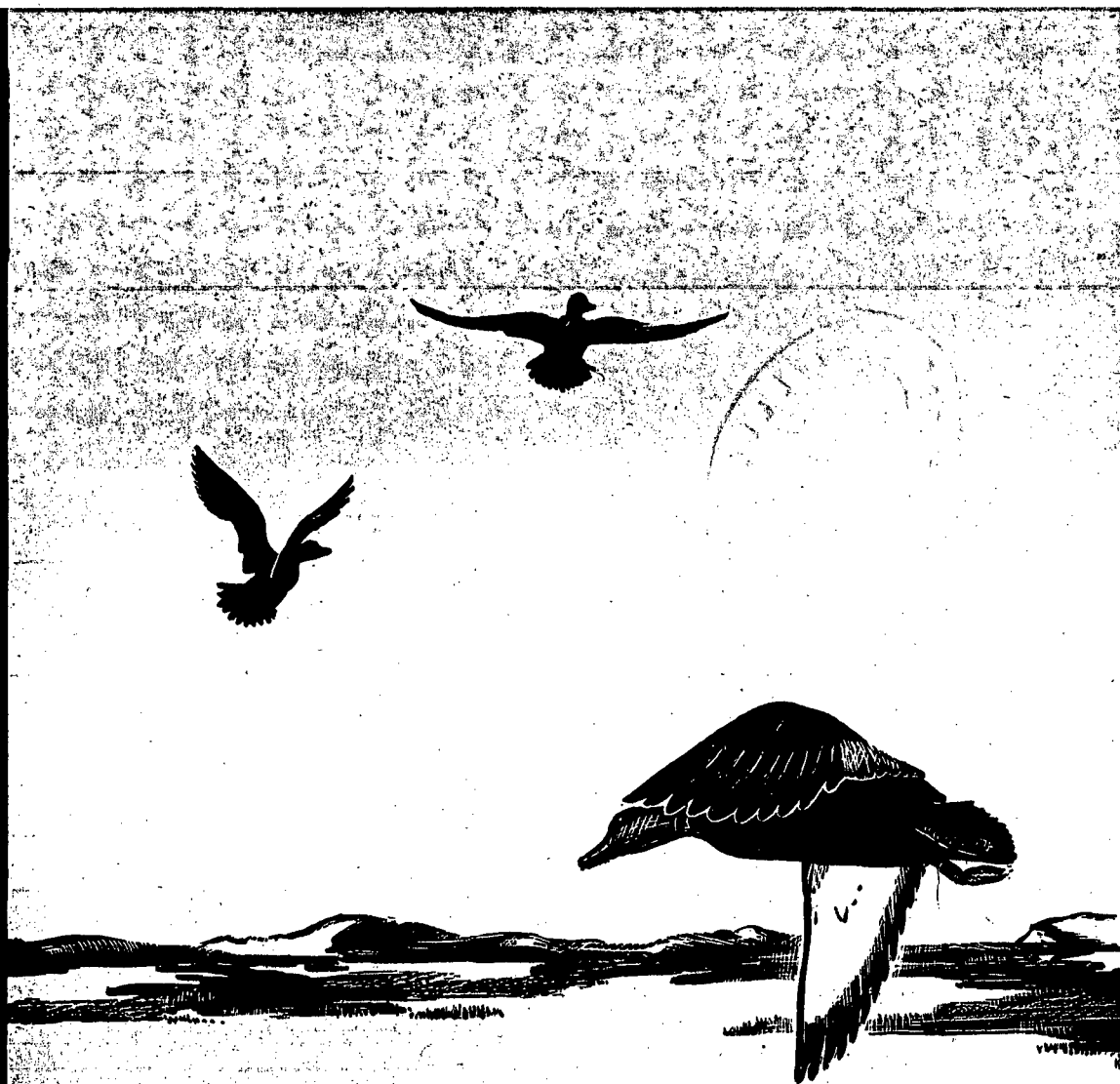


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# CONSERVATION IN ACTION

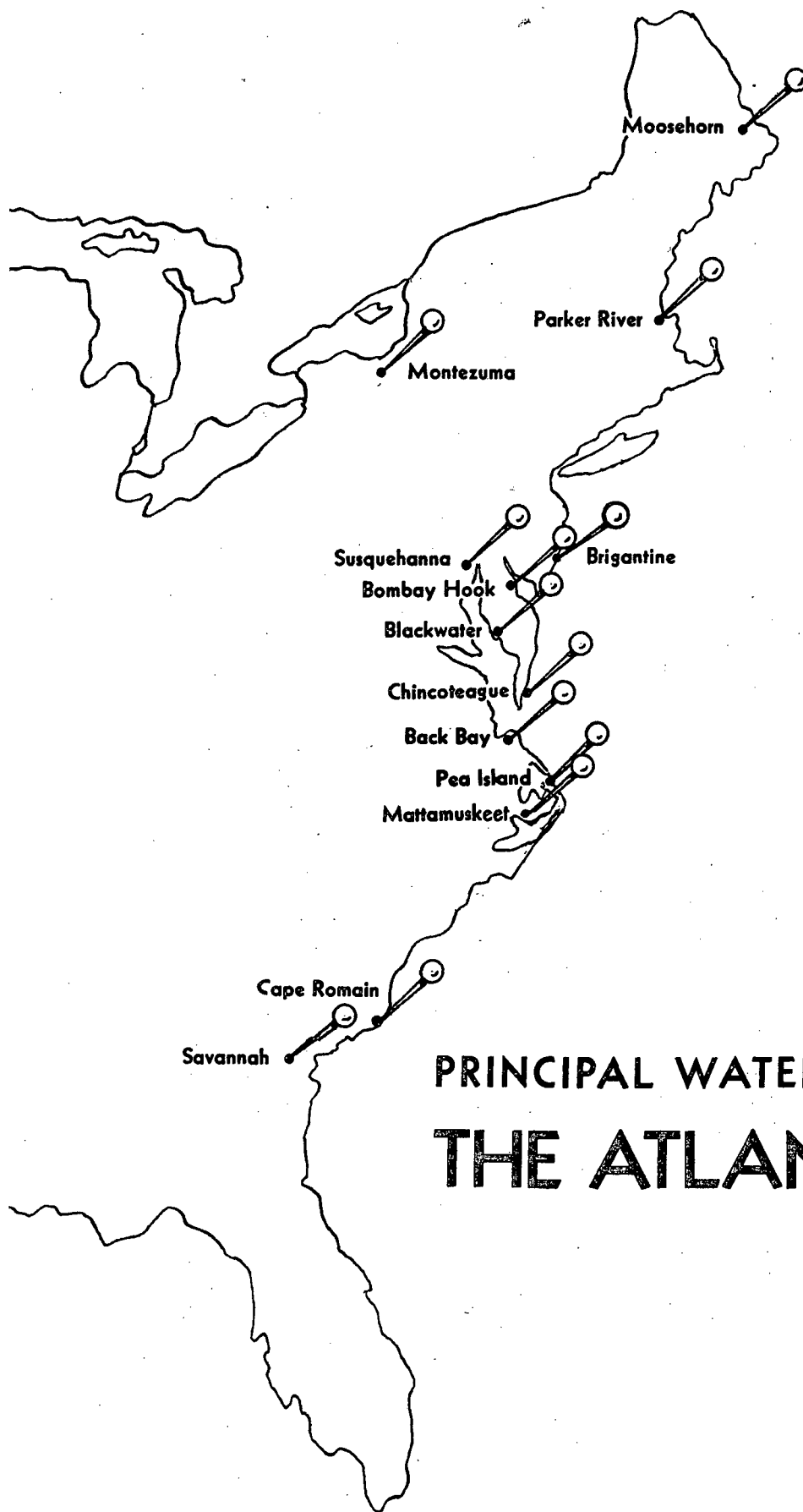


## PARKER RIVER

a National Wildlife Refuge

Number TWO  
Fish and Wildlife

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



## PRINCIPAL WATERFOWL REFUGES OF THE ATLANTIC FLYWAY

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UNITED STATES DEPARTMENT OF THE INTERIOR, J. A. Krug, *Secretary*  
FISH AND WILDLIFE SERVICE, Albert M. Day, *Director*    ««   ««   ««

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# PARKER RIVER

## A NATIONAL WILDLIFE REFUGE

*By Rachel L. Carson*

*Drawings and photographs by Katherine L. Howe*

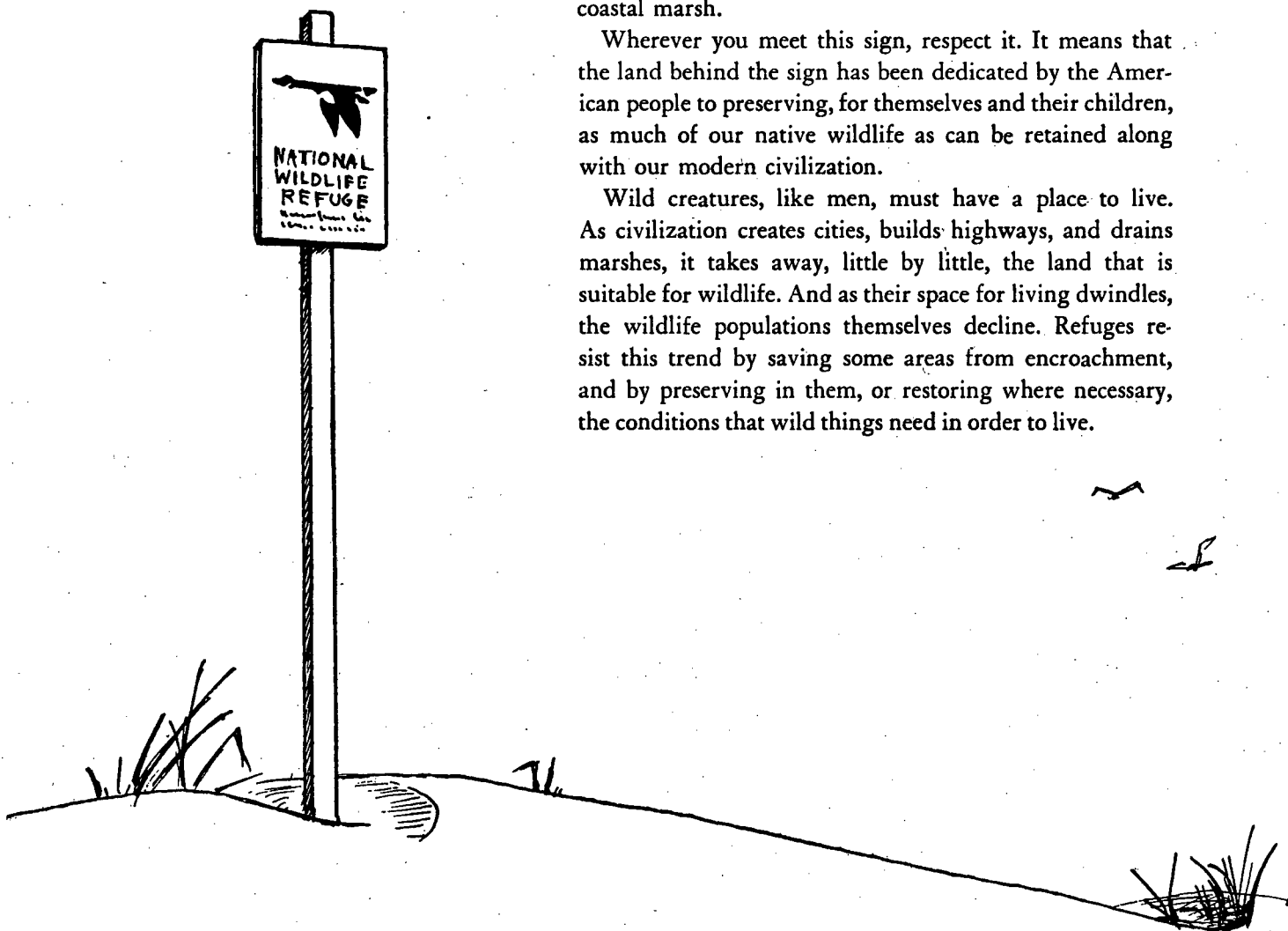


*Conservation in Action*

NUMBER TWO

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UNITED STATES GOVERNMENT PRINTING OFFICE • WASHINGTON : 1947  
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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.

# *Parker River*

## A N A T I O N A L W I L D L I F E R E F U G E

THE PARKER RIVER NATIONAL WILDLIFE REFUGE is New England's most important contribution to the national effort to save the waterfowl of North America. Many million Americans have a direct stake in the success of this effort: the 2,000,000 waterfowl hunters, the millions who find recreation and esthetic pleasure in observing and photographing the birds, and all those, whom there is no way of counting, who understand the value of preserving wildlife as part of America's natural heritage.

During the several generations in which the United States has been converted from a land preeminently wild and unsettled into an industrial and agricultural country, the waterfowl have been driven from most of the areas where they once lived. During the same span of years, we have seen the rise and decline of market gunning and the steady and continuing rise of hunting for sport.

In this period there have been at least three major declines in the waterfowl population. From the first two, which reached their respective low points in 1915 and in the 1930's, there was a partial recovery. The third great decline began in 1944. The downward sweep of such a cyclic decline—perhaps this, or the next, or the next—may reduce the flocks of

waterfowl to so low a point that there can be no recovery.

To save the wild fowl, one of the most important things we can do is to reserve for their use areas which provide them with the marshes and ponds, the natural foods and the sanctuary that they need in order to live in the midst of our civilization. Two hundred national waterfowl refuges scattered over the United States now provide these things. Whatever else waterfowl conservation demands, this is essential.

PARKER RIVER lies some 30 miles north of Boston in the coastal marshes of Essex County, Mass. The refuge was established late in 1942, but its active development to bring out its maximum usefulness had to be delayed until near the end of the war because of manpower and materials shortages. However, in this brief time, its use by waterfowl has increased sharply. In the spring of 1944, about 2,000 waterfowl used the refuge. Two years later, the spring count was nearly 15,000. Regular patrons of the refuge include 19 species of ducks, of which the great majority are black ducks, and 1 species of goose, the Canada. Greater snow and blue geese are reported casu-

ally. About 70 birds of other species make regular use of the refuge and many others occur as transients.

The Essex County marshes are within the Atlantic flyway, which is one of four great geographic divisions into which the North American continent may be divided according to the ways of waterfowl. The term "flyway" as ornithologists use it today includes the breeding and wintering grounds and most of the migratory paths that connect them. Birds have a hereditary attachment for one particular flyway and as a rule never transfer from one to another.

A striking fact about the Atlantic flyway—a fact which dominates the conservation problem—is the extremely limited area of its winter range compared with the vast extent of its breeding grounds. The nesting area extends from Greenland across much of northern Canada; the wintering grounds are confined to a narrow strip of coastal marshes along the east coast of the United States. A map of the flyway looks like a huge, distorted funnel with a long slender stem. Imagine that for one-half of the year all the contents of the funnel have to be contained within the stem and you can understand the compression of birds within their winter range. This fact makes wildlife refuges especially important on the Atlantic flyway.

Parker River is the only Federal refuge operated principally for waterfowl on the northern part of the Atlantic flyway. It lies in the path of a great many of the ducks and geese that fly south in the fall from the eastern Canadian Provinces and from northern New England. Some of these birds follow a route roughly corresponding to the outlines of the seacoast; others

fly overland from inland breeding grounds and make their first contact with the coast in the vicinity of Parker River.

These facts have in recent times been substantiated by bird banding. Recoveries of banded birds are demonstrating clearly the pattern of migration. The general route of the waterfowl has been known for generations, however, and has been fully recorded in many publications by New England ornithologists. Dr. Charles Townsend pointed out as early as 1905 that Essex County (site of Parker River) lay "in one of the great highways of bird migration." Dr. John Phillips rated Plum Island worth a visit to see "all sorts of migrants." Edward Forbush years ago declared it "the most important region on our coast" in which to locate a bird sanctuary. In the early 1930's the Massachusetts Audubon Society acted upon this advice, acquired some 1,600 acres in the central portion of the island, and converted it into a sanctuary. This former Audubon Society sanctuary is now part of the National Wildlife Refuge.

Parker River is a link in the chain of refuges established at carefully chosen intervals on the Atlantic flyway, so that the migrating waterfowl may find sanctuary and food at least every few hundred miles of their journey within the United States. Of the coastal refuges of the flyway, the migrations of the birds link Parker River toward the north with Moosehorn, near Calais, Maine, and toward the south with Brigantine on the ocean coast of New Jersey, and Bombay Hook, almost directly west on the shores of Delaware Bay. Then come Blackwater in Maryland; Chincoteague and Back Bay, Virginia; Pea Island and Mattamuskeet in

North Carolina; Cape Romain in South Carolina; and Savannah on the border between South Carolina and Georgia.

**W**ATERFOWL SANCTUARIES MUST BE LOCATED in the kind of country that attracts birds, provides proper food for them, gives them suitable places to rest before making the next hop on the long migratory flight. Parker River is this kind of country.

Plum Island, the heart of the refuge, is a long, narrow, coastal island. It begins where the Merrimack pours its waters into the Atlantic and ends about 9 miles to the south at Ipswich Bay. To get a panoramic view of Plum Island, climb one of the highest sand dunes—the dune topped by the Army Observation Tower is one of the best lookout points. As your eyes range from east to west, you see five totally different kinds of country as the birds would classify it, five different zones of life each containing a different community of animal life. These regions are the ocean beach, the dunes, the thickets, the salt meadows, and the tidal flats of the salt marsh creeks.

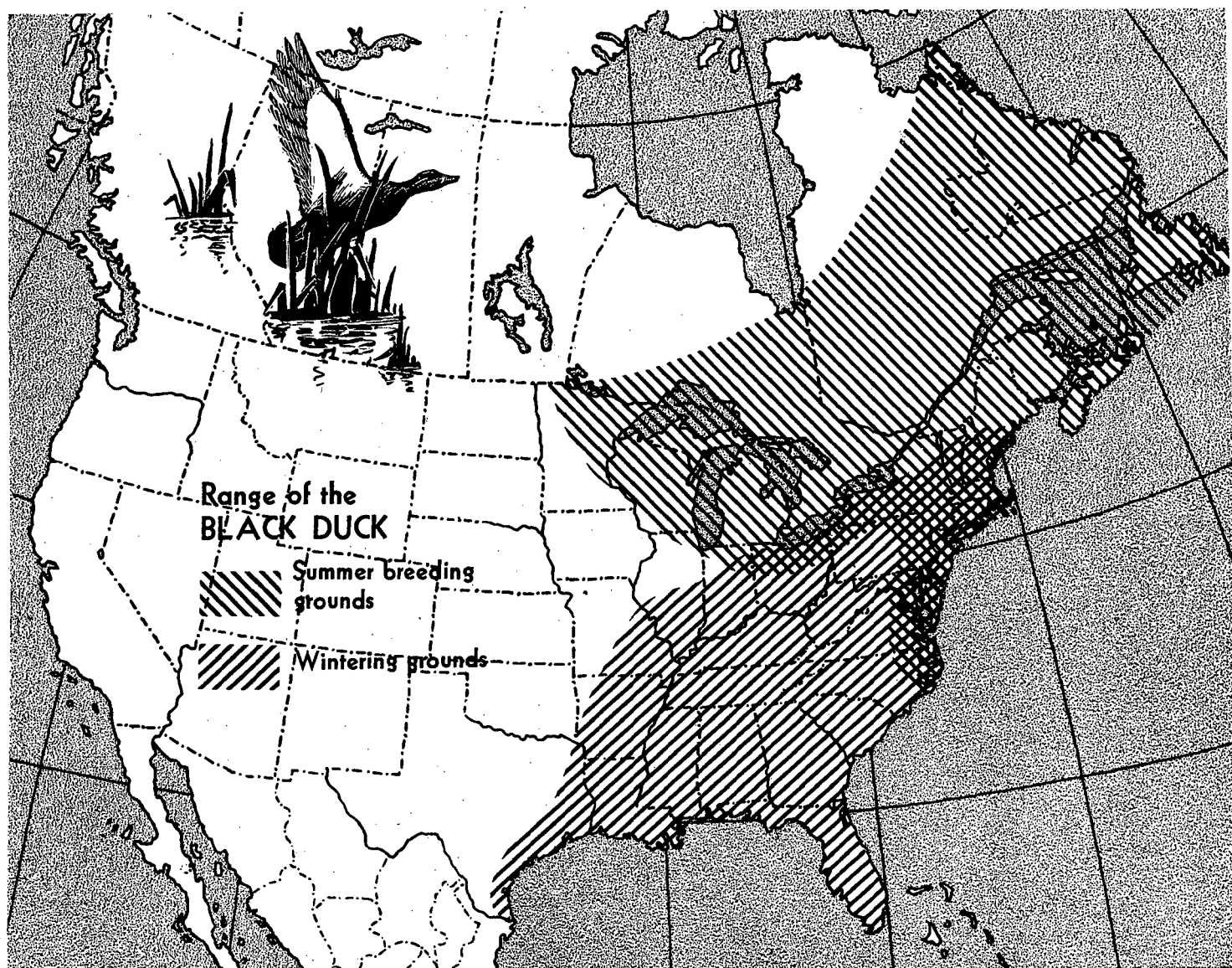
Eastward from our observation point is the immensity of the Atlantic, nothing but water between you and Spain. Outlined by the white surf lines, a sandy beach runs the length of the island. The large grains of the Plum Island sand do not pack to a hard surface; for this reason driving on the beach is difficult and should be indulged in only by those who know local conditions and are experienced in driving on sand.

On the landward edge of the beach, where the beachgrass *Ammophila* and the silvery-

leaved dusty-miller have begun to anchor the shifting grains, the dunes begin. Their contours are often steep, and as you look southward over the expanse of sand hills you see that the dune zone is pitted with many sandy depressions like bomb craters, their conical sides almost bare of plant growth. Except in these places, the dunes are widely covered with a low, sage-green carpet of the plant *Hudsonia*, helping to hold the shifting sand and prevent the sea beach from engulfing the land. A scattered growth of bayberry and poison-ivy begins midway across the dunes, gradually becomes more dense, and merges with the thickets that run down the center of the island. Cranberries grow abundantly in the low, wet places among the sand hills.

The shrubs, vines, and small trees that form the zone of thickets—the midrib of the island—are the home of the small land birds and give excellent cover and food for the pheasants. Probably the island supports from 60 to 75 pheasants—the only upland game bird on the island. Deer find good browsing here, as well as places of concealment from the casual eye. Most abundant plants are wild rose, sumac, beach plum, bayberry, black alder, choke cherry, pitch pine, aspen, and the ever present green-brier.

Lying to the west, almost like another vast green sea, are the salt meadows. The winding Plum Island River, the lower reaches of the Parker, and all their small, meandering tributaries traverse the marshes with an intricate series of open-water canals. Scattered ponds or pot holes bring down the migrating wildfowl to feed on the water plants that grow in them.



Look out over the marshes when the tide is high and you see nothing but grass and water. But look again when the tide is on the ebb and you will see that every creek has a border of black mud. At dead low tide the small creeks are completely drained; even the large ones have only a central channel in the midst of a great expanse of mud. These are the clam flats, home of the soft-shell clam.

THE CONSERVATION PROGRAM at Parker River is designed first of all to restore and if possible to increase the black duck population. The refuge has many other uses and many values, but these are secondary to its principal purpose. There is a logical reason for concentrating on the black duck. Of all waterfowl, no other is so typical of New England as this species. From Cape Cod north, it is the only surface-feeding



duck present in large enough numbers to maintain hunting for any considerable number of gunners. A serious reduction in the population of black ducks would mean the end of waterfowl hunting for the majority of the New England sportsmen.

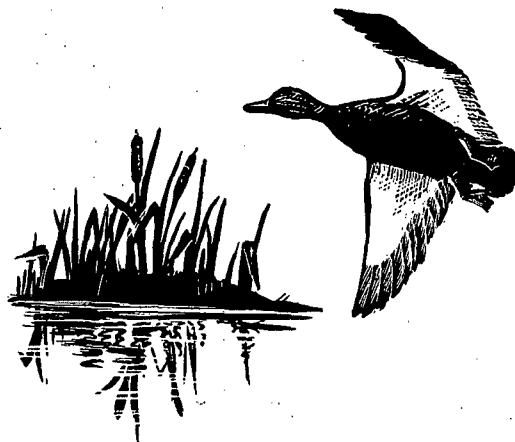
For many years, even in the famous "duck depression" of the 1930's, the black duck held its own better than the ducks that breed in the central prairies of Canada and northern United States, then stricken by drought. However, it did not respond so dramatically to restorative efforts as some other species. In recent years there have been danger signals. Massachusetts observers, including outstanding ornithologists of the region, began as early as 1943 to report a scarcity of black ducks. Again in 1944 the blacks were reported as having fallen off sharply; in 1945 the flight was described as a "complete failure"; in 1946 observers warned that the species was "notably down in numbers."

We need to know more about the biology of this species to understand fully what has happened to the black duck, normally a hardy and adaptable species, and once so abundant. But this much we know: many areas in north-eastern United States where black ducks once nested have been drained out of existence as breeding grounds. Innumerable pot holes have been filled for suburban residential sites and for industrial use. Also, conditions in recent years have been unfavorable in the Maritime Provinces of Canada, now one of the most important black duck nesting areas. Heavy spring rains there flooded out many duck nests in 1945 and 1946.

The present reduced population of black ducks needs the help of wildlife refuges.

Parker River and other refuges can to some extent help restore nesting territory within the United States. Refuges south of New England provide necessary wintering areas. The greatest value of the Parker River Refuge lies in the preservation of a natural waterfowl marsh where the birds may break the long migratory flight for rest and food.

**B**LACK DUCKS are to be found at Parker River any month of the year, but in September and October, almost more than any other time, you begin to get the feel of real black duck country as you tramp through the salt marshes of Plum Island. After the lull of midsummer, when only a few ducks are to be found here, migrants are coming in from the north. The great Joppa Flats in Newburyport Harbor are an early rallying point for them as they swing down from Labrador, Nova Scotia, Ontario, Maine, or wherever they may have summered. As you drive out from the town to Plum Island, you can see them gathering in the harbor, small black forms riding the outgoing tide, bobbing like boats at anchor. Today perhaps there are a thousand. Tomorrow morning there may be five thousand; next week as many more.



Soon the ducks spread out into the nearby marshes. Seeds of the salt-meadow plants—arrowgrass, bulrushes, tidemarth waterhemp, pondweeds—are choice duck foods, abundant in the marshes through which Parker River and half a dozen other creeks and small rivers cut their paths to the sea. As the late summer days pass and autumn comes, many ducks gather in the marsh pot holes south of the Cross farm.

In the days when there was no refuge here, the first roar of guns at the opening of the hunting season would send the ducks out to sea. They were safe there from the barrage of lead. But the open ocean provides little or no food for a black duck and for that reason it was a poor sanctuary.

Now the onset of the hunting season tends to concentrate the ducks in the refuge, where experience has quickly taught them they can find both safety and food. Hunters now find better shooting in the marshes on the mainland than before the refuge was established, and the good hunting lasts longer because the ducks are not driven immediately from the vicinity. So, by a seeming paradox, the refuge has improved hunting even while it has helped conserve the ducks.

The tide of black duck migration runs strong through October and November. By December most of the migrants have passed through to the south. These ducks, as we know from the returns of banded birds, winter in southern New England, on the New Jersey coast, in Chesapeake and Delaware Bays, some even as far south as Georgia. But some of the blacks stay at Parker River over winter, defying blizzards, freezing marshes, ice, and snow. The earliest ornitho-

logical records of the area report wintering black ducks, suggesting that this is a deep seated, instinctive behavior.

In a severe winter, duck food is scarce on the northern Massachusetts coast. The coastal marshes often lie under a deep covering of snow and ice. As the highest tides break up the ice, the ducks find some food on the top of the marsh and along the creek banks. At low tide they search the patches of open water. When the cold is at its bitterest, they subsist on mussels, snails, scuds, minnows—all the varied life of the salt marshes. They grow thin, sometimes losing as much as a pound—a third or more of their total weight—over winter. Some actually die of starvation.



By the time the ice has left the salt marshes—usually in March—many of the ducks are paired off. You can see them on the high tides in every little gut and puddle. As fast as fresh-water areas open up, blacks appear on them.

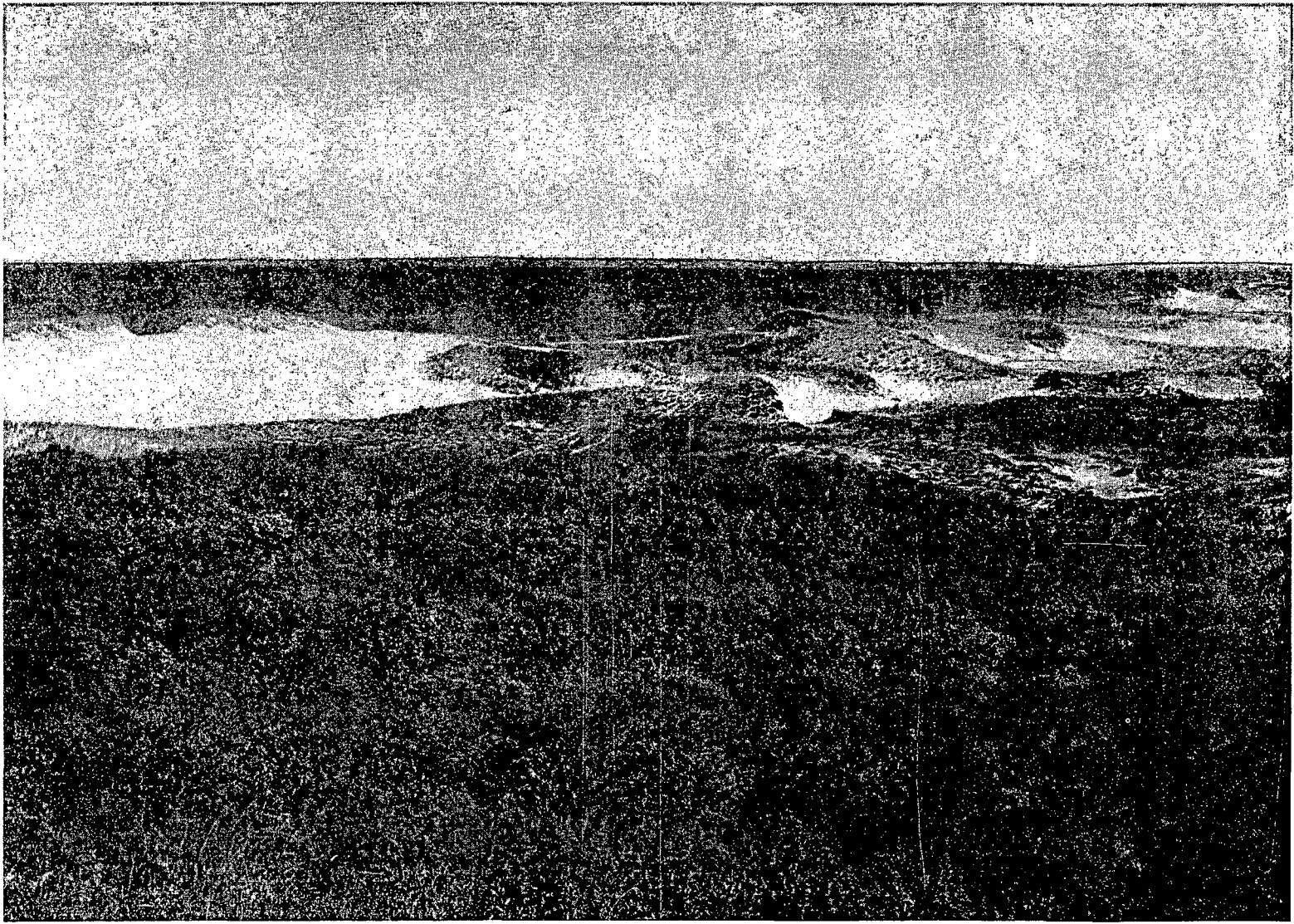
As the season advances, the paired birds go north to the nesting grounds in loosely organized flocks. A few pairs stay in the vicinity.

About mid-April the female begins to search the thickets about the marsh edges for a likely

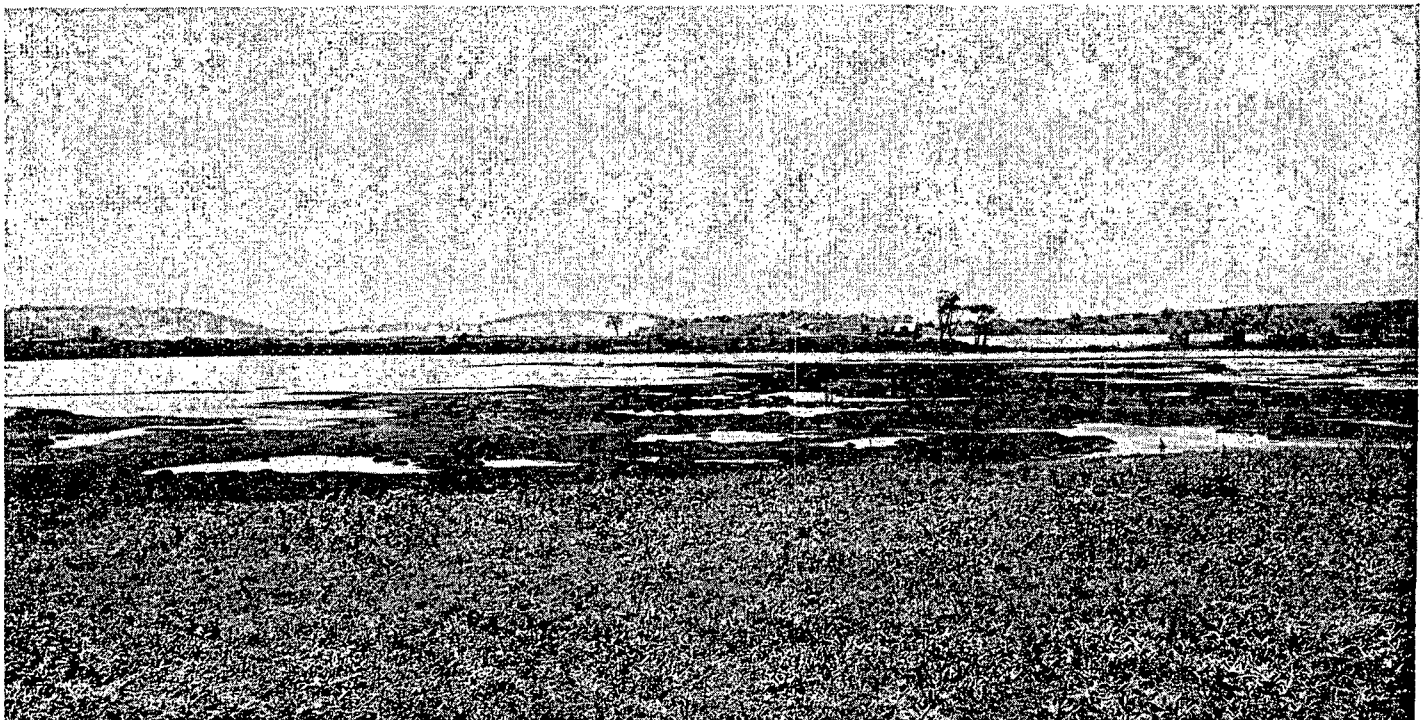


**Below: a clammer on Alewife Flats, Plum Island River. Digging is possible for about 3 hours on the ebb tide. A good yield per tide is 12 baskets, average is much less. Above, right: a Fish and Wildlife Service scientist surveys clam flats to find reasons for the periodic scarcity of clams.**





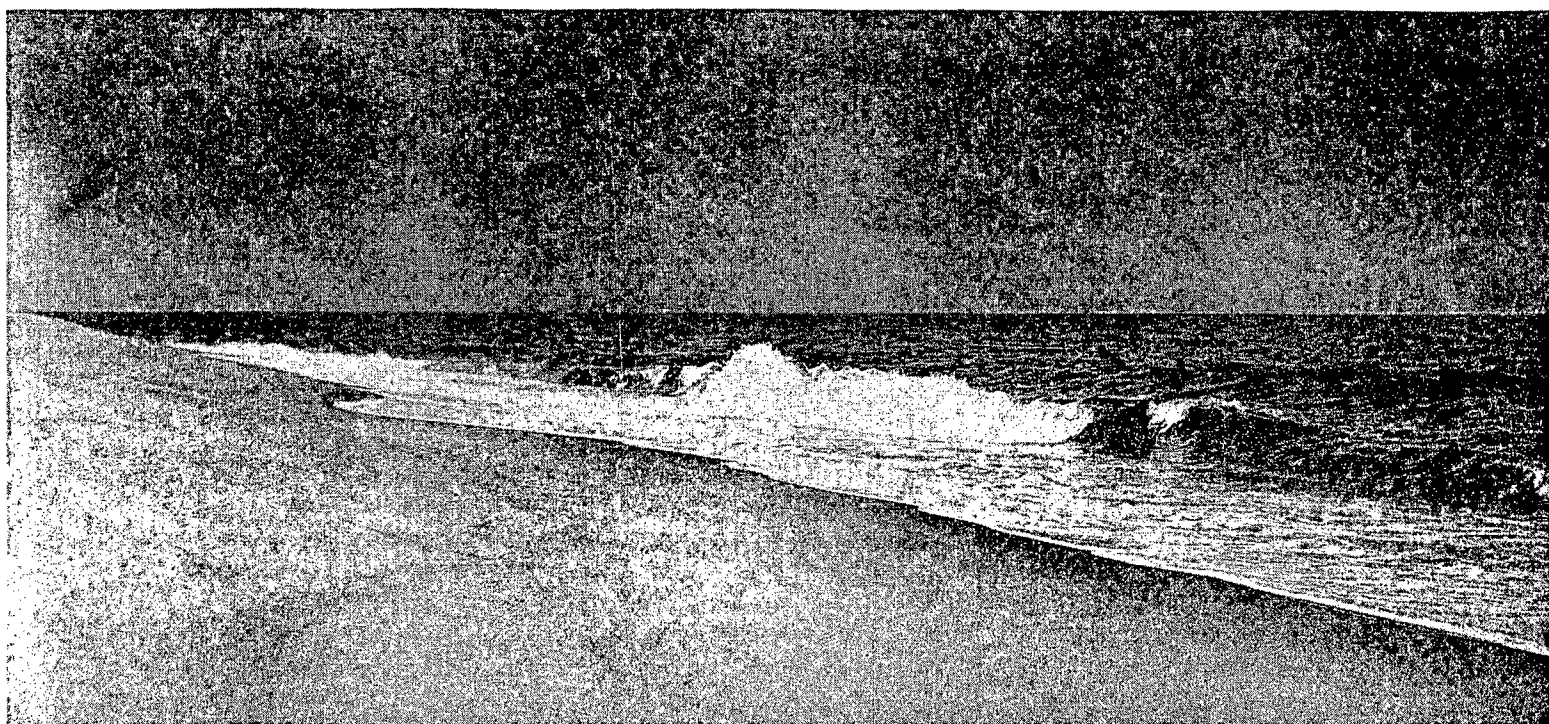
A panoramic view of Plum Island may be had from any high dune, from the bordering ocean in the east across dunes and thickets to the marshes. Below, left: pot-holes dot the marshes, are favorite stopping places for

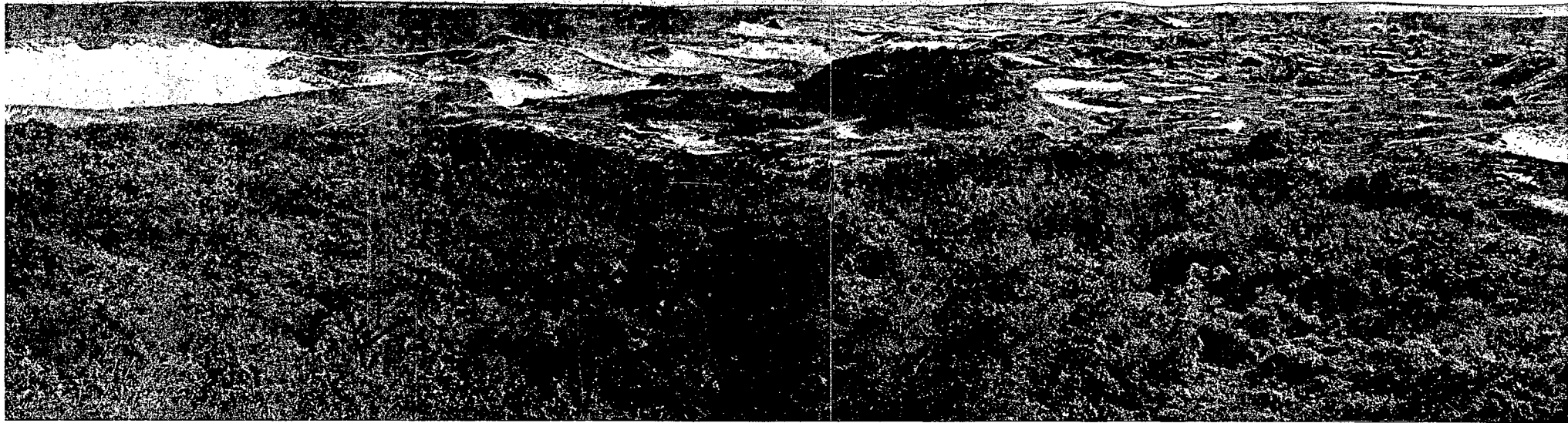




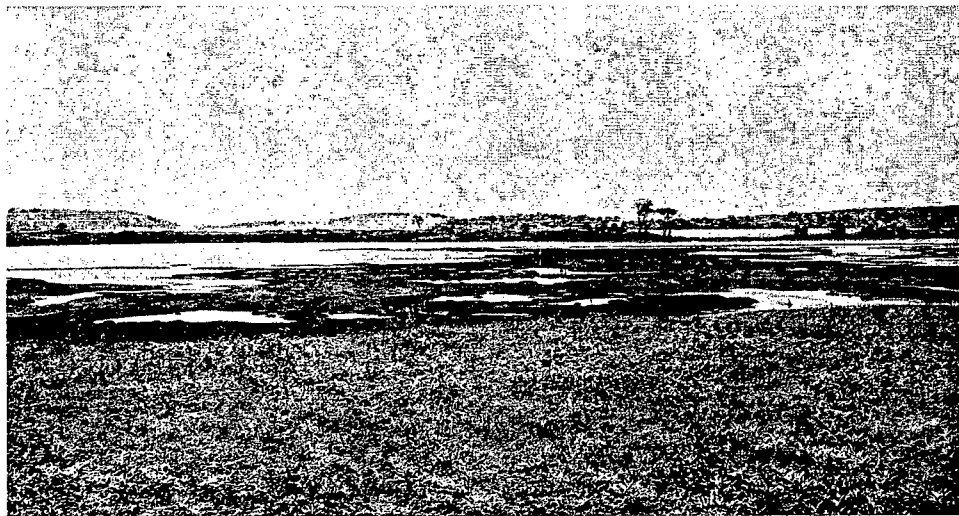


ducks. Right: the beaches of Plum Island attract many shore birds; diving ducks often appear offshore. Surf casters like to fish for striped bass from this beach.

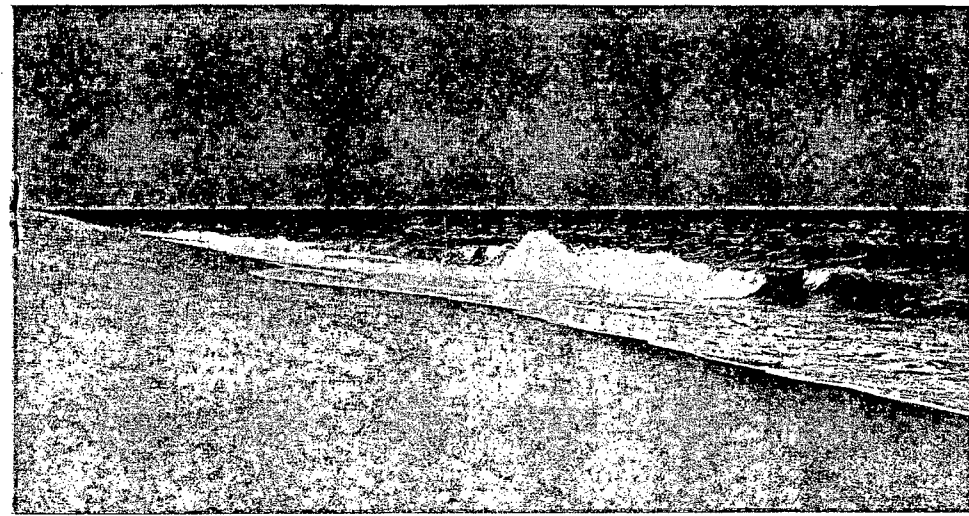




A panoramic view of Plum Island may be had from any high dune, from the bordering ocean in the east across dunes and thickets to the marshes. Below, left: pot-holes dot the marshes, are favorite stopping places for



ducks. Right: the beaches of Plum Island attract many shore birds; diving ducks often appear offshore. Surf casters like to fish for striped bass from this beach.







Bird banding stations are operated at many Federal Refuges to study migrations. The birds are caught without injury in cage traps and a numbered metal band or bracelet is attached to the leg. The sex, estimated age, and weight are recorded. Black ducks banded in the Parker River area have been recovered in all the Canadian Maritime Provinces, Newfoundland, and Labrador, and in every coastal State from Maine to Georgia with the exception of South Carolina.



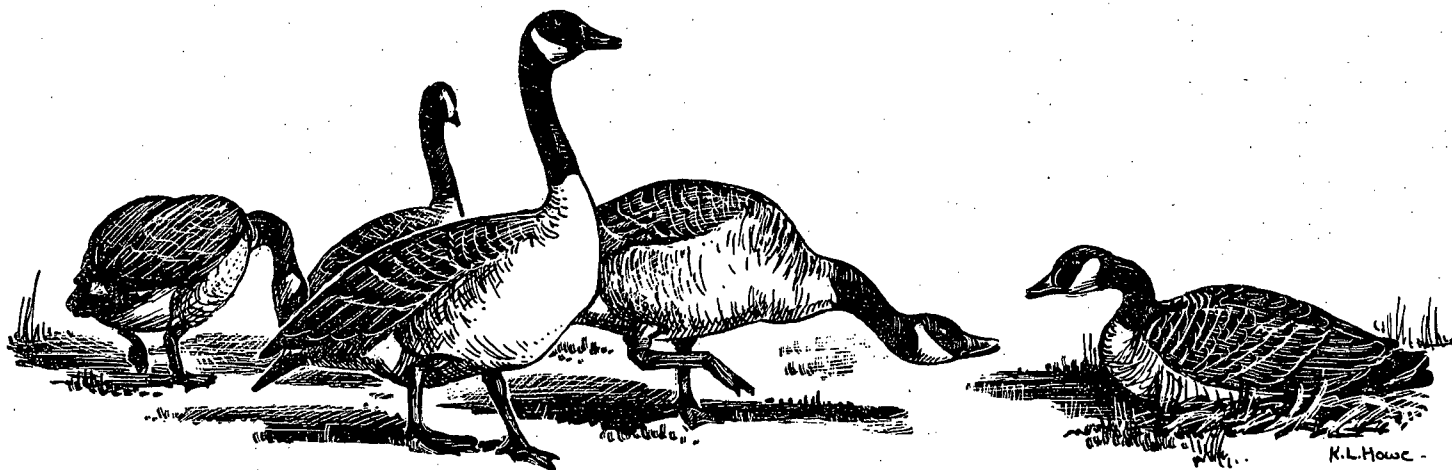
nesting site. She collects grass stems and in a dense patch of meadowsweet or bayberry she fashions a nest, carefully lining it with down. The first broods of ducklings appear at Parker River about May 15. The males do not take part in incubation; during the nesting season they gather in bachelor clubs, congregating in ponds and open water.

Barring molestation by enemies or other disaster, each nest produces a brood of about 10 ducklings. The youngsters take to the water almost immediately. In company with their mother they feed in shallow water, sheltered by overhanging grasses and water plants. As the season advances, enemies thin the broods of young ducks until, by late summer, the average family is 3 or 4.

By August the young ducks have exchanged their down for feathers, have tested them in flight, and now spend much time a-wing. Another month and they are ready, when the big migrations pass over Parker River, to take their place in the southward flights of the waterfowl.

CANADA GEESE move in their long wavering V's over the coastal marshes of Essex County, spring and fall. Only a few years ago, flocks of several thousand of these magnificent waterfowl visited Newburyport Harbor during March. Fall flights along the northeastern coast are usually somewhat smaller than the spring flights.

Reports of the refuge managers at Parker River give a good idea of the habits of the Canadas while in this area. In 1943, for example, the manager reported that a few Canada geese were present all through the winter, and that migrants from the south appeared by the time most of the ice was out of the marshes and tidal areas. Many of the geese congregated in the lower Merrimack around Woodbridge Island; others worked down Plum Island. On the flood tides they came high into the marshes to rest or eat the new shoots of the tall marsh grass. As soon as the fresh-water areas lost their ice, the geese tended to separate into smaller flocks and move to small outlying ponds, where they could be seen tipping up and feeding.





On the refuge, several patches of land have now been sown to rye as a source of food for migrating geese.

THE BLUE-WINGED TEAL, among other waterfowl transients, should benefit from freshwater dykes on the marshes at Parker River. This small and beautiful duck formerly nested in all the middle and northern States east of the Rocky Mountains. But gradually it was driven from the Eastern States as a breeding bird. Even in the prairie regions of northern United States and Canada, encroaching agriculture menaced it and widespread drought destroyed its broods.

Recent reports, extending over the past 10 years, show that some of the teal are returning now to their former breeding grounds in the East. Every year they breed in the general vicinity of the refuge. A number of broods have been raised in recent years on a tributary of the Parker River. At other salt-marsh refuges maintained by the Fish and Wildlife Service, blue-winged teal have increased greatly in numbers as the refuges have provided them with the conditions they need. It seems highly probable that this experience will be repeated at Parker River as the refuge is developed.



SEA DUCKS of several kinds—especially the scaups, scoters, goldeneye, bufflehead, old squaw, and mergansers—endure the rigorous winter climate of the northern Massachusetts coast.

The greater scaup is one of the most abundant wintering ducks in the Parker River area. Only the black duck is more numerous there in the bitter midwinter period. From one to two thousand greater scaups were present during the winter of 1945-46. In the spring, migrants swell the winter numbers. In 1945, local ornithologists reported "a continued increase over recent years, with a maximum of 11,500 at Newburyport April 8, the highest count ever recorded."

Along with the black duck and the scaup, the goldeneye is part of the dominant waterfowl population during the season when cold, storms, and ice have driven all less hardy fowl to the south. The goldeneyes first appear in the refuge waters about the middle of November. In recent years, Christmas censusers have reported one to two thousand goldeneyes off Plum Island in the surf.

Then there are always a few hundred buffleheads, old squaws, and scoters that linger over winter. They come during November. The scoters like the rock jetties near Bar Head, where they may often be seen diving near the rocks, even when heavy seas are rolling. The buffleheads and old squaws mingle with them.

IMPROVING THE LAND FOR WILDLIFE means, first of all, increasing the natural food supplies, providing more cover, adjusting the water levels, improving conditions for breeding.

Within a wildlife refuge, if it is a successful one, there is a much heavier concentration of birds and animals than in the surrounding country. Seasonally, as the migrations pass, the facilities of a refuge often are taxed to provide for the large number of transients that seek accommodations. In order to provide enough food, water, cover, and nesting areas for its patrons, a wildlife refuge must be a small, separate world in which all these things exist in greater abundance than in the world outside—a wildlife Utopia. To bring about these ideal conditions is the aim of refuge management.

The marshes of Parker River are being developed for two purposes: to increase the production of waterfowl foods, and to provide a greater area suitable for nesting by the black duck.

During the late summer and early fall the food of the black duck on the salt marsh consists largely of the maturing seeds of the various salt-meadow plants—particularly arrowgrass, tidemarch waterhemp, cordgrass or thatch, various bulrushes, and pondweeds. From August or early September until the winter freeze-up of the marshes, the seeds of these plants are easily available and so furnish food for the ducks during the fall migration.

To increase the production of food plants, a system of shallow flowages will be created in the marshes by impounding the water behind dykes. From small, experimental beginnings, these bodies of fresh or brackish water, about a foot and a half deep, will eventually become an important part of the Parker River refuge. In early summer some of the ponds will be drawn down, and plantings made. In the fall

the ponds will be flooded again to make large quantities of seeds and tubers available to the ducks.

Many places in the northeastern part of the country that once were good breeding grounds for the black duck have been spoiled by drainage. To make up for part of these areas, as much nesting territory as possible must be provided within the refuges. To do this at Parker River, wildlife technicians have had to solve special problems, not met at more southern coastal refuges. Parker River lies in a region of very high tides. At Newburyport the average height of the high tides is about 9 feet, while the highest tides of the year are nearly 12. These great tides come in April, May, and June—the time when the black ducks are nesting and bringing out their broods of young—and again in the fall. They completely flood most of the marsh areas and would destroy any nests within their range. This misfortune the ducks can avoid by nesting in the thickets along the central ridge of the island. But more and far better nesting territory is needed than the thickets can provide.

The refuge staff at Parker River is trying an interesting experiment in the management of a northern coastal marsh—building up potential nesting sites in the marshes by creating artificial “islands” which will rise above the level of the highest tides. These are constructed of marsh sod, then planted with waterfowl food plants. It is hoped that the ducks will utilize these mounds as nesting sites, but another year or two will be needed to judge the success of this experiment.

TO THE WATERFOWL HUNTER, a wildlife refuge is an investment. Let us say that 5,000 acres of marsh are "invested" in waterfowl conservation by converting them into a refuge. It is true that this area is withdrawn from hunting, just as money you invest in stocks is no longer in your pocket to spend. In a few years, however, the refuge investment begins to pay the sportsmen dividends.

These dividends may come in several ways. Almost immediately hunting in areas near the refuge improves. The birds are held in the area longer; the hunting season, as a result, is lengthened. Birds moving in and out of the refuge area provide hunting in nearby marshes. This is common experience. It is acknowledged by many Massachusetts gunners at Parker River. Black ducks that formerly were frightened out to sea by the first shots of the hunting season now stay in and about the refuge. Shooting in the marshes immediately north and south of the refuge was better in 1946 than for a number of years.

The most substantial dividends on the refuge investment come after a period of 5 to 10 years has passed. Then it will be found that waterfowl use has increased several hundred percent or more. Such increases at well-established Federal refuges are a matter of record. The Bombay Hook Refuge in Delaware is a good example. Here the number of waterfowl using the area has increased more than 400 percent since the refuge was established in 1937. Official reports show that it was used by 30,000 wildfowl in the fall of 1937, by 60,000 in 1942, and by 137,000 in 1945. When this happens, the sportsman understands the wisdom of the in-

vestment he and his fellow citizens have made. Instead of interfering with his sport, the refuge has increased it and made its future more secure.

PRESERVING THE ECONOMIC USES OF THE LAND for the community in which it lies is a principle that is carefully observed by the Fish and Wildlife Service in the development of Federal refuges. The economic values inherent in the land at Parker River are those of a typical northern seacoast region consisting of extensive salt marshes and dune country—the natural products of the salty waters, the salt marshes, and the sandy soil: shellfish, cranberries, beach plums, salt hay.

The Plum Island flats yield an important commercial product, the soft-shelled clam. For more than 200 years, the men of the coastal towns have made a living by digging clams, a poor living in years of clam scarcity, a good living when clams are abundant. According to the New England tradition, these fisheries have been managed by the towns.

In establishing the refuge, the Fish and Wildlife Service has made it clear that there would be no interference with the clam industry. The local towns continue to manage the fishery. Diggers from nearby towns like Newbury, Newburyport, Byfield, and Rowley work the clam beds as in past years with no restrictions by the Service.

In years when clams are abundant, a skilled digger averages about 6 bushels of clams on a tide—some 3 hours' digging. In years of clam scarcity, he may get only 2. He digs by marking out a section of bottom about 12 inches square with three quick thrusts of the fork, then

rapidly turning over the clod and removing the clams.

Over the years, abundance of clams and consequently the prosperity of the clam industry have fluctuated greatly. At present the causes of cycles of abundance and scarcity in the clam populations are not understood. Perhaps in some years their natural enemies, such as periwinkles and sand-collar snails, are more abundant and destructive. Perhaps changes in the saltiness and temperature of the water are important. Until science has discovered why clams are scarce, little can be done to make the yield of this fishery more stable.

With this in mind, the Fish and Wildlife Service has sent several of its shell-fish biologists to Parker River to make surveys on the clam flats, and in 1947 it established a small laboratory at the refuge headquarters for continuing studies. Through these efforts Parker River is becoming, on a small scale, an experimental laboratory which may develop new principles of clam culture. These principles will apply not only to the Essex County clam flats but wherever the soft-shell clam grows on the northern New England coast.

Cranberries and beach plums, although less valuable than clams, are nevertheless an economic asset that has been carefully preserved at Parker River. Free use permits to pick beach plums and rake cranberries on the refuge property are issued by the refuge manager to persons who apply at his office, 65 State Street, Newburyport. About 100 such permits are requested in a season. Each permit allows the bearer "and party" to harvest the fruits, so that the actual number of persons who visit the

refuge for such purposes is probably 300 to 400 annually.

Picking of beach plums begins about the middle of August; the first cranberries are ready for raking about the middle of September. The season for harvesting both fruits ends with the first hard frosts.

Salt-marsh hay is another product of the extensive salt meadows of the refuge. Neighboring farmers find it profitable to harvest the hay, which they use as bedding and to some extent as food for their stock. An acre of salt meadow yields nearly a ton of hay per year. The refuge manager issues permits for cutting, giving preference to former owners of the land.

From the standpoint of wildlife conservation, cutting the grass on the meadows has great value. Shore birds flock into these cut-over areas. Among the short stubble all the small food animals of the marshes are more easily found and captured. Cutting the hay on the salt meadows just before or during the fall shore bird migration greatly increases the natural food supply for these birds at a time when they particularly need it. Some of the scarcer east coast shore birds can be seen feeding on these hay meadows in August and September. The black-bellied plover is especially attracted to them.

Although Plum Island once contained a number of summer camps and cottages, most of these properties had lapsed into an uninhabitable state of decay and delapidation before the Government bought the property for a wildlife refuge. Access to all but the northern end of the island is extremely difficult. The road that makes its tortuous way between the dunes and



the marshes is often impassable except to jeeps or command cars. Fresh water is at a minimum everywhere, nonexistent in many places. Most property owners on Plum Island were glad to sell to the Government. Those who wished to remain did so under special arrangement. With the exception of several clammers who live regularly on the island, most of the residents come only in the summer for a short period of time.

FOR THE BIRD CLUBS of eastern Massachusetts, Parker River has an irresistible attraction. This attraction is based on a very practical reason: a greater variety of birds can be seen here than almost anywhere else in the State. Essex County, site of the refuge, has records of 357 different species. To give some meaning to

this figure, consider one of the best known birding grounds in eastern United States, Cape May County in New Jersey, where the record is 318. The majority of the birds of Essex County may be observed in the coastal sections which include Parker River.

Scarcely a week passes at the refuge without a visit from some bird club, nature study group, or scout troop. Some of the visitors are serious students of bird life; some are having their first introduction to the rewarding hobby of amateur bird study. Still others, without direct interest in the birds themselves, find in this outdoor recreation a welcome and refreshing release from the tensions of modern life.

Observant photographers find many opportunities on the refuge for close-ups of the native birds. Little parties of sandpipers run along

the beach, unsuspicious and unafraid. The richly colored killdeers along the road deserve color photography. Where clam shells, not long out of the shucking houses, have been dumped on the road, herring gulls hover above them in a cloud, so intent on picking the fragments of meat from the shells that they scarcely notice the approach of people.

In the meadows and on the mud flats the shore birds can be approached rather closely. One can always see curlews in the fall, standing like tall brown sentinels in the marsh; yellowlegs are a common sight as they wade the salt pools or chase minnows over a barely flooded flat. In September 1946 a rare species of shore bird appeared on Plum Island—the Hudsonian godwit.

Look carefully out over the marshes and you are sure to be rewarded with some sort of heron, standing motionless in the manner of herons—a good camera shot if you have a telescopic lens. There may be an American egret, a great blue heron, more rarely a bittern. Where the marsh hay is harvested, the stakes driven into the marsh to form the “straddles” for the hay stacks are favorite roosting places of the black-crowned night herons. Seen in early morning sunlight, their white breasts make them conspicuous for long distances.

Plum Island, Joppa Flats, and Plum Island breakwater seem to attract more than their share of rare species, and the hope of surprising an ornithological rarity gives zest to often repeated visits.

When the snowy owls periodically invade New England, birders visit Plum Island with reasonable assurance of finding one or more of

these spectacular birds perched atop a salt hay stack. A few years ago, visitors came from places many miles distant to see the rare western grebe. At another time, a flock of 82 Lapland longspurs fed on the Plum Island meadows—probably the largest flock ever seen in the State. The first king eiders recorded for Essex County were seen off Plum Island. The blue goose and the greater snow goose, both considered rare transients, are occasionally seen on the refuge, the latter with increasing frequency. Birding on the Joppa Flats or about the breakwater at the northern tip of the island may yield such rare fowl as the European wigeon.

Botanists find many interesting plants among the dunes, thickets, and marshes. A fine record of the wild flowers, fruits, and berries of seaside New England can be made by any photographer who will visit the refuge at intervals with color film in his camera.

**R**ECREATIONAL FACILITIES that may be enjoyed by people who visit the Parker River refuge are—in addition to Plum Island’s exceptional facilities for nature study—those that might be expected on a New England coast little spoiled by civilization. A wide beach, its beauty heightened by the roaring surf, forms the entire eastern border of the refuge. Certain sections of the beach, especially about the rocky ledges known as Bar Head or at Emerson Rocks, are considered good places for surf casting in the fall when the striped bass are running. Persons who wish to enjoy ocean bathing may do so from a public bathing beach at the northern end of Plum Island, outside the boundaries of the refuge. Here also arrangements may be made

for ocean sport fishing, including tuna fishing in Ipswich Bay, with the skippers of the numerous small boats anchored in the basin.

The Parker River National Wildlife Refuge is easily reached by automobile. (See map, inside back cover.) The office of the refuge manager is at 65 State Street, Newburyport. Persons who wish to visit only the beach or the upper third of Plum Island need make no special arrangements. To visit other parts of the refuge, however, or to harvest beach plums, bayberries, or cranberries, permission should be obtained from the refuge manager.

A hard-surface road leads to the northern boundary of the refuge. From this point the road is in fair condition as far as the refuge patrolman's headquarters, but driving is difficult after heavy rains. Portions of this road are flooded at high tide; visits should be planned with this in mind. Passage below the patrolman's headquarters should not be attempted by ordinary automobile until the road is improved. Driving on the beach is seldom safe or feasible except with special equipment and by persons thoroughly familiar with local conditions.

