one of these rodents in the act of plundering a nest. Whenever a ground squirrel approached a nest, the longspurs drove him away by swooping at him repeatedly, sometimes actually striking his back. Many nests were of course plowed under by the breaking plows of pioneer farmers. I have seen one or two go over with the turning sod, when it was too late to prevent it.

Of the night marauders very little was ascertained. Skunks and weasels played their part. Barbed wire fences, a source of danger to the horned larks, seemed not to menace the longspurs, probably because the latter are not given to rapid flights at low elevations.

Protracted rainstorms and late spring snows were by far the most destructive of all the mishaps which befell the young. Four days after a very destructive rainstorm I found one nest of McCown Longspur containing two living nestlings; but they were not many days old and probably had been in the egg shells during the downpour.

There was a deep fall of snow on May 25 of the second year, that ceased early on the 26th. I had previously marked a nest in which the bird was known to have begun incubating her four eggs on the morning of the 19th. The snow covered everything so completely that I could not find my marker; but in the afternoon of the 26th the marker-rock showed through the melting snow, and I uncovered the nest. The eggs had been in cold storage all of one day and part of another; but an hour or two after the nest was uncovered the female was sitting on the eggs. She continued to incubate until the 8th of June. That day she was absent morning and evening, though in the nest at noon. Before my return early the next morning the eggs and nest had been mysteriously destroyed. The bird had continued incubation about nine days beyond the normal period. Perhaps it was her first experience with eggs under the snow.

Excelsior, Minnesota, January 15, 1937.

MIGRATORY BEHAVIOR OF SOME GLAUCOUS-WINGED GULLS IN THE STRAIT OF GEORGIA, BRITISH COLUMBIA

WITH MAP

By G. D. SPROT

The recoveries of banded Glaucous-winged Gulls (*Larus glaucescens*) from the vicinity of the Strait of Georgia, British Columbia, that are dealt with in this article number 68, of which 12 are of birds more than 4 years old. Twenty-seven are from 665 birds banded by Mr. Theed Pearse between 1922 and 1931 on Mittlenatch Island; 4 are from 225 birds banded by Mr. Kenneth Alexander between 1926 and 1931 on Gull Island, Howe Sound; and 37 are from 590 banded by myself, with occasional help, between 1929 and 1934 on Bare and Yellow islands, Haro Straits.

Immature Mortality.—There is the same heavy mortality among Glaucous-winged Gulls up to three years of age as has been reported among the young of Herring Gulls and some other species of sea birds on the Atlantic coast of North America and in Europe. For 56 birds under 4 years of age, the casualty list is as follows:

Under 10 months	31
10 months and under 2 years	12
2 years and under 3 years	12
3 years and under 4 years	1

Winter and Spring Movements of Adults.—The 7 winter recoveries of birds over 4 years of age, banded as nestlings, are too few to permit any definite statement in regard to the migratory behavior of adults. About all that can be said is that there are indications of a dispersal (see dots marked A on map), to no great distance, in September.

My observations along stretches of the sea shore have led me to believe that some birds of this species, both adult and immature, take possession in winter of a certain area of beach or bay. They permit other gulls to come and go, yet resent any effort on the part of visiting individuals to feed in the vicinity or to make use of the owners' favorite perches, such as rock pinnacles, launch masts, and boathouse roofs. Colored bands would be useful in deciding whether my interpretation of the observed antagonistic behavior of individuals seen in the same spots throughout a great part of the winter is correct, and if so, whether these same birds return to occupy the same territory each winter.

An adult, banded as an adult by Theed Pearse in winter, is the only recovery of this class reported after one year following the date of banding. This bird returned the following winter to near where it was trapped and banded.

By nature, the Glaucous-winged Gull is not as sociable as are some other species of gulls, so that local concentrations of birds of this species can almost always be associated with abundance of food. Concentrations in winter are usually confined to a few rivers, bays or harbors, and do not interfere with the normal life of numbers of solitary individuals to be found in the many small sheltered bays elsewhere in this region; nor do they appear to interfere with the minor territorial rights of some individual birds in the large harbors where concentrations are most in evidence. In these latter places, as boat owners have informed me, and as I have observed for myself, a single bird of any age will occasionally attach itself to some small craft at anchor and guard its possession against all comers. Should the boat put to sea for several months, on its return to harbor it will often instantly be boarded by the same bird. I have already recorded an instance of this (Canadian Field Nat., vol. 47, 1933, p. 76), and I know of several others.

Summer and Autumn Movements of Adults.—Two of the four adults banded as nestlings that were recovered in the breeding season (ages 4, 5, and 7 years) were found over 100 miles, and a third over 80 miles, from their birthplaces, while the fourth bird was picked up about 15 miles north of where it was hatched.

From observations on the breeding grounds, it is generally assumed that adults of this species return annually to the same island to breed, but there is nothing at present to show that adults banded as nestlings return to their birthplaces for that purpose. From the reports of banders in this area, no adults banded as nestlings have ever been observed in the vicinity of their birthplaces in the breeding season. Negative information in this instance, however, is probably worth little when we take into consideration the heavy mortality among birds of less than breeding age and the small number of summer recoveries of adults or of banded adults that it would be possible to observe even under the most favorable circumstances. Furthermore it is not known whether the few summer adult recoveries were of actually breeding birds.

The habit of odd pairs of Glaucous-winged Gulls, of nesting in isolated spots, in some cases far from others of their own species, is not uncommon, and the exceptionally high nesting population of late years in this region may be a reason for this. It remains possible, then, that adults, banded as nestlings, do not often return to their birthplaces to breed, although prior to the protection, and consequent exceptional abundance of the species, they may at least have attempted to do so. Until more of the species are banded, the behavior of adults must remain somewhat obscure.

Winter and Spring Movements of Immatures.—The movements of immatures are more clearly indicated. The behavior of a young gull of about eight months' age, found in a starving condition near my home, and which later visited my garden daily, indicates a probable local dispersal of immatures about the end of April with a return to winter quarters about the middle of November. This bird made its first appearance in late February, 1933; it left on May 28 and returned November 20 of the same year; it left for the second time April 29, 1934, but returned again November 3 of the same year;

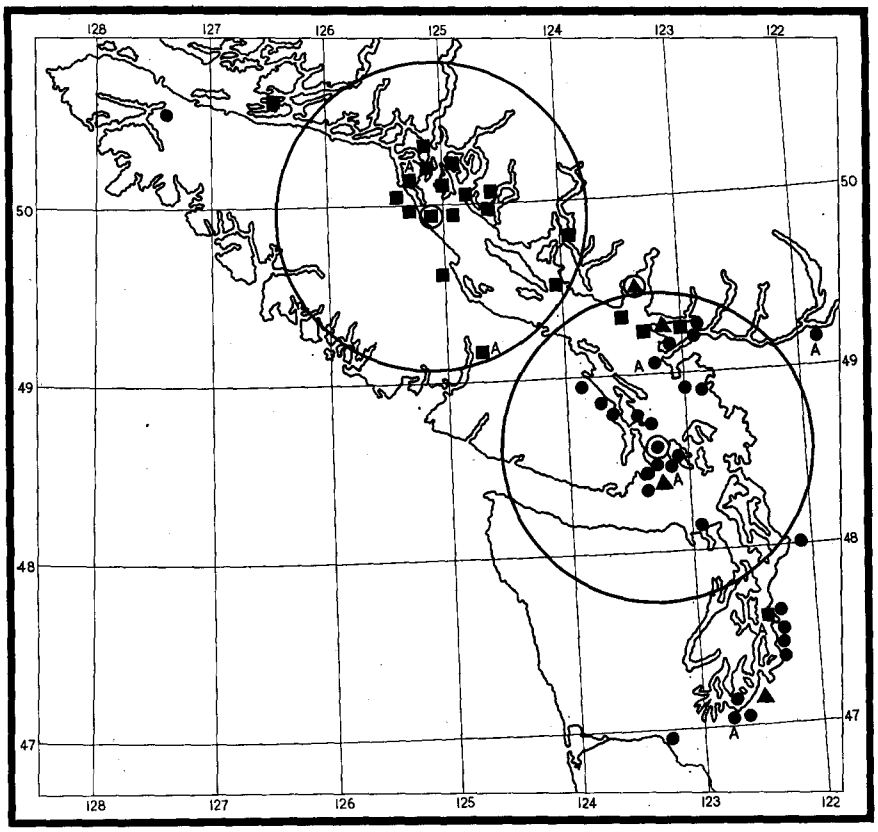

Fig. 66. Winter distribution of Glaucous-winged Gulls banded at nesting colonies in the Strait of Georgia, British Columbia. Squares represent birds from Mittlenatch Island; triangles, Gull Island; dots, Bare and Yellow islands. Locations of breeding colonies shown by symbols in small circles. The letter "A" denotes adult recoveries. Large circles show 60-mile radius.

it left for the third time April 17, 1935, and returned when 3 years and 5 months old, November 17, 1935. Unfortunately I was away from home for some time following its last return and the bird was not heard from again.

The map (fig. 66) shows clearly that the majority of birds up to 4 years of age remain in winter within a radius of about 60 miles of their individual birthplaces. Of 51 winter recoveries, 33 birds (30 immatures—21 under 1 year, and 9 over 1 yet under 3 years—plus 3 adults) were taken inside the 60-mile circle surrounding their birthplaces. Of 8 birds caught and released, discarding one the locality of which was given as "near Vancouver Island," 7 were taken well within 70 miles, in fact all except one well within 60 miles, of their individual birthplaces. The ages of these birds ranged from 5 months to 4 years and 8 months. Six, or 7 including the one previously discarded, were taken in the months of February, May, November, and December on board local coastal boats. These latter records suggest that a bird accompanying a ship in these waters rarely follows it beyond a certain point within the limits of a somewhat restricted range.

Overlapping of the winter (and summer) range of birds of Gull, and of Bare and Yellow islands is to be expected, but it will be noted that there is very little overlapping of these southern areas by the Mittlenatch birds. Mittlenatch Island lies about 90 miles

northwest of Gull and 120 miles northwest of Bare and Yellow islands, while the distance between Gull and the last two mentioned islands is about 60 miles.

The positions of the dots on the map representing recoveries suggest that shelter is one, if not the chief, requirement of this species in winter. Unfortunately there has been no banding of Glaucous-winged Gulls on the exposed west coasts of British Columbia and Washington. It might be found that there is a more extensive dispersal, or migration southward of these birds of the outer coast, perhaps to the sheltered Gulf of California.

Summer and Autumn Movements of Immatures.—The distance to which young gulls become dispersed can not be great, for of 10 immatures recovered in summer, 6 of various ages were found within 70 miles of their own birthplaces. Those birds exceeding the normal limit, or deviating from the general direction of the dispersal are listed below, with age, the locality where recovered, and the direction and distance from the nesting ground.

Mittlenatch Island		
6 months . .	Simoon Sound, B. C.	N 90 miles
Bare and Yellow islands		
4 months . .	Port Alice, V. I., B. C.	N 220 miles
1 year and 1 month	Linnton, Oregon	S 210 miles
2 years . . .	Port Hardy, V. I., B. C.	N 240 miles

Although 3 of these 4 birds went north instead of south, there is nothing here to indicate a northerly drift prior to the regular southerly migration, as is occasionally undertaken by odd individuals of some other species of birds. On the contrary, one is more justified in assuming that birds recovered from distant points in their second and third years actually reached those points in their first autumn, and remained in the vicinity of those points until recovered.

Eaton (Bird-Banding, vol. 5, 1934, p. 82) found in the Herring Gull on the Atlantic coast that the longest flights were invariably performed by immatures in their first autumn or winter. Although less spectacular, these flights by immature Glaucous-winged Gulls beyond the limits of the normal range of the colonies are similar in character to those of the Herring Gull.

In addition to the 4 immature birds listed above, there are 17 others from these several colonies that have made flights of from 90 to 190 miles, yet have remained within the limits of the range of these colonies as a whole, which is roughly from Chatham Point, Vancouver Island, lat. 50° 20′, to the southern end of Puget Sound. Of these 17 birds, the majority were recovered in Puget Sound; 5 were adults when recovered, of which 3 were taken in the breeding season and one in winter, over 100 miles from their birthplaces; 12 were immature, of which 8 were recovered in their first winter, 3 in their second winter and one in its third year. If we add to these the 4 birds previously listed as exceeding the normal limits of dispersal, we get 10 out of this group of 16 immatures performing in their first autumn or winter what would appear to be unusually long journeys for birds of these colonies. Two out of the remaining 6 slightly older immature birds still were far from home by midsummer of their first and second years. In fact these two birds reached points farthest north and farthest south of any of the birds recovered from these colonies to date.

It seems, then, reasonable enough to assume that birds from these colonies recovered in their second or third years, or even perhaps as adults, beyond the normal range indicated by the majority of recoveries, actually reached these distant points in their first autumn and remained in the vicinity of those points until recovered. We do know that the bird already referred to as attaching itself to a small craft in a harbor (Esquimalt, Vancouver Island) remained in the vicinity of the harbor for at least 12 months following

its arrival there in its first autumn, although in this instance the bird was but 20 to 30 miles from its birthplace.

Beyond this strange one-way dispersal of some individuals in their first autumn which appears to lack any definite directional trend, all that is indicated is a purely local dispersal of immatures in April, and of adults from their breeding grounds in September.

Why certain immature individuals depart from the normal behavior of their fellows in their first autumn is not clear. Eaton (*loc. cit.*), writing of Herring Gulls, suggests that "the pronounced tendency of immature birds to spend their first winter . . . [on the warm waters of the Gulf of Mexico] is a vestigial trait lost in adult birds," and this seems reasonable enough, although I am of the opinion that with these colonies of Glaucous-winged Gulls, the trait is lost when the bird reaches the terminus of its first autumn flight. Thus the bird becomes a permanent resident in the vicinity of that terminus. It is perhaps unwise as yet to attach any great significance to the movements of birds in their second or third years; for without the aid of colored bands, banding results alone are of little value in determining the movements of a bird between the date of its banding and that of its recovery. Continued efforts therefore seem necessary to band, not only nestlings, but more particularly adults, especially along the outer coast. Winter banding should give as good, if not better, results than the banding of nestlings, for birds of all ages would be taken, and there would be the chance of getting some "returns." Colored bands in this instance should give almost immediate results.

Cobble Hill, British Columbia, August 10, 1937.

A RECORD OF TWENTY-FIVE YEARS OF WILDFOWL SHOOTING ON THE SUISUN MARSH, CALIFORNIA

WITH THREE ILLUSTRATIONS

By EMERSON A. STONER

In the library of the California Academy of Sciences in San Francisco, there is a two-volume record of the birds killed at the Ibis Gun Club, Suisun Marshes, Solano County, California. Mr. M. Hall McAllister, who was for twenty-three years a member of the Ibis Club, and who donated the record above referred to to the Academy on May 1, 1921, suggested that, being a resident of the territory adjacent to the marsh, I would be interested in studying this record. Accordingly, I secured permission from Dr. F. M. MacFarland, President of the Academy, to withdraw these volumes from the library in order to make an analysis of their content. In view of the fact that the entries are carefully and seemingly accurately made, it is my opinion that they contain much that is of value for published record. The period covered is twenty-five hunting seasons, from September 15, 1882, to January 27, 1907.

Early History.—The Suisun Marshes had long been famous as wintering and feeding grounds for great quantities of wildfowl. As early as 1853, Heermann (Pac. Railroad Rept., vol. 10, part 6, no. 2, 1859, p. 67) referred to the great flocks of geese in the Suisun Valley where "as far as the eye could reach the sky was filled with flock after flock." Previous to the organization of the first shooting club, in 1879, the Suisun Marshes were held by market hunters, who shot over them for a period of about twenty years. They found a market in San Francisco and vicinity for the great quantities of birds which they were able to kill, transporting them ordinarily by boat to the metropolitan area some