WOOD DUCK BROOD SURVIVAL ON THE NOXUBEE NATIONAL WILDLIFE REFUGE[1]

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ABSTRACT

Two methods were used to determine survival. In 1968, newly hatched ducklings were web-tagged and subsequently recaptured. The survival rate from hatching to flight stage was 56%. In 1969, direct observation was the method used. Observations of 77 broods revealed a 52% survival from hatching to six weeks of age, with 74% of the total mortality occuring during the first two weeks after hatching.

INTRODUCTION

Little research has been conducted on wood ducks in the midsouth. As habitat continues to shrink, emphasis on nest box programs has gained widespread interest on National Wildlife Refuges as well as on state and privately owned areas. Most of these programs have involved checking the boxes for wood duck usage and egg and duckling production (Cunningham, 1968). Few workers have reported on the fate of ducklings after hatching.

A study was initiated at Noxubee National Wildlife Refuge in east-central Mississippi in 1968 to evaluate the nest box program and to study various aspects of wood duck production. The objective of this paper is to report on brood survival.

DESCRIPTION OF THE STUDY AREA

Noxubee National Wildlife Refuge contains about 46,000 acres. The portions of the refuge included in this study are composed of soils which are typically acid, silt loams to clays (Vanderford, 1962). The lakes of the refuge are subject to winter and spring flooding, primarily from the Noxubee River, Jones Creek, Oktoc Creek, and Loakfoma Creek. Brood survival studies were conducted mainly on Bluff Lake, Griffin Slough, Loakfoma Lake, and the Smith Field Impoundment.

Bluff Lake is the largest impoundment on the refuge. This 1,000 acre lake contains about 200 acres of shallow water with vegetation suitable for brood habitat. In the shallow areas thick stands of baldcypress *(Taxodium distichum)* regeneration furnish much of the brood cover, especially for early hatched broods. Willow *(Salix nigra)* and buttonbush *(Cephalanthus occidentalis)* are also common. Prevalent herbaceous plants include lotus *(Nelumbo lutea)*, swamp smartweed *(Polygonum hydropiperoides)*, waterleaf *(Hydrolea affinis)*, lizardstail *(Saururus cernuus)*, square-stemmed spikerush *(Eleocharis quadrangulata)*, and gaint cutgrass *(Zizaniopsis miliacea)*.

Griffin Slough, a 45-acre impoundment, is separated from Bluff Lake by a levee. A solid strip of buttonbush extends from 5 to 30 feet into the water around the edge of the slough. Common floating plants in the open water are watershield *(Brasenia shreberi)*, white water lily *(Nymphaea odorata)*, and frog-bit *(Limnobium spongia)*.

Loakfoma Lake is 500 acres in size and contains about 100 acres of shallow,

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marshy type brood habitat. Scattered stands of willow and buttonbush account for most of the woody vegetation, while square stemmed spikerush, waterleaf, and water primrose *(Jussiaea diffusa)* are common herbaceous plants. By late May or early June large patches of lotus emerge and furnish most of the brood cover through the summer.

The Smith Field Impoundment has been permanently flooded for 2 years. Eight acres of this 10-acre pond are in standing hardwood timber, and the remaining 2 acres comprise a shallow marsh containing a dense stand of lotus, smartweed, and square-stemmed spikerush.

It is refuge policy to lower water levels in Bluff and Loakfoma Lakes during the first week in July. This is done in order to promote vegetation growth on exposed mud flats for migratory waterfowl. By late summer the Smith Field Impoundment is normally dry due to low rainfall at this season. Although the water level in Griffin Slough usually recedes at this time of year, the slough does not completely dry up.

METHODS

In 1968 and 1969, predator proof nest boxes were checked at weekly intervals from February 1 through early June. The extent of box use and the dates of hatching were determined from the weekly checks.

1968

The Grice and Rogers (1965) technique of web-tagging newly hatched young and subsequently recapturing them was used in determining duckling survival. The authors utilized the females' homing instincts and made the assumption that "among web-tagged females the ratio of banded to unbanded females found during the breeding season was the same as the ratio of trapped to untrapped females surviving the previous summer." I accepted their assumption and formula which states:

$$X = B \frac{(C + D)}{C}$$

X = Ducklings which survived to flight
B = Ducklings captured and banded in traps near flight stage
C = Live returns in 1969 and 1970 which were previously trapped and banded in 1968.
D = Live returns in 1969 and 1970 not previously trapped and banded in 1968.

The procedure consisted of placing monel numbered tags (Size No. 1, Style 1005, National Band and Tag Company, Newport, Kentucky) in the web of both feet of the duckling before they left the nest box. Trapping and banding was conducted from June through August. Portable "Ohio" and "Lily pad" type traps were baited with cracked yellow corn and checked in min-morning and late evening each day. All wood ducks were banded and web-tag numbers were recorded.

1969

Direct observation of broods and their reduction over a period of time was the method used in the 1969 estimate of survival.

Incubating hens captured in nest boxes were color-marked with a marker similar to that described by Gullion (1951). Markers were made from a plasticized nylon fabric (DAY-GLO SAFLAG, Safety Flag Company of

America, P. O. Box 1005, Pawtucket, Rhode Island). One end of the plastic was folded over a Size No. 1 stainless steel safety pin and stapled with rust-proof paper staples. The completed marker was 60mm. long and 25mm. wide. Although the fabric was available in solid colors only, different combinations were obtained by applying vinyl paints to form patterns so that each hen had a different color combination. Markers were attached by imbedding the safety pin in a loose pinch of skin at the base of the duck's neck.

Broods were observed in the early morning and late evening hours from early May through mid-June. Although broods were present on the study areas later in the summer, dense vegetation, mainly lotus, made brood counts unreliable.

Observations were made from 2 tree blinds in Bluff Lake and 2 camouflaged scaffolds in Loakfoma Lake, as well as by cance and by wading. A variable spotting scope (10X - 60X) and 7 X 50 binoculars were used to make brood counts and to identify color marked hens.

RESULTS

1968 Brood Survival

A total of 221 ducklings were hatched from boxes on the areas selected for study and 188 of those ducklings were web-tagged. A 50:50 sex ratio at hatching was assumed. By using Grice and Rogers' (1965) formula and substituting my data, the results were as follows:

$$X = B \frac{(C + D)}{C}$$

$$X = 12 \frac{(5 + 17)}{5}$$

X = 53 females surviving to flight stage

Since 94 of the 188 ducklings hatched were assumed to be females and 53 were calculated to have survived to flight, a 56% survival rate was estimated. The average brood size at hatching was 9.6 ducklings. Using this survival rate, an average of 5.4 ducklings per brood were estimated to have reached flight state.

1969 Brood Survival

The average brood size at hatching in boxes was 10.7 ducklings (computed from 74 clutches). A total of 77 different broods which ranged from less than 1 week to 6 weeks of age were recorded. Broods older than 4-6 weeks were not recorded. According to McGilvrey (1969) the breakdown of brood bonds at about 5 weeks of age makes brood counts unreliable at that age. Broods were aged using the method of Dreis (1954). Of 56 incubating hens which were color marked, 23 were later sighted with broods.

By 6 weeks of age the ducklings had been reduced to an average of 5.6 per brood, indicating a 52% survival rate. During the first 2 weeks of life 74% of the total mortality occurred.

Table 1. Duckling Survival at Different Ages

	Age in Weeks		
	0 - 2	2 - 4	4 - 6
No. of Different Broods Observed	21	29	27
Average No. of Ducklings per Brood	6.9	5.9	5.6

DISCUSSION

The average survival of 5.4 (56%) ducklings in 1968 and 5.6 (52%) ducklings in 1969 was comparable to the results obtained by McGilvrey (1969) in Maryland. His observations revealed that an average of 5.6 ducklings per brood survived to 6 weeks of age. Grice and Rogers (1965) calculated that 5.8 ducklings per brood survived to flight stage in Massachusetts while Klein (1955) found that only 3.8 ducklings per brood survived to flight stage in New York.

Mortality was highest in the "downy" stage. The 0-2 week age group accounted for 74% of the total mortality. McGilvrey (1969) also commented on this high initial loss. Little loss occurred after the ducklings were more than 4 weeks of age.

Although my study points out the high mortality incurred by wood ducklings, especially those from hatching to 2 weeks old, little data was obtained on the actual causes of mortality.

I was in the field almost every day from February through August for 2 years and only 3 cases of predation or attempted predation were observed. A 3-week-old duckling, which was swimming in an old creek bed, was pulled under by a large-mouth bass *(Micropterus salmoides)* but emerged about 15 seconds later and managed to escape in thick vegetation. Another wood duckling about 1-2 weeks old was observed being pursued by a bowfin *(Amia calva)* in the shallows of Bluff Lake. The duckling escaped by leaping on the tops of floating lotus leaves. On another occasion I was observing a brood of 6 wood ducklings feeding around the edges of buttonbush when I noted a bowfin in shallow water only a few feet away from the brood. One of the ducklings swam near the bowfin and was immediately eaten by the fish.

Both bowfins and largemouth bass are plentiful on Noxubee Refuge, particularly in Bluff and Loakfoma Lakes. The bowfins in particular prefer weed-choked water during spawning in April and May. It is possible that bass and bowfin account for much of the duckling predation on the refuge.

Loakfoma Lake has a dense population of diamond-backed water snakes *(Natrix rhombifera rhombifera)* and yellow-bellied water snakes *(Natrix erythrogaster flavigaster)*. Although ducklings were often seen swimming near the snakes, no predation was noted. Raccoons *(Procyon lotor)* and mink *(Mustela vison)* were frequently seen around the lake edges, but my incidental observations of their scats revealed no duck remains.

In order to gain greater insight into the habits of broods, I raised four ducklings from eggs taken from a dump nest. (The hen had already exited with her brood). After the ducklings became imprinted to me, I took them on frequent excursions to the lakes and marshes on the refuge in order to observe their feeding habits in as natural conditions as possible. When they were less than 4 weeks old they were very excitable and would frequently dive if pursued. If they continued diving for a period of time their down and feathers became water soaked. Wild ducklings often dive when pursued. Continued pursuit by

man or predators may cause the ducklings' feathers to become water soaked. It would appear that even though they might escape immediate death or capture, subsequent mortality could occur due to exposure or reduced resistance to further predation.

It was concluded from this study that although brood survival rates may be estimated, more intensive research will have to be conducted before the specific causes of mortality are known.

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NEST BOX PRODUCTION AND BROOD SURVIVAL OF WOOD DUCKS ON THE PIEDMONT NATIONAL WILDLIFE REFUGE

1969*

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ABSTRACT

Wood duck (*Aix sponsa*) nest box production and brood survival was studied during 1969 on Piedmont National Wildlife Refuge.

Of a total of 446 ducklings hatched in nest boxes in 1969, 397 (89%) were marked with consecutively numbered web tags before their exit from the nest box. Eighteen female wood ducks were color marked with nasal saddles so they could be identified with their respective broods throughout the nesting season. Subsequent trapping and observation provided insight into brood survival and total production of this species on Piedmont National Wildlife Refuge.

During the 157-day nesting season* 46 successful hatches were recorded out of a total of 60 nesting attempts. The average number of ducklings leaving the nest box was 9.7. From the 194 available nest boxes there were 46 (24%) successful hatches. Six of the 194 boxes were used twice.

Brood size in the 4-7 week age class was reduced by nearly two-thirds.

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*Number of days from date of first egg layed to date of last hatch.