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THE BIRD LIFE OF LAKE BOWDOIN, MONTANA

WITH FIVE ILLUSTRATIONS

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Riding in summer across the endless prairies and benchlands of northeastern Montana on U. S. Highway No. 2, the nature-loving motorist receives the impression that here is a desolate land indeed. Mile beyond mile the sun-scorched lands roll to a hazy horizon. Local areas of sagebrush and greasewood and vast reaches of thin, light soil covered with prickly pear and dwarf grasses testify to the dryness of the climate. Occasionally longspurs and horned larks rise from the roadway and drift away to one side; at long intervals a solitary hawk may be seen in quest of ground squirrels or grasshoppers. But except in the river bottoms and in the restricted areas of irrigated farms, few other evidences of bird life are seen. One's mind scarcely entertains the possibility of observing waterfowl.

In Phillips County, about seven miles northeast of the town of Malta, the rolling prairie drops to a wide depression with its surface leveled by water. Let the motorist stop here to look and listen, to scan the surface of the water which reaches nearly to the highway. Along the shore he may see long-legged birds in active motion; scattered across the shimmering expanse beyond will be groups of dark, moving forms. Then he will hear, from far out across the water, a strange medley of bird notes—some raucous, some mellifluent; some plaintive, others defiant. And looking more closely, he will discern two dark lines of land relieved with rows and dots of vivid white; and perhaps in the air above, a dim cloud of shifting, intermingling forms.

Here lies Lake Bowdoin, Montana's most important collective breeding-ground for waterfowl. Famed throughout eastern and central Montana since pioneer days as a hunting-ground, for a third of a century the lake and the lands surrounding it have been owned by the federal government, as a part of the St. Mary's–Milk River Irrigation Project. During that time the area has been a subject of much contention among sportsmen, conservationists, and politicians. Although in 1921, in vetoing an act of congress giving a local gun club patent to a portion of the lake and shore, President Wilson recommended that the area be made a federal bird reservation, no action was taken by the proper authorities. In recent years the contention became intensified; suffice it to say here that the expressed urge of a great number of interested Montana citizens stimulated the Biological Survey in 1935 to set aside the greater portion of the lake and an adjoining marsh as a federal refuge. In the fall of that year the area established was fenced, and for the first time migratory waterfowl were enabled to enjoy this hereditary feeding ground unharassed by gunfire. Under adequate protection and with proper control of the water level and food supply, Lake Bowdoin under

federal supervision should be even more important as a breeding and feeding area for water birds than it has been in the past.

In spite of its renown among hunters, Lake Bowdoin is evidently little known to ornithologists. The only published account of its bird life we have knowledge of is a short article by George Willett (Condor, vol. 9, 1907, pp. 105-106) describing his visits to the area on three days during the nesting season of 1903. It is our purpose in this paper to describe the area and discuss briefly its adaptations and needs as a refuge, and to record the results of our observations of its bird life during four seasons. The dates of our visits to the area are these: by Marsh, June 19-21, 1932, June 18-22, 1933, June 17, 1934; by Marsh and Weydemeyer, June 7-13, 1935.

ECOLOGICAL CONDITIONS

Description of the area.—Lake Bowdoin is situated in central Phillips County, Montana, and lies between the Great Northern Railway and U. S. Highway No. 2, seven to fourteen miles east of Malta. Naturally a typical prairie lake fed by surface drainage, the water is very strongly alkaline, and its level varies considerably at different seasons and in different years. At the usual water level the lake proper covers about 3500 acres to an average depth of about four feet. The northeast and northwest shores of the lake, and the central portion of the south shore, are marked by rising land and remain fairly constant; but from the southwest and southeast arms of the lake the land stretches levelly over several thousand acres south and east of the lake, and much of this area is at times in spring covered by water. One portion of this area, comprising about 1200 acres northeast of the town of Bowdoin (named "overflow marsh" on the map) lies at a lower level than the main overflow area, and until about 1905 this was permanently covered with about two feet of water, affording an excellent nesting-ground for ducks and other birds. About that time, however, the U. S. Reclamation Service constructed ditches that cut off much of the flood water supply of the entire area, and a private ditch tapped this marsh and lowered its level. Since that time this marsh has been dry most of the time after early spring. This marsh should be restored to its former level by damming the old ditch, which no longer serves its original purpose. (See fig. 32.)

A supply canal of the Milk River irrigation project roughly parallels the northwest shore of the lake, and a sluiceway leading to the lake basin near the old clubhouse site at the westernmost point of the lake makes it possible to empty water into the lake from this source. In the past this possibility has not always served a useful purpose, for at least in one season water was dumped into the lake during the nesting season, and probably thousands of nests of ducks, geese, gulls, terns, and shorebirds were destroyed by the rising water level. Under federal control such a mistake can be avoided; the lake level should be kept as high as possible by supplying water from the ditch in late summer or autumn.

The nesting grounds.—The rising land bordering the northeastern, northwestern, and central southern permanent shores affords little cover for nesting. Only in restricted areas is this used by shorebirds and a few ducks. But the shallow water and flat shores of the two arms of the lake support heavy growths of bulrushes, cat-tails, and marsh grasses, and furnish cover for nesting ducks, geese, grebes, and coots, as well as for shorebirds and for hundreds of red-wings and yellow-heads. A few small islands in the central part of the lake are used by nesting colonies of pelicans, blue herons, cormorants, gulls, and terns, and by ducks, geese, and shorebirds.

Food and cover plants.—The aquatic food plants of the lake are limited by the extreme alkalinity of the water. A good growth of widgeon grass (*Ruppia* sp.) occurs

practically everywhere over the lake, constituting the most important food plant. Sago pondweed (*Potamogeton pectinatus*) grows in some of the shallower water of the two arms of the lake. In 1932, Marsh found a water buttercup (*Ranunculus* sp.) growing over several acres near the north corner of the lake, but we did not find the

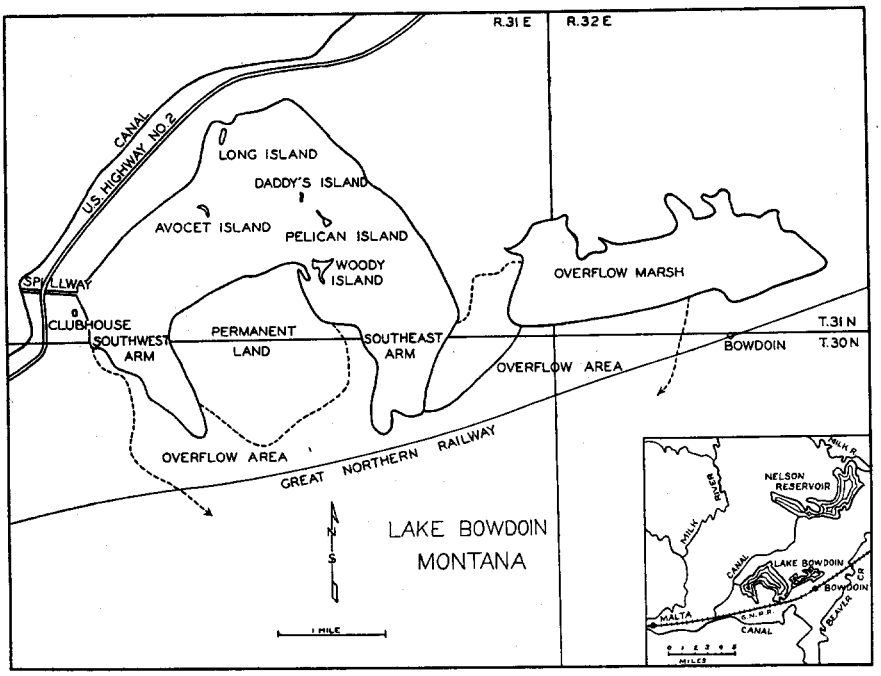

Fig. 32. Lake Bowdoin, central Phillips County, Montana, showing local features referred to in accompanying text.

patch in 1935 and could secure no specimens for identification. Experimental plantings of many well-known food plants have all resulted in failure, due to the extreme alkalinity of the water. The bulrushes (*Scirpus occidentalis*, *S. campestris*, and *S. americanus*) and cat-tail (*Typha latifolia*) which grow in and along the two arms of the lake, in the overflow marsh, and in restricted patches along the shores of the mainland and of Woody Island, are important for nesting cover and useful also as food plants.

Several kinds of grass-like sedges (*Juncus* and *Carex* sp.) grow prolifically along all shores except on the northeast side of the lake, furnishing excellent cover. A small heliotrope (*Heliotropium spathulatum*), which grows abundantly on the moister portions of the islands and shores, offers cover for nests of gulls, terns, and ducks. Nearly every Common Tern nest found in 1935 was situated beside a clump of this plant. Grasses important for cover along the shores and on Long Island include foxtail (*Hordeum jubatum*), *Agropyron Smithii* and *A. spicatum*, and *Poa nevadensis*. On Long Island, where in 1933 hundreds of ducks nested, cover is provided also by rose (*Rosa Fendleri*), cocklebur (*Glycyrrhiza lepidota*), morning glory (*Ipomoea purpurea*), lamb's quarter (*Chenopodium album*), and june grass (*Koeleria cristata*). The higher portion of Woody Island, which supports most of the pelican, heron, and cormorant population of the lake, is covered with an open growth of greasewood

(*Sarcobatus vermiculatus*) which furnishes support for heron nests, nesting material for geese, gulls, pelicans, herons, and cormorants, and shade and cover for young pelicans, gulls, terns, and shorebirds. Bulrushes and sedges grow along parts of the shoreline of this island, and most of the cover grasses and plants already named occur there also. A short grass (*Distichlis dentata*) grows in dense mats between the patches of greasewood, making a good turf for the young pelicans to rest on. A plant on this island that is injurious to birds, especially to young pelicans, is the prickly pear (*Opuntia polyacantha*), a heavily-spined cactus that occurs over the higher portion of the island where the pelicans, herons, and cormorants nest. This cactus also grows abundantly along the higher shores of the lake, especially on the east and south shores. (See fig. 33.)

Other food resources.—The supply of fish, which constitutes the principal food of the pelicans, herons, and cormorants, and, presumably, varying proportions of the food of the gulls, terns and grebes, is obtained mainly from the carp (*Cyprinus* sp.) occurring in Lake Bowdoin, in Nelson Reservoir (a larger and artificial lake lying about six miles to the northeast), and in irrigation canals and ditches. Normally, Lake Bowdoin is well stocked with carp, but in 1935 we saw no sign of a live fish; instead, thousands of tons of carp carcasses, up to 28 inches in length, lined the shores of the islands and mainland. A period of severe cold during the preceding winter, when the lake was at a low level, had developed so thick a covering of ice that the carp had evidently been smothered. It seems likely that the lake will become restocked naturally if water is emptied into it from the canal. The maintenance of a maximum supply of water in the lake would probably prevent a recurrence of this destruction of carp even in severe winters.

The gulls and terns range freely over the irrigated farmlands around the lake, utilizing the natural food resources available there.

Enemies and diseases.—The birds of Lake Bowdoin are fortunate in being little disturbed by predators. The island nesters are safe from prowling animals; occasional damage to shore nesters may be done by wandering coyotes, weasels, and skunks, but we have observed no evidence of any destruction by these species. Crows have not been seen near the lake; only a few occur in the surrounding region. Hawks are scarce. In 1935 a Marsh Hawk and a Prairie Falcon were seen to pass over the southwest arm of the lake nearly every day, always pursued by a noisy throng of red-wings and yellow-heads; and two Swainson Hawks were seen near the west shore. No hawks were seen near any of the islands. Probably the greatest destruction of young birds in the past has been done by a large pack of half-wild, half-starved dogs owned by a rancher living near the east shore of the lake. Horses and cattle grazing along the shores have destroyed nesting cover and probably nests. This stock hereafter will be kept out by the fence, and the dog problem should be properly met by the Biological Survey.

In the past the birds have been little molested by human enemies. Very few local residents have ever visited the islands or roamed the shores except during the hunting season. The unusual lack of raids upon the nesting colonies of pelicans and herons by sportsmen is due to the fact that practically no game fish, and hence no fishing, occur in that region.

The alkalinity of Lake Bowdoin is great; during summer and fall deposited alkali salts surface the mudflats along the shores and rise in great white clouds when a strong wind blows. Hence the occurrence of "duck sickness" is to be expected at times. Reporting in 1918 on investigations of "duck sickness" made by the United States Biological Survey, Wetmore wrote: "An outbreak that occurred at Lake Bowdoin,

near Malta, Mont., in August and September, 1915, killed large numbers of shorebirds and many ducks. A few birds were still affected after the 1st of October. Individuals examined at this time had the same malady as the ducks in Utah, but it can not be stated definitely that all had died from this trouble." (U. S. D. A. Bulletin No.

Fig. 33. Typical view on Woody Island, showing characteristic plants, two Double-crested Cormorants on their nests, a Great Blue Heron shading its young from the sun, and White Pelicans at their nests. Photographed June 10, 1935.

672, The Duck Sickness in Utah.) We have no knowledge of subsequent reports of the occurrence of this sickness at Lake Bowdoin.

We were particularly interested in the relation to other nesting birds, of the gulls and terns, traditional egg destroyers. At Lake Bowdoin the Common Terns and Ring-billed, California, and Herring gulls nest on the same small islands inhabited by pelicans, herons, cormorants, geese, ducks, and shorebirds, many of the gulls' nests being situated only a few feet from the nests of some of these other birds. Often during our visits the greater fear or caution of these various species caused their nests to be exposed to the bolder gulls and terns, sometimes for several hours at a time, while we remained in a blind. Yet not once during our visits in four seasons was a gull or tern seen to molest the eggs or young of any other bird.

THE BIRD POPULATION

The islands.—Woody Island, largest and most important of the islands, is roughly triangular in shape and about five acres in extent. The central portion, embracing about two-thirds of the area, lies at an elevation of two to five feet above high-water level, and is covered with a scattered growth of greasewood averaging about three feet in height. The three "points" of the island lie lower, are mostly sandy and exposed, and are bordered in places by a growth of bulrushes. The bird population of this island has remained fairly constant during the four seasons of our visits, but it differs considerably from that observed by Willett in 1903. At that time he found hundreds of ducks (Blue-winged and Green-winged Teal, Mallard, Canvasback, Baldpate, and Shoveller) nesting there; Avocet and Common Tern nests were abundant, and two Spotted Sandpiper nests were found. He found no White Pelicans, Great Blue Herons, or Ring-

billed Gulls, which now make up the bulk of the bird population of Woody Island, although he found birds of these three species on Pelican Island. In 1935 our census of Woody Island disclosed about 200 nesting pairs of White Pelicans, 50 or 60 Great Blue Heron nests, 7 Double-crested Cormorant nests, at least 1000 Ring-billed Gulls (650 adult birds were counted at one time in midday), about 50 California Gulls and 10 Herring Gulls, 25 Common Tern nests, 3 Canada Goose nests, 1 Redhead nest, at least 5 pairs of Spotted Sandpipers, about 150 Red-wings, and at least 5 pairs of Nevada Savannah Sparrows. The Common Tern population was far greater in the three preceding years (numbering into the thousands in 1933), and at least twice as many gulls were present in 1933. Many ducks, especially Mallards, Pintails, and Baldpates, nested on this island in 1933, and 12 or 15 nests were found the following year. In 1922, Harry Cosner, local deputy game warden, counted 78 Canada Goose nests on Woody Island.

The population of Pelican Island is even more variable. This island covers only about an acre at high water, rising four or five feet in the central portion; it is gravelly, with very little cover. In 1903, Willett found a few ducks, a colony of Ring-billed Gulls, a small colony of White Pelicans, and hundreds of Great Blue Herons. During the four years 1932-1935, very few gulls and ducks nested there. One Double-crested Cormorant nest was situated there in 1932 and in 1934. About 20 nests of the Great Blue Heron were on this island in 1932, and about 10 nests in each of the following years. About 40 White Pelican nests were found in 1932 and 1934, only 6 in 1933, and 116 sets of eggs were counted in 1935.

Long Island, lying only a few rods offshore near the north corner of the lake, covers about three acres and is practically all dry prairie in character. The east shore rises abruptly to an average height of about six feet; from here the land slopes gently to the west shore, which is margined in some places by narrow mudflats and growths of bulrush. The land generally bears a tall growth of grasses and other herbs, with patches of rosebush, affording excellent cover for ducks and geese. A few pairs of Spotted Sandpipers nest there yearly, and several pairs of Wilson Phalaropes nested there in 1933. In that year, when the duck population of the lake numbered perhaps 40,000 birds, this island was literally covered with duck nests, mainly those of Baldpate, Gadwall, Pintail, Blue-winged Teal, and Mallard. In 1935, however, when fewer than 1200 ducks were seen on the lake, no duck nests were found on Long Island, and only two on the other islands. With the exception of a few Redheads, all the ducks evidently were nesting along the shores of the mainland. One Canada Goose nest was found on Long Island; a few Spotted Sandpipers and Red-wings were the only other birds occurring there regularly. Long Island was not visited in 1934; in 1932, due to the low level of the lake, it was connected with the mainland and was little used by birds.

Half a mile northwest of Pelican Island, lowering of the water level in spring exposes a small gravel-bar known as Daddy's Island. In June of 1935 two ends of this island were exposed, each covering about a quarter of an acre. The north bar, bare of vegetation, contained 2 Avocet nests. On the south bar, which bore a sparse growth of heliotrope plants, we found 3 Avocet nests, 1 California Gull nest, and 13 Common Tern nests.

Another small island, similar in character, lies about a quarter of a mile off the central northwest shore. We named this Avocet Island. In 1935 this island consisted of a crescent-shaped gravelly, rocky bar covering about an acre, its only vegetation a few clumps of grass and patches of heliotrope in the highest central part. This central area contained 15 Common Tern nests and 7 Avocet nests. A pair of California Gulls

and their small young were here, and about 25 Black Terns occurred on the island, but were not nesting.

Population trends.—Most kinds of water birds at the lake have not varied greatly in numbers during the four seasons of our visits, except in 1933, which year was characterized by an unusual abundance of practically all species. Lack of accurate reports for preceding years makes it impossible in most cases to determine the present trend of fluctuations in population. It is encouraging to note that the White Pelican population is now much greater than it was at the time of Willett's visits in 1903. It is possible that the mortality of nestlings in 1935 may have been greater than normal, due to the unusual absence of carp in the lake and the greater difficulty of securing these fish in the deeper waters of the distant Nelson Reservoir. It seems likely that under the control of the Biological Survey the colony of White Pelicans can be preserved at about its present strength.

The Great Blue Herons of the lake have not varied greatly in numbers during the four seasons of our visits except in 1933, when between 500 and 1000 birds were present; but their nests cannot usually be counted by the "hundreds" as reported in 1903 by Willett. The few pairs of Double-crested Cormorants now nesting on Woody and Pelican islands have evidently become established there since 1903; reports of their presence date back to "a number of years" prior to 1927. Gulls have evidently increased since 1903. Willett reported only a small colony of one species, the Ring-billed Gull. During the years 1932-1935 the gull population has remained fairly constant, the largest estimate being 2000 to 5000 adults in 1933. The Common Tern population was unusually small in 1935; about 150 birds were present at the lake, as compared with the "peak" population of perhaps 8000 birds in 1932.

The duck population of the lake has suffered the constant decrease that has prevailed in general over the continent. The cover and food plants available in that area are sufficient to support a regular nesting population of at least twenty times the number of ducks present in 1935. In fact, ducks that year numbered only about three per cent of the actual 1933 population. The number of Canada Geese summering at the lake has varied considerably. Willett in 1903 found no nesting birds, though he found two old eggs of the previous season. In 1922, as has been mentioned, 78 nests were counted on Woody Island. In each of the four years of our visits a few pairs of these birds have been present.

SUMMER BIRDS OF THE LAKE AND VICINITY

The following annotated list of species includes both the water birds and the land birds which we have observed at Lake Bowdoin, or within seven miles of its shores, during our June visits in the four years 1932 to 1935, inclusive.

Colymbus nigricollis californicus. Eared Grebe. Common along the west side of the lake during all four years. Approximately 400 were counted there June 8, 1935. At that time we were unable to locate any nests in the marginal bulrushes which we could penetrate with our canoe, and no young birds were seen on the water.

Aechmophorus occidentalis. Western Grebe. Occurs in varying numbers along the north and west sides of the lake. Several hundred were present in 1933; in 1935 we estimated the total number present to be 10 or 12.

Podilymbus podiceps podiceps. Pied-billed Grebe. One record: a single bird was seen in June, 1933.

Pelecanus erythrorhynchos. White Pelican. Nests regularly on Woody and Pelican islands. Evidently more common now than in 1903, when Willett found none on Woody Island and only a small colony on Pelican Island. We estimated the adult population in 1935 to be about 800 birds, and a somewhat larger number was present in 1933. The Pelican Island birds usually nest later than those of Woody Island. On June 8, 1935, the Pelican Island nests held 116 sets of eggs and no young, whereas on Woody Island we found about 70 sets of eggs and about 150 broods of young,

the largest about one-fourth grown. Yet the birds of the two islands evidently comprise a single colony, as the number of pairs nesting on Pelican Island has varied greatly: about 50 nests in 1932, 6 in 1933, 40 in 1934, and 116 in 1935.

The season of nesting has varied greatly during the four years of our visits. In 1932 all of the eggs had hatched by June 19, and most of the young were more than half grown. In 1933 by that date about half of the young birds were large enough to band. The following season only about half of the eggs had hatched by June 17, and about 120 nestlings were large enough to band. A season of nesting similar to the last was indicated in 1935. The nests are composed generally of a heavy lining of sticks and twigs laid over a crater-shaped mound of dirt two to three feet across and four to eight inches high, though in some cases the lining is scanty or missing.

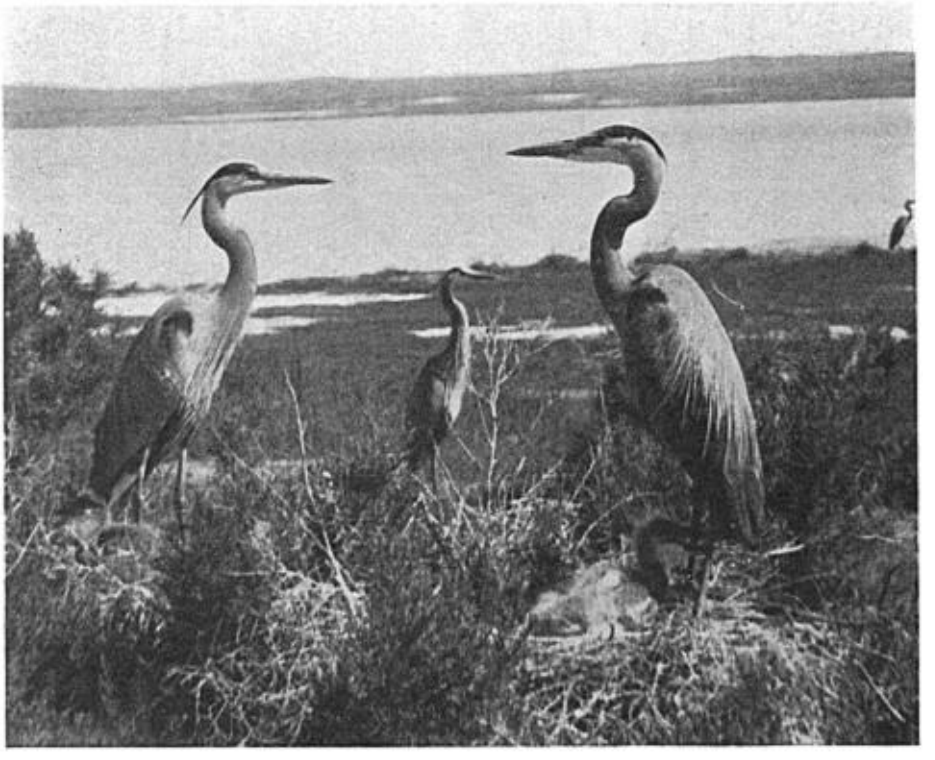

Fig. 34. Great Blue Herons at their nests on the ground of Woody Island. Photographed June 10, 1935.

During the afternoon of June 9, 1935, we erected a covered burlap blind five feet square and six feet high in the center of Woody Island, among the pelican, heron, and cormorant nests. The next morning we entered the blind at eight o'clock and remained there for five and one-half hours, observing and photographing the birds of these three species. Within an hour after we entered the blind the pelicans had returned to their nests, and thereafter they paid little attention to slight sounds within the blind or to movements of the burlap. Several times, however, dozens of the pelicans in our vicinity suddenly took wing with no apparent cause. Once a loud report like a rifle shot resulted in a hurried and thunderous "take-off" by all the pelicans on the island. Looking in vain for human raiders, we decided that an addled egg had exploded from the heat of the sun. During our stay in the blind, most of the unhatched eggs were left uncovered in the warm sunshine much of the time, whereas the young birds were in many cases shaded from the sun by their parents. Very little feeding was accomplished during these hours. (See fig. 36.)

Approximately 500 young pelicans were banded by Marsh in 1932, 1933, and 1934. Returns have been obtained from localities throughout Mexico, the southern states, and the Middle West;

several returns from southwestern Canada indicate that some of the birds move northward after the nesting season.

Phalacrocorax auritus auritus. Double-crested Cormorant. Seven to twelve pairs have nested yearly on Woody Island among the pelican and heron nests; in 1932 and in 1934 one pair nested on Pelican Island. In 1935 two nests each contained small nestlings, appearing to be not more than two weeks old, on June 8; five other nests still contained eggs on June 10. The nesting season was somewhat earlier in 1932 and 1933, but it was later in 1934. Placed on the ground, the nests are built mainly of greasewood limbs and twigs woven into a compact cylinder eight to thirty inches high and about two feet in diameter.

Three cormorant nests, two with eggs and one containing young, were situated within sixty feet of the blind which we occupied for five and one-half hours on June 10, 1935. The two cormorants incubating eggs remained on their nests only about half of the time, flying away at intervals of about an hour. Generally we became aware of their return by hearing their hoarse, hog-like calls. The nest containing young birds was only about thirty feet from our blind, and for nearly two hours after we disappeared therein the adult cormorants did not alight at the nest, though they flew over the blind occasionally. After that time they visited the nest frequently, sometimes both remaining there at once. Occasionally they fed the young birds, or to be exact, allowed them to feed themselves. These three nests were all placed within a few feet of pelican nests, but no discord between the two species was noted.

About 35 young Double-crested Cormorants were banded by Marsh in 1932, 1933, and 1934; returns have been obtained mainly from Kansas, Oklahoma, Texas, and Louisiana.

Ardea herodias herodias. Great Blue Heron. Nests regularly on Woody and Pelican islands. About 200 adults were present in 1935, perhaps representing the average population; in the "peak" year, 1933, at least 500 birds were on the lake. The bulky nests of sticks are built on the ground or in clumps of greasewood. One or two nests are placed in a scrubby cottonwood on Pelican Island, the only "tree" on the islands. In 1935 about 60 nests were occupied on Woody Island, about seventy per cent of the eggs having hatched by June 10; the largest young were about one-third grown. Like the pelicans, the herons of Pelican Island showed a later stage of nesting than those on Woody Island. Of the 10 nests there, 5 contained eggs, 4 contained young birds, the largest probably not ten days old, and one nest contained one runt nestling and two runt eggs measuring about 1.00 × .75 inches and having the appearance of dried clay marbles. The season of nesting was somewhat earlier in 1934 and 1933, and considerably earlier in 1932.

During our stay in the blind from 8 a.m. to 1:30 p.m. on June 10, 1935, we had under almost constant observation about twenty heron nests that afforded a clear view of the nestlings. Desirous of securing photographs of the adult birds feeding their young, we watched closely for such an opportunity. But although the adult herons visited the nests at intervals, or remained there almost constantly, only once during the five-and-a-half-hour period was one seen to feed its young. The nestlings appeared contented and generally gave no indication of desiring food when a parent bird would return after an absence. Some adults remained at their nests almost constantly, shading their young from the warm sunshine during the hottest part of the day. (See fig. 34.)

Though the herons did not return to their nests near the blind, after we first entered it, as quickly as did the pelicans, after once returning they showed little fear of the unfamiliar object, often remaining at their nests while all the pelicans around them rose in sudden flight at some unexpected sound or motion.

About 350 young Great Blue Herons were banded by Marsh in 1932, 1933, and 1934. Returns have been obtained from localities in the Middle West, the southern states, and Mexico.

Botaurus lentiginosus. American Bittern. One bird was observed in the southwest arm of the lake on three different days in 1935. Recorded also in 1933.

Branta canadensis canadensis. Common Canada Goose. Occurs in small numbers, nesting on the islands and along the shores of the lake. In 1933 most of the eggs had hatched by June 18. In 1935 three full-exposed nests were found on Woody Island, containing 1, 4, and 6 eggs on June 8. The 5 eggs of a nest hidden in tall grass and rosebushes on Long Island hatched June 12; and 4 young a few days old were seen on the water with their parents, on June 8. These small young dived repeatedly as we pursued them in our canoe, readily swimming nearly a hundred feet at a time under water. When we discovered the nest on Long Island on June 8, four days before the eggs were to hatch, the goose remained hidden on its nest for several minutes while we tramped about in view nearby, not flushing until we approached within about twenty feet.

Anas platyrhynchos platyrhynchos. Common Mallard. Well distributed over the lake; nested commonly on Long Island and Woody Island in 1933, but no nests were found there in 1935. In 1932 most of the females had finished egg-laying on June 19; in 1933 some of the eggs had hatched

by that date. No young were on the water by June 13, 1935. Though thousands of Mallards were present in 1933, we estimated the number on the lake in 1935 to be about 100.

Chaulelasmus streperus. Gadwall. Abundant in 1933; large numbers were found nesting on Long Island. In 1935 our counts totaled 212 ducks of this species, it being twice as common as the Mallard, but being outnumbered more than two to one by the Redhead.

Mareca americana. Baldpate. Observed only in 1933 and 1935. Though in 1933 this species was perhaps the commonest duck on the lake, thousands being present, in 1935 we observed only a single pair. Hundreds of nests were found on Long Island and Woody Island in 1933.

Dafila acuta tzitzihoa. American Pintail. Common in 1932 and 1933; only six birds were observed in 1935. A few young had hatched by June 22, 1933; nests with eggs were abundant at that time on Long Island, and a few were found on Woody Island. The birds also occurred in large numbers in the southwest arm of the lake.

Nettion carolinense. Green-winged Teal. A lone male observed June 12, 1935, was the only bird seen during our four annual visits. In 1903 Willett found this species nesting abundantly on Woody Island.

Querquedula discors. Blue-winged Teal. Abundant in 1932 and 1933; many nests were found on Long Island in 1933. In 1935 about 200 occurred on the lake. The only nest found was located in tall grass about 200 yards from the southwest corner of the lake; the 10 eggs hatched June 13.

Querquedula cyanoptera. Cinnamon Teal. One pair was seen daily during the visit in 1933.

Spatula clypeata. Shoveller. About 80 birds frequented the west half of the lake in 1935. Several pairs were seen in marshes south of the lake in 1933.

Nyroca americana. Redhead. Abundant in 1933, especially in the southwest arm of the lake. Easily the commonest duck on the lake in 1935. Our counts placed the total number present as 480, more than forty per cent of the total duck population of the lake. In 1935 an exposed nest of this species, containing 9 eggs, was the only duck nest found on Woody Island. Another nest of 9 eggs was found June 12 hidden in the reeds on a tiny low-water island near the southwest corner of the lake.

Nyroca valisineria. Canvas-back. Abundant in 1933, especially in the southwest arm of the lake, which was that season well-filled with water. Common in 1934; only about 50 birds were present in 1935. Near the southwest corner of the lake that year we found a nest containing 10 Canvas-back eggs, 1 Redhead egg, and 1 egg of uncertain origin, probably an undersized Canvas-back egg that may have been deposited by a second female of that species. Situated in six inches of water, the nest was built up with rush stalks to a height of eight inches above the lake surface. We approached this nest on three different days, and in each instance flushed a female Redhead from the nest. The eggs had not hatched by June 12.

Nyroca affinis. Lesser Scaup Duck. A total of about 20 birds frequented the west portion of the lake in 1935. In 1932 a pair nested on an island in Nelson Reservoir.

Erismatura jamaicensis rubida. Ruddy Duck. In 1935 8 or 9 pairs occurred regularly in the southwest arm of the lake, in the vicinity of heavy growths of bulrushes. The soft bottom and shallow water prevented a search for their nests either afoot or with our canoe. Birds of this species were plentiful in 1933, in the same part of the lake, but none was observed in 1932 or 1934.

Buteo swainsoni. Swainson Hawk. Not common; seen near the east shore of the lake in 1933; one was seen there June 12, 1935, and two were observed near Malta the same day.

Buteo regalis. Ferruginous Rough-leg. Not common; observed near the lake on two days in 1935.

Circus hudsonius. Marsh Hawk. Uncommon; observed in 1933; one bird coursed the southwest arm of the lake on three successive days in 1935.

Falco mexicanus. Prairie Falcon. Rare; one bird was seen at the lake daily from June 9 to 12, 1935.

Pedioecetes phasianellus campestris. Prairie Sharp-tailed Grouse. Two birds were flushed from Woody Island in 1934.

Centrocercus urophasianus. Sage Hen. A female with a brood of young was seen in 1933 near the clubhouse, west of the lake.

Perdix perdix perdix. European Partridge. A few occur near Malta. Two were flushed from Woody Island, June 8, 1935.

Phasianus colchicus torquatus. Ring-necked Pheasant. Fairly common near Malta, on irrigated farms and along the Milk River.

Porzana carolina. Sora. Both in 1933 and 1935 a bird was heard several times in the bulrushes near the clubhouse, and was seen briefly a few times.

Fulica americana americana. American Coot. In 1935 a few pairs inhabited the southwest arm of the lake, where cover was plentiful; 35 birds were counted June 9 during a circuit of their

grounds. No nests could be seen from the margins of the rushes, and no young birds were on the water. In 1933 several hundred coots inhabited that part of the lake, and numerous nests were found.

Oxyechus vociferus vociferus. Killdeer. Occurs regularly along the shores and occasionally on the larger islands. Our count in 1935 totaled 66 individuals.

Fig. 35. Typical bulrush growth along southwest shore of Lake Bowdoin, showing two Avocets and a pair of Wilson Phalaropes at a favorite feeding ground. Photographed June 7, 1935.

Capella delicata. Wilson Snipe. One bird was seen along the west shore in 1933.

Numenius americanus occidentalis. Northern Curlew. A few pairs occur along the north shore and locally on the surrounding prairies.

Actitis macularia. Spotted Sandpiper. Occurs in small numbers. Nests containing eggs were located in 1933 and 1935. In 1935 about 20 birds frequented the north shore; one pair was seen regularly on Long Island, and five pairs were noted on Woody Island.

Catoptrophorus semipalmatus inornatus. Western Willet. Occurred in small numbers along the shores every season. Less common than usual in 1935, our counts placing the number seen as not more than 12.

Pisobia minutilla. Least Sandpiper. A bird thought to be a Least Sandpiper was seen June 17, 1934. On June 8, 1935, a bird probably of this species was seen on Daddy's Island. Though we both examined it with binoculars, we were not favored with a view close enough to make identification certain.

Limosa fedoa. Marbled Godwit. Occurs regularly in small numbers, mainly along the north shore. Only about 10 birds were seen in 1935.

Crocethia alba. Sanderling. A pair was found on Woody Island in 1933; one was collected by Marsh.

Recurvirostra americana. Avocet. Fairly common along the shores and on most of the islands. In 1935, there were 5 nests on Daddy's Island, 3 containing 4 eggs each and 2 with 3 eggs each. The sets were complete before June 8, and no eggs had hatched by June 13. On Avocet Island by June 8 there were 5 nests, each with a set of 4 eggs. One nest contained 2 eggs and another nest 3 eggs and a Common Tern egg, on June 11. A young bird, probably not more than three days old, was seen on the land and also was seen swimming in the water, June 11. Two pairs of adults were present on Pelican Island; no birds were seen on Woody Island, where Willett found large numbers nesting in 1903, though several nests were found there in 1934. (See fig. 35.)

The nests are placed on gravel beds, a shallow depression in the ground being lined with dried feathers and fish bones. The nest lining material matches the gray color and general appearance of

the gravel beds more closely than do the rather dark, heavily-spotted eggs. In looking for nests, it is the eggs themselves that catch the eye, and at a distance there appears to be no nest.

Steganopus tricolor. Wilson Phalarope. Of regular occurrence, feeding almost entirely while wading or swimming in shallow water close to the shore. One pair in 1935 fed daily in a small opening among the bulrushes a few yards from our camp near the clubhouse site, often being there by sunrise in the morning and in the evening lingering until deep twilight. A number of pairs nested on Long Island in 1933.

Larus argentatus smithsonianus. Herring Gull. A few gulls of this species were observed in all four seasons, occurring with those of the following three species. One bird was collected by Marsh in 1933 to make identification certain. About 10 birds were distinguished in 1935 at Woody Island; on June 8 we found a nest of 3 eggs (1.94 × 2.88 inches) among nests of California and Ring-billed gulls.

Larus californicus. California Gull. Breeds regularly in small numbers on the islands. The bill and wing feathers of a dead bird found in 1933 were sent to Dr. J. Grinnell, who confirmed the identification. We estimated the total number present in 1935 as about 60 birds. Several nests containing two or three eggs were located on the northwest point of Woody Island; a nest of three eggs was found among Avocet and Common Tern nests on Daddy's Island; and three young gulls perhaps a week old, at Avocet Island, were attended by adults of this species. Measurements of several sets of eggs ranged from 1.62 × 2.31 to 1.87 × 2.62 inches.

Larus delawarensis. Ring-billed Gull. A common breeding bird, varying somewhat in numbers from year to year. The lowest population during our visits was reached in 1935, when probably 1000 birds inhabited Woody Island. Two large colonies that year occupied the northeast and south points of Woody Island, and a few pairs nested with California and Herring gulls on the northwest point. The nests varied in structure from scantily-lined depressions in the ground to mounds of grass and small sticks ten to fifteen inches across, built up three or four inches in height. The season's hatch was approximately eighty per cent completed by June 8. Most of the nestlings took to the water when disturbed, some swimming out from the island more than a hundred yards. The gulls have varied less from year to year in the time of nesting than have the pelicans and herons.

On the afternoon of June 8, 1935, we spent five hours in a covered burlap blind in the midst of the colony on the northeast point of Woody Island. Unlike the pelicans, herons and terns, the Ring-billed Gulls remained constantly aware of our presence in the blind, and did not approach closer than about forty feet, even after five hours of safety. Several broods of young were scattered about the ground near our blind and we hoped that these would draw their parents within closer range of our lenses, but the opposite occurred. By dint of much pleading and scolding and momentary sallies toward the young, the adult birds from a safe distance succeeded in coaxing their nestlings to them. Within an hour only a few of the young birds nearest our blind remained within sixty or seventy feet of us. One high rock, a favorite perch of the gulls of that colony, stood about thirty feet from the blind. During the afternoon a number of birds started to alight on it, but their courage always failed them before they came to a full rest.

On another day a gull was observed pirating his dinner from White Pelicans on Woody Island, by fluttering a few feet from a pelican's head and loudly scolding or begging until the pestered bird would strike at the gull with its beak. Occasionally this action by the pelican would be accompanied by the disgorgement of a fish, which would be promptly seized and carried off by the gull.

The gulls scattered widely over the farmlands north and west of the lake to feed. Small flocks regularly returned to the islands just before dark in the evening. Generally, upon reaching the west shore of the lake, they would drop down to within a few inches of the surface and fly across the lake at that level.

About 450 young gulls have been banded, with very few returns. Though about 200 young birds were banded in 1934, we saw not a single banded bird among the several hundred gulls observed there at close range the following year.

Larus pipixcan. Franklin Gull. A few pairs of gulls believed to be of this species rather than the following one, but not identified positively, were found apparently nesting in the southwest arm of the lake in 1933. Their nesting site could be approached only within fifty yards; 6 birds were counted at one time.

Larus philadelphia. Bonaparte Gull. Three birds of this species were observed closely for half an hour in June, 1932, near the southwest shore. A single bird of this species or of the preceding one was observed June 9, 1935.

Sterna hirundo hirundo. Common Tern. Occurs regularly but in varying numbers, nesting on some of the islands and feeding both at the lake and on the nearby farmlands. Common also at Nelson Reservoir. The breeding population at Lake Bowdoin was largest in 1932, when the lowered

level of the lake exposed several small sandy islands suitable for nesting areas. The birds nest peaceably among avocets, gulls, ducks, and geese, favoring the exposed beaches with scant cover. A shallow depression in the sand or gravel, usually bare, but sometimes lined with grass, reed-stalks, and feathers, receives the two or three eggs, which exhibit considerable variation in color. In 1935, 15 nests on Avocet Island contained 1 to 3 eggs each by June 11; of 13 nests on Daddy's Island, 5 contained 1 egg each on June 13, the rest 2 eggs each; about 25 nests on Woody Island contained 1 to 3 eggs each on June 8. The stage of nesting was similar in 1932 and 1933, but in 1934 most of the Common Tern eggs had hatched or were hatching by June 17.

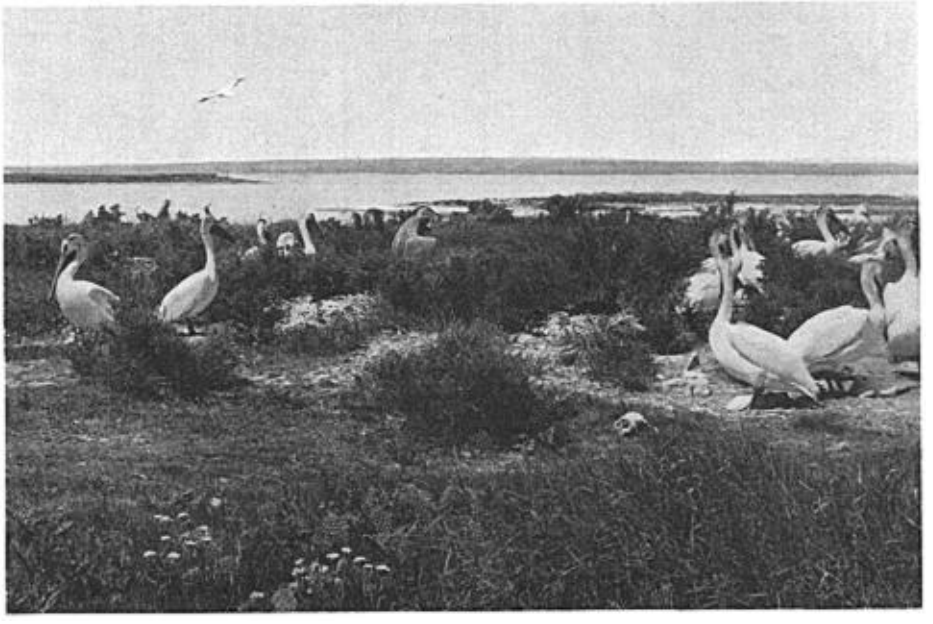

Fig. 36. A small section of the White Pelican colony on Woody Island. Photographed June 10, 1935.

We found the Common Tern to be less disturbed by our visits and blinds than any other species on the lake. On Avocet Island we found it necessary to erect our blind within four to six feet of three of their nests in order to keep a safe distance from Avocet nests. Within half an hour after we entered the blind the morning after its erection, however, terns had returned to all of these close nests, and throughout the morning they appeared to regard sounds and movements within our blind and the lenses thrust toward them with more curiosity than alarm. Often while one bird covered the eggs, its mate stood nearby, preening its feathers or resting, with no fear of the photographers that were recording its actions from a few feet distant. Meanwhile the Avocets often left their eggs uncovered with perfect safety; one set of eggs, in fact, in a nest also containing one tern egg, was covered part of the time by a Common Tern.

Chlidonias nigra surinamensis. Black Tern. Occurs in varying numbers. Common in 1933, nesting along the east shore of the southwest arm. In 1935 about 25 birds frequented the north side of the lake, making Avocet Island their resting place, but not nesting there at that time. Occurs also at Nelson Reservoir.

Zenaidura macroura marginella. Western Mourning Dove. Occurs in small numbers near Malta.

Chordeiles minor sennettii. Sennett Nighthawk. A few were seen over the lake. One evening at dusk as a nighthawk was feeding in erratic flight near our camp, a flock of Common Terns came in from the west and flew straight out over the lake. The nighthawk darted over to fall in line just at the front of the flock, and held this position with unwavering flight as long as the birds could be seen with binoculars.

Tyrannus tyrannus. Eastern Kingbird. Fairly common near Malta and about the farms.

Tyrannus verticalis. Arkansas Kingbird. One was observed between the lake and Malta in 1935.

Sayornis saya saya. Say Phoebe. A pair nested at the clubhouse in 1932 and 1933. A male remained at the same site all during our visit in 1935. The clubhouse itself was moved from the grounds the day we arrived, and it may be that a female bird and her nest accompanied it.

Otocoris alpestris leucolaema. Desert Horned Lark. Common on the prairies in the vicinity of the lake.

Iridoprocne bicolor. Tree Swallow. One was seen over Nelson Reservoir, June 12, 1935.

Riparia riparia riparia. Bank Swallow. A few breed in suitable banks near the lake. One of three occupied nests below the spillway from the canal contained 6 eggs on June 12, 1935.

Stelgidopteryx ruficollis serripennis. Rough-winged Swallow. A few pairs nest locally, near the lake.

Hirundo erythrogaster. Barn Swallow. A few pairs nest yearly on bridges near the lake. A nest on the concrete culvert where the highway crosses the canal spillway contained 4 eggs on June 12, 1935.

Pica pica hudsonia. American Magpie. Rare. A few birds were seen about a mile west of the lake in 1935.

Corvus brachyrhynchos hesperis. Western Crow. Rare; not seen at the lake. A few were seen near Malta on one day in 1935.

Telmatodytes palustris plesius. Western Marsh Wren. One was observed in the southwest arm of the lake in 1932.

Turdus migratorius propinquus. Western Robin. Not common; a few nest in Malta and about the farms.

Sialia currucoides. Mountain Bluebird. A pair was staying at the clubhouse grounds in 1933.

Lanius ludovicianus excubitorides. White-rumped Shrike. One was seen near the lake in 1933.

Dendroica aestiva aestiva. Eastern Yellow Warbler. A few were observed in Malta.

Geothlypis trichas occidentalis. Western Yellow-throat. Occurs commonly all along the southwest arm of the lake, inhabiting the bulrushes and the sedges and grasses near the shore.

Passer domesticus. English Sparrow. Common about the farms and towns.

Sturnella neglecta. Western Meadowlark. Common on the bottomlands along the Milk River. Rare near the lake. A singing male visited Woody Island for several minutes one day in 1935.

Xanthocephalus xanthocephalus. Yellow-headed Blackbird. Three or four hundred pairs nest among the rushes in the southwest arm of the lake. Occurs also in suitable sloughs and marshes throughout that locality. On June 12, 1935, we explored an acre of the bulrush growth in shallow water near the clubhouse site to determine the stage of nesting of this species. Twenty-seven nests were found in this area. Six nests were completed but contained no eggs; there were 2 nests with 1 egg each, 2 with 2 eggs, 5 with 3 eggs, 6 with 4 eggs; in 1 nest the eggs were hatching; 1 nest contained dead nestlings; and the remaining 4 nests contained 2 to 4 young birds about 1 to 4 days old.

Agelaius phoeniceus arctolegus. Giant Red-wing. Common every place on the lake that rushes grow. In 1935 there were four pairs on Long Island, about 150 birds on Woody Island, and about 250 birds along the north and west shores. This species occurs commonly in the surrounding country wherever suitable nesting sites are available.

Euphagus cyanocephalus. Brewer Blackbird. A small flock was seen on the south shore of the lake in 1935.

Calamospiza melanocorys. Lark Bunting. Common locally throughout the region.

Passerculus sandwichensis nevadensis. Nevada Savannah Sparrow. Breeds commonly along the shores of the lake and on Woody Island.

Pooecetes gramineus confinus. Western Vesper Sparrow. Occurs rarely near Malta.

Chondestes grammacus strigatus. Western Lark Sparrow. One was observed near the lake in 1933.

Melospiza melodia juddi. Dakota Song Sparrow. One bird, presumably of this subspecies, was seen daily in 1933 near the clubhouse.

Rhynchophanes mccownii. McCown Longspur. One was seen near the lake shore in 1935.

Calcarius ornatus. Chestnut-collared Longspur. The commonest land bird in the region, occurring everywhere on the untilled prairies and commonly about the farms. Three nests containing eggs were found along the northwest shore of the lake on June 11, 1935.

Fortine, Montana, March 25, 1936.