

REVIEW AND APPROVALS

CURRITUCK NATIONAL WILDLIFE REFUGE

Currituck County, North Carolina

ANNUAL NARRATIVE REPORT

Calendar year 1992

Ben Nottingham

Acting Refuge Manager

6-3-93

Date

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Associate Manager Review

6/10/93

Date

Harold W Benson

Regional Office Approval

6/16/93

Date

INTRODUCTION

The Currituck NWR is located in northern Currituck County, North Carolina along the Outer Banks barrier island chain. The Currituck Banks are part of an extensive coastal lowland that stretches from Newfoundland southward to Florida, and westward into the Gulf of Mexico. Along the Currituck Banks, inlets have periodically formed and reformed depending on storms, amount of sedimentation, the tidal heights, and degree of vegetation on the barrier beach.

Acquisition of Currituck NWR was intended to preserve and protect a part of the N.C. Outer Banks, one of the largest undeveloped coastal barrier ecosystems remaining on the East Coast. Service ownership ensures perpetuation of basic wetland functions, including nutrient cycling, floodplain and erosion control, and will help preserve the role of Currituck Sound estuaries as nurseries. The sound is an important black duck wintering area. Ownership of the protective buffer east of the productive marshes bordering the sound protects the marsh from direct pollution sources associated with development.

The Outer Banks remained isolated from the mainstream of activity in early America, and those few people who lived there relied heavily on activities associated with the area's natural values for their subsistence. Activity in the Currituck Sound area reached a peak in the late 1800's when commercial fishing and market hunting were at an all time high. A number of hunting clubs were established for sport hunting of waterfowl and drew much of their membership from affluent northern businessmen and professionals.

The navigation hazards along the Outer Banks resulted in numerous shipwrecks along the coast. Lifesaving stations were established along the beach of which several still exist. One station is located on an inholding within the Swan Island Tract and is used as a seasonal residence by a private citizen. The Currituck Lighthouse at Corolla still functions throughout the year.

During 1975 and 1976, The Nature Conservancy (TNC) acquired several parcels of land on the Currituck Outer Banks. The two major tracts of land were being utilized by the Swan Island and Monkey Island Hunting Clubs. Funds to purchase these areas were provided by the Melon Foundation, a sponsor of the National Wetlands Project. TNC transferred approximately 500 acres of the Monkey Island Tract to the State of North Carolina for inclusion in the National Estuarine Sanctuary System as the Currituck Banks component. A narrow strip from sound to sea of about 50 acres was retained by TNC between the Sanctuary and the Monkey Island Tract.

The Migratory Bird Conservation Commission (MBCC) met to consider the Currituck Refuge on August 2, 1983. The MBCC approved the boundary of the refuge in two parcels: the Monkey Island Tract, which is 1.5 miles north of Corolla, NC, and the Swan Island Tract some 3.5 miles further north. Two phases of acquisition resulted in 1,770 acres in fee title, 166 acres in conservation easement and some hunting blind rights at a cost of \$3.9 million. A third tract, 54 acres of marsh and low shrub and hardwood woodland, was acquired in 1988, through a trade with Currituck County, NC, for Monkey Island and is located along the west side of Corolla village. All three tracts comprise about 1,824 acres and have been administered by the Mackay Island NWR from their office on Knotts Island, NC, since July of 1990.

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(INSIDE BACK COVER)

A. HIGHLIGHTS

Twelve volunteers provide intensive survey effort to record Piping plovers nesting activity on the refuge and along a 12 mile survey route.

One Piping plover nest is found on the refuge and two chicks are fledged from this nest.

F. HABITAT MANAGEMENT

1. General

Currituck NWR is located on the Currituck Banks stretch of North Carolina's Outer Banks barrier island. This island chain was formed when melting glaciers caused a world-wide rise in the sea level. Later, when sea level rise slowed, a combination of factors were set in motion to create barrier islands on the continental shelf. The bays and estuaries that formed behind these barriers became shallow, due to sedimentation from rivers draining the coastal plain and storm overwash. Currituck Spit and the other Outer Banks islands are primarily perpetuated by the following processes: long shore currents, tides and tidal currents, wave action, storm surges and wind action. These dynamic forces cause shorelines to undergo constant change. The adaptability of these islands to constant physical change is a major part of their natural ecology. The approximate size of the habitat types are: 100% woodland, 18% sand and dune, 43% brush and 39% marsh.

2. Wetlands

The water control structure installed in 1988 continues to serve the Swan Island Tract well. It blocks the flow of rain water from the sandy flats between the dune lines into Ferebee Creek. This area, known as the "Flats", is maintained in a moist soil condition during the growing season, provided rains are sufficient. During many summers, the Flats can dry out but should consistent rain showers occur then moist soil species will thrive here. Moist soil species consist of *Eleocharis* spp., *Bacopa* spp., and *Cyperus*.

The water control structure is normally adjusted in the fall to hold more rain water for the benefit of migratory waterfowl. This year the stoplogs in the structure were held at the same position throughout the year. With no exceptionally high rainfalls, this position was adequate for avoiding flooding the adjoining Covington Tract. In contrast to the prior year, no complaints on flooding were made by Jim Covington or his co-owners.

In 1990, a small contract was awarded to Ernie Bowden to cut a portion of the encroaching wax myrtle, groundsel tree, and bayberry from the Flats. The intent of this work was to reclaim open space for more propagation of moist soils plant species, which had previously existed across the Flats. This contract effort was only marginally effective in opening up this area. Observation during 1992 revealed that much more acreage can be opened a succession of woody vegetation is continuing.

The marshes along the western shoreline are frequently inundated by wind driven water in the sound, creating "wind tides." The Flats and natural marshes support thousands of migratory waterfowl, marsh and water birds.

6. Other Habitats

Approximately 243 acres of beachfront and sand dune are contained within the Swan Island and Monkey Island tracts. The refuge's fee title ownership extends along the beachfront out to the mean high water line. The intertidal zone falls within the state's ownership according to state law.



One beautiful stretch of the Currituck Outer Banks, this is the beachfront of the Swan Island Tract. If one travels six miles south, one encounters the burgeoning vacation development of Carolla, NC. 3/93 BN

A dynamic habitat, the beach and dunes are shaped and developed by natural processes ranging from constant tidal influences to abrupt severe storms. On September 25, Tropical Storm Daniele was forecasted to come ashore at Virginia Beach but instead it skirted the North Carolina-Virginia coast. This storm surge caused minimal damage to the beachfront along the refuge.

G. WILDLIFE

1. Wildlife Diversity

With the exception waterfowl and piping plover surveys, no other periodic inspections have been conducted. Species diversity is largely comparable to other nearby barrier islands.

2. Endangered Species

The beach front and foredunes on Currituck Outer Banks have provided breeding habitat for three to five pairs of piping plovers since 1987. Nesting has been documented on both Currituck National Wildlife Refuge and private lands in the area from the Virginia-North Carolina state line to the north end of the village of Carolla, NC; this stretch encompasses about 11.7 miles. During the 1992 spring-summer season, 27 surveys were conducted by 21 different people including refuge volunteers, refuge staff, YCC enrollees, and a Virginia Department of Game and Inland Fisheries (VDGIF) wildlife biologist to monitor piping plover nesting activity. Many surveys were led by David Leake and several other volunteers from the Outer Banks Audubon Society who are also volunteers for Alligator River NWR. A total of 157 survey hours were compiled; MINWR staff accounted for 50.5 hours.



Refuge staff and volunteers alike surveyed for piping plover nests. 7/92 JM

This survey effort recorded two nests with one being on the refuge (north end of the Swan Island Tract) and the other being .3 mile north of the Swan Island Tract on property being sold by Riggs Realty. The refuge nest produced three chicks of which two survived to fledging stage. The other nest was destroyed at the end of June before any eggs were hatched. The cause of this nest loss could not be determined but observers found red fox tracks, numerous wild horse tracks, human, and ATV tracks in the immediate vicinity where the nest had been located.

On April 30th, VDGIF biologist Don Schwab and Refuge Officer Mike Panz found a dead adult female piping plover that was lying crushed in a vehicle tire track. This bird was found on the beach in front of the south end of the Swan Island tract. Mr. Schwab was unable to determine the proximate cause of death as the bird was severely disfigured. ARM Nottingham sent this bird off to Dr. Mark Pokras at the Tufts Veterinary Diagnostic Lab,

Tufts University, Boston, MA. The necropsy understandably revealed extensive internal injury to the thoracic and abdominal organs. However, the bird had no food in its' proventriculus and showed very little body fat. Because no hemorrhage sign or fibrin formation was found in the pectoral muscles, the veterinarian believed that the bird had been dead for some time before being run over and the bird had died of unknown causes.

After the nesting season, a report on piping plover production, mortality, and disturbance was compiled and sent to the Asheville Endangered Species Field Office and to the Piping Plover Recovery Team Leader.



Dead Piping Plover on beach in front of Currituck NWR. Necropsy findings suggest the bird died before being run over. 4/92 DS

Several sources of disturbance to piping plover and least tern nesting activity were recorded from April through August. Notwithstanding the prevalent vehicular traffic in front of the refuge along the beach, a number of vehicular trespasses occurred across shellflats and dunes both on and off the refuge. Nine vehicular trespasses (5 violation notices, 4 written warnings) on Currituck NWR were observed by Refuge Officers from April through July. During August, four violation notices were issued for vehicular trespass. Several other vehicular trespasses were witnessed off refuge, and in two cases, vehicles were driven through least tern nest colonies. In all law enforcement contacts involving vehicle trespass, refuge officers attempt to educate the public about the precarious location of plover and tern nest areas. In 1993, the refuge will possibly post plover nest locations on the refuge and possibly off the refuge should landowners agree to posting.

While most of the above vehicular trespasses included cars and trucks, other sources of disturbances may start to occur from several beachfront businesses that began to operate this summer around the Carolla vehicle ramp. This year the public had the opportunity to rent four-wheelers, horses, and even hang-gliders pulled by trucks on the beach. Since the intertidal zone is state land and the county has few ordinances governing this use strip, these rental activities were allowed to operate freely. However, a few local beachfront residences in the Ocean Hill development at the Carolla ramp area did raise enough complaints to warrant the Currituck County Commissioners to look closer into the legality of the business operations. The short term outcome of the issue was to allow the businesses to operate on through the summer. Fortunately, most of this activity was concentrated south of the Swan Island Tract where the piping plovers and least terns were nesting.

Loggerhead sea turtles have been known to utilize the beach areas of Currituck NWR and adjoining private land on a limited basis for nesting activity. Nests have been documented north of the refuge in previous years. If any nests are found, eggs will be relocated by staff of Back Bay NWR to their refuge for incubation and hatching. Development, commercial fishing, and increased vehicular traffic along the intertidal beach strand undoubtedly impacts nesting by loggerhead along this beach stretch.

Modest numbers of Peregrine falcons pass over the refuge coastline during their fall migration; some occasionally feed and roost in various refuge habitats during this time. To a lesser extent bald eagles also seasonally pass through the refuge in the fall-winter period.

3. Waterfowl

The most systematic aerial surveys to date were conducted for waterfowl during the 1991-92 winter. These flights were done each time in conjunction with surveys over Mackay Island NWR and Back Bay NWR. Waterfowl use was dominated by Greater snow geese which comprised 55.9% of the overall waterfowl use (Table 1). Snow geese use was characterized by several large groups (2,000-3,000) using the marshes around the Hay Pond located at the refuge's northern boundary; this use was somewhat sporadic through most of the season but was more consistent towards the season's end in late February when a peak count of 9,000 individuals was made.

Tundra swans accounted for roughly 25% of the overall waterfowl use and this species showed a somewhat late season peak in March (Table 1). Swans were commonly found at the marsh edges of the three refuge tracts where sandy bottoms or flats existed. These areas were sought for grit and they were used by swans and geese alike during episodes of strong winter winds. In contrast to the previous winter when no Canada goose use was recorded, a small flock of Canada geese used the marsh flats south of Parker's Bay (south end of refuge) during late October-early November. However, this use was shortlived as Canada goose numbers dwindled shortly thereafter.

Table 1
Wintering Waterfowl Occurrence on
Currituck NWR
1991-1992

Group	Percent	Number of Use- days	% Diff. from 1991-1992	Peak Number	Peak Period
Tundra Swans	24.5	120,505	+258.1	1,600	Mar. 14-20
Canada Geese	0.7	3,507	+100.0	50	Oct. 20 Nov. 2
Snow Geese	55.9	275,625	+280.1	9,000	Feb. 21-27
Ducks	18.9	93,142	+8.1	700	Oct. 20-26
All Waterfowl	100.0	492,779	+188.0	10,425	Feb. 21-27

Table 2
Composition fo Ducks Wintering on
Currituck NWR
1991-1992

Species	Percent	Number of Use- days	% Diff. from 1991-1992	Peak Number	Peak Period
G. W. Teal	26.0	24,213	+29.9	300	Oct. 20-26
Black Duck	24.2	22,526	+15.8	250	Feb. 21-27
Mallard	13.8	12,831	-41.4	125	Feb. 21-27
Wigeon	11.9	11,116	+100.0	300	Sept. 21-27
Pintail	7.4	6,874	-32.9	50	Nov. 3 Feb. 27
Gadwall	6.5	6,090	-28.4	100	Nov. 10-16
B. W. Teal	2.5	2,345	+100.0	50	Mar. 14-20
Ring-necked Duck	2.1	1,918	+100.0	50	Jan. 17-30
Bufflehead	1.4	1,267	+100.0	10	Dec.14 Mar.27
Unid. Ducks	1.3	1,225	+100.0	50	Oct. 20-26
Wood Duck	1.2	1,085	-78.1	40	Oct. 5-12
Mergansers	1.1	1,057	+100.0	10	Dec.14 Mar.27
Shoveler	0.6	595	+100.0	10	Jan. 3 - Feb. 6
All Ducks	100.0	93,142	+8.1	700	Oct. 20-26

Duck use in general was moderate to light due in part to a relatively mild winter. The composition of duck species using refuge wetlands consisted of green-wing teal, black ducks, mallards, widgeon, pintail, and gadwall (Table 2). The most common species throughout the winter included black duck, mallard, and pintail. These species were typically scattered across refuge marshes, the Hay Pond, and in the Flats. The later area held consistent numbers of black duck and pintails from mid to late winter on when consistent rainwater was held behind the control structure. Peak green-wing teal and widgeon use was recorded early in the season and this probably reflected migrational pulses by these species.



Pintails were once one of the more dominant wintering species to the Flats on the Swan Island Tract, now they are only modestly common. 12/92 LW

The remaining duck use was characterized by early and late winter use by wood ducks and a few diving duck species. Ring-necked ducks, bufflehead, hooded and red-breasted mergansers were present in consistent, but small numbers during the winter. While not recorded this winter, ruddy ducks do occur in sizeable numbers in Currituck Sound but these ducks are generally outside of the count area in the center of the Currituck Sound.

4. Marsh and Water Birds

Several species of herons and egrets utilize the Flats and the sound marshes either on a seasonal or year-round basis. Great blue, little blue, and green-backed herons feed and roost in the refuge wetlands year-round. Tri-colored herons are less abundant and virtually absent in the winter. Cattle, snowy, and common egrets range across the refuge's wetlands throughout the year. Modest-size (15-30 birds) groups of roosting cattle and common egrets

are found near refuge wetlands in the summer. Common egret and glossy ibises use the refuge wetlands as a result of their rookery on nearby Monkey Island.

On March 30-31, Refuge Officer Mike Panz assisted various North Carolina Wildlife Resources Commission staff in recovering approximately 30 stranded common loons from the beach in front of the Swan Island Tract and both north and south of this tract. Most of these birds were found dead, most others were near dead. These loons were discovered with oil covering their bodies. No other bird victims were observed during this time, nor were any oil residues spotted along the False Cape or Currituck Outer Banks shoreline. An offshore reconnaissance at this time revealed no detectable oil spill off of the North Carolina-Virginia line where the cause of this incident was left unexplained.

Additionally, the refuge marshes on the Currituck Sound provide breeding habitat for Virginia and King rails.

5. Shorebirds, Gulls, Terns, and Allied Species

The coastline of the Currituck Banks provides important migratory habitat for a variety of shorebirds during their spring and fall passages. The beach of the Currituck Outer Banks are especially valuable during shorebird migrations due to the lack of regularly exposed tidal (i.e., lunar) mudflats in Currituck Sound and Back Bay where irregular wind tides infrequently expose mudflats in these areas. Therefore, the intertidal area on the beach is invaluable since available foraging habitat is relatively scarce along this leg of the shorebird migration route. Several species using this beachfront such as sanderling, least sandpiper, and black-bellied plovers are recognized by the Service as species of special concern which have probably suffered recent declines in their continental populations. Sanderling, ruddy turnstone, semipalmated plovers, and black-bellied plovers are among the most abundant migrants along the Currituck Banks during both migrations. Red knots, dunlin, least and semipalmated sandpipers also utilize the intertidal zone for feeding stopovers.

The Flats, high refuge marsh, and irregularly exposed mudflats on the Currituck Sound are foraged over by greater and lesser yellowlegs, solitary and spotted sandpipers, and by willet during spring and fall migrations. Exposed mudflats on the east side of Currituck Sound are heavily used yellowlegs, semipalmated plovers, and peeps for protection and forage zones during spring Nor'easter storms.



Yellowlegs frequent the occasional mudflats of the Currituck Marshes. 10/92 LW

A typical assemblage of gulls and terns also utilize the Currituck Banks. Gulls present year-round include laughing, herring, great black-backed, and ring-billed gulls.

Terns frequenting this shore from spring through fall include common, royal, sandwich, and least terns. This year least tern nesting activity was monitored coincidentally during piping plover surveys both on and off the refuge. Three least tern colonies were located on private property and one colony was found on the refuge. All nests occurred from South Swan Beach to North Swan Beach and encompassed the Swan Island Tract of the refuge. Colonies were typically small and the only colony that produced young to fledgling stage (possibly three young) was immediately south of the Swan Island Tract.

6. Raptors

Modest numbers of American kestrels, sharp-shinned hawks, merlins, northern harriers, and Cooper's hawks pass over the refuge during their fall migrations as do Peregrine Falcons and an occasional Bald Eagle on the sound side.

15. Animal Control

Feral horses, feral pigs, domestic cattle, and dogs roam all three tracts of the refuge. The only effort made to control these animals has included capturing the occasional dogs who roam from a nearby hunt camp.

H. PUBLIC USE

1. General

The refuge is open to hiking, birdwatching and photography. Vehicular access is prohibited. Visitation is estimated at 2,000 persons, most of whom beachcomb on the Swan Island Tract. North Carolina Highway 12 ends at Corolla and all traffic north of there uses the beach strand, which is regulated by the county. About 30,000 vehicles use the beach each year to access the communities of Swan Beach and Carova Beach or to surf fish.

8. Hunting

The refuge is closed to all hunting by the public. However, waterfowl hunting rights were retained by the Swan Island Hunt Club at two hunt blind sites when the Swan Island Tract was purchased. These blinds are located on the Swan Island Tract but the Swan Island Hunt Club has not been seen to hunt them.

Hunting blind rights were acquired with the purchase of the Monkey Island Tract. Each year, the refuge leases these 13 blind locations, but does not allow hunting from them. This leasing action is taken to provide better integrity of the refuge as a sanctuary. Some of the blind locations also lie on the adjacent Nature Conservancy Tract and the North Carolina National Marine Estuarine Reserve. County regulations restrict hunting from within 500 yards of a licensed blind which gives the refuge at least a 300 yard buffer area along the western shoreline. Twelve of the 13 blinds were posted and brushed this year. Hunting within 500 yards of a brushed blind is restricted by a Currituck County law.

17. Law Enforcement

Mackay Island Refuge Officers patrol on an irregular basis. North Carolina Wildlife Resources Officers assist as requested but are nearly an hour away and cannot enforce refuge regulations. County Deputies enforce state and county laws and have been most cooperative in reporting violations of vehicular trespass. A total of 42 patrols were made this year which resulted in 21 reported incidents and the issuance of seven violation notices.

Refuge Manager Elizabeth Souheaver was notified of a marsh fire near Penny's Hill on February 8 by the county dispatcher. It could not be reached from the beach and posed no danger so the call was merely informative. The county dispatcher called again on February 9 to report another fire in the marsh on the Swan Island Tract. RM Souheaver proceeded to the site and met with Corolla Fire Chief Marshall Cherry. The fire burning slowly and was

inaccessible by vehicle so they decided to wait monitor it by returning by boat on the following day. An inspection on February 10 revealed that approximately 85 acres were burned on the Swan Island Tract and no other properties were involved. The arsonist and means of ignition could not be determined.

On August 9, Officer Panz discovered that someone had pulled up three steel posts from the back trail on the Swan Island Tract that restrict vehicular access. He followed the vehicle tracks to the old hunting camp and found a front end loader and trailer parked there. Over 100 trees had been pushed up or broken off to widen the path and several junk cars had been removed. Efforts to identify the owner were unsuccessful and the loader was seized on September 16. It was driven to Back Bay NWR for safekeeping.

A man called the refuge office on the 23rd and claimed to be the owner. He confessed to destruction of the trees and theft of the junk cars for salvage. A meeting was arranged to work out an agreement. In lieu of prosecution, the man agreed to remove all of the junk cars and other debris from the refuge and to restore the old camp to a "natural" condition. The loader was returned and work on the site is progressing.

Statistics

<u>Type of Incident</u>	<u># reported</u>	<u># violation notices</u>
Arson	1	
Camping	2	
Cattle Trespass	5	
Dogs at large	2	1
Motor Vehicle Trespas	10	6
Vandalism	1	
*Totals	21	7

*These are included in the Mackay Island Summary

Refuge Officers patrol the refuge on an irregular basis. North Carolina Wildlife Officers patrol the Swan Island Tract on occasion. Three hunting details by NC Wildlife and Officer Panz were unproductive. Thirty-one other patrols were made to repair or replace worn and vandalized signs.

Notable Incidents

Refuge Officer Mike Panz assisted the Coast Guard with logistical support for a detail they worked on August 26--28 around Currituck Refuge. They did not have an appropriate boat so the refuge loaned them the 17' Polarkraft. Officer Panz oriented and helped coordinate the water and land teams and provided a refuge radio for emergency assistance.

Unfortunately, NAVY SEALS interrupted the surveillance on the night of the 27th. They were training with a new hand held Global Positioning System device while circumnavigating Knotts Island in unlighted Zodiacs. A land crew and helicopter provided coordination for the exercise. Needless to say, the Coast Guard operation was not very successful.

J. OTHER ITEMS

3. Items of Interest

On April 7, PL Souheaver and ARM Nottingham were given a tour of the Swan Island Tract (SIT) by Mr. Dippy Pender, Manager of the Swan Island Club. Being former part-owner of SIT, Mr. Pender was able to provide these new managers with a good historical on how the Flats have changed (succeeded) over time. The tour was most informative.

On June 22, Ms. Janice Nichols, Endangered Species Biologist from the Asheville Field Office and Mr. Richard Aiken, FWS Economist from the Washington, DC Office visited the refuge to assist ARM Nottingham with a piping plover nest survey. Biologist Nichols also was interested to examine the status of the plover nest habitat. A complete survey was conducted and Ms. Nichols was not disappointed in observing five different piping plovers in addition to first discovering the plover nest on the refuge.

No land sale negotiations developed this year between Jim Covington and The Conservation Fund (TCF); it was hoped that Mr. Covington and his associates might reapproach TCF with an interest to sell part of their rich wildlife habitat.

On June 26, realty appraisers, Lynn Wilhite from the Regional Office and Dave Kimbrell from the Washington, DC FWS Office toured the Covington Tract to help them evaluate existing appraisal information.

4. Credits

B. Nottingham	-	Sections A, B, C, D, E, F, G, I, J.
M. Panz	-	Sections H.
P. VanZant	-	Typing, Colating

Photo Credits

BN - Ben Nottingham
 LW - Larry Wales
 DS - Don Schwab
 JM - Jessie McCleskey

CURRITUCK NATIONAL WILDLIFE REFUGE
MACKAY ISLAND NATIONAL WILDLIFE REFUGE
POST OFFICE BOX 39.
KNOTTS ISLAND, NORTH CAROLINA 27950-0039

Currituck National Wildlife Refuge, on North Carolina's Outer Banks, was authorized in 1983 and is managed by the U.S. Fish and Wildlife Service. The first refuge tract, a previous holding of the Monkey Island Hunt Club, was purchased in August 1984. Mainland marshes and dune areas of the Swan Island Hunt Club were donated by The Nature Conservancy to the Service in March 1985. A third tract of land was acquired in 1988, through a trade with Currituck County, NC for Monkey Island and is located at the village of Corolla, NC. All three tracts comprise about 1,824 acres and are administered by the Mackay Island N.W.R. from their office on Knotts Island, NC.

Currituck Refuge is open throughout the year for hiking, bird watching and photography. Vehicular access is prohibited. Some portions of the dune flats area, above the high tide line, may be closed to all public use during the spring and summer for protection of nesting sites of the endangered Piping Plover shorebird. Watch for "AREA CLOSED" signs that outline these areas. Please refrain from trespassing beyond those signs as the Piping Plover does not tolerate human intervention and may abandon their nests. Free roaming dogs present an extreme danger to the recovery of these tiny birds so the use of leashes is mandatory. Help us restore these birds by leaving them alone.

Hunting, firearms, air guns, bows, camping, fires, all terrain vehicles, littering and collecting of plants or animals are not permitted. The refuge is open during daylight hours only, any night time use is prohibited.

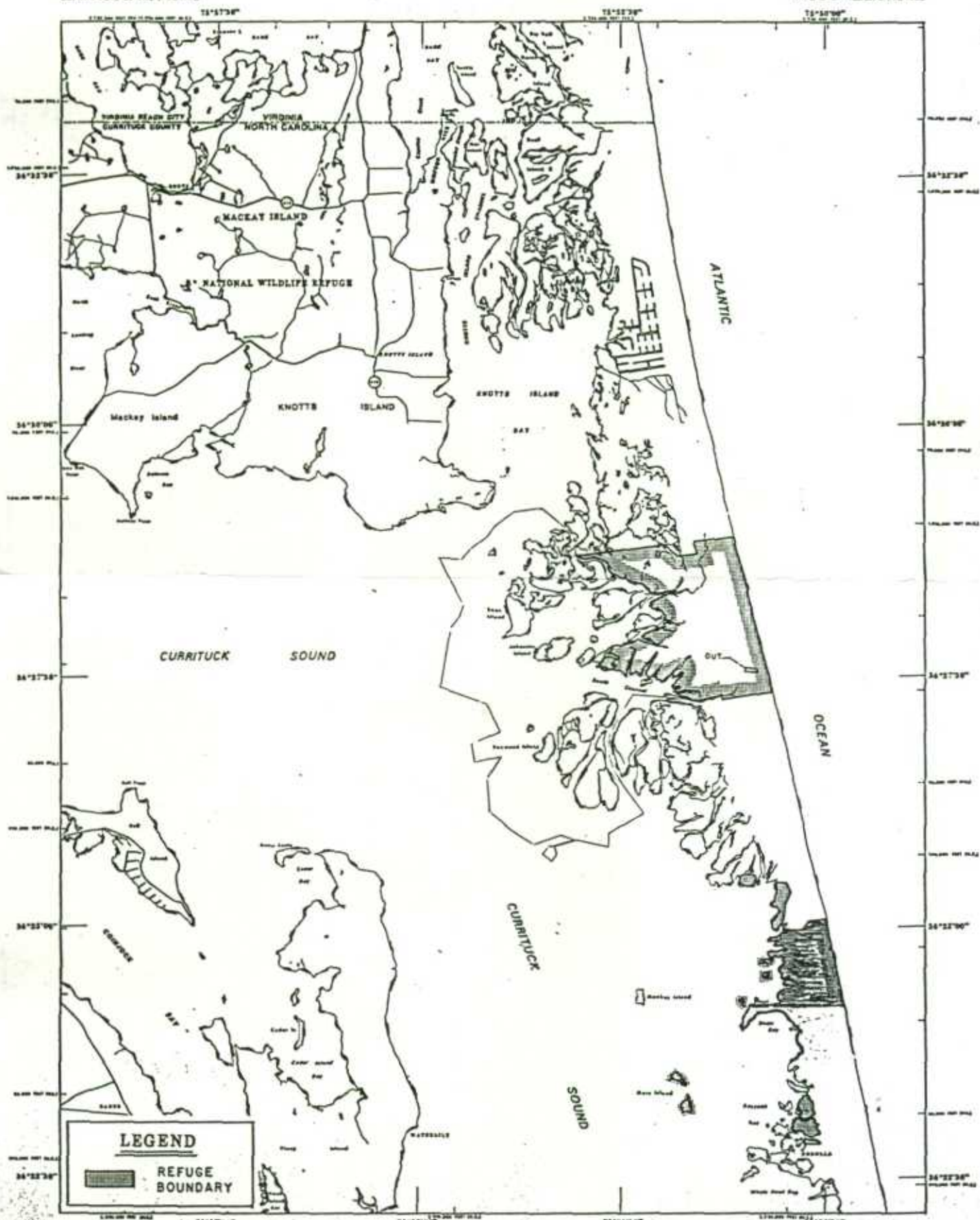
In addition to these provisions, all County codes State laws and Title 50 of the Code of Federal Regulations are enforced on the refuge. If you have any question regarding the legality of any activity, consult the refuge manager before participating in the activity.

CURRITUCK NATIONAL WILDLIFE REFUGE

CURRITUCK COUNTY, NORTH CAROLINA

UNITED STATES
DEPARTMENT OF THE INTERIOR

UNITED STATES
FISH AND WILDLIFE SERVICE



COMPILED IN THE OFFICE OF REALTY
FROM AEROPHOTOGRAMS AND AERIAL PHOTOGRAPHS

ATLANTA, GEORGIA

JULY, 1962

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MACKAY ISLAND NATIONAL WILDLIFE REFUGE
POST OFFICE BOX 39
KNOTTS ISLAND, NORTH CAROLINA 27950
(919) 429-3100

GENERAL REGULATIONS

The refuge office is open all year, Monday through Friday, from 8:00 am to 4:00 pm. Visitors are permitted to drive on the Mackay Island Road and to walk or bicycle the 4 mile Mackay Island Trail or the 6.5 mile Live Oak Point Trail from March 15 through October 15, from sunrise to sunset. Mackay Island Road is open to walking and bicycling up to the first gate from October 16 through March 14, from sunrise to sunset. The trails and marshes are closed during this time to protect resting areas for migratory birds.

Designated areas of the refuge are closed during Deer Hunts.

Firearms, bows, air guns, off-road vehicle use, airboats, camping, fires, littering and disturbing or collecting of plants, animals or human artifacts are NOT permitted within the refuge boundary.

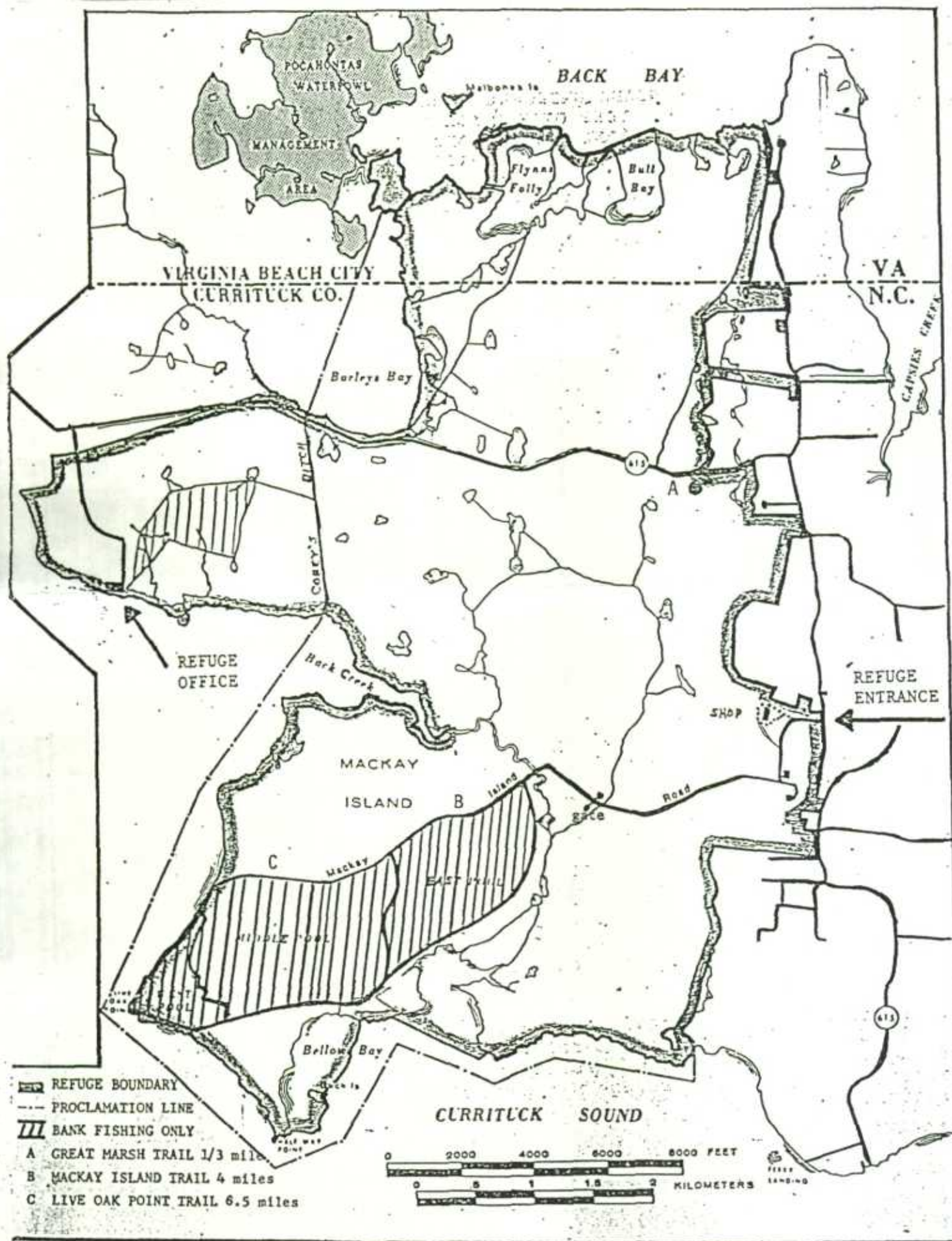
SPORT FISHING REGULATIONS

Sport fishing is permitted in all canals and bays between March 15 and October 15, with the following conditions:

- a. The use of boats or other flotation devices is not permitted within refuge impoundments. Bank fishing only.
- b. Sport fishing is permitted from sunrise to sunset.
- c. Commercial fishing, trot lines, eel and crab pots, bait traps and nets are not permitted.
- d. Launching of small boats from the Knotts Island Causeway (Rt. 615) is permitted from March 15 through October 15 from sunrise to sunset. Airboats are prohibited.
- e. Corey's Ditch, the Marsh Trail and the canal adjacent to the north bank of the Knotts Island Causeway are open to fishing throughout the year, or as indicated by signs. Canals and ponds at the refuge office are open to fishing year-round only when the gate to the refuge office is open.

In addition to these provisions, all County codes, State laws and Title 50 of the Code of Federal Regulations are enforced on the refuge. Should you have any questions regarding the legality of any activity, consult a refuge officer before engaging in that activity. The refuge manager may be reached at the refuge office.

MACKAY ISLAND NATIONAL WILDLIFE REFUGE



MACKAY ISLAND NATIONAL WILDLIFE REFUGE

The Mackay Island National Wildlife Refuge, along with over 470 other refuges scattered throughout the country, was established to protect our wildlife resources now and for future generations. Here, wildlife is provided the habitat needed for its survival because wild creatures, like humans, must have a place to live.

The refuge, located in the extreme northeast corner of North Carolina on Knotts Island, invites nature lovers both fowl and folk to a respite of quiet beauty. Of the nearly 8,000 acres of marsh, timberland and cropland, 874 lie in Virginia.

The U.S. Fish and Wildlife Service bears the Federal responsibility for the protection and management of many wildlife forms, including migratory birds and endangered species and their habitats. Mackay Island is fulfilling this responsibility by providing a habitat for transient and overwintering ducks, geese, swans and coots as well as for several endangered species. Many other species of wildlife find food, cover and nesting opportunities on the refuge.

A former private owner of Mackay Island played a significant role in the history of private wildlife conservation. In 1934, Joseph P. Knapp founded the organization known as More Game Birds in America. In 1937, this organization was incorporated as the modern day private conservation group known as Ducks Unlimited, Inc. Mackay Island and a large portion of the surrounding marsh was owned by Mr. Knapp from the early 1900s until his death in 1951. Mr. Knapp had used this land as his private duck hunting retreat. After a period of logging by a subsequent private owner, Mackay Island was purchased by the Department of the Interior to establish a National Wildlife Refuge (NWR). The Knapp Foundation established by Mr. Knapp has recently donated sizeable land acreage to Mackay Island NWR to bolster migratory bird conservation in the Currituck Sound.

WILDLIFE

The refuge abounds with wildlife throughout the year - some species just passing through at a particular time in the year and others calling the area home for their entire lives.

Mackay Island Refuge is strategically located along the Atlantic Flyway, making this an important wintering area for thousands of ducks, geese and swans during the fall and winter months. In September, after Snow geese have completed their nesting, they move down through northeastern Canada where they are joined by Canada geese and many other species of ducks as they travel to the Mid-Atlantic coastal marshes, including Back Bay, Currituck Sound and Mackay Island National Wildlife Refuge to spend the winter.

This refuge plays an important role in the conservation of the Greater Snow Goose. At times 40,000 of these birds may use the area. In the early 1970's, one-half of the entire Greater Snow Goose population could often be observed on the marsh at Mackay Island Refuge. In the mid 1970's, Snow Geese began feeding in nearby farm fields, thus the value of Mackay Island Refuge became more pronounced as the refuge served to minimize crop depredations on winter crops. Many species of ducks also make use of the refuge, including Mallards, Black Ducks, Green and Blue-winged Teal, Pintails and others.

The refuge also attracts many wading birds such as Great Blue Herons, Little Blue Herons, Snowy, Great and Cattle Egrets, Green-backed Herons and Glossy Ibises. On occasion the endangered Bald Eagle and Peregrine Falcon are spotted hunting over the refuge.

In addition to bird life, other forms of wildlife call the refuge home. This list includes Muskrat, Nutria, River Otter, Mink, White-tailed Deer, Gray Squirrel, Gray Fox and Raccoon. There are many kinds of turtles and snakes on the refuge. The Cottonmouth Moccasin, a poisonous snake, is abundant in the area and the visitor should be aware of this. All of the wildlife is protected in order to provide an opportunity for people to see them in their natural environment.

MANAGEMENT

Management of wildlife resources can take many forms. Maintaining healthy populations of wildlife is a primary objective and focuses on habitat modification, maintenance and population monitoring and management. Habitat for wildlife can be broken down into food, water and shelter and sound wildlife management activities consider all these aspects.

The natural food supply (submerged aquatic vegetation) offered by Currituck Sound and the adjoining marshes is supplemented by 122 acres of corn, wheat and other grains which are planted on the Live Oak Point and Headquarters fields.

Prescribed burning of certain marsh areas is used as a management tool. These controlled fires prevent trees from invading the marsh, stimulate desirable vegetation and provide accessible and attractive feeding areas for Snow Geese.

Wood Duck nesting boxes and Osprey nesting platforms are erected on the refuge to supplement natural nesting sites. The Wood Duck population was at one time a critical concern due to habitat destruction, however, through changes in the hunting regulations, habitat restoration and public

support, the species has rebounded. The refuge annually produces approximately 1,000 birds. The Osprey population, nationwide, has made a comeback as well since persistent and toxic pesticides were banned.

Water impoundments are another management effort to provide ample food for the wildlife. Controlling the water levels in the impoundments not only allows the desired waterfowl foods to grow, but also makes it readily available to the ducks and geese. They also provide primary foraging sites for wading birds such as herons, egrets, and rails.

HISTORY

Evidence of Indian activity around Mackay Island has been found by the type of artifacts unearthed. In addition, a mass burial site was discovered on adjoining Knotts Island in 1989. It was determined to be 600--900 years old. An unsubstantiated account shows that Captain James Knotts of England, sailed through the ocean inlet, which has since closed over, in 1594 and named Knotts Island for himself.

The original English land grants prior to 1680 show lower and upper "Norfolk," but they were assigned before the state and counties were delineated.

The first recorded history of Mackay Island began in 1761 when John Mackie acquired a parcel of land from John Jones, owner of Mackay Island, then known as "Orphan's Island." It is unknown how the name was changed to "Mackay" from "Mackie." John Mackie reportedly resided on the island until his death in 1823. Local rumor reveals that Mr. Mackie was buried on the island in an upright position so he could "keep watch over his fields."

Ownership of the island changed hands several times during the 1800's and was sold in 1906 by Cornelius Jones and Elizabeth Beasley to the George Roper Lumber Company for the standing timber. Mr. Roper sold it to Thomas Dixon, author of "The Birth of a Nation," in 1916.

Wealthy New York printing magnate and philanthropist Joseph P. Knapp purchased the island in 1918 for \$39,211. From the first moment he visited Mackay Island Mr. Knapp saw the potential of this beautiful area. He proceeded to make it into a private resort and built a mansion on Live Oak Point along with boating facilities, barns, greenhouse, swimming pool, golf course and hunting ponds. Mr. Knapp, a noted duck hunter, was so taken by the ideas of game management, that he formed the "More Game Birds in America Foundation" in 1930. He, along with political cartoonist J.N. "Ding" Darling, J. Pierpont Morgan, Arthur W. Bartley and John C. Huntington served as directors.

Mr. Knapp, now known as the father of "Ducks Unlimited," experimented with many of the newly emerging management practices, such as maintenance of water levels to attract certain types of aquatic grasses, on his estate at Mackay Island. Unlike many sportsmen, Mr. Knapp helped push legislation through that required fees for nonresident sportsmen, providing revenues that helped develop a system of county roads. When the locks on the intercoastal waterway were removed from the northern end of Currituck Sound at the end of World War I, Mr. Knapp paid the federal government \$250,000 to have the locks restored to prevent the flushing of pollutants into the sound.

Throughout the 1920's and 30's Mr. Knapp made sizeable donations to the Currituck schools, allowing the county to become the first in the state to provide free textbooks and lunches. He also gave \$250,000 to the University of North Carolina for a statewide public school survey, fisheries research and other projects.

After his untimely death in 1951 the island was sold to a Mr. James Standing in 1952. The island was logged through the 1950's and the Knapp estate fell into disrepair and vandalism. The island was acquired by the U.S. Fish & Wildlife Service in 1961 to provide habitat for transient and overwintering waterfowl, particularly greater snow geese.

Mackay Island National Wildlife Refuge is strategically located for birds migrating along the Atlantic Flyway. The old home has since been removed, but the magnificent magnolias, pecans, hackberries, hollies and numerous exotic tree species and shrubs still beautify the landscape. The former golf course is now planted to corn and winter wheat for use by wintering waterfowl and the old swimming pool is now used by wood ducks.

The refuge is visited by hundreds of thousands of migratory birds throughout the year and is home to many species of songbirds, wood ducks, geese, rails and osprey. Bald eagles are occasionally sighted. The area is rich with mammals, reptiles and amphibians which are protected from disturbance within the refuge boundaries.

Since 1961, the refuge has expanded to nearly 8,000 acres and includes numerous islands, marsh, uplands and open water embayments. Each area is managed intensively for the protection of habitat that is most suitable for migratory birds.



BIRDS of **Mackay Island** **National Wildlife Refuge**

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.



DEPARTMENT OF THE INTERIOR
U.S. Fish and Wildlife Service
RF-41660-2 - December 1989

Virginia/North Carolina

MACKAY ISLAND NATIONAL WILDLIFE REFUGE is located in the extreme northeast corner of North Carolina, with 842 of its 7,800 acres lying in adjacent Virginia. It was established in 1960 as a wintering ground for migratory waterfowl, particularly greater snow geese. Thousands of ducks, geese, and swans flock to Mackay Island marshes and water areas for the winter. They are just a few of the many groups of birds which visit the refuge during the year.

The Knotts Island Causeway (State Rt. 615) which crosses the refuge, offers some good look-out points for viewing most of the species of waterfowl and marsh birds that occur in the Back Bay/ Currituck Sound Area.

During the spring and summer the woodlands contain a variety of nesting songbirds. Most common are the cardinal, brown thrasher, Carolina wren, prothonotary warbler, prairie warbler, and mockingbird. Many species in the following list are only spring or fall migrants and may be missed easily on any one visit.

Refuge headquarters is reached by driving south on Virginia State Highway 615 toward the community of Knotts Island, North Carolina.

HOW TO USE YOUR CHECKLIST

The bird checklist was designed to be informative and simple to use. The birds under major headings are arranged in alphabetical order. Symbols which appear in this checklist represent the following:

SEASONAL APPEARANCE

Sp - Spring	
March - May	
S - Summer	
June - August	
F - Fall	
September - November	
W - Winter	
December - February	

SEASONAL ABUNDANCE

- a - abundant (a common species which is very numerous)
 c - Common (certain to be seen in suitable habitat)
 u - uncommon (present but not certain to be seen)
 o - occasional (seen only a few times during a season)
 r - rare (seen at intervals of 2 to 5 years)
 * - nesting has occurred on the refuge.

This checklist includes 182 species of birds and is based on observations by refuge personnel and visiting ornithologists. If you should find an unlisted species, please let us know at Refuge Headquarters. We will appreciate your help in updating our records.

LOONS AND GREBES

	SP	S	F	W
Common Loon			o	o
Horned Grebe	o			
Pied-billed Grebe	o	o	c	c
Red-necked Grebe				r
Red-throated Loon		r	r	

PELICANS AND CORMORANTS

Double-crested Cormorant	o	o	c	c
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BITTERN, EGRETS AND HERONS

American Bittern*	u	u	u	u
Black-crowned Night-Heron	o	o	o	
Cattle Egret	c	c	o	
Great Blue Heron	c	c	c	c
Great Egret	c	c	c	c
Green-backed Heron*	c	u	u	r
Least Bittern*	u	u	u	u
Little Blue Heron	u	u	o	
Snowy Egret	u	u	o	o
Tricolored Heron	o	o	o	
Yellow-crowned Night-Heron	r	r	r	

IBISES AND STORKS

White Ibis	r			
Glossy Ibis	u	u	o	o

DUCKS, GEESE AND SWANS

American Wigeon	u		c	c
Black Duck*	c	o	c	c
Blue-winged Teal	c		c	c
Bufflehead			o	u
Canada Goose*	o	o	u	u
Canvasback	o		o	o
Common Goldeneye	r	r		
Common Merganser		u	u	

	SP	S	F	W
Eurasian Wigeon		r	r	
Gadwall		a	a	
Greater Scaup		r	r	
Green-winged Teal	c		c	c
Hooded Merganser*	r	r	u	u
Lesser Scaup	o		u	u
Mallard*	c	u	c	c
Northern Pintail	o		c	c
Northern Shoveler	u		u	u
Redhead			u	u
Red-breasted Merganser			u	u
Ring-necked Duck			u	u
Ruddy Duck			c	c
Snow Goose	c	r	c	a
Whistling Swan	r	r	c	c
Wood Duck*	c	c	c	u

VULTURES

Black Vulture	r	r	o	o
Turkey Vulture	c	c	a	a

OSPREYS, KITES, EAGLES, HAWKS AND FALCONS

American Kestrel	c		c	c
Bald Eagle	o		o	o
Broad-winged Hawk		u	u	
Cooper's Hawk	o		u	u
Golden Eagle		r	r	
Northern Harrier	c		c	c
Merlin			o	o
Osprey*	c	c	c	
Peregrine Falcon			o	o
Red-shouldered Hawk	o	o	o	o
Red-tailed Hawk*	u	u	u	u
Rough-legged Hawk		r		
Sharp-shinned Hawk		u	u	u

GALLINACEOUS BIRDS

Northern Bobwhite*	c	c	c	c
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RAILS, CRANES, GALLINULES, AND COOTS

American Coot*	c	r	c	c
Common Moorhen*	c	c	c	u
King Rail*	c	c	c	c
Purple Gallinule	r	r		
Sora*	o	o	o	o
Virginia Rail*	u	u	u	u

SHOREBIRDS

SP S F W

American Woodcock	o	r	o	r
Killdeer	u	u	u	o
Common Snipe	u		u	u
Greater Yellowlegs	o		o	
Least Sandpiper	o		o	o
Lesser Yellowlegs	o		o	r
Semipalmated Sandpiper	u		u	o
Solitary Sandpiper	r			
Spotted Sandpiper	u	o	u	o

JAEGERs, GULLS AND TERNS

Black Tern	u			
Bonaparte's Gull			o	o
Caspian Tern	o	o	o	
Common Tern	u	c	u	
Forster's Tern	r	o	o	
Great Black-backed Gull	u		u	u
Herring Gull	u	u	u	u
Laughing Gull	u	u	c	c
Least Tern		o	o	
Ring-billed Gull	u		u	u
Royal Tern	r	r		
Sooty Tern			r	

PIGEONS AND DOVES

Mourning Dove*	c	c	c	c
Rock Dove	o	o	o	o

CUCKOOS

Black-billed Cuckoo	r	r		
Yellow-billed Cuckoo*	c	c	c	

OWLS

Barred Owl			r	r
Common Barn-Owl	r	r	r	r
Eastern Screech-Owl	c	c	c	c
Great Horned Owl*	u	u	u	u
Short-eared Owl*	r	r	r	r
Snowy Owl			r	r

GOATSUCKERS

Chuck-will's widow*	u	u		
Common Nighthawk	r	r		

SWIFTS, HUMMINGBIRDS,
KINGFISHERS

SP S F W

Belted Kingfisher*	c	c	c	c
Chimney Swift	o			
Ruby-throated Hummingbird*	u	u		

WOODPECKERS

Common Flicker*	c	c	a	c
Downy Woodpecker	u	u	u	u
Hairy Woodpecker	u	r	r	r
Pileated Woodpecker*	u	u	u	u
Red-bellied Woodpecker	u	u	u	o
Red-cockaded Woodpecker*	r	r		
Red-headed Woodpecker	r	r	r	r
Yellow-bellied Sapsucker	o	o	o	o

FLYCATCHERS

Eastern Kingbird*	u	c	u	
Eastern Phoebe			c	
Eastern Wood-Pewee*	c	o		
Great Crested Flycatcher*	c	u		

MARTINS AND SWALLOWS

Barn Swallow	c	c	c	
Northern Rough-winged Swallow ..	r	r	r	
Purple Martin*	u	c		
Tree Swallow	c	c	a	o

JAYS AND CROWS

Blue Jay*	u	u	c	u
Common Crow*	c	c	c	c
Fish Crow	u	u	u	

CHICKADEES AND
TITMICE

Carolina Chickadee*	c	c	c	c
Tufted Titmouse*	u	c	c	

NUTHATCHES AND CREEPERS

Brown Creeper	o			o
White-breasted Nuthatch	u	u		

WRENS SP S F W

Carolina Wren*	c	c	c	c
House Wren*	u	u	o	
Marsh Wren*	u	u	u	u

KINGLETS AND
GNATCATCHERS

Blue-gray Gnatcatcher	r	r		
Ruby-crowned Kinglet	o	o	o	

THRUSHES, ROBINS AND
BLUEBIRDS

American Robin*	o	u	u	o
Eastern Bluebird	o	o	o	
Hermit Thrush			u	

THRASHERS, MOCKINGBIRDS
AND CATBIRD

Catbird*	u	u	u	u
Brown Thrasher*	c	c	c	c
Mockingbird*	c	c	c	c

WAXWINGS, SHRIKES
AND STARLINGS

Cedar Waxwing	o	o	o	
European Starling*	c	c	c	u

VIREOS

Red-eyed Vireo*	o	o		
White-eyed Vireo*	u	c		

WARBLERS

American Redstart		u		
Black-and-white Warbler		r		
Blackpoll Warbler		o		
Black-throated Green Warbler	o			
Common Yellowthroat*	c	c	c	
Hooded Warbler		o		
Magnolia Warbler		o		
Myrtle Warbler	u	o	u	u
Northern Parula		r		
Ovenbird		o		
Palm Warbler		c		
Pine Warbler		r		
Prairie Warbler*	c	c		
Prothonotary Warbler*	c	c	o	

SP S F W

Yellow-rumped Warbler		o	a	a
Yellow-throated Warbler		o	r	
Yellow Warbler		o		

CARDINALS, GROSBEAKS
AND BUNTING

Blue Grosbeak	u	u		
Indigo Bunting	u	u		
Northern Cardinal*	c	c	c	c
Rose-breasted Grosbeak	o	o	o	

SPARROWS

Chipping Sparrow	o	c		
Dark-eyed Junco	u	u	u	
Field Sparrow	c			c
Fox Sparrow			u	
Rufous-sided Towhee*	c		c	
Savannah Sparrow*	c	c	c	c
Sharp-tailed Sparrow		r		
Song Sparrow*	c	c	c	
Swamp Sparrow			c	c
White-crowned Sparrow		o		
White-throated Sparrow	c	c	c	

BLACKBIRDS, MEADOWLARKS
ORIOLES AND COWBIRD

Boat-tailed Grackle	c	c	c	c
Bobolink		o		
Brown-headed Cowbird*	c	c	c	c
Common Grackle*	c	c	c	c
Eastern Meadowlark*	c	c	c	c
Northern Oriole		o		
Orchard Oriole*	u	u		
Red-winged Blackbird*	c	c	c	c

FINCHES

American Goldfinch	u	u		
Purple Finch	o		o	o

WEAVER FINCHES

House Sparrow*	u	u	u	r
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SIGHTING NOTES

Date: _____ Time: _____ to _____

Weather: _____

No. of species: _____

Route or area: _____

Observers: _____

Remarks: _____

For additional information, contact:
Refuge Manager
Mackay Island National Wildlife Refuge
P.O. Box 31
Knotts Island, North Carolina 27950
Telephone: (919) 429-3100

