THE BREEDING BEHAVIOR OF THE INDIGO BUNTING

(Passerina cyanea)

by

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1945

VICINITY OF

UNIVERSITY OF MICHIGAN BIOLOGICAL STATION

AND DEMONSTRATION FOREST

CHEBOYGAN AND EMMET COUNTIES, MICH.

LEGEND

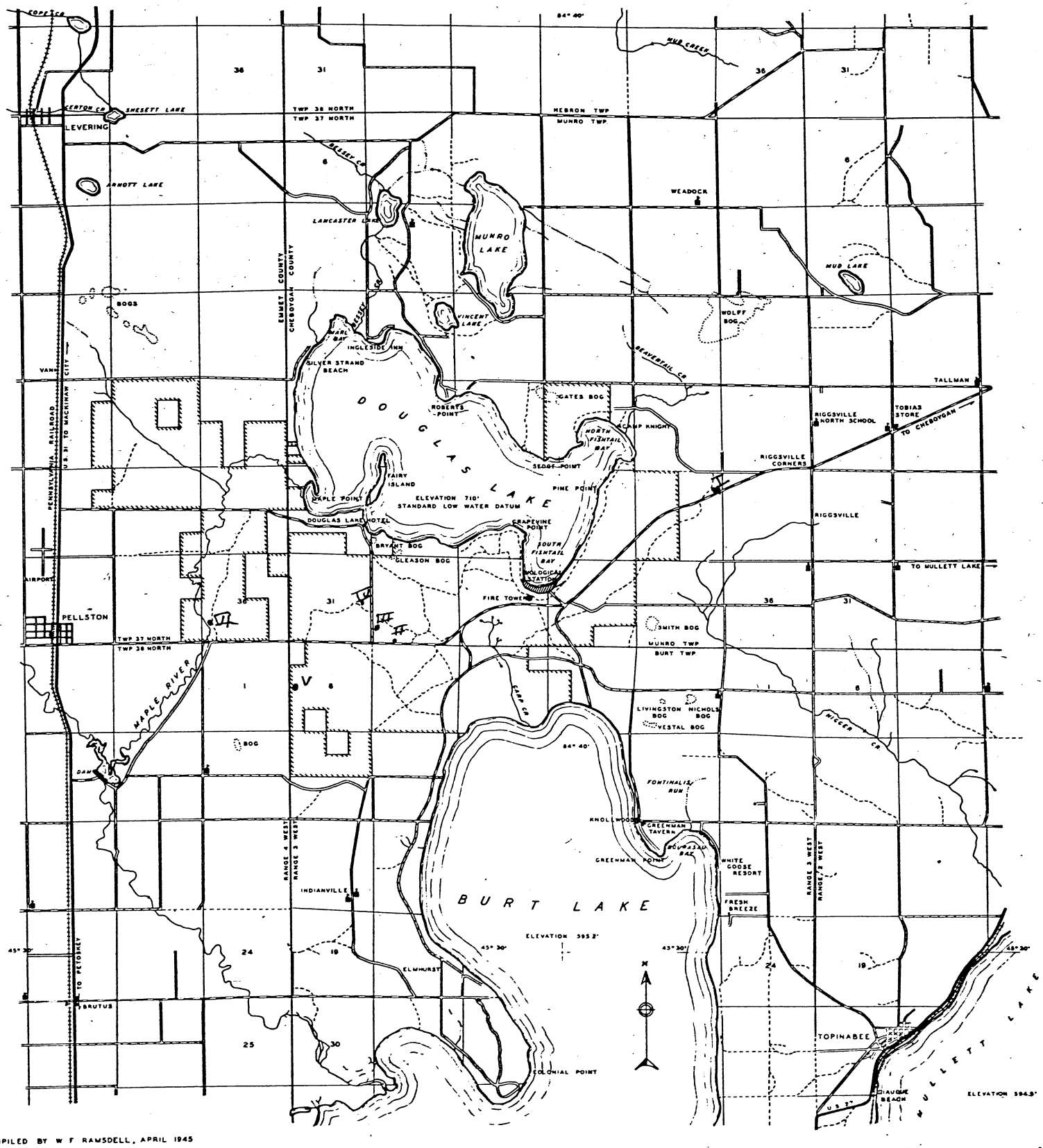
CHURCH
SCHOOLHOUSE
BOUNDARY OF UNIV LANDS
RAILROAD

SCALE

½ MILES
0 ½ 1 KMS

LEGEND

PAVED HIGHWAY
GRAVELLED ROAD
GRADED ROAD
UNIMPROVED ROAD
TRUCK TRAIL



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BJB

INTRODUCTION

A study concerned with the breeding behavior of the Indigo Bunting Passerina cyanea was conducted at the University of Michigan Biological Station located on Douglas Lake, Cheboygan County, Michigan. The study was carried on during the latter part of June, all of July and until the middle of August.

The methods used were observation. A previous paper was written by the author on the breeding biology of the bird. The work was done at the Museum of Zoology, Ann Arbor, Michigan, the data being taken from published work. This field study was an attempt to fill in some of the gaps in the breeding biology of the bird.

Considerable time was spent in search of nests which are most difficult to find. The actual number of hours was not recorded. The work was done under the direction of Dr. O. S. Pettingill, Jr.

GENERAL LOCATION

The area is located ecologically in the so-called Transition Zone between the Northeastern Coniferous Province and Deciduous Forest Province thus presenting a checker board appearance. The forest in this vicinity is made up of the secondary aspen association. The main dominants are Populus

grandidentata and P. tremuloides; the sub-dominants are Diervilla lonicera and Pteris ~~aquilina~~ aquilina, there is great diversity in ground vegetation. The climate is suitable for the growth of trees. The soil is of a sandy, well drained glaciated nature, normally acid and occasionally mixed with clay.

THE STUDY AREA

All of the nests with the exception of one were located on well travelled roads. (See map, page 1). The birds were found only along roads that had a ditch or low trough on one or both sides. These ditches gave rise to an abundance of bushy vegetation because they have quite a bit of water in them in the spring. One finds the ditches filled with Diervilla, Rubus, Pteris, clumps of Acer rubrum and Salix. The nests were never found in the bottom of these troughs but rather on the sides. Thus it may be stated that the Indigo Bunting is found along roads with ditches that give rise to a bushy type of vegetation in this vicinity. There are, of course, exceptions; a bird is not a machine.

In this region the bird is at the northern edge of its range and it is a known fact that animals at the extremes of their range have a more or less different behavior than do those in the center of the range. The reason is most evident: the edges are different ecologically than the center of the

range. The bunting nests in bushy situations in fields, edges of woods, along streams but avoids the "wetter portions of swamps, cleared fields, heavily grazed meadows, pastures, and wood lots, and the most mature forests with little shrub layer." (Troutman 1940). In this area the only situations comparable to those in toward the center of its range are found along the roads thus the bird is found there. Thus ecologically the bird is more or less restricted to these situations in this area.

TERRITORY

As I did not get on the area until late June I was unable to observe the actual formation of territory. The nests are spaced along the road (see map) at intervals of about every 150 yards, the male singing in a very conspicuous spot and defending the area against other buntings. On July 10, I have in my notes the following, "on bird 3 territory, male singing, another male bunting flies across territory about 30 feet in air, wings fluttering, like Kingbird, singing a variation of usual sing; 3 dives at and drives off territory" and on July 11, "on bird 5 territory two males actually fighting, one flies away." These are the signs of actual physical defense of territory that I saw.

From these observations I conclude that the male bunting defends some kind of a territory by song and violence against

other buntings. After the young leave the nest the male continues to sing but the territory breaks up and it often is difficult to find the male, female or young.

THE NEST

It is unfortunate that I never found a nest under construction so I cannot state which sex builds the nest and so on. The nests seem to be built in any situation that is bushy, they are well supported although nest number 1 did tip over but this was because of some animal. Tables 1 and 2 give information concerning five of the nests.

Nest number 1 was found on July 19 with four eggs; two bunting and two cowbird. The nest was on the south side of the road in an isolated clump of Rubus. The nest was in the top part of the bush and well concealed. The nest was within four feet of the road and consequently dust was thrown over it every time a car passed.

Nest number 2 was found on July 1 and contained three bunting eggs. It was on the south side of the road and 20 feet from the woods proper. The road was six feet away. The nest was located on the side of the ditch toward the road; the nearby vegetation consisted of clumps of Diervilla, the nest was in one of these clumps, Rubus, a few Salix and a ground layer of grass.

TABLE 1

Nest number	Exterior diameter at top	Interior diameter at top	Interior depth	Overall depth: outside	Weight in grams
1	81 mm.	55 mm.	38 mm.	55 mm.	6.23
2	90	50	39	71	8.60
3	95	50	45	60	8.55
4	85	55	54	82	6.00
5	72	48	30	63	6.36

TABLE 2

Nest	Vegetation	Height to Nest rim
1	Rubus	45.72 cm.
2	Diervilla	22.85
3	Acer rubrum	212.40
4	Acer rubrum	97.44
5	Diervilla	45.72
6	Diervilla	35.30

Nest number 3 was found on June 28 in an Acer rubrum tree, the nest was in the top three quarters of the tree. The tree was about seven feet high. The nest contained three young; it was on the eastern side of the road, 50 feet in toward the aspens although the aspens did not shade the Acer.

Nest number 4 was found on July 1 and contained three eggs. The nest was on the western side of the road in a small bushy clump of Acer rubrum. It was 20 feet from the road and seven feet from the woods. There was no shade from the aspens.

Nest number 5 was found on July 11 and contained two birds: one bunting and one cowbird. The nest was located in and shaded by the aspen association but only 30 feet from a clearing of considerable size.

Nest number 6 was found on July 17 and was in a clump of Diervilla about 18 feet from the south side of the road and 40 feet from Maple River. It had three young in it about ready to leave the nest.

Thus in general it may be stated that the Indigo Bunting nests in bushy situations on the edge of breaks in the Aspen association. The nests are usually away from the aspens. The range in height is from 18 inches (45.72 cm) to five feet (212.40 cm). The nest is very substantial and is attached to a fork in the bush.

The nest is composed of leaves, grasses and fibrous material. On the outer edge the leaves are very loose but as one goes in toward the conter of the nest the leaves become woven in with grasses and fibers. The pocket of the nest is made of grasses. No horse hair was found in the lining; it is a very compact affair.

EGGS

The eggs have been described in my other paper (MS). Three eggs seems to be the normal clutch although the number varied from one to three. Nest number 1 was a second nest as the male was feeding young while the female incubated. This is the only evidence of a second nest found.

INCUBATION

The incubation period was never observed. The female does all of the incubating, on only one occasion did the male come at all close to the nest and this was because of the newly erected blind.

Nest number 1 found on July 19 was the only nest in which incubation was observed. The other nests with eggs all hatched shortly after the finding of them. The incubation data may be found in Table 3. A blind was built on July 21; one of the two cowbird eggs was also taken. The female did not seem to notice the loss of an egg although my notes

TABLE 3

July 21	8:15 A.M.	3	3	41 min.	19 min.	69	32
	11:15					24	9
July 23	7:15 A.M.	4	5	21.2	24.4	5	1
	11:30					43	74
July 25	7:30 A.M.	3	3	42.6	30.6	26	23
	11:25					54	39
July 26	12:55 P.M.	Very high wind, bird would not					
	4:00	settle at all					
July 28	All young hatched						

indicate some disturbance: "8:36 A.M.: sets down few seconds, gets on edge of nest, peers in, settles down, considerable body movement" and "8:45 gets on edge again, peers in, settles." Observation was begun on July 21 and on July 26 two of the three eggs had hatched. The female did all of the incubating; the nest was always approached in the same direction and left in another definite direction. The female has two ways of leaving the nest: when frightened she would arch her wings abd flutter off very low to the ground, when leaving in a normal manner she would just fly off without fluttering her wings in the other manner. She never chipped while on the nest although she usually chipped when coming up to it; the male never fed the female on the nest. The nest was visited twice at night and both times the female was on it. There was no definite direction which she faced but never did she put her back to the blind.

This data found in Table 3 is rather incomplete on the attentive and inattentive periods for several reasons: on July 23 and 26 the wind was very high and every time the blind would move the female would jump from the nest then again the blind was near a farm house, and the children of the family were most annoying.

During the time the female was on the nest the male would sing about once every 15 minutes, the female gave no

visible reaction. On one occasion did the female react to the males chipping. On July 25 the male started chipping near the blind, the female jerked her head up and left the nest, the chipping of both parents could be heard and the rattle of the young was also heard. It was quite evident that the male was feeding young as the female incubated. This leads to the supposition that the nest was a second nest. On July 29 the nest was found to be tipped and the young quite dead; as to the reason for this I am unable to say anything, perhaps some animal. perhaps children, it is open to question.

CARE OF THE YOUNG

Nest number 2 on July 1 at 10:00 A.M. contained three eggs, at 2:30 P.M. one egg and two young and on July 2 at 8:00 A.M. three young. Observation from a blind was begun on July 2 at 8:00 A.M.

The young were always fed by the female; all of the food was insect matter although I was unable to identify it as to family. Only one bird was fed at a time and it was that bird that got its head up the highest. The head moved back and forth at first but as the birds got older the head was held more steady. Fear seemed to be acquired in the sixth day; it was characterized by a hunching of the body and a stillness.

The first sound was heard at the age of four days but it is suspected that noise can be produced earlier if the birds were ignored by the parent. As the birds got older the noise was used more and more until they were only quiet when the parent was at the nest. The sound produced is a high pitched rattle as if stones were being shaken in a can.

The young at first responded to the parent only when her feet hit the edge of the nest; at the age of three days they began to respond when she entered the bush. I never saw them respond to just a vocalization from the parent.

The female always came to the nest in a certain manner and direction and left in another definite direction. This was true for both incubating and feeding. When frightened she left in any direction. The routes were the same in incubating and feeding.

The fecal sacs were always removed by the female; they are taken usually after each feeding. I saw the female eat a sac only once. The shells were carried away for the most part, some remained in the nest.

The young left the nest at the age of seven days. I did not see them depart but it was in the morning. Data concerned with the feeding activity may be found in Table 4.

When the young are out of the nest they are fed by both male and female. I do not know how long it is before the

TABLE 4a.

Nest No. 2	Feeding Activity				
Age of nestlings	1 day July 2	3 days July 4	4 days July 5	6 days July 7	7 days July 8
Period of observation	3 hrs. 59 8:00 A.M. 11:59	6 hrs. 35 min. 6:50-11:00 AM 1:15 - 3:30 PM	3 hrs. 7 min. 7:42 - 10:49	2 hrs. 45 min. 8:00 - 10:45	1 hr. 24 min. 8:21-9:41
Number nestlings	3	3	3	3	3
Total feeding visits (all by female)	3	14	18	12	10
Average number per hour	1	2.4	6	6.1	9.8
Extremes	1 - 1	1 - 3	2 - 7	2 - 4	5 - 6
Average interval between visits	89	60	23	22.8	6
Extremes between visits	42 - 80	2 - 60	1 - 30	1 - 33	1 - 10

TABLE 4b

Nest No. 1		
Age of nestlings	1 day July 26	2 days July 28
Period of observation	3:55 12:55 PM 4:00	2 hr. 7:30 10:30
Number nestlings	2 1 egg	3
Total feeding visits (all by female)	No feeding	3
Average number per hour		1.5
Extremes		1 - 2
Average interval between visits		59
Extremes between visits		2 - 63

young become independent of the adults as the birds leave the nesting territory. The young stay down in the grass and low bushes and are very difficult to see; they seem to pair off, one parent feeding a certain young and the other feeding the other young. The rattle note was the only sound heard given by the young and it was heard quite frequently. I never heard either of the adults give the rattle note.

NESTING ~~SEASON~~ Success

Of the six nests found all but one raised young. Nest number one was tipped so that the young fell on the ground and died. I do not know the cause of the tipping. An important factor in nesting success is the mowing of edges of the main highways; this mowing cuts down a lot of vegetation in which the bunting might be found nesting. Two of the nests were cut down in this manner but after they were empty. Two of the six nests were parasitized by cowbirds.

VOCALIZATION

I do not believe the male has definite singing perches as there were so many places from which it might sing such as trees, telephone lines and so forth. No male was singing from one spot more than twice. It seems that when the female is incubating the male is not affected by people coming around but goes on singing but when the female is feeding

young the male will stop singing when any one approaches, and will begin to chip.

The bird sings during most of the day but more frequently in the morning and early evenings. The song varies among individuals. The female on the nest pays no visible attention to the song. The male sang right up to the middle of August.

There are two types of chips; one is given by the male and is lower than the one given by the female. If danger approaches, the chipping increases in activity but the quality remains the same. The male at one time only had the female leave the nest by means of a chip.

CONCLUSION

From a considerable amount of data collected the more important facts have been incorporated into this paper. It is hoped that the data presented has some value.

LITERATURE CITED

Lowther, M. A. 1945. A Survey of the Literature Concerned with the Breeding Biology of the Indigo Bunting (Panerina cyanea) (M.S.)

Trautman, M. B. 1940. The Birds of Buckeye Lake, Ohio. Miscellaneous Publications, Museum of Zoology, University of Michigan, No. 44.