

BIRD MIGRATION IN THE MACKENZIE VALLEY.

BY WELLS W. COOKE.

THE Mackenzie Valley in northern Canada presents a broad surface with a gentle slope rising only eight hundred feet in the fifteen hundred miles from the mouth of the Mackenzie to the head of steamboat navigation on the Athabaska at Fort McMurray. The height of land between it and the valley of the Saskatchewan to the south is but slightly over two thousand feet in elevation and presents an almost uniform flat surface with not even a ridge of hills to mark the change of slope from the north to the south.

The migratory birds of the Mackenzie Valley have the choice of three principal routes as they return from their winter homes. They can come from the south, through Alberta, western Saskatchewan, western Montana and Utah, where Great Salt Lake, the winter home of thousands of birds, lies directly south of Great Slave Lake. A second route passes up the Pacific coast of the United States to Washington and thence up the valley of the Columbia to the headwaters of the Athabaska or up the valley of the Fraser to the watershed of the Peace River. The third route is up the Mississippi River to southern or central Minnesota; thence to the valley of the Red River of the North and up the Assiniboine and Saskatchewan Rivers to the sources of the Athabaska in Alberta, or across Saskatchewan at right angles to the valleys of these rivers directly to Lake Athabaska.

The first of these routes lies across a wilderness of mountains with many divides 8,000 to 10,000 feet high, and in the southern half of the United States through a district largely a desert. It would therefore seem probable that comparatively few species would employ this route and indeed not a single species is known certainly to migrate from Arizona or Utah to the Mackenzie Valley, and from a study of the data it seems that hardly half a dozen species can possibly travel this route.

There is a modification of this route which ought apparently to form a convenient and fairly direct course from Mexico or Texas to the Mackenzie Valley. This is along the foothills of the Rocky

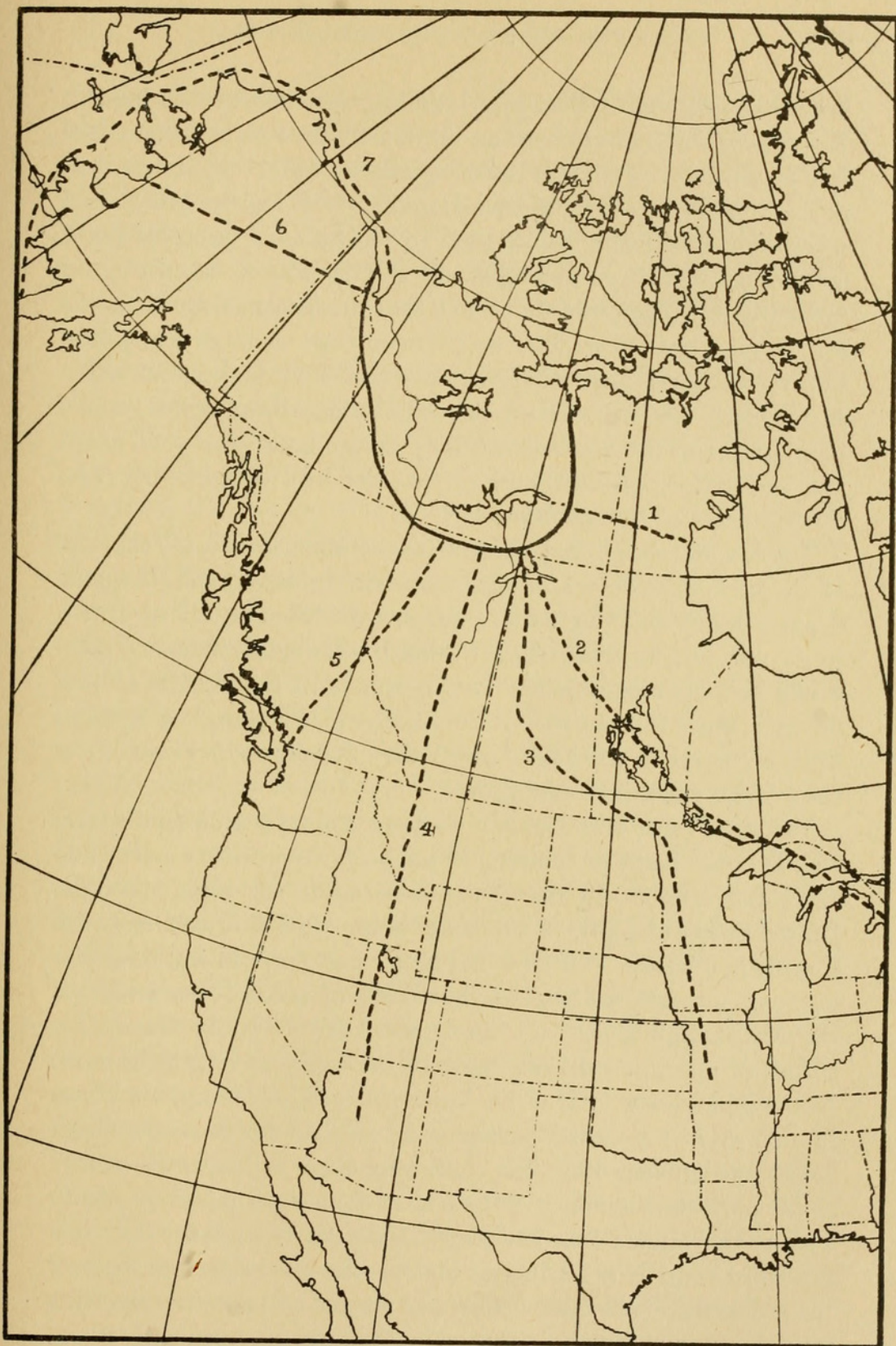


Fig. 1. Principal Migration Routes to the Mackenzie Valley.

Mountains through Colorado, Wyoming and Central Montana to Western Saskatchewan, over an almost uniform plain 5,000–6,000 feet in altitude. Probably some species do follow this route, but no positive proof of this has been found, and it is known that several species for which this would seem to be the most desirable path, actually go many hundred miles out of their way to travel a route farther east. The birds that come into the Rocky Mountains are for the most part birds that are to breed there or to go north only into the southern parts of Canada; very few go even as far north as northern Alberta. Hence in considering the probable routes of migration to the Mackenzie Valley we can ignore the usual north and south direction and consider that the bird comes either from the southeast or the southwest.

The second route from California to the Mackenzie is the shortest of the three. No deserts or high mountains intervene and the whole country seems well adapted to support a wealth of bird life. If this route was largely used, then the birds of the Mackenzie Valley would be most closely related to the species of the western United States. Since the contrary is the fact, very few migratory western birds occurring in the Mackenzie Valley, it follows that only a few species can use this second route.

The third route is the longest and seems quite roundabout to one who is in the habit of thinking of migration as always a north and south movement. In the spring most migratory birds enter the United States along the north shore of the Gulf of Mexico between Florida and Texas. Of these the larger part enter in a still smaller path, six hundred miles wide, the middle of which is the mouth of the Mississippi River. At the border of the United States, the course of migration divides: part of the birds travel northeast to New England, the Gulf of St. Lawrence, and to Labrador's inhospitable shores; a second part migrate straight north to the Great Lakes and Hudson Bay; the third part move at first north nearly to the northern boundary of the United States and then turn northwest to the valley of the Mackenzie and even to Alaska. This last described route is the principal highway for the migratory birds of the Mackenzie Valley and is the most natural and notable migration route on the whole globe. Stretching for more than three thousand miles from the mouth of the Mississippi to the mouth of the Macken-

zie, not a mountain chain or even a ridge of hills interferes with the uniform movements of the birds. The highest elevation is less than two thousand feet, and so gradual are the slopes that, with a few short portages the whole distance can be traversed in a canoe. The whole region is well watered and well timbered, affording ideal conditions for the support of the multitudes of birds which swarm along this route as they do nowhere else on the North American Continent.

If the mouth of the Mackenzie River was due north of Louisiana and in the middle of the continent, bird migration by this route would be a uniform progression from south to north in the spring and the reverse in the fall. On the contrary the valley of the Mackenzie lies nearly two thousand miles nearer to the Pacific than to the Atlantic Ocean, and the warm Japan current produces conditions that interfere with the uniformity of migration and bring about variations, probably not equalled anywhere else in the world, both in the direction and the speed of migration.

That this diagonal northwest and southeast route is traversed by birds from the Mississippi Valley is shown positively in the case of thirty-three species, for these breed in the Mackenzie Valley and pass in migration across the United States and yet occur in the United States as far west only as the eastern edge of the plains. Hence it is certain that these thirty-three species have a northward migration in the Mississippi Valley from eastern Kansas to western Minnesota and thence a northwestward route to Lake Athabaska.

This is shown on the accompanying map of the distribution of the Rose-breasted Grosbeak (*Zamelodia ludoviciana*).

It is evident that the westernmost breeding birds, those that summer in the Mackenzie Valley must have reached their breeding grounds from the southeast by way of the Mississippi Valley.

The cause of the choice of this route is easily found in the conditions of moisture and woodland. All these species are either lovers of damp forests or of moist meadows and marshy lakes. Their favorite surroundings extend in the United States not farther west than eastern Kansas and western Minnesota. On arriving at Manitoba, the dry plains that have been a barrier on their left for the last thousand miles, become better watered and interspersed with groves and soon these groves unite to form almost continuous

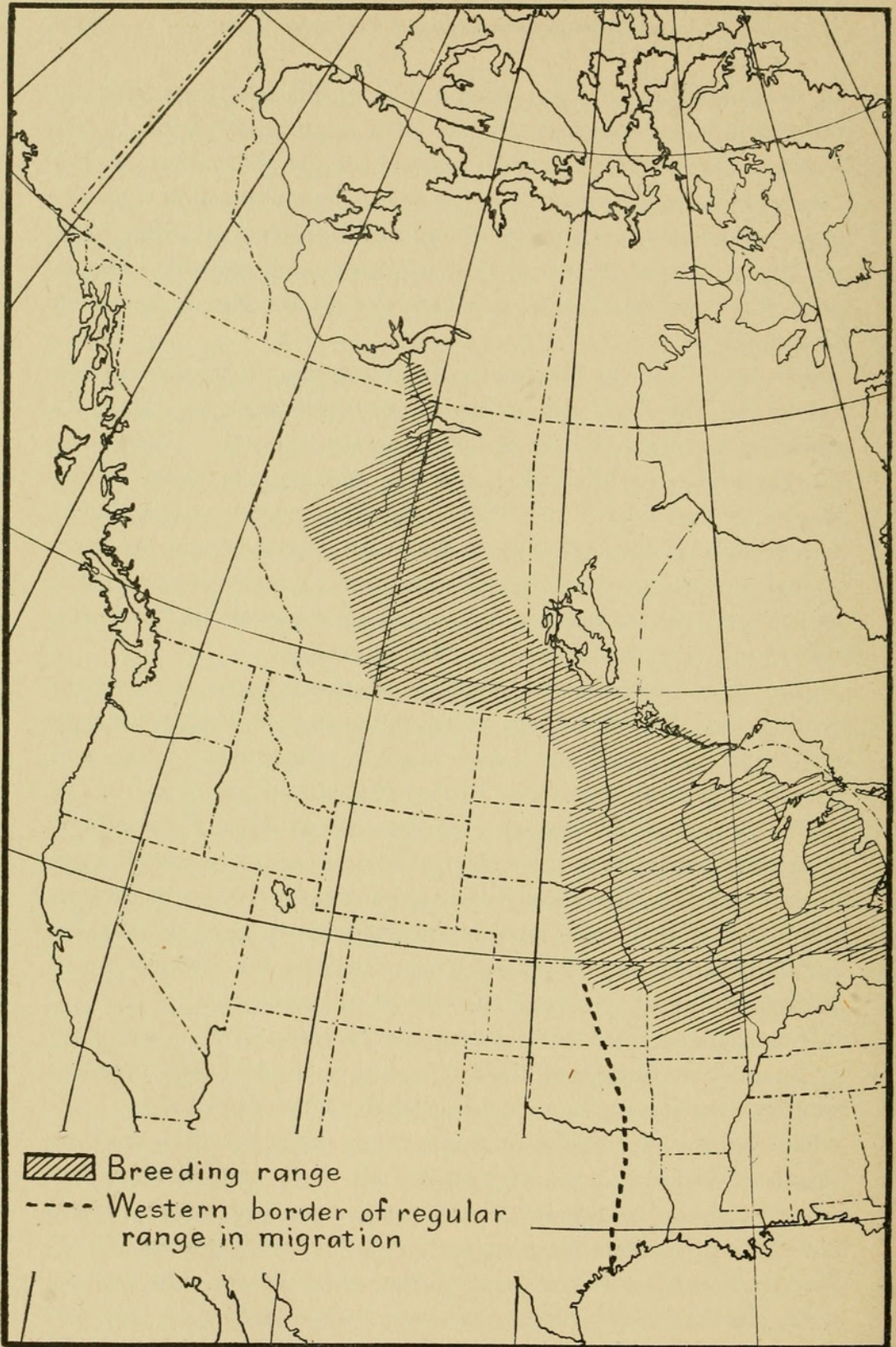


Fig. 2. Rose-breasted Grosbeak (*Zamelodia ludoviciana*).

well-watered forest — a genuine birds' paradise. Attracted by the early season and abundant food supply, the birds turn northward and settle for the summer in the valley of the Mackenzie.

The thirty-three species that traverse this route are *Sterna hirundo*, *Micropalama himantopus*, *Limosa hæmastica*, *Numenius borealis*, *Buteo b. borealis*, *Sphyrapicus v. varius*, *Chordeiles v. virginianus*, *Sayornis phoebe*, *Empidonax flaviventris*, *Empidonax traillii alnorum*, *Otocoris alpestris hoyti*, *Cyanocitta c. cristata*, *Euphagus carolinus*, *Carpodacus p. purpureus*, *Calcarius l. lapponicus*, *Passerherbulus n. nelsoni*, *Zonotrichia albicollis*, *Spizella m. monticola*, *Melospiza m. melodia*, *Melospiza georgiana*, *Passerella i. iliaca*, *Zamelodia ludoviciana*, *Vireosylva philadelphica*, *Lanivireo s. solitarius*, *Dendroica tigrina*, *Dendroica magnolia*, *Dendroica castanea*, *Dendroica virens*, *Dendroica p. palmarum*, *Seiurus aurocapillus*, *Wilsonia p. pusilla*, *Hylocichla a. alicia*, and *Hylocichla guttata pallasii*.

A modification of this route from the southeast in a still more pronounced form is followed by the White-winged Scoter (*Oidemia deglandi*), which winters off the coast from Massachusetts to New Jersey and in its spring migration follows the valley of the Connecticut, crosses to the Hudson, thence to the Great Lakes and northward to its summer home in the Mackenzie Valley. It is probable that this same general route is followed by many thousands of the ducks of other species which winter so abundantly along the coast from Chesapeake Bay to Florida, but it is also true that a comparatively small part of these traverse this route as far as Great Slave Lake, since the larger part stop for the summer in the "ducks' paradise" of Manitoba and the Saskatchewan.

Still another route, practically east and west instead of north and south is followed by the three species of Jaeger, which winter on the Atlantic, appear in Hudson Bay with the earliest open water and then cross nearly due west to the breeding grounds about Great Slave Lake, and to the northward.

There are eighteen species that also probably use the main route from the southeast but the proof of this use is not so simple, because these species not only occur in the central Mississippi Valley, but also range regularly across the plains to the foothills of the Rocky Mountains. These eighteen species are: *Grus americana*, *Pisobia*

fuscicollis, *Ereunetes pusillus*, *Bartramia longicauda*, *Falco s. sparverius*, *Colaptes auratus luteus*, *Tyrannus tyrannus*, *Empidonax minimus*, *Agelaius phœniceus fortis*, *Quiscalus quiscula æneus*, *Vireosylva olivacea*, *Mniotilta varia*, *Vermivora c. celata*, *Vermivora peregrina*, *Dendroica striata*, *Setophaga ruticilla*, *Hylocichla ustulata swainsoni*, and *Planesticus m. migratorius*.

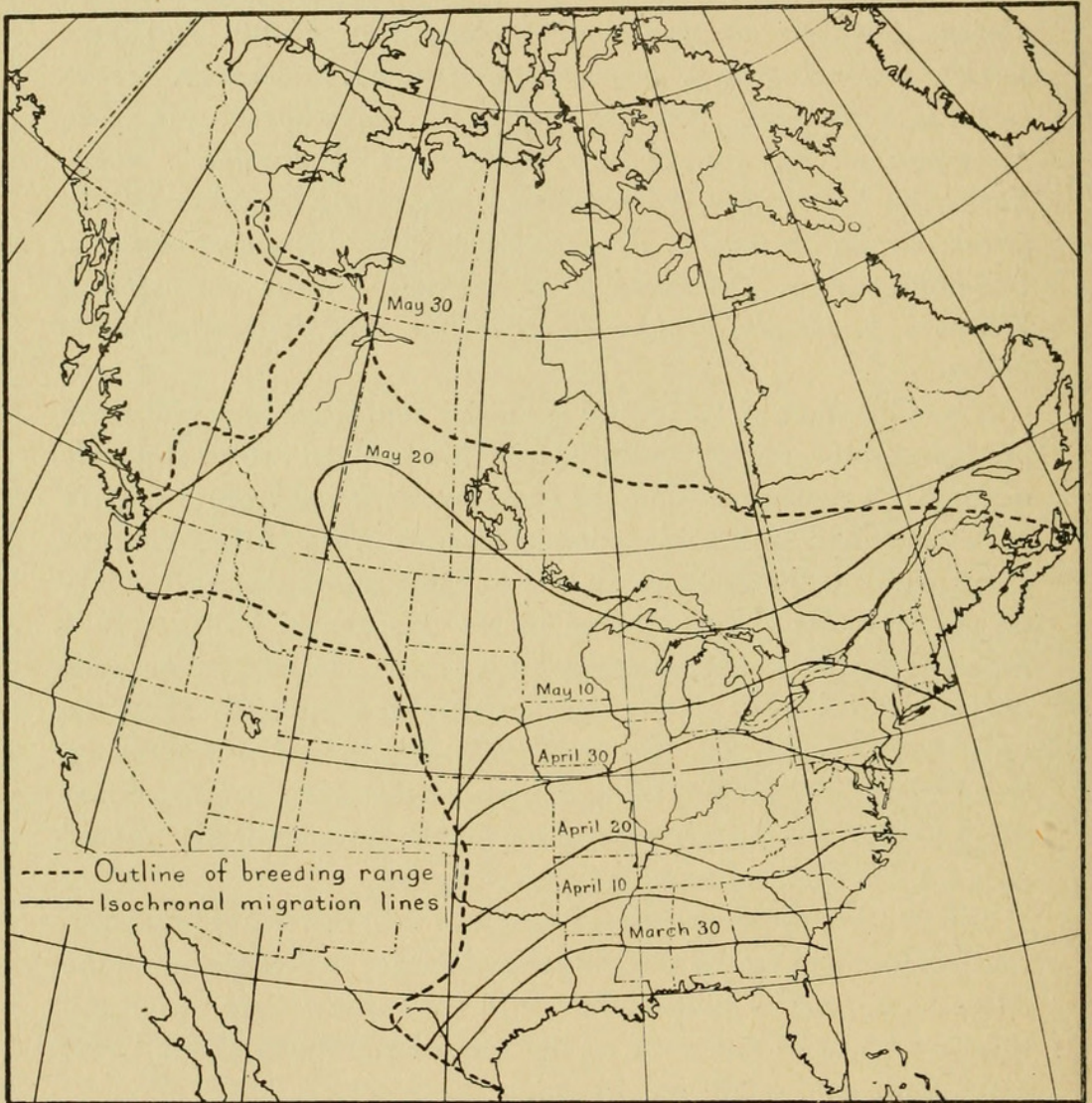


Fig. 3. Red-eyed Vireo (*Vireosylva olivacea*).

They present some of the most interesting problems in the study of bird migration. In the case of the Red-eyed Vireo, the species breeds along the whole northern tier of states west to Washington,

and occurs in migration in Colorado and Wyoming, but the individuals that appear first in Alberta are not birds that have passed through Colorado, Wyoming and Montana, because the dates of migration, as indicated on the map, show that migration is early and rapid in the middle Mississippi Valley and late and slow along the foothills of the Rocky Mountains. The earliest arrivals in southeastern Saskatchewan appear on the average May 17, but they do not come from directly south, since in eastern Colorado, 600 miles to the southward the birds do not appear on the average until May 22. The first advance to Athabasca Lake by May 28, which is just the date at which they appear on the average in northern Montana and northern Idaho. Therefore it is evident that the birds of the Mackenzie Valley at Lake Athabasca have not come by way of the Rocky Mountains, but by the route near the Mississippi River.

The same general method of proof can be applied to the migrations of the other seventeen species in this group. The proof is particularly clear and convincing in the case of the Robin, Flicker, Bronzed Grackle, Redstart and the Black-poll, Tennessee and Black-and-White Warblers.

Eighty-two other species of migratory birds breed in the Mackenzie Valley and during the winter or in migration occur across the United States from the Atlantic to the Pacific. But even with these species it can be shown that most of them probably reach the Mackenzie Valley from the middle part of the Mississippi Valley. These eighty-two may be divided into fifty-eight species of wide ranging water birds, nine species of hawks and owls, and fifteen species of smaller land birds.

The fifty-eight species of water birds that are found at Lake Athabasca and which also range from the Atlantic to the Pacific oceans present a problem with regard to their route of migration that with the records at hand cannot be certainly solved. The Canada Goose is one of the abundant water birds of the Mackenzie Valley and may be taken as representative of the above mentioned group. The great bulk of the Mackenzie Valley Canada Geese must come from the Mississippi Valley, where the species is abundant, for *Branta canadensis* is rather rare on the Pacific coast, its place there and in Alaska being taken largely by the other three forms, *hutchinsi*, *occidentalis* and *minima*.

But the fact that the Mississippi Valley birds pass to the Mackenzie Valley cannot be proved by dates of migration as is shown by the following records. The Canada Goose begins its migration near the Mississippi river in February. About the twentieth of that month may be considered the date of its normal arrival in southeastern Iowa. Passing slowly north it appears one month later in southeastern Minnesota at the end of the first week in April. Migration in southeastern Nebraska commences at about the same time as in southeastern Iowa, but the birds move north a trifle faster and cross to Saskatchewan about the first of April. Further west the Canada Goose winters not far south of the United States boundary and crosses into southern Alberta the last of March. On the Pacific coast the species winters in British Columbia. When, therefore, it is known that the Canada Goose arrives at Lake Athabaska April 20, no certain conclusion can be drawn from this data as to whether these earliest birds come from Manitoba, Alberta, or British Columbia. The last furnishes its most northern winter home and hence would require the least rapid migration in spring to reach Lake Athabaska by the given date. The journey by way of Manitoba or eastern Saskatchewan is a longer distance and the later start requires a higher speed of migration. Hence if no other information was available, the migration dates alone would lead one to suppose that the earliest birds at Lake Athabaska came from the southwest. But as stated at the outset, the relative numbers of the birds east and west of the Rocky Mountains, make it certain that most the birds of Lake Athabaska really do come from the Mississippi Valley. Since this is true of the geese, it may be assumed to be true also of the Mallard and Pintail Ducks which travel in company with the geese and have the same range from the Atlantic to the Pacific.

The same method of reasoning may be applied to the larger part of the fifty-eight species of wide-ranging waterfowl that occur regularly at Lake Athabaska. Most of them are abundant in migration across the moist plains from Kansas to Saskatchewan, but are comparatively rare in the whole mountainous region of western United States where favorable localities either for breeding or for feeding during migration are few and of small area. Hence it must be true in general that the untold thousands of water birds that frequent

the lakes and marshes of the Mackenzie Valley, come from the moister portions of the Mississippi Valley.

With regard to the nine species of migratory hawks and owls of wide range that visit Lake Athabaska nothing can be judged at present either from distribution or migration as to the route or routes they employ. Fifteen species of the smaller migratory land birds have the same range and in some cases, the dates of migration afford a hint of the route traveled. Thus in the case of the Crow, the dates of migration show clearly that the earliest individuals to reach southwestern Manitoba come not from South Dakota as would be expected, but from the timbered regions of Minnesota. The date of arrival at latitude fifty degrees in southwestern Manitoba is March 27, as determined by fourteen years' observations from four neighboring towns. March 27 is a fair average date for the arrival of the Crow in east central South Dakota, three hundred and fifty miles to the southward; while the average date of arrival in southern North Dakota is a week later than in Manitoba. Continuing in the same general northwestern course it is probable that the Crows appearing April 2, 1893, at Osler, Saskatchewan came from Manitoba rather than from Montana; since this date would be considered an early date of arrival in southeastern Montana. In this manner the dates of migration show that the earliest Crows in the Mackenzie Valley come from the wooded districts of the Mississippi Valley.

The Myrtle Warbler presents a quite similar set of dates. This species ranges from the Mississippi Valley throughout the Rocky Mountains and to the Pacific, becoming much rarer west of the mountains. In its spring migration, it reaches southern Manitoba April 23, at about the same time as its first appearance in central Nebraska and northern Colorado, showing conclusively that the Manitoba birds come from the southeast. It is equally sure that the arrival at Osler, Sask. latitude fifty degrees May 4, 1893, came from the southeast, for this is the usual time of arrival in central Montana latitude forty-seven degrees. Farther north a new possibility presents itself, since the May 16 birds of Lake Athabaska might, as far as the date is concerned, have come from British Columbia in the southern portion of which Province they arrive the middle of April. To determine this latter point use can be

made of the general principle of parallel lines of migration. Since it is true that the birds of western Minnesota pass northwestward to Saskatchewan, it is probable that the birds of Montana also proceed in a northwestern direction and traverse Alberta, in which case it is altogether unlikely that the birds of the same species would be migrating northeast from British Columbia to Athabaska across the route of the eastern birds and at right angles to it. A more reasonable assumption is that the birds of British Columbia migrate also northwestward and proceed to Alaska, where the dates of arrival, May 5 at Fort Reliance on the middle Yukon and May 18 at the mouth of that river, show that the birds must have come from British Columbia.

The migration records now available are insufficient to determine whether the remaining thirteen species of small migratory wide-ranging land birds come to the Mackenzie Valley from the southeast, or southwest.

There remain twenty-three species of migratory birds which breed in the Mackenzie Valley, but which in migration are confined to the Western United States, ranging not farther east than the eastern edge of the plains. These may be divided into three groups. The first group comprises nine species that in winter are confined to the Pacific coast; the second group, three species that range east to the Rocky Mountains, and the third, sixteen species that occur east to the plains.

The species of the first group, whose routes are best known, are the Pacific Eider (*Somateria v-nigra*), Black Brant (*Branta nigricans*), Short-billed Gull (*Larus brachyrhynchus*), Ross's Goose (*Chen rossi*), and the Northern Varied Thrush (*Ixoreus naevius meruloides*). The accompanying chart shows the principal migration route followed by each of these species. They all cross the Rocky Mountains, but in widely separated latitudes. The Ross's Goose crosses the lofty ranges of the main chain of the Rocky Mountains from northeastern California to northwestern Montana and thence north across the Mackenzie Valley to its breeding grounds on the Arctic islands.

The Northern Varied Thrush winters mainly in the interior of California and in western Nevada. Its main migration route crosses thence through northern Idaho and northwestern Montana and

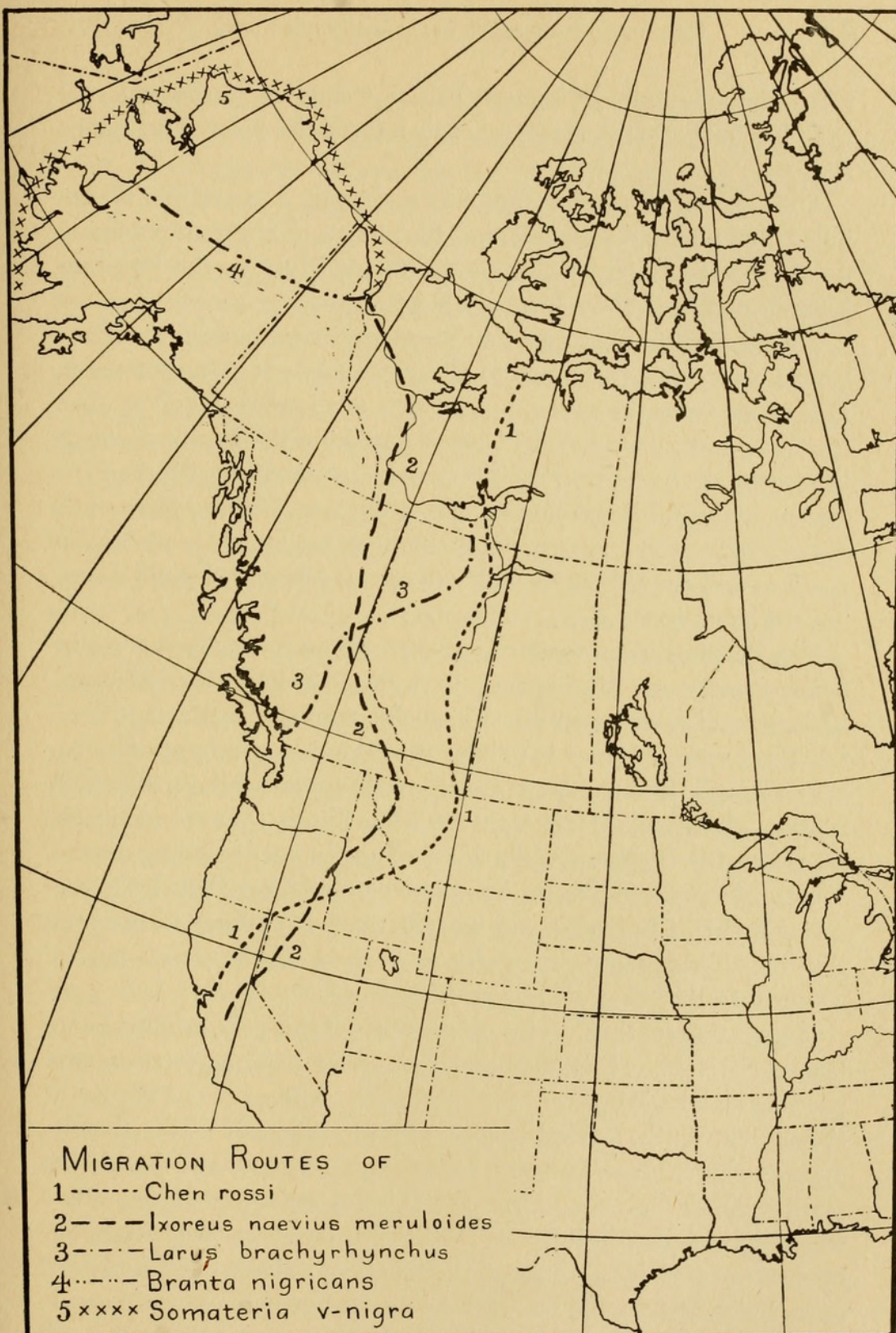


Fig. 4. Migration Routes from the Pacific Coast to the Mackenzie Valley.

along the mountains of eastern British Columbia to the valley of the Liard and reaches the Mackenzie a few miles below Fort Simpson.

The relation of the breeding and wintering areas of the Short-billed Gull makes it probable that the main migration route follows up the Fraser River and down the Peace River to the breeding grounds on Great Slave Lake and northward.

The Black Brant is a common breeder at the mouth of the Mackenzie and along the coast to the eastward. It does not reach Mackenzie from the south, indeed it is not known inland in that Province, but in spring migration it passes up the Pacific coast to the mouth of the Yukon, up this river to its junction with the Porcupine, and up this stream and across the low divide to the mouth of the Mackenzie. It seems probable that the Pacific Loon (*Gavia pacifica*) and the Sabine Gull (*Xema sabini*) follow this same route, but the proof is not as yet conclusive.

The Pacific Eider (*Somateria V-nigra*) does not occur inland in either Alaska or Mackenzie. It winters around the Aleutian Islands and is a common breeder on the coast east of the mouth of the Mackenzie. Hence it follows that the line of migration must pass through Bering Strait and go round the northern coast of Alaska. It seems certain that the King Eiders (*Somateria spectabilis*) and the Glaucous Gulls (*Larus hyperboreus*) breeding on the Mackenzie coast arrive by the same route rather than from the Atlantic side. Indeed it can be said there is nothing to indicate that any birds migrate regularly from the Labrador coast northwesterly to the coast of western Mackenzie.

A migration route as yet unsolved is that of the Yellow-billed Loon (*Gavia adamsi*). It appears at Great Slave Lake as soon as any part of the lake is open. It is not known at any time of the year, either east, south, or west of Great Slave Lake, and at the time it appears there, no open water exists anywhere between that Lake and the Arctic Ocean, and the species is not yet recorded from anywhere inland in Alaska. In fact the records as they stand at present are explainable only on the theory of a single flight from the open Polar Sea to the summer home on Great Slave Lake, and such a flight is scarcely believable.

The three western species occurring in the Mackenzie Valley

that range from the Rocky Mountains to the Pacific are *Spizella passerina arizonæ*, *Vireosylva gilva swainsoni*, and *Piranga ludoviciana*. The migration route of this last species is especially interesting. It breeds over the whole of western United States from the eastern foothills of the Rocky Mountains to the Pacific. Hence if one saw the map of the breeding range and noted that the line of the easternmost limit was almost north and south and extended without a break from Mexico to Canada, he would take it for granted that the breeding birds of Alberta reached their summer home by a migration route along the eastern slope of the Rocky Mountains. Such reasoning is correct with almost all species, but an examination of the large amount of migration data available shows that the Western Tanager is an exception to the rule. The bird winters in Guatemala and when it starts north in the spring the individuals along the Pacific coast move north faster than those that choose to migrate along the eastern slope of the Rocky Mountains as shown by the isochronal lines on the accompanying map. By May 10, the earliest migrants have reached northern Washington along the Pacific coast, while in the Rocky Mountains they are just entering southern Colorado. During the next ten days the eastern birds loiter across Colorado to southeastern Wyoming, while on the same date, May 20, the first birds appear in central Alberta, a thousand miles farther north. It is evident that these latter birds could not have come by way of Colorado, but must have come from Washington and British Columbia, though this latter assumption requires that they cross the main chain of the Rocky Mountains at a time in the spring when even the lowest passes are still covered with snow. It is true that warm weather has already come by this date in the southern Mackenzie Valley, but it is one of the strangest problems in bird migration as to how the Western Tanagers know that on the other side of those snow clad ranges summer is waiting for them.

The migration dates of the Western Chipping Sparrow show that the breeding birds of Alberta follow the same general route as outlined above for the Western Tanager, while the data so far available concerning the migration of the Western Warbling Vireo throw no light as to the route employed.

The fifteen western species breeding in the Mackenzie Valley and

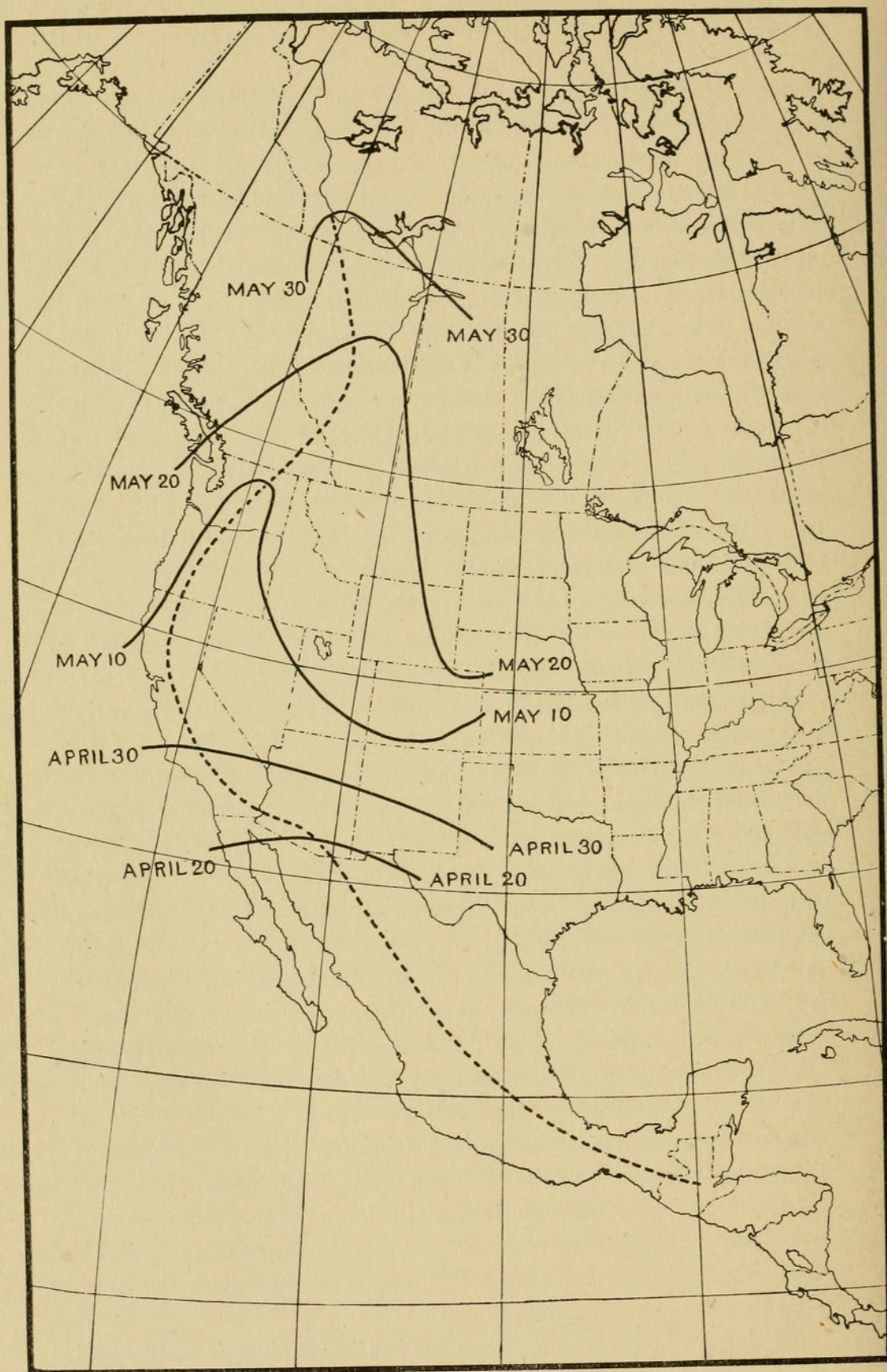


Fig. 5. Migration Route of the Western Tanager (*Piranga ludoviciana*).

ranging to the eastern edge of the plains in the United States are: *Larus californicus*, *Branta canadensis hutchinsi*, *Grus canadensis*, *Macrorhamphus griseus scolopaceus*, *Sayornis sayus*, *Xanthocephalus xanthocephalus*, *Calcarius lapponicus alascensis*, *Calcarius pictus*, *Poæcetes gramineus confinis*, *Passerculus sandwichensis alaudinus*, *Passerherbulus lecontei*, *Zonotrichia leucophrys gambeli*, *Spizella monticola ochracea*, *Spizella pallida*, and *Seiurus noveboracensis notabilis*.

Larus californicus winters abundantly on the coast of British Columbia and breeds commonly from Great Slave Lake northward, showing that its route of migration is northeast across British Columbia.

Branta canadensis hutchinsi is known to migrate in immense flocks from the plains of the Mississippi to those of the Mackenzie on its way to its northwestern breeding grounds. The same is true of *Macrorhamphus scolopaceus*, the line of whose northwestern migration is known to extend from Florida to Great Slave Lake; the same route is undoubtedly followed by *Grus canadensis*.

The earliest individuals of *Sayornis sayus* reach southern British Columbia about two weeks earlier than the first arrive in southern Colorado. The Alberta dates agree with those of Montana rather than those of British Columbia and Washington, while the dates on the lower Mackenzie and the Yukon can be satisfactorily explained only on the supposition that these birds have come from British Columbia. *Xanthocephalus xanthocephalus* is so rare at Athabaska Lake and northward, that it can be considered as hardly more than a straggler in the Mackenzie Valley. The date of arrival in eastern Saskatchewan however is so much earlier than in eastern Montana, as to indicate that the birds of Saskatchewan come from the southeast. The migration records of *Zonotrichia leucophrys gambeli* are so much earlier in British Columbia and Alaska than in corresponding latitudes to the eastward as to make it practically certain that the Alaska birds have come by way of the interior warm valleys of British Columbia. Hence it is equally probable that the individuals which swarm in Nebraska, Kansas, and southward during migration and winter are the birds that pass north through Manitoba and Saskatchewan to breed in the Mackenzie Valley.

The migration route of *Calcarius pictus* is evident since the great majority of the individuals are confined during migration and winter to a narrow belt of plains country extending from Texas northward to the Saskatchewan and thence northwestward along the Mackenzie to the summer home on the Barren Grounds of the Arctic. The same route is followed more or less closely by *Passerherbulus lecontei*, *Spizella pallida*, and *Calcarius lapponicus alasensis*.

One of the strangest migration routes to the Mackenzie Valley is that of the Yellow-bellied Sapsucker (*Sphyrapicus v. varius*). The mouth of the Nahanni River a hundred miles northwest of Fort Simpson forms the normal limit of the species' range in that direction; this is in longitude 124° W. The Yellow-bellied Sapsuckers breeding here come by way of Minnesota at least as far east as longitude 96° W. The range of this species extends thence south through western Missouri on the meridian of 94° and then southwest through the whole eastern half of Texas to at least longitude 103° W. in southwestern Mexico. Thus the migration route forms a bow, the southern half extending through nine degrees of longitude in a portion of the globe where this is equal to six hundred miles, and the northern half through thirty degrees of longitude, equivalent in those high latitudes to nine hundred miles.

The above routes account for the different groups of species breeding in the Mackenzie Valley as follows:

Eastern species ranging in the central United States only to the edge of the Plains.	33
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Eastern species ranging regularly or occasionally to the Rocky Mountains in the central United States.	19
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Species that in migration or during the winter occur across the whole United States from the Atlantic to the Pacific.	82
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Western species confined almost entirely to the Pacific coast.	9
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Western species, ranging only occasionally east of the Rocky Mountains in the central United States.	3
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Western species, ranging to the eastern edge of the Plains in the central United States.	15
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Total migratory species breeding in the Mackenzie Valley, and wintering to the southward.	161
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In addition to these, the list of the birds of the Mackenzie

Valley includes several groups of species that do not come under any of the above headings.

Non-migratory species and those which occur during the winter. 37

Species that barely reach the Mackenzie Valley from the south, being found on the Athabaska and not ranging north to Lake Athabaska. 41

Species not included under the previous headings, being for the most part stragglers or species that are most common on the Arctic islands. 29

Total species known to occur in the Mackenzie Valley 268

The distinctly eastern character of the avifauna of the Mackenzie Valley is shown by the fact that of the one hundred and sixty-one regular breeding migrants, only eighteen are known with certainty to reach the Valley from the west or southwest, while it is known with equal certainty that seventy-one reach it from the southeast or east; and of the remaining seventy-two species, mostly water-birds, probably four-fifths come from the central Mississippi Valley.

LIST OF WATER AND SHORE BIRDS OF THE PUGET SOUND REGION IN THE VICINITY OF SEATTLE.

BY SAMUEL F. RATHBUN.

THIS region is a much favored resort of many of the species of water birds whose habitat is the Pacific coast and this undoubtedly is accounted for by the fact that within its boundaries are embraced the essential desiderata necessary to attract them, viz. protection from the elements, an abundance of food and a most equable temperature throughout the year.

Its geographical location is likewise fortuitous being nearly in the direct line of migration of the countless numbers of birds whose summer home is the North Pacific and of these, thousands use this region as a winter resort, finding here every requirement



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