

CONSERVATION IN ACTION

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BEAR RIVER

a National Wildlife Refuge

Number EIGHT
Fish and Wildlife

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

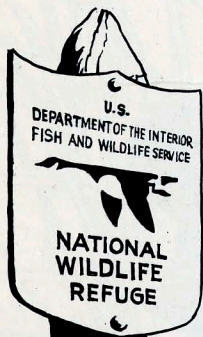
BEAR RIVER

A NATIONAL WILDLIFE REFUGE

By Vaner T. Wilson and Rachel L. Carson

Illustrations by Bob Hines

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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.

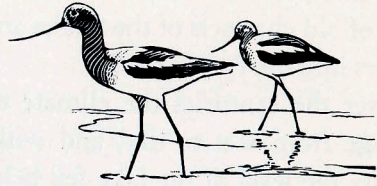
You may meet it by the side of a road crossing miles of flat prairie in the Middle West, or in the hot deserts of the Southwest. You may meet it by some mountain lake, or as you push your boat through the winding salty creeks of a coastal marsh.

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.

Cover: Egret and yellow-headed blackbird
Opposite page: Avocets

Bear River



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

IN THE AUTUMN OF 1824 A BUFFALO-HIDE CANOE drifted down the Bear River to its mouth in the Great Salt Lake of Utah. Within sight of that vast inland sea, Jim Bridger must have paused in amazement. Everywhere he looked—in the sky, on the open water, over the marshy borders of the lake—there were birds. It is said that the famous explorer of the western wilderness brought back reports that he had that day seen “millions of ducks and geese.”

The Bear River marshes were soon to know years when their waterfowl were numbered, not by millions, but by thousands; when the white settlers had diverted water for irrigation and drained the wet lands where the waterfowl found food and protection; when gunners had slaughtered them by the thousands; and many others had fallen prey to diseases resulting from this disastrous series of events.

But now a miracle of conservation has been accomplished, and once again, as in the days of Jim Bridger, the skies over Bear River are patterned with millions of wings. The Bear River Migratory Bird Refuge which helped accomplish this miracle is one of the show places of the continent. About 20,000 people visit it annually. Here, especially during the fall migration, it is literally possible to see a million

ducks in one day. Here many species considered rare elsewhere may be seen by anyone who will drive his car slowly around the miles of gravel road that crown the retaining dikes of the marshes. Here are birds that, in their north and south flights, have touched almost all parts of the western half of the continent. The site of this great spectacle is a key spot in the conservation of North American birds.

The Bear River marshes were not always as they are today. The setting of the refuge has been molded, first by the slow processes of nature, then more rapidly through changes resulting from human settlement of the region. Some of the latter changes have been for the better, some for the worse.

High up on the flanks of the mountains around the flat marshlands of the refuge there are plainly marked terraces that stand out as light streaks against the blue background of the mountains. These were the shorelines of ancient Lake Bonneville, a large inland sea that covered some 20,000 square miles of this part of the world during the Pleistocene Epoch, some scores of thousands of years ago. Rain and snow fell heavily during those times, and streams ran full with the water of melting ice during the interglacial periods. Lake Bonneville was

1,000 feet deep in places. Through Red Rock Pass in its northern rim its waters drained by way of old channels of the Snake and Columbia Rivers into the Pacific Ocean.

Over the centuries the climate underwent a change from wet to dry, and with increasing aridity the level of the lake fell below its outlet and drainage ceased. The area covered by water shrank; the lake became increasingly salty. Great Salt Lake is the present-day remnant of old Lake Bonneville; it is a tenth the size of its ancestral lake, its average depth is not more than 20 feet, and it contains one part of salt to five parts of water. The flat land enclosed within the rim of mountains is the former floor of Lake Bonneville. This is the site of the Bear River Refuge.

THE WATERFOWL THAT FLEW OVER THIS PART of the Pleistocene world must have found little to attract them to the deep, steep-walled Lake Bonneville. But as Great Salt Lake matured and the receding waters reached the present valley floor, marshes developed at the mouths of rivers and streams, and unexcelled habitats were created for water birds. Early records of the bird life of these marshes are vague as to the species, but they give a clear impression of the vast hordes of waterfowl that must have supplied food for generations of Indians.

Following Jim Bridger and the few adventurous trappers that searched the Bear River and other mountain streams for beaver and other fur animals, came Capt. John C. Fremont and his exploration party. On September 3, 1843, Captain Fremont visited the delta of the Bear River. In his official report he gave the following description:



The Bear River marshes are famous for their green-winged teal, among the most beautiful of ducks and the smallest American waterfowl.

"The waterfowl made this morning a noise like thunder. A pelican (*Pelecanus onocrotatus*) was killed as he passed by, and many geese and ducks flew over the camp. Descending the river for about three miles in the afternoon, we found a bar to any further travelling in that direction—the stream being spread out in several branches, and covering the low grounds with water, where the miry nature of the bottom did not permit any further advance. We were evidently on the border of the lake, although the rushes and canes which covered the marshes prevented any view; and we accordingly encamped at the little delta which forms the mouth of Bear River; a long arm of the lake stretching up to the north between us and the opposite mountains. The river was bordered with a fringe of willows and canes, among which were interspersed a few plants; and scattered about on the marsh was a species of *Uniola*, closely allied to *U. spicata* of our sea coast. The whole morass was animated with multitudes of waterfowl, which appeared to be very wild—rising for the space of a mile round about at the sound of a gun, with a noise like distant thunder. Several of the people waded out into the marshes, and we had tonight a delicious supper of ducks, geese, and plover."

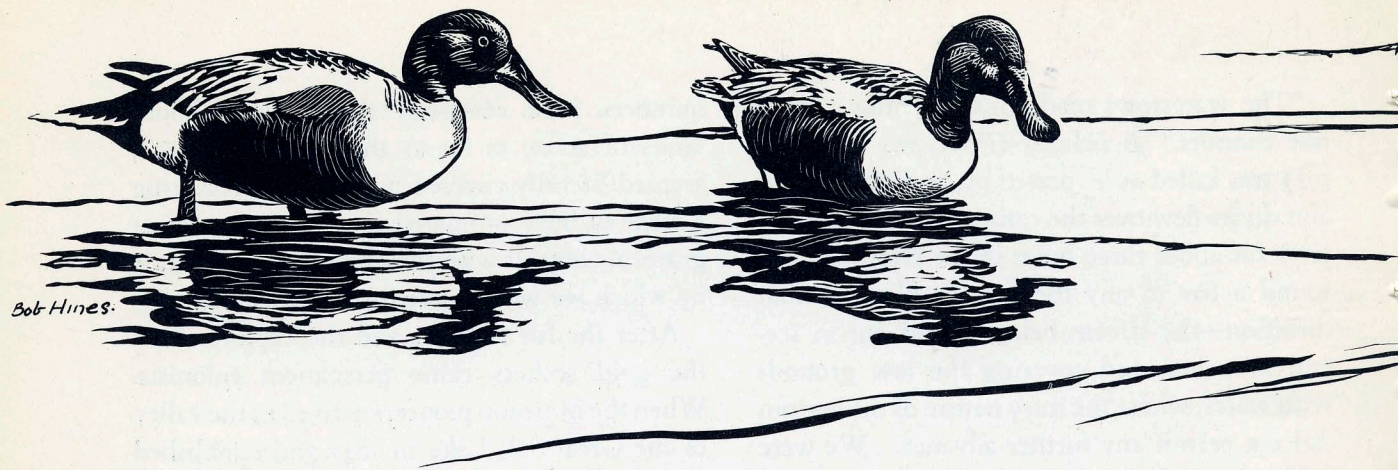
A few years later Capt. Howard Stansbury, making a reconnaissance of a new route through the Rocky Mountains, arrived at Bear River Bay on October 22, 1849. It was covered, he wrote, "by immense flocks of wild geese and ducks among which many swans were seen, being distinguishable by their size and the whiteness of their plumage. I had seen large flocks of these birds before, in various parts of our country, and especially upon the Potomac, but never did I behold anything like the immense

numbers here congregated together. Thousands of acres, as far as the eye could reach, seemed literally covered with them, presenting a scene of busy, animated cheerfulness, in most graceful contrast with the dreary, silent solitude by which we were immediately surrounded."

After the fur trappers and the explorers and the gold seekers came permanent colonists. When the Mormon pioneers arrived in the valley of the Great Salt Lake in 1847 and established their settlement, the country was inhabited only by Indians and was part of the region belonging to Mexico. At the close of the Mexican War in 1848 it became part of the United States. The Territory of Utah was established in 1850. In 1869 the rails of the first transcontinental railroad were joined within sight of the present refuge, and the rapid advance of civilization into the wilderness began.

WATER, AND CONFLICT FOR WATER USE, dominate the history of the area. The first need of the permanent settlers was the production of life-sustaining crops. On the valley floor the poorly drained soils contained a high concentration of soluble salts, and cultivation was necessarily restricted to better drained lands near the base of the mountains. Here irrigation was necessary. Although good agricultural land was at a premium, water was even more scarce in these arid lands of the Great Basin.

Little by little, every possible source was utilized to its fullest extent. The Bear River, in its 600-mile course from the Uinta Mountains through parts of Utah, Wyoming, and Idaho to Great Salt Lake, is said to be the most completely utilized river in the world. The Bear River Valley canal and irrigation system, one of the



Although less abundant than the redhead, gadwall, or mallard, shovellers are seen in small numbers and may be recognized instantly by their large bills, highly specialized for surface feeding. Shovellers winter chiefly in the Southern States and Mexico.

largest diversions of water from the Bear River, was completed in 1891 and the first water was diverted from the river the following spring. This and later diversions greatly reduced the summer flow, and after a few years little remained of the once extensive marsh areas.

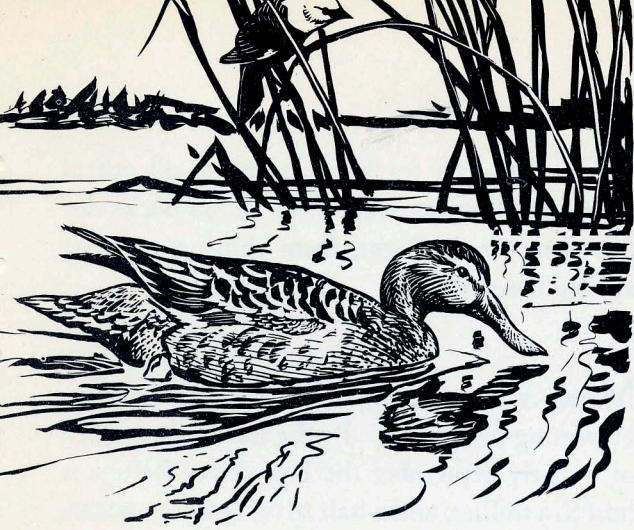
Irrigation took its heavy toll of available water; drainage, drought, and power projects took more. The watersheds were overgrazed by sheep and cattle. Ponds, sloughs, and pot-holes fluctuated, became temporary, and finally dried away.

The loss of waterfowl habitat was one enemy of the waterfowl; the market gunner was another. Residents of the Valley probably contributed unwittingly to the destruction of their valuable wildlife resource. To the early settlers it must have seemed that the millions of waterfowl and other forms of wildlife that had

congregated there through the ages would forever remain sufficiently abundant to satisfy all demands. From 1877 to 1900 more than 200,000 ducks were killed annually on the Bear River marshes for eastern markets. The great flocks of the waterfowl began to dwindle.

Disease was still another menace. Following the reduction of water levels and the crowding of great concentrations of birds into smaller areas, losses from botulism, a disease resembling food poisoning, were first noticed about 1900. More and more ducks sickened as the epidemic spread over the stagnant waters of the shallow alkali flats and in 1910 about half a million died around the mouth of the Bear River and in the Willard Spur area during the late summer.

THE FIRST EFFORTS TO SAVE THE WATERFOWL were made by sportsmen. Several duck clubs organized around the turn of the century acted to save at least scattered remnants of the once vast marsh area. They purchased or leased a large part of the remaining marshes around the mouth of the river. The Bear River Club, which was organ-



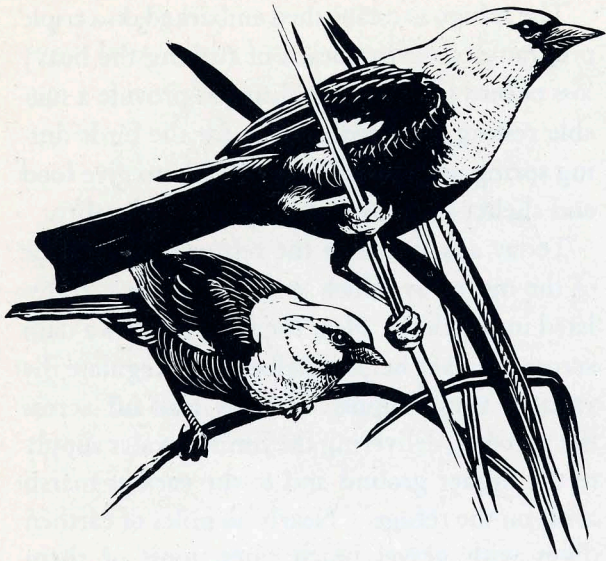
ized in 1901, owns approximately 8,000 acres of choice marshland in the area known as the North Bay. This club, its membership made up of sportsmen from all parts of the country, has aided waterfowl conservation by preserving areas where the birds can nest and feed.

Other, larger, areas had to be added, however, and steps taken control disease. Through efforts of the Utah Fish and Game Commission, western sportsmen's organizations, and Federal officials who had studied the situation, a program of attack was developed in 1926 that ultimately led to the establishment of the Bear River Migratory Bird Refuge by a special act of Congress on April 23, 1928. The nearly 65,000 acres acquired under this act were to be "maintained as a refuge and breeding place for migratory birds included in the terms of the convention between the United States and Great Britain for the protection of migratory birds, concluded August 16, 1916." The act provided that "at no time shall less than 60 per centum of the total acreage of the said refuge be maintained as an inviolate sanctuary for such migratory birds."

The refuge so established embarked on a triple program: to devise means of curbing the heavy loss of bird life from botulism; to provide a suitable resting and feeding area for the birds during spring and fall migrations; and to give food and shelter to birds that breed in the locality.

Today any visitor at the refuge can see some of the means by which this program was translated into action. Near the headquarters a dam across the river helps distribute and regulate the variable water supply. Canals lead off across the marshes, delivering the limited water supply to the higher ground and to the various marsh areas on the refuge. Nearly 40 miles of earthen dikes with gravel beach lines, most of them topped with roadways, divide the refuge into five impoundment areas, each comprising about 5,000 acres. The dikes exclude the salty waters of the lake and impound fresh water from the river. They have also brought about the drying of extensive shallow waters and mud flats beyond the dikes—areas which were centers for outbreaks of botulism.

The water of mountain streams brought down by the Bear River freshened the marshes once they were cut off from the salty lake. Favorite duck foods were planted in the bays impounded by the dikes, and food and cover plants were established along the banks. A small "duck hospital" was established; there sick ducks by the thousand were treated by the injection of an antitoxin, were banded, and released. A striking example of recovery from botulism was provided by one "patient." A pintail, after treatment for botulism, was released August 15, 1942. It was found 83 days later at Palmyra Island, a tiny pinprick on a map of the Pacific Ocean, 3,600 miles from Bear River.



One of the most colorful summer residents of the marshes is the yellow-headed blackbird.

The success of the program may be judged by the visitor as he looks out over the refuge from the tower or drives along the roadways on the dikes. Everywhere he looks there are birds. From the headquarters building he may watch the snowy egrets, in gleaming white plumage, fishing near the dam that spans the river. Almost any time a party of western grebes may be seen swimming up and down the canals, suddenly vanishing from sight, and as mysteriously reappearing. A flock of avocets may be moving over a shallow mud flat, swinging their long, upcurved beaks from side to side like so many wielders of scythes, providing one of the greatest shows of the refuge. Stately lines of pelicans, rising and dipping, move over the marshes, their bodies white against the blue background of the

mountains. But for sheer numbers all others are eclipsed by the waterfowl whose flocks dot the water or, in flight, form shifting patterns against the sky.

MIGRANT WATERFOWL MOVE INTO THE MARSHES beginning in August. By the end of the month or in early September the Bear River Refuge is host to a million and a half to two million waterfowl. Among them is one of the largest concentrations of whistling swan to be found in the United States; flocks totaling 15,000 frequently are seen. Thousands of geese, both the Canada and snow, visit the refuge during migration. There are also a number of records of the rare Ross' goose. Predominating in the fall flights are pintails, whose numbers often exceed a half-million birds. The green-winged teal is nearly as abundant. As many as 100,000 canvasbacks have visited the refuge.

Many of these birds remain into the winter, leaving the refuge only as cold weather freezes over the water areas. Upon leaving Bear River, about half of the birds migrate west into California, some move south to Arizona and New Mexico, while others move eastward into Colorado, Texas and Mexico. With the spring they return, but the concentrations of birds then are smaller, and their stay shorter. Courtship activities are often seen among the migrants, and the nesting of some species, particularly the Canada goose, begins early.

These marshes are teeming with life even in the summer, the quieter season between migrations. Of the 198 species of birds recorded on the refuge, about 60 are known to nest there. The Bear River marshes are among the greatest producers of waterfowl in the United States.



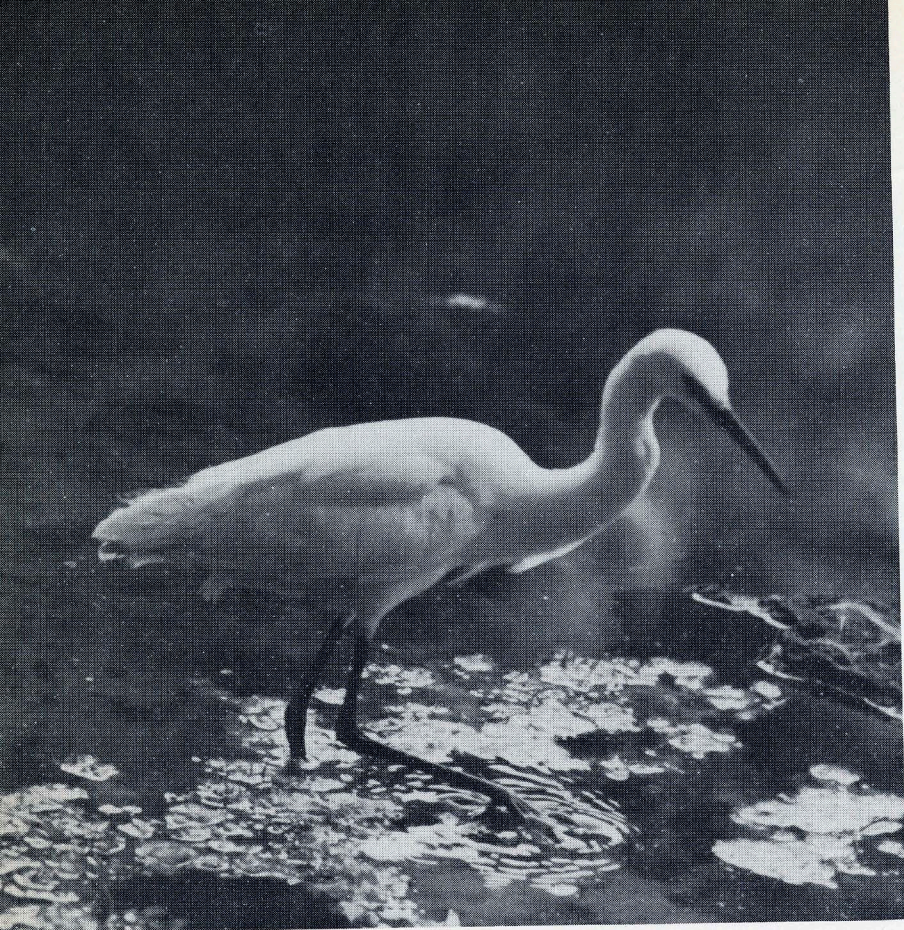
Western grebes, most accomplished of avian swimmers and divers, glide up and down the canals. They build floating nests of grass and weeds and raise 4 or 5 young. Baby grebes often ride on the mother's back, nearly or completely hidden among her feathers.



At Bear River the black-necked stilt (above) typically a bird of the Tropics, finds one of its most northern nesting grounds.

During the fall migration of the waterfowl, the waters of the Bear River Refuge and the sky above them are never empty of wings.





The two smaller herons of Bear River, the snowy egret (shown here) and the black-crowned night heron of shorter, stockier build, are often found fishing below the spillway near the refuge headquarters.

Pure white geese with black wing tips that show best in flight are the lesser snow goose, an Arctic nester which swings down across central and western Canada and the United States to its winter range in California and on the Gulf coast.





Stately great blue herons may be seen standing motionless along the canal banks, nearly hidden among the rushes, as they watch for fish.



Thousands of white pelicans regularly visit the refuge, coming from nesting colonies on Gunnison and Bird Islands in Great Salt Lake. Their community feeding, as a number of the great white birds move through the water together, is one of Bear River's unforgettable spectacles.





Among the activities that made the refuge a haven for birds was the planting of vegetation for food and cover. Foundation planting of carefully selected species has controlled erosion along the canal banks and provided seed stock from which these desirable plants spread.

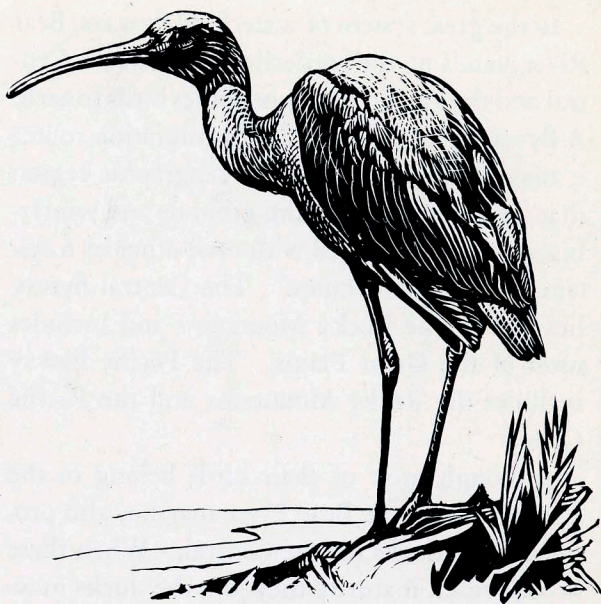
A research station operated at Bear River for several years developed a means of controlling duck sickness or botulism through the proper manipulation of water levels. Findings of the Bear River Station are widely applicable to other areas where botulism occurs.



All along the water margins ducks may be flushed from their nests—gadwalls and red-heads, mallards and pintails and cinnamon teal; and in spring the Canada geese pilot their little convoys of goslings up and down the canals and across the ponds.

Many other birds breed there, too. California gulls, the bird that the Mormons honored by erecting a statue, raise six to seven thousand young each year, and from the grass-lined nests of the avocets come two to three thousand young. Other nesters included the western grebe, Wilson's phalarope, Brewster's egret, Franklin's gull, white-faced glossy ibis, black-necked stilt, yellow-headed blackbird, and several terns, grebes, herons, and small shore birds.

In restoring conditions favorable for birds in a great marsh area such as Bear River, it follows that other forms of wildlife will benefit as well. A good duck marsh is also a good muskrat marsh, and these animals are plentiful at Bear River. Local trappers take the surplus under permit. In all about two dozen species of mammals live on the refuge. The weasel is fairly common along the channel banks and over most of the higher marsh area; mice are its principal food. The skunk population is kept in check to prevent loss of waterfowl eggs during the nesting season. There are small numbers of marmots, ground squirrels, and jack rabbits; the cottontail rabbit is common about the headquarters area. Despite the scarcity of willows and other trees, a few pairs of beavers are living along the main channels of the marsh. With patience and persistence, the visitor to the refuge may see still another member of the mammal population—the coyote. Especially in the fall, one of these animals may sometimes be seen running along the dikes or through the marsh.



The white-faced glossy ibis, a bird of open marshes, is widely distributed from Utah and Oregon southward. At Bear River several hundred pairs nest, forming one of the largest conveniently visited colonies in the country.

THE IMPORTANCE OF THE BEAR RIVER REFUGE is far more than local. The millions of feathered visitors that congregate there during migration will spread out widely over the continent. Banding has taught us much about where they go. Out of some 36,000 birds that have been marked with numbered metal bands at Bear River, nearly 3,000 have later been recovered. The returns have come from distant places as well as nearby. Birds from Bear River have gone to Alaska, Canada, Mexico, Honduras, and Palmyra Island in the mid-Pacific. They have been recovered in 29 States, principally west of the Mississippi River.

In the great system of waterfowl flyways, Bear River stands on the borderline between the Central and the Pacific, and contributes birds to each. A flyway is much more than a migration route; it may be defined as "a vast geographic region that has extensive breeding grounds and wintering grounds connected with each other by a system of migration routes." The Central flyway lies east of the Rocky Mountains and includes most of the Great Plains. The Pacific flyway includes the Rocky Mountains and the Pacific Coast.

Although most of their birds belong to the Pacific flyway, the Bear River marshes also produce many ducks for the Central. When these broods reach maturity they join the ducks moving down this flyway by two routes: one eastward through the Green River Valley of Wyoming, another southeastward through the San Luis Valley of Colorado, thence to wintering grounds along the coasts of Texas and Mexico.

The long Pacific flyway, that extends from Alaska and the Aleutians all the way to Central America and the northern countries of South America, claims most of the ducks and geese of the Bear River Refuge. Migrants that have come down from the north stop there in the fall for food and to rest from the long flight, then they move on, most of them, to the west and south. Some will provide targets for the guns of hunters in Nevada, California, and Arizona. Among those that survive many will spend the winter in the great interior valleys of California, where the Sacramento and other National Wildlife Refuges provide rice and other food plants especially grown for their benefit. Others will continue south to the Salton Sea National Wildlife Refuge or into the marshy valleys of Mex-

ico to feed until once more the migratory urge calls them northward.

THE REFUGE HEADQUARTERS ARE LOCATED near the mouth of the Bear River about 15 miles west of the town of Brigham and near the center of Bear River Valley, with the Promontory Mountains on the west and the Wasatch Range on the east. These mountains rise abruptly from the valley floor, which is at an elevation of 4,200 feet above sea level, and extend upward to 9,700 feet at the highest peaks.

Located at the headquarters are an administration building, a research laboratory, four residences, a combination garage and storage building, a service building, a boathouse, a building for housing a water-filtering system and a power plant, and a steel observation tower 100 feet in height.

Visitors may reach the refuge headquarters, which are open to the public daily from 9 a. m. to 5 p. m., by traveling due west from Brigham, Utah, over a hard-surfaced road. This city has a population of 6,000, has available hotel and auto court accommodations, and is located on U. S. Highways 30-S and 91.

After free registration at the refuge headquarters, a panoramic view of the refuge may be had from the tower. Visitors are permitted to drive their cars around Unit No. 2, one of the five large artificial lakes and marsh areas. This is a trip of 12 miles over a gravel road constructed on top of the artificial dikes that impound and distribute the waters from the Bear River.

This refuge offers unusual photographic opportunities. The abundance of birds, their lack of any fear of people, and the opportunity of



The air boat, with its flat-bottomed aluminum body and airplane propeller, was developed at Bear River to allow easy and rapid travel on the very shallow waters over the mud flats. Now this type of boat is used in many parts of the country for travel in marshes and other still, shallow waters.

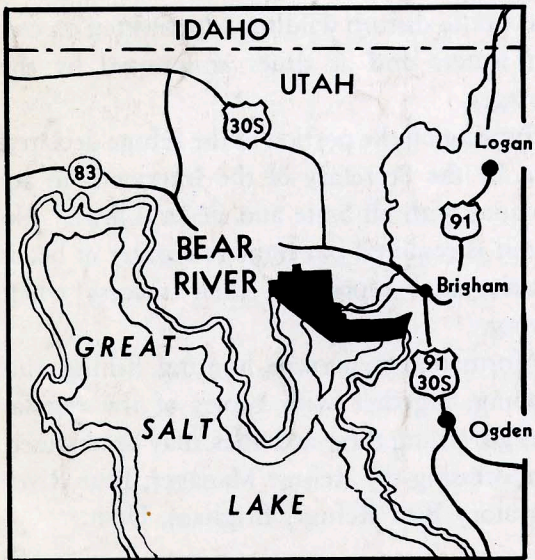
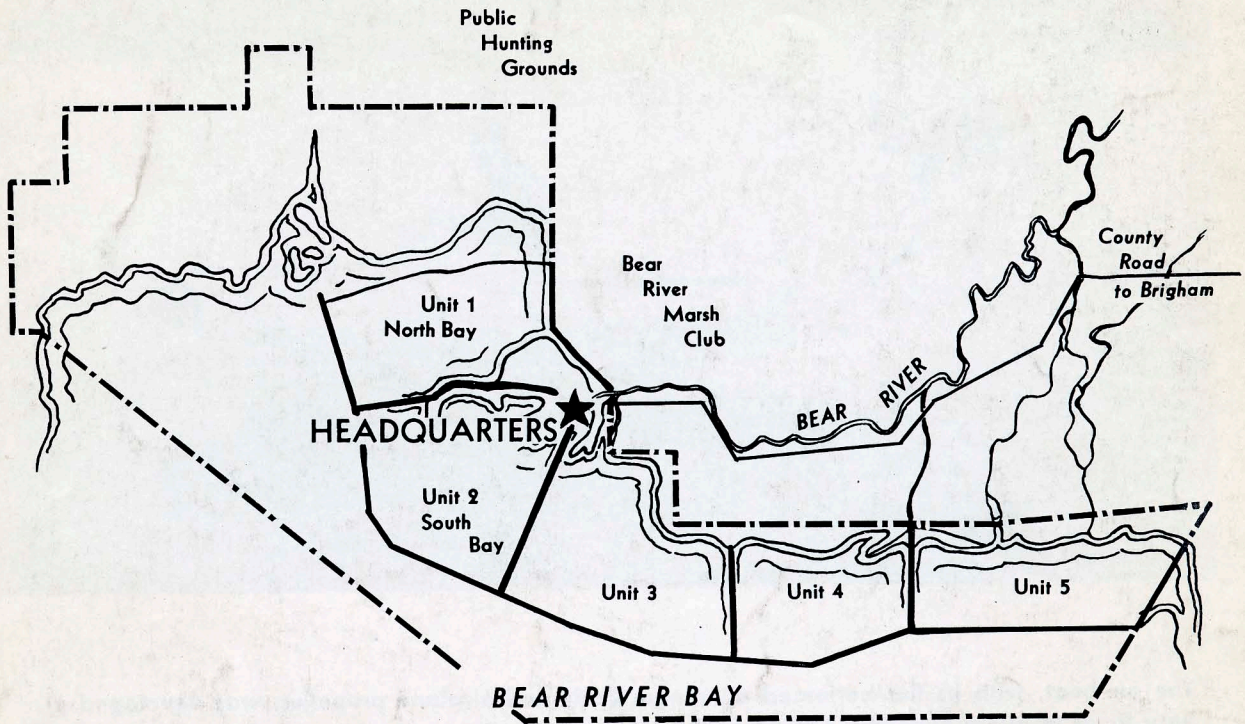
seeing them while driving, provide conditions probably unequalled elsewhere. During the spring, summer, and fall, many different species of birds, varying in size from the tiny marsh wren to the large white pelican, may be observed from the car windows on the trips around Unit No. 2.

Permission is not required for amateur photographing of wildlife on the refuge done during the course of a tour. Photographing involving use of a blind or special travel, or requiring several days, may be authorized by a permit issued by the refuge manager. Fishing on the refuge, in compliance with State laws, and carried on

so as not to disturb wildlife, is permitted on certain waters and at times announced by the manager.

Hunting on the portion of the refuge declared open by the Secretary of the Interior is in accordance with all State and Federal laws. No permit is required but hunters register at headquarters and report on their success when leaving.

Information on permits, hunting, fishing, and trapping, together with copies of the regulations governing these activities, may be obtained by addressing the Refuge Manager, Bear River Migratory Bird Refuge, Brigham, Utah.



BEAR RIVER MIGRATION BIRD REFUGE AND ITS LOCATION