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THE STATUS OF MIGRATORY GAME BIRDS: 1940-41

Prepared in the Section of Distribution and Migration of Birds
Division of Wildlife Research

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INTRODUCTION

For many years most species of migratory game birds have been in a precarious situation. Drainage of millions of acres of marshland has deprived the waterfowl of large portions of their natural habitat, while improved roads and better means of transportation have made it easier for gunners to hunt the ducks, geese, snipe, woodcock, doves, and pigeons. Each fall they all have to run the gauntlet of a constantly increasing army of hunters equipped with modern weapons and more and more powerful ammunition. In addition, and throughout the year they are called upon to withstand unpreventable losses from diseases, climatic

disturbances, and predators. To maintain the waterfowl population, to say nothing of increasing it demands a tremendous replacement that Nature is expected to provide annually.

Nevertheless, in the history of our migratory waterfowl during the past seven years there is ample evidence to support the claim that an abundance of this resource is assured if we but manage it wisely.

To achieve that end we need accomplish only two objectives, namely, to restore and improve habitat conditions, and to control the kill.

Careful estimate shows that 120,000,000 acres of former waterfowl habitat have been taken from the birds by agriculture, manufacturing, and other industries. It has been figured, however, that about 7,500,000 acres of marshland, properly distributed throughout the flyways of the continental United States, will take care not only of the existing population of ducks and geese, but of a considerably increased population. More than three and one half million acres of good waterfowl habitat are now included in Federal wildlife refuges. The refuge system of the Mississippi Flyway is nearly complete but much remains to be done to provide adequate quarters, well-stocked with food, in the other three flyways.

In 1940 the sale of duck stamps increased to more than 1,200,000. That indicates a considerable army of hunters. Besides those gunning for ducks and geese other thousands of sportsmen took to the field in quest of Wilson's snipes, woodcocks, rails, mourning doves, white-winged doves, and band-tailed pigeons. Probably not all were successful, but the size of the hunting army makes it certain that the kill of migratory game is enormous. With shooting unrestricted and unregulated it would not take long for the horde of hunters to bag all of the game. Public shooting is an American tradition and American sportsmen have frequently demonstrated that they were willing to fight for it. But they must also be willing to regulate it.

Investigations of the status of migratory game birds have been continuous. Fish and Wildlife biologists in their search for facts, have again covered the length and breadth of the continent (See map, p. 5).

As in the last report on this subject (Wildlife Leaflet BS-165) the present summation treats all families of birds for which a shooting season is provided by Federal regulations.

PART 1: MIGRATORY WATERFOWL

Spring Migration

The previous report concluded with an account of the results obtained from the inventory of January 1940. Estimates based upon the resulting data, and on experience through the preceding year indicated an increase of about 15% in the waterfowl population since January 1939. From the

figures compiled, it was estimated that the continental population of ducks and geese was in the neighborhood of 65,000,000, or about half of the number that existed in 1900. This figure was, however, nearly two and one-half times the size of the estimate of 1935.

Reports covering the spring migration of 1940 were submitted by 401 observers favorably located throughout the country. In analyzing these returns, it appears that increasing difficulty is being experienced by observers in making reliable percentage comparison with the results of the previous year. All members of this corps have been carefully selected and probably are as well-qualified observers as can be found anywhere. Their tendency is properly on the conservative side.

Their observations supported the results of the January inventory in general, 86 reporting no change, 201 an increase, and 52 a decrease in waterfowl. At first glance this appears to indicate a most gratifying condition but actually the 59% of all observers who reported an increase in the spring flight of 1940 was 12% less than the proportion that reported an increase in 1939.

Analyzing the reports according to species of waterfowl, it was found that a large part of this reduced percentage of reports of increase was offset by increases in the number reporting no change. Nevertheless, the analysis did show a very definite tendency toward a lowering of the percentage of reports of increase and a raising of that for reports of decrease. In most cases this amounted to only one or two points and possibly was due to increased difficulties of observation and the commendable desire of the observers to be conservative.

When the returns were further broken down by flyways, it was found that the situation was the same, a general lowering of the percentage of reports of increase and a raising of the percentage of reports of decrease, the difference in almost every case being absorbed by variation in the no change classification. On the basis of this study the numerical strength of the birds was considered satisfactory.

Breeding Ground Surveys

Pacific Flyway

During the period from the latter part of May to the last of July, Luther J. Goldman, the biologist of the Pacific Flyway, continued his investigations on the waterfowl breeding grounds in British Columbia. It will be recalled that in 1939, because of the pressing need of a reconnaissance of the important Alaskan nesting grounds, Mr. Goldman was unable to make his customary survey in British Columbia. In consequence, the results of his 1940 operations are to be compared with those of 1938 reported in Wildlife Research and Management Leaflet BS-136.

Field investigations were begun on the many lakes and sloughs in the transition life zone of the Okanagan and Fraser River Valleys. Work in

this region dates back to 1934 and for the purpose of comparative studies in 1940, some of the best of the known waterfowl habitat was selected for observation. Later in the season, the work was extended northward into the higher Canadian zone of the Lillooet and Cariboo Districts from Clinton on the Cariboo Trail north to Williams Lake. No attempt was made to take a "census" of all areas visited but rather to make a practical comparison.

Due to the extreme mildness of the winter of 1939-40 and to an early spring, nesting was unusually early, an important factor which must be given proper weight in evaluation of the data obtained. It is possibly for this reason that Mr. Goldman found a somewhat smaller waterfowl population than he had recorded in previous reports.

Swan Lake, near Vernon, is one of the finest waterfowl nesting areas in the southern part of British Columbia. Mr. Goldman visited it on May 28, 1940 and makes a comparison with his visit of May 23, 1936, writing "It was obvious that the waterfowl in evidence on this lake were very definitely less....." Similar observations were recorded from other areas in the Okanagan and Fraser Valleys.

Further north in the Kamloops District a somewhat better situation was found, as in the lakes and sloughs of the Tranquille area, where "the duck population.....was fairly good" and many females with their broods were noted.

Moving on north to the Lillooet and Cariboo Districts, the investigator recorded that the waters in some of the sloughs were lower than he had ever seen them, although in this higher Canadian zone country the waterfowl habitat in general was in good condition. Nevertheless, the status of the waterfowl was proportionally much the same as in the lower country and Mr. Goldman concluded that the evidence he obtained could only indicate a decrease in the nesting population. By way of illustration he gives the details of his observations in 1936 on two large sloughs immediately south of Clinton, on which at that time he recorded 22 families of ducks of six species. In these same sloughs in 1940, all he could find was one family of mallards and two of goldeneyes.

A similar condition prevailed in all areas visited, north to, and including Williams Lake and westward to the lower Chilcotin River Valley. Conferences with local game officers brought out their complete agreement with his observations, namely, that gains in the waterfowl population on the British Columbia nesting grounds were not coming up to popular expectations.

In summing up his report Mr. Goldman comments as follows: "Within the Province are good waterfowl nesting grounds extending notably between the Coast Range and Rocky Mountains, from the International Boundary northward to Williams Lake, and thence westward up Chilcotin River Valley and across the Coast Range Divide to the Anahim Lake country on the headwaters of the Bella Coola River. From the Chilcotin Valley there is some good nesting ground north to Vanderhoof.

"The entire area may be visualized as a potential nesting ground although much is not highly productive. In the mountain valleys are multitudes of lakes of the mountain type. Here in silted-in creek outlets and bays, ducks and geese nest in scattered pairs. In the aggregate the potential possibilities of waterfowl production must be very large.

"The Province is a large producer of mallard and Barrow's goldeneye ducks. Other species are more scattering. Since the pintail, the bird that affords the backbone of the duck supply for the western United States and western Mexico prefers low, flat country as a nesting and wintering habitat, British Columbia, a region abounding in mountain lakes, cannot ever rank in first place as a producer of this species."

Returning to the United States in the latter part of July, about a month was spent by Mr. Goldman in an examination of nesting grounds in Oregon, Idaho, and California. The areas surveyed were chiefly Federal refuges, including Upper and Lower Klamath Lakes, Tule Lake, Malheur Lake, Minidoka Lake, Camas Creek, Bear River, Ruby Lake, and Sacramento. While his visit was too late to make accurate checks on the percentage of breeding birds, he records conditions at most points as being excellent, with ducks plentiful.

Central and Mississippi Flyways

Urgency of an investigation during the breeding season of the eastern race of the white-winged dove made it necessary for Dr. Geo. B. Saunders, the biologist of the Central Flyway, to remain in the Rio Grande Valley in Texas. Substituting for him in the Prairie Provinces of Canada, biologist Robert C. McClanahan of the Washington office, entered Saskatchewan at North Portal on May 30.

During the next two months he worked back and forth across this Province and Alberta, pushing steadily northward to Montreal Lake and Waterhen Lake in Saskatchewan, and to Cold Lake, Lac la Biche, Lesser Slave Lake, and Peace River in Alberta. In the latter part of August he crossed southern Manitoba to the south end of Lake Winnipeg. His travel included more than 8,000 miles by automobile and an undetermined distance by boat, wagon, and foot.

When the ducks arrived on the prairies in the spring of 1940, many sloughs that had contained water the previous year were dry; little precipitation had occurred in the fall of 1939, and in the spring of 1940 the snow melted slowly and the water seeped into the ground. As a result only a relatively small number of sloughs were available as nesting sites.

On June 1 northeast of Regina, Saskatchewan, in the Qu'Appelle Valley it was estimated that there were twenty dry sloughs to every one containing water. On June 7 between Old Wives and Mortlach, Saskatchewan, thirty-three dry sloughs were counted before one with water was seen.

On June 10 the moisture was estimated by the Searle Grain Company Limited as 77% of normal as compared with 104% at the same time in 1939. However, light and scattered showers began the first week in June, and on June 7-8 parts of Saskatchewan received the heaviest rain experienced during the last ten years.

Rains continued over the prairies throughout July. Moisture conditions in Manitoba improved from 81% of normal on April 22 to 103% on August 10; in Saskatchewan from 57% on May 27 to 83% on August 10; and in Alberta from 86% on June 24 to 95% on August 5.

It should be understood that evaporation from the sloughs was still rapid and many went dry, but in most of them water remained until early August. On August 20, a trip was made from Regina to Moose Jaw, Assiniboia, Pangman, and return to Regina, a section most of which had been covered the first week in June. An estimated 75% of all sloughs had disappeared by August 20, and fully 20% of all water remaining was in projects of the Prairie Farms Rehabilitation Administration. However, in the prairies as a whole, there was no indication of any serious loss of ducklings from lack of water; in fact, the evidence points to less than the average loss from this cause. Not only was there no important waterfowl mortality due to a shortage of water, but the entire 1940 nesting season was lacking in wholesale destruction of birds by any adverse factors. An outbreak of botulism was reported near Brooks, Alberta, and one was observed on the Nettley Marsh, Lake Winnipeg, Manitoba. These were, however, insignificant and rapidly decreased in intensity.

While the northern pike has been accused of wholesale destruction of ducklings, and unquestionably it does take them at times, it is interesting to examine some comparative figures obtained by Mr. McClanahan on two lakes, one containing pike, and the other free of this predator. On the former he counted 44 broods averaging 6.47 ducklings, while on the latter he recorded 84 broods, averaging 7.19 ducklings, a difference of only .72 ducklings. In discounting the effect of these fishes, Mr. McClanahan stated in his report "By far the most important factor limiting increase was a breeding stock insufficient to occupy the water present, this condition being more serious when it is remembered that water areas also are reduced in both size and number."

He concluded, however, that "The Prairie Provinces will send slightly more waterfowl to southern wintering grounds than in 1939. This increase appears to be greatest in the lesser scaup, blue-winged teal, shoveler, baldpate, and gadwall, while smaller increases should be noted in the mallard, pintail, canvasback, green-winged teal, and ruddy duck." an exception to a generally improved status was the redhead which was the only species for which he could not report an increase.

C. E. Gillham, biologist of the Mississippi Flyway, resumed his investigations of the great waterfowl breeding grounds of northern Canada.

In the belief that the 10,000 square miles of the Mackenzie Delta constitute a key region in which to mark trends of waterfowl abundance, and in order that more complete data might be obtained on the ecologic conditions affecting the birds, John J. Lynch, a biologist of the Section of Food Habits Research, was detailed to accompany Mr. Gillham.

It was decided to have the investigators on the ground before nesting actually took place. To make the trip by steamer on the Mackenzie River would necessitate a start later in the season and would require almost a month to make the 2,000 miles from Edmonton, Alberta, across Lake Athabaska, Great Slave Lake, and down the Mackenzie to the Eskimo village of Aklavik. The biologists accordingly started on May 12 and proceeded to Seattle where they boarded a steamer for Seward, Alaska. Continuing by rail and stage they arrived at Circle City where they loaded their equipment into a folding boat and, with an outboard motor, made the run down the Yukon River to Fort Yukon, where they entered the Porcupine River. This stream was navigated into Yukon Territory and, by way of the Old Crow River, the boat trip ended at the Indian village of Old Crow. Arrangements had been made with Canadian Airways to send a plane to pick up the party and equipment at this point. This arrived after a few days wait and on June 22 Aklavik was reached where, with the folding boat re-assembled and an Eskimo to act as interpreter, the trip was continued to the Arctic coast.

A permanent camp was established on an unnamed island in the Mackenzie Delta and as Mr. Gillham had camped there in previous seasons, Mr. Lynch promptly christened it "Gillham Island." In commenting on this, Mr. Gillham stated that he could see little honor in having named for him "a mud flat in the ever changing Mackenzie Delta." They proceeded, however, to name three adjacent islands, "Gabrielson," "Henderson," and "Bell" islands, in honor of the Director and Assistant Director of the Service, and the Chief of the Wildlife Research Division, while the chiefs of the Sections of Food Habits Research and Distribution and Migration of Birds found their names had been attached to "Cottam Lake" and "Lincoln Lake" on Gillham Island. On this group of islands 960 nests of snow geese and black brants were observed.

A late season prolonged the stay at this camp and made it necessary to ration food supplies, but the added time enabled Mr. Lynch to work out all of the plants that are utilized by waterfowl.

The entire nesting schedule in these high latitudes is remarkably uniform and within four or five days of the hatching of the first eggs, the young are all out and ready to accompany their parents away from the nesting grounds.

Following work in this section, the eastern portion of the Delta was explored to the north end of Richards Island.

Because of somewhat disrupted flying schedules it was necessary to leave Aklavik on August 2, the party arriving at Fort Chipewyan, Alberta,

the following day. Here, in the delta of the Athabaska River, two weeks were spent studying waterfowl conditions.

In reporting upon their observations in the Far North, Mr. Gillham states that while many factors have received the blame for reduction in the number of birds, his studies have convinced him that, as regards the nesting grounds in high latitudes "The greatest damage to waterfowl is done by the uncontrollable hazard of unfavorable weather, and the controllable factor of overshooting." The effects of climatic conditions were clearly demonstrated in the spring of 1940 when a severe freeze came on shortly after nesting started. Immediately the birds deserted the coastal breeding grounds and returned within the delta, where open water could be found. This delayed hatching two weeks and resulted in small broods of young. By way of illustration, Gillham Island in 1939 carried 300 nests of the snow goose, averaging 4.6 eggs per nest, while in 1940 this island had 402 nests that averaged only 3.75 eggs per nest.

A certain amount of predation from jaegers was recorded but Mr. Gillham points out that the local concentration of these birds was undoubtedly due to the large number of goose eggs scattered promiscuously over the ground as a result of the late spring storm. Arctic foxes were decidedly rare and no snowy owls were recorded. A brood of American rough-legged hawks were fed lemmings to the exclusion of everything else.

In 1939, 83 nests of the black brant were under observation, while in 1940, 108 were checked. As with the snow geese, the average number of eggs per nest was about one egg less in 1940 than in 1939.

In addition to the snow geese and black brant, Mr. Gillham found scaups (apparently greater), pintails, shovelers, baldpates, mallards, green-winged teals, and Canadian and white-fronted geese on this Arctic breeding ground. While natives and white trappers seemed to agree that more waterfowl were seen in 1940 than in 1939, it was Mr. Gillham's own opinion that a somewhat smaller number of ducks were noted.

In the delta of the Athabaska River, comparison of the status of ducks with that of former years was made difficult because of extremely low water. Ever since the beginning of the waterfowl restoration program there has been a steady increase in the number of birds using the 2,500 square miles included in this area which is easily one of the finest waterfowl breeding areas on the North American continent. In 1940 many lakes formerly visited were entirely dry or nearly so, and navigation, even in the smallest craft, was impossible. The low water did not, however, have any adverse effect on the ducks and geese and Mr. Gillham reported that it probably increased the available cover, though cover probably is never lacking in this region.

It was his own opinion supported by that of the natives, that there had again been an increase in the numbers of birds. At Mud Lake a great increase in canvasbacks was noted, while mallards, pintails, blue-winged

teals, and scaups were at least as abundant as in 1939. As was the case in the delta of the Mackenzie, the baldpate or American widgeon was the only species to show a decrease. Canada geese have nested in the Athabaska Delta only during recent years, and it was gratifying again to find a slight increase in their numbers.

The only seriously destructive factor noted in this region was several huge forest fires that ravished the country on almost all sides of the Athabaska Delta. While it is always difficult to state definitely the effects of such catastrophes on wildlife, there is not the slightest doubt that these fires destroyed large numbers of nests.

Atlantic Flyway

During the month of June, Harold S. Peters, biologist of the Atlantic Flyway, was engaged in a survey of waterfowl conditions on nesting grounds in Nova Scotia, New Brunswick, and Prince Edward Island. He was accompanied and assisted in his work at different times by Robie W. Tufts, Chief Federal Migratory Bird Officer for the Maritime Provinces, Col. H. H. Ritchie, Chief Game Warden of New Brunswick, and by other provincial game wardens, Dominion Forest officials, and officers of the Royal Canadian Mounted Police.

A check was made of all important waterfowl nesting areas in the three Provinces. Climatic and other conditions were found satisfactory and all indications were that ducks were continuing the steady increase that was recorded during the preceding three years when investigations were made in these same areas. Mr. Peters comments that several species are now present in such good numbers that it becomes increasingly difficult to report specifically upon them.

The pintail continues to be the most interesting species for the reason that it is evidently the duck that has most recently become a breeding bird in this region. It was first found nesting in the Maritime Provinces in 1938 when Mr. Peters found a nest in Westmorland County, N.B. Pintails have continued to increase slowly in that area and in 1940 it was believed that there might be 50 pairs. There is possibly another breeding area for this species in the Portobello Creek section of central New Brunswick.

The ring-necked duck, likewise of much interest, is also increasing steadily. In 1939 it was definitely proved to breed on Prince Edward Island as well as in New Brunswick, and in 1940 it was recorded as nesting in Nova Scotia.

Black ducks are, of course, the major nesting species in all of these Provinces and the evidence indicated that they too were continuing to increase in abundance. An interesting adaptation in their habits is shown in the frequency with which their nests are built in cavities and in crotches of trees. This trait is noted chiefly in the important Portobello Creek section and may be a protection adopted against regular spring floods.

Both the blue-winged teal and the green winged teal are nesting in New Brunswick and on Prince Edward Island, but only the first of these has been definitely recorded nesting in Nova Scotia. Wood ducks and goldeneyes also nest in fair numbers in each Province.

Satisfactory crops of young were recorded throughout this section of eastern Canada due to abundance of food, favorable climatic conditions, and general absence of destructive factors.

Later in the season (September 12 to October 9), at the invitation of Dr. Harrison F. Lewis, Chief Federal Migratory Bird Officer for Quebec and Ontario, Mr. Peters joined in a trip to James Bay for the purpose of obtaining information on the ducks and geese that concentrate in the coastal marshes preparatory to their southward migration.

Through the excellent cooperation of the Department of Indian Affairs, the investigators were enabled to spend three weeks cruising James Bay and to visit areas of high importance to waterfowl. This is the region where each fall great numbers of blue and snow geese concentrate before taking off on their long non-stop flight to the coastal marshes of Louisiana.

The boat trip started at the Hudson Bay Company port of Moose Factory and continued north to the Attawapiskat River where the party crossed to Akimiski Island, the largest island in James Bay (area about 900 square miles). Through the courtesy of the Royal Canadian Air Force they were furnished aerial photographs of this uninhabited island which showed its interior to be dotted with small lakes, some of which were successfully reached through the almost impenetrable timber and underbrush. Mr. Peters records that he was surprised at the good numbers of ducks and geese observed feeding in the marginal fringe of marshes.

Returning to the west side of the bay the party proceeded southward to the Albany River and then up this stream about 10 miles. Heading back to Moose Factory the boat was refueled and turned toward the eastern side of James Bay where inspections were made at Charlton Island and on the Stratton Islands. On this side, the most northern point reached was the Eastmain River where the travelers headed southward visiting Rupert House, Quebec (the oldest post of the Hudson's Bay Company), Rupert Bay, Boat-swain's Bay, the Hannah Bay, and Plover Bay Sanctuaries, and other points.

On this trip excellent opportunity was had to observe the operations of the Indians who each year repair to this region to shoot and cure their winter supply of geese. Mr. Peters writes: "There are supposed to be approximately 3,000 Indians living around James Bay. Since the development of firearms their hunting has been facilitated but it is doubtful if many more birds are killed than absolutely necessary for the livelihood of these natives. The Indian seems to realize that if he kills just for the fun of it and not from necessity that he may not have so many birds the following year. He is generally a good conservationist, as we found on this trip.....We found Indians who appeared to be expert shots, but we

later realized that the reason they get so many birds for the shells used is that they just do not take risky shots, but wait until the birds are within close range before firing. If more white hunters did this we certainly would reduce the crippling of waterfowl."

During this work on James Bay countless thousands of ducks and geese were found gathering to feed in the immense expanse of coastal marshes. In addition to the blue, snow, and Canada geese, pintails were abundant with black ducks and green-winged teal in good numbers. Good proportions of young were present in the flocks of blue and snow geese. As a direct result of this expedition, the Canadian Government has set aside (early in 1941) two-thirds of Akimiski Island as the largest bird sanctuary in all of Canada, consisting of 600 square miles of land with many more miles of fringing shallow water. The Government of Quebec also has reserved Boat-swain Bay on the eastern side of James Bay, as a waterfowl sanctuary much needed to protect geese and ducks from ever increasing hunting pressure as airplanes and boats bring in more whites to hunt in this wilderness area. With the previously established Harmah Bay Sanctuary and Twin Islands Game Sanctuary, the refuge system of James Bay gives adequate protection to the important wildlife resources of the region.

Nesting Conditions in the United States

The situation in the United States during the breeding season of 1940 was generally favorable if we may judge from results on the Federal migratory waterfowl refuges.

From a report compiled by Robert H. Smith of the Section of Habitat Improvement, Division of Wildlife Refuges, the following account of the season is substantially quoted:

"Due to a peculiar set of conditions the surface water runoff in the Great Plains area was not as great as the previous year, although the precipitation had been comparable. This was due primarily to the dry unfrozen state of the soil at the time of the first snow fall and to the nature of the precipitation, i.e., there were no periods of concentrated rainfall resulting in flash floods. These conditions, while not particularly favorable to the maintenance of marsh areas, were very favorable to good vegetative growth, particularly on areas surrounding marshes and lakes, encouraging cover for waterfowl nests and a good growth of food plants. Marshes on refuges in the main did not suffer from lack of water due to the management of impoundments. Water levels, however, diminished often to the detriment of waterfowl on refuges not having a reserve water supply and on those areas not under administration. Despite these conditions the over-all picture of nesting showed some improvement over that of 1939.

"The Souris areas had less runoff from Canada during 1940 than in 1939 but with careful control of the available water, satisfactory conditions were maintained. The manager of the Upper Souris Refuge, North Dakota, reported the finest growth of native vegetation on that area since its establishment as a refuge, due to the heaviest rainfall experienced in the

region in the past eight years. Waterfowl nested in greater numbers than in 1939 and an estimated 65,000 young ducks were produced.

"Food and cover also were improved on the Lower Souris Refuge, in North Dakota. The gain was larger than in any previous year under refuge administration. The rainfall on this area was greater than that for the spring of 1939. No increase was reported in the number of young ducks produced, however, as 250,000 were estimated for this year, the same as in 1939. Canada geese nested for the first time in the history of the refuge.

"The heaviest rainfall in recent years greatly improved food and cover also on the Des Lacs Refuge in North Dakota. The spreading of bulrushes, smartweeds, and other desirable marsh and aquatic plants from their original areas is very encouraging. Due to a late spring and ice lingering in the marshes the area was not visited by the usual number of water birds. The number of birds returning to nest in this refuge was undoubtedly affected also by the severe outbreak of botulism on the area the previous summer and fall at which time a great number of birds were lost.

"At Arrowwood Refuge, North Dakota, the amount of rain falling was nearly 50% less than the average for the period 1892 to 1940 according to United States Weather Bureau reports. However, some water was present in the Mud Lake, Stoney Brook, and McKenzie Creek Units. Nesting birds were restricted to those areas and made no increase over their numbers for the previous three years. At the Medicine Lake Refuge, and Bowdoin Refuge, in Montana, there was considerable rainfall but the runoff in this region was not good. Impoundments, however, supplied sufficient water to the refuges to promote satisfactory cover and food conditions and there was greater utilization of the areas by waterfowl. The manager of the Medicine Lake area considered that the vegetation was in the best condition yet noted there. A substantial increase in nesting waterfowl was the response to the lush hay meadows of this refuge, and increases in redhead, scaup, and ruddy ducks were noted on the Bowdoin Refuge.

"The manager of the Sand Lake Refuge, South Dakota, reported that water conditions were poor during the nesting period with levels about the same as in the preceding year. Nesting waterfowl in general showed an increase; the gain was especially noticeable among redheads, black ducks, and mallards. Canada geese which nested for the first time in this area in 1939, again bred in 1940.

"On the Lacreek Refuge, South Dakota, drought conditions prevailed during the spring and summer, the flow of water into the area diminishing as the season progressed. In spite of this the water areas were in fine condition and this was reflected in an increase in nesting use of the area. The manager estimated that 20,000 to 25,000 young ducks were produced in 1940. This is approximately four times the hatch of 1938.

"Drought impaired the Valentine Lakes Refuge, Nebraska, also and as it has prevailed for some time, most of the larger lakes on the refuge

were either dry or nearly so. The effect upon nesting use of the area was most detrimental and a decided decrease in breeding birds was noted.

"Crescent Lake Refuge, Nebraska, received approximately 1/3 the amount of rainfall normal to that region, and the lakes on the area were lower than they had been for several years. A decrease in both nesting and migrating birds was noted.

"The extensive planting program on the Seney Refuge, in Michigan, is now bearing fruit, and with the sufficient rainfall of the present season, desirable vegetation reached a stage of considerable abundance. The luxuriant plant life attracted a larger number of birds to the area than in any previous year within the knowledge of the refuge personnel.

"Precipitation was above normal on the Tamarac Lake Refuge, in Minnesota, and consequently both upland and aquatic vegetation were the heaviest yet noted by the refuge manager; an estimated 1,250 pairs of ducks nested in 1940—a slight increase over the number estimated as nesting in 1939.

"The planting program of the Service on the Mud Lake Refuge, in Minnesota, has been most successful and an abundance of food and cover awaited the spring migrants. Increases in nesting by all species except the mallard were noted. This species showed a reduction of approximately 25% in nesting use of the refuge.

"Water conditions on the Camas Refuge, in Idaho, were comparable to those of 1939, with little precipitation in the area. Due to restricted grazing and to water impoundment, moisture conditions were satisfactory and nesting cover and food plants were available to the nesting birds earlier in the season than in previous years. Nesting by waterfowl was not observed to have increased over that of 1939, however, and mallards, pintails, and canvasbacks showed a decrease with gadwalls, baldpates, shovelers and ruddy ducks increasing their nesting use of the area. Canada geese bred on the refuge for the first time.

"The planting program on the Minidoka Refuge, Idaho, in 1938 and 1939, involving the introduction of marginal plants, has resulted in greatly improved cover. Nesting activities were scattered over a wider area and greater utilization of the refuge was noted due to improved vegetative conditions. There was an increase in waterfowl using the area for nesting and migration with the exception of the ruddy, bufflehead, canvasback, and redhead.

"On numerous small easement refuges scattered through the breeding grounds of the Great Plains area in the States of North Dakota, South Dakota, and Montana water conditions were favorable and food and cover improved."

Fall Migration

With generally favorable reports from a large part of the northern breeding grounds, a definite increase in the numerical strength of the fall flocks was confidently expected.

From the Rocky Mountains eastward to the coast the early part of the migration season was characterized by a long period of mild weather. Nevertheless, and although "bluebird weather" predominated, hunters in the northern plains states were successful in bringing to bag large numbers of birds.

Then came the Armistice Day blizzard, a howling storm of polar origin, that sent temperatures to subnormal levels and, in the upper Mississippi Valley and adjoining regions, caused the death of many hunters and others caught far from shelter. Among those who had narrow escapes, was the biologist of the Mississippi Flyway who, back from his work in the Arctic, was watching the southward flight from a small island in the Mississippi River. In saving himself, he probably also is to be credited with saving the life of a hunter from a nearby island.

The ducks and geese that had been "lazing around" on northern lakes and marshes, departed in mass for more southern latitudes. Many observers reported great flocks flying south ahead of the storm. It appears that many birds were actually driven south of average stations for that time of the year for, as the weather moderated, there was evidence of some northward movement.

Reports on the fall migration to the number of 397 were received from the corps of volunteer observers.

Under the heading of "waterfowl in general," an analysis of the data substantiated pre-season expectations. Making comparison with reports on the fall flight of 1939, the gross figures showed that 74 observers could see no change, 175 noted an increase, and 87 believed there had been a decrease in waterfowl. On a percentage basis, the no-change classification of returns rose from 14% in 1939 to 22% in 1940. The percentage of reports of increase dropped from 55 in 1939 to 52 in 1940, and of those of decrease from 31 in 1939 to 26 in 1940.

Among the wildfowl species, the best showing on the basis of those reports was made by the mallard, green-winged teal, pintail, and blue goose. For the redhead and the canvasback there was an apparent slight decrease, but the percentages were too small to be conclusive. Slight and unexplained decreases also were reported for the black duck on the Atlantic coast and for the Canada goose in the Mississippi Valley.

An analysis of the reports by flyways showed a reversal of a situation that has prevailed for several years when the important gains have been

made in the Atlantic and Mississippi Flyways. This year a more improved status of the ducks and geese of the Central and Pacific Flyways is clearly indicated in the following comparative table:

Table 1

Percentage comparison by flyways of reports on the status of migratory waterfowl: Fall migrations of 1939 and 1940

Flyway	No change		Increase		Decrease	
	1939	1940	1939	1940	1939	1940
Atlantic	42	47	47	38	11	15
Mississippi	43	45	39	31	18	24
Central	33	44	31	38	36	18
Pacific	41	46	43	42	16	12

Wintering Ground Surveys

Studies in Mexico

Luther J. Goldman, biologist of the Pacific Flyway, continued his winter investigations of waterfowl conditions in Mexico. He crossed the border at El Paso, Texas, and worked southward through the states of Chihuahua, Nuevo Leon, and Hidalgo to the Valley of Mexico. From this point he traveled southwest to inspect Lakes Patzcuaro and Cuitzeo, in the state of Michoacan, and Lake Chapala in the states of Michoacan and Jalisco.

Waters were abnormally low throughout the country visited and some of the most important to migratory waterfowl were entirely dry.

At the usually excellent winter resort of Lake Patzcuaro, the water level appeared to be about normal but no large number of ducks were seen. Lake Cuitzeo, formerly a winter gathering point for thousands of birds, was entirely dry, as were also most of the sloughs along the Rio Grande or Rio Cointzio in the Morelia Valley. This was due chiefly to the construction of a large water storage dam on the Rio Grande a short distance above the city of Morelia. Here, there has been impounded a body of water which extends several miles up the river valley to a point near its marshy headwaters. The marshes were in good condition but the newly constructed reservoir, completely lacking in aquatic plant foods, and heavily charged with silt, was not attractive to either migrant or local waterfowl.

A distinct shortage of birds was noted in the vicinity of Guadalajara, and also on Lake Chapala. This is the largest lake in Mexico, being approximately 50 miles in length. Its shoreline had noticeably receded.

Between the Lerma and Zamorano Rivers, a short distance east of the town of La Barca, there is a reservoir about a mile in length. It has long been a favorite wintering place for ducks and geese. Upon visiting it this season, Mr. Goldman found that a deep trench had been excavated by which the water had been drained into a canal. The lake was nearly empty but a few ducks and about 25 lesser snow geese were still frequenting the diminishing waters.

The Presa San Antonio de Huarache, situated in the lower Lerma River Valley and near the east end of Lake Chapala is celebrated as a resting place for large numbers of geese where ordinarily, they may be regularly observed in their daily flight to feeding grounds to the southward. On the occasion of the present examination the waterfowl population was limited to 25 white-fronted geese and a few ducks.

The Laguna de Santiagiullo, in a valley of the Sierra Madre mountains north of the city of Durango, is another large lake, being more than 30 miles in length. The stability of this lake has been improved and its water supply assured by the construction of a strong retaining dam across the outlet. Waterfowl winter here in large numbers and in addition to the wide acreage of flat grassy valley lands, excellent for geese and cranes, there is a considerable area under cultivation where grain is grown by the members of an industrious colony of Mennonites, originally from the United States and Canada.

In summing up his work, Mr. Goldman reported that the waterfowl population of the Mexican tableland as a whole, showed a marked decrease. In certain sections, notably in western Chihuahua and central Durango, there were exceptions to this general situation, but in no section was a large number of ducks or geese reported. A probable explanation for at least a part of this shortage in Mexico is found in the increased number known to have wintered in California.

On the east coast, Dr. G. B. Saunders, biologist of the Central Flyway, operating from his temporary headquarters at Brownsville, Texas, made repeated trips to Mexican waterfowl areas. An aerial survey was made on January 2 and 3 south over the waters of the Laguna Madre on the coast of Tamaulipas, and along the western side of the Laguna Tamiahua. Weather conditions nullified a plan to scout the lagoons of the Tampico District, but the survey was carried south to Tuxtla, Chiapas, which is the southernmost of the Mexican states. While the trip was only one way, whereas round trips were made in 1939 and 1940, the comparative figures (Table 2) are of unusual interest and significance.

Table 2

Comparison of Wintering Ducks
Coastal District of Tamaulipas, 1939-41

Year	: Total Ducks	: Pintail	: Baldpate	: Redhead	: Scaup	: Unidentified
1939	: 453,400	: 146,600	: 20,650	: 168,600	: 123,700	: 36,500
1940	: 669,300	: 252,300	: 550	: 120,900	: 244,700	: 37,100
1941	: 138,300	: 16,650	: 220	: 107,600	: 12,200	: 1,700

During 1939 and 1940 a severe drought prevailed along the coast so that most of the ducks were concentrated in the lagoons. This past season, however, was characterized by heavy rains that refilled hundreds of small freshwater ponds (charcos) near the coast. These, of course, were attractive to the shoal-water species. The scaups and redheads, however, continued to concentrate on Laguna Madre.

In that portion of the Laguna Madre bordering Cameron County, Texas, Dr. Saunders reported that his observations indicated a wintering population of not more than 50% of the number present in 1940. An aerial reconnaissance of that region on February 7 revealed only 2,000 Redheads. The status of this duck continues to be one for concern. A feeling exists among some biologists working in western areas, that there is a heavy kill of these birds in the early part of the season.

Dr. Saunders concluded his report with the statement that so far as the Brownsville district is concerned, he had observed less than half as many migrant and wintering ducks as were there in the winter of 1939-40. It is probable that a considerable part of this apparent shortage may be accounted for by the abundant rains and milder weather along the northern and central Texas coast which caused a large number of the birds to winter there instead of proceeding farther south.

Studies in the United States

The winter investigations of the biologists of the Mississippi and Atlantic Flyways were again made in the lower Mississippi Valley and adjoining portions of the Gulf coast, and in south Atlantic coastal areas.

Operating from temporary headquarters in Louisiana, C. E. Gillham inspected all important waterfowl concentration areas west to central Texas. The heavy rains that fell over so much of the southern part of the country had done much damage to rice fields. Thousands of acres were flooded and the abundant food thus made available to the waterfowl resulted in heavier concentrations than had been known for several years.

A special problem having developed regarding the blue goose, most of Mr. Gillham's time was devoted to an intensive study of this species.

Almost the entire population of these birds, which now is between 700,000 and 800,000 is concentrated in winter on the coast of Louisiana, chiefly between the deltas of the Mississippi and the Sabine Rivers. Since this area also is the habitat of the muskrat, a fur-bearer of first importance in that state, and since both feed extensively upon the so-called "three square" grasses or bulrushes (Scirpus americanus and S. olneyi), it was feared that too rapid increase in the goose population might have a serious effect upon the fur crop.

Mr. Gillham reports: "There is no major conflict between muskrats and blue geese. Of all the rat land on the Louisiana coast, probably a little less than 10% of it is used by geese." It is, of course, true that the geese do frequent some of the muskrat territory, as the tidal marshes on Marsh Island, the Rockefeller, Rainey and other refuges, and at times compete with the muskrats for food. On the other hand, in a marsh with an over-population of rats, these animals will eat up the food and so drive out the geese. In other words, the competition works both ways; it is moreover a local problem and should excite no more concern than any other case of bird damage. They are local and should be locally adjusted. The area assigned to an individual trapper may suffer severely but so far as the crop of furs from Louisiana is concerned, Mr. Gillham concluded that the geese did "not make a 'drop in the bucket' of difference."

From available evidence it seems possible that the geese (blue and snow) are about as numerous now on the Louisiana coast as they were forty years ago. Because of the great areas that are closed to shooting, and the more or less inaccessibility of the region as a whole, the total annual bag by sportsmen is always small. Probably the heaviest drain on the blue geese is the take by Indians in the James Bay region of Canada who depend upon them for a part of their winter food supply.

Upon his return from the James Bay region, H. S. Peters, operating from his regular headquarters at Charleston, S. C., kept under surveillance the coastal regions from Delaware south to the Florida Keys. A licensed airplane pilot himself, he hired small planes and made many flights over strategic areas. In addition, cooperation of the Coast Guard enabled him to cover more extensive sections of the region.

During the early part of the fall flight, ducks came south along the coast in goodly numbers and there was a noticeable increase in the numbers of geese that reached the more southerly points. Before the end of the year it was apparent, however, that the south Atlantic coast was not supporting the waterfowl population that it had the previous year. This was later verified by the figures of the January inventory and explained, at least in part, by the increased number of birds that spent the winter in areas north of Chesapeake Bay.

Among the features of outstanding interest was the absence of the great concentration of ducks that attracted so much attention in the Cape Sable, Florida area during the winter of 1939-40. In contrast there was

increasing use of some of the refuges on impoundments of the Tennessee Valley Authority. For example, during the fall flight an estimated 12,000 ducks and geese came to the Wheeler Wildlife Refuge in northern Alabama. More than 6,000 of these stayed throughout the winter, feeding in the marginal purple-top grass (Panicum agrostoides), wild millet, cut grass, and smartweeds. Most of these birds were shoal-water ducks, as mallards, black ducks, pintails, etc., but an interesting element of the concentration was a flock of about 600 hooded mergansers. The manager estimated that at least 20,000 ducks and geese made extensive use of the refuge during the spring migration of 1941.

January Inventory

The seventh consecutive January inventory of migratory waterfowl was the first to be conducted under a reorganization whereby the nine regions of previous years was reduced to five. This resulted in realignment of states and reassignment of personnel. As is so frequently the case in January, climatic conditions were adverse in many sections causing postponements and delays in completing some of the aerial operations.

As usual, splendid cooperation was available from the Army Air Corps, the Naval Air Service, the Coast Guard, a commercial tire and rubber company, the Soil Conservation Service, Forest Service, National Park Service, State Game and Fish, forestry, and police departments, colleges, universities, and others.

While it is questionable that coverage of the waterfowl areas in these inventories will ever be complete, it is nevertheless believed that the work is so carefully planned and organized that a better than average sampling is the result. Many areas of exceptional importance are inspected both from the ground and from the air. Although by no means infallible, the method employed for making reasonably accurate estimates has had the benefit of tests by aerial photography and it has been of proved value, particularly when used each year by the same observer on the same area.

The hunting regulations in effect during the fall represented a considerable liberalization and it was known that despite many "bluebird days" in all three zones, the total kill had been heavy. Investigations also had shown that there was a great reduction in the number of birds that had passed into Mexico to winter, which meant that nearly all of the continental population was in the United States at the time the inventory was made. With these facts in mind the results were awaited with some anxiety.

When the data were fully assembled and analyzed it was calculated that there were about 70,000,000 ducks and geese on the North American continent. This represented a gain of about 5,000,000 over the estimate resulting from the 1940 inventory. It was the smallest increase since the inauguration of the restoration program. While there is cause for much satisfaction that there was an increase, nevertheless, and despite the increased size of the breeding stock, it is apparent that the harvest of 1940 was perilously close to the entire crop.

When broken down by species and compared with the figures obtained in January, 1940, there were no impressive changes. As was indicated at the time of the fall migration, the green-winged teal and the blue goose made the best showing, whereas the fall indications of substantial increases in mallards and pintails were almost completely dissipated due, probably, to a greater kill resulting from natural preference of hunters for these fine ducks. The two species of scaups (considered together), the widgeon, and the gadwall also showed some increase. The status of the canvasback remained about as in 1940 while that of the redhead continued to be enigmatical.

A comparison by flyways with the results of the 1940 inventory gave reason for both satisfaction and concern. The United States portion of the Pacific Flyway showed the greatest gain. While gratifying in view of its poor showing in previous years, at least part of the apparent increase is offset by the decreases reported for the wintering grounds of western Mexico. A somewhat comparable situation existed in the Central Flyway where an apparent gain had to be balanced against a pronounced shortage in the waters and coastal marshes of eastern Mexico.

As usual, the population of the Mississippi Flyway exceeded the totals for the other three. A distinct gain was recorded in ducks but a loss in the numbers of geese. This last was due chiefly to reduced numbers of Canada geese and was partially offset by important gains in the numerical strength of the blue geese.

Were the situation in the Atlantic Flyway to be appraised solely on the basis of data from areas south of Chesapeake Bay, it would be necessary to record a heavy loss. Coverage was excellent over most important sections, and figures from some of these showed decreases up to 25% or more. Even the lowly coot showed a heavy decrease. It should be recalled, however, that the Atlantic seaboard had little real winter weather so it was not surprising that reports of important increases were received from areas to the north. Considered as a whole, there apparently was very little change in the status of the birds of this flyway.

PART 2: OTHER MIGRATORY GAME BIRDS

Woodcock

For fully 40 years the status of the woodcock has been a subject of controversy. As was to be expected, some protests were received because of the regulatory action taken last year in halving the shooting season and apparently, in a few areas, fair to good fall flights of woodcock were observed. Nevertheless, an analysis of information obtained from widely separated sections showed that the restriction was fully warranted and in some quarters the flight was so poor that criticism was directed toward the Service because the season had not been closed entirely.

The situation was clearly revealed by study of a large number of reports received from virtually all portions of the range of the woodcock

in the United States and in which simple comparison of status during the fall flight was made by use of the terms "no change," "increase," and "decrease."

When analyzed on a percentage basis, a remarkable consistency was found in the percentage of observers who could detect no change in the number seen in 1940 and in 1939. The figures were 54 and 55 percent respectively. In the reports of increase and decrease, however, there was great variance. In 1939, 35% reported an increase, while in 1940 only 14% could detect any improvement, and whereas only 10% reported decrease in 1939, in 1940 this figure rose to 32%. On the basis of such reports only one conclusion could be drawn, namely, that the numerical strength of the species was not satisfactory.

In order that a more thorough check-up might be made, while the birds were on the important Louisiana wintering grounds, Russell T. Norris, a collaborator of the Service, was appointed assistant to Mississippi Flyway Biologist C. E. Gillham, and sent to that state for an intensive investigation that covered the period December 1940 to February 1941. Mr. Norris had received his training on woodcock under Dr. Logan J. Bennett, leader of the Pennsylvania Wildlife Research Unit.

On the grounds in Louisiana he was indefatigable in his search for information and spent night after night traveling widely and in many little-known sections, as he studied the birds. Operations were started in the parishes of Tangipahoa and St. Tammany where much time was devoted to working over the small strips of cypress and tupelo that occur in every low area throughout these pine lands. No concentration of birds could be found. The investigator then moved to Plaquemines where in the region along the bottomlands of the Mississippi and Atchafalaya Rivers there is a great deal of almost impenetrable swamp land. The drainage of the Atchafalaya and surrounding country constitutes one of the largest swamps in the southern states. Much of it is covered with several feet of water and it is honey-combed with small rivers and bayous. There are some canebrakes along the river and along the edges of the big swamps and these are used by woodcock as daytime coverts. In many sections, dense stands of Palmetto cover the forest floor and make excellent cover for the birds.

After exhaustive work in country of this kind, Mr. Norris reported that while he was finding woodcock every night, he could not record any heavy concentration. In commenting on Norris's final report, Mr. Gillham stated that while he had not been entirely satisfied that the severe storm of January 1940, and following heavy kill by hunters had been responsible for great decrease in the numbers of woodcock and had believed that a nearly normal population of the birds would be present during the winter of 1940-41, Mr. Norris had proved that this was not the case and he added his own comment that "Woodcock were without doubt much scarcer this winter than a year ago."

As this report is written (June 1941) reports are available from breeding grounds in Pennsylvania, Wisconsin, Maine, Nova Scotia, New Brunswick, Prince Edward Island, Quebec, and eastern Ontario. In Ontario and Quebec there appears to be a population of woodcock that may approximate that of a couple of years ago but from almost all other points the evidence indicates a continued decrease.

Wilson's Snipe

As has been stated in previous reports, the Wilson's snipe or "jack-snipe" has an extensive breeding range that extends northward to Alaska, Mackenzie, Labrador, and Newfoundland. Because of this it has been felt that the birds were not in any particular danger.

A careful study of data obtained in recent years and compared with that of a decade or two ago shows, however, that we are confronted with another case of a species that is steadily slipping downward toward the danger point.

A comparison of the reports of increase and decrease of the spring migrations of 1939, 1940, and 1941, and of the fall migrations of 1939 and 1940, graphically illustrates what is taking place (Table 3).

Table 3

Percentage comparison of reports on the status of Wilson's snipe

Classification	Spring migration			Fall migration		
	1939	1940	1941	1939	1940	
Increase	27	17	15	33	17	
Decrease	11	18	21	16	26	

Service investigators who have, for several years visited the northern nesting grounds, have reported that while they always find some of these birds, the numbers are never large and are startlingly small by comparison with those reported by other naturalists who visited the same regions a decade or two ago.

Rails and Coots

Reports on the coot at the times of both the spring and fall migrations of 1940, indicated very little change in its numerical status. In both analyses of both of these series of returns there was some evidence of decrease. Tabulation of the figures from the 1941 January inventory, however, produced a total that amounted to only 60% of that for January, 1930. No explanation is available as the reports from the breeding grounds, particularly from some of the refuges in the northern part of the United States show that this species is still too abundant in view of its aggressive disposition toward other birds.

Rails have suffered from destruction of their habitat through drainage for mosquito control and other purposes. A few reports on the sora indicate that its numbers have declined, probably due as much to the freezing of southern marshes as to excessive shooting. At several points on the south Atlantic coast the hunting of "marsh hens" (king and clapper rails) is a popular sport. Hunters going out for these birds last year reported a marked scarcity and requests for an immediate closed season were made from some of the states. The clapper rail, however, does not come under Federal supervision. Fortunately, these birds produce large sets of eggs so that if given aid, they are likely to recover rapidly.

Mourning Doves

In the last report on this subject (Wildlife Leaflet BS-165) comment was made on the losses suffered by the mourning dove in the southeastern states during the storm of January, 1940. The full significance of the blow was not fully appreciated at that time although it became more and more apparent with the progress of the 1940 breeding season and report after report came in telling of the scarcity of doves. While regulatory action was taken to reduce the kill during the hunting season, it now appears that more drastic measures would have been fully justified.

So serious did the situation appear in some regions, that instructions were awaiting C. E. Gillham, biologist of the Mississippi Flyway, when he returned to his headquarters from work in the Canadian Arctic, to proceed immediately to Tennessee to investigate the status of the dove in that state. Similar instructions were given to H. S. Peters, the biologist of the Atlantic Flyway, to cover dove areas in the southern states of that flyway.

In his report Mr. Gillham makes the significant statement that when, on September 5 he left his headquarters at Edwardsville, in southern Illinois, he knew of two nests in that town containing fledgling doves, although the shooting season in that state had been open for five days. From the survey made he found that "except where concentrated by grain fields, doves are scarce." He concluded that a completely closed season might be necessary east of the Mississippi River.

The experience of sportsmen, game management agents, and biologists was the same throughout most of the southeastern region and there was almost complete unanimity as to the general scarcity of these birds. The only exception to this condition was an unusual concentration reported early in the season from southern Florida. In that section good sport was available for a few days and then the flocks dispersed.

A conference with representatives of the game departments of most of the southeastern states on the status of the mourning dove was held at Atlanta, Georgia, on April 15, 1941, and the testimony there developed was almost unanimously in support of the findings already stated. In all of those states the dove is an important game bird and it was obvious that the

administrators felt that some action must be taken for its restoration. Its numerical status was in fact considered to be similar to that of the migratory waterfowl at the end of the shooting season of 1934.

The situation in the western states is not so serious but even in that region the evidence indicates that there has been a steady and progressive decline in the numerical strength of the mourning dove. The apparent reason is excessive shooting through long seasons.

White-winged Dove

Research on the white-winged dove was continued both in Arizona and Texas, and was extended also into Mexico. The objective is information on which a program of sound management may be based. Reports available at this writing very definitely raise the question as to whether an open season on the western race should be permitted pending the formulation of a management plan.

Due to the restricted range of this species in the United States, reports from volunteer observers are not numerous but in those received during the fall of 1940, there was unanimity of opinion that the whitewing had decreased since the fall of 1939.

Biologist Johnson A. Neff, of the Food Habits Section, again studying this species in the field, devoted the season of 1940 to investigations in Arizona, in the course of which he had valuable assistance from officers of the Division of Game Management of the Fish and Wildlife Service, and of the State Game and Fish Department. As a part of his program many wardens, sportsmen, and others were interviewed and requested to state their opinion as to the abundance of the whitewings compared with that of 5 to 10 years ago. No statement was accepted unless the conversation showed that the individual concerned spent considerable time out of doors, had a fair and practical viewpoint on the game situation, and appeared to appreciate the principles of conservation. Every observer so qualified agreed that the species had steadily decreased, estimated percentages for the 5 to 10 year period running from 50% to 90%.

The investigation started in 1940 in the lower Rio Grande Valley of Texas, by Dr. G. B. Saunders, biologist of the Central Flyway, has been continued. Dr. Saunders has again been relieved of summer duty on the Canadian waterfowl breeding grounds in order that the whitewing investigation may be pressed to an early conclusion. With the cooperation of the State Game, Fish, and Oyster Commission, and assignment of personnel from a Federal Aid (Pittman-Robertson) project, the work has been materially expanded.

The range of these birds in Texas is not extensive and during the nesting season they are confined chiefly to the ebony woodlands of the Rio Grande Valley. No other habitat seems to be acceptable at that season and as these thickets continue to be cleared, the progressive concentration of

the breeding birds increases. This, of course, is likely to give a false impression of abundance. It also makes the birds more vulnerable to hunting.

The heavy shooting to which whitewings are subjected is well illustrated by the following quotation from the Quarterly Progress Report for August, September, and October, 1939, Division of Wildlife Restoration, Pittman-Robertson Project 1-R, Texas Game, Fish, and Oyster Commission:

"In the lower valley 1,160 hunters were checked, having a total of 11,069 birds or an average of 9.54 birds per hunter. Approximately 36% of the hunters were visitors and 64% local hunters. After 9 shooting days a check of 3 miles of roadway typical of the 25 miles of roadway across the width of the San Manuel flight zone revealed 1,305 empty shotgun shell boxes. This indicates there were some 10,875 empty shell boxes along the 25 miles of roadway representing 271,875 shells fired at doves in that area in 9 days. Based on field checks that 4.5 shells were fired for each whitewing bagged, and that an average of 5 birds were lost for each 15 bagged, the following estimate of kill in the San Manuel area is made:

Date	Shooting days	Shots fired	Birds bagged	Birds killed and lost	Total kill
September	9	271,875	60,417	20,140	80,557"

The statement has been frequently made that most birds of this species are found in Mexico and this has been considered probable. To ascertain the facts, L. J. Goldman, biologist of the Pacific Flyway, was diverted from his waterfowl investigations in Mexico and directed to investigate the status of whitewings in Chihuahua while on his return to headquarters this past spring. His examination failed to disclose any large nesting population in that state. Because of the urgency of this problem, he has returned to western Mexico and at this writing is working in the torrid, semi-desert areas in the states of Sonora and Sinaloa. Reports thus far received indicate a scattering population of whitewings but no large colonies such as are known in Arizona and Texas.

There is, or at least there was, a fairly good supply of these birds in Baja California according to reports from Maj. E. A. Goldman who last worked in that state in 1936.

To supplement his activities in Texas, Dr. Saunders has recently made reconnaissance trips into Tamaulipas and Nuevo Leon. In the large area scouted, whitewings were found only in certain habitats of dense woodland. Nowhere was the species present in numbers. In some localities a few birds were apparently occupying breeding territories but in no instance were there more than one or two singing males to the acre and in most cases there was only one male to several acres. In commenting on his findings, Dr. Saunders cautions against too pessimistic conclusions as these observations were made at an altitude of 1,500 feet whereas the colonies in

the Rio Grande Valley are practically at sea level. Subsequent investigations in the lowlands may result in the discovery of large colonies in the dense woodlands of the deltas of the San Fernando, Soto la Marina, Cachimbas and other rivers between the Rio Grande and Tampico. Also it is possible that there are many thousands of whitewings nesting in the ebony woodlands of the interior of Tamaulipas. If so, they are, however, so widely and sparsely distributed over the immense territory that no nesting concentrations have yet been located.

Band-tailed Pigeon

The band-tailed pigeon is found only in the West, chiefly near the Pacific coast. It is nearly or quite as large as the common pigeon of the barnyard, and at times is destructive to farm crops such as prunes, cherries, nuts, etc.

Unfortunately, and possibly because of the fact that the bird is occasionally guilty of depredations, sportsmanship seems to be wanting in some sections when an open season is allowed. Reports have been received to the effect that shooting pigeons becomes an obsession with some hunters who go out day after day and frequently kill birds they make no attempt to retrieve. It also appears that there is a constantly increasing number of pigeon hunters and it may, therefore, be pointed out that serious injury to the species may be done before protective adjustments can be made. Sportsmen interested in this bird should be moderate in their pursuit of the bandtails to avoid the necessity of regulatory action.

CONCLUSION

Investigations on the status of migratory waterfowl indicate a condition that may be considered satisfactory although the recorded increase is the smallest since inauguration of the restoration program. This is believed due to the 1940 liberalization of shooting regulations and the constantly increasing number of hunters.

The status of the woodcock, while showing some local improvement, continues to be unsatisfactory.

Wilson's snipe has been decreasing steadily for many years.

While coots continue to be too abundant for their own good or for that of associated waterfowl, rails have suffered not only from shooting but also from adverse climatic conditions.

The mourning dove is probably at its lowest point in history, particularly in the region east of the Mississippi River. The numerical reduction is due not only to heavy overshooting but also to severe winter losses caused by unusual storms.

The western race of the white-winged dove also is at a record low and a great reduction has been noted in the status of the eastern subspecies.

While it is probable that many of these birds breed in Mexico, investigations thus far made have failed to disclose concentrations comparable to those of Arizona and Texas.

While the band-tailed pigeon appears to be holding its own, some fears have been expressed that unsportsmanlike shooting practices may result in serious damage to this species.

Apparently there must be renewed emphasis upon conservation measures.