

RETURN TO
DISMAL SWAMP NATIONAL WILDLIFE REFUGE
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The Great Dismal Swamp

Brooke Meanley



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written and photographed by

Brooke Meanley

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The Cover:

The Wayne's warbler, drawn by John W. Taylor.

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FOREWORD

The Great Dismal Swamp is an unbelievable realm of mystery and charm, holding within its marshy confines the enchantment of southern American swamps. Today it is the last wilderness swamp area in the Middle Atlantic region of the United States.

It is the northernmost habitat of some of our most exotic flowers. Bears, few in number, claim it as home. Cottonmouth moccasins slither through its marsh grasses. The canebrake rattler reaches its northern limits in the Great Dismal Swamp. It is the last surviving wilderness area in the Middle Atlantic region where cypress and Spanish moss can be seen.

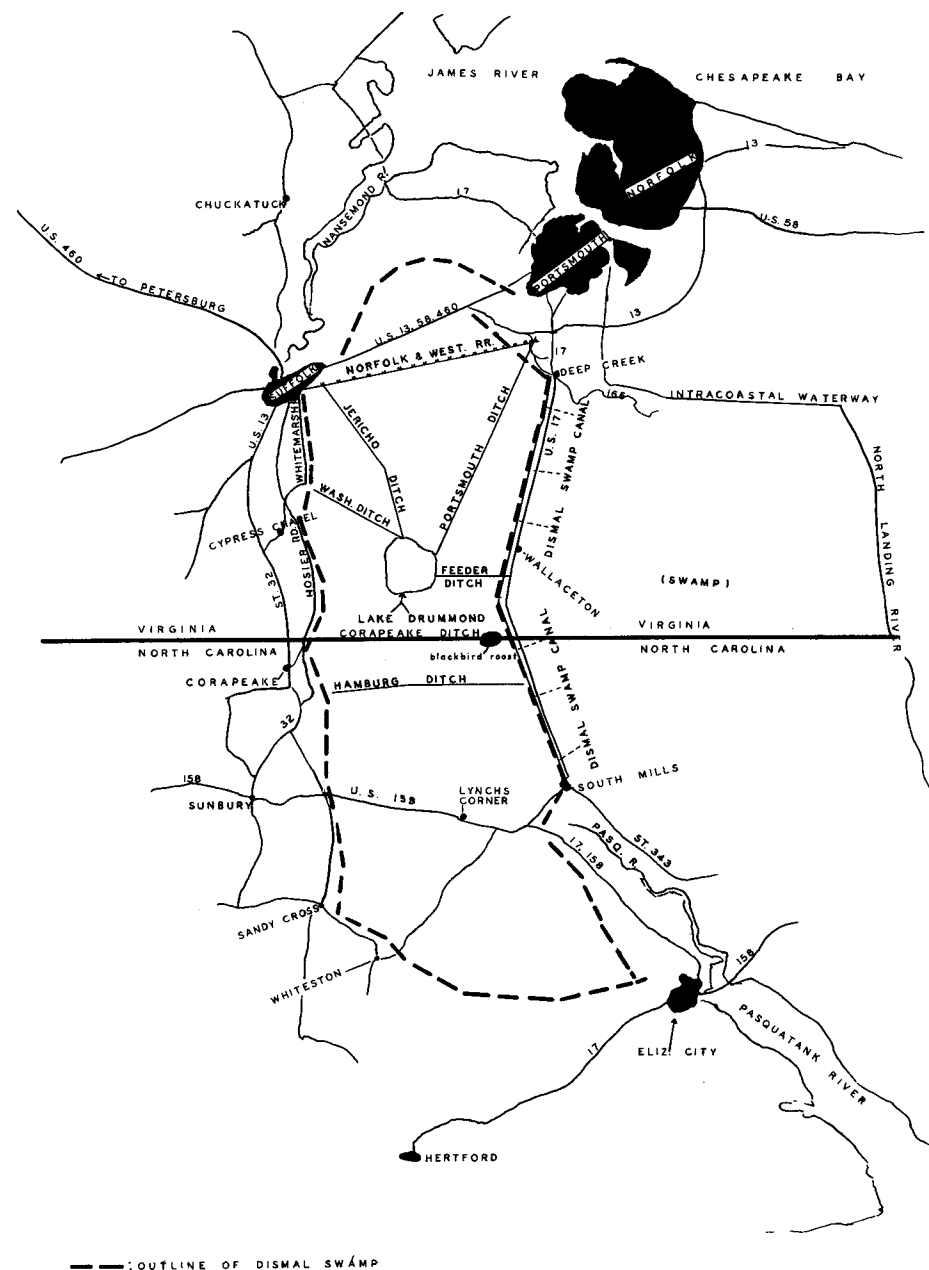
Public appreciation of this wondrous and fragile wilderness area, already high, will be broadened by this writing. Its natural history alone is of interest to any reader.

We should all feel gratitude toward the author, a man who has spent his life studying wild things. His effort is no mere scientific tour of the Great Dismal Swamp but, rather, reflects the sensitivity of a man in love with nature, a man who understands and respects the delicate balances that nature maintains in the wild.

I truly hope that all readers derive as much satisfaction and pleasure from this booklet as I did. Naturalists, by nature and training, it seems, are mostly gentle men. Their writings and the fruits of their labors rarely gather headlines, but for those among you who take the time to read of their pursuits, as in this work, you will quickly learn that theirs is a life of the highest adventure.

NATHANIEL P. REED

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INTRODUCTION

This introduction to the natural history of the Great Dismal Swamp is presented at a time when 50,000 acres of the Swamp are being converted from private holdings to a national wildlife refuge. Recently, the Union Camp Corporation donated this large parcel of swamp wilderness to the Nature Conservancy, which will turn it over to the U.S. Department of the Interior. There are approximately 300,000 acres remaining of this last great wilderness area along the Coastal Plain of the Middle Atlantic states.

The Swamp is especially important as the northern outpost of many kinds of southern plants and animals. J. J. Murray (in Pettingill, *The Bird Watcher's America*, 1965) states: "The Dismal is a finger of the palustrine forest of the Coastal Plain, extended north yet oriented south because of high temperatures, high humidity, and a long growing season."

This extensive swamp wilderness is also of much historic interest. George Washington personally supervised drainage and logging operations and owned considerable acreage in the Swamp. Washington Ditch, which leads from White-marsh Road on the western edge to Lake Drummond in the heart of the Swamp, is four and one-half miles in length and was surveyed by Washington in 1768. William Byrd II, a colorful Virginia statesman of the Colonial period, penetrated the Great Swamp as a commission member in the 1728 survey conducted to establish the boundary between Virginia and North Carolina.

Despite its proximity to a great urban center and the constant lumbering and drainage for almost 200 years, in 1973 the Swamp is still a vast wilderness, even though most of it is second-growth forest. Some of the most attractive areas in the Swamp are also the most accessible. Among these are the Lake Drummond area; the north part of Jericho Ditch, which has the finest forest in the Swamp; and Washington Ditch, because of its historic significance and sections of fine forest.

Since the 1700s, drainage and logging have been the principal activities in the Swamp. In the late 1700s and early 1800s, the Dismal Swamp Canal was conceived as an inland link between the mouth of Chesapeake Bay and Albemarle Sound in North Carolina. In the early days the canal was well within the Swamp, but today this link in the Intracoastal Waterway is the eastern border of the Swamp—as very little swampland to the east of the canal remains. The canal has served as an effective barrier by preventing ready access to the area west of it, thus helping to perpetuate the Swamp's primitiveness.

A sizable section of the Swamp is still owned by several lumber companies. At the moment, most of the lumbering operations are on the North Carolina side. The large area (50,000 acres) in the northwest section that is to become a wildlife refuge has been exceptionally well protected, and there has been very little logging there in the last 30 years. It is a more pleasant area in which to wander than many of our National Parks. Some sections in the northeast and southern parts of the Swamp are continuing to be reclaimed for agricultural purposes.

Since much of the Swamp is privately owned, the greatest threat to the area is the sale of land for real estate development and agricultural use. The purchase and protection of vast areas by conservation agencies could ensure the preservation of this primitive area. Even though virtually all of the forest is second growth, under a successful preservation program the great swamp forest similar to that of the past will be renewed. A notable recent change has been the almost complete logging off of the formerly vast Atlantic white cedar forest. However, this type of forest will renew itself in time if former areas are protected.

In the extensive forests of the Swamp, there are still found several species of the larger mammals such as the black bear, white-tailed deer, bobcat, and river otter. Certainly the greatest thrill for anyone who enters the Dismal is the rare sight of a black bear, of which there are not many left—perhaps only 100.

The Great Dismal is the type locality of the Dismal Swamp log-fern (*Dryopteris celsa*) and an endemic mammal, the Dismal Swamp short-tailed shrew. Among the birdlife of the Swamp, the Swainson's warbler and the Wayne's black-throated green warbler are the specialties. The Swainson's warbler, a common breeding bird in the Dismal, is rare north of the Swamp, although a few occur in the Pocomoke Swamp on the Eastern Shore of Maryland. Wayne's warbler, the coastal race of the black-throated green warbler, is common in the Dismal Swamp, where it reaches its northern limit. Brimley's chorus frog might be considered as one of the cold-blooded vertebrate specialties. It too reaches its northern limit in the Dismal and generally is not well known.

Apparently the most intensive natural history surveys of the Swamp were made between 1890 and 1900, mainly by biologists of the Smithsonian Institution and the U.S. Biological Survey. Among the most active of these scientists were A. K. Fisher, William Palmer, Paul Bartsch, and T. H. Kearney.

Kearney's survey of the Dismal Swamp plants, made from May to November 1898, is the most important botanical study of the Swamp and one of the first to demonstrate that the Dismal Swamp region is the northern limit of many southern palustrine plants. His *Report on a Botanical Survey of the Dismal Swamp Region* was published by the U.S. National Herbarium in 1901. Extensive studies of the flora of southeastern Virginia, mainly west of the Dismal Swamp but including some observations in the Swamp, were made by Merritt Lyndon Fernald and associates during the period 1935 to 1943. Reports of their investigations appeared in the botanical journal *Rhodora*.

J. J. Murray, an ornithologist, wrote one of the finest general accounts of the history and natural history of the Swamp that I have read, titled "The Great Dismal Swamp." It was published in *The Raven* (1948, vol. 19 (3-4): 14-26), journal of the Virginia Society of Ornithology.

I began making my own observations in the Dismal Swamp in the fall of 1957. My earliest work was concerned with the large winter blackbird roost that contains an estimated 30 million birds. During four nesting seasons (1966 through 1969), I spent a total of 40 days in the Swamp studying the Swainson's warbler, one of the Swamp's avian specialties. A number of plants collected in the Swamp were taken to the U.S. Department of the Interior's Patuxent Wildlife Research Center herbarium for identification. Some of these plant specimens are now in the Center's collection.

The list of plants in this report is not complete, but it certainly contains most of the species of trees, shrubs, and vines of the Swamp, including some mention of various herbaceous plants. Plant names are mostly from Fernald (1950) and Radford, Ahles, and Bell (1968). Species of birds treated are primarily those identified with this region as well as those whose status in the Swamp is uncertain. Lists of breeding and winter birds are included. Bird names are from the American Ornithologists' Union (A.O.U.) *Check-list of North American Birds*, 5th Edition (1957). Names of mammals are mostly from Miller and Kellogg (1955); those of reptiles and amphibians, from Conant (1958); and those of butterflies, from Mitchell and Zim (1964). (See Bibliography for complete source list and Appendix for lists of Swamp species and other information.)

Through the excellent cooperation of E. A. Friend, formerly supervising forester of the Nansemond District, Union Camp Corporation, which owned much of the Virginia section of the Swamp, I was able to operate freely throughout their holdings. The same can be said of officials of the Atlantic Forest Products Company, whose operations are mainly in the Carolina section of the Swamp. I am grateful to my colleague, Neil Hotchkiss, botanist of the Patuxent Wildlife Research Center, U.S. Department of the Interior, and to Marie Mellinger, Georgia botanist, for the identification of a number of plants.



The author's 11-year-old daughter stands by a giant bald cypress in the Great Dismal Swamp. The tree has a diameter at breast height of five feet three inches. (Photographed in April 1972)

THE SWAMP AS THE NORTHERN LIMIT OF PLANTS AND ANIMALS

Because of the moderating influence of the Gulf Stream along the south Atlantic Coast, the ranges of many southern plants and animals extend farther northward along the Outer Coastal Plain than they do inland. The Gulf Stream bends out to sea as it approaches the latitude of the North Carolina-Virginia line, and a resulting climatic change halts the northward distribution of many of these Deep South forms in the region of the Great Dismal Swamp.

Some of the best-known indicator plants of the Deep South—Spanish moss, live oak, tupelo gum, longleaf pine, southern magnolia, and cotton—reach their northern limits in the southeastern part of Virginia. Live oak and longleaf pine grow near the Swamp but not in it. Live oak occurs commonly along the Coast north to Cape Henry, some ten miles east of Norfolk, while longleaf pine at this

latitude is found a few miles west of the Swamp near Zuni, Virginia, in the sand barrens of the Blackwater River. Spanish moss grows on a few bald cypresses in Lake Drummond and in places in the North Carolina section of the Swamp along U.S. 158 near Lynch's Corner. There is a station for Spanish moss on the Virginia Eastern Shore near Eastville, but its distribution there is very local, and the plant may have been introduced.

I have seen only one specimen of the well-known and often cultivated southern magnolia growing in the Swamp. This may have been an escape. However, A. M. Harvill, Jr. (*Rhodora*, 1964) found a number of old trees and seedlings of the southern magnolia in a small swamp a few miles east of the Dismal, near Pungo, Princess Anne County, Virginia.

The plant community at this latitude that presents the sharpest contrast with the more northerly woods is the pocosin, bay, or broad-leaved evergreen shrub bog. This combination of broad-leaved evergreens, bays, and pond pines does not occur north of the Dismal Swamp as a major plant community. Such areas in the Dismal Swamp are known as "lights."

Cotton was formerly a fairly important agricultural crop of the region surrounding the Swamp but has largely been displaced by newer crops such as soybeans.

The Great Dismal Swamp area is also the northern outpost for numerous other southern plants and for a number of animals, including the cottonmouth moccasin, canebrake rattler, chameleon or green anole, little grass frog (tiniest North American frog), squirrel treefrog, southern toad, yellow-bellied turtle, cotton mouse, marsh rabbit, Wayne's black-throated green warbler, and Florida grackle. Nowhere else at this latitude in eastern North America is there such an accumulation of diverse southern forms, and more of them occur in the Swamp than in the surrounding area.

It would seem appropriate to mention that the Pocomoke Swamp, which extends southward from lower Sussex County, Delaware, through the Eastern Shore of Maryland nearly to the Virginia line, has some of the characteristics of a typical southern swamp but with fewer southern specialties than the Dismal. The Pocomoke is a long narrow swamp along the Pocomoke River. The northernmost section, near the Delaware line in Maryland, most closely resembles the original swamp, and it is preserved as a sanctuary by Delaware Wild Lands, a private conservation group. The entire Pocomoke, however, could be placed in one small corner of the Dismal.

Bald cypress is one of the Pocomoke's common trees, and such southern plants as crossvine, horse sugar, and red bay reach their northern limits there. The Pocomoke is also the northeastern coastal limit of the range of the Swainson's warbler. Several additional species of plants and animals doubtless would extend their ranges northward to the Delmarva Peninsula (Delaware and the Eastern Shores of Maryland and Virginia) were it not for the mouth of Chesapeake Bay, a formidable barrier. Climate, however, is the chief limiting factor for many species of plants and animals that reach their northern limits in the Dismal Swamp region.



Lake Drummond, in the heart of the Great Dismal Swamp, is approximately two and one-half by three miles in area. Its greatest depth is about six and one-half feet, its bottom is sandy, and its water is amber in color. (Photographed in June 1970)

GEOGRAPHY OF THE SWAMP

Origin

According to Murray (1948), the Dismal Swamp was formed some 6,000 years ago. In his paper he refers to N. H. Darton, who said that the Swamp is all that remains of an old sound or lagoon that was shut off from the sea by a barrier beach (*Norfolk Folio* of the United States Geological Survey). Fenneman (1938) indicates that the original depression was a shallow trough in the undersea surface, made before it emerged as a land terrace.

Climate and Soils

The Dismal Swamp region lies at the extreme northeastern limit of the Humid Subtropical Climatic Province (see Blair's classification 1942). The upper limit of this Province is the January isotherm (mean temperature) of 43 degrees F. Warm Temperate Climate sometimes is used to characterize the region. Zoogeographers cite the Dismal Swamp region as the northeastern limit of the Austroriparian Life Zone (see Merriam 1898). In addition, the Dismal Swamp is the northeastern limit of the Cotton Belt.



Spanish moss on bald cypress in the North Carolina section of the Dismal Swamp is an epiphytic plant, common in only a few small areas of the Swamp, where it reaches its northern limit.

The region has a mean annual temperature of about 60 degrees F. and an average winter temperature of about 42 degrees F. The frost-free season is about 225 days. Mean annual precipitation is about 48 inches, with the greatest amount (average 28 inches) occurring in the warm months (April through September). In an oceanic climate as is found here, temperature fluctuations are not as great as farther inland, and generally there is more rainy and cloudy weather.

Phenologically there is a considerable difference in early spring between the Dismal Swamp region and Washington, D. C., which is only two degrees latitude, or 150 miles, north of the Dismal. Some plants bloom up to three weeks earlier in the Dismal Swamp than in Washington.

Most of the soils in the Dismal Swamp are saturated and very acid. The deepwater swamp, characterized by cypress and gum, has a humus soil; the Atlantic white cedar and evergreen shrub bog communities, with less surface water, are underlain by peaty soil deposited to a depth of ten feet in some places. The organic soils of the surface and subsurface are underlain by sands of various textures and clay to a lesser extent. A relatively small percentage of the Swamp is covered with surface water.

Location and General Features

The Dismal Swamp begins about five miles south of the city of Norfolk, Virginia, and is approximately 25 miles from the Atlantic Ocean. It covers about 13 by 35 miles, a slightly greater portion being in North Carolina. Originally it encompassed about 2,200 square miles (Kearney 1901). Lake Drummond, the highlight of the Swamp, is about two and one-half by three miles in size and is near the center, on the Virginia side. The lake is one of the highest points in the Swamp, about 22 feet above sea level. Its greatest depth is about six and one-half feet, its bottom is sandy, and its water is amber in color and quite turbid.

Prominent man-made features within the Swamp are the several canals or ditches that lead from Lake Drummond to the upland border. Some of the older ditches, such as Washington and Jericho, were dug by slave labor. The Feeder Ditch, approximately three miles long, connects Lake Drummond with the Intracoastal Waterway or Dismal Swamp Canal on the east side of the Swamp.



Tupelo gum is another of many southern plants that reach their northern limits in southeastern Virginia.

The best example of an original timber stand in the Swamp is a large but disappearing tract of Atlantic white cedar or juniper, much of which straddles the Virginia-North Carolina line. A few hardwoods, some exceeding 100 feet in height, are scattered throughout many parts of the Swamp, with the best concentration in the north Jericho Ditch area.

Compared to Okefenokee, the Dismal is mostly solid forest, while Okefenokee is a complex of forests, lakes, and grassy prairies. The kinds of cypresses that occur in the Dismal and Okefenokee differ: bald cypress is the characteristic tree of the Dismal, pond cypress in Okefenokee. Atlantic white cedar, a predominant forest type in the Dismal, is rare in the more southern swamp. Okefenokee has a more diversified bird fauna, featuring a galaxy of large waders; the Dismal has its herons and egrets but no white ibis, wood storks, or sandhill cranes. The Dismal Swamp apparently has a richer breeding songbird fauna, however, since it is generally drier.

Because of drainage projects dating back to the 1760s to facilitate timber removal, the Swamp is drier than formerly, which has led to the invasion, in a few places, of plants requiring a higher and drier substrate. Such upland plants as white oak and chinquapin occasionally are found one or two miles out in the Swamp, mostly on hammock-type lands. But in spite of man's interference, the Dismal is still essentially a wetland area.

MAJOR PLANT COMMUNITIES

Apparently most of the original or climax forest of the Dismal Swamp was composed of swamp black gum, bald cypress, and tupelo gum. These species were dominant when the Swamp was wetter than it is today, but even in pristine times there were probably several other major plant communities besides these so-called deepwater types. Due to natural causes such as fire started by lightning during dry periods, and droughts, the evergreen shrub bog and Atlantic white cedar communities also developed. Man's interference has also changed the complexion of the Swamp and has contributed to the diversification of its plant communities.

Kearney (1901: 360) referred to the swamp forest as the Hygrophile Forest and divided it into two major types: the Dark or black gum swamp and the Open or light swamp, the latter with the following associations: juniper (Atlantic white cedar), Ericaceae (shrubs), canebrake, and Woodwardia-sphagnum.

Hydric or Deepwater Swamp. This is the wettest plant community. In some places plants may be growing in one or two feet of water. These same plants, however, may grow on drier sites or where there is no standing water but the soil is damp or where surface water may accumulate for short periods following heavy rainfall.

This type is best characterized by bald cypress, tupelo gum or water tupelo, swamp black gum, and red maple. These four species may occur together or in stands of one species only. In a few sites bitter pecan or water hickory occurs with cypress. Extensive stands of tupelo gum and bald cypress are rare in the Swamp today, although some tupelo gum occurs on the wettest sites. Red maple is probably the most abundant and widely distributed tree in the Swamp.

Less abundant species of this community are water and pumpkin ashes, swamp poplar, and black willow. Shrub strata plants—such as Virginia willow, highbush blueberry, buttonbush, and sweet pepperbush—are few, particularly where there is standing water for long periods. Lizard-tail is a common herbaceous plant in drier tupelo gum stands. The polypody or resurrection fern is an interesting tree fern that is most often found growing on the trunk of the tupelo gum.

Unusually large cypress trees, mostly culls left from former logging operations, occur here and there throughout the Swamp. Kearney (1901: 418) reported cypress trees 120 feet high and five feet in diameter above the swollen base. The largest cypress that I have seen in the Swamp has a diameter at breast height of five feet three inches.

Semihydric or Mixed Swamp Forest. This community has the richest mixture of plant species in the Swamp and has probably evolved from a wetter, pure stand of swamp black gum forest as the Swamp has become drier. The mixed swamp forest may remain flooded for extended periods following heavy rainfall; most of the year it is without standing water but is damp.



Mixed swamp hardwoods in the North Carolina section of the Dismal Swamp are the principal habitat of Wayne's and Swainson's warblers. (Photographed in April 1970)



The Atlantic white cedar forest in the Dismal Swamp is the largest in existence. The wood thrush and blue jay are usually the only breeding birds of the dense stands.

The mixed swamp forest is composed mainly of swamp black gum, sweet gum, red maple, water oak, swamp magnolia, red bay, American holly, and paw paw. Sweet pepperbush is often the major understory shrub; and two vines, supplejack or rattanvine and greenbrier, occur frequently with this shrub forming dense entanglements. In the more open parts of the forest the netted chain-fern is the common ground cover plant.

In the north Jericho Ditch section of the Swamp, where the best example of this forest type is found, a wide variety of southern plants occurs along its edge, facing Jericho Road and the Ditch. These are mostly shrubs and vines that will not grow in the interior of the dark swamp forest. One of the shrubs is fetterbush, known in the Okefenokee Swamp region as "hurrahbush." Another is shining inkberry, one of the *Ilex*es. Two of the vines, the showiest in the Swamp, are yellow jessamine and climbing hydrangea. A most unusual plant growing along the edge of north Jericho Ditch is a hybrid azalea, a cross between the swamp azalea (*Rhododendron viscosum*) and the pink azalea (*Rhododendron nudiflorum*). Some of these plants reach a height of 10 to 12 feet.

Mesic Forest. This type has some elements of the higher and drier upland or terrace forest found outside the Swamp. It is also known as a hammock. In the swamps of the Deep South, a hammock is a high place, a sort of island in a swamp; it is usually only two or three feet higher than the surrounding swampland. Mesic or hammock forest in the Swamp is a rich moist woods usually with more clay in its soil than is found elsewhere in the Swamp; its acreage here is relatively small.

Important trees of the area are white oak, swamp chestnut oak, water oak, beech, tulip poplar, sourwood, cherrybark oak, American holly, and hornbeam. A few loblolly pines are scattered among these hardwoods. The wild or silky camellia, also known as *Stewartia* (*Stewartia malacodendron*), is a rare small tree in this forest community. The shrub strata is rather open but contains scattered plants of downy leucothoe and switch cane. The dwarf trillium (*Trillium pusillum*) and some of its associates, Indian cucumber-root, crane-fly orchid, and Solomon's seal are found in several mesic forest tracts that I know of in the Dismal. In these same hammocks there are usually four species of fern: New York, netted chain, royal, and cinnamon. Muscadine or scuppernong grape is a common vine of this community.

Atlantic White Cedar Forest. Juniper, as it is known to the local people, occurs in the most extensive pure stands of any tree in the Swamp; at one time the juniper forest of the Dismal was the largest of its kind. Prior to the 1930s, more than 100,000 acres had been cut there. The dense stands are found in areas of acid swamp peat overlying a sandy subsoil. In areas where extensive pure stands occur, the density of the forest usually precludes understory shrubs, but in slightly less dense stands highbush blueberry and shining inkberry or sweet gallberry occur.

The best examples of this forest type are found along the Corapeake Ditch on the North Carolina-Virginia border. The Atlantic white cedar forest is about the last solid stand of timber of significant commercial importance left in the Swamp.



The evergreen shrub bog community is at the east side of the Swamp along the North Carolina-Virginia line. Shrubs, mostly gallberry or inkberry (*Ilex glabra*), average about four feet in height. Such areas in the Dismal Swamp are known as "lights." (Photographed in June 1969)



Ti-ti (*Cyrilla racemiflora*) is a southern shrub reaching its northern limit in southeastern Virginia. It occurs along the edge of the Dismal Swamp Canal and in the evergreen shrub bog community of the Swamp.

Evergreen Shrub Bog Community or Pocosin. Extensive open areas known in the Swamp as "lights" contain plants characteristic of the evergreen shrub bog community, better known in coastal North Carolina as pocosin or bay. Such areas in the Dismal Swamp followed the burning off of the Atlantic white cedar forests.

The evergreen shrub bog community is a combination of waterlogged peaty soil, a ground cover of sphagnum moss, dense broad-leaved shrubs and small trees that are mostly evergreen, thorny vines known as catbrier or bamboo brier and a pond pine overstory. Most of the shrubs belong to the family Ericaceae, including gallberry or inkberry, fetterbush, downy leucothoe, sheep laurel, and ti-ti. Myrtle is common. Two small bay trees, swamp bay or swamp magnolia and red bay, are present. Virginia chain-fern invades the drier sections of this community. Drought or drainage also may result in a succession from shrubs and bay trees to extensive pure stands of switch cane. Kearney (1901: 422) reported cane 20 feet in height. I have seen none over ten feet and rarely any up to one-half inch in diameter. The giant cane of the Deep South canebrakes often reaches 30 feet in height and one and one-half inches in diameter at ground level; I have not seen giant cane in the Dismal Swamp area.

Two Unusual Plants of the Swamp

In the north Jericho Ditch section of the Swamp, in the spring of 1968, I came across two of the rarest plants in southeastern Virginia: the wild or silky camellia and the dwarf trillium. I found the tiny trillium one morning in the midst of the trail of a black bear I was following. The half-dozen wild camellia trees and the bed of trilliums were only about 100 yards apart; both plants were growing in the mesic or hammock-type forest described previously.

The wild camellia, better known by its generic name *Stewartia*, a small tree in the same family (Theaceae) as *Gordonia* and the lost *Franklinia*, reaches a height of about 15 feet and has large showy blossoms that appear in the latter half of May in the Dismal Swamp. When I visited the Swamp on May 23, 1969, the wild camellias were at the height of bloom. The flower has five white petals and numerous dark purple stamens. The conformation of this small tree reminds me somewhat of a beech sapling.



Flowers of the wild and silky camellia (*Stewartia*). A small tree in the same family (Theaceae) as *Gordonia* and the lost *Franklinia*, *Stewartia* reaches a height of about 15 feet and blooms in late May in the Swamp.





Paw paw leaves and fruit. This species is a common understory tree in the mixed swamp hardwood forest.



Beautyberry or French mulberry (*Callicarpa americana*) is a southern shrub with violet-colored fruit clusters.

The dwarf trillium, whose specific name *pusillum* means small, grows to a height of only about one to three inches above the leaf litter and blooms in the Swamp in late March and the first half of April; on April 11-12, 1969, the trilliums were a little past the peak of bloom. Most of the plants had purple flowers, but a few were white or pink.

In one Dismal Swamp hammock, I estimated that there were about 2,000 trillium plants in a quarter-acre area of the most open and driest part of the hammock forest. They do not grow where the leaf litter is heavy.

When I visited the trillium hammock on June 21, 1969, the trilliums were dropping their seed capsules. These capsules, each with its six to 12 seeds intact, drop from the plant and burst open some days later.

The dwarf trillium was first observed in this area by Dr. Paul A. Warren of William and Mary College, who found it along the path from Wallacetown to Lake Drummond in April 1926. Micheaux described the dwarf trillium from specimens collected near Charleston, South Carolina. During his annual botanical explorations in southeastern Virginia from 1935 to 1943, Merritt Lyndon Fernald, the renowned botanist of Harvard's Gray Herbarium, never saw the dwarf trillium. He treated the Virginia trilliums as a geographic variety of *T. pusillum* found farther south and referred to the local plant as "the Virginian endemic" (described in *Rhodora*, 1943, 396-97).

Fernald did find or was told of a station in the Dismal Swamp for the wild camellia. In *Rhodora* (1940: 466) he made the following statement regarding Virginia localities for this plant: "To the few known Virginian stations add one in Norfolk County: dry woods of a 'hammock,' Great Dismal Swamp, west of Yaddin, nos. 11,078 and 12,131, many treelike shrubs up to 6m. high."

In Virginia, the dwarf trillium has been found at several localities on the Coastal Plain as far west as Richmond. According to Robert McCartney, a biologist at Williamsburg, the wild camellia is known from a few localities east of the Dismal Swamp near the North Carolina line and in Accomack County on the Eastern Shore.

The wild camellia, described by Linnaeus in 1753, apparently was first known from southeastern Virginia. Dr. Carroll E. Wood, Jr., associate curator of the Arnold Arboretum of Harvard University, has indicated to me (letter of November 6, 1968) that it may have been discovered by either John Clayton or John Mitchell, early botanists of the Virginia "Tidewater" country.

Both the wild camellia and the dwarf trillium are southern in distribution, being found mainly in the south Atlantic Coastal Plain and the Lower Mississippi Valley, although a variety of the dwarf trillium occurs in the Ozarks of Missouri and Arkansas. These two species reach their northeastern limits in southeastern Virginia.



The dwarf trillium, a rare plant of southeastern Virginia, blooms in the Swamp in late March and early April. Its small size is noted when compared with leaf of American Holly (foreground).

Flowering Periods of Certain Plants

The main flowering period for Dismal Swamp plants is from about April 15 to June 15. The showiest plants are red maple, because it is so abundant and widespread throughout the Swamp, yellow jessamine, swamp magnolia or swamp bay, swamp azalea, downy leucothoe, and sourwood. Japanese honeysuckle is particularly abundant about the borders; and climbing hydrangea, a vine that climbs the trunk

of a tree much like poison ivy, is very showy but often not well exposed in the shade of the swamp forest. Yellow jessamine and swamp magnolia are the most fragrant plants.

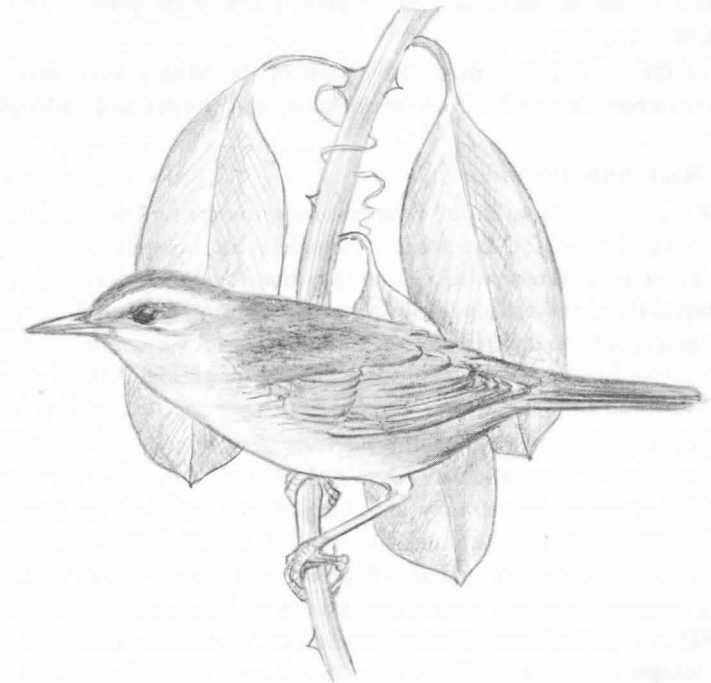
The first woody plant to bloom is the red maple. I have seen some trees in bloom as early as January 16; that same year, 1969, the earliest red maples bloomed in the District of Columbia on about March 7. The dwarf trillium, which blooms in late March and early April, is one of the earliest herbaceous plants to flower. The plant in bloom over the longest period is probably the coral honeysuckle; I have found it blooming from mid-April to late June.

Red Maple.....	late January-February
Shadbush.....	late March-early April
Dwarf Trillium.....	late March-early April
Yellow Jessamine.....	April 15-May 5
Coral Honeysuckle.....	mainly April 15-May 30; a few plants to June 25
Japanese Honeysuckle.....	mid-April-May
Dogwood.....	April
Paw Paw.....	April
Horse Sugar.....	April
Red Chokeberry.....	April
Downy Leucothoe.....	late April-early May
Sweetbells.....	late April-early May
<i>Rhododendron viscosum</i> X <i>R. nudiflorum</i>	late April-early May
Crossvine.....	late April-early May
Adamasco Lily.....	May 22, 1967
Wild or Silky Camellia.....	last half of May
Swamp Magnolia.....	May 15-June 15
Virginia Willow.....	late May-early June
Swamp Azalea.....	late May-mid-June
Strawberry Bush.....	late May-early June
Climbing Hydrangea.....	early June
Clematis.....	early June
Maleberry.....	late June
Sourwood.....	late June
Ti-ti.....	late June
Buttonbush.....	early July
Virginia Creeper.....	early July
Swamp Rose.....	early July

NOTES ON DISMAL SWAMP BIRDS

Since the Dismal Swamp is mostly solid forest, it is essentially a songbird swamp. In several areas where major highways cross the Swamp, particularly in North Carolina, there are wide canals bordering the roads that are used by herons, egrets, ducks, and several other kinds of waterbirds. Also, ditches within the Swamp—Jericho, Washington, Corapeake, Feeder, and others—are used by wood ducks, mallards, black, bluewinged and green-winged teal, hooded mergansers, ring-necked ducks, and a few herons. Because Lake Drummond is rather sterile, producing very little waterfowl food, it is used mainly as a rest area by diving ducks, Canada geese, swans, grebes, and loons. When water is low in the lake, shorebirds stop over to forage along the exposed sandy bottom, although it is not as good for them as mud flats along the coast or farther inland. A few herring and ring-billed gulls course the lake in winter. Great blue, little blue and black-crowned night herons, red-shouldered hawks, barred owls, and turkey and black vultures are among the large birds that breed in the Swamp. The pileated woodpecker, one of the most spectacular birds of the eastern forest, is a common breeding bird.

While most of the songbirds of the Great Dismal can also be found in smaller nearby southeastern Virginia swamps, nowhere else can they be seen in such abundance. Also, the Dismal's two southern specialties, Swainson's and Wayne's warblers, occur there in greater numbers than in most other parts of their range.



Swainson's warbler as drawn by G. M. Bond.

The semihydric or mixed swamp forest community along north Jericho Ditch in the northwest section of the Swamp has the largest trees and the richest mixture of plant species and is the best area for bird watching.

The student of geographic distribution of birds will be impressed by the absence of species he might expect to find in the Dismal. In four years, I have seen only one Kentucky warbler in the Swamp during the breeding season—on the morning of May 23, 1969. Since I did not see or hear it on subsequent visits, I suspect that it was a late migrant or a stray. Murray (1952) presents no breeding records for this section of Virginia. The parula warbler is absent from most hardwood sections of the Swamp during the breeding season, and in the northern Jericho Ditch section, where most of my observations were made, I have not seen one in the past five breeding seasons. Where it does occur during the breeding season, it seems to be associated with stands of bald cypress, which no longer form an important part of the swamp forest.

The brown-headed cowbird appears to be a rather uncommon breeding bird in the Swamp. I usually see only three or four a day during April and May and fewer in June. None of the 11 Swainson's warbler nests that I found was parasitized by the cowbird, although this warbler is an important host species in other areas.

Perhaps the rarest bird in the Swamp is the red-cockaded woodpecker. Since the Swamp has mainly hardwoods, this pinewoods bird is limited to tracts of loblolly pine mainly around the edges and to the pond pines of the pocosin or evergreen shrub bog community.

All of the woodpeckers that I have seen in the Swamp have been in pond pines in the eastern Corapeake Ditch section along the North Carolina-Virginia line.

Spring Migration Period

Since my main mission in the Swamp during the spring has been to study the Swainson's warbler, I have not made a complete list of spring migrants nor a complete schedule of their arrival. Such information for the Norfolk-Dismal Swamp region is available in *Audubon Field Notes* and Murray's *Check-list of Virginia Birds* and is probably no different for the Swamp than for surrounding areas. I have, however, recorded certain observations that may be of special interest as well as a partial list of spring arrival dates.

The summer-resident or breeding warblers arrive in the Swamp before the northern transients. The yellow-throated and Wayne's warblers are the earliest arrivals, the first individuals usually appearing by the last week in March. When I visited the Dismal Swamp on April 11, 1969, all of the resident warblers except the Swainson's had returned, and the Wayne's had already begun to nest. Since the foliage in general was only about one-third out, and, since the Swainson's occupies the shadiest part of the Swamp, its late appearance is probably timed with the later stages of foliage development. The earliest Swainson's arrive in the Swamp about April 15, with the bulk of the population arriving the third week in April.

Summer-resident warblers that had arrived by April 11 (1969) were the prothonotary, pine, yellow-throated, Wayne's, prairie, hooded, ovenbird, Louisiana waterthrush, yellowthroat, and redstart. The black and white and worm-eating warblers also were present. These two species may nest nearby and possibly in the Swamp, but I have not seen the black and white there beyond May 15, and I have observed only one worm-eater during the breeding season (June 4, 1971).

Most of the winter residents are still on hand when the summer-resident warblers arrive. On April 11, 1969, evening grosbeaks, winter wrens, hermit thrushes, and white-throated and swamp sparrows were observed.

The blue-winged warbler is one of the earliest of the transient warblers to arrive in the Dismal. Several were observed on April 20, 1969, and by the end of the first week in May most of them had passed through. Although Murray (1952) lists this species as being a rare transient in the state of Virginia, I found it to be a common spring migrant in the Swamp during four years of observations (1966 to 1969). On April 28, 1968, I counted 30 in a 100-acre tract. During the last week in April 1970, there was a heavy movement of blue-winged, black-throated blue, and black-poll warblers; I counted at least 20 of each in two hours one morning. The black-poll is usually an indicator of the tail end of the main spring warbler migration.

The bobolink, a migrant that I am surprised to see each spring in the swamp forest, is identified with open farmland, usually frequenting meadows and grainfields. Every year during the first week in May I see them feeding on larvae in the tops of tall oaks, often accompanied by red-winged blackbirds (mostly females) and Florida grackles. (See Appendix for the arrival dates of some spring migrants in the Dismal Swamp.)

The Breeding Season

There are about 84 species of breeding birds in the Swamp (see list in Appendix). The warbler family is represented by the greatest number. The prothonotary warbler and the red-eyed vireo are probably the most abundant breeding birds in the forested sections. In the north Jericho Ditch section, where the best swamp forest is located, these two species and the hooded warbler, the Wayne's warbler, and the ovenbird are the five most abundant breeding birds. The prairie warbler, a species usually found in open cutover brushland, such as "lights" in the Dismal Swamp, is an unexpected avian associate of the Swainson's, hooded, and prothonotary warblers in the shrub strata of the mixed swamp forest.

The most sterile habitat for breeding birds in the Swamp is the Atlantic white cedar or juniper forest. This is an extremely dense and dark forest where only the blue jay and the wood thrush are consistent breeding birds. The mourning dove and rufous-sided towhee occur in the less dense stands.

The Dismal Swamp is the only place where I have observed the chimney swift nesting and roosting in hollow trees (usually swamp black gum, tupelo gum, or bald cypress). Writing in *Osprey* (1901), a popular ornithological journal of yester-

year, Paul Bartsch mentioned the nesting chimney swifts in the cypress trees along the edge of Lake Drummond.

On April 18, 1970, I observed a common grackle in the Swamp, nesting in a hole in a stump. This is rather unusual but not unknown.

Both the whip-poor-will and chuck-will's-widow occur in the Dismal Swamp region but more along the edge of the Swamp than in it; they prefer the higher ground. Several nighttime surveys on the western side of the Swamp between Suffolk and Cypress Chapel revealed the whip-poor-will to be the more abundant. On the night of May 23, 1969, I heard nine whip-poor-wills and three chuck-will's-widows along this route.

Although the white-breasted nuthatch is listed by Murray (1952) as uncommon on the coast (and presumably including the Swamp area), I observed six along a half-mile transect in the Jericho Ditch section on June 12, 1969. One was observed carrying nesting material on April 11, 1969.

The Florida grackle (*Quiscalus quiscula quiscula*), a southern form or race of the common grackle, reaches its northern limit in southeastern Virginia (A.O.U. *Check-list*, 1957), where some intergradation may occur with the purple grackle (*Q.q. stonei*) (see Chapman 1935). Three specimens that I collected at a nesting colony in the Swamp on April 22, 1969 appeared to be typical of the Florida race.

The purple and the bronzed grackle (*Q.q. versicolor*) races are apparently the common winter residents of the Dismal Swamp region. The status of the Florida race as a winter resident in this area is unknown, although John S. Webb collected a male of this race on the Maryland Eastern Shore at Whiton, February 16, 1963.

I was surprised to find the scarlet tanager nesting in the Swamp. This species is rare as a breeding bird in this area (see Murray 1952). I observed a pair in its nesting territory throughout June 1971. The summer tanager nests along the border of the Swamp and in some of the more open sections in the Swamp.

The Fall Period

Most of the summer-resident songbirds have departed from the Swamp by the end of September. When I visited there on September 18, 1971, prothonotary and Swainson's warblers, ovenbirds, and Louisiana waterthrushes had left the area, but I saw five hooded warblers, three white-eyed vireos, two wood pewees, six Acadian flycatchers, a yellow-billed cuckoo, a crested flycatcher, and a summer tanager.

The main southward migration of northern songbirds occurs during September, with earliest migrants usually arriving in the second half of August and latest arrivals moving through during the first half of October. During the second week in October the most numerous warblers still migrating are the black and white, parula, magnolia, northern waterthrush, redstart, and yellowthroat. During this early fall transition period the yellowthroat is probably the most abundant bird in the Swamp. Indigo buntings, house wrens, and wood thrushes are common through the second week in October, and flights of sharp-shinned and pigeon hawks may be observed at this time.

Few winter residents arrive before October 1; and the incursion of mass blackbird flights does not begin until about mid-October.

During the second half of October the ornithological picture has changed from one of transition to that of winter aspect. By this time most of the winter-resident species are in the Swamp: white-throated, swamp, and fox sparrows, junco, hermit thrush, ruby-crowned kinglet, winter wren, rusty blackbird, and yellow-bellied sapsucker.

The Winter Period

Because of the relatively mild winter climate, the abundance of winter foods, and the protection provided by the heavy growths of the Dismal, the Great Swamp is the northern limit for large number of wintering catbirds, brown thrashers, robins, towhees, phoebes, fox sparrows, flickers, and woodcocks. The first four are found in greatest numbers in the evergreen shrub bog community along the North Carolina-Virginia boundary on the east side of the Swamp. But the most numerous birds of the Swamp are the blackbirds.

Blackbirds, robins, and common and fish crows form huge roosts in the evergreen shrub bog community. In the 1960s, the blackbird roost contained an estimated 30 million birds; the robin roost, one million; and the crow roost, one-half million.

Most of the blackbirds and the crows feed in the peanut fields on the west side of the Swamp. But from time to time flocks of common grackles return to the Swamp to forage for acorn mast, amphibians, and insects found beneath the leaf litter. At this time of the year the robin is more of a woods bird, feeding mostly on berries, but during protracted warm periods it supplements its diet with worms and other items found in nearby open fields.

In the mixed swamp hardwoods section on the west side of the Swamp, I observed robins feeding on the fruit of American holly, rattanvine, mistletoe, poison ivy, and Japanese honeysuckle. I also have seen cedar waxwings, hermit thrushes, bluebirds, mockingbirds, and pileated woodpeckers feeding on these same fruits.

Shortly after dawn on January 21, 1970, I witnessed the exodus of the myriad robins from their roosts in the evergreen shrub bog area. It was a very cold day, with a temperature of 13 degree F. at 7:00 A.M. and a half-inch of snow on the ground. Throughout the day thousands of robins were observed feeding on fruits of the gallberry or inkberry. This is the predominant shrub of the evergreen shrub bog community in the Dismal Swamp. I examined a number of robin droppings in the area and found that the birds were also feeding to a minor extent on greenbrier (*Smilax*) berries.

On this same day, I visited the nearby Atlantic white cedar forest, the largest in existence, and observed what was probably the largest number of pine siskins ever reported in a single day—10,000 birds. I counted more than 5,000 siskins in groups of various sizes feeding in cedars, and I saw a flock that I estimated to num-



The barred owl, seen here leaving its nest, is the common owl of southern swamps and river floodplain forests.

ber 5,000. On the basis of my 20 years experience censusing blackbirds for the U.S. Fish and Wildlife Service, I feel that my estimate of the number of siskins in this huge flock was, if anything, conservative.

In addition to the pine siskin, the purple finch and evening grosbeak are other northern finches regularly wintering in the Swamp. I counted 60 evening grosbeaks at the north end of Jericho Ditch on January 21, 1970, and I see or hear several every time I visit the Swamp in winter.

The winter wren, a common winter resident in most sections of the Swamp, was usually the only bird that I saw in the understory of the dense stands of Atlantic white cedar. Such stands resemble remarkably the heavy forests of spruce and fir of the northern breeding grounds of this wren. The hermit thrush occurs where the stands of cedar are less dense.

One of the most notable winter evenings that I spent in the Swamp was the time that I heard 50 woodcocks *peenting* (courtship note of the male given from the ground) and saw them performing their courtship flights. This occurred in late January on the western edge, about five miles north of the Carolina line, in the late 1950s.

Two Southern Specialties

The Swainson's Warbler. The Swainson's warbler, one of the least known of southern birds, was first observed in the Dismal Swamp of Virginia on June 2, 1895 by A. K. Fisher. So far as I can ascertain it was 71 years later—on June 16, 1966—that the first active nest was found in the Swamp (by the author). The species is near the northern limit of its breeding range here. (A few occur in the Pocomoke Swamp on Maryland's Eastern Shore near the Delaware line.)



Swainson's warbler on nest in cane. This species is fairly common in the Dismal Swamp and can be seen in the north section of Jericho Ditch and the west side of the Swamp along U.S. 158 in North Carolina.

As of 1969, the Swainson's warbler could be considered a fairly common breeding bird in the Dismal Swamp, especially in the best stands of remaining hardwoods. That May 1, I counted 20 singing males along three miles of roadside in the northwestern corner of the Swamp. Eight had been observed along a half-mile transect at the western end of Corapeake Ditch on April 20, 1958.

The parts of the Swamp in which the Swainson's occur have been drained for logging operations during the past 100 or so years but remain damp. Being in low, flat land with a high water table, some Swainson's warbler territories become partially flooded following heavy rainfall.

These warblers are found mostly in openings between clumps of sweet pepperbush and greenbrier and in small, pure stands of sweet pepperbush in the best swamp forests. Nests are often placed in greenbrier tangles. This is quite like the habitat in which the bird is found in the Pocomoke.

The mid-April arrival of the Swainson's warbler at its breeding ground is heralded by its song, one of the finest of the warbler tribe. It sings from the ground and from trees, shrubs, and vines, usually below 30 feet.

On June 2, 1966, I spent an entire day in a Swainson's warbler territory to determine the number of songs sung and the rate of singing. I arrived in the territory well before daylight and remained there until dark. The Swainson's male started singing at 4:27 A.M. and ceased singing at 5:00 P.M. It sang 1,168 songs that day!

A few birds begin nesting as early as the last few days of April, but most nesting begins the first week in May. The earliest date that I have seen a bird building a nest is April 23 (1969), and the latest I have observed an active nest is July 13 (1971). That nest held two three-day-old chicks. On May 1, 1968, I found a nest in the early stages of construction; it was completed by the evening of May 3. Although most of the building was done between 7:00 A.M. and 11:00 A.M., construction was resumed briefly each day between 4:00 P.M. and 5:00 P.M. The nest was constructed by the female, who gathered all of the nest material from the ground within 30 feet of the nest site. She made between 100 and 120 trips each morning and fewer than a half-dozen each afternoon. The base and outer layers of the nest were constructed mostly of swamp magnolia and swamp black gum leaves, and the cup was lined with cypress needles and the pedicels of red maple flowers.

One female constructed three nests in a single season, none of which fledged young. Nesting success in this species is low because the eggs are white, and the nest is large, not too well concealed, and located one to five feet from the ground.

The Wayne's Warbler. The breeding range of the Wayne's warbler (*Dendroica virens waynei*) is a narrow strip of the outer Coastal Plain extending from the Dismal Swamp region of southeastern Virginia to about Charleston, South Carolina (A.O.U. *Check-list*, 1957). I have traveled this strip for many years and have found this race of the black-throated green warbler to be as abundant in the

Dismal Swamp as in any place within its restricted range. It is one of the earliest resident warblers to arrive in the Swamp; in a normal spring some arrive during the last week in March.

The Wayne's warbler was first discovered in the Dismal Swamp by Russell Richardson and Herbert G. Deignan (see *Auk*, 1926: 552-553), who observed birds in the North Carolina section of the Swamp on June 20, 1926. J. J. Murray and William B. McIlwaine, Jr. obtained the first breeding record when they observed adults feeding fledglings on the Virginia side of the Swamp on May 24, 1932 (see *Auk*, 1932: 487-88).

Since the Wayne's warbler is one of the earliest resident warblers to arrive in the Swamp, it is one of the first to nest. It starts nest building before the better-known northern race of the black-throated green warbler has even left its wintering ground in tropical America. W. R. Rountrey (personal communication to J. J. Murray) found a nest on the east side of the Swamp as early as April 4 (1953). I observed a female carrying nesting material on April 12 (1969). She was gathering the wool coating that covers the young stems or "fiddleheads" of the cinnamon fern; the coating is used in the lining of the nest. On April 17, 1970, I found a nest under construction 30 feet up in an American holly. On April 29, it contained two eggs of the warbler and one of a brown-headed cowbird.

The Wayne's and yellow-throated warblers and the yellow-throated vireo are the so-called treetop birds of the swamp forest, usually ranging between 40 and 80 feet up. These three species do not compete for food because the yellow-throated warbler mostly frequents the loblolly pine and bald cypress, the yellow-throated vireo stays at a rather constant height in the deciduous trees, and the Wayne's warbler, also found mostly in deciduous trees, ranges much more vertically than the vireo, sometimes foraging as low as 20 feet.

The Wayne's warbler does most of its foraging for insects in the terminal parts of branches. In early and mid-April its favorite feeding places are the flower clusters of the sweet gum, and in May it frequently forages among the blossoms of the tulip poplar and the swamp magnolia.

Some ornithologists of the Dismal Swamp region are of the opinion that the Wayne's warbler departs from the breeding grounds soon after the nesting season (by early June), but I found the birds fairly common in the Swamp throughout June. I saw eight territorial males along a one-mile transect on June 12, where ten had been seen in April and May, and I saw two birds in this same transect on June 21; and, as noted above, Russell Richardson and H. G. Deignan reported several from the North Carolina section of the Swamp on June 20. My latest sighting was July 1.

Since I usually discontinue my work in the Swamp by early July, I do not know their status in most of July and August. Like most other birds, they sing much less in summer, and, since they are generally high ranging, their presence would likely go unnoticed.

Thirty Million Blackbirds

The most extraordinary sight in the Great Dismal is the evening gathering of millions of blackbirds at their winter roost near the heart of the Swamp. The roost is in dense pocosin or evergreen shrub bog cover on the North Carolina-Virginia border—the largest blackbird roost in North America. It has been in use for at least 70 consecutive years.

On December 23, 1961, the number of birds occupying the Dismal Swamp roost was estimated to be 31,100,810, a determination made by a number of persons censusing along evening roost flight lines. The east side of the Swamp was manned by Paul Sykes and his Christmas Bird Count group from Norfolk, while the counting on the west side was done by John S. Webb and myself, both of the U.S. Fish and Wildlife Service. Several major flight lines in the west, southwest, and northwest were unmanned; thus many blackbirds were not tallied. It is possible that the roosting population numbers 50 million birds!

The composition on this date was approximately 53 percent common grackle, 46 percent red-winged blackbird, one percent brown-headed cowbird, trace starling, and trace rusty blackbird. The composition on November 15, 1968 was 60 percent common grackle, 20 percent red-winged blackbird, ten percent brown-headed cowbird, ten percent starling, and trace rusty blackbird.

The major flight lines to and from the roost are in the same location year after year. Some blackbirds were observed to fly as far as 30 miles from the roost each day to feed in the peanut fields and corn stubble.



Entrance to the summer loafing and sleeping thicket of a yearling black bear in the Jericho Ditch area, June 1971. Note plants around the entrance such as muscadine grape, tulip poplar saplings, switch cane, and, in the foreground, soft rush. Beyond is the dense thicket of sweet pepperbush and greenbrier.

MAMMALS

In the late 1890s, several prominent naturalists of the Smithsonian Institution and the U.S. Biological Survey began a series of explorations of the Great Dismal Swamp to determine the kinds of animals inhabiting the area. William Palmer, E. A. Preble, A. K. Fisher, C. Hart Merriam, Paul Bartsch, and several of their associates centered their investigations about Lake Drummond in the Virginia portion of the Swamp. Their studies and those of Charles O. Handley, Jr., presently of the Smithsonian, form the basis of what is known about Dismal Swamp mammals.

The Dismal Swamp is the type locality of one species and three subspecies of mammals. The Dismal Swamp short-tailed shrew, discovered by A. K. Fisher in 1895 and described by C. Hart Merriam (*North American Fauna* No. 10, 1895), is an endemic species. The Bachman southeastern shrew, southern bog lemming or lemming mouse, and a muskrat (*Ondatra zibethicus macrondon*) are subspecies discovered in the Swamp. The golden mouse, also found in the Dismal Swamp, was discovered at Norfolk, Virginia, only a few miles from the Swamp.

Paul Bartsch, late curator of mollusks at the U.S. National Museum, made numerous trips into the Dismal around the turn of the century. Bartsch, an all-around naturalist, was usually concerned with birds and mammals on these visits, and among his favorite exploring places were the hollow cypress stumps a few feet offshore in Lake Drummond. In these stumps he found such things as nesting chimney swifts and bats. On one trip he found the red bat, evening bat, and big-eared bat occupying these hollow stumps.

That the Great Dismal is still a vast wilderness is exemplified by the presence of two of its largest mammals, the bobcat and the black bear. The bobcat is still common, but the bear population is diminishing, and probably fewer than 100 are left.

Bears occur in all plant communities in the Swamp. In the spring and early summer of 1971, I saw bears on a number of occasions along the north end of Jericho Ditch. I found the honey tree of a yearling bear with numerous claw marks along the trunk. The bee gum was in the end of a hollow limb of a huge tulip poplar about 50 feet from the ground, and the shrubs beneath the bee hollow were often dripping with honey. I saw the yearling on at least a half-dozen occasions near the honey tree. About a half-mile up the Jericho Ditch from the honey tree was an active den of a female with small cub. The den was in a large swamp black gum, only about one mile from the city of Suffolk. Large tracks, apparently those of a male bear, were also observed in this area.

During the summer I saw fresh bear signs along Corapeake Ditch, just south of the North Carolina-Virginia border in the recent cutover sections of the Atlantic white cedar forest, where the animals had been feeding on blueberries and blackberries. In late summer and early fall, bears occasionally pilfer cornfields that border the Swamp; some caught in the act are shot by farmers.

The river otter is still a common mammal and is mainly associated with the

ditches or canals. In April 1968, I observed a pair with two pups about two-thirds grown at their den in a bank of the Jericho Ditch. I could sit across the ditch, ten feet from the den, and watch the otter family as long as I wished, as they seemed not to be concerned with me. I could hear the pups occasionally crying and watched them swim two or three feet out into the canal as one of the parents returned after a quarter-mile trip up Jericho.

Well-known mammals that are rare or absent in the Dismal Swamp are the larger burrowing animals—the striped skunk, woodchuck, and foxes. The gray fox is common around the upland edge of the Swamp and may hunt in the Swamp at night. The chipmunk is uncommon; I never see more than one a day, and these are in the best forest in the Swamp. Beaver have been extirpated. The fox squirrel is either rare or extirpated; I have not seen one in 15 years of work in the Swamp.

The Dismal Swamp is the northern limit of the marsh rabbit. I have seen only one of these mammals, and that was along the North Carolina-Virginia line in the evergreen shrub bog community on June 30, 1971. The marsh rabbit is stockier and darker than the cottontail, which also occurs in some sections of the Swamp.

In June 1970, I saw a nutria, an exotic mammal that has been introduced into nearby North Carolina marshes. It seemed out of place deep in the swamp forest.



Bear track along Jericho Ditch Road.



Bear den in swamp black gum (Nyssa biflora) near Jericho Ditch.

SNAKES, TURTLES, AND FROGS

Snakes

When one thinks of swamps one of the first things that comes to mind is snakes. They are numerous in the Dismal, but not many are seen in a day's outing unless a special effort is made to see them. I have wandered in the Swamp all day for several days without a single sighting. I recall spending four days in the Swamp one June when the only snake I saw was dangling from the talons of a red-shouldered hawk flying about 25 feet over my head.

There are three species of poisonous snakes in the Dismal: the canebrake rattler, the cottonmouth moccasin, and the copperhead. All three are uncommon. The rattler and moccasin are southern snakes near their northern limits. The mud snake and red-bellied water snake also are southern snakes close to their northern limits on the Atlantic Coastal Plain. By contrast, the northern water snake, one of the most common of the Swamp's water snakes, is near its southern limit.

Turtles

The spotted turtle is the turtle species that I have observed most often in the swamp forest, especially in the tupelo gum swamps. Most of the other turtles, except for the box turtle, seem to be associated with the Swamp's ditches or canals. The yellow-bellied turtle reaches its northern limit in the Dismal Swamp region, where it is quite common and can best be observed in the wide ditch bordering U.S. 158 in the North Carolina section. The painted turtle, mud turtle, snapping turtle, and perhaps other species occur in the ditches.

Frogs

An interesting assortment of frogs occurs in the Great Dismal. Of the several species at or near their northern limits, one is the tiniest of the frog tribe; another, named after a prominent North Carolina naturalist, is little-known but apparently fairly common in the Swamp; and several are treefrogs.

I found temporary rainwater ponds usually the best in the Swamp for a variety of species. The little grass frog, smallest of our frogs, and the southern toad, both near their northern limits, are common during April in such a pond at the head of Railroad Ditch, at the western border of the Swamp. But the southern cricket frog was the most abundant in this pond.

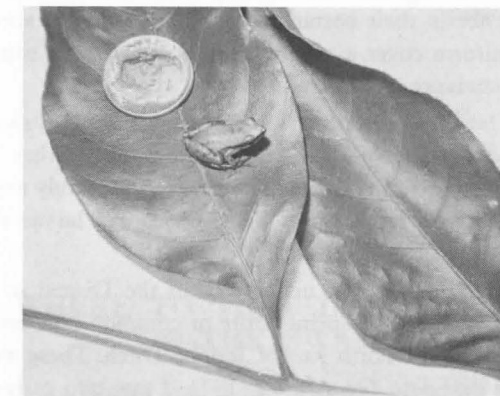
The little grass frog is one of four species of treefrogs (Hylidae) that I have found in the Dismal Swamp. I have seen it in ponds, on the edge of ponds, on blades of grass, or in honeysuckle vines, and in pocosin or evergreen shrub bog communities but not in the heavy swamp forests. The pine woods treefrog occurs mainly in the evergreen shrub bog community and also in cutover white cedar areas.

The squirrel treefrog and gray treefrog both occur in the heavy swamp forest, and I have heard the gray treefrog in cutover white cedar thickets. In a pond in one such area along Corapeake Ditch I saw the eggs of four species of frogs, including

the gray treefrog. The gray treefrog and squirrel treefrog are commonly heard along the north end of Jericho Ditch in May and June. On June 29, 1971, I heard nine squirrel treefrogs calling in a one-acre area along this section of the Ditch.

One of my greatest thrills of 1971 in the Swamp was the finding of Brimley's chorus frog. Russ Dyrland, Phil Jones, and I found two along Jericho Ditch. Phil found one under a log in mixed swamp forest. Roger H. de Rageot, formerly of the Norfolk Museum and an authority on Dismal Swamp reptiles and amphibians, informed me that this attractive frog is fairly common in the Swamp.

There are a number of other species of frogs in the Dismal. Some that I have seen and heard that are quite common are the bullfrog, the spring peeper, the southern leopard frog, and the green frog.



Adult little grass frog (smallest frog in North America) reaches its northern limit in the Dismal Swamp region, where it is fairly common.



Brimley's chorus frog reaches its northern limit in the Dismal Swamp, and is found southward along the Coastal Plain to about Savannah, Georgia.

BUTTERFLIES

Most of the butterflies in the Dismal Swamp occur along the spoil bank roads or logging roads and in the "lights" (evergreen shrub bog communities). It is along the edges of the open, well-lighted roads that a profusion of wildflowers grows, from which the butterflies obtain their nectar. In the "lights" the ericaceous shrubs form a dense and fairly uniform cover averaging four to six feet in some sections; such shrubs produce an abundance of flowers.

By comparison, few butterflies occur in the densely wooded swamp forests. The zebra swallowtail and the Creole pearly eye are the species that I have observed most often in the swamp forests. The zebra swallowtail is mainly associated with the paw paw, a small tree with large leaves upon which the larvae feed. The Creole pearly eye is associated with switch cane.

The butterfly season really gets under way in the Dismal in late March and early April. On April 1, 1971, the spring azure or common blue and the hoary elfin were quite common along the north part of Jericho Ditch. These were the only two species seen there on that date. On April 2, 1971, I saw two early-appearing zebra swallowtails and an early tiger swallowtail along U.S. 158, which runs through the North Carolina section of the Dismal. Commas were abundant on this date along Hamburg Ditch, in the North Carolina section. By the last week in April 1971, the zebra and tiger swallowtails were the most abundant large butterflies in the north Jericho Ditch section where the best swamp forest is located.

On April 24, Robert T. Mitchell, an entomologist at the Patuxent Wildlife Research Center, and I collected the following butterflies along the north section of Jericho Ditch: zebra swallowtail, Palamedes swallowtail, tiger swallowtail, pipevine swallowtail, Juvenal's duskywing, silverspotted skipper, gummed satyr, orange tip, common blue, and Creole pearly eye.

During the late spring, summer, and early fall of 1970 and 1971, the Palamedes swallowtail, a southern butterfly near its northern limit, was the most abundant large butterfly in the Swamp.

In the first week in October 1970, I found the following butterflies to be fairly common in the more open sections of the Swamp: Palamedes swallowtail, monarch, pearl crescent, question mark, red admiral, great purple hairstreak, American painted lady, red-spotted purple, Creole pearly eye, southern cloudywing, and buckeye.

HOW AND WHERE TO VISIT INTERESTING SECTIONS OF THE SWAMP

The interior of the Dismal Swamp can be reached through a network of logging or spoil bank roads and in a canoe or boat by way of the Feeder Ditch to Lake Drummond. All of the roads are chained off, and for access one must have permission from the wildlife refuge representative at Suffolk.

The main road into the Swamp is Jericho Ditch Lane, which lies just beyond the city limits of Suffolk. To reach Jericho Ditch Lane, take Washington Street east through Suffolk to White Marsh Road; drive south about three-quarters of a mile, just beyond the power line that crosses the road, and turn eastward into the Swamp. Jericho Ditch Lane, Washington Ditch Road, and Railroad Ditch Road—all on the west side of the Swamp in Virginia—lead to Lake Drummond as well as to other sections of the interior of the Swamp.

Swainson's, Wayne's, prothonotary, and other summer-resident warblers can be heard and seen along most sections of these roads. Common southern plants bordering these access trails include tupelo gum, swamp black gum, bald cypress, red bay, water oak, downy leucothoe, switch cane, yellow jessamine, rattanvine, and climbing hydrangea.

The most attractive and productive section of the Swamp for a variety of plants and birds is along the north section of Jericho Ditch.

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APPENDIX

Trees, Shrubs, and Vines of the Dismal Swamp

Trees

Loblolly Pine (<i>Pinus taeda</i>)	Tulip Tree (<i>Liriodendron tulipifera</i>)
Pond Pine (<i>Pinus serotina</i>)	Swamp Magnolia (<i>Magnolia virginiana</i>)
Bald Cypress (<i>Taxodium distichum</i>)	Southern Magnolia (<i>Magnolia grandiflora</i>)
Atlantic White Cedar (<i>Chamaecyparis thyoides</i>)	Paw Paw (<i>Asimina triloba</i>)
Red Cedar (<i>Juniperus virginiana</i>)	Red Bay (<i>Persea borbonia</i>)
Black Willow (<i>Salix nigra</i>)	Sassafras (<i>Sassafras albidum</i>)
Swamp Cottonwood (<i>Populus heterophylla</i>)	Sweet Gum (<i>Liquidambar styraciflua</i>)
Bitter Pecan (<i>Carya aquatica</i>)	Sycamore (<i>Platanus occidentalis</i>)
Hornbeam (<i>Carpinus caroliniana</i>)	Washington Thorn (<i>Crataegus phaenopyrum</i>)
River Birch (<i>Betula nigra</i>)	Hawthorn (<i>Crataegus viridis</i>)
Beech (<i>Fagus grandifolia</i>)	Shadbush (<i>Amelanchier</i> sp.)
White Oak (<i>Quercus alba</i>)	

Overcup Oak (*Quercus lyrata*)
 Swamp Chestnut Oak (*Quercus michauxii*)
 Pin Oak (*Quercus palustris*)
 Southern Red Oak (*Quercus falcata*)
 Cherrybark Oak (*Quercus falcata*, var. *pagodaefolia*)
 Water Oak (*Quercus nigra*)
 Willow Oak (*Quercus phellos*)
 Laurel Oak (*Quercus laurifolia*)
 American Elm (*Ulmus americana*)
 Winged Elm (*Ulmus alata*)
 Red Mulberry (*Morus rubra*)
 Sugarberry (*Celtis laevigata*)

Shrubs

Wax Myrtle (*Myrica cerifera*)
 Bayberry (*Myrica heterophylla*)
 Hazel-nut (*Corylus americana*)
 Alder (*Alnus serrulata*)
 Chinquapin (*Castanea pumila*)
 Virginia Willow (*Itea virginica*)
 Swamp Rose (*Rosa palustris*)
 Red Chokeberry (*Aronia arbutifolia*)
 Poison Sumac (*Rhus vernix*)
 Dwarf Sumac (*Rhus copallina*)
 Winterberry (*Ilex verticillata*)
 Inkberry (*Ilex glabra*)
 Shining Inkberry (*Ilex coriacea*)
 Strawberry Bush (*Euonymus americanus*)
 Hercules Club (*Aralia spinosa*)
 Sweet Pepperbush (*Clethra alnifolia*)

Vines

Common Greenbrier (*Smilax rotundifolia*)
 Catbrier (*Smilax bona-nox*)
 Sawbrier (*Smilax glauca*)
 Coral Greenbrier (*Smilax walteri*)
 Bamboo Brier (*Smilax laurifolia*)
 Wild Yam (*Dioscorea villosa*)

American Holly (*Ilex opaca*)
 Box Elder (*Acer negundo*)
 Red Maple (*Acer rubrum*)
 Wild Camellia (*Stewartia malacodendron*)
 Swamp Black Gum (*Nyssa biflora*)
 Tupelo Gum (*Nyssa aquatica*)
 Dogwood (*Cornus florida*)
 Sourwood (*Oxydendrum arboreum*)
 Persimmon (*Diospyros virginiana*)
 Horse Sugar (*Symplocos tinctoria*)
 Water Ash (*Fraxinus caroliniana*)
 Green Ash (*Fraxinus pennsylvanica*)
 Pumpkin Ash (*Fraxinus tomentosa*)

Swamp Azalea (*Rhododendron viscosum*)
 Mountain Laurel (*Kalmia latifolia*)
 Sheep Laurel (*Kalmia angustifolia*)
 Maleberry (*Lyonia ligustrina*)
 Fetterbush (*Lyonia lucida*)
 Downy Leucothoe (*Leucothoe axillaris*)
 Sweetbells (*Leucothoe racemosa*)
 Highbush Blueberry (*Vaccinium corymbosum*)
 French Mulberry (*Callicarpa americana*)
 Possumhaw Viburnum (*Viburnum nudum*)
 Arrow-wood (*Viburnum dentatum*)
 Elderberry (*Sambucus canadensis*)
 Ti-ti (*Cyrilla racemiflora*)

Muscadine (*Vitis rotundifolia*)
 Fox Grape (*Vitis labrusca*)
 Summer Grape (*Vitis aestivalis*)
 Maypops (*Passiflora incarnata*)
 Yellow Jessamine (*Gelsemium sempervirens*)
 Crossvine (*Bignonia capreolata*)

Leather-flower (*Clematis crispa*)
 Climbing Hydrangea (*Decumaria barbara*)
 Poison Ivy (*Rhus radicans*)
 Rattanvine (*Berchemia scandens*)
 Virginia Creeper (*Parthenocissus quinquefolia*)

Trumpet Creeper (*Campsis radicans*)
 Japanese Honeysuckle (*Lonicera japonica*)
 Coral Honeysuckle (*Lonicera sempervirens*)

Arrival Dates of Some Spring Migrants

Observations were made on selected days that I visited the Swamp and are not the results of consecutive days of observation during the migration period. Thus it is probable that virtually all of the species listed arrived several days prior to dates I have given.

March 31, 1970	Yellow-throated Warbler	April 12, 1969	Common Loon
	Ring-necked Duck	April 15, 1961	Swainson's Warbler
	Barn Swallow	April 16, 1970	Ruby-throated Hummingbird
April 2, 1971	King Rail		Crested Flycatcher
	American Bittern		Solitary Vireo
	Wayne's Black-throated Green Warbler		Yellow-throated Vireo
	Parula Warbler	April 17, 1970	Wood Thrush
	Louisiana Waterthrush		Black-throated Blue Warbler
	Black and White Warbler	April 18, 1970	Blue Grosbeak
	White-eyed Vireo		Orchard Oriole
April 3, 1971	Cattle Egret	April 20, 1969	Blue-winged Warbler
April 11, 1969	Prothonotary Warbler	April 21, 1966	Rose-breasted Grosbeak
	Pine Warbler	April 28, 1968	Yellow-billed Cuckoo
	Prairie Warbler		Black-poll Warbler
	Hooded Warbler	April 29, 1970	Acadian Flycatcher
	Ovenbird	May 1, 1968	Yellow Warbler
	Yellowthroat		Baltimore Oriole
	Redstart	May 1, 1969	Tennessee Warbler
	Worm-eating Warbler		
	Red-eyed Vireo		

Breeding Birds of the Dismal Swamp, Virginia-North Carolina

Great Blue Heron (<i>Ardea herodias</i>)	Carolina Chickadee (<i>Parus carolinensis</i>)
Green Heron (<i>Butorides virescens</i>)	Tufted Titmouse (<i>Parus bicolor</i>)
Little Blue Heron (<i>Florida caerulea</i>)	White-breasted Nuthatch (<i>Sitta carolinensis</i>)
Black-crowned Night Heron (<i>Nycticorax nycticorax</i>)	Brown-headed Nuthatch (<i>Sitta pusilla</i>)
Black Duck (<i>Anas rubripes</i>)	House Wren (<i>Troglodytes aedon</i>)
Wood Duck (<i>Aix sponsa</i>)	Carolina Wren (<i>Thryothorus ludovicianus</i>)
Turkey Vulture (<i>Cathartes aura</i>)	Mockingbird (<i>Mimus polyglottos</i>)
Black Vulture (<i>Coragyps atratus</i>)	Catbird (<i>Dumetella carolinensis</i>)
Cooper Hawk (<i>Accipter cooperii</i>)	Brown Thrasher (<i>Toxostoma rufum</i>)
Red-tailed Hawk (<i>Buteo jamaicensis</i>)	Wood Thrush (<i>Hylocichla mustelina</i>)
Red-shouldered Hawk (<i>Buteo lineatus</i>)	Bluebird (<i>Sialia sialis</i>)
Sparrow Hawk (<i>Falco sparverius</i>)	Blue-Gray Gnatcatcher (<i>Poliopitila caerulea</i>)
Bobwhite (<i>Colinus virginianus</i>)	Starling (<i>Sturnus vulgaris</i>)
King Rail (<i>Rallus elegans</i>)	White-eyed Vireo (<i>Vireo griseus</i>)
Woodcock (<i>Philohela minor</i>)	Yellow-throated Vireo (<i>Vireo flavifrons</i>)
Mourning Dove (<i>Zenaidura macroura</i>)	Red-eyed Vireo (<i>Vireo olivaceus</i>)
Yellow-billed Cuckoo (<i>Coccyzus americanus</i>)	Prothonotary Warbler (<i>Protonotaria citrea</i>)
Screech Owl (<i>Otus asio</i>)	Swainson's Warbler (<i>Limnolophus swainsonii</i>)
Great Horned Owl (<i>Bubo virginianus</i>)	Worm-eating Warbler (<i>Helmitheros vermivorus</i>)
Barred Owl (<i>Strix varia</i>)	Parula Warbler (<i>Parula americana</i>)
Chuck-will's-widow (<i>Caprimulgus carolinensis</i>)	Yellow Warbler (<i>Dendroica petechia</i>)
Whip-poor-will (<i>Caprimulgus vociferus</i>)	Black-throated Green (Wayne's) Warbler (<i>Dendroica virens waynei</i>)
Chimney Swift (<i>Chaetura pelagica</i>)	Yellow-throated Warbler (<i>Dendroica dominica</i>)
Ruby-throated Hummingbird (<i>Archilochus colubris</i>)	Pine Warbler (<i>Dendroica pinus</i>)
Belted Kingfisher (<i>Megaceryle alcyon</i>)	Prairie Warbler (<i>Dendroica discolor</i>)
Yellow-shafted Flicker (<i>Colaptes auratus</i>)	Ovenbird (<i>Seiurus aurocapillus</i>)
Pileated Woodpecker (<i>Dryocopus pileatus</i>)	Louisiana Waterthrush (<i>Seiurus motacilla</i>)
Red-bellied Woodpecker (<i>Centurus carolinus</i>)	Yellowthroat (<i>Geothlypis trichas</i>)
Red-headed Woodpecker (<i>Melanerpes erythrocephalus</i>)	Yellow-breasted Chat (<i>Icteria virens</i>)
Hairy Woodpecker (<i>Dendrocopos villosus</i>)	

Downy Woodpecker (<i>Dendrocopos pubescens</i>)	Hooded Warbler (<i>Wilsonia citrina</i>)
Red-cockaded Woodpecker (<i>Dendrocopos borealis</i>)	Redstart (<i>Setophaga ruticilla</i>)
Eastern Kingbird (<i>Tyrannus tyrannus</i>)	Red-winged Blackbird (<i>Agelaius phoeniceus</i>)
Crested Flycatcher (<i>Myiarchus crinitus</i>)	Orchard Oriole (<i>Icterus spurius</i>)
Phoebe (<i>Sayornis phoebe</i>)	Common Grackle (<i>Quiscalus quiscula</i>)
Acadian Flycatcher (<i>Empidonax virescens</i>)	Brown-headed Cowbird (<i>Molothrus ater</i>)
Wood Pewee (<i>Contopus virens</i>)	Scarlet Tanager (<i>Piranga olivacea</i>)
Barn Swallow (<i>Hirundo rustica</i>)	Summer Tanager (<i>Piranga rubra</i>)
Blue Jay (<i>Cyanocitta cristata</i>)	Cardinal (<i>Richmondia cardinalis</i>)
Common Crow (<i>Corvus brachyrhynchos</i>)	Blue Grosbeak (<i>Guiraca caerulea</i>)
Fish Crow (<i>Corvus ossifragus</i>)	Indigo Bunting (<i>Passerina cyanea</i>)
	Goldfinch (<i>Spinus tristis</i>)
	Rufous-sided Towhee (<i>Pipilo erythrophthalmus</i>)
	Chipping Sparrow (<i>Spizella passerina</i>)

Composition and Relative Abundance of Breeding Birds*

(Based on one-mile transect, Jericho Ditch, May 2, 1969, 10:00-11:00 A.M.)

Prothonotary Warbler	14	Wood Pewee	3
Wayne's Warbler	10	Blue Jay	3
Red-eyed Vireo	10	Catbird	3
Hooded Warbler	10	Red-shouldered Hawk	2
Yellowthroat	7	Pileated Woodpecker	2
Ovenbird	7	Common Crow	2
Swainson's Warbler	5	Ruby-throated Hummingbird	2
Yellow-throated Vireo	5	Louisiana Waterthrush	2
Carolina Wren	5	Acadian Flycatcher	2
Prairie Warbler	4	Crested Flycatcher	2
Tufted Titmouse	4	Yellow-throated Warbler	1
Red-bellied Woodpecker	4	Rufous-sided Towhee	1
Cardinal	3	Redstart	1
Blue-gray Gnatcatcher	3	Carolina Chickadee	1
Common Grackle	3	Barred Owl	1
White-breasted Nuthatch	3	Downy Woodpecker	1
White-eyed Vireo	3	Hairy Woodpecker	1
Wood Thrush	3	Brown-headed Cowbird	1

* This is not a complete list of breeding birds of the Swamp.

Composition and Relative Abundance of Breeding Birds*

(Based on count made between 10:00 A.M. and 2:00 P.M. in northwest section of
Swamp, January 16, 1969)

Common Grackle	25,000†	Golden-crowned Kinglet	5
White-throated Sparrow	200	Cedar Waxwing	5
Fox Sparrow	82	Red-shouldered Hawk	4
Carolina Chickadee	34	Hairy Woodpecker	3
American Goldfinch	26	Brown-headed Nuthatch	3
Robin	43	Yellow-bellied Sapsucker	3
Cardinal	22	Red-tailed Hawk	2
Myrtle Warbler	17	Mourning Dove	2
Carolina Wren	15	Red-winged Blackbird	2
Ruby-crowned Kinglet	13	Song Sparrow	2
Bobwhite	12	Mockingbird	2
Red-bellied Woodpecker	11	Swamp Sparrow	2
Yellow-shafted Flicker	10	Rusty blackbird	2
Brown Thrasher	9	Black Vulture	2
Junco	9	Purple Finch	1
Tufted Titmouse	8	Pine Siskin	1
Pileated Woodpecker	8	Downy Woodpecker	1
White-breasted Nuthatch	8	Sparrow Hawk	1
Common Crow	8	Catbird	1
Hermit Thrush	9	Bluebird	1
Winter Wren	7	Evening Grosbeak	1
Blue Jay	7	Phoebe	1
Rufous-sided Towhee	7	Kingfisher	1
Turkey Vulture	6	Barred Owl	1

* This list does not include all species that winter in the Swamp.

† Estimated.

A Preliminary List of Dismal Swamp Mammals

The preliminary list of Dismal Swamp mammals presented below was constructed partly from information I obtained in the field and partly from the following sources: *Wild Mammals of Virginia* by C. O. Handley, Jr. and C. P. Patton, 1947; "Mammals" by C. O. Handley, Jr. and C. O. Handley, Sr., in *The James River Basin, Past, Present, and Future*, 1950; *A Checklist of North Carolina Mammals* by E. R. Smith, J. B. Funderburg, and T. L. Quay, 1960; *List of North American Recent Mammals* by G. S. Miller, Jr. and R. Kellogg, 1955; and from field catalogs of several of the earlier mammalogists who explored the Swamp.

- Opossum (*Didelphis marsupialis*)
- Bachman's Shrew (*Sorex longirostris*)
- Dismal Swamp Short-tailed Shrew (*Blarina telmalestes*)
- Least Shrew (*Cryptotis parva*)
- Common Mole (*Scalopus aquaticus*)
- Star-nosed Mole (*Condylura cristata*)
- Keen Bat (*Myotis keenii*)
- Pipistrelle (*Pipistrellus subflavus*)
- Red Bat (*Lasiurus borealis*)
- Evening Bat (*Nycticeius humeralis*)
- ✓ LeConte's Big-eared Bat (*Corynorhinus macrotis*)
- Cottontail (*Sylvilagus floridanus*)
- Marsh Rabbit (*Sylvilagus palustris*)
- Eastern Chipmunk (*Tamias striatus*)
- Gray Squirrel (*Sciurus carolinensis*)
- Southern Flying Squirrel (*Glaucomys volans*)
- Rice Rat (*Oryzomys palustris*)
- Harvest Mouse (*Reithrodontomys humulis*)
- White-footed Mouse (*Peromyscus leucopus*)
- Cotton Mouse (*Peromyscus gossypinus*)
- ✓ Golden Mouse (*Peromyscus nuttalli*)
- Lemming Mouse (*Synaptomys cooperi*)
- Meadow Vole (*Microtus pennsylvanicus*)
- Muskrat (*Ondatra zibethicus*)
- Gray Fox (*Urocyon cinereoargenteus*)
- Black Bear (*Euarctos americanus*)
- Raccoon (*Procyon lotor*)
- Longtail Weasel (*Mustela frenata*)
- Mink (*Mustela vison*)
- Otter (*Lutra canadensis*)
- ✓ Bobcat (*Lynx rufus*)
- White-tailed Deer (*Odocoileus virginianus*)

Some Reptiles and Amphibians Observed in the Swamp by the Author

Common Snapping Turtle (*Chelydra serpentina serpentina*)
Stinkpot (*Sternotherus odoratus*)
Eastern Mud Turtle (*Kinosternon subrubrum subrubrum*)
Spotted Turtle (*Clemmys guttata*)
Eastern Box Turtle (*Terrapene carolina carolina*)
Eastern Painted Turtle (*Chrysemys picta picta*)
Yellow-bellied Turtle (*Pseudemys scripta scripta*)
River Cooter (*Pseudemys concinna concinna*)

American Toad (*Bufo americanus*)
Southern Toad (*Bufo terrestris*)
Fowler's Toad (*Bufo fowleri*)
Southern Cricket Frog (*Acris gryllus gryllus*)
Spring Peeper (*Hyla crucifer*)
Pine Woods Treefrog (*Hyla femoralis*)
Squirrel Treefrog (*Hyla squirella*)
Gray Treefrog (*Hyla versicolor*)
Little Grass Frog (*Hyla ocularis*)
Brimley's Chorus Frog (*Pseudacris brimleyi*)
Bullfrog (*Rana catesbeiana*)
Carpenter Frog (*Rana virgatipes*)
Green Frog (*Rana clamitans*)
Southern Leopard Frog (*Rana pipiens sphenoccephala*)

Red-bellied Watersnake (*Natrix erythrogaster erythrogaster*)
Northern Watersnake (*Natrix sipedon sipedon*)
Eastern Garter Snake (*Thamnophis sirtalis sirtalis*)
Eastern Hognose Snake (*Heterodon platyrhinos platyrhinos*)
Southern Ringneck Snake (*Diadophis punctatus punctatus*)
Eastern Worm Snake (*Carphophis amoenus amoenus*)
Eastern Mud Snake (*Farancia abacura abacura*)
Northern Black Racer (*Coluber constrictor constrictor*)
Rough Green Snake (*Opheodrys aestivus*)
Black Rat Snake (*Elaphe obsoleta obsoleta*)
Eastern King Snake (*Lampropeltis getulus getulus*)
Copperhead (*Agkistrodon contortrix*)
Eastern Cottonmouth (*Agkistrodon piscivorus piscivorus*)
Canebrake Rattler (*Crotalus horridus atricaudatus*)
Scarlet King Snake (*Lampropeltis doliata doliata*)