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CONSERVATION IN ACTION



MATTAMUSKEET a National Wildlife Refuge

Number FOUR
Fish and Wildlife

Service, United States Department of the Interior, Washington, D. C.

MATTAMUSKEET

A NATIONAL WILDLIFE REFUGE

By Rachel L. Carson

Illustrations by Katherine L. Howe

Conservation in Action NUMBER FOUR



IF YOU TRAVEL MUCH in the wilder sections of our country, sooner or later you are likely to meet the sign of the flying goose—the emblem of the National Wildlife Refuges.

You may meet it by the side of a road crossing miles of flat prairie in the Middle West, or in the hot deserts of the Southwest. You may meet it by some mountain lake, or as you push your boat through the winding salty creeks of a coastal marsh.

Wherever you meet this sign, respect it. It means that the land behind the sign has been dedicated by the American people to preserving, for themselves and their children, as much of our native wildlife as can be retained along with our modern civilization.

Wild creatures, like men, must have a place to live. As civilization creates cities, builds highways, and drains marshes, it takes away, little by little, the land that is suitable for wildlife. And as their space for living dwindles, the wildlife populations themselves decline. Refuges resist this trend by saving some areas from encroachment, and by preserving in them, or restoring where necessary, the conditions that wild things need in order to live.

Cover: Canada geese over Mattamuskeet Lodge

Mattamuskeet

MATTAMUSKEET, PEA ISLAND, AND SWAN-QUARTER—two on the mainland and one on the outermost barrier beach—are three National Wildlife Refuges in North Carolina that provide winter food and shelter for more than 100,000 waterfowl. Ducks, geese, and swans that in summer scatter across the northern rim of the world from Greenland to Alaska come down the sky lanes in the fall and in these refuges find the conditions they need to survive the hard months of winter.

At Mattamuskeet you can see one of the largest assemblages of Canada geese on the Atlantic seaboard and more of that giant white bird, the whistling swan, than the average person is likely to see in a lifetime. Pea Island is a winter haven for thousands of snow geese, Canada geese, and such ducks as goldeneyes, pintails, and mallards. At Swanquarter the diving ducks like buffleheads and scaups find the salt waters and the submerged aquatic plants that they need to tide them over winter.

These refuges lie within the Atlantic flyway of the waterfowl. There are four such flyways in the United States, the others being the Mississippi, the Central, and the Pacific.

The Atlantic flyway has extensive breeding grounds, scattered from the eastern border of the continent to the western, but its winter range is only a narrow strip on the Atlantic coast of the

United States, an area that is also densely settled and developed for agriculture and industry. Waterfowl refuges are especially needed in this flyway to provide plenty of food and shelter for the birds during the critical winter period.

This booklet tells the story of Mattamuskeet, which is the largest of the three refuges in North Carolina and the most accessible to visitors, and which in some respects is unique among all wildlife refuges. It also includes brief accounts of Swanquarter and Pea Island.

MATTAMUSKEET—the rhythmic softness of the Indian name recalls the days when tribes of the Algonquin roamed the flat plains of the coast and hunted game in deep forests of cypress and pine. The Indians are gone, leaving few traces upon the land they once knew. Much of the forest as the Indians knew it is gone, too, but even today some of the wildest country of the Atlantic coast is to be found in this easternmost part of the Carolina mainland—the area bounded by Albemarle Sound on the north and Pamlico Sound on the east and south. Here, in this coastal region, are dense woods of pine, cypress, and gum; here are wide, silent spaces where the wind blows over seas of marsh grass and the only living things are the birds and the small, unseen inhabitants of the marshes.

The Mattamuskeet National Wildlife Refuge includes about 50,000 acres of land and water in this Carolina coastal country, in the county of Hyde. The dominant geographic feature of the refuge is Lake Mattamuskeet—a shallow, sluggish body of water more than 15 miles long, 5 or 6 miles across, and some 30,000 acres in extent. Being little more than 3 feet deep anywhere, the lake is stirred deeply by the winds and its waters are usually muddy. Silt-filled waters support little plant life, and so the best feeding grounds for the waterfowl are not in the open lake but in its surrounding marshes. Cypress trees form most of the northern border of the lake, but its eastern and southern shores pass into low swamplands.

Try to learn the origins of this vast inland lake and at once you stumble upon a collection of local legends in which it is hard to separate fact from fiction. Of all the stories of the genesis of Mattamuskeet, local opinion divides its support between two. According to one story, the Indians long ago set fires in the peat bogs, fires that burned so long and deeply that a huge, saucer-like depression was formed. This caught the rains and the drainage water, creating a lake.

The other story has it that a shower of giant meteors once struck the Carolina coastal plain, the impact of the largest ones digging out the beds of Lake Mattamuskeet and the smaller, but otherwise similar, Lakes Alligator, Pungo, and Phelps that lie northwest of Mattamuskeet.

THE MODERN HISTORY OF MATTAMUSKEET, although less stirring to the imagination, has been a troubled one. The flat plain between Albemarle and Pamlico Sounds is an agricultural country that yields crops of soy beans, cotton, collards, and grain. On the whole it has too much, rather

than too little water. About 1914, people conceived the idea of draining Lake Mattamuskeet and converting its shallow bottom to farm land. Being patterned after similar projects in Holland, this community was named "New Holland."

The history of this attempt is too long to tell here—the digging of a network of canals, the building of pumping plants and a community of cottages, the spending of millions of dollars, the bankruptcy of one company after another, and the eventual abandonment of the scheme as impractical and impossibly expensive.

In 1934 the land was acquired by the United States Government and a waterfowl sanctuary was established. The Civilian Conservation Corps converted the former pumping plant into a refuge office and store rooms, combined with a modern, comfortably furnished lodge for visitors. A circular staircase was built into the former smoke stack of the pumping plant, turning it into an observation tower. This 120-foot tower affords a magnificent view of the entire refuge and the surrounding country, with thousands of geese and swans often in sight at one time.

According to an agreement with the State of North Carolina, two areas along the south shore of the lake have been set aside for managed hunting, where shooting is under the direct control of the State. Federal as well as State regulations are enforced. About 20 to 25 blinds are established, each in charge of a guide who is required to enforce hunting regulations. Reservations for these blinds should be made in advance by writing to the State Game Protector, North Carolina Wildlife Resources Commission, New Holland, N. C.

Fishing in the lake and canals is a popular recreation, also managed by the State, for which all fishermen are required to obtain a permit.

Fishes caught most abundantly are crappie, white perch, carp, and black bass. Fishing is permitted all year except during the hunting season, when it is restricted to Sundays.

Because the refuge is an excellent place to see many wild creatures native to the Atlantic coastal region, bird clubs and general nature study groups, classes in conservation, scouts and conservation-minded hunters are visiting Mattamuskeet more and more often to observe its wildlife.

Deer are plentiful on the refuge. Often you hear them splashing as they make off through the marshes, frightened by your approach. At night, emboldened, they roam about the refuge lawns, where you may surprise them in the beam of your flashlight. Bear occur in small numbers in the region; foxes, raccoons, opossums, mink, and some other small mammals are abundant. A good many muskrat houses are to be seen in the marshes, but this little furbearer saves himself a great deal of labor by often tunneling into the canal banks.

Alligators, which give the nearby Alligator River its name, sometimes swim lazily in the canal near the lodge. Snakes native to the coastal swamps—cottonmouth and water moccasins, copperheads, black snakes, and others—occur but are not often seen in winter. Frogs are very abundant in the swamps and a throbbing amphibian chorus fills the night air even in mid-winter when the weather is mild.

FOR VISITORS TO MATTAMUSKEET, a modern and comfortable lodge is operated by a concessionaire throughout the year. The lodge has space for 45 to 50 people, accommodations ranging from single or double rooms with private bath to 4-bed

rooms. Meals are served in the lodge dining room. Advance reservations and all arrangements for accommodations should be made with the Manager, Mattamuskeet Lodge, New Holland, N. C.

Because of the great demand for space during the hunting season, reservations for this period need to be made far in advance. The most satisfactory time for bird clubs to visit the refuge is during the fall before the hunting season opens, and again in winter and spring after the hunting season. There are comparatively few birds at the refuge during the summer.



Mattamuskeet Lodge



Whistling swans feeding on the marshes

WHISTLING SWANS are the most spectacular birds to be seen at Mattamuskeet. With their wing spread of 6 to 7 feet, they are the largest of all North American waterfowl except the related trumpeter swan, which is now reduced to less than 400 birds in the United States.

The whistling swans arrive at Mattamuskeet sometime in November, remain several months, and usually in February begin their northern migration. When they leave Mattamuskeet, they have a trip of 2,500 to 3,500 miles before them, for most of them breed north of the Arctic Circle. The species winters on the Atlantic coast, principally between Maryland and North Carolina, and also on the Pacific coast from southern Alaska to southern California.

A large flock of swans is noisy and their voices are a typical winter sound on the refuge. The mingled chorus of swan voices is something like the sound of geese, although somewhat softer. The name "whistling swan" is given because of a single high note sometimes uttered—a sound that suggests a woodwind instrument in its quality. The trumpeter has a deeper, more resonant voice

because of an anatomical peculiarity—the wind-pipe has an extra loop. Trumpeters are never found on the Atlantic coast, however.

After a long history of persecution by man, all wild swans now enjoy complete protection in the United States, Alaska, and Canada. As though sensing this security, the swans at Mattamuskeet show very little fear of people and allow themselves to be approached much more closely than the geese. Five to ten thousand swans usually winter here, feeding in shallow water areas about the southern and eastern shores of the lake. It is possible to see a flock of 500 swans at one time, magnificent in their gleaming white plumage. Sometimes the swans feed or rest in family groups in which the young birds or cygnets may be identified by their grey color.

FOR THE CANADA GEESE of the Atlantic coast, Mattamuskeet is one of the chief wintering places, with a population of about 40 to 60 thousand of these handsome birds from November to the middle of March.

Magnificent though the swans are, the person who visits Mattamuskeet in midwinter is likely to come away with impressions of geese uppermost in his mind. Throughout much of the day, their wings pattern the sky above you. Underlying all the other sounds of the refuge is their wild music, rising at times to a great, tumultuous crescendo, and dying away again to a throbbing undercurrent.

Guided by the voices of the birds, you walk out along the banks of one of the canals about sunrise. A steady babble of goose voices tells you of a great concentration of the birds on the lake, probably off the end of the canal. At intervals the sound swells as though a sudden excitement had passed through the flock, and at each such increase in the sound a little party of birds takes off from the main flock and moves away to some favored feeding ground. As you stand quietly in the thickets along the canal, they pass so close overhead that you can hear their wings cutting the air, and see their plumage tinged with golden brown by the early morning sun.

The Mattamuskeet country is so famous for its geese that hunters come from great distances, and rent shooting blinds from farmers of the region or in the managed hunting areas operated on the refuge. In the 1946-47 season, the total kill of geese within these managed areas was 868. Large numbers are shot also in the surrounding countryside, but exact figures are not available.

A large majority—probably three-fourths—of the Mattamuskeet geese breed along the eastern shores of Hudson Bay, smaller numbers in the Maritime Provinces.

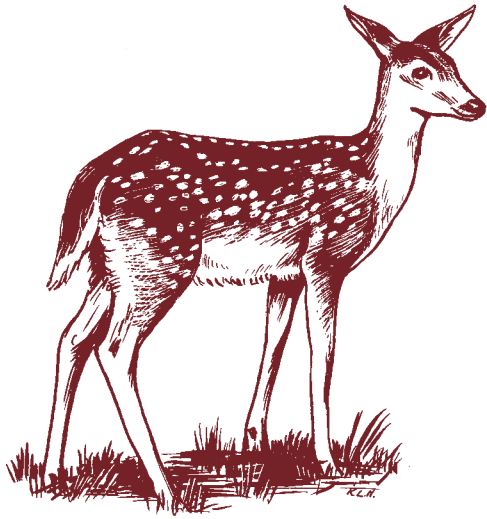
The ducks that winter at Mattamuskeet are largely the marsh or dabbling ducks—the shallow-water feeders. Pintails are the commonest of these, and it is a beautiful sight to see 10,000 or more of

these graceful ducks wheeling above the marshes. Small flocks of wigeons appear in spring along the lake road. Black ducks, green-winged teal, mallards and blue-winged teal spend the winter here in varying numbers, from a few hundred to a few thousand.

Most of the ducks found in winter from Delaware Bay south nest in the prairie provinces of Canada or in the flat country of the Dakotas and Minnesota. All of this country is subject to periodic droughts; then many ponds and marshes dry up, few ducks nest successfully, and few ducklings survive to join the fall flights south.

THE BIRD CLUBS OF NORTH CAROLINA and surrounding States have made frequent visits to Mattamuskeet ever since the refuge was established. So many birds may be seen in the thickets or along the canals within a few hundred feet of the lodge that it is unnecessary for older members or others unable for strenuous exercise to go far afield. More than one person confined to a wheel chair, who had believed his days of field ornithology behind him, has been brought to Mattamuskeet for a satisfying and refreshing experience.

To gain the best vantage points for observing swans, geese, or ducks, it is worth while to hike out along the remnants of the former canals that here and there extend in long, densely overgrown peninsulas into the lake. Sometimes this will bring into view thousands of geese resting on the water. Concentrations of swans on feeding grounds along the south shore of the lake can sometimes be spotted from the highway, and can then be approached on foot within good binocular or camera range. All cultivated fields of the area should be watched for large flocks of geese.



Fawn of white-tailed deer

The bird life of Mattamuskeet includes about 200 different species, with water birds and water-loving land birds predominating—less variety than is found in a more diversified country. Bird clubs visiting Mattamuskeet therefore may not compile a long list but see extremely large numbers of certain species, occasionally record a rarity, and have excellent opportunities for close observation of bird behavior.

Waterfowl are, of course, the chief winter attraction. Of these, swans, Canada geese, and the surface-feeding ducks find ideal conditions at Mattamuskeet. Diving ducks tend to go to the Swanquarter area (see page 8). Marsh birds like herons are common: the great blue stays throughout the year, the American bittern is here in winter, the least bittern, green and little blue herons, and American egret are summer residents. Shorebirds, loons, and grebes find little suitable country for their habits and occur only in limited numbers.

The brown-headed nuthatch is a permanent resident, probably nesting on the islands of the lake or about the borders of the canals. In winter the wax myrtles are alive with myrtle warblers. Carolina wrens, chickadees, white-throated, fox, swamp, and song sparrows fill the winter thickets. Other winter residents or transients include the hermit thrush, ruby-crowned kinglet, pipit, horned lark, and cedar waxwing. The mockingbird is common throughout the year.

The most abundant of the summer warblers at Mattamuskeet is the prothonotary, with the prairie warbler also a common bird. Vireos, both white-eyed and red-eyed, are common in summer, as are wood thrushes and orchard orioles.

Observers of birds at Mattamuskeet over the years have marked up a number of unusual species, such as the white pelican, blue goose, white-fronted goose, Hutchins goose, black tern (a fall transient), European wigeon, black rail, and—as interesting stragglers from the west—the avocet and Arkansas kingbird.

WHAT DOES THE MATTAMUSKEET REFUGE DO for the waterfowl that could not be done in the same area of wild country without management? This is a fair question, and its answer gives one of the chief reasons for establishing wildlife refuges in selected localities over the country.

The answer is this: by cultivating or managing the marshlands by scientifically tested principles, the land within the refuge is made many times as productive of natural foods as outside areas not under management.

Underlying and determining the character of the management activities are the great recurrent rhythms of nature. Moving over the marshlands

as over a stage, the passing seasons bring the cyclic sweep of two great series of events, one in the animal world, the other in the world of plants. The two cycles are directly related. In the spring the marshes that have been brown and desolate come alive with fresh green shoots of plants like the sedges, bulrushes, and salt grass. Spring yields to summer, the hot sun is over the land, the plants grow, flower, mature their seeds. By the time autumn begins to paint the leaves of the gums and the swamp maples, the marshes are loaded with food—the roots, seeds, and shoots of the plants that waterfowl eat.

Now the fall migrations of the birds—the sweep of the other, the animal cycle—fill the marshlands with ducks, swans, and geese come down from the north. Here in the marshes they find the food they must have if they are to survive the winter.

By late winter or early spring the food supplies are exhausted. But once more the urge to migrate is stirring among the waterfowl, and soon the marshes are left empty. In the stillness and heat of summer the recuperative powers of nature set to work to build up new food supplies.

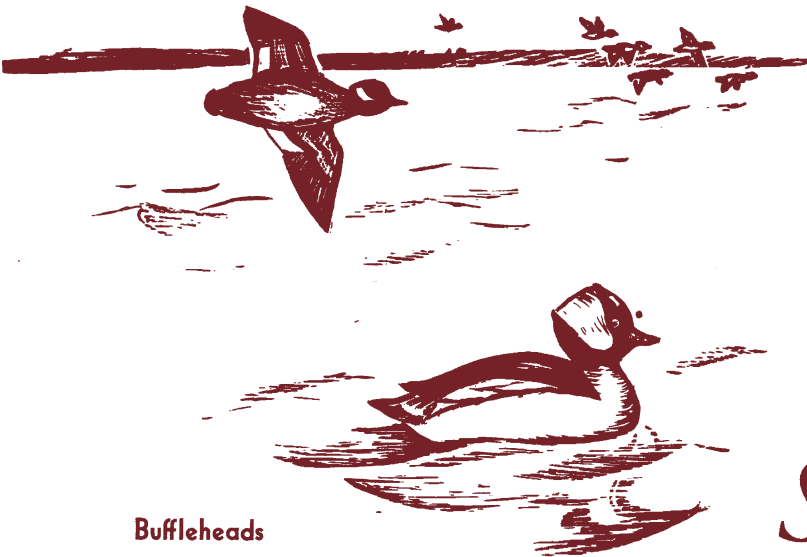
To get the largest possible production of waterfowl foods out of the marshes at Mattamuskeet, the manager operates the refuge with certain aims in mind. Among the most important, he must keep down the brush that is forever moving into the marshes. Geese, swans, and ducks feed in marshes but not in thickets, so every foot invaded

by the fast-growing brush is a corresponding loss of waterfowl pasture. Today at Mattamuskeet you can see hundreds of acres of productive marsh which have been won back from the thickets by burning, disking, and cutting.

Control of the water level is another method used by the refuge manager to increase the production of food plants. In the spring he lowers the water by manipulating the gates in the canals that lead from the lake to Pamlico Sound, about 8 miles distant. This lays bare extensive areas where 3-edge, 4-square, and other food plants can grow. In the fall the gates are closed, and the marsh areas flooded to serve the food plants in the way the birds prefer—under a few inches of water.

By late January or early February, most of the natural marsh food has been eaten. The thousands of birds that remain must have food to fuel their bodies on the long spring migration. This is a season of busy activity on the refuge. Crews of men move out into the marshes, starting fires in the marsh grass. Keeping the fires carefully under control, many hundreds of acres are burned. Less than a week later, new green shoots are coming up all over the marsh. Within ten days the geese have moved in to harvest this new food supply.

By thus coordinating the management of the refuge with the natural cycles of plant and animal life, the Fish and Wildlife Service has developed Mattamuskeet to the point where it now supports much larger flocks of waterfowl than came to this region in former years.



Buffleheads

Swanquarter

THE SWANQUARTER NATIONAL WILDLIFE REFUGE, like Swanquarter Bay and the town of Swanquarter, takes its name from the great flocks of swans that the early settlers found each winter in all the waters of the region. Swanquarter Refuge still has its wintering swans, although in much smaller numbers than at nearby Mattamuskeet. At Swanquarter the ducks now greatly outnumber either swans or geese.

This refuge was established chiefly for the diving ducks which include such important game species as redheads, scaups, goldeneyes, and buffleheads.

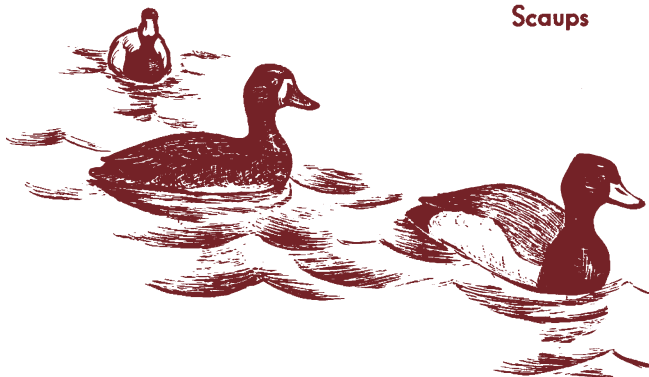
One of the principal winter foods of the divers was eelgrass. In the 1930's, a disease swept the eelgrass beds along the entire coast, but at Swanquarter, as well as in other sections, this important plant now is showing encouraging signs of recovery. As the patches of eelgrass spread over its bays again, Swanquarter may be expected to attract even larger numbers of divers than are found there today.

Besides waterfowl, the bird life of Swanquarter includes gulls, terns, bald eagles, ospreys, and characteristic small birds of the woods and marshes. Mink, muskrat, otter, and raccoon are

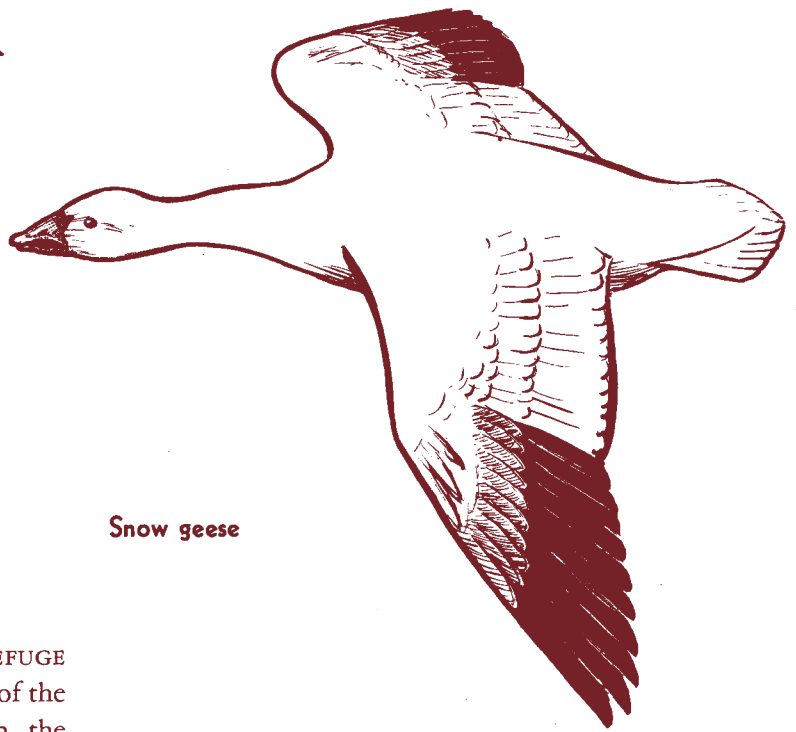
the most abundant furbearers. A good many deer, and an occasional bear, occur in wooded sections.

Swanquarter includes about 43,000 acres of land and water—15,000 acres of woods and marsh bought in 1931 and 1932 under the provisions of the Migratory Bird Conservation Act, and about 28,000 acres of water closed to hunting by Presidential Proclamation in 1933. Water areas of the refuge are public, navigable waters, in which fishing and oystering are conducted subject to State (but not Federal) regulation.

The entrance road to the refuge leaves U. S. Highway 264 about 4 miles northwest of the village of Swanquarter and extends south about 2 miles to the shore of Rose Bay, where the patrolman's headquarters is located. Permission may be obtained to use the dock and beach area for swimming and picnics.



Scaups



Pea Island

Snow geese

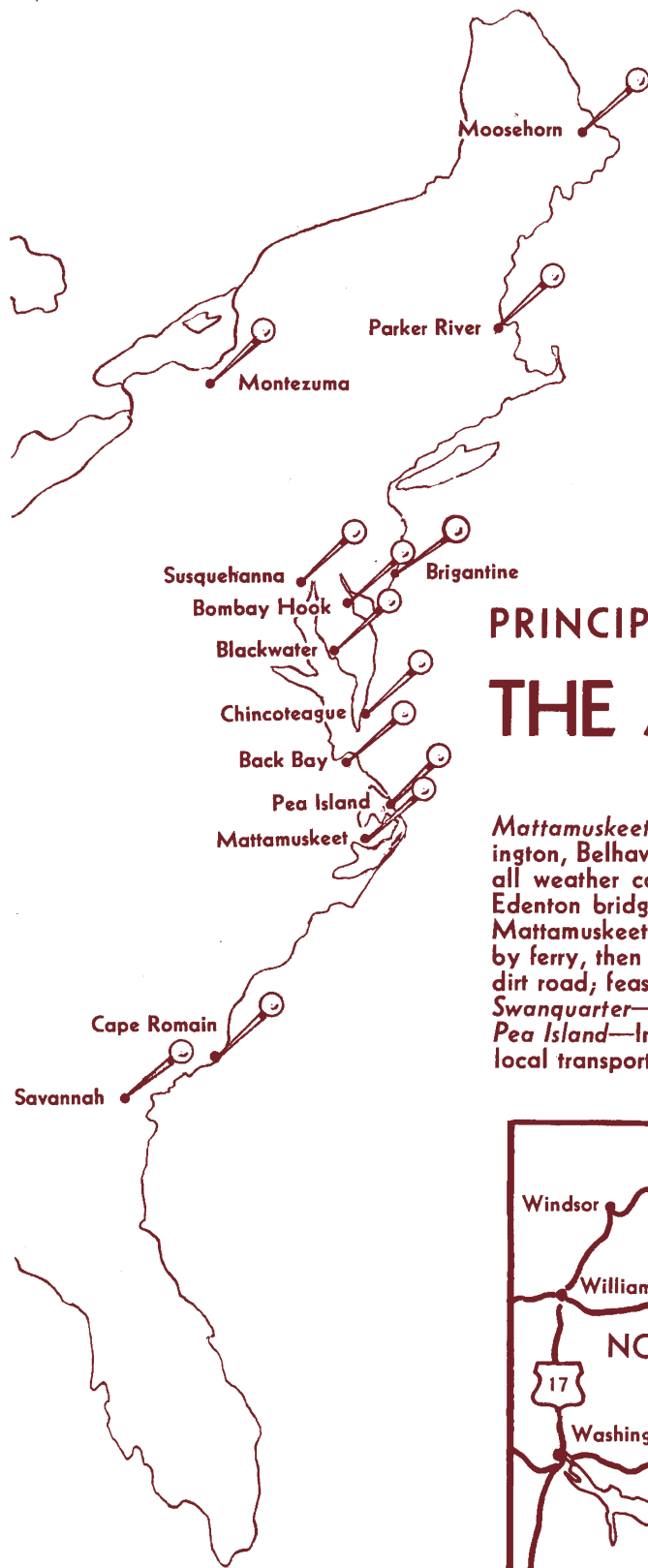
THE PEA ISLAND NATIONAL WILDLIFE REFUGE lies in a section that only recently was one of the most remote and inaccessible places on the Atlantic coast—the North Carolina banks south of Roanoke Island—bounded on one side by Pamlico Sound, on the other by the open Atlantic. These narrow barrier islands, consisting of beach, dunes, and marsh, are roadless and have been considered beyond the limits of automobile travel. Now jeeps and command cars make travel over the trackless beaches possible, although still hazardous and demanding skill; magazine articles and newspapers proclaim the quaintness of this unspoiled land with its scattered fishing villages, and the mounting influx of sport fishermen and tourists is fast destroying the solitude that was Pea Island's.

The Pea Island refuge begins at Oregon Inlet and runs south almost to the town of Rodanthe. It includes about 5,880 acres. This narrow island is one of the winter homes of the greater snow goose, accommodating probably half of the entire population of this bird, of which there are not more than 20 to 30 thousand in the world. Many Canada geese and brant come here, as well as practically all species of ducks that winter any-

where on the North Carolina coast. Pea Island is one of the finest places on the coast to observe the seasonal migrations of the shorebirds, of which two species—the willet and Wilson's plover—nest on the refuge.

Since the refuge was established in 1938, much development work has been done to stabilize the dunes and to create fresh water marshes by building dykes.

The impounded areas, with only the abundant rains as a source of fresh water, have gradually freshened and food plants such as sago pondweed, wigeongrass, bulrushes, and spikerush have become established. Surprisingly, these ponds remain fresh throughout the year. This has made the refuge attractive to a great variety of waterfowl. The average winter population of ducks and geese has increased from about 15,000 when the refuge was established to about 50,000 ten years later. Many additional birds come in during severe winters that freeze over the feeding areas north of Pea Island.



PRINCIPAL WATERFOWL REFUGES OF THE ATLANTIC FLYWAY

Mattamuskeet may be reached: 1. Via U. S. Route 264 through Washington, Belhaven, and Swanquarter, to New Holland. (Best route under all weather conditions.) 2. From Norfolk across Albemarle Sound at Edenton bridge, then by routes 32, 64, and 94 to Fairfield, across Lake Mattamuskeet on causeway. 3. From Roanoke Island to Manns Harbor by ferry, then by road through Englehard to New Holland. (Forty miles dirt road; feasible only in dry weather.)

Swanquarter—First route recommended for *Mattamuskeet* is best.

Pea Island—Inquire of refuge manager in Manteo, Roanoke Island, as to local transportation by boat or bus.

