



GAME AND FISHERIES BRANCH

AN INVESTIGATION OF
CERTAIN WATERS IN
THE PORCUPINE MOUNTAINS

SECTION "A" - GENERAL PREAMBLE

SECTION "B" - A R M I T L A K E

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-gray 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 woody, 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. Wolf, 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 unpleasant 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 Steeprock, South Steeprock, Pickerel and Ball Lakes. In addition, a check on the fish present in Whitefish Lake, previously surveyed, was also made. Details of these surveys follow.

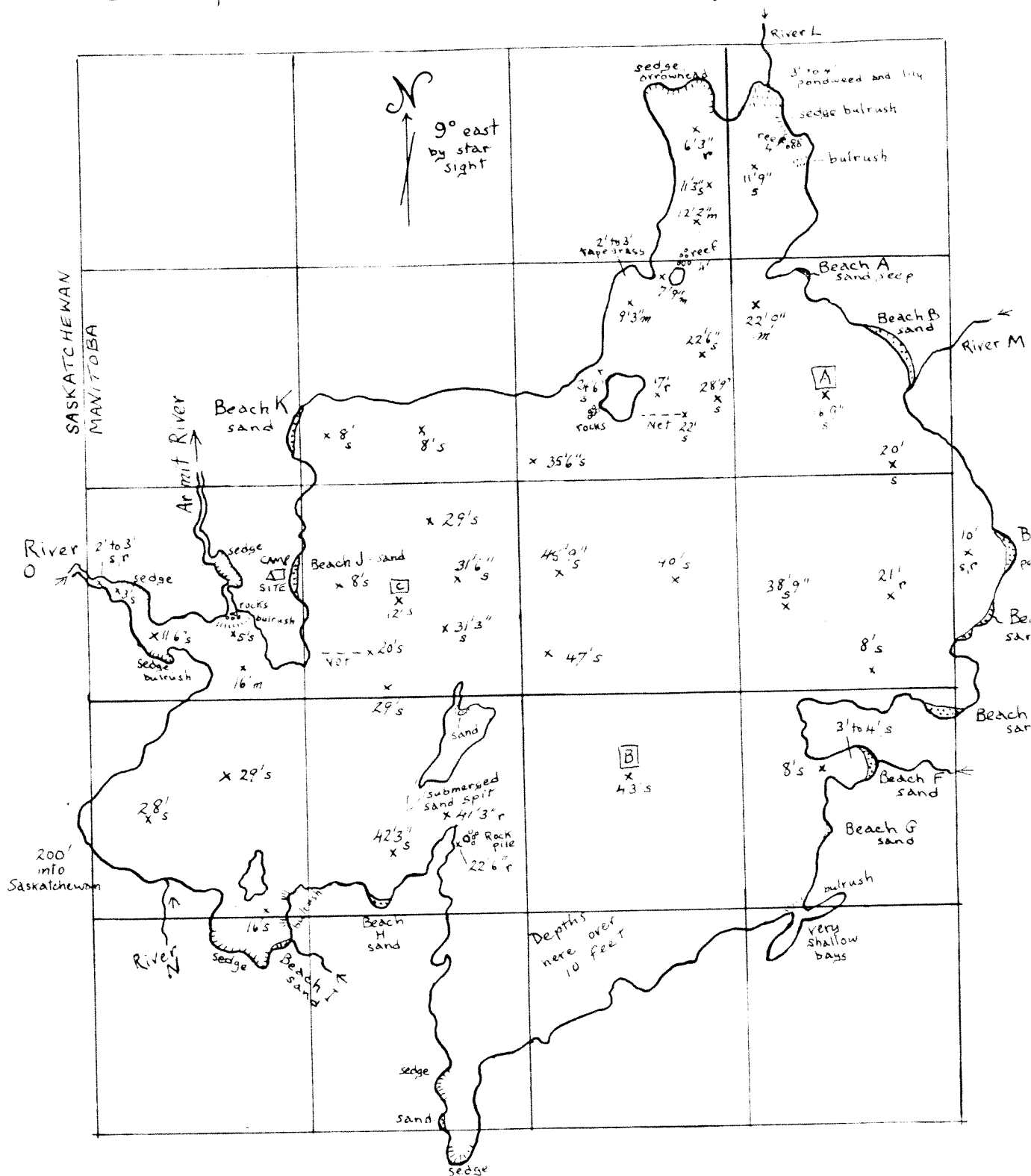
It will be seen from this introduction and from the surveys that, apart from the southern area about Whitefish Lake, the country is not of a type to appeal to the angler or camper. The difficulty of land travel, the high cost of road-making, the water-soaked terrain, and the numerous blood-sucking insects 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.

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ARMIT LAKE

Scale, $\frac{2}{3}$ mile to the inch: each square = 1 mile



A BIOLOGICAL SURVEY OF ARMIT LAKE, PORCUPINE MOUNTAINS

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GENERAL

Armit Lake is a fairly small lake lying close to the Saskatchewan border in the Porcupine Mountains Forest Reserve and occupying the greater portion of Township 41, Range 29 West, at Latitude $52^{\circ} 33'$ North, Longitude $101^{\circ} 35'$ West. The largest lake in this area, it is roughly rounded with an average diameter of three miles and no greatest dimension over five miles.

Access in summer is by airplane. No roads or trails lead to the lake, the closest suggestion to such being the narrow cleared zone marking the Manitoba-Saskatchewan border. The Armit River cannot be considered a navigable stream, even to canoes, because of its small size and very numerous small rapids. It is accordingly not surprising that during this investigation not the slightest sign of the presence of man was seen anywhere about the lake, other than the border zone referred to.

Biological investigations were carried out from June 3 to June 14, 1952, camp being established at a point about midway down the western shore. Transportation to and from the lake was by Manitoba Government Air Service aircraft.

TERRAIN AND LAND VEGETATION

The land about the lake consists of very gently rolling hills, few of which attain a height of more than fifty feet. The slight hollows or valleys between them are very commonly marshy or wet. Either level may occur at the lake, so that the land may either slope steeply into the water, or grade into it fairly evenly. The few beaches that occur are located in the latter areas, so that though the beaches may present attractive landing areas, they are not suitable for camp-sites.

Geologically the land is part of the Manitoba escarpment, belonging to the Riding Mountain Formation, and consisting of grey and greenish-grey shales with numerous clay ironstone deposits. This structure was, however, not seen at any point about the lake, the ground being uniformly covered

with a thin soil and vegetation; the only uncovered rock seen being boulders, cobbles and pebbles of considerably varied nature at the water's edge or in the rivers, plus occasional deposits of yellow sand on the beaches.

The region is uniformly treed, no clearings being observed at any point. Dominant are the spruces, chiefly black spruce, with an admixture of white spruce. Stands are dense, occasionally very dense, so that these trees were rarely seen with diameters greater than six inches. Shallowly rooted, they are easily upset by winds and other agencies, so that hung and fallen trees in all stages of decay greatly obstruct travel in any direction. Stumps, logs, and ground are alike covered with a dense carpet of mosses of many types, so that the footing is always soft and frequently treacherous.

The shallow valleys, although treed, have the spruces greatly reduced in number and size. Replacing them are alder bushes in frequent clumps, and great tangles of Labrador tea in all directions. The ground level is uneven, with numerous hummocks a foot high and some eight to eighteen inches across, covered, like the surrounding level, with thick soft moss, chiefly Sphagnum. Travel in this territory is preferably on the hummocks, into which one sinks ankle-deep; otherwise you sink thin deep into several inches of water. Such swampy areas are sometimes wetter, and are then marked in addition by growths of marsh grasses, sedges, and marsh marigold.

Travel in this territory is exhausting, and little progress beyond one mile an hour can be expected.

At the lake shore the vegetation becomes more varied. Hills near the water's edge have relatively few spruce; they are clothed instead with poplars, chiefly balsam poplar with a scattering of aspen. All these trees are more widely spaced and commonly reach a diameter of 8 or 9 inches. Between the trees, coarse grasses largely replace the mosses, and there are clumps of raspberry, strawberry, wild sarsaparilla, bunchberry, and similar plants. The lower areas, however, are still marked by small spruce, alder, Labrador tea in quantity, and moss. From a distance then, the lake appears to be rimmed with deciduous trees, except for the low (beach) areas where evergreens are present; beyond the whole picture is evergreens.

A few feet from the water is a narrow zone whose greater light and better drainage permits a greater variety of vegetation. Here occur not only bunchberry, raspberry, strawberry and wild sarsaparilla, but also highbush cranberry (very stunted).

wintergreen, current bushes, alder, buttercups, and most common of all, Equisetum, dandelion and false Solomon's seal. None of these occur in large clumps.

One white birch was noted at the water's edge on the eastern shore.

PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE LAKE

(a) Size and Shape

These features are best seen on the accompanying sketch map. It will be observed that the lake is very roughly rounded, with an average diameter of 3 miles, an extreme north-south distance of 5 miles, and an extreme eastwest distance of 4 1/3 miles.

The low rounded hills offer little protection from the wind, and since strong breezes were a very common feature at the time of this investigation, white-caps and a strong chop were more often present than absent.

(b) Shores and Beaches

As noted above (Terrain and Land Vegetation), hill and valley alike march down to the water. Whether steeply or gently sloping, however, the picture is much the same; trees and lesser vegetation to the edge, with a sudden drop of 18 to 24 inches marked by a line of granitic boulders up to 3 feet in diameter. These boulders continue into the water usually to a depth of about 8 feet and a distance of about 20 feet from the shore; like the cobbles and pebbles mentioned below, they are bright and clean, without adherent silt, weed, etc.

In very low areas, where alder and Labrador tea come down to the water, the shore may be marked with a tiny stream or seep, or may be in the form of a sand and cobble bank whose nature is obscured by the covering growth of the lesser vegetation mentioned above. This drops off sharply twelve or fifteen inches usually to a sand beach of modest extent.

A brief account of the individual beaches follows, starting from the northern-most point of the lake and progressing in a clockwise direction.

Beach A, one mile down the eastern side of the lake from the northern most point, extends 150 yards, with an

average width of 4 feet. Of good quality sand, bright and clean as with the other sand beaches, it includes some gravel at the water's edge. The ground level behind it is low and swampy, with a very small trickle or seep of brown bog water making its way to the lake.

Beach B. half a mile south, is the largest and most attractive beach on the lake. A quarter of a mile long and up to 25 feet wide, it is a clear expanse of excellent clean sand. The land behind is again low and drained by a fair sized river, dealt with below.

Beach C. the easternmost point of the lake, is a pebble beach, the stones being of uniform size but very varied nature - granite, diorite, quartz, limestone, chert, ceresite, muscovite, hornblende, etc., all clean and bright. It extends some 200 yards, with a width of 4 feet, continuing into the water for 6 feet out, where cobbles rapidly replace the pebbles. Only traces of sand are to be seen. The ground behind is slightly above lake level and bears the mixed vegetation characteristic of such fringing zones, as mentioned above.

Beach D. is in reality two small sand beaches close together, of quite limited extent, the more northerly receiving a small seep from the swampy area to the east.

Beach E. another half mile south, is somewhat larger, measuring about 150 yards long and 4 feet wide. The ground behind it is relatively free from swamp, and fairly steep.

Beach F. still farther south, is small- 100 yards long and no more than 3 feet wide - but of good quality sand. A small river runs through it from the swampy area behind.

Beach G. is a mere sand rim 10 yards long and 2 feet wide. Beaches H and I. in the south-west area of the lake, are very similar. All three have low-lying areas behind them, and the last received a very small stream.

Beach J. at the campsite area selected on the west side, is 100 yards long and 4 feet wide, of good quality sand, with frequent areas of gravel and occasional cobbles, particularly at the water's edge. It is backed with a sand and cobble bank 12 to 15 inches high, completely

overgrown with a varied vegetation, as given above. The land behind this is again low, with numerous alders, Labrador tea, etc., as previously noted.

Beach K. a mile farther north, is precisely similar to the last.

Apart from these somewhat unimpressive beaches, the shores of the lake are everywhere of the same general character; treed areas sloping fairly steeply to the water, with a drop-off of 18 to 24 inches which is marked by granite boulders.

(c) Inflowing Streams

Inflowing streams are small, sometimes very small, and uniformly consist of dark brown slow-running swamp water. In order, clockwise, from the northern end they are as follows:

River L, at the northern extremity, is 12 to 15 feet wide, and has an average depth of 2 feet, although this depth fluctuates greatly. The dark brown, all-but-motionless water flows over a boulder and muck bottom, with frequent tangles of debris. Sagittaria and water lily clumps are occasional, particularly near the mouth. The banks are simply a slight drop-off from the surrounding land, marked sometimes by stands of sedges. As with the other rivers, the waters are greatly shaded by the surrounding trees.

At Beach A, there is a seep of swamp water some 5 inches wide and 2 to 3 inches deep, with very slight flow as noted above.

River M flows into the lake at the south end of Beach B. Greatly shaded by trees, it is 18 to 25 feet wide, 3 feet deep, and flows at approximately 1/2 m.p.h. The water is the usual dark brown relatively lifeless swamp water. A sand bar across the mouth is continuous with the beach to the north. The river bottom is the usual silt and debris.

Topographical maps show a definite river running into the lake at Beach D, in the easternmost area of the lake. This is actually just a small seep draining a swamp, whose 8 inch wide channel was quite dry at the time of these investigations.

Another small river runs into the lake at Beach F. Following a sinuous course, it varies from 4 to 6 feet wide, with a depth of 1 to 2 feet. The water is dark brown swamp water, and the bottom silt, with numerous tangles of boles and branches; the flow is just perceptible. Alders line the banks and nearly meet over the water. Sedges form a sparse edging, varied at intervals by marsh marigold. Occasional small clumps of short Sagittaria occur on the bottom. A sand bar across the mouth reduces the channel to 20 inches wide and 3 inches deep, so that the speed is increased to 3 m.p.h. The whole aspect of the stream is gloomy and dank.

A very similar river flows into the lake at Beach I, in the south-west area. Six to 8 feet wide and 2 to 3 feet deep, the dark brown water flows at 1 m.p.h. over a silt and debris bottom. Alders shadow the water and meet completely over the mouth, further obscured by a sandbank, so that the river is all but invisible at distances beyond 25 feet. The flow into the lake is a mere trickle.

River N flows into the lake farther west, near the Manitoba-Saskatchewan border. Again the mouth is highly inconspicuous, screened by a fringe of sedges and a boulder barricade over which the boat has to be lifted. Within this screen, the river is 15 feet wide and 3 to 4 feet deep, dark brown and all but motionless; after a hundred feet, however, the water narrows abruptly to 20 inches - far too narrow for a boat - while still remaining deeper than three feet. On either side are sedges, grasses and moss, with an occasional bush to be seen in the distance; but this vegetation is a floating mat, firm yet too unstable to walk upon. The valley-like appearance thus produced is about 50 feet wide, and stretches away into the bush - obviously a backwater of some size previously.

River O, crossing the border from Saskatchewan one half mile west of the Armit River flows into the lake by an obvious mouth. Nine feet wide, it has an average depth of four feet, though in many places this is reduced to two feet. The water is dark brown but clear swamp water, with no perceptible current, and flows over a silt and organic detritus bottom littered with many sunken trees and branches. Near the lake this bottom is covered with Sagittaria and Vallisneria, but farther upstream these are replaced by scattered clumps of Nymphaea.

Myriophyllum and, less frequently, Potamogeton perfoliatus. The water's edge is marked by a belt of sedges 1 to 2 feet wide, beyond which the land is low and marshy, with only small and widely-scattered evergreens for a hundred yards on either side of the river; the only approach to an open area around the whole lake. Because of this more open character, the river is rather more favorable for animal life than the other inflowing streams, and a number of pike were easily observed.

(d) Outflowing Streams

The only exit from the lake is the Armit River, arising in the far western area. The origin is screened by a stand of giant bulrush growing in 2 to 3 feet of water, beyond which the actual aperture is marked by a boulder ridge some 30 feet across, and stretching some 20 feet from bank to bank. Many of the rocks of this ridge project above the water, while the remainder are covered by 6 to 12 inches of water, necessitating careful carrying of the boat. Beyond this the river flows directly north for 200 yards, with a depth of 2 feet and a width of 20 feet. On each side there is a solid band of bulrush and sedges 15 feet wide which merges with the land.

Further downstream the river narrows to 6 feet and follows a sinuous curve between masses of Equisetum, then abruptly widens to a small lake 900 feet long, 120 feet wide and 3 to 5 feet deep. This is solidly edged with sedges and bulrushes. Downstream from this the river is 50 feet wide, but very soon narrows and takes on its typical appearance as follows:

Width, 20 to 25 feet, and depth, 3 to 4 feet, shallowing at edges. Speed, approximately 1/2 m.p.h. over a bottom composed chiefly of sand or gravel, with occasional scattered boulders and sunken tree boles. This picture is interrupted approximately every hundred yards by rapids, usually thirty to forty feet long with a drop of two to three feet, the water bubbling and splashing in depths of 2 to 6 inches among boulders and cobbles; the first of these numerous rapids is, however, considerably larger, with a drop of six feet extending over a distance of 100 feet.

Most of the quiet stretches between the rapids possess an area where the water is deeper and current is minimal. Such pools are some twenty feet in diameter and three to four feet deep in the centre, with a sand bottom on which may grow occasional sprigs of

Potamogeton spp. to a height of 4 inches.. Submerged boulders and cobbles bear a luxuriant growth of algae and long strands of a true moss, Philonotis, in addition to great numbers of Helicopsygid and Leptocerid nymphs (Trichoptera). In many cases there are banks of silt deposited at the edges of such pools, very soft and sharply marked off from the sand bottom. These bear heavy growths of sedges of various species, every submerged leaf and stem being covered with Simulium (blackfly) larvae and pupae, with numbers of small Chironomid larvae. Rarely, molluscs were found in these silt areas; Sphaerium sulcatum, Lymnaea stagnalis jugularis, Pseudosuccinea columella and Physa ancillaria being most common. The characteristic faunal picture of the river, however, is immature Trichoptera and Simulium, with occasional pike (Esox lucius).

The banks of the river in all areas is simply the land with its characteristic flora, with a steep drop-off of one to four feet to the water's edge, this being marked by a thin fringe of alder bushes. The least difficult method of travel is wading in shallow water near the shore line. The water is clear and greenish-brown, exactly like the lake water in all respects.

(e) Water level and depth of water

At no point were trees or bushes found standing in the water, nor was there any indication that present land areas had suffered any prolonged submergence. This, together with the notably sharp margin of the lake, indicates a relatively stable lake with the water at normal high; fluctuation are probably of slight extent, judging by the nature of the inflowing and outflowing streams.

The lake is moderately deep, readings in the central areas consistently falling between thirty and fifty feet, with no shallows or reefs being noted from the air. Depths lessen steadily towards the west, north and east shores, but remain with but little change until fairly close to the southern shore. The accompanying sketch map shows these features well.

(f) Nature of the Bottom

This is characteristically a sand bottomed lake, the sand being clean and firmly packed. Cobbles and rocks are found occasionally in the sand at all depths. A few areas of a soft silty grey mud were found

at the north end, chiefly in shallow water.

(g) Temperature

Relatively few temperature readings were taken, but these were very consistent, regardless of distance apart or depth of water. Surface temperatures ranged from 14.5°C on a day when the air temperature was 23°C , to 13°C when the air temperature was 8.5°C . Bottom temperatures ranged from 12 to 13°C in depths from 12 to 43 feet. It is apparent then that at the time of these investigations the mass of water was at uniform temperature, with no indication of a thermocline. Such stability was probably the result of the almost continuous stirring action of the strong to moderate winds which occurred daily throughout the period spent in the Porcupine Mountains.

(h) Transparency

The water is uniformly clear and greenish-brown, with an average Secchi disc reading of 10 feet 8 inches.

(i) pH, Oxygen

Although restricted in number, chemical determinations were very consistent. Oxygen values from surface samples ranged from 9.1 to 9.55 parts per million, giving saturation values of 85 to 93% when corrected for temperature. Bottom samples from depths of 12 to 43 feet had oxygen contents ranging from 9.1 to 9.3 parts per million, which when corrected for temperature gave a saturation value of 85% in all cases. These figures clearly show the rapid turnover in this lake.

The water is slightly alkaline, all samples top and bottom, having a pH value of 8.1 - another indication of the thorough turnover in the lake. Phenolphthalein titration gave a calcium carbonate equivalent of 3 parts per million, with no further change for methyl orange, indicating then a very soft water. Subjectively the water is quite palatable, with but little flavor.

BIOTA

(a) Emergent and submerged vegetation

As might be expected from the nature of the

shore, emergent vegetation is very limited. The northernmost bays, near River L, have small stands of various species of sedge (Carex), bulrush (Scirpus), arrowhead (Sagittaria) and water-lily (Nymphaea). Bulrushes grow across the mouth of the peculiar little double bay south of Beach G, while sedges are common along the southernmost bay. Sedges and bulrush occur also near Beach I, while a stand of bulrush in 2 to 3 feet of water obscures the origin of the Armit River, as noted above. It will be seen from the map that these various areas constitute but a very small part of the periphery of the lake.

Submerged vegetation is also very scant. Muskie weed (Potamogeton praelongus) was seen in the northernmost bay off the mouth of River L, while a few further strands were picked up on Beach F, together with drying wisps of Canada pond weed (Elodea canadensis), water milfoil (Myriophyllum) and tape grass (Vallisneria). Weed was not found on other beaches. The shallow bay on the west side opposite Beach A was sparingly planted with Vallisneria in two to three feet of water, and pike were frequently seen here. Finally, three tufts of burgy pondweed (Najas flexilis) were taken from the gill net set east of the larger northern island.

(b) Plankton

Planktonic organisms were plentiful everywhere in the lake, with the horizontal surface hauls and the vertical haul at Station A being particularly abundant. Many species of algae, rotifers and crustaceans were represented, the commonest form being the diatom Melosira, followed by Pediastrum and Stephanodiscus.

Details of representative counts appear later in this report in table form.

(c) Invertebrates

Annelids were sparingly represented by leeches. Three specimens of Erpobdella punctata, 25 to 38 mm. long, were found under stones on the pebble beach C, accompanied by numerous Herpobdellid egg capsules. A small specimen of Glossiphonia fusca was found in a white-fish, and a small Haemoris marmoratis was collected at Beach J. Occasional leeches were noted in River L, at the northern extremity of the lake.

Gastropod molluscs and their shells were

moderately plentiful in all areas. Most common was Helisoma antrosea sayi, found at Beaches A,B,C,F and J. Helisoma trivolvis was found less numerously at Beaches A,B,C and F, and also in River O and the Armit River. Lymnaea stagnalis jugularis was collected in two feet of water very near the mouth of River L, in the Armit River, and on Beach F, while two very small Lymnaea were found in a common sucker. Pseudosuccinea columella was found sparsely at Beach F, and in the Armit River. Gyraulus deflectus was found at Beaches B and F, and occurred also in the common sucker mentioned above. Physa ancillaria was found occasionally on Beaches A, B, and F, and in the Armit River, while P. gyrina was found in a whitefish, and two more physids in a second whitefish. Ammicola walkeri was seen at Beach F, while A. limosa was occasionally plentiful in whitefish. Valvata tricarinata was collected at Beaches B and F, while V. lewisi helicoides was found at Beach B, and in the Armit River.

Pelecypod molluscs are scant. No fresh-water clams (Unionidae) were seen at any point. Finger-nail clams (Sphaeriidae) were represented by one or two specimens of Pisidium sp. in a whitefish and three suckers and Sphaerium sp. in four whitefish and one sucker. In addition, one entire shell and five single valves of a relatively very large (15 to 19 mm. long) Sphaerium were collected in the silt areas of the Armit River; almost certainly this was S. sulcata.

Crustaceans other than planktonic forms were extremely rare. A single crayfish, Cambarus immunis, male, 62 mm. long, was found in the drift at Beach J. Two carapaces of crayfish were found on Beach C, a single leg on J. and another on F. No remains were noted in fish. Of smaller crustaceans, one specimen of Hyalella azteca was found in the waterweed Myriophyllum on Beach A.

Insects were varied and abundant in water and on land. Of Ephemeroptera, nymphs of Hexageniids were found in common sucker, whitefish and pike, while tiny Heptageniid nymphs were noted among weed in the Armit River and at Beach J in small quantity. Odonata were represented by numerous adult dragonflies and damselflies, while dragon-fly nymphs were taken from pike on one occasion. Of Hemiptera, the water-boatman Corixa was frequently to be seen in the water in both adult and nymphal form and was a commonplace in whitefish, where it was accompanied by a lesser number of the back-swimmer Notonecta. Water-striders (Gerridae) were common in River L. Diptera swarmed;

mosquitoes were ubiquitous on land and shore day and night and reached levels of extreme nuisance in the evenings, while their larvae and pupae occurred in great numbers in the water-filled holes left by uprooted trees. Immature stages of blackfly (Simulium sp.) thickly covered the submerged vegetation of the Armit River, while moderate numbers of the adults of these and of punkies (Gnucoides sp.) could be collected daily from the human skin. Bloodworms (Chironomidae) were common in the larval stage on the vegetation of the Armit River, while larvae and pupae were occasionally seen in the water near the beaches and were a commonplace in whitefish and to a less extent in common suckers. Largerflies (Lucilia, Calliphora, etc.) collected in quantities when fish examination was in progress.

Beetles (Coleoptera) were not very numerous. A considerable number of small but active forms was noted at Beach B one day, and also at Beach F, accompanied by fair numbers of Coccinellids. Whirligig beetles (Cyrinus sp.) were common in River L and were also seen in small numbers at Beach J. Hydrophilid and Carabid beetles were noted rarely in whitefish.

Trichoptera were not as numerous as might have been expected, although their remains occasionally were found in common sucker and whitefish. Adults in fair numbers were seen at Beach F, while Phryganeid larvae were plentiful in River M. In the Armit River caddis worms were noted in scattered locations; collected were one Brachycentrus, several species of Limnephilids, and one Helicopsyche borealis, all in larval stages, and three Hydropsychid pupal cases. The absence of Helicopsyche along the rocks of the shores was marked.

Lepidoptera - Butterflies were common in the more open areas along the shore. Most plentiful were tiger swallowtails and blues.

Hymenoptera - Wood ants were plentiful in the stumps of fallen trees. The only other Hymenoptera noted were considerable numbers of larch sawfly, Lygaeonematus, at Beach F.

Arthropods other than insects - Spiders in variety were plentiful in dry land areas. Water mites (Hydrachnida) were found in two whitefish.

(d) Vertebrates other than fish

Amphibians - Wood frogs (Rana sylvatica) were noted several times on the eastern shore.

Birds - Not numerous. Sight records included 1 gull, 1 great blue heron, 2 ducks, and several pelicans and common loons. Goatsuckers and several song-birds were heard but not observed. A female ruffed grouse with a brood of seven recently-hatched young was flushed near the campsite.

Due south of the largest island and very close to a salient point of the shore is a small island that is little more than a rockpile twenty feet across and thirty feet long, bearing a few handfuls of grass and scrub. When visited, this was found to carry 9 white pelicans, a pair of common loons and a female duck. A slight search resulted in the finding of a loon nest with one egg and a duck nest with nine eggs, the nests being less than four feet apart.

Mammals - Rabbit and moose sign was common, and moose tracks were frequently seen along the shores and beaches. Red squirrels were numerous on the eastern shore. One wolf was seen, and others heard at night. No signs of muskrat or beaver were noted.

(e) Seine fish

Seining off the sand beaches was quite productive, as the following representative hauls show:

Off Beach J. June 4, 1952: Net carried out 40 feet by boat

261 Ninespine stickleback, Pungitius pungitius, 35 to 56 mm. long
17 Johnny darter, Boleosoma n. nigrum, 27 to 39 mm. long
12 Spottail minnow, Notropis h. hudsonius, 21 to 61 mm. long
8 Perch, Perca flavescens, 39 to 44 mm. long
2 Sculpins, Cottus cognatus, 32 to 36 mm. long
2 Blacknose minnow, Notropis heterolepis, 27 to 28 mm. long
1 Common sucker, Catostomus commersonii, 47 mm. long

Off Beach F. June 9, 1952: Net carried out by wading

479 Common sucker, 41 to 76 mm. long
266 Spottail minnow, 43 to 83 mm. long
12 Blacknose minnow, 28 to 53 mm. long
10 Perch, 42 to 69 mm. long
1 Ninespine stickleback, 49 mm. long
2 Longnose dace, Rhinichthys c. cataractae, 31 to 53 mm. long

These were the best hauls, and no other species were secured. Examination of samples of these forms showed a heavy parasite load. Ten percent of the sticklebacks carried the large larval liquid Schistocephalus in the body cavity. The majority of the perch had metacercariae in the skin, and nearly all carried the parasitic copepod Ergasilus on the gills. The shiners (Notropis spp.) also were very heavily infested with Ergasilus; one spottail was found to have a Ligula in the body cavity, another had a metacercarium in the skin. Metacercariae were noted also on some of the common sucker.

(f) Larger fish

Gill-net operations were somewhat hampered by frequent bad weather, but nets set in different regions of the lake for a total of 50 net-hours resulted in the capture of 62 whitefish (Coregonus clupeaformis), 49 pike (Esox lucius), and 6 common sucker (Catostomus commersonii), or 117 fish in all. Bait casting at odd moments yielded 17 pike and 1 whitefish, the latter foul-hooked.

In addition, one of the pike taken by net (AR 88) contained the head and shoulder regions of a small fish estimated to have been 5 inches long. Although well digested superficially, the mouth and gill rakers were clearly indicative of a lake herring (Leucichthys, sp. non det.). No other specimens were taken.

In all, then, 135 fish of three species were taken, plus the remains of the lake herring.

The whitefish were small, ranging from 7 ounces to 3 pounds 4 ounces, with most running from 1½ to 2½ pounds. The condition of these fish was fair to good, though few had more than a moderate quantity of fat. The diet was predominately insect, with smaller quantities of molluscs.

The pike ranged generally from 1 lb. 2 oz. to 12 lbs. They were in fair to excellent condition, usually with very good amounts of fat. The diet was almost entirely fish, with occasional insect remains being noted.

The common sucker ranged from 1 lbs. 7 oz. to 2 lbs. 7 oz. They were in good to excellent condition

with fair quantities of fat, and had been feeding on insects and molluscs.

Tabled accounts of these fish will be found following.

(g) Parasites

The parasite load of the whitefish was heavy. Proteocephalus was an usual fairly common in the intestine, but far more important were the muscle cysts of Triaenophorus. Few fish were without three or four of these, while one specimen contained over thirty. Species of these parasites were E. coregoni and T. crassus.

The pike presented the usual heavy load of Proteocephalus pinguis, Triaenophorus crassus, Triaenophorus nodulosus, and Raphidascaris canadensis. Eight specimens contained the plerocercoids of Diphyllbothrium in the musculature.

Of the common sucker, four contained thorny-head worms of the genus Pomphorhynchus, one a primitive tapeworm Glaridacris, while the last was free of intestinal parasites. None had muscle cysts.

The parasitic load of the seine fish has already been dealt with.

(h) Predators

Pelicans and loons were frequently seen, while gulls and great blue heron were also noted. No other predators were observed.

FIELD NOTES

Armit is a productive lake, with very good plankton and insect life. Whitefish and pike are plentiful; in this regard it should be noted that angling was almost entirely restricted to a hundred yard stretch 30 to 50 feet off shore, just south of the camp site, with the pike biting freely on all occasions. And as noted before, pike were often seen in the shallows of the bay on the west side, opposite Beach A. Finally, pike remains were often seen on the beaches. It is of course unfortunate that the pike and whitefish were so heavily infested with Triaenophorus.

The unfavorable terrain, the mosquitoes and other blood-sucking pests, and the difficult access indicate that this is not likely to become a popular angling lake/it^{is} further species of fish were introduced.

Lake ARMIT

Date June 6th, 1952.

Weather Slight haze

Wind West, 2 m.p.h. Sun Bright, at 1:15 p.m.

Aerial Temperature - 23°C

Station ----- A
 Depth----- 16 ft. 9 ins.
 Bottom----- sand and cobbles
 Turbidity----- 10 ft. 8 ins.
 Surface Temp.--- 14.5°C
 Bottom Temp.--- 12°C
 Temp. break----- Nil
 O2 bottom----- 9.3 c.c.
 O2 Surface----- 9.55 c.c.
 pH bottom----- 8.1
 pH surface----- 8.1
 Plankton surf.--- Vertical haul
 12-15 ft.----- very thick
 bottom-----
 REMARKS-----
 Bottom of hard packed sand

Station-----
 Depth-----
 Bottom-----
 Turbidity-----
 Surface Temp.---
 Bottom Temp.---
 Temp. break-----
 O2 bottom-----
 O2 Surface-----
 pH bottom-----
 pH surface-----
 Plankton surf.---
 12-15 ft.-----
 bottom-----
 REMARKS-----

LAKE ARMIT

Date June 14th, 1952.

Weather Overcast, with rain. Wind, NW, 12 m.p.h. Sun, Nil at

Station----- B
 Depth----- 43 ft.
 Bottom----- sand
 Turbidity----- too rough
 Surface temp.--- 13°C
 Bottom temp.--- 12.5°C
 Temp. break-----
 O2 bottom----- 9.2 c.c.
 O2 surface----- 9.225 c.c.
 pH bottom----- 8.1
 pH surface----- 8.1
 Plankton surf.--- Horizontal haul
 12-15 ft.-----
 bottom-----

Station----- C 7:30 a.m.
 Depth----- 12 ft.
 Bottom----- sand
 Turbidity----- too rough
 Surface temp.--- 13°C
 Bottom temp.--- 13°C
 Temp. break-----
 O2 bottom----- 9.1 c.c.
 O2 surface----- 9.1 c.c.
 pH bottom----- 8.1
 pH surface----- 8.1
 Plankton surf.--- Vertical haul
 12-15 ft.-----
 bottom-----

REMARKS-----

REMARKS-----

PLANKTON ANALYSIS, ARMIT LAKE

<u>Genus</u>	<u>Horizontal Haul, Station B.</u>	<u>Vertical, Station A</u>	<u>Vertical, Station C.</u>
<u>Bacillariaceae</u>			
Fragillaria	X	X	X
Asterionella	X	XX	XX
Tabellaria	X	XX	X
Stephanodiscus	XXX	X	X
Navicula	X	X	
Melesira	XXXX	XXXX	XXXX
Diatoma	X	X	X
Synedra	X	X	X
Surirella	X		
Pleurosigma		X	
Cymatopleura		X	
Amphora	X	X	
Campylodiscus	X	X	
<u>Cyanophyceae</u>			
Anabaena	XX		
Clathrocystis	X	X	XX
Oscillatoria		X	X
<u>Proteococcales</u>			
Dictyosphaerium	X	X	X
Pediastrum	XXX	X	X
Betryococcus	X		
Dictyosphaeropsis	X	X	
Coelastrum	X		
<u>Confervales</u>			
Ulothrix			X
<u>Protozoa</u>			
Ceratium	X	X	X
Dinobryon	X		
Verticella		X	
<u>Rotifera</u>			
Keratella	XX	X	XX
Rattulus	X	X	X
Notholca	X	X	X
Stephanocera	X		XX
Synchaeta			XX
Floccularia	X		X
Conochilus	X		XX

PLANKTON ANALYSIS, ARMIT LAKE (cont'd)

<u>Genus</u>	<u>Horizontal Haul, Station B</u>	<u>Vertical, Station A.</u>	<u>Vertical, Station C</u>
Crustacea			
Daphnia	x	x	x
Bosmina	xx	x	x
Diaptomus	x		xx
Cyclops	x	x	x
Holopedium	x		x
Chydorus			x
Diaphanosoma	x		
Nauplii	x	x	x

xxxx Predominant forms

xxx Very common
x Occasional

xx Fairly numerous

FISH RECORD, ARMIT LAKE

No.	Spinal Length inches	Weight lb.-oz.	Age, years	Condition	Alimentary contents	Parasites
<u>Whitefish, Coregonus clupeaformis</u>						
	11 1/8	0-13	5	fair-no fat; male	two 1" fish; sphaerid; Glossiphonia; hydrachnids; much insect debris, esp. Corixa & Chalcids	c. 20 sm. med. tw.; sm., 4 lg. <u>Triacnopho</u> cysts.
	13 1/4	1-7	8	fair-no fat; female	Many Amnicola, Hexagenia, Corixa; Notonecta & other insect fragments; Sphaerium, hydrachnids.	2 tw., 4 <u>Triacnopho</u> cysts.
	13 1/4	1-10	10	fair-no fat; male	insect debris	c. 40 med. sm. tw.; 3 <u>Triacn. cysts</u>
	14 1/2	2-2	11	fair, no fat; female	gt. quan. Corixa nymphs, insect debris	3 <u>Triacn. cy</u>
	15	2-4	9	fair-little fat female	many trichop. larvae, Notonecta, 1 Physa, 1 Amnicol.	15 med. tw.
	14 1/2	1-14	10	fair, little fat; male	Fish eggs, carabid, Notonecta, Amnic., Corixids, much insect debris;	6 <u>Triacnoph</u> cysts
	14 1/4	1-14	11	fair-little fat; female	Nil	c. 50 med.
	11 1/2	1-0	9	fair-no fat; female	insect debris	6 <u>Triacn. cy</u> 4 <u>Triacn. cy</u>
	15 1/2	2-14	15	good, fair fat;	insect debris	6 <u>Triacn. cy</u>
	16 3/4	3-4	17	good, fair fat; female	compl. filled with Amnicola;	v. many sm. med. tw.; 3 <u>Triacn. cyst</u>
	16 1/2	3-1	16	good, some fat	1 Hexagenid, 6 Trichopta, 2 Physa, much insect debris;	4 <u>Triacn. cy</u>
	15 1/2	2-9	16	good, some fat	Hydrophilid, carabid & other beetle remains, 2 ad. ichneumons; insect debris, in quant.	3 <u>Triacn. cy</u>
	15	2-8	16	excellent; fat scant	many bloodworms, insect remains; 1 sphaerid	v. many sm. med. tw.; 1 muscle cyst, mm long
	12 3/4	1-9	14	excellent; fat fair	as last, with 4 sphaerids	15 <u>Triacn. cy</u>
	13 3/4	1-15	15	excellent, no fat; female	insect debris	v. many sm. & tw.; 5 <u>Triacn. cysts</u>
	12 3/4	1-10	14	good, no fat; male;	Corixa nymphs, some insect debris	3 med. tw.; 5 <u>Triacn. cysts</u>
	8 7/8	0-7	8	Good, no fat; female	Full of insect debris;	Nil

FISH RECORD, ARMIT LAKE (cont'd)

	Spinal length inches	Weight, lb.-oz.	Age, years	Condition	Alimentary contents	Parasites
<u>Pike, Esox lucius</u>						
8	21 1/2	2-14	13	✓ excellent, good fat;	1 5" fish; fish meal;	gt. number of 1 med. & sm. tw.
11	20 1/4	3-0	10	✓ excellent, good fat;	NIL	9 Raphidascari
				female		c. 150 med. & sm tw.
12	23 3/8	3-13	13	✓ good, fat scant;	NIL	packed with tw
				male		4 Raphidascari
13	22 1/4	3-10		✓ good, fat scant;	2" fish, Hexagenid	packed with tw
				male	nymph, fish meal	
14	23	3-10	13	✓ good, fat scant;	little fish meal at	packed with tw
				male	rectum	Raphidascaris
15	21 1/2	3-14 1/2	9	✓ good, moderate fat;	as last	20 tw.; 33 Rap
				female with massive		
				ovary		
16	22 3/4	3-11 1/2	13	✓ good, moderate fat	7" fish-coregon-id;	packed with sm
					much fish meal	tw.; 17 Raphid
17	22 1/4	3-4	13	✓ good, fat good	tiny amt. fish meal	packed with tw
18	23	4-5	11	✓ good, fat scant	8" whitefish, 2"	packed with tw
					leech, some fish	
					meal	
19	23	4-2	13	✓ good, fat scant	little fish meal	24 tw.
20	21 3/4	3-8	12	✓ good, fat fair	small fish; fish	packed with tw
					meal	12 Raphidascari
21	14 3/4	1-2	9	✓ good, fat fair	one fish, 3/4"	6 tw.; 24 Raph
22	31 1/2	12-0	15	✓ excellent, v. fat	NIL	packed with tw
						4 Raph.; 1 Dip
						on tail
23	29	8-11	12	✓ excellent, v. fat	2 odonate nymphs	c. 50 tw.; 4
24	27 3/4	8-7 1/2	15	✓ excellent, v. fat	whitefish, est. 12 1/2";	packed with tw
					fish meal.	Diphylllobothr
25	21 7/8	3-14	13	✓ good, mod. fat	sm. amt. of fish	packed tw.; 6
					meal	Diphylllobothr
85	15 3/4	1-4	8	✓ excellent, fat scant;	a little fish meal	packed with tw
86	24 1/2	4-6	11	✓ excellent, no fat	NIL	c. 50 tw.; 5 D
87	20 1/4	2-9	9	✓ excellent, fair fat;	little fish meal	v. many tw.; 4
88	20	2-12	10	✓ excellent, fat good;	1 5" Leucichthys &	4 tw.; 1 Raph
					much fish meal	2 Diphyllobot
89	23 1/4	4-12	11	✓ excellent, fat fair;	whitefish est. 9";	24 tw.; 2 Dipl
					fishmeal	

Common sucker, Catostomus commersonii

10	13 3/4	2-1	10	v. good, fair fat;	Psidium, insect egg	NIL
					trichopt., debris;	

FISH RECORD, ARMIT LAKE (cont'd)

	Spinal Length inches	Weight lb.-oz.	Age, years	Condition	Alimentary contents	Parasites
<u>Common sucker, Catostomus commersonii (cont'd)</u>						
26	13 1/2	2-0	10	excellent, v. good fat; insect debris;	moll.	1 Glaridacris
27	14 7/8	2-6	10	good, fair fat	insect debris	c. 50 Pomphorhynch
28	14 3/4	2-5	10	good, slight fat	insect debris, trichopt & blood worms.	c. 40 "
95	12 1/8	1-7	7	fair, no fat	debris	1 Pomphorhynchus
96	14 1/2	2-7	10	good, fair fat	debris, half full	c. 20 Pomphorhynch

DETAILS OF OTHER FISH TAKENPike, Esoc Lucius

<u>Ref. No.</u>	<u>Spinal Length inches</u>	<u>Weight lb.-oz</u>	<u>Ref. No.</u>	<u>Spinal Length inches</u>	<u>Weight lb.-oz</u>
AR 33	24	4-9	AR 76	17	1-10
AR 34	23 1/2	3-14	AR 77	18 1/4	2-4 1/2
AR 35	24 1/4	4-5	AR 78	21	3-2
AR 36	29 1/4	8-1	AR 79	24 1/4	4-6
AR 37	21	3-8 1/2	AR 80	22 3/4	3-13 1/2
AR 38	23 3/4	4-0 1/2	AR 81	22 1/2	3-14
AR 39	25 1/4	5-1	AR 82	18	2-0
AR 40	26	5-0	AR 83	24	4-4
AR 41	24 1/4	4-8	AR 84	20 1/8	2-8
AR 42	21 1/2	3-12	AR 97	20 1/4	2-13
AR 43	21 1/4	3-3	AR 98	20 1/2	3-0
AR 44	23 1/4	3-8	AR 99	19 1/2	2-10
AR 45	23 1/4	3-14 1/2	AR 100	22 3/4	4-3
AR 46	23 1/8	3-10	AR 101	22 3/4	3-11
AR 47	20 1/4	2-11	AR 102	22 1/2	3-2
AR 48	21 3/4	3-3	AR 103	23 1/4	4-1
AR 49	22 3/4	3-11	AR 104	18 3/4	2-2
AR 70	30 1/4	9-6	AR 105	23 3/4	4-11
AR 71	30	10-2	AR 106	22	3-5
AR 72	16 1/4	1-8	AR 107	22	4-0
AR 73	14 1/2	1-3	AR 108	23 3/4	4-2
AR 74	20 3/4	3-8 1/2	AR 109	19 3/4	2-11
AR 75	19 3/4	2-2			

Whitefish, Coregonus clupeaformis

AR 50	14	1-12	AR 113	13 1/2	2-0
AR 51	13 3/4	1-9 1/2	AR 114	14 1/2	2-2
AR 52	14 5/8	2-0 1/2	AR 115	13 1/2	1-10
AR 53	13 7/8	1-14	AR 116	15 1/4	2-4
AR 54	13 3/8	1-8 1/2	AR 117	12 3/4	1-8
AR 55	14 3/4	1-15	AR 118	12 3/4	1-11
AR 56	13 3/8	1-9 1/2	AR 119	9 3/4	0-9
AR 57	13 1/2	1-12 1/2	AR 120	11 7/8	1-3
AR 58	13 1/2	1-10	AR 121	12	1-3
AR 59	14 1/2	2-4	AR 122	13 1/4	1-10
AR 60	16	2-13	AR 123	11 3/8	1-1
AR 61	15 1/2	2-11	AR 124	13 7/8	1-15
AR 62	14 3/4	2-0	AR 125	13 3/4	2-4
AR 63	14	1-12 1/2	AR 126	14 3/4	2-6
AR 64	14	1-12 1/2	AR 127	13 3/4	1-12
AR 65	13 1/4	1-8 1/2	AR 128	14	1-13
AR 66	12 1/4	1-4	AR 129	15 1/2	2-7
AR 67	15 5/8	2-8	AR 130	15 1/4	2-7
AR 68	13 1/4	1-12	AR 131	11 1/4	1-0
AR 69	14 1/8	1-15	AR 132	11 3/4	1-2
AR 110	13 3/4	1-14	AR 133	11 3/4	1-3
AR 111	12 3/4	1-10	AR 134	13 3/8	1-9
AR 112	12	1-2	AR 135	11 1/4	1-2

DETAILS OF NET SETS, Etc.

1. Net set June 4th, 1952, at 12 noon in six to twenty feet of water, offshore from point immediately south of Beach J; raised four hours later; net 4½ x 40 mesh x 45 fathoms.

Catch: 18 fish: 10 pike (AR 11 to 20); 7 whitefish (AR 3 to 9); and one common sucker (AR 10).

2. Net set June 4th, 1952, at 4 p.m. in six to twenty feet of water, offshore from point immediately south of Beach J; raised twenty-four hours later; net 4½ x 40 mesh x 45 fathoms.

Catch: 48 fish: 21 pike (AR 22 to 25 and 33 to 49); 24 whitefish (AR 29 to 32 and 50 to 69); and 3 common sucker (AR 26 to 28).

3. Net set June 8th, 1952, at 9:30 p.m. in ten to twenty-two feet of water, offshore from the east side of the middle island (hence due west of Beach B); raised twenty-two hours later; net 2½ x 40 x 45 fathoms.

Catch: 51 fish: 18 pike (AR 85 to 89 and 97 to 109); 31 whitefish (AR 90 to 94 and 110 to 135); and two common sucker (AR 95 and 96).

4. Taken by plug casting; 17 pike (AR 2, 21, and 70 to 84) and one whitefish (AR 1, foul-hooked).

Beach J at Armit Lake, showing the narrow sand area, with drift, and the low sand and gravel bank, with its varied herbs and occasional spruce. Beyond the beach, poplar and spruce march down to the row of small boulders that mark the water's edge.

Another beach view at Armit Lake, showing the total submersion of the sand area when the wind is blowing.