

NESTING STUDIES OF THE BOAT-TAILED GRACKLE

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BOAT-TAILED Grackles are notorious for their habit of preying upon eggs and young of other birds. They destroy many eggs of White-winged Doves, Mourning Doves, and other species. I made studies on several colonies of the Boat-tailed Grackle (*Cassidix mexicanus prosopidicola* Lowery) on the Welder Wildlife Refuge near Sinton, San Patricio County, Texas, during the summers of 1959 and 1960. The purpose of this investigation was to obtain information on the nesting habits and production of this species and to learn more of its relationship to other nesting birds. This investigation was coordinated with a concurrent waterfowl nesting study on the refuge conducted by Dr. Clarence Cottam and myself.

Several nesting studies have been made on the Boat-tailed Grackle. Bendire (1895) noted the nesting period, number of broods per season, habitat preferences, and flocking habits. Chapman (1898) studied its breeding habits. Pearson (1921) described its call and habitat preferences. Friedmann (1924) commented on its destructive habits on other colonies of nesting birds. McIlhenny (1937) and Skutch (1954) presented data on the species' breeding biology. Selander (1958, 1960) and Selander and Giller (1961) made rather extensive studies of the breeding behavior and biology of the species as well as of its taxonomic status.

PROCEDURES

Several nesting colonies of Boat-tailed Grackles were located on two lakes, Big Lake and Pollito Lake, approximately one km apart on the Welder Wildlife Refuge. These lakes are oxbow lakes of the Aransas River, which forms the north boundary of the refuge, and the lakes, when filled, are generally from 0.6–1.7 meters deep and no more than 2.1 meters deep in any place. Emergent vegetation consists primarily of clumps of cattail (*Typha latifolia* L.), Bulrush (*Scirpus californicus* (C. A. Meyer) Steud.), and lotus (*Nelumbo lutea* (Willd.) Pres.).

During the summer of 1959, 517 nests were marked and followed throughout the breeding season (Table 1). In the summer of 1960, 67 nests were observed. During the latter period an unusual opportunity to study renesting was presented when a 20-cm (8-inch) rain on 25 through 26 June raised the water levels and destroyed most of the nests. Of the 69 nests studied in 1960, 20 apparently were renesting attempts.

All nests were marked with serially numbered, waterproof tags and visited at intervals throughout the nesting seasons. This permitted an accurate recording of the activity and status of nesting. Nesting had already

TABLE 1
SUCCESS OF THE THREE NESTING PERIODS

	1959	1960	
		First nesting	Renesting
Per cent of nests successful	86.46	20.40	65.00
Per cent of eggs hatched	73.81	40.65	51.56
Per cent of young fledged	93.07	44.44	84.84
Per cent of eggs producing fledglings	68.70	18.06	43.75
Per cent mortality in the young	5.11	55.55	15.15
Average clutch size	3.29	3.14	3.20
Average fledged per nest	2.26	0.57	1.40
Average young per nest	2.43	1.29	1.65

begun when the studies were started in 1959, and some nests contained eggs and others contained young. However, most of the nests were in the process of being built.

All nests were checked at least four times; most were checked six to eight times, and some were visited as many as 10 times. Observations were made on 11 days in the period from 9 June to 10 July 1959. The first nesting attempts during the summer of 1960 were checked from 14 June to 5 July. The renesting attempts were observed from 5 July to 4 August. Information recorded for each nest included the nest number, checking dates, nesting material, size of nest, number and condition of eggs and young present, the result or degree of success, and the relationship of grackles with other nesting birds in the colonies.

NESTING SITES

Pearson (*op. cit.*) noted that the Boat-tailed Grackle inhabits fresh-water ponds, islands surrounded by salt water, towns and high prairies or chaparral lands if water is in the vicinity. Bendire (*op. cit.*) reported that grackles nest in ". . . willow thickets and chaparrals bordering the streams and irrigation ditches, or in the tops of mesquite, ebony, and colima trees, so common a feature in the lower Rio Grande Valley; they nest less often in hackberry, prickly ash, and oak trees, as well as in the extensive canebrakes bordering the numerous lagoons and fresh-water lakes and in the rushes in the salt marshes near the Gulf Coast."

In this study the birds were found nesting in colonies in cattails, bulrushes or tules, and dead huisache trees (*Acacia farnesiana* (L.) Willd.). All nests were built in vegetation growing in water.

NESTING HABITS

Nests were constructed in three basic steps: (1) long sprigs of grasses, rushes, vines, stolons, or other similar material were woven in and around

twigs of trees or stems of rushes to form the sides and bottom of the nest; (2) the cup was lined with mud to hold the nest firmly together; and (3) the mud cup was then lined with soft material, which consisted usually of fine grass blades and stems.

The nests were built from 15 to 120 cm (6–48 inches) above the surface of the water, sometimes very loosely, with the result that wind and wave action occasionally caused the nests to slip down the stems into the water.

Nesting in 1959 began about the middle of May, increased to a peak during early June, and ceased in the latter part of the month. This varied somewhat from Bendire's observations (*loc. cit.*). He noted that nesting began the latter part of April, reached its peak in the first half of May, and lasted through June. In 1960 nesting began the first of June. The flood during the last part of June submerged 38 of the 41 remaining active nests. This disturbance caused approximately 50 per cent of the grackles then nesting to renest. Since I did not have marked birds, it can only be inferred that it was the unsuccessful females that renested.

Renesting began the last of June, lasted through July, and ended the first part of August. Even though there were eggs and young birds of all sizes present concurrently in 1959, I have no evidence to prove that females are double- or multibrooded.

There was no nest parasitism among these birds. Females built their own nests, laid, incubated, and fed the young without assistance from the males. In a few instances the young were not fed and therefore starved. It is not known if the females deserted or whether they were killed.

CLUTCH SIZE

During the breeding season of 1959, 1,700 eggs were laid in the 517 nests, averaging 3.29 ± 0.12 eggs per clutch. In the first nesting attempt in 1960, 155 eggs were laid in 47 nests with the clutch size averaging 3.19 ± 0.26 . Sixty-four eggs were laid in 20 nests in the renesting attempt with an average clutch size of 3.20 ± 0.25 .

INCUBATION PERIOD

The incubation period was determined in 1959 only. I noted that eggs were laid early in the morning at the end of the nightly resting period, usually between sunrise and one hour thereafter. During the day the colonies of birds could be heard from some distance as they noisily went about their daily activities. During the night the birds were quiet and inactive unless disturbed. Incubation started at the time the first egg was laid, and one egg was laid each day until the clutch of two to five eggs was complete. There seemed to be little or no variation in the incubation

period of the different clutches. For example, eggs laid consecutively on 9, 10, and 11 July 1959, hatched on 22, 23, and 24 July, respectively, after an incubation period of 13 days. Since the 1959 study was begun after nesting had started, the incubation period could not be determined for every clutch. But 68 of the 517 nests had less than a full clutch at the time of the first observation, and these 68 nests were used to calculate incubation period. Without exception, considering that eggs were laid in the early morning hours, and that incubation began with the laying of the first egg, the incubation period was 13 days.

MORTALITY OF THE YOUNG

Terrestrial predators were repelled by the water surrounding the colonies. Cotton-mouth water moccasins (*Ancistrodon piscivorus*) and diamond-backed water snakes (*Natrix rhombifera*) were plentiful in the two lakes. Twenty-five of the latter were collected, and their stomach contents were examined for grackles. None were found. While I have collected only 10 moccasins for food-habit analysis and found no grackles among the items taken by these snakes, Dr. Cottam has collected in excess of 30 moccasins from another marsh area (Tule Lake) on the Welder Wildlife Refuge and found young and adults of cowbirds (*Molothrus ater* Bod.), Red-winged Blackbirds (*Agelaius phoeniceus* L.), and Boat-tailed Grackles in their stomachs. It seems reasonable that some grackles were lost to moccasins in the colonies in the two lakes where my studies were conducted.

Both diamond-backed water snakes and water moccasins used nests of grackles and water birds as sunning platforms. I never saw either take the eggs for food or found eggs of any bird in their stomachs, but eggs were often spilled from the nests by the snakes when I approached.

The greatest losses, however, came as a result of poorly constructed nests placed on weak substrates. After the young reached a size where their weight could be a factor, many of the nests slid down the stems of bulrushes into the water, or the nests tilted and tumbled the young into the water. It might be added that some nests with eggs were lost in this manner. Wind and wave action surely contributed to loosening attachments of the nest materials to the bulrush stems.

It was noted also that nests with three or four young often appeared to be overcrowded, and I suspect that some young were trampled, smothered, or perhaps forced out of the nest. Because hatching of the young of Boat-tailed Grackles is asynchronous, it might be that the last-hatched young is at a disadvantage in competing for food that the female brings to the nest, or perhaps the last-hatched young is the member of the brood that is most often trampled or smothered because of its smaller size.

NESTING EFFICIENCY

The reproductive efficiency of birds is affected by clutch size. Lack (1954) states that "clutch size has been evolved through natural selection to correspond with the largest number of young for which the parents can on the average find enough food." My sample sizes are small for some clutch sizes (clutches of one and five especially); however, the percentage of young that fledged from the different clutch sizes supports Lack's hypothesis.

The percentage of eggs that hatched in 1959 was fairly constant for all clutch sizes except in the case of the clutches of one egg. Only one out of the eight (12.5 per cent) of the single-egg clutches hatched. For the remaining clutches of two, three, four, and five eggs, approximately 75 per cent of the eggs hatched (Table 2).

While the percentages of eggs that hatched remained fairly constant for all clutch sizes, the percentage of fledglings produced from eggs of different clutch size gradually decreased with the increase in the number of eggs per clutch (Table 2). In the two colonies in 1959, there was only one nest with a clutch of one that produced a nestling, and this nestling fledged. But in nests with larger brood size, the percentage that fledged decreased with the increase in the number per brood. In nests with clutches of one and two, desertion by the female accounted for many nest failures; but, even so, a high percentage of young in such nests (100 and 97 per cent, respectively) fledged. In the broods of three, 98 per cent of the young fledged; in the broods of four, 92 per cent; and in broods of five, only 78 per cent fledged.

Comparison of a theoretical 100 nests of each of the different brood sizes shows that nests with clutches of five were most productive for the 1959 season. From the totals recorded, the number of fledglings that would be produced by each of the brood sizes that were found in these two colonies increased with each additional egg. As the clutch size increased so did the productivity of the nesting colony. One hundred nests with a brood size of one would have produced 12.5 fledglings; a brood size of two, 144 fledglings; a brood size of three, 210 fledglings; and a brood size of five, 300 fledglings. Such a pattern suggests that 1959 was an excellent breeding season for this particular site, because nests having more eggs than the genetically determined clutch size produced a greater number of young.

RELATIONSHIPS OF GRACKLES TO OTHER NESTING BIRDS

During the course of the study, I noted that approximately 30 pairs of water birds nested in the same clumps of vegetation where the grackles

TABLE 2
SUMMARY OF DATA WITH RESPECT TO CLUTCH SIZE

Nesting period	Clutch size	Number of nests	Number of eggs	Per cent of nests	Per cent of eggs hatched	Per cent of eggs that produced fledglings	Per cent of young fledged	Number of young that fledged per 100 nests
Summer 1959	1	8	8	1.50	12.50	12.50	100	12.5
	2	38	76	7.35	73.68	72.37	96.66	144
	3	274	822	52.99	71.47	70.16	98.30	210
	4	191	764	36.94	76.70	70.96	92.49	284
	5	6	30	1.16	76.66	60.00	78.25	300
		517	1,700	100	73.81	68.70	93.07	226
Summer 1960— first nesting	1	2	2	4.26	50	0	0	0
	2	4	8	8.51	50	25	50	25
	3	21	63	44.68	39.68	26.98	68.00	81
	4	18	72	38.29	38.88	12.50	32.14	50
	5	2	10	4.26	50.00	0	0	0
		47	155	100	40.65	18.06	44.40	59.6
Summer 1960— re-nesting	1	0	0	0.00	—	—	—	—
	2	1	2	5.00	100	100	100	200
	3	14	42	70.00	50	42.85	85.71	150
	4	5	20	25.00	50	40	80.00	160
	5	0	0	0.00	—	—	—	—
		20	64	100	51.56	43.75	84.84	140

had their nests. In some instances the water bird nests, Purple Gallinule (*Porphyryula martinica*), Common Gallinule (*Gallinula chloropus*), American Coot (*Fulica americana*), Pied-billed Grebe (*Podilymbus podiceps*), Least Grebe (*Podiceps dominicus*), Least Bittern (*Ixobrychus exilis*) and Green Heron (*Butorides virescens*), were within 10 to 50 cm (4 to 20 inches) of the grackle nests and all were within a very few meters of one or more grackle nests.

The grackles, customarily predaceous, seemed to respect these birds and their nests located within the confines of the grackle colonies. No nests or eggs of water birds within the colonies were molested by grackles. On two occasions, at the beginning of the nesting season, two grackles were observed trying to drive a Florida Gallinule away from the clump of cattails that the grackles had selected as a nesting site.

Away from the grackle nesting colony all exposed eggs and nests of both land-nesting and water-nesting birds of coot size or smaller were apparently vulnerable to attack. Eggs in water bird nests only a few feet away from established grackle colonies were destroyed, while eggs within the clump of vegetation where the colony was active were not molested.

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SUMMARY

A nesting study was conducted to determine the nesting habits and productivity of Boat-tailed Grackles in colonies nesting on two oxbow lakes on the Welder Wildlife Refuge near Sinton, Texas, during the summers of 1959 and 1960.

In 1959, 517 nests were observed for more than a month. During this time 1,700 eggs were laid. Of these, 1,257 hatched (74 per cent), and 1,168 of the young fledged (93 per cent). Sixty-nine per cent of the eggs produced fledglings. The average clutch size was 3.29 ± 0.12 , and the incubation period was 13 days.

During the 1960 nesting season rising water levels destroyed nearly all of the nests, and some of the birds apparently renested. The first nesting

attempt consisted of 47 nests containing a total of 155 eggs. Of these, 41 per cent hatched, 18 per cent of them produced fledglings, and 44 per cent of the nestlings fledged. The average clutch size was 3.19 ± 0.26 .

Twenty nests were built in a renesting attempt in which 64 eggs were laid; 52 per cent of the eggs hatched, 44 per cent produced fledglings, and 85 per cent of the young fledged. The average clutch size was 3.20 ± 0.25 .

An inverse relationship was found between clutch size and per cent of young that fledged, which supports Lack's hypothesis.

Mortality of the young was due to water moccasins and nests sliding down the stems of bulrush or tipping over and dumping the young into the water. It was suspected that some young, especially the last hatched of the brood, were lost due to their disadvantage in securing food brought to the nest by the female and perhaps by being trampled or smothered by the larger young of the brood.

Grackles preyed extensively on nests of water birds outside of the confines of the grackle colonies, but nests of water birds located within the grackle colonies were not harmed.

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