NESTING BIRDS OF THE SHORELINE AND ISLANDS OF CRAB ORCHARD LAKE, ILLINOIS

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A nesting bird survey was made at Crab Orchard Lake, Williamson County, Illinois, in 1951 and 1952 to determine: 1) the species which utilized the shoreline and islands for nesting purposes; 2) the numbers of individual species; and 3) the degree of nesting success.

Previous investigations at Crab Orchard were limited to a detailed study of the great blue heron, *Ardea herodias* (Lopinot, 1950), to a study of the aquatic vegetation (Hankla, 1952), and to observations by representatives of the Crab Orchard National Wildlife Refuge and of the Wildlife Research Laboratory, Southern Illinois University.

This study is of value as a record of nesting birds which utilize the existing marsh and island habitats. It will serve as a reference for later studies and provide a source for comparison with conditions which should develop during future years as the result of expected successional changes.

Materials and Methods

A preliminary survey of the shores and islands of Crab Orchard Lake was made in March, 1951, and investigations were continued in specific areas until July, 1951. The study was resumed in March, 1952, and continued until August. Other pertinent observations were made during the intervening months.

Nests on the islands were located by traversing the breadths of the islands in parallel strips, the widths of which depended on the density of cover. Nests were located in the marsh areas by walking through the center of the lengths of cat-tail stands which were six feet or less in width. Wider cat-tail stands were surveyed by moving through at intervals of two to five paces depending on the density. The recording of nest data included: 1) size; 2) height, if above ground; 3) apparent depth in vegetation; 4) distance between nests; 5) distance from water's edge; 6) presence or absence of eggs; and 7) presence or absence of adult birds. Outline maps showing outstanding habitat features were made of bays selected for detailed observations. Positions of nests were noted on these by numbering; data on eggs and young were recorded three to five times weekly.

Relevant data for the years prior to this study and for supplementing this study were obtained from Crab Orchard National Wildlife Refuge Narrative Reports (Anon., 1949-1952). Valuable data were also obtained by interviews with personnel at the Crab Orchard National Wildlife Refuge.

Description of Area

Crab Orchard Lake, completed in 1940 and filled to crest elevation in 1942, has a surface area of approximately 6,500 acres and a shoreline of 126 miles. Twenty islands, varying in size from one one-hundredth acre to ten acres, are present in the lake (Hankla, 1952).

The distribution of shoreline vegetation is determined by the youthfulness of the lake and by various environmental conditions. Because it is a young lake, changing conditions of the shoreline are to be expected as the result of the operation of successional forces. However, adverse environmental conditions tend to produce effects which retard or prevent vegetative growth in many sections of the lake. Prevailing winds cause waves which sweep across the lake with great force. Particularly affected are the vertical, exposed banks of the mainland and islands, which receive full impact of the erosive action of waves. Vegetation has no opportunity to become established on such banks because of severe erosion, instability of infertile silt materials, and the lack of available organic debris. These barren areas thus account for many miles of shoreline which are not used by nesting birds.

Narrow bands of cat-tail, *Typha latifolia,* are prevalent in the western section of the lake, where a more gently sloping shoreline grants at least partial protection from wave action. The cat-tail stands become quite extensive in the north-western bay areas, where more typical marsh conditions prevail. Buttonbush, *Cephalanthus occidentalis,* is present in many marsh areas, particularly in the eastern section, and is in varying degrees of abundance.

The vegetative cover of the islands consists primarily of such invaders as broomsedge, *Andropogon virginicus,* and blackberry, *Rubus* sp. Occasional trees of former timber and orchard areas are present on the islands, as are small stands of black willow, *Salix nigra,* and persimmon, *Diospyros virginiana.*

In 1947, Crab Orchard Lake was included in the newly established Crab Orchard National Wildlife Refuge, under the jurisdiction of the U. S. Fish and Wildlife Service (Hankla, 1952). With the development of protected open waters, local feeding areas, and improved shore habitats, numerous migratory and resident species of birds remained at the lake for extended periods of time.

Nesting Birds

The present investigation revealed that 12 species of birds, representing 6 families, utilized the marshes and islands of Crab Orchard Lake for nesting purposes (Table 1).

Nine of these species may be considered rare marsh and island nesting birds, as only from one to eight nests and (or) broods of each species were observed in the study area. These species include the pied-billed grebe, green heron, American bittern, least bittern, mallard, black duck, osprey, king rail, and American coot.

The survey revealed that the great blue heron rookery, established in 1945, was undergoing a decrease in the breeding population. The number of active nests declined from

134 in 1948 (Lopinot, 1950) to 36 in 1952.

Canada geese were found to be utilizing the broomsedge cover of the islands for nesting purposes. Of the 49 escaped decoy birds present in 1950, four pairs were found to have nested (Anon., 1950). Three nests were located in 1951 and nine in 1952. Of this total of 16 nests, 10 were known to be successful, with time of hatching occurring from April 22 until May 14. There were three to six eggs in completed clutches. Additional nests were believed to have been constructed during this period as evidenced by observations of 17 immature Canada geese in 1950, 27 in 1951, and 35 in 1952. Losses of young in a two-months period after hatching were estimated to be from 20% to 60% of the total hatch. Although positive evidences of the causes of mortality were not obtained, possible threats to the young were believed to include not only sudden severe wind and rain storms, but also predators, such as: snapping turtles, *Chelydra serpentina;* birds of prey, Falconiformes; foxes, *Urocyon cineroargenteus* and *Vulpes fulva;* raccoon, *Procyon lotor;* and fishermen.

A large breeding population of eastern red-wings was present at Crab Orchard Lake from March until September, making use of the marshes during the periods of breeding, nesting, and raising of young. In the western part of the lake, numerous red-wing nests were built in cat-tail stands, while occasional nests were in black willow and buttonbush. Nests of small groups and scattered pairs were constructed in cat-tails, shrubs, and trees in the eastern part of the lake. On the islands, it was found that trees (black willow; persimmon; elm, *Ulmus* sp.; and box elder, *Acer negundo*) contained nests.

In 1952, a total of 547 red-wing nests was constructed in cat-tails along 8 miles of shoreline, with the greatest density of nests being noted in the stands of protected areas. The average number of nests was found to be 35 in typical protected areas approximately 100 yards in length, whereas, in unprotected cat-tail areas of equivalent length, the average number was 7 nests.

The nesting period of red-wings was from early May until late July. Typical clutches contained four eggs, although clutches were observed with two, three, and five eggs. A 12-day period was the usual time of incubation. Observations of 547 nests indicated a high rate of fertility in 1952, as only four eggs, in separate nests, failed to hatch. Predation by birds appeared to be low. Of 230 active and inactive nests observed in July, 1952, 5% showed evidence of disturbance by unknown agents. This fact seemed to indicate a low predation rate, even though the nests were built in areas highly subject to human interference arising from fishing activities.

Observations indicated a high percentage of nesting success, with an average of three young per nest reaching fledgling stage. Basing estimates on this figure, at least 1600 young red-wings were produced in nests observed in this study, and a minimum of 10,000 young were produced on the entire lake.

TABLE 1.—Birds Utilizing Shoreline and Islands of Crab Orchard Lake, Illinois, as Indicated by Field Survey, 1949-1952.

Species	Nests				Young			
	1949	1950	1951	1952	1949	1950	1951	1952
Pied-billed grebe, *Podilymbus podiceps*	.....	.....	.....	.....	.....	4	2	1
Great blue heron, *Ardea herodias*	110	75	59	36	225[2]	225[2]	.....	.....
Green heron, *Butorides virescens*	.....	.....	.....	7	200-300[2]	200-300[2]	200-300[2]	200-300[2]
American bittern, *Botaurus lentiginosus*	.....	.....	.....	4	.....	2	4	2
Least bittern, *Ixobrychus exilis*	.....	.....	.....	8	.....	4	2	4
Canada goose, *Branta canadensis*	1	4	3	9	4	17	27	35
Mallard, *Anas platyrhynchos*	.....	.....	2	.....	14	20	10	14
Black duck, *Anas rubripes*	.....	.....	.....	1	.....	4	.....	.....
Osprey, *Pandion haliaetus*	1	1	1	1	1	1	1	1
King rail, *Rallus elegans*	.....	3	.....	.....	.....	.....	.....	27
American coot, *Fulica americana*	.....	1	.....	.....	5	18	5	11
Eastern red-wing, *Agelaius phoeniceus*	.....	.....	.....	547[1]	.....	.....	.....	1600[2]

[1] Number of nests found along eight miles of cat-tail shoreline.
[2] Estimate.

Discussion

The results of the survey indicate that only individuals of a few wintering and migratory species, other than the eastern red-wing, utilize the shoreline and islands of Crab Orchard Lake during the nesting season. This may be accounted for, in part, by the fact that Southern Illinois is outside the breeding ranges of many of these species, and, in some instances, is in the fringe area of the ranges. Therefore, the few individuals which do nest at the lake are possibly all which could be expected. Also, marsh-dwelling types, which migrate into southern Illinois during the nesting season, generally disperse and seek secluded, widely separated nesting sites. Never present in extremely large numbers, as are species with flocking tendencies, their dispersing activity would result in few individuals utilizing Crab Orchard Lake.

Continued use of nesting cover at the lake, by increased numbers of birds, will depend to a large extent on the return of birds raised there. If the homing instinct is strong in forms which are now known to nest, an increase in future nesting activity might be expected. Perhaps certain species of waterfowl, which are influenced by the homing instinct and return to established breeding grounds, would be able to nest successfully at Crab Orchard Lake. It might be possible to establish the lake as the breeding ground for various species, such as the mallard, black duck, and blue-winged teal. To do so would probably involve pinioning 500 to 1,000 birds and releasing them prior to the nesting season. Theoretically, the young of these birds would return, and in time, a larger breeding population might be established.

Increasing suitable habitat might also serve to attract additional nesting birds to the area. The construction of off-shore breakers in areas of eroded shoreline would be of value in alleviating the destructive wave action and would give vegetation an opportunity to become established. Planting of marsh-type vegetation has already proven successful in selected bay areas. Increased use of this procedure in bay areas, or combined with use of breakers in the main body of the lake, would hasten stabilization of the shoreline.

Human interference may be considered a prime factor which determines nesting success and continued nesting bird occupancy of the lake's marsh areas. The presence and activities of humans are believed to interfere seriously with many nesting birds. Finding of nests by fishermen and others who frequent stabilized areas of marsh vegetation often results in either destruction of nests and eggs or removal of eggs. At the present time, no portion of the refuge is inviolate during the nesting season. The human factor could be controlled by developing extensive marshes in the eastern portion of the lake, with subsequent restrictions concerning entry into these areas.

The tremendous annual increase of eastern red-wings leads to the view that the population may in time present serious hazards to area farm crops. Although the principal foods consist of weed seeds and insects, food habit studies have shown that red-wings frequently in-

vade fields of corn, wheat, and oats (Cardinell and Hayne, 1945). Because of the general tendency of small flocks to range long distances to feed, only slight damage may now occur in many fields and possibly goes unnoticed. However, considering the high rate of nesting success and low mortality rate of the young, it is felt that further studies will be necessary to determine whether management of the species is advisable.

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