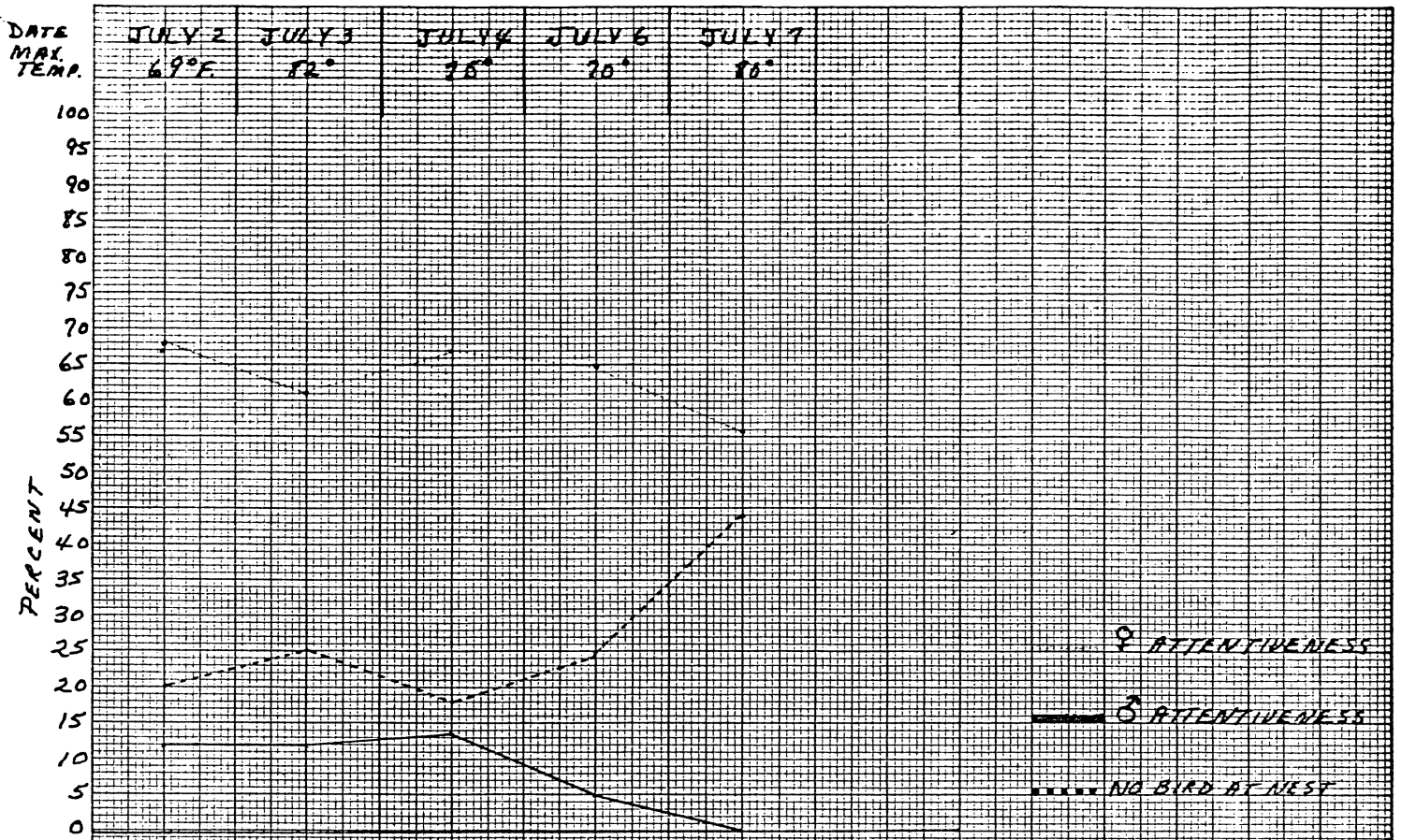


FIGURE 1. PERCENT OF ATTENTIVENESS AND INATTENTIVENESS DURING INCUBATION.

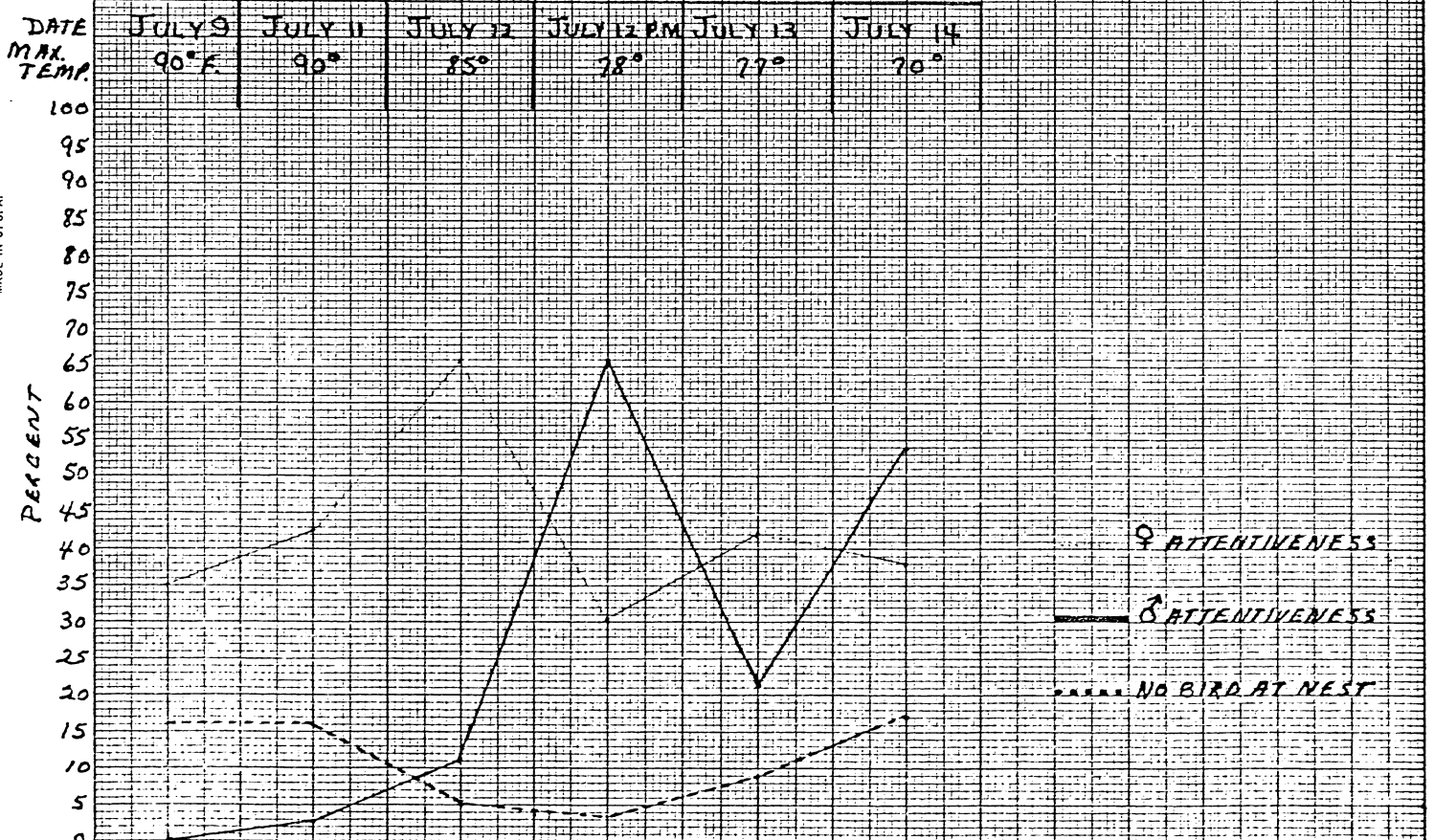


FIGURE 2. PERCENT OF ATTENTIVENESS AND INATTENTIVENESS DURING BROODING.

for 1085 minutes, an average of 15 minutes as compared to 60 inattentive periods for the female for 819 minutes or an average of 13 minutes. The male was attentive 19% of the time and the female 38%. The female, however, spent no time in the area except at the nest, whereas, the male often sat on a perch and sang or guarded the area. Figure 2 indicates a decrease in attentiveness and an increase in inattentiveness after the young were four days old.

FEEDING

On July 11, the first feeding was observed when the female brought in a larva and tried it in two open mouths and then took it out of one mouth and dangled it from her bill into the next mouth. The male entered the area several times with food in his bill but could not get over his wariness long enough to enter the nest. On July 12 the male with eyes fairly bulging managed to reach the nest with food. He fed them twice and the female three times in 210 minutes, or every 42 minutes, as compared to 45 minute intervals on July 13, and 27 minute intervals on July 14. The nest was broken up on July 16 when the oldest of the young was eight days in the nest. At this time there was a trend toward feeding at shorter intervals as the young became older. Table III.

The male fed the young 11 times and the female fed 15 times in 1357 minutes or an average of 52 minute intervals when the four young were 3-8 days old. Esten (1925:401)

found an average of 52 visits to the nest in 17 hours on one day or an average of 24 minute intervals between feedings with 4 young in the nest 6-9 days old. Esten (1925) also found that the male made more trips and fed more than the female. The amount of food the male bird carried in his bill was indicative of more feeding but I found that he made fewer trips to the nest, 11 as compared to 15 for the female during this period of study. Both birds carried the insect food well back in their mouths with the ends showing on either side of the bill. The female carried more than one insect at a time but somehow her bill never looked as full as the male's. This was observed in moving pictures taken at the nest and a comparison was easily made. The male was much more awkward in carrying insects and feeding than the female. At no time did I observe anything but insects carried to the nest though Gabrielson (1915)³⁶⁶ found 15.25% vegetable materials and Esten (1925)⁴⁰⁰ stated that 81.36% of the food was seeds. The birds raised in semi-captivity (Ivor, 1944)⁷⁸ fed the young entirely on insects.

The behavior of the adults during feeding was similar to that in incubation with both sexes taking part. The usual routine was to have the male sing softly or cheep on a nearby branch before flying into the nest area. The female would fly off the nest usually giving a few call notes before leaving it. The male cautiously approached the nest with short hops from perch to perch and then up to the rim where he would stand to feed the young. On

July 16, after the two young were returned to the nest the male darted after the female and drove her away when she attempted to enter the nest and she was not seen in the area again.

NEST SANITATION

When the young were one day old the female seemed to be eating fecal material, not contained in a sac, directly from the young or at least from the bottom of the nest. After the third day fecal sacs were taken out of the nest and eaten by the male or female after feeding. The adults made 40 trips to the nest and in this time fed the young 26 times, the female feeding 15 times and eating fecal sacs 11 times while the male fed 11 times and ate fecal sacs 8 times. Usually more than one sac was eaten at each visit by the female but the male being so wary usually ate but one.

NESTING SUCCESS

When the young were in the third stage of development, 7-8 day birds, I arrived in the area at 8:00 A.M. and found the nest torn apart and all the young on the ground. Two of the birds were dead but only one was bruised. I solicited some help to tie the mass of twigs to the fork in the alders and we placed the two young back in the nest. The adults sat on perches giving series of sharp call notes. Later when the female approached the nest the male drove her out of the area. At 4:45 P.M. I again visited the area and only one young remained, it was calling loudly as it sat on the rim of the nest. The male bird was on a perch

20 feet from the nest and would give an occasional call note. The following day, July 17, Fern Brooks visited the nest and found the situation the same. One young in the nest was giving call notes at short intervals while the male was sitting on a perch nearby. The male visited the nest once but did not feed the young.

On July 18 at 5:30 A.M. I visited the blind and found the area very quiet. The nest was again torn apart and the young one had disappeared. When I climbed the blind the male appeared on a perch and began a series of call notes. The nest must certainly have been torn apart by something in the area. The red squirrel previously mentioned was the only predator I had seen. According to Burt (1946:187) the red squirrel's food consists practically of everything available in the habitat, chiefly nuts, pine cones, bird eggs, meat and sap. It is difficult to draw a conclusion on so little evidence but it is the only answer I have for the destruction of the grosbeak nest.

DISCUSSION

The male grosbeak according to Esten (1925)³⁹⁷ showed no concern over the blind whereas in this study the male was an extremely nervous, cautious bird and the female showed scarcely any wariness. She remained on the nest while several people cut a path through the alder thicket, dragged in the tower blind and set it up. She did flush

from the nest when branches and leaves were trimmed between the blind and the nest.

Direct feeding by placing insect food into the open mouths of the young was the only type of feeding I observed and, Gabrielson (1915)³⁶² also reports observing only direct feeding. On the other hand, Esten (1925)⁴⁰⁰ observed regurgitation of all foods given. The process as described by Ivor (1944)⁹⁸ is one in which the larvae bodies are rolled in the mouth until partly macerated and then inserted into the open mouth. In my observation no special care was noted in feeding but larvae were merely inserted in the open mouth.

The food of birds studied by Gabrielson (1915)³⁶⁶ and Esten (1925)⁴⁰⁰ of this species includes vegetable matter but in this study only larvae and a few winged insects were carried to the young. The habitat may have influenced their selection of food since there was not an abundance of seeds in this area, or this vegetable material may have been fed when the young were more than 8-day birds.

SUMMARY

1. The Rose-breasted Grosbeak was found nesting in an alder thicket in a second growth aspen association on Pine point just off North Fishtail Bay on Douglas Lake. The nest when found on June 30, 1948 contained four eggs.

2. A nesting area was defended by the male but no territory could be designated as only one nest was located. This area was used for singing and preening.

3. The nest was constructed ten feet from the ground in a forked section of the alder saplings. The twigs were loosely arranged and the nest similarly lined gave it a flimsy, crude appearance.

4. The incubation period had already started when the nest was found but continued until July 8 when the first young hatched. Both male and female participated in incubation, using a signal song to give their mate time to leave the nest.

5. Intraspecific fighting was observed on several occasions and interspecific fighting occurred during almost every observation period.

6. The male and female both sang at the nest, the male while sitting on the nest used the short "signal song" and also the call notes but the female was heard giving a full melodious song.

7. Both sexes took part in the brooding though the male was excitable and his brooding periods were usually shorter and often interrupted.

8. Food was carried by both sexes, the female made more trips to the nest but the male always carried more food in his bill and fed more than one bird on each visit.

9. Nest sanitation was a part of the regular feeding process in that the fecal sacs were eaten immediately after feeding and thus both sexes shared in the process.

10. No predatory action was witnessed but a red squirrel was observed on the blind and the nest was torn down on

July 16 and again on July 18. Two young were killed at the nest and the other two disappeared on July 17 and July 18.

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Supplementary table

Activities at the nest

July 2. (P.M.)

- 2:04. A first year male grosbeak appears. Male drives him away several times, then he returns to a perch singing but not to the nest.
- 2:06. Male flies into the area again.
- 2:12. Male on the nest and intruding first year male appears. He drives it away again and female comes to nest at once.
- 3:00 and 3:05. The female sings a soft warbling song of short duration on the nest.
- 4:25. A Crested Flycatcher swoops past the nest several times and alarms the female so she leaves the nest.
- 4:38. A Catbird darts at the male and he drives it out of the area then sits on a perch and gives a series of sharp call notes.

July 3. (A.M.)

- 8:20. Female is on the nest when rain begins. She fluffs up her feathers and then with her bill rearranges them.
- 9:04. Rain has stopped and now the male sits on the nest.
- 9:25. Male leaves nest in answer to female signal song. Female sits on the nest and sings, then turns eggs and settles down.
- 9:58. Female again sings on the nest in answer to a signal song from male and he takes her place on nest.
- 11:07. Female is using her feet to push twigs aside in the bottom of the nest as if to reshape it.
- 11:20. Female flushes as a pair of Crested Flycatchers fly by.
- 11:22. Male is incubating when the first year grosbeak appears. Male drives him away and then sits on a perch and cheeps continuously.
- 11:44. Male from his guarding position drives out a Crested Flycatcher.
- 12:38. Female in answer to the male call notes sang a low warbling song.
- 1:20. Female again sings as she settles on the nest. Indistinct.

July 5. (A.M.)

- 9:30. While photographing the nest Dr. Pettingill observed the male bird feeding the female on a branch about two feet below the nest.

July 6. (A.M.)

- 6:10. Male arrives at nest with food in his bill. Eats it and hops on the nest.
- 7:59. Female is on the nest when another female arrives. She hops near the nest and looks curious but the female on the nest does not react and the intruder soon leaves.

July 7. (P.M.)

- 1:10. Male chases a Red-eyed Vireo out of area.
- 1:50. Female arrives with a green larva in her bill. Hops into the nest, eats the larva and then incubates.
- 2:29. Female is preening on a perch about 30 feet from the nest. She spreads her tail feathers and then her wings. The yellow linings were visible as she lifted her wings away from her body.
- 3:34. Female gives a series of soft call notes on the nest.

July 9. (A.M.)

- 9:30. Two young in the nest (0-day and 1-day birds) and 2 eggs.

July 10. (A.M.)

- 8:20. Three young and 1 egg.

July 11. (P.M.)

- 1:03. Feeding noticed for first time.

July 12. (P.M.)

- 10:35. First year female Grosbeak appears in territory but neither of the adults drive her away. Fourth bird hatched.

July 13. (P.M.)

- 3:56. Young are making their first crying noises for food. All four heads are up begging for food.
- 7:02. Adult raccoon walks around the clump of bushes supporting the nest and then disappears.

July 14. (A.M.)

- 5:35. Both sexes are incubating at approximately 20 minute intervals.

July 16. (A.M.)

- 8:10. Nest torn apart and four young are on the ground.
- 8:50. Tied the nest into the fork in the trees and put two young back in the nest.
- 10:30. Red Squirrel is seen on the blind.
- 11:20. Male feeds one of the young I returned to the nest.
- 4:30(P.M.) One young has disappeared, only one left in the nest.

July 17. (A.M.)

8:30. Fern Brooks observes the nest. One young is still calling loudly - the male is guarding the area but does not feed it.

July 18. (A.M.)

5:30. Nest is torn apart and young one has disappeared.