DEPARTMENT OF MINES AND NATURAL RESOURCES

GAME AND FISHERIES BRANCH

AN INVESTIGATION OF CERTAIN WATERS IN THE PORCUPINE MOUNTAINS

SECTION "A" - GENERAL PREAMBLE

SECTION "C" - BELL LAKE

SUMMER - 1952

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GENERAL PREAMBLE ON THE PORCUPINE MOUNTAINS

The Porcupine Mountains lie on the Manitoba - Saskatchewan border between 52° and 52° 45' North Latitude, some 264 miles north-west of Winnipeg. Attaining a height of 2300 to 2600 feet above sea level, they thus rise somewhat abruptly 1300 to 1600 feet above the surrounding level to the east. The Manitoba portion of this range extends 45 miles north and south, and 22 miles east and west, with an estimated surface area of 742 square miles.

Geologically this region is a part of the Manitoba escarpment, consisting basically of grey and greenish-grey shales with numerous clay ironstone deposits, characteristic of the Riding Mountain Formation. This underlying structure was, however, not evident on the surface of the ground at any point visited. It represents a Cretaceous deposit sloping very gently to the south-west, uplifted at the end of the Cretaceous, with a secondary uplift in early Cenozoic times.

Although thus geologically identical with the Duck Mountains and the Riding Mountains, and appearing exactly the same when viewed from the east, physically the country is somewhat different. The mountain crests or peaks are of quite moderate height, so much so that from the air the terrain looks all but flat, while from the ground the horizon is formed of low rolling hills merging into one another. Few of these hills rise more than a hundred feet, most are considerably less. Drainage is very poor, and the pockets between the hills hold the waters well. The country therefore, is exceedingly wet, and from the air shows a marked similarity to the areas about The Pas - muskeg, sloughs, potholes and lakes in profusion, linked by small water courses, most of which are obscured by dense plant growth, and separated by slight rises. The accompanying photograph taken by H. H. Harvey en route to Armit Lake from The Pas shows well the characteristic flat appearance and the numerous bodies of water as seen from the air.

Necessarily the flora reflects the general character of the country. Heavily treed, evergreens occur in profusion, chiefly black and white spruce, with lesser areas of jackpine, balsam, and

some tamarac. Most commonly such stands are dense, sometimes very dense, so that the trees tend to be tall and spindling, and in most areas seen those over eight inches in diameter were rare; further from the lakes, however, larger specimens are met. Due to the shallow nature of the light soil, they are commonly uprooted by winds or other agencies on reaching a moderate size, and thus passage through the woods is very greatly hampered by the leaning and fallen trees in all stages of decay. The holes left by the uprooted trees form, incidentally, excellent breeding grounds for mosquitoes, so that these abound in all areas, accompanied by lesser numbers of such pests as blackfly, punkies, deerfly and horsefly, to such an extent that the evening hours in particular become intolerable without the use of a considerable amount of protection against them.

The coniferous woods are mixed with deciduous trees about the margins of the lakes to a variable extent. These may form anything from less than 10% to more than 90% of the fringing tree growth. Almost invariably these deciduous forms are species of poplar; occasionally a few birch occur.

The lesser vegetation away from the water is relatively little varied. Mosses abound, covering the ground, fallen logs, and stumps generally, forming a soft moist layer ankle deep. Lichens similarly are common on the standing trees, live and dead. Small openings in the forest are characteristically paved with bunchberry or wild sarsaparilla, while similar open areas at lake shores are marked in addition by raspberry, current, strawberry, wintergreen, highbush, cranberry, etc. Low areas between the hills are commonly waterlogged, and here are found, in addition to conifers, thickets of alder, Labrador tea, marsh grasses, sedges, and marsh marigold in quantity.

Streams are small and most generally very slow running. Nearly always they are marked by marginal growths of varied nature, in which sedges predominate. Frequently such streams are choked and all but obliterated by the growth of the sedges which may form a continuous mat, firm enough in some cases to support the weight of a man, floating over a foot or more of water. In addition, seeps or mere trickles of water are plentiful about the lake shores.

The lakes are in general shallow and weedy, with very few beach areas and these of small size. Temperatures are relatively high in summer and very similar for top and bottom, indicating an absence of springs. The bottom is characteristically soft organic ooze.

Turning to the fauna, moose are quite common. Not only are they frequently seen, but their trails and droppings are found about all lakes, their tracks are on all sand beaches and across most shallow bottoms. Deer on the other hand are scarce, indications of their presence being noted only sparingly at Whitefish Lake. Wilf, bear, muskrat and beaver were seen on but one or two occasions, nor are indications of their presence common. Red squirrels and chipmunks abound, with a variety of smaller rodents. Rabbits, however, are very rare. Aquatic birds most commonly met are loons, terns and pelicans; gulls, ducks and grebes were noted only occasionally. Fish most commonly found were pike, suckers and perch, as might be expected from the general picture given above. In addition, pike, perch, whitefish and tullibee were taken from the deeper lakes. Forage fish are common, but were not taken in great quantity at any point.

The somewhat unpleasing conditions outlined here are considerably alleviated in the southern portion of the reserve. Here the hills are considerably higher, drainage is far better, and the marshy areas correspondingly reduced, so that the terrain in the region of, say, Whitefish Lake, is very similar to that of the Duck Mountains. This is clearly indicated on survey and topographical maps of the area, the reduction in waters being a very obvious feature. In this regard it might be pointed out that those lakes found worthy of investigation were those that had received names on the maps, while of the various unnamed bodies of water, none was found suitable for study.

Investigations were carried out from June 3 to July 18, 1952, transportation being arranged with the Manitoba Government Air Service at The Pas by radio through the Mafeking station of the Forestry Service.

The larger lakes in Township 42, Range 28 West, other than North Steeprock, were observed from the air. Few were as much as a mile in the greatest dimension, and all showed one-half or more of the bottom readily from the air, indicating, in this area, less than eight feet of water. Low marsh shores encircled most lakes entirely, again an indication of shallow water away from the centres. These features so severely limited the areas of deeper water that it was judged profitless to investigate these small bodies more closely. Local reports speak of pike in these lakes in some cases, and there is no

reason to doubt that they, and suckers, may be present; nevertheless, the lakes are so small and available waters so reduced that the application of fish culture methods would be pointless.

The somewhat larger lake in the north-east area of Township 42, Range 27 West, some six miles West -SW of Mafeking, is merely a shallow pothole, so shallow indeed that Air Service pilots would not consider landing either Fisheries or Forest Survey parties on it. The same thing holds for the small lake two miles south-east of this point, and for the lake two miles north-east of Bell Lake. Still another of the same type is the lake between Armit and South Steeprock Lakes, in Township 41 on the border of Ranges 28 and 29 West.

The two mile long lake west of Hart Mountain, in the north-east quadrant of Township 40, Range 29 West, is but little better. Every part of the bottom is easily visible from the air, the shores are marshy, and emergent vegetation is plentifully scattered. In addition, frequent moose trails across from side to side indicate very clearly a completely unsatisfactory lake for fish.

Restricted size and the presence of islands prevented landing on the two lakes of Armit River and on Cross Lake. In the case of the former, little damage was done, for these lakes are small in size, partially obscured with islands, and have considerable shallow areas. Cross Lake, neatly divided by a large island, could be landed upon in emergency, but pilots were reluctant to land otherwise. Nearly a mile and a half long, it presented some shallow areas, but also contained good stretches of deeper waters. Although there is no reason to suppose it would be markedly different from other Porcupine Mountain lakes, it could be surveyed through the use of the road leading to the well-established wood camp present on the shore. This road, a branch of the Whitefish Lake Road, is passable for trucks and tractors but is definitely not recommended for passenger cars at the present time.

The lake at the south-east corner of Township 39, Range 29 West, one and one-half miles west of Cross Lake, presents a similar appearance to Cross, and could also be investigated by road. It is, however, quite small, measuring but half a mile each way, and is too small for aircraft to land with safety. Landing, of course, is not so much a matter of the

water surface available as the necessity for clearing the treed hilltops surrounding such lakes; and as noted above, the hills are of greater height in this southern region.

The remaining lakes in Township 39, Ranges 28 and 29 West, are all quite small and little more than pot-holes in most cases, with the exception of Whitefish Lake.

Accordingly, full biological investigation was carried out upon Armit, North Steepcreek, South Steepcreek, Pickerel and Bell Lakes. In addition, a check on the fish present in Whitefish Lake, previously surveyed, was also made. Details of these surveys follow.

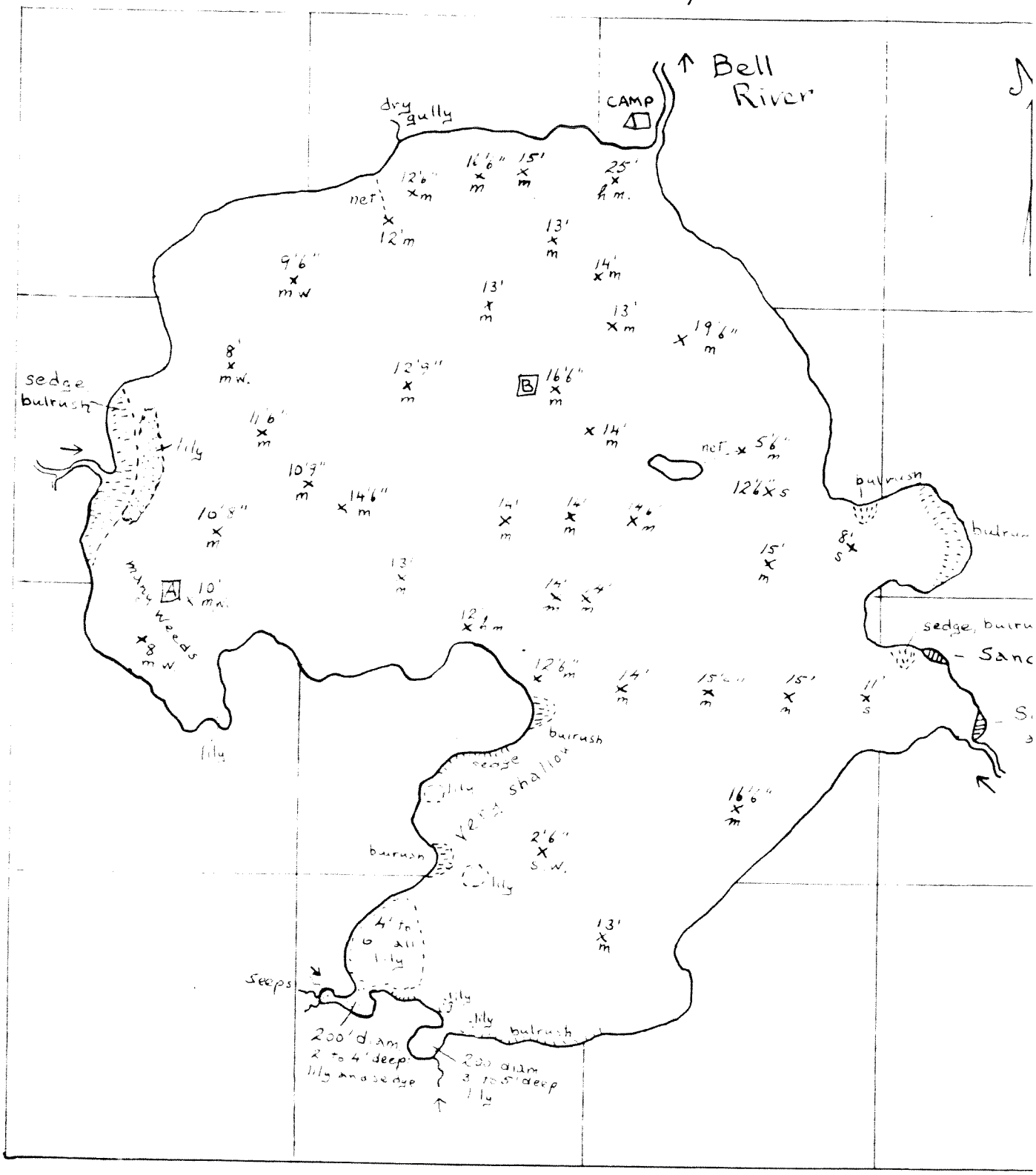
It will be seen from this introduction and from the surveys that, apart from the southern area about Whitefish Lake, the country is not of a type to appeal to the angler or camper. The difficulty of land travel, the high cost of road-making, the water-soaked terrain, and the numerous blood-sucking insects are all unsatisfactory features. The character of the lakes is such that angling presents little of a spectacular nature, nor are the lakes capable of much improvement, with the possible exception of Pickerel Lake, which, however, is likely to prove difficult of access for a long time to come. In all, the country has very little of the appeal of the Duck or Riding Mountains, and it seems most unlikely to become a popular resort or angling territory.

The writer is glad to acknowledge the cheerful co-operation and unflagging energy shown by Mr. Harold H. Harvey in assisting him in these investigations. His help was of very great value.

x x x x x x x x

BELL LAKE

4 inches to the mile : each square = ½ mile



x depth in feet and inches

A station

m mud

hm hard mud

s sand

w weed

A BIOLOGICAL SURVEY OF BELL LAKE

Porcupine Mountains

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GENERAL

Bell Lake is a small lake in the east-central region of the Porcupine Mountains Forest Reserve, lying at 52° 32' North Latitude, 101° 15' West Longitude, in the east-central portion of Township 41, Range 27 West. In the shape of the thickened horseshoe, it extends a mile and a half overall from north to south, and the same distance from east to west.

Transportation was by aircraft of the Manitoba Government Air Service. Access to the lake may also be secured by an indifferent logging road from the town of Novra to Bell Lake Wood Camp, situated approximately three quarters of a mile down the Bell River, from whence a narrow foot-path follows the river to the lake. Camp workers commonly frequent the lake in the evenings, and at present use a canoe and a rowboat on it, but do little angling.

Biological investigations were carried out from July 4th to July 14th, 1952, transportation requirements necessitating this length of time. Camp was established on the north shore, on the west bank of the Bell River at its origin.

TERRAIN AND LAND VEGETATION

As with the other Porcupine Mountain Lakes, the land contours are formed by low rolling hills covered with evergreens which march down to the water's edge. The hills here are however slightly steeper

and more sharply defined, although few are much more than fifty feet high; the aspect then approaches that around Whitefish Lake rather than the other lakes investigated, although similar heights are not attained. Nevertheless the country is somewhat better drained than around the majority of the lakes in this area, a feature clearly indicated by topographical maps, although swampy areas bearing alder and Labrador tea are still frequent.

The trees are chiefly spruce, with occasional plantations of jack-pine; a few balsam and tamerack also occur. These trees in general are more widely spaced than about the other lakes investigated and hence quite commonly reach a diameter of 8 to 12 inches or more. Tiny natural clearings are marked by a growth of Linnea borealis, Cornus canadensis, Mertensia sp. and wild sarsaparilla; elsewhere the ground is covered with a soft blanket of mosses growing in a thin organic soil.

Close to the lake and also along the Bell River, the spruce become mixed with lesser numbers of poplar, chiefly black poplar with a fairly high percentage of aspen. A thin fringe of alder is common at the water's edge.

The west bank of the Bell River at its origin has been partially cleared in the past, and the mouldering remains of half a dozen log cabins can be seen. This clearing now supports dense growths of raspberry, highbush cranberry, currant, fireweed and strawberry. Small clumps of honeysuckle, tiger-lily and wild rose are to be found, and a few tufts of meadow grasses. Insects abound and rusted tin cans are also plentiful.

The underlying shale of the Riding Mountains formation is not visible at any point.

PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE LAKE

(a) Size and shape

The lake is a thick crescent or horseshoe in form, with the concavity to the south-west. Extending over a total distance of a mile and a half from north to south and a similar distance from east to west, the average width is under a mile. There is one small island. These features are easily seen on the accompanying sketch map.

(b) Shores

The rolling land with its trees marches to the water's edge with a final steep slope of three to six feet in most areas. The actual edge is marked by a vertical drop-off of 12 to 18 inches, formed of well-rounded boulders, chiefly granitic. These boulders extend a short distance into the water, and depths of three feet or more can be expected within five feet of the edge, with few exceptions. Submerged boulders and cobbles are covered with very slippery brown algae, making landing a somewhat tiresome business in most areas.

A few shallower areas of shore occur, marked in most cases by the presence of bulrushes. In addition, the more southerly of the two small bays of the east side presents two small submerged sand flats. Of these, the southernmost emerges as a rim beach 18 inches wide and 100 feet long - the only beach in the lake.

These features are indicated on the accompanying map.

(c) Inflowing streams

A small river empties into the more southerly of the two bays of the eastern shore. Eighteen feet wide and two to three feet deep, the clear red-brown water flows at one mile per hour over a silt or sand bottom which is bare except for occasional twigs of

Potamogeton perfoliatus and Sagittaria, with a few clumps of water-lily (Nymphae). The banks are low and marked by sedges and alder.

Extremely similar is another river entering near the mid-point of the western side. This is also eighteen feet wide, but varies from three to five feet deep; the water is again red-brown and clear, and flows at one mile per hour over bare silt or sand, with the same weeds present, plus a few clumps of water arum (Calla palustris). The banks again are similar sedge and alder tangles. The mouth of this river is however largely hidden by the offshore vegetation - sedges, bulrushes and water-lily. A few tufts of Sparganium were seen in the channel through this vegetation.

Both these rivers follow sinuous courses, and the latter is marked by a number of small backwaters or creeks near the lake. In both the fauna is scant: Helisoma trivolvis was the most frequently seen form, while less numerous were Lymnaea stagnalis jugularis, Physa ancillaria, Hyalella azteca, Gammarus sp., water-striders (Gerridae), and whirligig beetles (Gyrinidae). The egg rings of Phryganea and three fry of the common sucker (¾ inch long) were taken in the western river.

At the southernmost point of the lake are two small land-locked bays. The easternmost of these, some 200 feet in diameter and 3 to 5 feet deep, covered with water-lily, receives a marsh drainage stream. This is 15 feet wide and 2 to 3 feet deep at its mouth, but within a hundred feet becomes 18 inches wide and 6 inches deep, to break up almost immediately into a number of tiny rills babbling out of a swamp. Three pike between 18 and 24 inches long were observed in the almost motionless water of the mouth of this stream, but could not be induced to strike.

The more westerly of these two small bays is also 200 feet in diameter and covered with water-lily. The depth varies from 2 to 4 feet and the margin is rimmed with sedges. A westward extension of this bay receives a number of small swamp seeps, none over a foot wide and three or four inches deep.

A short distance west of the midpoint of the northern shore is a dry gully 3 feet wide and two feet deep running down to the shore. This no doubt is a channel for spring run-off.

No other entering streams were observed in cruising around the entire periphery of the lake.

(d) Outflowing streams

The only exit from the lake is the Bell River, arising from the northern shore. Its origin is marked by a boulder barrier thirty feet wide, between whose rounded granitic stones the water bubbles rapidly, dropping three feet in the first fifty feet down river. Beyond this point the river becomes a slow practically currentless dank stream flowing over a silt and debris bottom, running between steep rounded banks up to ten feet in height and heavily shaded by the trees. The width is variable, between 30 and 100 feet, for a distance of one mile, after which it becomes reduced to 20 feet or less; the depth too is equally variable, for while depths of 1 to 2 feet are common, many areas reach 3 to 6 feet. Where the river becomes narrowed to 20 feet, the depth is less than 2 feet. The whole aspect is gloomy and still, with very few signs of life - a few water-striders (Gerridae) and water beetles (Hydrophilidae) were the only forms observed, apart from beaver, which have dammed the river a quarter of a mile downstream forming a pool a hundred feet wide. The dam is a solid structure of brush, mud and cobbles 3 feet above water and five feet wide on top;

it was broken this spring and is only partially repaired, thus lowering the pond by 3 feet and exposing a considerable area of drowned trees and alders upstream. The beaver house is a hundred yards above the dam, 20 feet across and 7 feet high. Beaver were observed only occasionally, but very noticeable is the fact that nearly every poplar along the river has been felled, and the beaver are now cutting at least a hundred yards along the lake shore. The trees are so close that only about half fall when cut. Only one evergreen was seen cut - a pine 2 inches thick which was apparently in the way of a considerably larger poplar.

The rapid water at the origin of the river showed a slightly richer fauna. The surface of the boulders was covered with vast numbers of the larvae and pupae of black-fly (Simulium), with lesser numbers of the trichopteran larva Hydropsychodes. Leeches (Erpobdella, Haemopis) and their egg capsules were also common. Schools of very small fish, numbering from 5 to 100, were seen commonly between the boulders; when examined these proved to be common sucker (Catostomus commersonii) 13 to 20 mm. long. Small groups of the same fish of a later age were also seen, with a length of 50 mm. Rarely, darters were seen, two specimens collected being Iowa darters (Poecilichthys exilis). Still rarer were Phryganeid and limnephilid larvae and adult Dytiscids of small size. A small group of Gammarus was found in an eddy.

(e) Water level and depth of water

As with other lakes in this region, there was no evidence of former flooding or submergence, suggesting that the lake is at normal high with little annual variation.

The lake is quite shallow, with the great majority of readings falling between ten and fifteen feet. A maximum reading of twenty-five feet was found close to the origin of the Bell River, but this was quite exceptional.

(f) Nature of the bottom

This is again a mud-bottom lake, with very few areas of sand. The mud is very soft and flocculent, and brown in colour. Water weeds are common in depths of six feet or less, but not in thick masses. No reefs were found, and there is but one island.

(g) Temperature

As with other lakes in this area, the temperature of the water is but little below air temperature, and there is no significant difference between top and bottom temperatures; thus, when the air was 20° C the surface was 19° C and the bottom at 10 feet was 18.5° C.

(h) Transparency

The water in this lake is distinctly brown, even in small quantity, differing markedly from the grey-green of neighboring lakes. At the time of this study the plankton was very heavy, with great quantities of Anabaena, with the result that Secchi disc readings were not more than 5 feet 2 inches.

(i) Oxygen, pH, etc.

Oxygen values from this lake are very consistent in all areas, and accord well with the figures for other lakes in this region. There is no significant difference between suface and bottom figures, and the total range of values is from 7.55 to 7.98 parts per million, which when corrected for the respective temperatures give saturation values of from 81 to 86%. It is obvious that there is no lack of

oxygen and that turnover is complete in these shallow waters.

The water is very slightly alkaline, with pH values of 7.9 or 8.0 in all areas tested, top or bottom.

Phenolphthalein titration gave a calcium carbonate equivalent of 3.5 parts per million with no further change for methyl orange, indicating a very soft water. Subjectivaly the water was fairly palatable but flavored of course by the heavy algal growth.

BIOTA

(a) Aquatic vegetation

Since most of the shoreline is exposed and bleak, emergent vegetation is scant. Bulrushes (*Scirpus*) are however to be found in the eastern bays, in the most southerly portion of the lake, on the east of the main peninsula, and extensively at the far west of the lake near the mouth of the western river. They are sometimes accompanied by sedges (*Carex*), especially on the east of the main peninsula and at the western river. Yellow water-lily (*Nymphaea advena*) is plentiful in the most southerly portion of the lake and offshore from the western river.

Submerged vegetation is not plentiful apart from the north-west end of the lake where *Potamogeton perfoliatus* is constantly in view over a considerable area. *Potamogeton zosterifolius* occurs in a small area off the origin of the Bell River. One or two other small areas of *Potamogeton* were also found.

The distribution of this vegetation is indicated on the sketch map.

(b) Plankton

Plankton was very heavy but not very varied, due to the predominance at this time of Anabaena, so prevalent that the surface of the water appeared peppered with minute spots of green. Less common was Rivularia. Other forms were represented sparingly, with crustaceans fairly varied. A detailed analysis will be found on a later page.

(c) Invertebrates

The invertebrates found in the rivers have been dealt with under that heading.

Annelida The egg capsules of Herpobdellidae were plentiful on the rocks of the exposed shores. Four medium and one small Haemopis marmoratis were collected on the north shore, while partially digested leeches were found in six of the fourteen pike examined in detail. One was identified as Glossiphonia fusca.

Mollusca A single Helisoma trivolvis was collected from a cobble and boulder shore in the more southern of the two bays of the east side, while a large Lymnaea stagnalis jugularis was found close to the campsite. It is to be noted that both these specimens were not far from rivers, where snails could be occasionally found.

Pelecypod molluscs were even more scantily represented by a single small Sphaerium found in a pike.

Crustacea The presence of Gammarus and Hyalella azteca in the rivers has been noted. These forms were also identified in seven of the pike examined in detail, and a live Hyalella was taken in the dredge at Station A.

Arachnoidea Spiders were numerous in the cleared area west of the Bell River.

Insecta Ephemeroptera were only moderately plentiful considering the nature of the lake. Hexagenia and Ephemera were seen in small quantity on the wing. Hexagenia nymphs were found in five of the pike examined in detail, and their shed skins were found on the east shore and numerously in the back eddies of the origin of the Bell River whence they had been carried from the lake. Rather remarkably no Heptageniid nymphs were found on the exposed shores.

Plecoptera were represented by a fair-sized adult, probably Acroneuria, taken at the tent.

Odonata were represented by numerous damsel flies and abundant large dragonflies on the wing in the neighborhood of the camp, but were not seen elsewhere nor were immature stages taken.

Hemiptera were represented by the water-boatman Corixa in considerable quantity: two or three were visible on every square yard of the lake surface one quiet evening, while at other times fair quantities were observed on the eastern and northern shore areas. Specimens were taken in one sucker.

Tricoptera were seen on the wing near the campstie in small quantity. Larval Helicopsyche borealis were found in limited quantity on the rocks of the north shore only, and were also recorded in two pike. Two Mystacides larvae and a Hydropsychid pupa were found on the north shore, while several Limnephilid larvae were recorded from the east shore.

Lepidoptera Butterflies in considerable variety frequented the campsite clearing but peculiarly few swallowtails were seen, prevalent though they were at the other lakes in the area.

Diptera Adult flies were incredibly abundant. Mosquitoes were most plentiful, rendering the evenings intolerable in the open. Clouds of bluebottles (Calliphoridae) and other common flies (Muscidae) appeared on the slightest opportunity. Blackfly (Simulium) appeared in great numbers on calm evenings. Less numerous but equally annoying were the biting flies Tabanus and Chrysops. But two specimens of punkies (Culicoides) were recorded, however. Nowhere else in this area were flies so numerous or so annoying.

Aquatic Diptera were scarce. Four very small bloodworms (Chironomidae) were found on the rocks of the northern shore, while empty pupal cases of the same forms were common in the eddies of the Bell River, obviously carried in from the lake.

Coleoptera were represented by two small carnivorous water beetles (Dytiscidae) observed on the east shore.

Hymenoptera were represented by numerous colonies of carpenter ants living within the decaying stumps of the campsite clearing.

(d) Vertebrates other than fish

Aves. Great northern divers and western grebes were seen only at intervals. Pelicans were seen but once, and then in flight. Common terns however were present in small numbers at all times, in spite of the scarcity of small fish. A pair of bald eagles nested on the east end of the island, but proved most timid. A single mallard flew down the Bell River every evening at dusk. Crows were noted on two or three occasions and a large hawk was observed some distance down the Bell River.

Mammalia. The presence of beaver in the Bell River and nearby lake has been noted above. Moose tracks were fairly abundant

about the lake, although not as common as in the other areas examined, and the decaying head of a young male, with two inch horn cores, was found among the boulders of the origin of the Bell River. Chipmunk and red squirrel were common.

(e) Seine fish

The presence of small common sucker and of Iowa darters in the Bell River very close to the lake has been noted above. In the lake itself no schools of small fish were seen at any point. Seining was finally successful off the sand beach of the eastern shore, the catch being 9 fish of 51 to 57 mm. length and two of 20 mm. length; all of which proved to be common sucker (Catostomus commersonii).

(f) Larger fish

Two gill nets were set in representative areas for a total of 44½ net hours resulted in the capture of 23 pike (Esox lucius) and 3 common sucker (Catostomus commersonii). Six more pike were taken by angling.

The pike ranged from 13 ounces to 5 pounds ½ ounce and were in very good condition. They had been feeding almost entirely on insects, leeches and Gammarus.

The common sucker ranged from 13 ounces to 1 pound and had been feeding on organic detritus and insects. Their condition was good, but with less fat than is usual.

Tabled accounts of these fish will be found on a later page.

(g) Parasites

Of the fourteen pike examined in detail, only four contained Proteocephalus pinguis, and those in small quantity. Raphidascaris canadensis was present in but two cases, while the plerocercoids of

Diphyllobothrium latum were present in two fish also, each possessing a single worm. The parasite load then is remarkably light.

The common suckers showed the usual thorny-headed worm infestation.

(h) Predators

The only predators noted were the few fish-eating birds listed above.

FIELD NOTES

This shallow and mud-bottomed lake presents a remarkably barren appearance on examination. With the single exception of water-boatmen (*Corixa*), no form of invertebrate life is plentiful in the water, and even the exposed rock shores are low in the quantity of the characteristic forms to be expected. The entire absence of crayfish, clams and minnows, and the extremely scant numbers of snails and small crustaceans are marked features. The lake may be classified as a pike-and-sucker lake of low productivity, kept in existence by its insect life. No marked improvement as an angling lake can be hoped for.

BELL LAKE, July 8th, 1952

Station A

Time, 7:30 p.m. Weather, fine and mild: 10% cumulus
Sun, bright Wind, west @ 2 m.p.h. Temperature, 20°C.

Depth.....	10 feet
Bottom.....	mud
Turbidity.....	5 feet 2 inches
Temperature, surface...	19°C.
Temperature, bottom....	18.5° C.
Oxygen, surface.....	7.55 c.c.
Oxygen, bottom.....	7.81 c.c.
pH, surface.....	7.9
pH, bottom.....	8.0
Plankton.....	vertical haul
Ekman dredge.....	soft flocculent brown mud, with 1 *Hyalella azteca*

Station B

Time, 8:30 p.m. Weather, fine and mild: 10% cumulus
Sun, low but bright Wind, west at 2 m.p.h. Temp., 18.5°C.

Depth.....	16 ft. 6 inches
Bottom.....	mud
Temperature, surface....	19° C.
Temperature, bottom....	18° C.
Oxygen, surface.....	7.98 c.c
Oxygen, bottom.....	7.6 c.c.
pH, surface.....	7.9
pH, bottom.....	7.9
Plankton.....	verticalhaul
Ekman dredge.....	soft flocculent brown mud

Plankton, 100 yard horizontal haul near Bell River

PLANKTON ANALYSIS, BELL LAKE

	Station A	Station B	Horizontal haul
Bacillariaceae			
Asterionella	x	x	x
Stephanodiscus	x	x	x
Melosira	x	x	x
Synedra	x	x	x
Amphora	x	x	x
Surirella		x	
Pleurosigma		x	x
Cyanophyceae			
Anabaena	xxxx	xxxx	xxxx
Rivularia	xx	x	xxx
Clathrocystis	x	x	xx
Lyngbya	x	x	xx
Protococcales			
Pediastrum	x	x	x
Botryococcus	x	x	x
Selenastrum		x	
Conjugales			
Staurastrum	x	x	x
Protozoa			
Ceratium	x	x	x
Vorticella	x	x	x
Rotifera			
Keratella	x	x	
Rattulus	x	x	x
Notholca	x	x	x
Conochilus	xx		x
Crustacea			
Daphnia		x	x
Bosmina	x	x	x
Diaptomus	x	x	x
Cyclops	x	x	xx
Nauplii	x	x	x

xxxx predominant forms; xxx very common; xx fairly numerous; x occasional

DETAILS OF NET SETS, etc.

1. Net set July 8, 1952, at 1:30 p.m. in 5 to 6 feet of water due east of the eastern end of the island; raised 22 hours later; net 4¼" x 40 x 45 fathoms.

   Catch, 2 pike.

2. Net set July 8, 1952, at 2:15 p.m. in 6 to 12 feet of water due south from the north shore at the prominent point ½ mile west of the Bell River; raised 22½ hours later; net 2¾" x 40 x 45 fathoms.

   Catch, 21 pike, 3 common suckers.

3. Taken by angling: 7 pike

FISH RECORD, BELL LAKE

Ref.No.	Spinal length inches	Weight lb.-oz	Age, Yrs.	Condition	Alimentary contents	Parasites
Pike, Esox lucius						
B- 1	17 7/8	1 - 4½	7	Exc.v.fat	1 Schistocephalus(?); 1 sm. leech	6 med.& lg.tapew 3 nematodes
B- 2	24 ¾	4 -15	11	V.G.-fair fat	mucus	1 Diphylloboth.l
B- 3	21¼	3 - 2	8	Exc.-Exc.fat	mucus	nil
B- 4	26¾	5 - ½	12	";fair fat	1 Hexagenia nymph	nil
B- 5	16¾	1 -12½	8	Exc;fat exc.	6 Gammarus, 1 Hex.nymph, 1 Helicopsyche larva	20 med.& lg.tape
B- 6	22 3/8	3 - 7½	10	V.G.-fair fat	1 Hex.nymph, 1 leech.	Nil
B- 7	20	2- ½	9	V.G.-no fat	3 Gammarus, 1 Hex. nymph, 1 leech.	Nil
B- 8	20¼	2- 9	8	Exc.Exc.fat	3 Gammar., 1 leech.	Nil
B- 9	23¼	3- 9½	9	V.G.-slight fat.	1 sucker(4⅝")	Nil
B-10	20	2- 8½	8	Exc.-v.g.fat	1 leech	Nil
B-11	13½	0-13	6	Exc.-v.g.fat	2 leech, 1 Gammar.	9 med.& lg. tap
B-12	23	3- 0	10	Fair-no fat	1 Gammarus	Nil
B-13	20¼	2- 6	9	V.G.-slight fat.	1 Hexagenia N. 1 Gammarus	1 Diphyllobothr pleroceroid.
B-14	15¾	1- 4	7	Exc-exc.fat	5 Gammarus, c.100 Hyalella, 1 Sphaerium, 1 Helicopsyche	c.50 med.& lg.t 10 nematodes
Common sucker, Catostomus commersonii						
B-15	11 3/8	1- 0	4	Good; mod. fat.	Daphnia,Corixa, organic debris	c.300 thornyhea worms
B-16	10 3/8	0-13	4	Good; fair fat	Organic debris	a few thornyhes
B-17	10 5/8	0-13½	4	Good; fair fat.	Organic debris	Nil

OTHER FISH TAKEN AT BELL LAKE

Pike, Esox lucius

24½ inches; 4 lb.- 9 oz.	23¾; 3- 8
23; 3- 3	24; 4- 2
21¼; 2-12	18½; 2- 2
20½ 2- 7	21¼; 2- 8
19 1-15	21¾; 2- 8
20½ 2- 0	17¾; 1-11
20 3/8; 2-11	16½; 1- 4
14 7/8; 1- 1½	