# BREEDING BIRDS OF HALL SWAMP POCOSIN, MARTIN COUNTY, N.C.

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*Abstract.* Pocosins are shrub- and tree-dominated wetlands formed in the coastal plain of North Carolina and other Southeastern States. The vertebrate fauna of pocosin habitats is poorly known. This paper presents the results of several breeding-bird censuses conducted in both altered and unaltered pocosin habitats in Martin County, N.C. Additional notes on vegetation composition, bird-habitat relationships, and other faunal components of the pocosins are also given.

Within the North Carolina coastal plain are numerous poorly drained upland swamp areas, better known as pocosins. These pocosin habitats originally occupied about 2,263,000 acres (Wilson 1962) but since the 1950s substantial amounts have been drained and cleared for conversion to agricultural and silvicultural production. The largest remaining pocosins occur in the Great Dismal Swamp, the Dare-Tyrrell-Hyde County (Pamlimarle) peninsula, Holly Shelter Swamp, Angola Bay, Croatan National Forest, and the Green Swamp. The coastal-plain pocosins contain some of the largest roadless wilderness areas remaining in the state and support a diverse assemblage of plants and animals, some of which may reach their greatest abundance there. A diversity of wetland shrub- and tree-dominated habitats occur in pocosins, and for this reason they serve as valuable breeding and foraging sites for a number of bird species, some of which are considered uncommon or local breeders in the state. Faunal composition of the vast coastal-plain pocosins is poorly understood, particularly breeding birds. It is hoped that this paper will stimulate further research in these areas.

The term *pocosin* has been used over the years to describe many different types of wetland habitats. It evolved from an Algonquin Indian word that meant "where water backed up, as in spring freshets, or in rainy season, which by reason of such happening become necessarily more or less boggy" (Tooker 1899). Early settlers used the term to describe, in a broad sense, any number of swamp types dominated by both trees and shrubs.

Probably the best definition of pocosins, and the one used in this paper, was proposed by Wells (1928). He decribes them as being primarily restricted to the coastal plain, and occurring in broad shallow stream basins, drainage basin heads, and on broad flat uplands. These are areas with long hydroperiods, temporary surface water, periodic fire, and soils of sandy humus, muck, or peat.

Kologiski (1977) in his study of the Green Swamp, a pocosin in Brunswick County, N.C., described eight major vegetation types associated with and often restricted to pocosin areas. They are sedge marsh, Pond Pine-evergreen shrub bog, Pond Pine-deciduous hardwood pocosin, pine savanna, pine flatwoods, Atlantic White Cedar forest, evergreen bay forest, and deciduous bay forest. Each of these types is a complex continuum of species populations determined by soil type, hydroperiod, fire frequency, or other disturbances.

## STUDY AREA

Hall Swamp pocosin is situated in southeastern Martin County and northwestern Beaufort County. Roughly rectangular, it extends from just south of the towns of Plymouth and Jamesville southward into Beaufort County, an area of approximately 78 square miles (i.e. 50,000 acres). The pocosin is bordered on the north by uplands draining into the Roanoke River, on the south by Pamlico River drainages, on the west by well-drained uplands, and on the east by the Pinetown Scarp, a distinct narrow sandridge believed to represent a Pleistocene ocean shoreline (Mixon and Pilkey 1976).

Topography of the Hall Swamp pocosin is essentially flat; 90% of the area is between 46 and 51 feet above mean sea level. The pocosin lies on the Wicomico Terrace, a flat plain that is believed to have been formed by marine and estuarine forces during a high sealevel stand during the middle to early Pleistocene Period (Daniels et al. 1978).

An estimated 90% of the Hall Swamp pocosin has been ditched, drained, and cleared of the native vegetation for conversion to intensively managed pine plantations, a practice that is rapidly altering pocosin and other wetland habitats throughout the North Carolina coastal plain. This has been accomplished by a grid system of roads and numerous ditches and canals that have lowered the water table sufficiently to permit establishment of the pine plantations and to provide easy access for vehicles during timber harvest operations. Hall Swamp can be characterized today as an intensively altered wetland area containing a mosaic of various age class Loblolly Pine plantations with small, scattered pocosin and swamp forest remnants.

The study area was chosen because it represents one of the last remaining blocks of natural pocosin vegetation within Hall Swamp. The term *block* is particularly appropriate because the study area is bounded on all four sides by pine plantations 1 to 10 years old.

The study area (Fig. 1) is at the northern end of Hall Swamp in extreme southeastern Martin County about 8.4 air miles SSE of Jamesville. The area is accessible by road by taking NC 171 south of Jamesville until reaching SR 1541. Continue east on SR 1541 for 3.7 miles until the end of state maintenance. From this point a private timber road (Diamond City Road, which is open to public access) continues SE for 1.2 miles to the southern border of the study area (Fig. 2).

The study area encompasses approximately 775 acres along the broad, flat streamhead of Hardison Mill Creek, one of several small streams that drain the western margin of Hall Swamp. The site is bisected by a number of drainage ditches that feed into the main channel ditch, which in turn feeds into Hardison Mill Creek. The larger road ditches and the main channel ditch are approximately 8 to 10 feet deep and about 12 feet wide. The smaller ditches are about 4 feet deep and 5 feet wide. Spoil banks occur along all ditches. Judging from the early successional stage of the spoil-bank vegetation, the study area was probably ditched less than 10 years ago. It is assumed that eventually the site will be cleared and converted to a pine plantation.

The plant community at the study area is composed of a distinctly three-layered stratification: canopy, subcanopy, and shrub. Loblolly Pine (*Pinus taeda*) is the dominant canopy tree over a closed subcanopy layer of Red Maple (*Acer rubrum*), Red Bay (*Persea borbonia*), Sweet Bay (*Magnolia virginiana*), and smaller Loblolly Pines. The shrub layer is composed of a

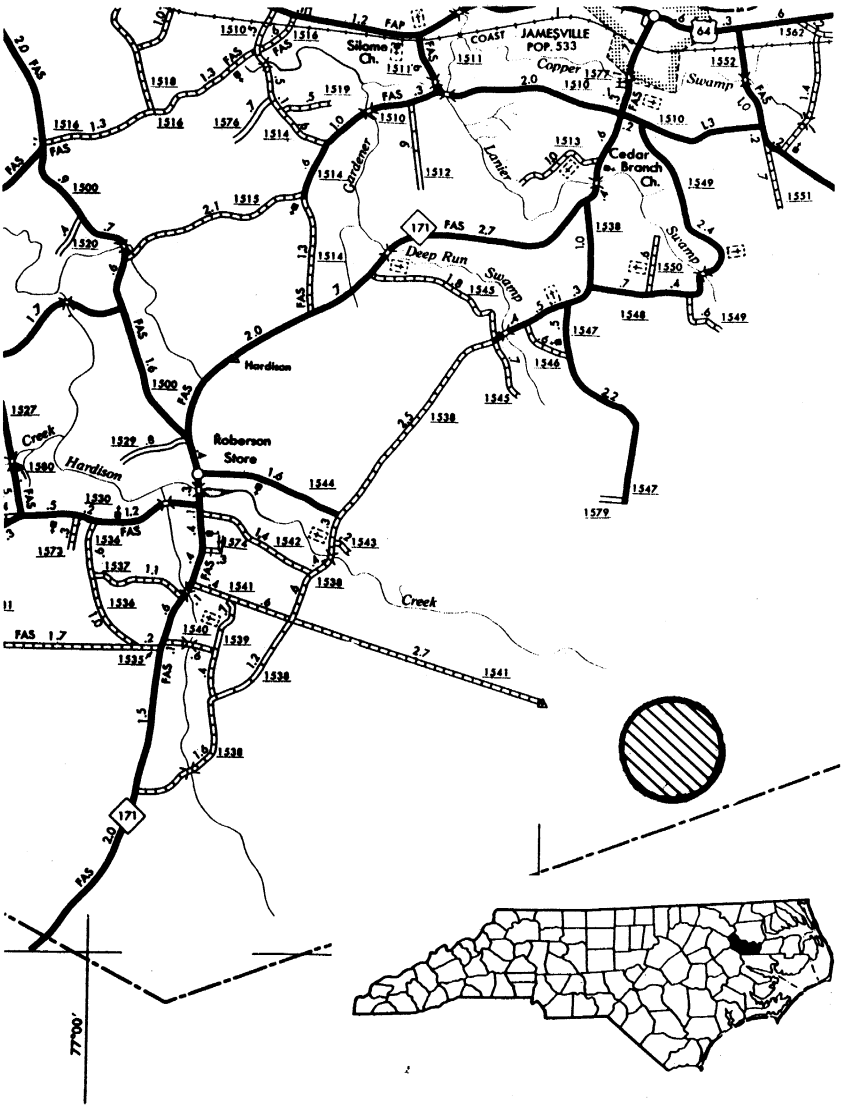


Fig. 1. Study area, Hall Swamp, Martin County, N.C.

dense growth of Sweet Pepperbush (*Clethra alnifolia*), which forms a thicket over much of the area. Ground cover is sparse and consists of occasional patches of Cinnamon Fern (*Osmunda cinnamomea*) and Netted Chain-Fern (*Woodwardia areolata*). Canopy height is an estimated 80 to 95 feet with the

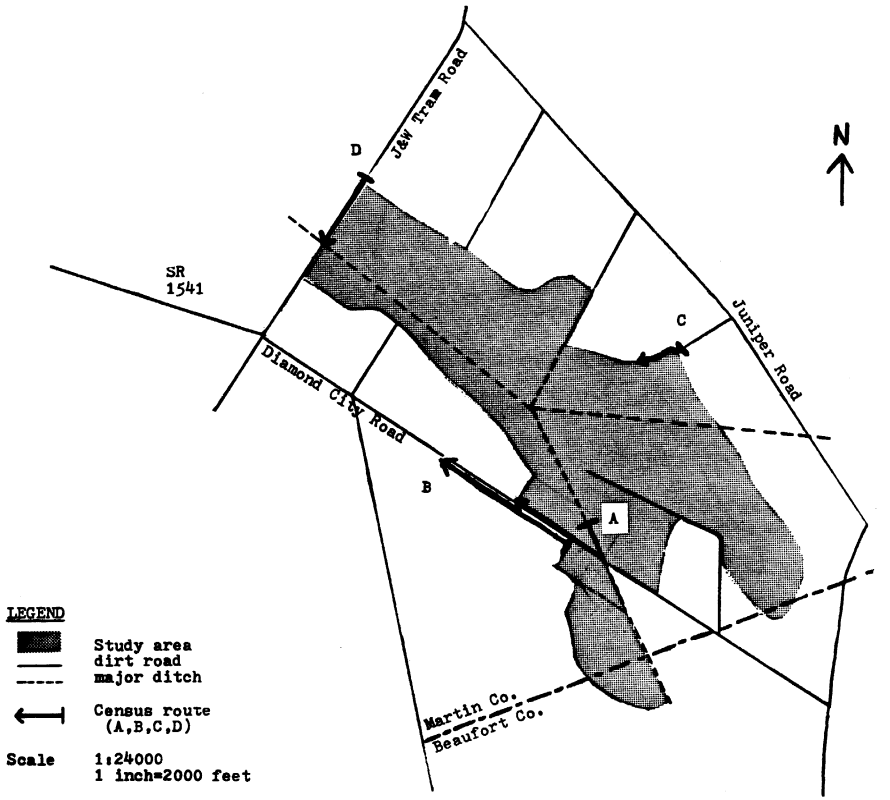


Fig. 2. Martin County, N.C., pocosin study area showing Census Routes A, B, C, and D.

trees averaging about 1.7 to 2.1 feet DBH (diameter breast high). Also present in the canopy are scattered old-growth Bald Cypress (*Taxodium distichum*) up to 90 feet tall and 2.5 feet DBH. Scattered Sweetgum (*Liquidambar styraciflua*), Atlantic White Cedar (*Chamaecyparis thyoides*), and Swamp Black Gum (*Nyssa sylvatica* var. *biflora*) are also present in the subcanopy layer. Other common shrubs include Hercules Club (*Aralia spinosa*), Red Chokeberry (*Sorbus arbutifolia*), and several blueberries (*Vaccinium* sp.). Vines are common, particularly along the road and ditch edges, and include Yellow Jessamine (*Gelsemium sempervirens*) and Greenbriar (*Smilax laurifolia*). Scientific plant names follow Radford et al. (1968).

In summary the forest is characterized by an open canopy of tall, scattered Loblolly Pines over a dense, closed subcanopy of Red Maple and bay trees over a dense, low shrub layer of Sweet Pepperbush (Fig. 3). The scattered Bald Cypresses and Swamp Black Gums are probable indicators of a wetter system in the past before ditching and draining activities lowered the water table. Presently, Red Maple is the only aggressively reproducing tree species,

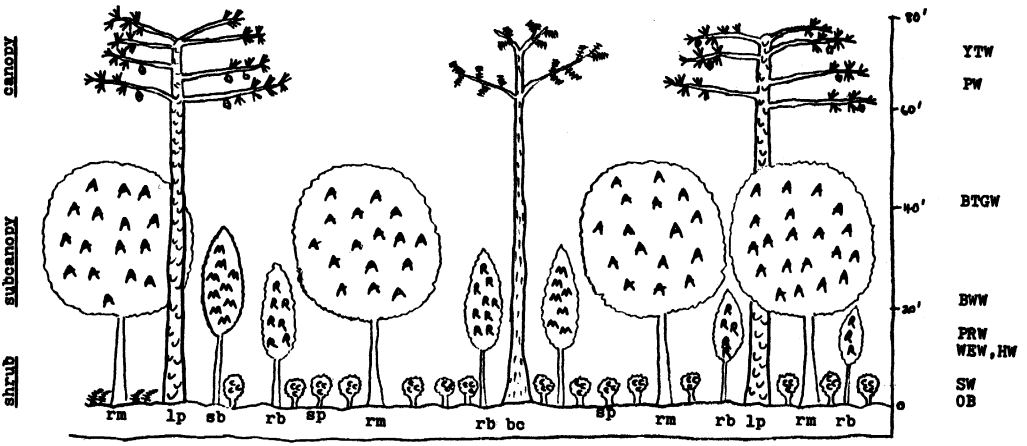


Fig. 3. A diagrammatic representation of the Loblolly Pine-bay forest pocosin habitat type illustrates the vegetation structure and the wood warbler foraging niches. Characteristic plant species are denoted by lower case abbreviations, and wood warbler species are denoted by upper case abbreviations.

| Wood warblers: | |
|---|---|
| Yellow-throated Warbler | YTW |
| Pine Warbler | PW |
| Black-thr. Green Warbler | BTGW |
| Black-and-white Warbler | BWW |
| Prothonotary Warbler | PRW |
| Worm-eating Warbler | WEW |
| Hooded Warbler | HW |
| Swainson's Warbler | SW |
| Ovenbird | OB |

| Characteristic plants: | |
|---|---|
| Red Maple | rm |
| Loblolly Pine | lp |
| Sweet Bay | sb |
| Red Bay | rb |
| Sweet Pepperbush | sp |
| Bald Cypress | bc |

as evidenced by abundant transgressive seedlings and saplings present throughout the study area.

The vegetation of the study area is similar structurally to the deciduous bay forest pocosin type as described by Kologiski (1977) in his study of the Green Swamp pocosin vegetation. His definition of bay forest is characterized by shallow to deep organic soils, intermediate to long hydroperiods, absence of major fires, and a canopy dominated by combinations of the following species: Red Maple, Atlantic White Cedar, Swamp Black Gum, Sweet Bay, Red Bay, Loblolly Bay (*Gordonia lasianthus*), Titi (*Cyrilla racemiflora*), Pond Pine (*Pinus serotina*), and Pond Cypress (*Taxodium ascendens*).

However, in species composition the two sites differ. The last four species are absent from the Hall Swamp study area and are replaced by species that occupy similar structural niches. Loblolly Pine and Bald Cypress replace Pond Pine and Pond Cypress in the canopy while in the shrub layer Sweet Pepperbrush replaces Titi. These differences in composition may be related to soils, hydroperiod, and geography. Pond Pine, Pond Cypress, and Loblolly Bay are common and well adapted to moderately deep organic soils with medium to long hydroperiods (Kologiski 1977), whereas Loblolly Pine and

Bald Cypress more commonly occur over mineral soils with or without shallow organic surface horizons. The study area is underlain by mineral soils with shallow (less than 1.5 feet) organic surface layers. In addition, Martin County is near the northern edge of the natural range for the three absent species. The fourth species missing from the study area, Titi, usually occurs on wetter sites than Sweet Pepperbush. This may explain its absence at Hall Swamp.

Soils in the study area have tentatively been mapped as poorly drained fine sandy loams of the Bladen, Lynchburg, and Rains soil series. These soils have a seasonal high water table within 1 to 1.5 feet of the surface and are strongly to very strongly acidic. Generally throughout the study area a shallow layer of organic matter overlies the mineral soil horizons (Soil Conservation Service 1978).

## STUDY TECHNIQUES

On 18 April and 29 May 1981 I conducted several bird censuses along selected routes on the southern and northern borders of the study area. Censuses were conducted for one hour each between 1200 and 1430. Territorial pairs (represented by singing males) seen or heard along each route were counted. Censuses were conducted by walking slowly along the road or ditch and recording species and numbers seen or heard along the way. In an effort to standardize the counts, each route was (1) run in the same direction, (2) conducted during the same time period, and (3) performed under similar weather conditions on each day. See Figure 2 for locations of the census routes.

Four census routes (A, B, C, D) were conducted during this study. Two routes (A and B) were conducted consecutively on each of the two dates, whereas Route C was censused only on 18 April and Route D only on 29 May. Routes A, C, and D sampled representative examples of the natural pocosin vegetation as described in the Study Area section. Route B sampled a 5-year-old Loblolly Pine plantation managed by a private timber company and situated immediately adjacent to the Route A portion of the study area. This plantation is representative of the many managed even-age pine stands in Hall Swamp. Rows of planted pines about 10 to 20 feet tall form a dense cover. Scattered saplings of Red Maple and Sweetgum are in the stand along with occasional dense patches of Blackberry (*Rubus* sp.). Route B was chosen to sample breeding bird composition and density at an intensively altered site that once contained habitat similar to that of the study area. Tables 1, 2, and 3 summarize census results.

## SPECIES ACCOUNTS

*Whip-poor-will*: Three singing birds were recorded during a nocturnal reconnaissance of the study area on 29 May. This species' distribution in the coastal plain of the Carolinas is poorly understood. Hamel et al. (1979) reported Whip-poor-wills during the breeding season from two locations in the upper South Carolina coastal plain; Fussell and Guida (1975) reported similar observations from the Croatan National Forest, Carteret County, N.C. During June and July from 1975 through 1980, I noted singing birds at several locations in the northern coastal plain of North Carolina: California, Hertford County; Gates, Gates County; Askewville, Bertie County; and Hamilton, Martin County. These records suggest that this species may be fairly common

TABLE 1. Composition and abundance of breeding birds at the Hall Swamp pocosin study area, Martin County, N.C. *Census Route A:* Loblolly Pine-bay forest plant community. Both censuses were conducted between 1200 and 1430 hours. Numbers are territorial males seen or heard along a 3000-foot transect on the Diamond City Road.

| *Species* | *18 April 1981* | *29 May 1981* |
|---|---|---|
| Worm-eating Warbler | 4 | 7 |
| Ovenbird | 2 | 5 |
| Acadian Flycatcher | - | 3 |
| Red-eyed Vireo | 6 | 3 |
| Yellow-billed Cuckoo | - | 2 |
| Eastern Wood-Pewee | - | 2 |
| Great Crested Flycatcher | 2 | 2 |
| Carolina Wren | 2 | 2 |
| Blue-gray Gnatcatcher | 2 | 2 |
| White-eyed Vireo | 1 | 2 |
| Black-and-white Warbler | 1 | 2 |
| Prothonotary Warbler | 4 | 2 |
| Yellow-throated Warbler | 3 | 2 |
| Pine Warbler | 4 | 2 |
| Hooded Warbler | 3 | 2 |
| Northern Cardinal | 5 | 2 |
| Red-shouldered Hawk | 1 | 1 |
| Great Horned Owl | - | 1 |
| Northern Flicker | 1 | 1 |
| Pileated Woodpecker | 1 | 1 |
| Red-headed Woodpecker | 1 | 1 |
| Hairy Woodpecker | - | 1 |
| Northern Bobwhite | - | 1 |
| Ruby-thr. Hummingbird | - | 1 |
| Carolina Chickadee | - | 1 |
| Tufted Titmouse | 3 | 1 |
| Swainson's Warbler | - | 1 |
| Black-thr. Green Warbler | 5 | 1 |
| Wood Thrush | - | 1 |
| Summer Tanager | 1 | 1 |
| Brown-headed Cowbird | 3 | 1 |
| Rufous-sided Towhee | 1 | 1 |
| Red-bellied Woodpecker | 2 | - |
| Blue Jay | 1 | - |
| TOTALS: Individuals | 59 | 58 |
| Species | 24 | 32 |

but local in the northern coastal plain and uncommon to rare in the Carolina coastal plain south of the Neuse River.

*Common Nighthawk*: A total of 12 individuals were seen 29 May at four sites adjacent to the study area. Birds were observed feeding over recently

TABLE 2. Composition and abundance of breeding birds at the Hall Swamp pocosin study area, Martin County, N.C. *Census Route B.* 5-year-old Loblolly Pine plantation. Both censuses were conducted between 1200 and 1430 hours. Numbers are territorial males seen or heard along a 3000-foot transect on the Diamond City Road. The two species recorded in the pine plantation but not in the Loblolly Pine-bay forest plant community are marked with an asterisk (*).

| *Species* | *18 April 1981* | *29 May 1981* |
|---|---|---|
| Prairie Warbler* | 6 | 8 |
| Northern Bobwhite | - | 4 |
| Yellow-breasted Chat* | - | 4 |
| Indigo Bunting | - | 4 |
| Brown-headed Cowbird | 2 | 4 |
| White-eyed Vireo | 3 | 3 |
| Common Yellowthroat | 3 | 3 |
| Mourning Dove | 2 | 2 |
| Yellow-billed Cuckoo | - | 2 |
| Gray Catbird | 1 | 2 |
| Carolina Wren | 2 | 1 |
| Hooded Warbler | 2 | 1 |
| Northern Cardinal | 2 | 1 |
| Rufous-sided Towhee | - | 1 |
| TOTALS: Individuals | 23 | 40 |
| Species | 9 | 14 |

cleared land where large piles of brush and debris had been bulldozed into rows. Behavior of the birds suggested that they were roosting and probably nesting in these cleared areas.

*Black-and-white Warbler*: A total of three singing males, assumed to be territorial, were recorded on two census routes. Recent breeding-season records in the North Carolina coastal plain are few and scattered:

| | | |
|---|---|---|
| Carteret County | June-July 1970-1971 | Fussell, Audubon Field Notes 24:672 and 25:846 |
| Tyrrell County | June 1971 | LeGrand, AFN 25:846 |
| Dare County | June 1971 | Mahler, AFN 25:846 |
| Bertie County | July 1973 | Lynch, American Birds 27:859 |
| Gates County | June 1976-1977 | Lynch, unpub. notes |
| Dare County | May 1980 | LeGrand, AB 34:887 |

The Carteret, Tyrrell, and Gates County records are all from deciduous bay forest pocosin habitat. The birds seen at the study area were in the Red Maple-bay tree subcanopy zone where the Black-throated Green Warbler also forages (see Fig. 3).

*Worm-eating Warbler:* A total of *eight* singing males were recorded on two routes. To my knowledge this is the highest number ever recorded at one locality during the breeding season in the North Carolina coastal plain. Along Route A (Table 1) this warbler was the most common species. Individuals were restricted to the shrub layer and lower levels of the subcanopy. Several males were observed singing from perches in small Red Bay trees about 20 feet above

TABLE 3. Composition and abundance of breeding birds at the Hall Swamp pocosin study area, Martin County, N.C. Both censuses were conducted in the Loblolly Pine-bay forest plant community between 1200 and 1430 hours. Route C includes territorial males seen or heard along a 1000-foot transect; Route D includes territorial males seen or heard along a 2000-foot transect on the J & W Tram Road.

| *Species* | *Route C 18 April 1981* | *Route D 29 May 1981* |
|---|---|---|
| Mourning Dove | - | 3 |
| Carolina Wren | 1 | 2 |
| Northern Cardinal | 1 | 2 |
| Blue-gray Gnatcatcher | 1 | 2 |
| Prothonotary Warbler | 1 | 2 |
| White-eyed Vireo | 2 | 2 |
| Tufted Titmouse | 1 | 2 |
| Northern Bobwhite | - | 2 |
| Yellow-billed Cuckoo | - | 2 |
| Wood Thrush | - | 2 |
| Common Yellowthroat | - | 2 |
| Indigo Bunting | - | 2 |
| Brown-headed Cowbird | - | 2 |
| Northern Flicker | - | 1 |
| Pileated Woodpecker | - | 1 |
| Downy Woodpecker | - | 1 |
| Great Crested Flycatcher | 1 | 1 |
| Eastern Wood-Pewee | - | 1 |
| Acadian Flycatcher | - | 1 |
| Gray Catbird | - | 1 |
| Red-eyed Vireo | 3 | 1 |
| Pine Warbler | 1 | 1 |
| Yellow-throated Warbler | - | 1 |
| Hooded Warbler | 1 | 1 |
| Ovenbird | 1 | 1 |
| Summer Tanager | - | 1 |
| Red-tailed Hawk | 1 | - |
| Red-headed Woodpecker | 1 | - |
| Red-bellied Woodpecker | 1 | - |
| Black-and-white Warbler | 1 | - |
| Worm-eating Warbler | 1 | - |
| Rufous-sided Towhee | 1 | - |
| TOTALS: Individuals | 20 | 40 |
| Species | 17 | 26 |

the ground. Highest densities seemed to be correlated with the densest understory. Interestingly, the Route A census recorded 4 singing males on 18 April and 7 males on 29 May, apparently indicating an influx of additional birds in late April or early May. Singing intensity was vigorous even during the heat of midday on both count days. Worm-eating Warblers are considered

TABLE 4. Master species list of the breeding birds of the Hall Swamp pocosin study area, Martin County, N.C.

Turkey Vulture
Black Vulture
Red-tailed Hawk
Red-shouldered Hawk
Northern Bobwhite
Mourning Dove
Yellow-billed Cuckoo
Great Horned Owl
Whip-poor-will
Common Nighthawk
Chimney Swift
Ruby-throated Hummingbird
Northern Flicker
Pileated Woodpecker
Red-bellied Woodpecker
Red-headed Woodpecker
Hairy Woodpecker
Downy Woodpecker
Great Crested Flycatcher
Acadian Flycatcher
Eastern Wood-Pewee
Northern Rough-winged Swallow
Blue Jay
American Crow
Fish Crow
Carolina Chickadee
Tufted Titmouse
Carolina Wren
Gray Catbird
Wood Thrush
Blue-gray Gnatcatcher
White-eyed Vireo
Red-eyed Vireo
Black-and-white Warbler
Prothonotary Warbler
Swainson's Warbler
Worm-eating Warbler
Black-throated Green Warbler
Yellow-throated Warbler
Pine Warbler
Prairie Warbler
Ovenbird
Common Yellowthroat
Yellow-breasted Chat
Hooded Warbler
Brown-headed Cowbird
Summer Tanager
Northern Cardinal
Indigo Bunting
American Goldfinch
Rufous-sided Towhee

rare and local during the breeding season on the North Carolina coastal plain (Parnell 1977). Recent records are:

| | | |
|---|---|---|
| Carteret County | June-July 1970-1971 | Fussell, AFN 24:672<br>Fussell, AFN 25:846 |
| Dare County | June 1971 | LeGrand, AFN 25:846 |
| Tyrrell County | June 1971 | LeGrand, AFN 25:846 |
| Gates County | June 1972-1980 | Lynch, AB 34:887 |
| Dare County | June 1973 | Fussell, AB 27:859 |
| Dare County | June 1975 | Lynch, AB 29:960 |
| Carteret County | June 1975 | Fussell, AB 29:960 |
| Dare County | June 1977 | Lynch, AB 31:1127 |
| Camden County | April-June 1980 | Terwilliger, AB 35:68-69 |
| Washington County | May 1981 | Lynch, unpub. notes |

Terwilliger (1980) conducted several breeding-bird censuses in Atlantic White Cedar stands, a common pocosin vegetation type, within the Great Dismal Swamp, Camden County, N.C., and the City of Suffolk, Virginia. Worm-eating Warblers were the fifth and sixth most common species in two of these study plots. As far as I can determine all of the 1970 to 1980 records are from similar habitat, i.e. wetland pocosin habitats dominated by dense shrub and subcanopy layers. It seems likely that the Worm-eating Warbler may be

more widespread in the coastal plain than previously thought. It should be looked for in bay forests and Atlantic White Cedar stands.

*Black-throated Green Warbler*: A total of five singing males were recorded on Route A on 18 April. However, on 29 May only one male was recorded. This may be explained by the fact that this species is an early nester and singing activity decreases markedly by early June. Meanley (1979) reports that populations in the Great Dismal Swamp nest "mostly in April" and also notes that this species is one of the most common breeding warblers in the swamp with daily counts of over 100 individuals in the Virginia section.

Within the study area this species had a localized distribution with all pairs clustered in one area along the southern border. Three singing males could be heard simultaneously from one location. Singing activity was vigorous even during midday, and all birds seen were foraging in the Red Maple-bay tree subcanopy zone, 20 to 60 feet above the ground (see Fig. 3).

## OTHER FAUNA

During the study I also noted the occurrence of various mammals, reptiles, and amphibians. Although documentation by specimens was not possible, the following species list may help fill some of the gaps in our knowledge of faunal composition in pocosin habitats.

Mammals:

- Opossum (*Didelphis marsupialis*): tracks only
- Eastern Gray Squirrel (*Sciurus carolinensis*): one seen
- Marsh Rabbit (*Sylvilagus palustris*): one seen
- White-tailed Deer (*Odocoileus virginianus*): 6 seen, many tracks; apparently very common in area

Reptiles and Amphibians:

- Oak Toad (*Bufo quercicus*): hundreds calling after rain, 29 May
- Southern Toad (*Bufo terrestris*): 10+ calling, 29 May
- Southern Cricket Frog (*Acris gryllus*): 10+ calling, 29 May
- Gray Treefrog (*Hyla chrysoscelis*): 20+ calling, 29 May
- Squirrel Treefrog (*Hyla squirella*): 50+ calling, 29 May
- Little Grass Frog (*Limnaoedus ocularis*): hundreds calling, 29 May
- Bullfrog (*Rana catesbeiana*): 2 calling, 29 May
- Green Frog (*Rana clamitans*): 15 calling, 29 May
- Southern Leopard Frog (*Rana sphenocephala*): 10 calling, 29 May
- Eastern Box Turtle (*Terrapene carolina*): 2 seen
- Southeastern Five-lined Skink (*Eumeces inexpectatus*): one seen

## DISCUSSION

A total of 51 avian species, all of which are probable breeders, were recorded within or immediately adjacent to the 775-acre study area. Of this total, 42 species were recorded on the four census routes. A breakdown of the latter total by habitat type indicates that 28 species (67%) are restricted to the mature Loblolly Pine-bay forest plant community, only 2 (5%) are restricted to the early successional Loblolly Pine plantation, and 12 (28%) are common to both habitats. An additional 9 species were seen in the study area but not recorded on the census routes: Turkey Vulture, Black Vulture, Whip-poor-will,

Common Nighthawk, Chimney Swift, Northern Rough-winged Swallow, American Crow, Fish Crow, and American Goldfinch.

The mature Loblolly Pine-bay forest plant community supports a surprisingly diverse assemblage of breeding birds, including 10 species of wood warblers and 6 species of woodpeckers. Contributing to this diversity is the three-layered stratification of the forest, providing a number of foraging niches for the warblers, and the presence of numerous old-growth canopy trees providing abundant dead stubs and branches suitable for use as nesting and feeding habitat by the woodpeckers (see Fig. 3). The dense understory also provides numerous nesting sites for the small passerines, as well as foraging cover.

Several species considered uncommon or local in the coastal plain were recorded. These are Whip-poor-will, Black-and-white Warbler, Worm-eating Warbler, and Black-throated Green Warbler. A number of species considered to be fairly common to common in coastal-plain swamp forests and other wetland habitats were *not* recorded from the study area. These include: Wood Duck, Green-backed Heron, Barred Owl, Chuck-will's-widow, White-breasted Nuthatch, Yellow-throated Vireo, Northern Parula, and Orchard Oriole.

Distribution of the Northern Parula in the coastal plain seems to be correlated with that of Spanish Moss (*Tillandsia usneoides*), an epiphytic plant that provides well-concealed nesting sites. No such obvious explanation can be offered for the apparent absence of the other potential breeding birds that were not found in Hall Swamp.

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## Pocosin: A Clarification

The term "pocosin" is used to describe various freshwater wetland habitats in the coastal plain of the southeastern United States. Botanists, zoologists, hydrologists, geologists, and other researchers have defined the term to include slightly different types of wetland vegetation. Some professionals consider pocosins to be restricted to areas of deep peat or sandy peat characterized by dense Pond Pine and evergreen-shrub vegetation. Their definition of pocosin is narrower than the one used in the above paper on Hall Swamp pocosin. They consider the vegetation type described in this paper to be an upland swamp forest and not a "true" pocosin. Nonetheless, I prefer to use the broad definition of pocosin given by Wells (1928), and included various vegetation types that are associated with poorly drained upland or nonalluvial wetlands. The plant community in Hall Swamp pocosin meets the criteria established by Wells, and the study site is vegetatively quite distinct from typical bottomland or alluvial swamp forest. I believe it is best characterized as a vegetation sub-unit of the pocosin wetland complex.

Persons wishing to learn more about pocosin ecology are referred to *Pocosin Wetlands/Proceedings of Pocosins: A Conference on Alternative Uses of the Coastal Plain Freshwater Wetlands of North Carolina* (C. J. Richardson, editor, 1981, Hutchinson Ross Publishing Co., Stroudsburg, Pa.). —JML