

A THREE YEAR STUDY OF THE WOOD DUCK
ON THE
YAZOO NATIONAL WILDLIFE REFUGE

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In 1965 a wood duck (Aix sponsa) nest box program was initiated on the Yazoo National Wildlife Refuge near Hollandale, Mississippi. The first boxes were erected in June, too late for use in 1965. More boxes were added prior to the 1966 nesting season and still more boxes were added prior to each of the next two seasons.....in all, 55 boxes were available to the ducks in 1966, 135 boxes available in 1967, and 202 boxes available in 1968.

The program was not a research project or a study per se, but rather a function of management implemented to determine what effects, if any, a nest box program would have on the nesting efficiency of wood ducks on Yazoo Refuge. This report then is a treatise of the results of the program to date.

THE STUDY AREA

Yazoo National Wildlife Refuge, encompassing some 11,000 acres, is located in south central Washington County, Mississippi, some 25 miles south of Greenville, 70 miles north of Vicksburg and 165 miles south of Memphis, Tennessee. Lying in the heart of the vast Mississippi Delta, the area is characterized by flat to slightly undulating terrain

with rich alluvial soils averaging 46 feet in depth. Yazoo is superimposed upon an old oxbow channel of the Mississippi River.....Containing some 4,500 acres, the old horseshoe channel is about 15 miles long and varies in width from 1/3 to 1 1/2 miles. The "Big" River which abandoned the old channel some 600 years ago now flows within its man-made levees 5 miles (air) to the west. The 4,500 acres of agricultural lands within the refuge boundary are broken and interspersed by numerous sloughs and depressions which, like the old oxbow channel, are poorly drained and are, in effect, cypress-willow swamps which remain flooded much or most of the year. In those lower elevations which are perennially flooded the open water area is clogged with duckweed, pennywort, water primrose and buttonbush. The slightly higher elevations support dense stands of black willow with occasional cypress occurring as individuals or in scattered stands. An understory of swamp privet is common, with sparse stands of water locust or water elm occurring intermittently. In the ecotones above the swampy lowland and on well drained ridges and flatland are some 2,000 acres of medium to high quality hardwoods. The stands are dominated by water oak, Nutall oak, hackberry, sweetgum, bitter pecan, willow oak and overcup oak. Other species of lesser abundance are cottonwood, ash, elm, locust, sycamore, box elder and maple.

METHODS AND MATERIALS

All boxes employed in this program were the typical wooden board boxes constructed of one-inch cypress lumber. Inside dimensions were approximately 11 inches square by 21 inches high in the front and 23 inches in the rear. An oval entrance hole $3\frac{1}{2}$ x 4 inches in most

instances was given some measure of protection from rain by a 3 inch overhang on the roof sloped from back to front. The boxes were protected by either 30 inch conical shields or 24 gauge sheet metal sandwich type shields, 30 inches tall by approximately 16 inches wide. With few exceptions the boxes were mounted back to back, two on a post. Practically all the boxes were erected over water, usually toward the centers of water areas or well within the water line. Height above the water ranged from 2 feet to 5 feet, the average more like 3 feet. In the third year, a pilot project was initiated with 7 boxes erected on dry land ranging from 375 feet to 585 feet to the nearest water. These boxes were erected in the refuge headquarters area all within 195 feet of the manager's quarters, the nearest box only 34 feet from the building. A small portable observation blind was used to make close-up observations of individual boxes and the entire project could be surveyed from within the residence, a mean distance of 130 feet from each of the 7 boxes. Altogether some 60 hours of observations were logged from the date the first box was inspected by ducks on April 14th until all broods were gone in July. In these nests, daily inspections were made, eggs were numbered with ink and precise details were recorded as nesting progressed.

Generally, however, it was not feasible to make frequent regular checks on the majority of the boxes. Other investigators have seen fit to inspect the boxes more frequently; Bellrose et al (1964) checked housing units on 10 - 14 day intervals, Grice and Rogers (1965) checked boxes weekly, and Dr. Hester (1967) inspected boxes as often as 3 times weekly. In our study the inspection of nest boxes was incidental to other refuge functions; subsequently the frequency of checks on each

housing unit varied from 21 to 30 days or on the average, 5 times per nesting season.

Recognizing the intrinsic difficulties in exacting precise data from the infrequent inspections of the boxes, we attempted to construct a thorough case history by establishing a card file for each box and each female banded or recovered in the boxes (recovered in this case refers to those females banded in nest boxes or those found in boxes which were previously banded on the refuge or on other refuges). Detailed field notes were condensed and entered on the file cards after each inspection. During the 3 year period, 102 females were banded or recovered in the boxes, 8 in 1966, 44 in 1967 and 50 in 1968. From these limited observations an attempt was made to analyze their movements and to some extent, survival rates. In this pursuit one innovation was injected into the project. In 1967 a nest box was modified to include a trap door which held the birds captive until they were banded and released. When it had been determined that the "trap" box would work, 5 more were added to the study area in 1968.

RESULTS

1966

The results of the 1966 season were concise, uncomplicated, and virtually devoid of situations which required interpretative or speculative analysis. There were 43 nest starts in 35 of the available 55 boxes. Four of the nests were abandoned but 39 were incubated to successful hatches. The average clutch contained 15.0 eggs and the natality rate was extremely high.....28 of the 39 successful nests yielded 100% hatches and the remaining 11 nests exhibited good hatching

rates. An average of 14.02 ducklings exited per box used for a total production of 547 ducklings. There were no incidences of predation and no dump nesting was observed. The largest number of eggs laid in any one nest was 22, and while it is not known that all the eggs were laid by a single female, there was no evidence to support a supposition that it was a dump nest.

1967

The 1967 season brought increased nesting activity and along with it many complications. Of the 135 boxes available 120 were used - there were 161 nest starts and 125 successful broods for a total production of 1,648 ducklings. There was considerable competition for nest boxes and dump nesting was encountered for the first time. The complication of dump nesting injected a measure of difficulty in establishing a precise clutch size. We determined that there was a rather distinct delination in nests which contained 23 eggs or less and those which contained 24 eggs or more. When nests contained 24 or more eggs it was obviously the result of 2 or more females depositing eggs in the same box. Nests containing 23 or fewer eggs were evidently the products of one female's nesting attempt. It is possible, even probably that an occasional single egg or even several eggs were dumped in these "single" duck nests but the incidence rate was not significant to influence the hatching rate or the rate of abandonment. Upon the basis of this assumption the average clutch size was 15.8 eggs for those 109 nests occupied by a single female, while the average dump nest incubated contained 30.9 eggs, the range was 24 to 41 eggs. The hatching rate of course, was lower for dump nests than for single nests. But because more eggs were actually incubated in the dump nests the actual number of ducklings produced per

nest was considerably greater. In 16 dump nests incubated to completion the average number of ducklings which exited was 17.9 as opposed to 13.1 ducklings produced per single nest.

Nest predation was also encountered for the first time in 1967. In all, 13 nests were known destroyed by predators and there was some interference from other species of birds which attempted to nest in the boxes.

1968

The 1968 season definitely reflected intensified activities in the nest boxes. Of 202 boxes available, 194 were used - there were 289 nest starts and 160 successful broods for a total production of 1,894 ducklings. In addition, 3 nests were started in an experimental 12 box complex but all were abandoned. The conspicuously high rate of nest failures (132 failures out of 292 starts, 45.2%) was due largely to predation and high water, which in combination accounted for the loss of 91 nests. Intraspecific conflict also attained significant proportions.....38 nests were abandoned and in many cases it was obviously the result of conflicts and stress growing out of competition for nest sites.

Tables I and II present in summary form the combined results of the three year study.

DISCUSSION

Nesting Chronology: Nesting searches and box inspection were two of the most interesting aspects of this study. The search for suitable nest sites apparently plays a big part in the over-all role of wood duck propagation. It appears that some inward force compelled the ducks to

TABLE I

Tabulations from three year nest box production on Yazoo National Wildlife Refuge, 1966-68

<u>Year</u>	<u>Number boxes avail- able</u>	<u>Number boxes used</u>	<u>Number Nest Starts</u>	<u>Number Nest completed</u>	<u>Number eggs laid</u>	<u>Number eggs incubated in successful nests</u>	<u>Number eggs hatched</u>	<u>Number duck- lings exited from boxes</u>
1966	55	35	43	39	599	586	548	547
1967	135	120	161	125	2,652	2,193	1,659	1,648
1968	202	194	292	160	4,986	2,963	2,016	1,894

TABLE II

Fate of wood duck nest starts which did not result in successful brood production.

<u>Year</u>	<u>Number Nests started but not completed</u>	<u>Lost to elements (wind or high Water)</u>	<u>Lost to Predators</u>					<u>Female died on nest</u>	<u>Abandoned - No known reason. Intraspecific conflict sus- pected in most instances.</u>	
			<u>Raccoon</u>	<u>Mink</u>	<u>Wood- pecker</u>	<u>snake</u>	<u>Predator Unknown</u>		<u>Single Nests</u>	<u>Dump Nests</u>
1966	4								4	
1967	36		3		10			1	4	18
1968	132	28		1	55	8	1	1	14	24

make numerous nest box inspections before final selection was made.

It also was obvious that egg laying was often induced before the female had settled upon a nest site. We observed that many females flew about depositing eggs first one place and then another prior to initiation of a nest. For instance 5 eggs were found deposited in depressions on logs which had fallen in the water, and 5 different females laid one egg each in a "trap" nest box in which they were held captive for short periods of time (not exceeding 4 hours). Had they already been nesting it is highly improbable that they would have entered the trap box; and further, there was no nest material in the trap box. In no case did we observe that a female voluntarily laid any eggs in a box that contained no nest material. This evidence that some ducks are induced to lay before they select a nest site could explain 8 instances over the three year period in which a single egg was deposited in a box and subsequently "abandoned". It also supports our motion that in many instances an occasional egg or even several eggs are "dumped" in another bird's nest as a matter of opportunity rather than intentional vying for a given nest box.

At Yazoo the period of nest searching began in mid to late January. Pairs were observed perched on boxes at least a week prior to any nest starts. Later in the season the search was more intense. Females were observed in the act of searching diligently up and down tree boughs for cavities. Others were observed scrutinizing 2 inch camera holes in two different photo-blinds.....2 females were observed inspecting chimneys and bathroom air ducts and on one occasion 2 females were removed simultaneously from the refuge office smokestack. Four females inspected one box in a single morning and one female was observed entering and departing

3 different boxes in one thirty minute period. One "trap" nest box captured 5 different females in a 7 day period.....25 wood ducks were taken in this one box, 9 in 1967 and 16 in 1968. This information along with other banding data revealed that in a given season many females travel not only from box to box within a pond or lake but from pond to pond as far removed as 1 1/3 miles. We made some observations that tend to indicate the male may play a more active part in nest selection than is presently suspected. On several occasions males were observed sitting atop nest boxes making rapid head jerking motions. Ostensibly these gestures were made to attract to the box, females which were perched several feet away on the ground or on other boxes. On one occasion an adult male was taken captive after he entered a "trap" nest box. To what extent the male influenced nest selection or the significance of it was not investigated.

The period of nest initiation appears to begin earlier at more southerly latitudes. In Massachusetts Grice and Rogers (1965) report early nest starts for a 7 year period ranged from March 23rd to April 13th. Leopold (1965) indicated that dates of nest initiation in Iowa were in late March and early April. Dr. Hester (1967) in his North Carolina studies cited mid-February as the time of nest initiation and at Yazoo in Mississippi, we recorded nest starts as early as February 1st in 1967 and February 6th in 1968.

For purposes of establishing chronology of nesting events the 1966 season has been discounted for two reasons: (1) 20 of the 55 boxes were not erected until early to mid-March and were therefore not available to early nesters and (2) the nest box program was brand new in

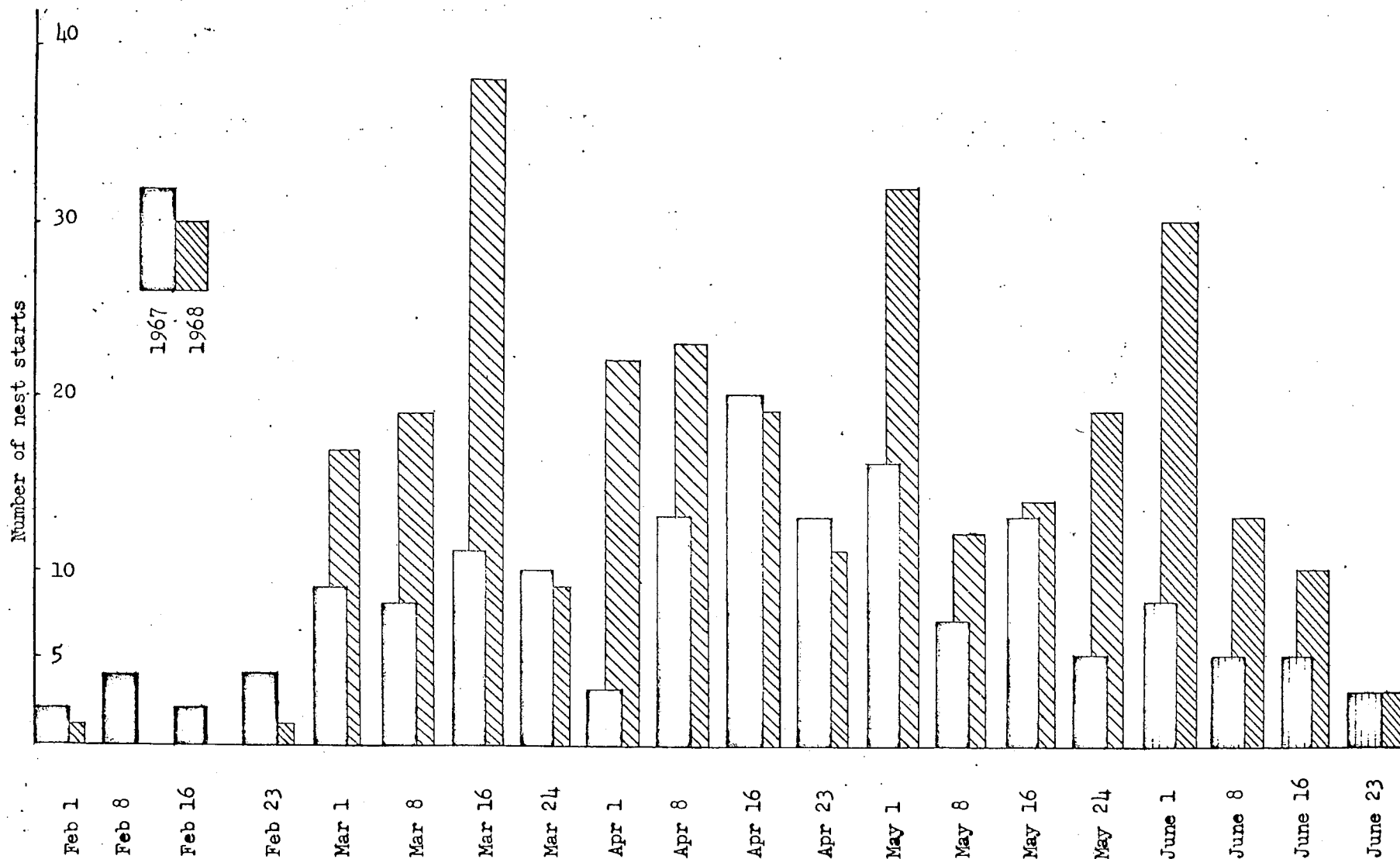


TABLE III Span of nest initiation and intensity of nest starts by weekly intervals. (1967 and 1968)

1966 and the lack of early nesting might indicate only that the birds were not adequately exposed to the boxes. This point is indicated by the late response to the boxes in 1966.....72% of all nest starts occurred after April 22nd and almost 60% of the nest starts were made after May 29th. This was not true in the 2 subsequent years. Nesting events of 1967 and 1968 were strikingly similar. First and last nest starts were made on February 1st and June 30th in 1967, February 6th and June 25th in 1968. The span of nest initiation was 151 days in 1967 and 141 days in 1968 for an average of 146 days. This is distinctly longer than the Massachusetts span cited by Grice and Rogers (1965). They indicated a range of 51 to 83 days for an average of approximately 65 days.

Table III depicts the periods and rates of nest initiation for 1967 and 1968. When viewed on a weekly basis there were obvious peaks and lulls within the span of nest initiation for both years, and indeed within each month. If nest initiation is combined into monthly periods it becomes apparent that 1967 nesting exhibited a more orderly progression to a peak in mid-April and a rather constant decline to the end of June. In 1968 the peak of nest initiation was reached in mid-March but periods of initiation intensities were exhibited on or about April 7, May 1, and June 1.

Table IV depicts the actual number of nest initiations by months. Nesting chronology is further understood by an analysis of the span of brood production in conjunction with the span of nest initiation. We found that actual hatching dates ranged from early March to early August. This data is presented in Table V. If this information is extrapolated to include a 6 week period for growth to flight stage, it becomes apparent

that the "nesting" season for Yazoo covers a very extensive period which begins with nest searching in mid-January and terminates with the advent of flight by late fledglings in late September or even early October.

TABLE IV

Nest starts by months for 1967 and 1968 nesting seasons. (Actual number of nest starts followed by percent of total starts in parentheses)

Year	February	March	April	May	June	Total Starts
1967	12 (7.4%)	38 (23.6%)	49 (30.4%)	41 (25.5%)	21 (13.1%)	161
1968	2 (.7%)	83 (28.4%)	74 (25.3%)	77 (26.4%)	56 (19.2%)	292

TABLE V

Production of ducklings by months as related to nest initiation-by months.

1967

Month Nests Started	Number success- ful nest starts	Number of young subsequently produced in:						Total Production
		Mar	Apr	May	June	July	Aug	
February	9	36	76					112
March	26		106	283				389
April	44			145	515			660
May	28				149	154	11	304
June	18					153	31	184
Totals	125	36	282	428	664	307	31	1,648

1968

Month Nests Started	Number success- ful nest starts	Number of young subsequently produced in:						Total Production
		Mar	Apr	May	June	July	Aug	
February	2	6	5					11
March	30		135	263				389
April	43			231	348			579
May	45				229	276		505
June	40					288	13	401
Totals	160	6	140	494	577	664	13	1,894

Dump Nesting: It is generally agreed that the laying by more than one duck in a nest constitutes dump nesting or compound nesting. In our study it was necessary to qualify our interpretation of "dump nesting". In many instances we were able to determine precisely that 2, 3, even 4 females laid in a given box. On the other hand, because of the infrequency of box inspections we could not state unequivocally that all the eggs in any given nest were laid by one duck. For example, in our yard, by actual observation we know that 4 ducks laid in one nest that contained only 16 eggs. Only on one day were two eggs laid - the other eggs were deposited one per day. Meanwhile another box only 90 feet away contained 18 eggs when incubation began and 4 ducks also laid in it - all on the same day. Had these 2 boxes been checked on a 3 week interval, it is likely that we would have interpreted both nests as those of a single female. Recognizing this inadequacy in our data it was necessary to qualify our version of the criteria for a dump nest. Therefore we took note of multiple egg laying when it was obvious, but as a basis for determining clutch size, egg deposition rates, and natality rates, a nest was classified as a "dump" nest or a "single" nest based upon these criteria: (1) If it was determined that a sufficient number of females were vying for the nest or the total number of eggs laid obviated a disruption of normal nest progression, it was classified a dump nest. (2) If on the other hand normal progression was evident and egg numbers did not become excessive (even though an occasional egg was dumped by an alien female), it was classified as a single nest.

In 1967 the point of distinction was reached at 23 eggs - those nests with 24 eggs or more were classed as dump nests. In 1968 the distinction was manifested at 20 eggs - those nests with 21 eggs or more were classed as dump nests. In 1966 there were no dump nests.

Only one nest contained as many as 22 eggs, but there was no obvious interference and all 22 eggs hatched. We assume then that the average clutch of 39 successful nests in 1966 with only one suspected instance of egg dumping will serve to establish the "normal" clutch. This was found to be 15.0 eggs. In 1967 the average clutch size for single nests was determined to be 15.8 eggs - this figure probably reflects some bias for minor egg dumping. In 1968 the average clutch size for single nests dropped to 13.5. We believe the drop in clutch size to be the consequence of increased competition for nest boxes. Specifically we felt that many females who were competing for ultimate control of a nest actually curtailed the period of egg laying and started incubating earlier than they normally would have. We have but limited substantiation for this supposition. One example of the wood ducks' ability to modify routine to counteract competition lends some credence to our theory. In one nest under close scrutiny in our yard, on May 15th a female started to incubate 16 eggs of which only 12 were her own.....3 other ducks had dumped 4 eggs in her nest. On each of the 2 succeeding mornings while she was taking her early feeding flight, an alien duck dumped an egg in her nest. Thereafter she took no morning flights but stayed on the nest and repulsed the invading females. She then took afternoon flights while there were no egg laying activities. It was only after some 2 weeks when all competition had ended that she resumed early morning flights.

The marked increase in dump nesting was glaring. Not only did the incidence of dump nesting increase in 1968, but many of the nests were considerably larger. Several were found to contain 40 or more eggs, 2 nests contained 44 eggs each and two largest nests each contained 46 eggs.

One significant example which points up the intensity of nest competition warrants special note. In April, 36 boxes were completely covered by flood waters. They were subsequently removed and re-erected in other areas. The surging flood waters had washed away the nesting material from 10 of the boxes and it was not immediately replaced when the boxes were moved, and of course no use was made of the boxes until nest material was added. Of the remaining 26 boxes, 2 were erected on April 27th, 4 on April 29th, and 20 on May 1st. Checks were made of these 26 boxes on May 16th through 20th....this represented intervals of 19 days for 22 of the boxes, and 21 days for 4 of the boxes. Within the mean period of 19.3 days, 24 of the 26 boxes contained nests - 11 nests contained more than 20 eggs, 4 of the boxes contained 30 to 35 eggs, and the combined number of eggs in the 24 boxes was 478.

Percentage wise dump nests increased from 0% in 1966 to 13% in 1967 and 33.5% in 1968. The natality rates of both single nests and dump nests declined from 1966 to 1968. (Table VI)

Jones and Leopold (1967) have described a situation in California which very nearly parallels our project at Yazoo. A build up of breeding bird density resulted in intraspecific interference and a subsequent decline in overall production efficiency was the end result. Of course the magnitude of the two programs is tremendously different - they worked with only 16 boxes as compared to more than 200 at Yazoo. It is our intent to continue to add nest boxes, but it is doubtful that they can be added at a rate which is comparable to the rate of increase in breeding bird densities.

TABLE VI

Natality rates and nesting efficiency for the period 1966 - 1968.
(Natality rates are expressed in percent of ducklings actually exiting from boxes per given number of eggs incubated.)

<u>Year</u>	<u>Number of single nests started</u>	<u>Number of single nests com- pleted</u>	<u>Percent of single nests com- pleted</u>	<u>Average number eggs in single nests</u>	<u>Average number young produced per single nest</u>	<u>Natality rate for single nests</u>
1966	43	39	90.7	15.0	14.02	93.5%
1967	140	109	77.9	15.8	13.1	82.9%
1968	194	106	54.6	13.5	9.9	73.3%

<u>Year</u>	<u>Number of dump nests started</u>	<u>Number of dump nests com- pleted</u>	<u>Percent of dump nests com- pleted</u>	<u>Average number of eggs in dump nests incubated</u>	<u>Average number young produced per dump nest</u>	<u>Natality rate for dump nests</u>
1966	0	0	-	-	-	-
1967	21	16	76.2%	28.75	17.9	62.3%
1968	98	54	55.1%	28.40	15.67	55.18%

Nest Interference and Predation: Thus far our shields have offered adequate protection from climbing predators. Only three instances of raccoon predation were recorded and in each case wind action had broken the shields loose from the posts and they had fallen to the ground.

In the spring of 1968 we sustained a prolonged period of flooding and many boxes were either covered by the water or the shields were covered. This allowed for entry by snakes and minks (Mustela vison). One incubating female was killed by a mink and mink predation was suspected in another case; although the evidence was not conclusive. Blotched water snakes (Natrix erythrogaster) took advantage of the situation and destroyed 8 nests. Snakes were also found in some boxes after water had actually risen over the nest material - these losses were attributed to the water rather than to the snakes. In six instances snakes were found in the boxes and in every case they were the same species, blotched water snakes.

It is significant to note that no starlings (Sturnus vulgaris) attempted to nest in our boxes even though they were present throughout the nesting period. There was some interference from red-winged black birds (Agelaius phoeniceus). In some eight instances they carried nesting material into the boxes. Twice they actually covered wood duck nests, but twice wood ducks utilized the foreign material to fashion their own nests. In most cases we detected the red-wing activity and cleaned out the boxes but once the birds succeeded in hatching a clutch before we ousted them. Prothonotary Warblers (Protonotaria citrea) nested in three boxes but it seems logical that woodies could easily evict them. Screech owls (Otus asio) slept in several boxes and twice

they actually nested in the boxes but their activities were of little consequence.

Wood peckers were the major source of nest predation. Yellow shafted flickers (Colaptes auratus) were the chief offenders. In 1967 they destroyed 10 nests and in 1968, 54 nests were destroyed by these vandals. We hasten to add that in all instances we cannot positively state that flickers were the predators.

In several instances red-headed woodpeckers (Melanerpes erythrocephalus) were noted on the boxes and twice were observed entering and leaving boxes, still we were not able to pinpoint actual nest predation by red-heads. Once I observed a red-bellied woodpecker (Centurus carolinus) in the act of destroying a nest. He entered and departed the box 4 times in one 10 minute period, each time remaining in the box only a few seconds. One time he pecked only one egg, twice he pecked 2 eggs, and once - 3 eggs. There was no evidence that woodpeckers actually consumed any of the contents of the eggs.

Flickers actually impaled some eggs and threw them out of the boxes and they were observed carrying their devastating attacks from box to box. There was little evidence that the flickers were competing for nest sites, only twice did they build nests in the boxes. So far as we could determine the acts of molestation were essentially malicious.

We should add too, that in some instances the predation might have occurred after nests were abandoned for other reasons. In 33 cases of flicker predation in 1968, egg laying was in progress and numbers of

eggs had not attained dump nest proportions; there was little room for speculation in determining that these nests were definitely abandoned as a consequence of the woodpecker raids. In 21 instances the nests attacked by these avian predators were dump nests - some containing as many as 35 eggs. So it became a matter of judgement whether the nests were abandoned as a result of woodpecker predation or as the result of strife among the ducks. At any rate the fact that 55 nests containing 937 eggs were attacked by woodpeckers in one season is significant cause for concern and will demand further serious consideration.

Miscellaneous Observations: We have no positive evidence to substantiate survival rates of ducklings. However, when viewed in combination, several contributing factors tend to indicate a figure of about 40%. When the build-up of breeding pairs is analyzed the 40% estimate is convincingly realistic. Refuge files indicate for the 6 year period from 1960 to 1965, an average breeding population of 30 to 35 pairs. The presence of some 150 pairs during the 1966 season suggests that the earlier census figures may have been somewhat low. Of course the jump in 1966 figures over previous years can partially be explained by the acquisition of some 2,000 acres to the refuge area in early 1966 and by the suggestion that many pairs might have been enticed to remain on the refuge and nest in the boxes rather than disperse to other areas.

At any rate the number of breeding pairs increased from 150 in 1966 to 260 in 1967 and to 375 in 1968. We have more substantial evidence that survival after birds reach flight stage was very good. In 1966, 8 females were banded in nest boxes and 6 were banded in bait traps but later showed up in boxes. Of these 14, all were still around in 1967

(as determined by 1968 banding data) and 10 were found in boxes in 1968. In 1967, 42 females were banded in the boxes and 15 were recovered in 1968. The 1968 sample of females handled in nest boxes was 70 birds, thus only about 1/3 of the nesting females were actually handled. If this sample factor is extrapolated and applied to the 1967 recoveries then it becomes apparent that survival among adults is very high. It would appear that our refuge ducks stick rather close during hunting season and are subjected to very little gunning pressure.

One final observation warrants documentation. Over the three year period we recorded many instances in which eggs would disappear from the nest with no hint as to the cause. As a matter of fact we recorded 53 instances of this phenomenon in 1968.....in all 216 eggs disappeared without a trace. It occurred that nests in all stages of progression were vulnerable to these losses, although the incidence of occurrence was higher in nests that were being incubated. In the 7 boxes in my yard it occurred 3 times and a total of 10 eggs were lost. All the eggs laid in these boxes were numbered in bold letters with ink and the boxes were checked as often as twice each day. There is little wonder then that we were baffled when an egg laid one day was gone the next day. It is possible that in boxes away from centers of activity a woodpecker sneaked in, impaled an egg, and flew away with it. This is not likely however, because in every instance of known woodpecker predation, several or most of the eggs in any given nest were pecked and in practically every case desertion followed. Not so in these 53 instances. There was no discontinuity of egg laying or incubation in any case. In the 3 month period that the 7 boxes were under close scrutiny in our yard only

one woodpecker was seen in a box and he was destroyed - then too, this box was not one of the 3 afore mentioned.

As a suggestion to others who might have encountered this dilemma or to those who will later, we offer this factual account which suggests one possible explanation. One afternoon in late May at approximately 6:00 PM from a distance of 170 feet, I watched a female wood duck fly out of the nest box with an egg in her mouth. I could not be certain, but judging from the size of the particle, the egg appeared to be whole. At any rate it was definitely the greater portion of an egg. The same female went on to bring off a brood of 9 although 6 eggs had disappeared from the nest.

In many instances females pushed rotten or infertile eggs to the corners of the boxes, but this is the only instance in which one was actually observed removing an egg. Of course this might have been an anomalous incident since we were not able to find a precedent in the literature. We are not suggesting that such a practice was common enough to account for the unexplained disappearance of the other 215 eggs, but it was a factual observation and it is offered as such for whatever consideration it may warrant.

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