

BREEDING HABITS OF THE PIED-BILLED GREBE IN AN IMPOUNDED COASTAL MARSH IN LOUISIANA

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ALTHOUGH the Pied-billed Grebe (*Podilymbus podiceps*) is a common winter visitor in Louisiana (G. H. Lowery, *Louisiana birds*, Baton Rouge, Louisiana State Univ. Press, 1960; p. 104), only a few remain through the summer and nest. Breeding of the species in Louisiana has been recorded mostly in the interior, although R. J. Newman (*Aud. Field Notes*, 9: 383, 1955) reported a nest in a large impounded freshwater marsh on Lacassine National Wildlife Refuge near the coast.

In the spring of 1961, I found Pied-billed Grebes nesting in a small impoundment of brackish water on Rockefeller Wildlife Refuge. Virtually all previous reports of the nesting of this species refer to fresh water, although R. A. Miller (*Cassinia*, 32: 25, 1942), writing of the Philadelphia region, has already expressed the thought that the birds might nest under saline conditions where deep water without tidal fluctuation was found. Because nesting of this species has so seldom been noted along the Louisiana coast, and in view of the absence of previous records of nesting in brackish water, in Louisiana or elsewhere, I undertook this study, in which special attention was paid to breeding habits and success.

METHODS

The study extended from late April through mid-September 1961, and 107 nests were examined. I tried to locate every nest within the impoundment, and think I found nearly all. After each new nest was located, a numbered marker was placed near it and the number of eggs recorded. Each nest was then visited weekly, and the number of eggs and condition of the nest recorded. Records were kept, also, of all broods observed in the water.

NESTING AREA AND HABITAT

The 85,000 acre (34,400 hectare) Rockefeller Wildlife Refuge in Cameron and Vermilion parishes is operated by the Louisiana Wild Life and Fisheries Commission, and lies about 40 miles (64 km) southeast of Lake Charles, Louisiana. The Refuge is bordered on the south by the Gulf of Mexico and on the north by the Grand Chenier ridge complex, and consists of tidal marshes 1.1 feet (0.34 m) above mean sea level. Normal tidal fluctuation is one foot, but high tides frequently inundate the marshes with salt water. In 1956, nine impoundments having a total area of 18,200 acres (7,365 hectares) were constructed, to control water levels and salinities, as part of a waterfowl management program.

The impoundment that became the preferred nesting area included 200 acres (81 hectares), of which 75 per cent was open water. Vegetation surrounding the open water consisted almost entirely of wiregrass (*Spartina*

patens). The depth of the open parts of the pond averaged 18 inches (0.46 m), while in the wiregrass it ranged from 8 to 12 inches (0.20 to 0.30 m). Water salinities during the study ranged from 4,300 to 6,400 parts per million. The entire area of open water in the impoundment was filled with a very dense submerged growth of widgeongrass (*Ruppia maritima*).

While the reasons that the birds selected this particular area for nesting are not definitely known, three factors seem likely to have been important. The first was the large area of open water, broken occasionally by islands of vegetation; second was the depth of 18 inches or more, which facilitated escape and feeding; third was the abundance of widgeongrass, which furnished material for nest construction. The abundance of food in the area was not a significant factor in attracting grebes. Other areas nearby produced an abundance of food, but were not used for nesting.

Nesting of grebes elsewhere in the vicinity, indeed, was practically nonexistent at the time; however, the very few nests seen outside the study area were all in impoundments with widgeongrass and water deeper than 12 inches.

BREEDING HABITS

The nest.—The grebes showed no obvious pattern in selecting nest sites, other than avoiding areas close to large stands of vegetation. They were wary, and selected sites affording unobstructed visibility. The distance of the nests from the nearest stands of dense, emergent vegetation varied from 3 to 600 feet (1 to 183 m), with an average of 197 feet (60 m). This tendency to nest in the open seems to be a departure from the usual habits of the species elsewhere, as adequately indicated in the standard literature.

Widgeongrass was uniformly distributed throughout the open water area; therefore density of this plant was not a factor in the selection of nest sites. Also, small stands of wiregrass, one to five feet in diameter, and isolated stems of bullwhip (*Scirpus californicus*) were scattered throughout the large openings where most nests were located.

All nests were constructed mainly of widgeongrass, with the addition of varying amounts of plant debris collected from the bottom. In the open areas nests were floating, anchored by widgeongrass attached to the bottom. Of all nests, 52 per cent were constructed in open water, free of emergent vegetation, 46 per cent in small stands of wiregrass, and 2 per cent in bullwhip.

The grebes appeared to establish nesting territories. The distance between nests in use averaged 180 feet (55 m) and was never less than 75 feet (23 m).

In July, 14.87 inches (37.8 cm) of rainfall were recorded in the area,

and because of the increased depth of water widgeongrass began to disappear. Consequently, the birds built nests elsewhere and began using the small "islands" of wiregrass. Of 99 nests constructed before the July rains, 36.6 per cent were placed in wiregrass, but after the rains, all new nests were constructed in wiregrass. Enough widgeongrass was still available for nest construction, but not enough to provide an anchorage for the nests.

Egg laying and incubation.—The number of eggs per nest varied from 5 to 9 (average of 67, 7.0). Clutch size tended to decrease throughout the breeding season. Clutches averaged 7.3 eggs in May (28 nests), 7.2 in June (25), 6.9 in July (9), 5.3 in August (3), and 5.0 in September (2).

The birds began incubating with the first egg. Although the frequency of my visits did not permit more exact records, egg laying appears to have been somewhat irregular with respect to the interval between laying of the eggs of a given clutch, and consequently the time required to complete a clutch of given size varied considerably; the majority of the clutches, however, seemed to require about two weeks for completion. Consequently, hatching most frequently required a similar period, and I often saw several sizes of young in individual broods.

Because of the position of the nest on the water, the nest and the lower portion of the eggs were always moist. Also, when an adult left the nest, it usually covered the eggs with moist vegetation. This did not seem to affect the eggs, however, and may have aided incubation. Cottam and Glazener (*Trans. North Amer. Wildlife Conference*, 1959. Mimeo., 11 pp.) thought that solar heat played a large part in the incubation of the eggs of grebes.

Nesting success.—Of the 107 nests examined, 96 (89.6 per cent) were successful, in the sense of producing some young; 11 (10.3 per cent) were either abandoned or destroyed by adverse weather or predators. Cottam and Glazener (*op. cit.*) obtained similar results in south Texas, where in 1957 18 of 23 nests (78.3 per cent) produced some young, and in 1958 10 of 12 (91.7 per cent) did so. In 49 successful nests examined in my study, 327 of 358 eggs hatched, or 91.3 per cent.

Twice I observed a pair of grebes using an old nest after a first brood had left it. I do not know if the grebes using the old nests were the original pairs.

Behavior of nesting birds.—Mating calls, as described by L. Kilham (*Wilson Bull.*, 66: 55, 1954), were heard in the study area in early May, but courtship and pairing were not observed.

As correctly indicated in the literature (A. C. Bent, *U. S. Natl. Mus., Bull.* 107: 41, 1919; S. C. Kendeigh, *Illinois Biol. Mon.*, 22: 178, 1952)

both sexes incubated and both parents cared for the young. Occasionally both birds were seen in the vicinity of the nest.

The Pied-billed Grebe is very shy, and quickly leaves the nest when approached, even when an intruder is 600 to 800 feet away (182 to 244 m). Before departing, however, the grebes usually covered the eggs with widgeongrass taken from the sides of the nest. The eggs were frequently left unattended for several hours, but this was usually by day when solar heat was adequate for incubation.

TABLE 1
NESTING AND HATCHING DATES OF PIED-BILLED GREBES AT ROCKEFELLER WILDLIFE
REFUGE, SUMMER, 1961

<i>Date</i>	<i>Number of new nests</i>	<i>Number of nests with hatching completed</i>	<i>Per cent of hatching completed</i>
3 May	8	0	0
10 May	12	0	0
17 May	13	0	0
24 May	22	8	8.3
31 May	20	20	20.8
6 June	10	34	35.4
13 June	3	53	55.2
20 June	4	72	75.0
27 June	5	80	83.3
7 July	2	85	88.5
13 July	2	88	91.7
21 July	1	90	93.8
27 July	2	91	94.8
7 August	1	92	95.8
11 August	0	93	96.9
22 August	2	95	98.9
7 September	0	96	100.0

Hatching.—Hatching peaked (Table 1) in early June; it was completed in 52 nests (54.2 per cent) between 31 May and 20 June. Allowing 24 days for incubation (Bent, *loc. cit.*) it seems that about 54 per cent of the clutches were completed from 8 to 28 May. By 27 June hatching was 83.3 per cent completed; however, nesting continued throughout the summer. On 7 September one clutch began to hatch and two others, each of five eggs scheduled to begin hatching in mid-September, were being incubated, but all these nests were destroyed by hurricane “Carla” on 10 September.

Brood size.—The average size of 29 broods of swimming young was 4.4 (range 1 to 8). The difference from an average clutch (7.0) indicates considerable early loss of young, but it should be stated that accurate brood counts were difficult because of the wariness of the species. If

frightened, the young would submerge, with only part of the brood surfacing at once.

Rearing area.—After hatching, the broods remained in open water, away from dense emergent vegetation. Broods were seldom seen in open areas of less than one-half acre (0.2 hectares); however, most were seen in larger open areas, from 20 to 30 acres (8.1 to 12.1 hectares) in size.

In general, the rearing area was approximately the same as the nesting area. The adults usually remained in areas of open water with the young, but at times ventured close to the shoreline or dense stands of vegetation. When approached the entire flock would dive, later to surface with only the heads of the birds above water.

NEST LOSSES

Weather.—The greatest losses of nests and eggs resulted from wind, rain, and storm tides.

On 7 July there were 14 nests containing eggs in the study area, which from 9 to 12 July was swept by strong, southerly winds accompanied by 9.26 inches (23.5 cm) of rain. On 13 July only 4 nests remained. Many broke apart, while others became detached from the bottom and drifted to the leeward side of the impoundment. Floating eggs and dead young were seen in various places.

On 10 September hurricane "Carla" struck the southwestern Louisiana coast with devastating force. The violent winds and resultant high water destroyed the few remaining nests, and no nesting attempts were noted afterward.

Predators.—Their location in open water, away from dense vegetation, probably protected the nests and eggs from terrestrial predators. Potential predators on eggs or young more or less common in the area were Laughing Gulls (*Larus atricilla*), water snakes (*Natrix* sp.), alligators (*Alligator mississippiensis*), and raccoons (*Procyon lotor*), and probably others, but nest losses from predation were almost negligible.

SUMMARY

Between 3 May and 10 September 1961, 107 nests of the Pied-billed Grebe were examined in a marshy brackish water impoundment of 200 acres on the southwestern coast of Louisiana. This is the first recorded instance of nesting of numbers of Pied-billed Grebes in southern Louisiana, and the first reported instance of the species using brackish water for nesting.

The nests were placed in open water at an average distance of 197 feet from the nearest stands of dense emergent vegetation, and were uniformly distributed on the ponds with none closer than 75 feet to other nests.

Clutches varied from 5 to 9 eggs (average 7.0) and the average clutch size decreased throughout the nesting season. Of 107 nests examined, 96 (89.6 per cent) produced some young, and in 49 successful nests 91.3 per cent of the eggs hatched. Most nest losses seemed to result from severe weather; nest predation was very light. Hatching peaked in early June; from 31 May to 20 June 54.2 per cent of all eggs hatched. By 26 June hatching was 83.3 per cent complete; three nests were still active on 10 September, when destroyed by a storm.

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