

# WOOD DUCK ROOST UTILIZATION OF NORTHEASTERN NORTH CAROLINA SWAMPS\*

H. RANDOLPH PERRY, Jr., North Carolina Cooperative Fishery Research Unit, North Carolina State University, Raleigh NC 27607<sup>b</sup>

**Abstract:** A total of 112 standardized counts of roosting ducks were made at 4 roosts within 2 typical northeastern North Carolina swamps from September-March, 1972-73 and 1973-74. Zero to 60 ducks were observed per count with an overall average of 7.5. Approximately 97% of all ducks observed were wood ducks (*Aix sponsa*). No differences in numbers of roosting ducks were detected between years or swamps in spite of major watershed differences. However roost site differences within a swamp and several year interactions were important. A significant cubic relationship over time was noted in the average number of ducks observed per count with a peak occurring in late October and early November. Approximately 8% of all ducks observed during the counts were singles and 70% were in flocks of greater than 2 birds. Over 96% of the ducks arrived at roosts after sunset during the November-January hunting-season period whereas overall only 72% of the ducks arrived after sunset.

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Increasing development within northeastern North Carolina coastal plain watersheds requires that biologists more precisely define the importance of swamp ecosystems to fish and wildlife populations. One of the most important waterfowl species in North Carolina is the wood duck and swamp systems offer the most significant coastal plain habitat for these game birds. In an effort to obtain some relative information on the extent ducks use northeastern swamp watersheds within North Carolina and to characterize roosting ducks in swamp communities, standardized counts of ducks at selected roost sites were made in 2 typical watersheds. These counts also allowed the evaluation of seasonal and yearly changes, watershed differences, and roost site differences in duck usage within each swamp.

Studies have been conducted on the roosting characteristics of the wood duck in east-central North Carolina woodland ponds (Hester and Quay 1962, and in Iowa (Hein 1965). The applicability of using roost counts as an index to wood duck abundance has been examined by Martin (1959), Hein (1962), Hein and Haugen (1966), Hester (1966), and Tabberer (1971). Float counts have also been used to index ducks, but Hein (1966) found flight counts more useful for estimating the abundance of nesting wood ducks on Mississippi River tributaries in northeast Iowa.

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## MATERIALS AND METHODS

The study was conducted at Duke Swamp (Gates County) and Haggard Mill Creek (Bertie County) watersheds located approximately 56 km apart in the coastal plain. Two duck roosts per study area (Blanch I and II in Duke; Albemarle and Chemistry site in Hoggard) were chosen for examination during September-March, 1972-73 and 1973-74. Roosts were selected on the basis of quality (roosting a high number of ducks) and stability (expected low day-to-day variation in roosting numbers). Tupelo gum (*Nyssa aquatica*) was the dominant tree at the roost sites; bald cypress (*Taxodium distichum*)

\*North Carolina State University, North Carolina Wildlife Resources Commission, and U.S. Fish and Wildlife Service cooperating.

<sup>b</sup>Present address: Louisiana Cooperative Wildlife Research Unit, School of Forestry and Wildlife Management, Louisiana State University, Baton Rouge 70803.

and black gum (*N. sylvatica*) were also common overstory components. Basal area ranged around 33 m<sup>2</sup>/ha. Major understory plants associated with roost sites were ash (*Fraxinus* spp.), Virginia willow (*Itea virginica*), lizard's tail (*Saururus cernuus*), and cane (*Arundinaria gigantea*). Each of the 4 roosts contained both open water and heavily vegetated areas with varying amounts of crown cover.

Counts were made biweekly beginning 30 minutes before sunset and ending 40 minutes after sunset. Temperature, relative humidity, cloudiness, wind direction and velocity, precipitation, and stream depth were recorded before each count. Although counts were made by different observers, counting procedures and observation points remained constant; 82 percent of the counts were made by 2 observers.

Ducks observed were recorded by species and sex (when possible) within 10 min intervals. Singles, pairs, and flocks were noted separately; observations were made as to the direction of flight and roosting status of each bird. Birds leaving the roost were also noted.

An analysis of variance based on a model containing the sources: swamp, roost/swamp, year, swamp by year, roost/swamp X year, count, and error was used to evaluate the total number of ducks observed on each count. A square root transformation was utilized to minimize the effects of heterogeneous variance within subgroups.

## RESULTS AND DISCUSSION

Fourteen counts were made on each roost during each study segment (September-March); from 0 to 60 ducks were observed per count. The average number of ducks observed per roost count varied from 3.7 to 12.2 with an overall mean of 7.5 (Table 1). Approximately 97 percent of all ducks observed were wood ducks. Other species utilizing the roosts included hooded mergansers (*Lophodytes cucullatus*) and mallards (*Anas platyrhynchos*).

Table 1. Average number of ducks observed on standardized biweekly counts of 4 roosts in Hoggard and Duke watersheds, September-March, 1972-73, 1973-74.

Year	Hoggard			Duke			Year
	Albemarle	Chemistry site	Combined	Blanch I	Blanch II	Combined	
1972-1973	6.8	5.1	6.0	14.1	5.8	9.9	7.9
1973-1974	2.9	13.0	8.0	10.4	1.6	6.0	7.0
Overall	4.9	9.1	7.0	12.2	3.7	7.9	7.5

Fewer wood ducks were observed roosting in northeastern swamps in this study than were found by Hester and Quay (1962) roosting in woodland ponds in east-central North Carolina. Although Hester and Quay (1962) reported peak numbers of 70 to 164 wood ducks per study area, their study areas ranged to 101 ha whereas the largest roost I studied was approximately 2 ha. Total ducks seen on 4 Louisiana lake and pond roosts observed in early October by Tabberer (1971) ranged from 25 to 87; roost size ranged from 4 to 20 ha. Hein and Haugen (1966:660) stated that roost area was loosely related to the number of ducks using the roost.

Despite the fact that the upland portion of Hoggard watershed was in immature plantations of loblolly pine (*Pinus taeda*) and the upland community of Duke was mature mixed pine-hardwoods, no overall swamp (study area) differences in numbers of roosting ducks were observed. However, a swamp by year interaction was present ( $P < 0.05$ ); more ducks were observed using Duke roosts during 1972-1973 whereas in 1973-1974 more waterfowl were seen utilizing the 2 roosts in Hoggard (Table 1). A year-by-roosting-site-within swamp interaction was also present which indicated differences in sites were not consistent over the 2 yr study period. Yearly changes in the relative number of ducks utilizing a particular area may be due to local breeding success, food and water availability, hunting pressures, and migratory behavior. Hester and Quay (1962) observed that peak roosting numbers corresponded with fall migration in their 3 yr study except for a deviation apparently related to an experimental food planting. Tabberer et al. (1972) found that numbers of roosting ducks were affected by water level and shooting. In my

study, availability of cultivated crops varied seasonally and yearly, and evidence of hunting pressure was observed in the Duke roosts on numerous occasions during 1973-74.

Simple roost site differences within a swamp were also detected ( $P < 0.01$ ). Each study area appeared to have 1 heavily used roost and 1 roost which was utilized only moderately (Table 1). Inherent roost site characteristics (cover, water, proximity to food, accessibility) may partially account for such differential duck utilization. Roosts are often difficult to physically identify within swamp ecosystems, except for their use by ducks. As pointed out by Hein and Haugen (1966), detailed physical description of a roost would likely fit surrounding areas which do not characteristically serve as wood duck roosts.

The average number of ducks seen per count varied significantly ( $P < 0.01$ ) by season. The relationship was significantly cubic ( $P < 0.01$ ) with a peak in the average number of ducks observed per count occurring in late October and early November (Fig. 1). A general decline was noted after the opening of hunting season; however, only

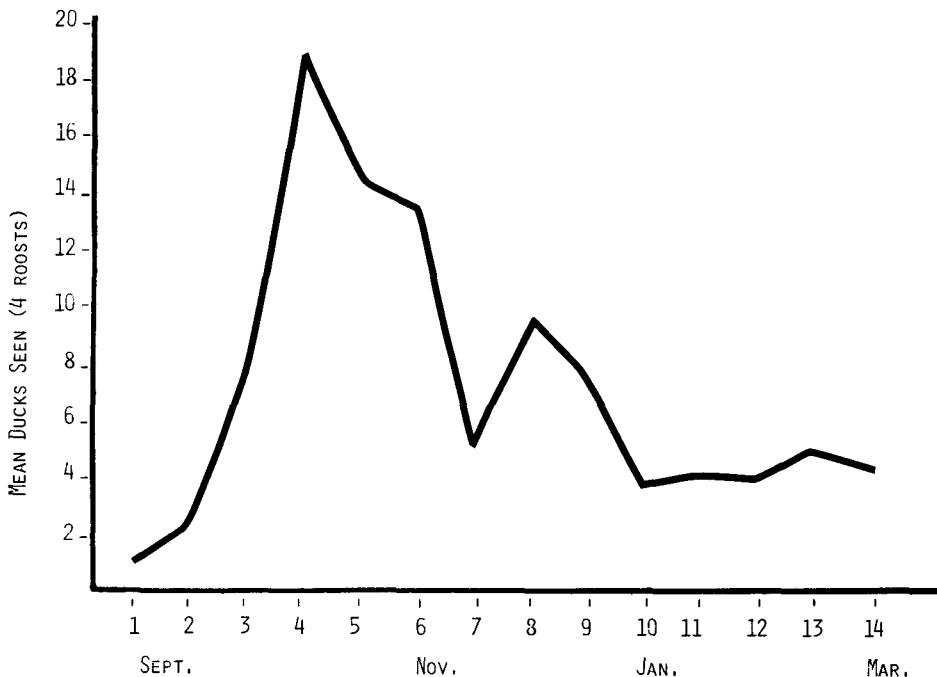


Fig. 1. Mean ducks observed per biweekly count of 4 roosts in Hoggard and Duke watersheds, September-March, 1972-73, 1973-74.

1 of the roosts received heavy hunting pressure (Blanch I). Blanch II and the Hoggard roosts were hunted only moderately. Some studies in different areas and years have also indicated peaks in roosting wood ducks in October and/or early November (Martin 1959, Hester and Quay 1962, Tabberer 1971) while other studies have indicated a peak in roosting numbers in early September (Hartowicz 1965) and in late September-early October (Hein and Haugen 1966).

Approximately 8 percent of all ducks observed during roost site counts were singles and 70 percent were in flocks of more than 2 birds (Table 2). Peaks in the percentage of ducks observed in pairs occurred in September (66.7%), February (70.6%), and March (84.2%). Hester and Quay (1962) found flocks of 2 birds most common and Tabberer et al. (1972) found the percentage of total ducks observed in pairs peaked during the last 3 counts in spring. With large enough samples, flock status should reflect production, migration, and breeding.

Almost 28 percent of all ducks observed during counts at roosts entered the roost before sunset (Table 3). However, during the late-November to early January hunting-

season period (counts 7-9), only 3.3 percent of the ducks observed entered roosts before sunset (the legal close of daily waterfowl shooting). Therefore, it appears that successful harvests of wood ducks coming to roost during a major portion of the hunting season could not be made in these areas without violating current waterfowl regulations. Martin and Haugen (1960), Hester and Quay (1962), Hein (1965) and Tabberer et al. (1972) also found that during fall and/or winter, most wood ducks arrived at roosts after sunset.

Table 2. Status of ducks observed on biweekly counts of 4 roosts in Hoggard and Duke watersheds, September-March, 1972-73, 1973-74.

Count	Month	Percentage observed as		
		Singles	Pairs	Flocks
1	Sept.	33.33	66.67	0.00
2	Sept.	15.00	0.00	85.00
3	Oct.	10.94	21.88	67.19
4	Oct./Nov.	8.55	14.47	76.97
5	Oct./Nov.	4.31	6.90	88.79
6	Nov.	8.33	11.11	80.56
7	Nov./Dec.	2.38	14.29	83.33
8	Dec./Jan.	7.69	20.51	71.79
9	Dec./Jan.	10.94	25.00	64.06
10	Jan.	18.18	18.18	63.64
11	Jan./Feb.	2.94	23.53	73.53
12	Feb.	5.88	70.59	23.53
13	Feb./Mar.	6.98	27.91	65.12
14	Mar.	5.26	84.21	10.53
Totals		8.14	21.80	70.06

Table 3. Arrival time of ducks observed on biweekly counts of 4 roosts in Hoggard and Duke watersheds, September-March, 1972-73, 1973-74.

Count	Month	Percent arriving		Number observed
		Presunset	Postsunset	
1	Sept.	0.00	100.00	9
2	Sept.	25.00	75.00	20
3	Oct.	20.31	79.69	64
4	Oct./Nov.	53.29	46.71	152
5	Oct./Nov.	44.83	55.17	116
6	Nov.	33.33	66.67	108
7	Nov./Dec.	2.38	97.62	42
8	Dec./Jan.	2.56	97.44	78
9	Dec./Jan.	4.69	95.31	64
10	Jan.	3.03	96.97	33
11	Jan./Feb.	5.88	94.12	34
12	Feb.	11.76	88.24	34
13	Feb./Mar.	39.53	60.47	43
14	Mar.	36.84	63.16	38
	Overall	27.66	72.34	835

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