

A GEOGRAPHICAL STUDY

OF

KEPPEL TOWNSHIP

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by

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I N T R O D U C T I O N

Living by their wits and brawn, early settlers in Ontario hunted, farmed, logged, and fished for the major part of their substance. The forests in many parts (including the Bruce Peninsula) were logged over indiscriminantly. Loss of woods helped to reduce the game, and although land cleared could usually be farmed, in many places serious soil erosion was a consequence of the loss of trees. It follows that there is a problem of correct land use which varies with local physical conditions.

The special trend of geographic field work today is away from the generalizations of the epic to those based on sample studies carried out in detail. Keppel Township is a small area of Southern Ontario. It presents a problem in land use as related to the physical influences. To discuss the particular problem it is necessary to understand the physiography, an understanding which is deepened through study of the geomorphological processes involved. It is necessary also to know something of the evolution of the present land use, or more simply, the history of settlement and opening of the land. Thirdly, the present land use and land capability, resting as it does on the advantages and limitations of the physical conditions and the customs of the settlers, must be analyzed. Finally, the conclusions drawn from such a study can provide the basis for later recommendations of better land use practices.

Part of the field work for the present study was conducted while the author was employed by the Ontario Department of Planning and Development which conducted surveys in the area during the summers of 1958 and 1959. During these two summers the author traversed by foot

most of the cleared areas of the township. Observations noted in the field form the basis of this essay, but reference has been made to a number of publications which supplied most of the historical information, and several more which led to a better understanding of the general physiography. Statistics are derived from Government of Canada publications. All references are listed in the bibliography. Information gained by interview has been incorporated into the text.

The study has been divided into five chapters. Since the environmental conditions of the physical world provide the basis for all man's activity, the physical geography of Keppel Township is discussed first. It is followed by a chapter on the history of settlement which leads to the discussion of present conditions and patterns of man's adaptation to the environment. In all chapters sample studies are included to show either typical or special patterns of the land and its use.

CHAPTER I

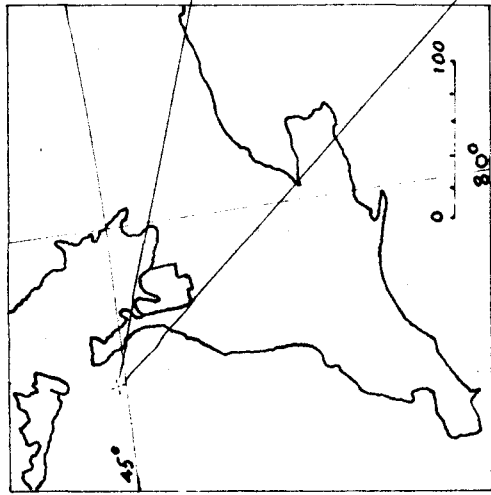
PHYSICAL GEOGRAPHY

1. Location, Size, Shape, and General Condition

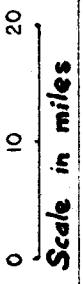
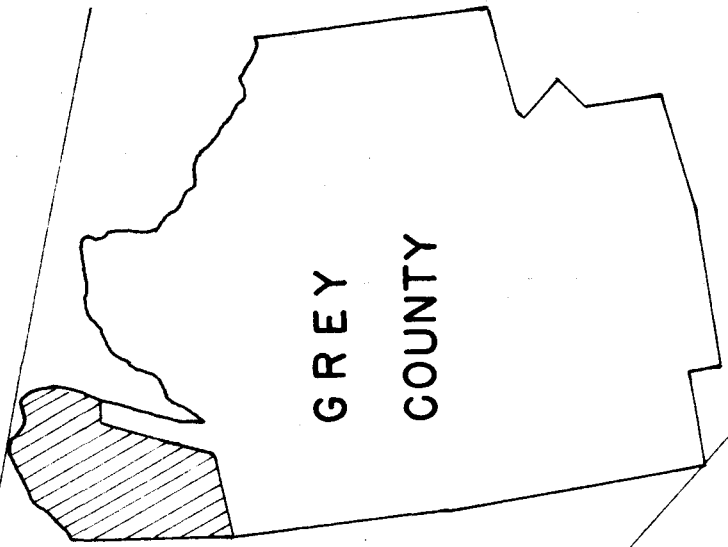
Keppel Township comprises part of the eastern side of the base of the Bruce Peninsula. The waters of Colpoy and Big Bays and Owen Sound, all parts of Georgian Bay, wash its northern and eastern sides. With diminutive Sarawak Township, Keppel forms a broad peninsula in Georgian Bay. To the west, the township boundary is Highway 6 separating Keppel from Amabel Township in Bruce County. The southern boundary, dividing Keppel from Derby township, is a line about one half mile north of and parallel to Highway 21. From a mile south of Kemble, the eastern boundary is a line approximately north-north-east to south-west by south, separating Keppel from Sarawak Township.

Inasmuch as it is considered to be within Bruce County, the town of Wiarton notches into the north-east corner of Keppel Township. Owen Sound, about two miles south-east of the township, is the centre of a sphere of influence which engulfs all of Keppel. Both Wiarton and Owen Sound engage in Great Lakes shipping, bringing the township into close contact with this important activity.

Keppel is the largest township in Grey County. Including Griffith and White Cloud Islands it comprises 84,992 acres, or about 133 square miles. There are (almost exactly) twenty miles of shoreline of a total perimeter of 33 miles. (Perimeter figures from measurement of maps). Within the borders are 11 lakes of which only one, Bass Lake,



KEPPEL
TOWNSHIP



LOCATION MAP

Figure 1

attains any depth. Two others have been drained for a number of years. Three other areas of open water lie within Keppel but do not bear the designation "lake". They are the Slough of Despond to the south-west of North Keppel, the open water at Wolseley, and a pond in the Long Swamp. Of the total acreage, there are some 40,000 acres of bushland.

The shape of the township is essentially rectangular but it displays one important modification. It deviates slightly from the north-south line to a north-east to south-west trend. This condition is partly due to the great influence of the last glaciation when the ice moved over this area in a south-westerly direction gouging deeper the preglacial valleys now occupied by Colpoy Bay and Owen Sound; carving lesser re-entrants in the same direction into the scarp face; scouring the bedrock or depositing its load, all in a north-easterly to south-westerly direction. The impression of this orientation of the township is accentuated slightly by the appearance of the shape of the south-west corner where Highways 21 and 6 meet, forming a slightly acute angle pointing south-west. Further, the survey of the diagonal roads placed them in a north-west to south-east direction, exactly at right angles to the general trend. Thus the side roads between the diagonals run north-east to south-west. This direction of trend is very important and will be mentioned many times in this essay. It can be seen on all the maps showing physical or land use conditions.

Keppel is sharply divided north-south into two levels along a scarp of the Niagara escarpment. Below this scarp lies a generally flat area averaging just below 800 feet ASL.* The edges of this area

* ASL - Above sea level.

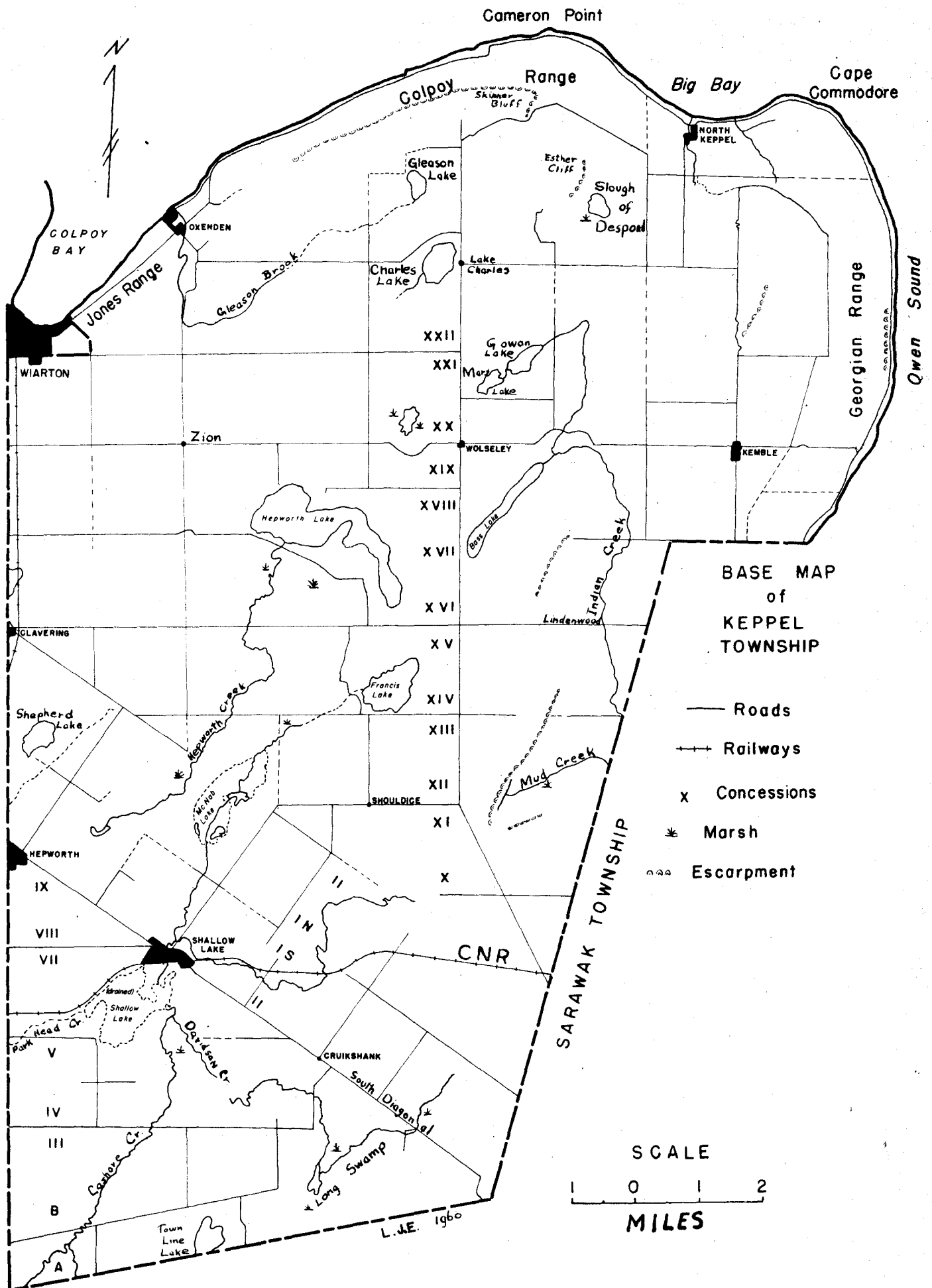


Fig. 2

descend to the shore. Most of the township lies above the escarpment, and, beginning at over 1000 feet ASL in the north-east, the land descends gradually to the west to an elevation of 700 feet ASL. The drumlin field in the south-west stands at about 800 feet ASL.

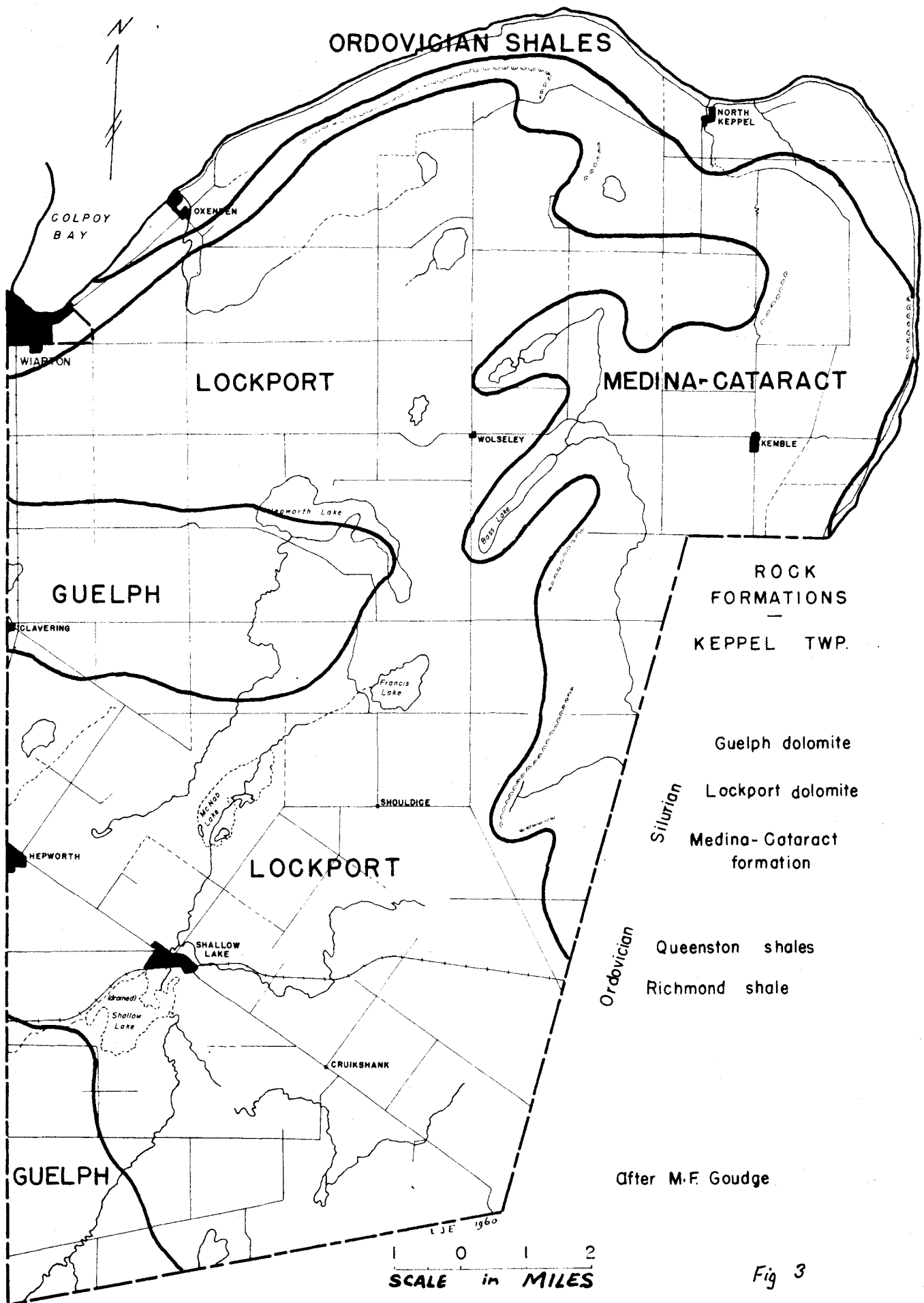
2. Bedrock Formations

Whether it be of distant bluffs or nearby outcrops, of huge limestone fragments or tiny pebbles in till, one of the first observations one makes in Keppel concerns the apparent omnipresence of rock, mostly dolomite. The only exception, and equally arresting, is the appearance of the red shales of the coastal lowlands below the towering cliffs of the Niagara escarpment. To the west and south, away from the edge, rock outcrops become fewer in number owing to the greater accumulation of glacial debris in the forms of drumlins and moraines. At Hepworth, sands of the Algonquin shore hide the bedrock from view.

Immediately behind the lip of the scarp is a strip of land, averaging over a mile in width, where the bedrock dominates the surface, and overburden is confined to shallow depressions. These areas have been included in Land Type 5 (see Chapter 1, part 3) and the land use map, with its large areas of forest and scrub pasture reflecting these features.

While geologists have been very busy investigating Niagara escarpment strata elsewhere in Ontario, no work of much value has yet been published concerning the formations exposed in Keppel. The accompanying map is generalized. (Fig. 3)

The rocks exposed in Keppel Township are of the Ordovician and Silurian periods of the Palaeozoic era. The Ordovician are the older rocks and are composed of soft shales, red in colour, underlying the hard Silurian limestones and dolomites. The formations of the Ordovician shales are the Queenston and Richmond, interspersed with thin,



ORDOVICIAN SHALES

ROCK FORMATIONS
—
KEPPEL TWP.

Guelph dolomite
Lockport dolomite
Medina-Cataract formation

Silurian

Queenston shales
Richmond shale

Ordovician

After M.F. Goudge

0 1 2
SCALE in MILES

Fig 3

insignificant bands of limestone. The red colour of the Queenston shows up strikingly in Keppel, for erosion has been so severe as to strip most of the clay topsoil and to carve great gullies. (Illus. 1)

The boundary between the Ordovician and Silurian rocks is dramatically marked by the Niagara escarpment. The resistant Silurian rocks of the upper strata dip at a low angle to the south-west. The first Silurian sediments formed a group of strata collectively termed the Medina-Cataract formations by Goudge (12). The chief band in the group is the Manitoulin dolomite which shelves out from under the Lockport in the eastern part of Keppel, even to the shore. It too is edged in places by a steep cliff, sometimes nearly 100 feet in height. The Manitoulin is flat-lying, and around Kemble is covered by shallow drift which supports one of the best agricultural districts in the township.

In appearance, Manitoulin dolomite is grey or blue grey, but it stains to a coffee brown. Because of this it is not too desirable as a building stone. A further disadvantage is that it weathers unevenly. Its main use is as rubble or crushed stone, but these uses are not as widespread in Keppel as elsewhere.

Hidden by trees about a mile east of Oxenden, a fairly large open cave has developed in the Medina-Cataract formations. This cave is shaped somewhat like a band shell but is double-domed and partly supported by a remnant column at the gaping entrance, thereby creating two arched openings. (Illus. 2) The openings may exceed 15 feet in height. The cave penetrates no more than 60 feet and narrows slightly



Illus. 1 Great gullies have been cut into the Dunedin clay developed on the Queenston shale in the north of Keppel Township. They often start where cattle have trampled the grass. Note the large boulders, remnants of a once more extensive cover of till.



Illus. 2 The remnant pillar in the opening of Bruce's Cave near Oxenden.

to the back which is a flat wall about 45 feet long. Each of the openings exceeds twenty feet across.

The cave is called Bruce's Cave and there is a curious tale associated with it. Bruce is the only name folks ever knew for the old Scotsman who inhabited the cave. It is thought that he was a fugitive from British army justice, for he was a deserter of the Boer War. Before coming to Canada he hid for a time in the Scottish Highlands. He went to live on the north shore of Lake Huron where he gave his name to the community of Bruce Mines. In time he left and moved to Keppel, to this cave near Oxenden. His winter dwelling was a cabin he had built, but his summer abode was the cave. His few needs were supplied by selling goats' milk and blueberries in Wiarton. His fate is unknown, but some of those who were children during his time can still recall a picture of the solitary Scot.

In several places the contact between the Medina-Cataract and the overlying Lockport formations is marked by a steep cliff averaging about 150 feet in height, and occasionally exceeding 200 feet. The upper surface averages about 900 feet ASL. In colour, Lockport is light brown to grey, and chemically it is fairly pure. Heavily bedded, broken chunks are often conspicuous as huge blocks. It has been used for crushed stone and for building purposes. Lockport dolomite is by far the most extensive bedrock strata in Keppel Township.

Overlying the Lockport, and difficult to distinguish, is the Guelph dolomite seen in the south-west corner of Keppel and in a section west of Hepworth Lake. In colour and uses it is similar to Lockport.

Fossils are common in both the Lockport and Guelph formations.

Three main groups of Silurian limestone-dolomite formations form the bedrock for most of Keppel Township. They are sharply marked from the softer Ordovician shales by the Niagara cuesta. These shales are exposed only as the lowlands of the north and east shores.

3. Physiography

(i) Legacy of the Pleistocene

As part of Southern Ontario, Keppel Township came under the influence of the Wisconsin glaciation. Other glaciations preceded this, but their mark in Keppel has been obliterated. Lobes of the continental ice sheet moved across Southern Ontario in several different directions, but the one which moved across the area now known as Keppel Township, did so in almost a perfect south-west direction. Likely this is due in part to the general trend of the lobe coming from Georgian Bay, and in part to the directional influence on the ice by the pre-glacial valleys now inundated and known as Owen Sound and Colpoy Bay.

In its advance the ice faced the barrier of the Niagara escarpment. This was overridden, and in the process, the ice either gouged out or helped enlarge several re-entrants in the scarp face. One can readily see these on a map and they are located from the north, at Skinner Bluff, the Slough of Despond, Mary Lake, Bass Lake, Lindenwood, and behind Mud Creek. (Fig. 2) In a number of places along the scarp face drift was plastered, but the ice also scoured bare the rock of the upper level for more than a mile back from the lip. To the south-west, various deposits were made in the form of drumlins and moraines.

The drumlins in the south belong to the Arran drumlin field as it is named by Chapman and Putnam (1), and immediately east of Town Line Lake there are curious moraine like features stringing between them.

This is the most north-easterly occurrence of the Tara Strands, also named by Chapman and Putnam (1). Most of the drumlins are quite long (up to a mile), are usually narrow, and vary from gently to steeply sloping along the sides. A steep stoss end is not generally a striking feature. In some instances it appears as though drumlins have been plastered on top of one another, thus suggesting phases of ice retreat and re-advance. Smaller groups of drumlins found at Shouldice and east of Clavering show similar features to those described.

There is not a great morainic belt in Keppel, but one does see a group of small morainic ridges north of Shallow Lake and Cruickshank also north-west of Wolseley. Most of the morainic deposits, however, do not form spectacular topography, being rolling and hummocky rather than hilly.

The only esker the author found in Keppel is located in the extreme south-west. Its highest spots just reach 800 feet ASL, and it is not very long. It can be seen to cross the first concession about one half mile east of Highway 6.

Of similar materials is the ^akame moraine, an outwash deposit associated with ice retreat. There are no significant areas of ^kleame in Keppel, but there is a spotty distribution of fluvio-glacial material in the moraine and drumlin areas. Exposures of kame revealed that, in Keppel, particles vary in size from very fine sands to small cobbles. Stones of limestone origin are more common than those of shield origin, although the latter occur not infrequently.

The texture of drumlin materials varies widely from very fine to very coarse particles. The same range of particle size is true of

the moraines and indeed, where drumlins and morianes are mingled, they are indistinguishable. In the case of drumlins, however, many pebbles are of shield origin, even though limestone particles are the most numerous. In the moraines, particles are almost exclusively limestone, and in many places huge boulders dot the surface. (Illus.13) Sometimes they are so big that it is difficult to differentiate between them and bedrock outcrops. The great number of large dolomitic boulders is evidence of the erosive power of the ice and is also an indication that the source of morainic and drumlin material was not far distant. The limestones of the escarpment were the first available to ice invading Keppel from the north-east.

As the ice sheet re-advanced and retreated several times, extensive areas were flooded. Several substages occurred in the Great Lakes Basin, but those affecting Keppel Township territory were the Lakes Algonquin and Nipissing substages. The earlier was Lake Algonquin whose shore is marked by the sand dunes at Hepworth, sorted beach gravels north-west of Wolseley, west of Shallow Lake, and on the drumlins at Hepworth Lake. Below the escarpment the waters were contained against its walls and little or no trace is to be found. The Nipissing shore, however, is found only in the eastern and northern parts of the Keppel-Sarawak peninsula. Its beach can be traced along the base of the escarpment to the east of Oxenden where it crosses the mouths of the re-entrants at Skinner and Slough of Despond. It disappears to the east and is next seen at Lindenwood. In contrast to the sandy materials of the Algonquin beaches to the west, the Nipissing beaches are composed of flat slabs of limestone of varying

sizes up to a maximum of about 12 inches across. These shingle beaches are obvious features of the landscape where they occur. The limestone materials indicate that the stones have come from the escarpment and then worked into the beach form by the waves.

A beach cross section of the north shore is to be seen just east of Oxenden. (Illus. 3) The size of particle is related both to depth of water and to wave and current action. The deeper and stiller the water, the finer the particle. Several feet below the surface there is a reddish band about one foot thick. Closer inspection reveals that the colour is largely due to a red clay matrix. It seems likely that the waters attacked the red Ordovician shales, and due to conditions of deposition, the particles were laid down in one particular band. Lenses of coarse sand occur in several places, and there is some contortion, related perhaps to melting ice blocks. In the top layer, larger stones are laid at an angle, with the highest end pointing inland. This condition is associated with sorting in shallow water during the last retreat of the glacial lakes.

The lakes of Keppel occupy shallow depressions which may have been scoured out by ice. In the case of Hepworth Lake, the water is contained by drumlins lining its western shore, rather than by a significant depression in the bedrock. In addition to the lakes, there are several areas of muck lying in shallow depressions. Without exception, the lakes and muck areas are underlain by a marl deposit. A sample of the muck on Concession 4, south-west of Cruickshank, reveals up to 14 inches of black decomposed organic matter. Below this lies a white marl to a depth of 30 inches. Contained in the marl is a



roughly cross -
bedded with larger
stones which point
upward and inland.

well sorted layers
of coarse sands
and gravel.

$\frac{1}{4}$ " to $\frac{1}{2}$ " gravel
held by fine red
clay matrix.

alternate layers
of coarse sand and
gravel, less well
sorted as to size -
no perceptible
matrix.

accumulation of
fallen debris.

Illus. 3 Cross section of Algonquin beach in the
north of the township.

profusion of tiny shells which decrease in number beyond 30 inches where the material is a light buff clay. This profile can be taken as representative and typical.

During the Wisconsin glaciation, the whole of Keppel Township was drastically changed by the ice except for the durable Niagara escarpment. Ice ground over the land from north-east to south-west leaving drumlins, moraines, outwash, scourings, and flutings. Re-entrants into the escarpment also bear the north-east to south-west orientation. Some shallow depressions, perhaps created by ice action, are filled with water or muck and are underlain by marl. Shells appear in virtually all samples which the author observed.

(ii) The Re-entrants

Throughout this essay, continual reference is made to the obvious and important north-east to south-west orientation of land forms. In this regard it is interesting to note the remarkable parallel development of re-entrants into the scarp face from the north-east. Almost in order from small to large, they are found from north to south at Skinner Bluff, the Slough of Despond, Mary Lake, Bass Lake, Lindenwood, and Mud Creek. The increase in size from north to south may be attributed to the increased power of the ice to erode as it advanced up Owen Sound into a more and more restricted area between the arms of the escarpment bluffs on each side of the valley. Being compressed by its own enormous weight and moving into a smaller volume would cause it to burst sideways at particular points of stress or wherever restriction was least. Thus there is the difference in size of re-entrants at Skinner Bluff and Mud Creek. The latter, found to the south, is not only as long as any of the others, but also generally very much wider. Drift was plastered along the sides of the re-entrants, the major deposits being clearly depicted by contours on topographic maps.

It is most important to note that in at least two cases there are deep depressions at the inner ends of the re-entrants. In figure 4, contours showing the depth of Bass Lake indicate a difference of 16 feet between the lowest spot of 44 feet and the average depth of 28 feet. This is a deep hole in a small area in limestone strata where there is no sign of any structural depression. The inference is that the hole is an erosional depression. The author has no data on

depths in the Slough of Despond, but on a traverse through the wet forest, a series of steps in the limestone bedrock were descended to the water's edge. This observation leads one to think that this depression is also erosional and is analagous to the development of the depression at Bass Lake. Similar situations can be conjectured for the re-entrants at Skinner Bluff where the inner muck area is definitely depressional, and to Mary Lake which appears deeper than Gowan Lake owing to the absence of marsh and the presence of steep rock sides descending below the surface.

Not only is it important to note the erosional depressions, but significant too is the position of the other lakes in relation to the re-entrants. A straight line drawn between Gleason Lake and the Skinner Bluff re-entrant assumes a north-east to south-west orientation. Likewise Charles Lake is just south-west of the Slough of Despond; the water at Wolseley and Hepworth Lake is immediately south-west of Mary Lake; Francis, McNab, and Shallow Lakes, all joined by streams, lie south-west of Bass Lake; the Mud Creek re-entrants is just north-east of a small muck area drained by a tributary to Park Head Creek.

The emerging pattern leads to the suggestion of an hypothesis. At one time water poured over the lips of these re-entrants, something in the fashion of Inglis Falls above Owen Sound. Thus the erosional depressions were created, and will now be referred to as remnant plunge pools.

The theory may appear deceptively simple on the surface but there are several problems involved. The most difficult is the question of the source of sufficient water to create these plunge

pools, and the level differential required for the falls to develop since the glacial lakes were at the same elevation both east and west of the escarpment. The best answer to the first part of this problem was suggested by Mr. D. C. Ford, and later worked out more fully.

In its active and aggressive advance over the area, the great thickness of ice, facilitated by the probable plasticity of its lower layers, easily overrode the escarpment. The ice sheet became increasingly thin during its waning stages, and eventually a break would appear along the line of the escarpment, allowing the main ice to continue melting northwards through Georgian Bay while a large chunk of ice was left stranded above the escarpment. The dead ice covering Keppel above the escarpment would continue melting and its waters would gradually become channelled and plunge into the re-entrants as falls. Eventually, the ice would be all melted and only lakes, dammed up behind drumlins and located in other depressions would supply the water. Some falls would undoubtedly receive more water than others by this arrangement, but it is impossible here to say which ones. In any case, the melting ice supplies the water required in this theory, and the level differential is the escarpment.

Another problem arises concerning the position of the plunge pool within the re-entrant. For instance, the Slough of Despond is some distance beyond the lip of the "falls". It seems to be the only re-entrant where this problem arises seriously. If one were to postulate a pre-glacial falls at that (and perhaps other) re-entrants, this problem could be largely answered.

The lip was formerly at the edge of the pool but was ground back by the glacier itself. In this sequence, the plunge pool would

already be in existence. Meltwaters would flow over the lip now removed back from the depression and they would not contribute to the further development of the pool. The greater width and rounded end of the Slough of Despond re-entrant imply that meltwater fell over a wider segment of the lip, therefore dissipating its energy and reducing its capacity to erode and to create a plunge pool. This contrasts with conditions at Bass Lake where the falls would be more concentrated due to the narrower re-entrants. Another limiting factor in the development of a plunge pool by meltwaters at the Slough of Despond is the possibility of decreasing volume of water from the dead ice, for as the ice melted it would recede from the scarp. The fact is that the slope at the Slough is not sheer, indicating that there was not enough time and enough water to erode away the base to form a cliff.

A final question arises in that although the theory holds that there was drainage through the re-entrants from the lakes behind, in fact, today these lakes all drain south-west, away from the re-entrants. The answer to this problem lies in the effect of uplift of the north-eastern part of the Keppel-Sarawak peninsula, thus causing the drainage to revert from the outlet at the re-entrants to a south-westerly flow, following the changed incline of the bedrock.

In Figure 42 of his book, J. L. Hough (3) shows that uplift has indeed occurred along a north-west to south-east line, thus giving maximum relative uplift in the north-east of Keppel. He shows that the area has risen 150 feet since Algonquin times.

At the present time, the drainage has not succeeded in emptying completely the very shallow lakes whose outlets are now to the

south-west. The lakes and marshes are backed up against glacial deposits, and since there is no drainage outlet, they cannot be developed easily.

In order to account for the erosional depressions in the bedrock of the scarp re-entrants, the theory put forward is that they developed as the plunge pools of waterfalls. Perhaps some one or all of them started pre-glacially. At any rate, meltwaters had a great effect in modifying the re-entrants and except in the Slough of Despond, probably aided in deepening the depressions. There was a more concentrated waterfall at Bass Lake in immediate post-glacial times. Eventually uplift of the north-east, relative to the south-west, caused the natural drainage to reverse directions. Natural drainage of the lakes and marshes is not yet complete.

4. Hydrography

Keppel Township embraces within its borders eleven or fourteen lakes depending on whether or not one includes the open stretches of water in the Long Swamp, the nameless waters at Wolseley, and the Slough of Despond. Town Line Lake receives its name from its position astride the Keppel-Derby township boundary and is the only water body which protrudes slightly across the borders. In size these lakes vary from the 525 acre surface of Hepworth lake down to those much smaller--Gleason Lake and the tiny ponds remnant in drained Shallow Lake.

Certain similarities among the lakes are apparent. All of them tend to be more or less elongated in a north-east to south-west direction, with the exception of Gleason and Hepworth lakes. However, their lowlands and marshlands draw out their shapes to correspond to the common orientation. Without exception, all the lakes have stony marl bottoms overlain by woody detritus of varying depths. The composition of the marl is similar throughout, being a mixture of clay and calcium carbonate with numerous small shells. Another common feature is the marked shallowness of these lakes. The deepest points of Francis and Hepworth Lakes are only 7 and 5 feet respectively, while their average depths are 4 and 3 feet. One important exception to the rule is Bass Lake which is 44 feet at its deepest and have an average depth of 28 feet. (Fig. 4) It will be noticed that Francis Lake is deepest in the middle while Bass Lake is deepest at its southern end. This has been referred to in some detail in the previous section.

Plants found commonly at the margins include such species as

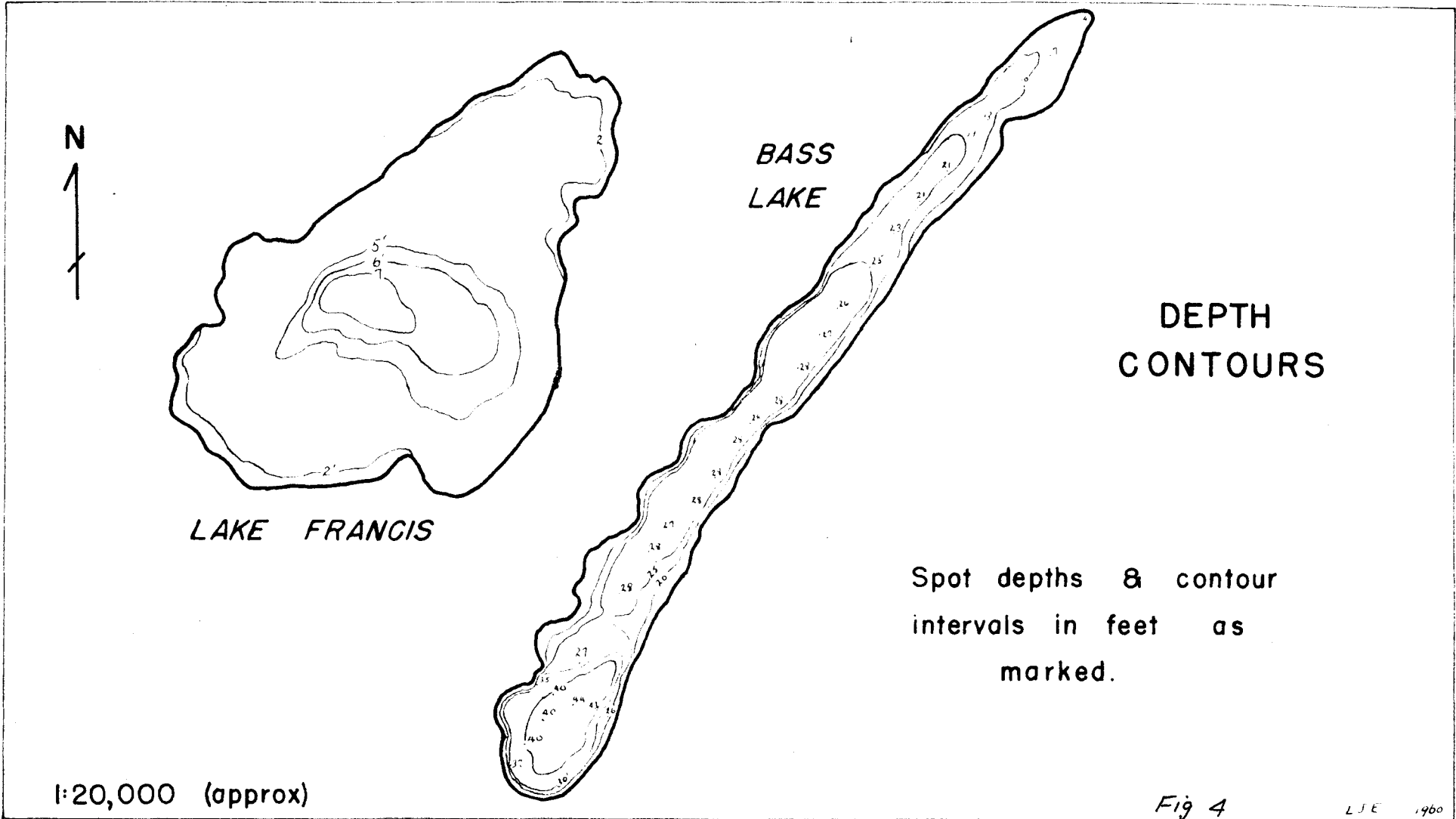
the bulrush, stovewort, and waterweed. The maximum surface temperature of Francis and Hepworth Lakes is 64°F while that of Bass Lake is 70°F. The minimum temperature of Bass Lake is 45°F, while Francis and Hepworth both freeze in winter.

Several water bodies have no apparent outlet, their level being maintained by evaporation and internal drainage, probably through fissures in the bedrock. Included in this group are Shepherd, Town Line, and Charles Lakes, the Slough of Despond, and the water body at Wolseley. All these have some periodic outlet except Charles Lake and the Slough of Despond. All other drainage resolves into three main systems. Streams above the escarpment flow mainly south-west. The smallest system is Gleason Brook which drains Gleason Lake, flows south-west over a shallow rock bed and enters a swamp south of Oxenden. From here the brook flows north through Oxenden to Colpoy Bay. Above the swamp it is dry in the summer but is permanent below. The brook has supplied power for at least three mills in the history of Oxenden.

The next most important drainage system is that of Indian Creek rising principally at the outlet of Bass Lake but receiving, as tributary, water from Gowan Lake, Mud Creek, and several small streams. Indian Creek drains south through Sarawak Township and into Owen Sound at Balmy Beach.

The most important drainage of all is to the Sauble River which never enters Keppel. The main creeks are Hepworth, draining Hepworth Lake; Park Head, draining from Lake Francis through McNab and Shallow Lakes; Cashore, rising just south-west of the township and flowing north-east to join Davidson Creek which drains the Long Swamp.

27



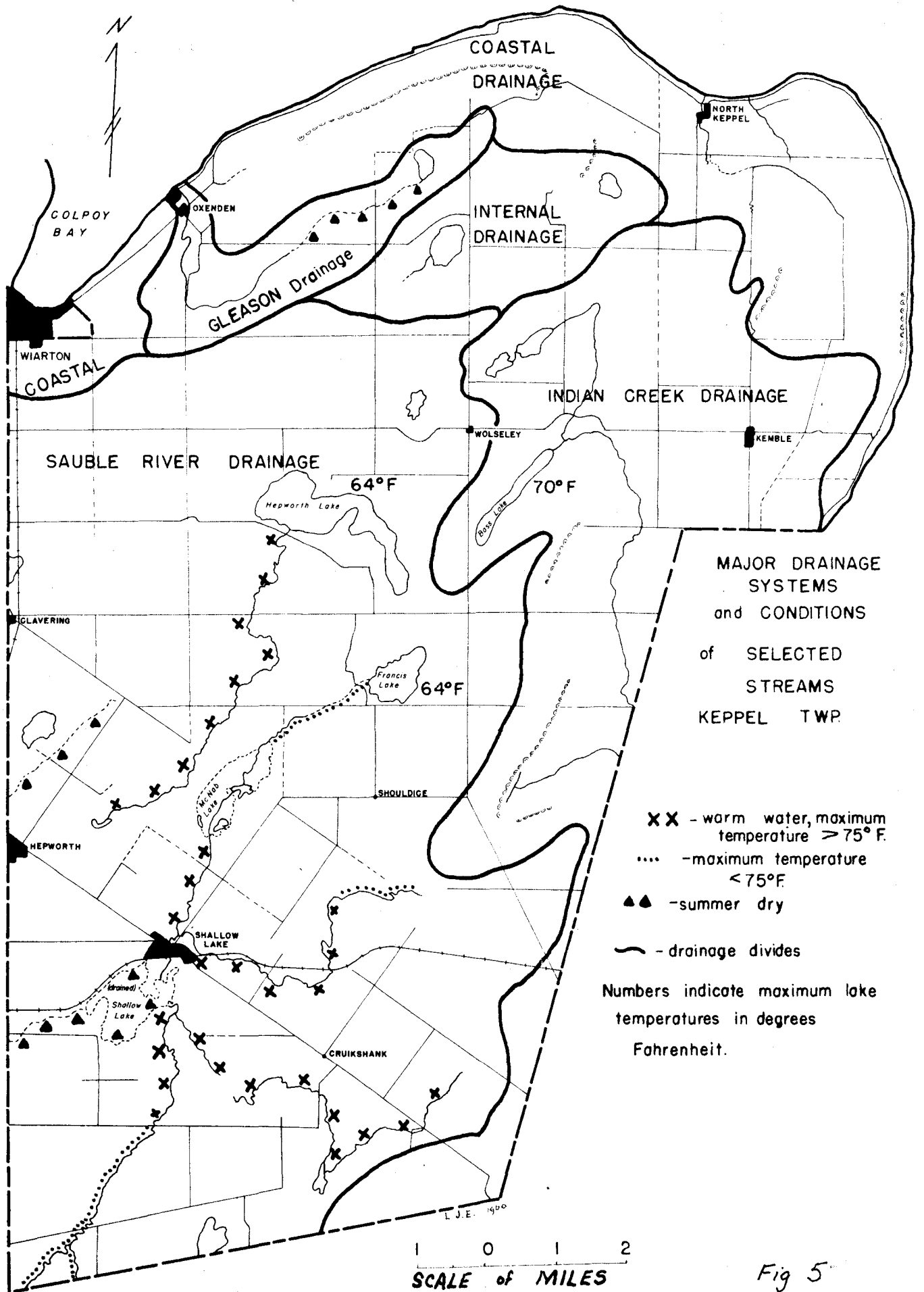


Fig 5

These last two creeks rise in the higher land of the south and flow north into Shallow Lake, through its system of ponds, and eventually out through Park Head Creek.

Finally, there are two other areas of drainage which do not fall into one of the major watersheds described above. The area marked internal drainage (Fig. 5) has within its orders Charles Lake and Slough of Despond. For the low level maintained by Charles Lake in recent years there is no active outlet. The water in the Slough of Despond is gathered in a depression and lies behind a prominent raised beach of the Nipissing Lakes. The area of coastal drainage is a region of small streams rising as springs at the escarpment face and finding their ways to the water.

None of Keppel's streams have very steep gradients and they often become lost in swamps. The steepest gradients are those of Gleason Brook in its lower course and the essentially obsequent drainage of the very small streams draining to the coast.

Just east of Hepworth there is an unusual occurrence in that Hepworth Creek sinks underground. It is not seen again but the assumption is that the waters travel underground to the Sauble River. Davidson Creek also sinks underground at a point just west of Cruickshank, but reappears shortly. It seems to pass under till deposits rather than flow through joints in the bedrock.

Early in 1959 the Sauble River Watershed Authority constructed a permanent dam at the outlet of McNab Lake. This restored its former level and the hope is that the wildfowl and fish populations will be restored to their former numbers. Both Shallow Lake and McNab Lake

were drained years ago in order to make accessible the marl bottoms for purposes of making cement. When new methods of cement making were developed, putting the local companies out of business, the lakes were never refilled.

Keppel Township has numerous shallow lakes with marly bottoms, and are oriented north-east to south-west in every case. There are three main drainage systems draining the lakes and lands of Keppel. One flows north to Colpoy Bay, one east to Owen Sound, and one west to Lake Huron.

5. Land Types and Soils

The classification of land types is based upon groups of soils. The types, whose distribution is shown in Fig. 18, are reflected in land capability. As it turns out for Keppel Township, type 1 comprises soils of till origin only, while types 2, 3, and 4 comprise soils of varied origin. Type 5 designates the most unfavourable areas such as muck, marsh, marl, bottom land, and rather large areas of shallow soil with limestone outcrops.

A quick comparison of Keppel soils with those in more southerly parts of the province reveals that there are no first class soils in the township. It follows that Land Type 1 should not be misunderstood and taken to mean first class land, except in relation to lands of this township.

The standards applied by which the many soil types were reduced to several land types are conditions of drainage, texture, structure, slope, degree of erosion, stoniness and boulderiness. The author's personal judgment based on observation has influenced the classification. Inherent fertility was also considered but is of lesser importance as artificial fertilizers can change any fertility conditions provided the farmer is willing to incur such cost.

There follow two descriptions of the land types. The first is generalized, indicating the major conditions of each type. The second briefly describes the conditions of each major soil within the type. Profiles of two soil types are discussed in more detail.

GENERAL CONDITIONS OF LAND TYPES

- Type 1 well-drained; slopes generally favourable to cultivation; stoniness varies but sometimes land has been improved by clearing; inherently fertile.
- Type 2 well to imperfectly drained; artificial drainage successful where needed; stoniness varies but is not a great problem; inherently fairly fertile.
- Type 3 includes sandy and gravelly soils at one extreme and heavy clays at the other; sands suffer imperfect drainage or are susceptible to erosion; gravels and tills are stony with steep irregular topography; clays are heavy, blocky but are stonefree and sometimes respond to artificial drainage; fertility is best on the clays.
- Type 4 heavy, poorly-drained soils not too responsive to artificial drainage; land use restricted to forest and poor pasture.
- Type 5 mucks; marl; marsh; bottom lands; escarpment; rocky land.

CHIEF SOILS* OF THE LAND TYPES

Land Type 1

- Harkaway silt loam - well-drained; texture, structure and slopes vary but often are favourable to cultivation; much land improved by stone clearance; erosion not too serious; inherently fairly fertile.
- Vincent silty clay loam - well-drained; varying slope conditions; very few stones; quite fertile; favourable structure; erosion not serious.

Land Type 2

- Wiaraton loam and silt loam - imperfectly drained (this condition does not always obtain in the areas mapped by the soils survey.); artificial drainage usually successful; favourable slope, structure, and textural conditions; stoniness not serious; fairly fertile; no erosion. (member of Harkaway catena).
- Kemble silty clay - imperfect drainage (Vincent catena); favourable conditions same as listed for Vincent, barring drainage.
- Elderslie silty-clay loam - imperfect drainage but responds to artificial drainage. Its only other fault is that it is often heavy to work.

Land Type 3

- Tioga sandy loam - well-drained; usually gently sloping; subject to severe erosion by wind but can be checked by careful practices; low inherent fertility; stonefree.

* All soils are those named by the Ontario Soil Survey Report 17.

- Brady sandy loam - imperfectly drained; level topography; responds to artificial drainage; low natural fertility; stonefree; little erosion.
- Dunedin clay - well-drained; moderate to steep slopes; severely eroded in Keppel; low inherent fertility; essentially stonefree.
- Osprey loam - well-drained; topography is usually irregular steeply sloping; very stony and bouldery; fairly productive where fields have been cleared, but clearance is a Herculean task.

Land Type 4

- Granby sand - poorly drained; smooth gently sloping; stonefree; no erosion; infertile.
- Morley clay - poorly drained; smooth gently sloping; usually stonefree; heavy, blocky structure; infertile, severely eroded.
- Lily loam - poorly drained; level depressional topography; very stony and bouldery.
- Parkhill loam - very poorly drained, but productive if artificial drainage can be employed; moderately stony; level to depressional topography.
- Donnybrook sandy loam - well to excessively drained; irregular, often steep slopes; very stony; susceptible to severe erosion; low inherent fertility.

Land Type 5

- Bottom Land (and steep banks) - low areas adjacent to streams which are subject to flooding and are usually poorly drained; sometimes stony; any steep banks which occur

are conveniently included; main land use is permanent pasture or tree growth.

- Marsh - under water most of the year; sometimes stony.
- Muck - commonly more than 12 inches of decomposed organic matter overlying marl, clay, or bedrock.
- Breyphen - a land type named by the soils survey; numerous outcrops of limestone bedrock with shallow pockets of soil between them; topography varies from hilly with steep slopes to undulating; often excessively drained.
- Escarpment edge - sheer vertical rock wall.

Harkaway silt loam

Where slope and stony conditions are favourable, the Harkaway soil comprises one of the soils of Land Type 1. It is the well-drained member of the Harkaway catena, and is an intergrade between the Grey Brown Podzolic and Brown Forest Great Soil Groups. Developed on medium textured limestone till, its profile is shallow, the C horizon never appearing deeper than 20 inches. A description of the profile follows (after Soils Survey Report 17).

- A₁ - 0-4 inches; silt loam; very dark brown; fine granular structure, very friable; pH--6.9
- B₁ - 4-9 inches; silt loam; brown; medium nuciform structure; friable; moderately stony; pH--6.7

- B₂ - 9-15 inches; silt loam; yellowish brown;
medium blocky structure; pH--7.2
- C - loamy till; pale brown; calcareous.

These profile characteristics vary from place to place, sometimes exhibiting more similarities of one or another of the great soil groups of which it is an intergrade. It will be noticed that there is no A₂ horizon described. This condition, plus the shallow profile, testifies to reduced weathering of this soil, a characteristic of the Brown Forest soils. However, since there is some evidence of translocation of particles, the soil also resembles the Grey Brown Podzols. Owing to the chemical nature of its parent material, Harkaway is quite calcareous, and never needs lime in agriculture.

Tioga sandy loam

The Tioga series is found in Keppel on the sand plain of the Algonquin beach at Hepworth. It is well-drained soil of fine, sandy texture which is subject to erosion by wind.

- A₁ 0-1 inch; sandy loam; dark greyish brown;
granular structure; pH--6.0
- A₂(p) 1-3 inches; sand; light grey; single grain;
loose; pH--5.5
- B (p) 3-8 inches; sand; dark yellowish brown; weak
granular structure; pH--7.2
- A₂ (GBP) 8-12 inches; sand; light yellowish brown;
single grain structure; pH--7.3
- B₂ (GBP) 12-15 inches; sand; brown; weak crumb
structure; pH--7.4
- C sand; light grey; calcareous.

Illus. 4. Harkaway silt loam.

Note the shallow profile, the uneven depth of profile development, the till stone fragments.

A₁ --
 B₁ --
 B₂ --
 C --



Illus. 5. Tioga sandy loam.

Note the double profile, the uneven depth development.

A₁ --
 A₂(p) --
 B₂(p) --
 fire layer --
 A₂ (GBP) --
 B₂ (GBP) --
 C --



It will be noticed that there is a double profile in this soil, (p) referring to podzol characteristics, (GBP) to grey brown podzol characteristics. A₂(p) and B(p) are usually accompanied by a grey or black layer due to the ashes of burned material, the result of a forest fire in 1919. The fire layer appears at different depths depending on the amount of accumulation of wind blown particles above it. It has completely disappeared from blow-outs where there is no profile development at all. Agriculturally, Tioga is not a good soil because it is subject to blowing. However, with care, it can be used in places for cultivation and pasture. Strict controls are essential, for cattle trampling often starts a blowout.

Broad Patterns of Land Types

The distribution of land types over the township reflects the north-east to south-west trend characteristic of all distribution in Keppel. It is another manifestation of the influence of glaciation. Land Type 1 is found chiefly to the west, often on drumlinized topography. Type 2 has three main concentrations, the south-west quarter, the north-west near Wiarnton, and the north-east around Kemble. Type 3 is found mainly to the west of the north-south road through Wolseley locally called the Centre Road. Type 4 comprises the poorly drained eroded clays of the north-east and the very rough morainic topography between Shallow Lake and Shouldice. Type 5 is the most extensive, and is seen in its general relationship to occupy a broad band from the north shore right to the southern boundary. Elsewhere it appears associated with marsh, muck, and rocky lands.

The significance of the distribution of land types is shown best by the concentrations of land use. The analysis of the land use patterns is in a following chapter.

The land type classification devised for Keppel is one based more on the physical characteristics of soils as related to land capability than on physiographic divisions. Land type boundaries therefore coincide only in part with the boundaries of materials of different origin. The classes of land are related only to the soils of Keppel. Conditions of each soil type in each group are indicated, and two soils are discussed in detail. Patterns of land types show the general north-east to south-west trend. A quick glance at the map reveals the preponderance of poorer types of land. The land use pattern closely reflects the soil pattern.

6. Climate

Of the major influences governing the climate of Keppel, the two most important are its location between $44^{\circ} 32'$ and $44^{\circ} 52'$ north latitude, and its position as part of the Bruce Peninsula between two large water bodies. The moderating influence of Lake Huron is carried by the prevailing westerly and south-westerly winds across Amabel Township and into Keppel at least as far as the escarpment edge. Below the escarpment, the influence of Georgian Bay is felt, but it is less moderating since the waters around Keppel's shore are usually quite cold. The weather is fairly changeable, a characteristic related to the frequency of cyclonic storms passing through the Great Lakes lowland. The prevailing westerlies are variable in direction and intensity.

In general, conditions of climate in Keppel can be seen from statistics compiled for Owen Sound where records have been kept for 54 years. For this purpose, statistics are tabulated. Frost data are listed.

Monthly and Annual Averages of Daily Maximum
Temperatures

Fahrenheit degrees

<u>Year</u>	<u>Jan</u>	<u>Feb</u>	<u>Mar</u>	<u>Apr</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>Aug</u>	<u>Sept</u>	<u>Oct</u>	<u>Nov</u>	<u>Dec</u>
52	28	28	36	50	63	72	78	76	69	56	42	31

Daily Minimum Temperatures

34	13	11	19	31	41	50	56	54	49	39	29	20
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Average Monthly and Annual Precipitation in Inches

35.98	4.0	2.95	2.40	2.2	2.55	2.67	3.05	2.59	3.03	3.17	3.34	4.21
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Snowfall in Inches

126.2	34.2	25.2	14.6	4.2	0.4	--	--	--	--	1.7	12.1	33.8
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Frost Data

Average frost free period - 139 days
 Average last spring frost - May 19
 Average first autumn frost - October 5
 Longest frost free season on record - 165 days
 Shortest frost free season on record - 103 days

It will be seen from the table that the mean maximum temperature is 52°F while the minimum is 34°F. The temperature 42°F is usually taken as critical for plant growth and the growing season is measured as the number of days between occurrences of this temperature, when temperatures are higher. The average frost free period at Owen Sound is 139 days, while the average last spring and first autumn frosts occur on May 19 and October 5. However, ground temperature allows plant growth and cultivation before May 19, for the tables show that the mean maximum temperature passes 42°F in March or April, and the mean minimum reaches 41°F in May. By the same token, October 5 is not the date when plant life becomes dormant, for following that date warm days usually occur. More important is the influence of the wind from over the warmed lake water which does not cool as quickly as the land. The approximate growing season is from April 20 to November 3.

Chapman and Putnam place Owen Sound and Keppel in their Lake Huron-Georgian Bay climatic region (8). About 46% of the possible amount of bright sun is received, and it is cloudy about 50% of the time. In this region there are between 150 and 170 rainy days during the year. The average annual precipitation at Owen Sound is 35.98 inches while 126.2 inches of snow fall annually, adding roughly 13 inches to the rainfall total if the commonly used equivalent of 10 inches snow equals 1 inch rain be employed.

On a climatic map based on the Koppen classification, Owen Sound and Keppel Township fall into the area designated Dfb. This means that it is an area where the winter is severe, the precipitation is well distributed throughout the year and is not deficient, and the

summer is short but warm. Koppen's actual criteria for this symbol are as follows:

- D -- coldest month below 26.6°F .
-- warmest month above 50°F .
- f -- moist
-- precipitation well distributed throughout the year.
- b -- warmest month is over 71.6°F but more than four months are below 50°F .

Keppel's climate has been discussed using climatic data for nearby Owen Sound. It is a moist area receiving adequate precipitation including a great deal of snow. The temperatures are moderate-none recorded above 100°F -and the growing season is roughly 190 days. The growth of long season tender crops is therefore precluded.

The climate is described as a microthermal middle latitude rainy climate with severe winters, or Dfb, according to the Koppen system.

7. Vegetation. Trees.

The type of tree associated^{165 174} which invades any given place is controlled primarily by the soil type and climatic conditions. A combination of these two influences controls the selection of a certain association as dominant. Subsequently, the vegetation exerts a very real control over the further development of soil characteristics. If, as in Keppel, the dominant trees are broad-leaf deciduous, the leaching process in the soils is less marked than in areas of predominant coniferous tree growth. When the forest is cleared, the soil type, and therefore indirectly the vegetation, exerts an influence over the particular land uses which are attempted. Climate in Keppel acts roughly the same upon tree selection throughout, and therefore the chief control is the soil.

According to the boundaries drawn by G. A. Hills (13), Keppel Township is located in a forest site region which he calls the Lake Huron-St. Lawrence River. The dominant association found within this region comprises three species, sugar maple, beech, and hemlock. In Keppel, the incidence of hemlock is less than the general classification would imply, but other types, basswood, white elm, and white ash occur not infrequently. The maple-beech association is found in well-drained areas, particularly on soils whose parent material is some form of glacial till. The tills of Keppel are all highly calcareous. While mature stands on well-drained sites may be of this association, the first trees to invade a cleared area are an association of white birch and aspen (Illus. 6). Since much of the township has been logged and



Illus. 6 Following clearance of the land, the first association of trees to invade well-drained sites is the birch-aspens.

burned, much of the forest is a secondary growth showing the prevalence of aspen-birch group.

The imperfectly drained areas are dominated by a different association comprising elms, soft maples, and ash. White cedar is also to be seen where ground conditions are relatively wet. Of these, the maple soft usually develops best on deep, fine-textured soils, while the elms are more often found on the generally sandy soils.

The distinctly poorly drained sites are characterized by such water-loving trees as cedar, black ash, and silver maple. These are also found commonly along water courses and in marshy areas. In cleared, poorly drained areas, there is a predominant scrub association comprising dogwood, willow, and alder. These are woody shrub trees which are water-loving. They are eventually succeeded by a taller association of trees which are also hygrophytic namely, cedar, black ash, elm, and silver maple.

Different tree associations characterize different areas according to the conditions of drainage, soil texture and climate. In Keppel Township, the climate is uniform, so soil texture and drainage are the chief controls. The maple-beech association characterizes well drained sites, while a soft maple-elm-ash group is commonly seen on imperfectly drained sites. Cedar, black ash, and silver maple are the chief species of poorly drained areas.

CHAPTER II

HISTORY OF SETTLEMENT

Prior to 1855 there was no white settlement in Keppel Township. After arrangements with the Department of Indian Affairs were completed in 1856, the Indians (Ojibway) left the area for the Cape Croker Reserve in Albemarle Township to the north. Lord Bury, then head of this department, gave his family name, Keppel, to the township. In the same year Charles Rankein, first Grey County settler and public land surveyor, began the survey of Keppel. This survey did not include Sarawak Township, as that area had been retained as an Indian reserve in addition to the Cape Croker Reserve. History is therefore responsible for this anomaly where the small township of Sarawak exists without a geographic basis for its separation from Keppel.

For some years Keppel remained attached to Derby Township for administrative purposes. In the early days, travel to the settlements on Colpoys Bay was by water only. About 1863 the north-west to south-east diagonals were opened, the "South Diagonal" being the most travelled from an early date. Cruickshank and Shallow Lake, Keppel's largest community developed along this road.

Rectangular 100 acre lots were laid out along the diagonals and therefore assumed a north-east to south-west trend. These lots are all within the bounds of the two outside diagonal roads. Over most of the rest of Keppel roads and lots were surveyed in standard north-south and east-west directions. Below the scarp in the north and north-

east there are three distinct areas of survey. Between Wiarton and Oxenden lies Jones Range, comprising ten lots tending north-west to south-east as the result of their right-angled abutment on Colpo Bay. This area remained Indian property slightly longer than the rest of Keppel. From Oxenden to Cape Commodore lots of the Colpo Range are laid out in the standard north-south orientation. From one mile south of Cape Commodore to the Sarawak border, lots, numbering 26 in all, are oriented due east-west. This is the Georgian Range. These three names are less referred to now, partly because very few people live on the ranges and much of the land is now essentially idle.

The first sale of land took place in Owen Sound in 1856. The value of lots had been set by the surveyors and were called "upset prices" in order to entice settlers. As people gradually moved in they tended to cluster in the areas of better land thus giving birth to small agricultural communities. The history of Keppel then became largely the history of these communities. The more important are briefly discussed and are representative.

North Keppel

North Keppel prospered at an early date, having both a saw-mill and a grist mill by 1871. By then there was also a school, a blacksmith shop, a dock, a threshing machine which was shared, and weekly mail delivery from Owen Sound. Oddly enough, there was also a very popular singing school. Presbyterian, Methodist, and Congregationalist churches were built, 1874 and 1884. A telegraph to Wiarton was put into operation in 1874.

North Keppel was more than an agricultural community. It

was also the centre of lumbering and fishing activities which since have disappeared. There are no mills in the village now, and the dock is maintained for use by pleasure craft in summer.

Kemble

Kemble grew mainly between 1861 and 1864, and from the start had several activities. At first potash was made to be sold for cash to pay for land. A school and Presbyterian church were built a few years later, and a waggon maker from Hamilton set up shop. A library was founded in 1900 and continued for half a century. Shoes were made in the early days by Clinton Hurlburt who resided in Kemble. He later founded a factory in Preston and the Hurlburt shoes for children became famous. Kemble was the third centre in Ontario to found a branch of the Women's Institute.

The annual Kemble fair is a big event in Keppel, and in 1955 the Township Centennial celebrations were held here.

Oxenden

Oxenden was first an Indian community. In 1862 the land surrounding this community was opened for white settlement, and the village was named Pettmanville after a settler. Later the name was changed to Oxenden, after an English village. A school for white children was built shortly and other construction included an Orange Hall (1866), hotel (1870), telegraph (1874), church (1877), two blacksmith shops, a tailor shop, and a general store. A government dock was built in 1876 and rebuilt in 1897 and 1958. In 1901-02 there were a beet sugar and a cement factory between Oxenden and Wiarton,

necessitating a railway from Wiarton.

Except the general store, all retail establishments are now defunct. Some people are retired, some work in Wiarton. One recent development is a mink farm, started after World War II. From the original pair, there are now more than 700 minks. Furs are sold in New York.

Hepworth

Hepworth developed on the county line at the point of junction with the South Diagonal. From the first the village centred around the hotel, and later a post office and several mills located here.

On the Keppel side of the highway on the southern fringe of the village is a curious old foundation. Inquiry revealed that this is the site of the former Hepworth Silica Pressed Brick Company which made an artificial sandstone block used in large ovens and houses. Several houses in Hepworth are constructed of this material. About 35 men were employed but increasing costs forced the company out of business.

Today Hepworth is an agricultural centre with a bank which is open during regular hours, a post office, several stores and gasoline stations, a chop mill, and two hotels. The village profits in the summer by hotel trade in beverages with vacationers at Sauble Beach and folk from Owen Sound. A type of window blind (on the Venetian blind principle) is produced at present by a company which only recently moved from Burlington where it had been forced to make frequent moves due to rezoning.

Shallow Lake

In 1911, Shallow Lake was incorporated as a village with its

own municipal government. Churches, schools, and a post office were part of the community from an earlier date. There was a hotel and a livery stable which have ceased to function, but a blacksmith shop which also made waggons and sleighs continues today making truck racks and farm necessities.

In 1884 a cement company was formed which utilized marl deposits in the lake bed for raw material. This company brought prosperity to the village for it employed about 250 men. Its location here was the reason that the railway laid a branch line from Park Head through Shallow Lake to Owen Sound. Cheaper cement making processes elsewhere forced the company out of business. (Illus. 7, 8)

The Caesar Woodworking Co. was important at an early date for it shipped weekly loads of basket bottoms to Ontario apple districts and to the Niagara fruit belt. A sawmill still operates in the village.

Communities in Keppel are quite numerous (Fig. 13) but many have declined to the point where they are unimportant. There are two chief reasons for this. One is that the population has decreased substantially. Also the automobile has changed the pattern of life so that the main centres of Wiarton and Owen Sound are easily accessible, and the centres just described as being more important serve only immediate needs. The smaller centres named below are unimportant economically but retain some individuality through continued services of church and school. Grouped together are Clavering, Zion, Wolseley, Lake Charles, Shouldice, Cruickshank, and Lindenwood. Each has its own points of interest historically, e.g. Wilfred Campbell, Canadian poet and author, taught at Zion school 1878-80. Each has its own local



Illus. 7 The shell of one of the buildings of the former Doyle Cement Company at Shallow Lake stands as a monument to the most important industry the township has ever known.



Illus. 8 Such dilapidated structures reveal some of the difficulties which are encountered in the attempt to revive the brick and tile industry.

colour and historical details which need not be presented in a geographical investigation.

It will be noticed that the only wheat mapped in Keppel Township is a field north of Kemble (Fig. 17). In the past, however, wheat has been an important crop. For instance, in 1871, 2,268 acres were planted, yielding some 25,119 bushels, or only about 11 bushels per acre. Wheat acreage increased but the more remarkable increase was in production, for in 1911, 2,919 acres yielded some 75,000 bushels, about 25 per acre. From that date to 1956 the acreage of wheat dropped to 416, and yields per acre also dropped. There seems to be little likelihood that wheat will be an important crop again.

The fate of wheat is the story of some other crops also. For example, peas and beans were once important, yielding as much as 40,362 bushels for the township in 1881. They remained important until after 1911 when the yield was 38,545 bushels. A sharp decline in acreage and production occurred before 1921 so that only 25% of the 1911 amount was produced in that year. For the past 20 years or so, no peas and beans are reported in the census.

Other crops with similar stories of rise and decline are potatoes and turnips. The upswing in agricultural production has been in oats and mixed grain (barley and oats), which can be cultivated more extensively and by machinery. The changes in agricultural production in Keppel as elsewhere, reflect the revolution of agriculture by mechanization which occurred in the 1920's and 1930's and continues at present. While field patterns have limited the efficiency of mechanization in Keppel, machines have nevertheless taken over and the

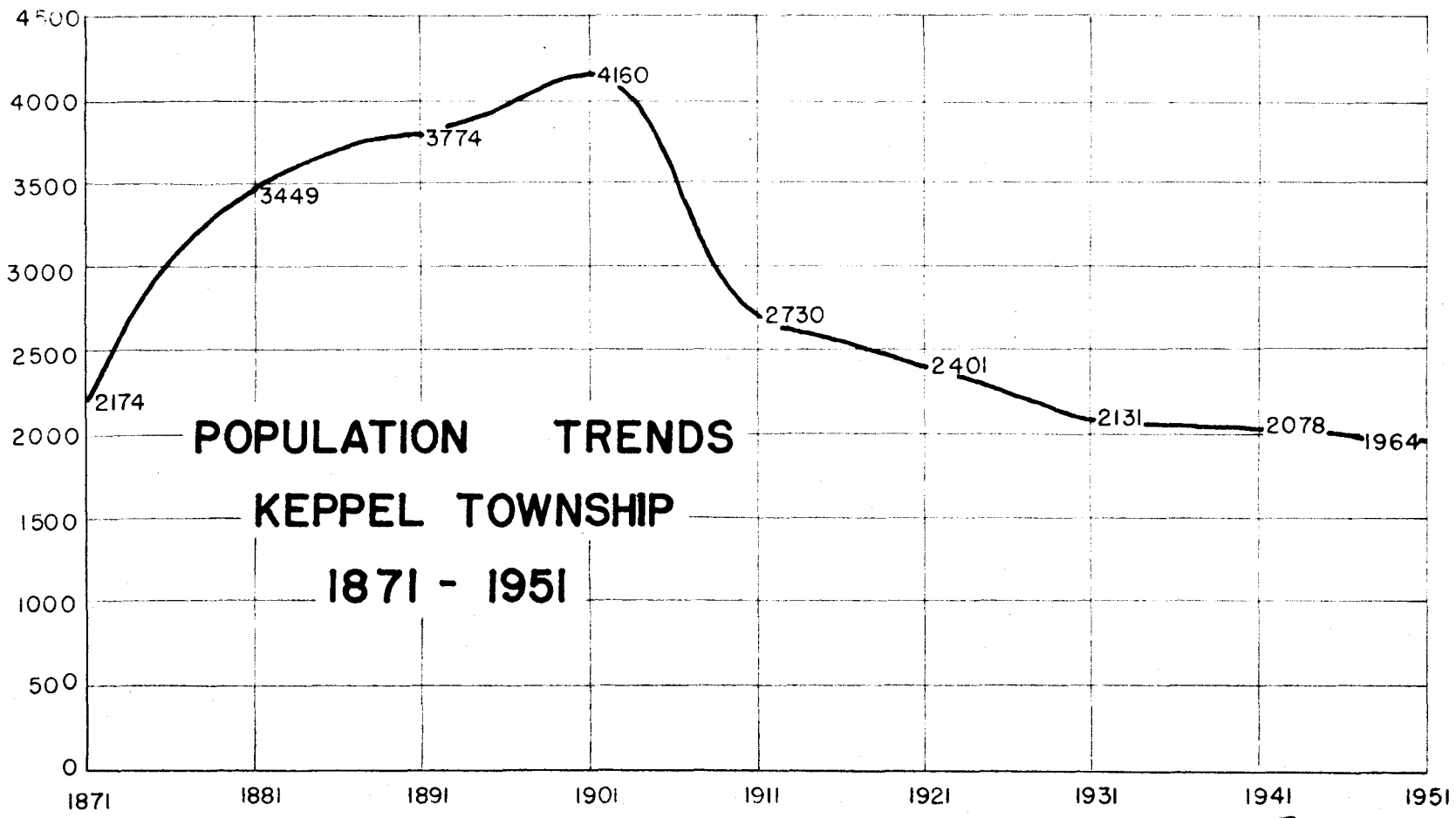
predominant crops, grains and hay, are those which can be produced with the use of mechanized equipment.

As machinery invaded the farm operations, the number of oxen dwindled to nothing and the number of horses greatly decreased. Horses are still used, however, but whereas in 1931 there were 1,531 in Keppel, in 1951 there were only 708, and in 1956, 427. By contrast, the numbers of cattle have increased greatly, pointing up the emergence of an agricultural economy based mainly on cattle. There is an ever increasing proportion of beef over dairy herds. The numbers of cattle increased in 5 years (1951-1956) from 8,536 to 11,811. This livestock emphasis is intimately associated with the change of crop production to the point where there is an overwhelming preponderance of grains and hay. Sheep and poultry have declined in number but swine have remained at a fairly constant figure for the last 30 years. Poultry has declined slightly in importance during recent years.

The people of Keppel are overwhelmingly of British origin. A fair number of Scotch and Irish are found. The only important minority group were the Germans who are few in number today in Keppel, but are found to the south of Grey County. The first reliable census figures are those of 1871 which list the total population at 2,174 persons. This number increased consistently in the next 30 years to 4,160 persons in 1901, after which there was a marked decline which began to level off in the 1920's. The 1951 census listed only 1,964 persons living in Keppel, or fewer than half of the number in 1901. (Fig. 6)

There are a number of reasons for the decline. The early settlers were not only farmers, they were also woodsmen. They cut and logged over their own lots. But there were commercial lumbering

55



POPULATION TRENDS
KEPPEL TOWNSHIP
1871 - 1951

Fig 6



Illus. 9 Abandoned farmsteads dot the landscape of Keppel. (overlooking the Slough of Despond; Esther Cliff can be seen at the left of the photograph.)



Illus. 10 A large stone farmhouse was an ambitious project, but the land could not support its owners. (Construction material is the local bedrock, the Lockport formation.)



Illus. 11 Owing to the rocky nature of the land, one of the most important tools or machines in early days was the stone-puller. The boulder was raised slightly in the middle and then the whole machine was pulled by oxen or horses.



Illus. 12 Evidence of former commercial fishing from Oxenden is now seen in the net shed and drying racks beside the dock. The dock is used for pleasure craft in summer and is maintained by the federal government.

companies throughout "the Bruce" which logged indiscriminantly. Some of the land exposed was so rocky that farming was futile and, robbed of its natural wealth, has been allowed to grow up in a struggling second stand or has been used as scrub pasture.

The fishing industry from Oxenden and North Keppel was important at one time but the catch declined so that now no commercial fishing is carried on and all that remains of the industry are one or two wrecked boats, an old net house and drying racks at Oxenden (Illus. 12), and the wistful tales of old-timers.

Many stone fences are found in the township, most delineating small fields (Illus. 40). They are a testimony to the industry and perseverance of the settlers. Efficiency had to be increased with the introduction of commercial agriculture and mechanization of the industry. The stone fences often prevent this even today, for cost of their removal is exorbitant. With the handicaps of small fields, stony pastures, and the chronic lack of capital, many farmers found that the 100 acre lot was not an economic unit and had to sell out and move. In 1956, only 115 of 383 farms occupied 70-129 acres. Thirty-one more were below this size, but 237 were larger. About 150 farms were between 180-399 acres, averaging better than twice the original lot size. Abandoned farmsteads dot the landscape and are a constant reminder of those who struggled to maintain a way of life but were forced by the economics of their situation to change or to pursue it elsewhere. What is needed is a long term land use programme which will take into account physical and economic factors affecting farm production. Fortunately for Keppel, most of the township has been included within

the Sauble River Conservation Authority through which the government is working on a long term programme of improvement.

Several industries which once existed in the township are now defunct. They are cement, tile, and waggon factories at Shallow Lake, beet sugar and cement factories at Oxenden, shoe and waggon manufacturing at Kemble, and the sand block industry at Hepworth. New industries have not replaced them as a source of employment. Canadian Fractional Motors Ltd., a subsidiary of a German firm, has brought its own skilled workmen. The fur ranches and window blind company are small specialized concerns which provide little employment. The only hope at present lies in the seasonal recreational industry.

Past land use patterns are difficult to change to suit modern demands, therefore, the present carrying capacity of the land is markedly reduced. Since production cannot be increased, the scales must tip and the population be decreased until a balance is reached where people can live by a decent standard. This has largely taken place in Keppel Township, although life still remains an economic struggle for most.

CHAPTER III

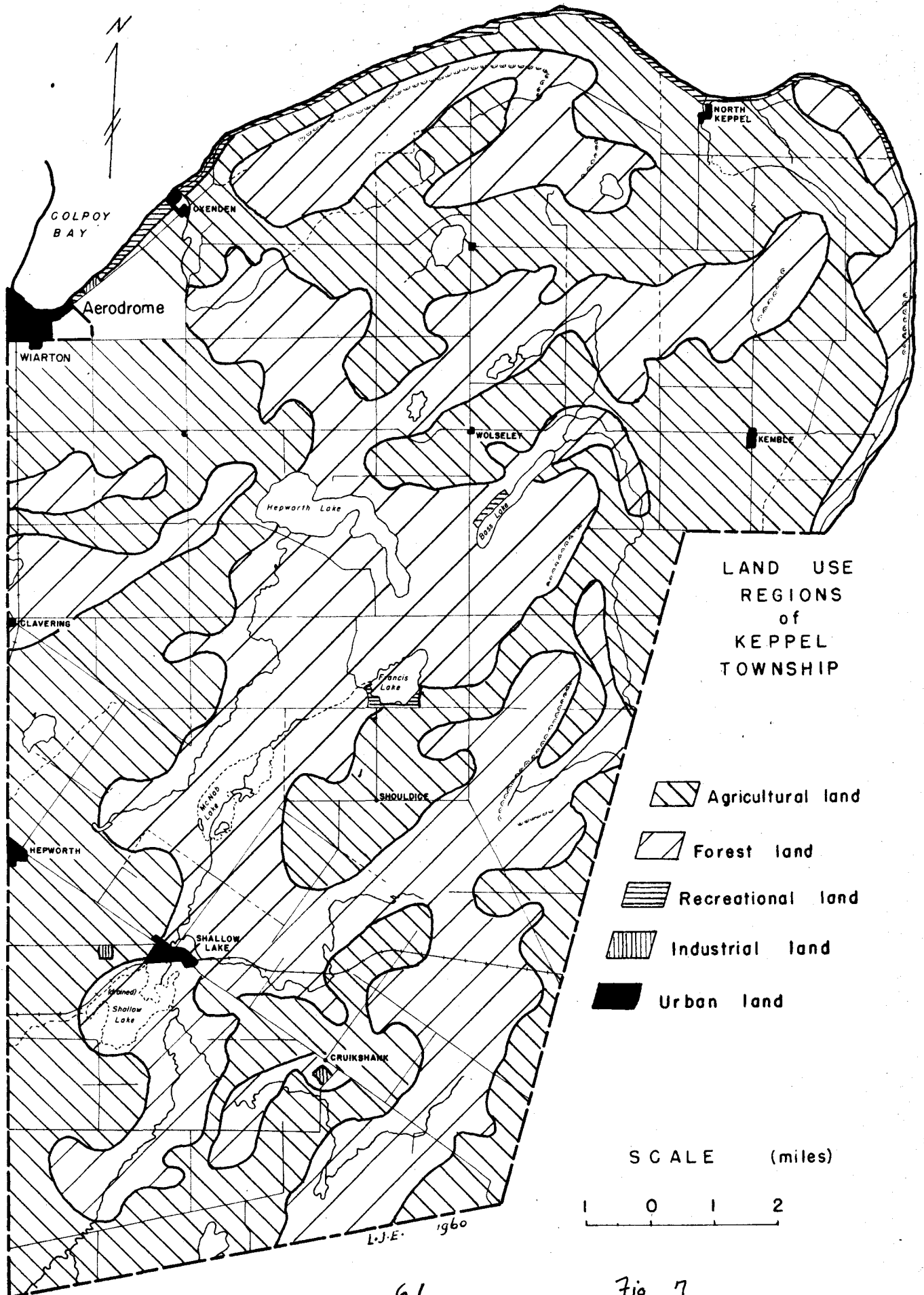
P R E S E N T L A N D U S E

The broad divisions of land use in Keppel Township are agricultural land, woodland, urban, recreational, idle, and industrial lands. (Fig. 7) These uses are by far the most extensive. The total area of farmland in 1956 was 77,399 acres, with 72,608 acres operated by their owners who numbered 337. Improved land amounted to 30,508 acres while unimproved land exceeded this by some 16,000 acres. (Fig. 8)

1. Patterns of Land Use

Already much mention has been made of the north-east to south-west orientation of features in Keppel Township. The trend is once again demonstrable, this time in agricultural land use. The areas of greatest concentration are slightly elongated in shape, and conform to the general lineation. This reflects the directional trends of Types 1 and 2 land (Fig. 18) which underlie these areas. Glacial deposits were drawn out in this orientation, and the position, though rarely the shapes of fields has followed suit. Often in considering the positional relationship of as few as two fields, they are placed along a north-east to south-west line.

The concentrations of agricultural land use are found in the west of the township, (a) in scattered areas around Wiarnton, (b) in a north-south band from Clavering to south of Hepworth, (c) in a smaller concentration about Shouldice, and (d) in a section south-west of Cruickshank. In the east they occur around Kemble and reach to Wolseley and Lindenwood. Little farming is done near the edge on top of the escarpment, for there the land has little or no soil. The





Illus. 13 This rocky land is used for pasture. A better use would be forestry.



Illus. 14 Erecting line fences poses a problem when there is no soil. This land is also used for pasture by small herds of cattle which roam at will.

agriculture at Kemble is carried out on shallow soil (18" - 36").

The area is one of the most generally prosperous, its land being flat and more uniformly good than anywhere else in Keppel.

At Shouldice there are many varieties of land, but the industry of settlers in clearing the stones has improved most of the land immeasurably. Stoniness has always been the most serious difficulty of this land, and in general, is a problem in the other good areas south-west of Cruickshank and to the west of Keppel. Steep slopes are often a difficulty in all these areas.

The great stretches of woodland coincide closely with the rocky land reaching from the escarpment edge back for roughly 2 miles, and the swampy areas associated with the streams and shallow lakes. As a measure of good farm practice, or because of rock outcrops and/or pockets of muck, some woodlots are to be found in the better farmlands. The tree associations differ with the conditions of growth (see Chapter I, Part 7). Profits from the woodlots vary as some woods are more useful than others and therefore in greater demand.

Urban sites have been determined in Keppel only partly by physical conditions. It was coincidental that the cement plant was able to locate at Shallow Lake Village, for the location along the road at the junction with the Shouldice road had been determined previously. It should be pointed out that while the inland villages located at crossroads, these locations were in every case in areas of better farmland. Shipping was the greatest locational influence for North Keppel and Oxenden, although the latter had previously been an Indian settlement. It is paradoxical that the only urban centre to have

difficulty adapting to its site is Shallow Lake, the largest village. The site is depressional and was more swampy in the past. Draining the lake had the effect of draining some of the surrounding land.

Recreational land is limited to two main areas. The more important is along the north shore of the township and to a lesser extent along the north-east shore. The second area is at Bass Lake where there is cottage and camp development along the north-west side beside the deepest part of the lake. A third, minor, area is along the south shore of Francis Lake. This lake is quite shallow (Fig. 4) but is nevertheless the deepest in Keppel apart from Bass and perhaps Mary Lakes.

The identification of idle land in Keppel Township is difficult to make. Much land that is essentially idle is used occasionally as pasture by wandering herds of cattle. The author chose to regard this as permanent pasture, a category explained in the Appendix. Therefore, only one or two areas of idle land are mapped, the largest being on the sand plain at Hepworth. This section suffers at present from severe wind erosion.

Industrial land is limited to three locations. The shore of Colpoy Bay just east of Wiarton is the location of the Canadian Fractional Motors Co.Ltd., which is housed in the old buildings of the former Wiarton Cement Company (Illus.17). Shouldice Cement Products Limited just west of Shallow Lake manufactures concrete blocks using the material from a gravel pit in a raised beach in which they are located (Illus. 15). The Owen Sound Ledgerock Company produces thin slabs of rock for special construction from the Lockport formation which



Illus. 15 Shouldice Cement Products Ltd., producing concrete blocks just east of Shallow Lake.



Illus.16 Owen Sound Ledgerock Co. Thin Flat slabs of stone are cut from the bedrock.

is near the surface at the location just south of Cruickshank (Illus. 16) This is the only important enterprise in the township which is directly related to the bedrock. Other industries such as the tile and fur industries at Shallow Lake and Oxenden are included in the land use of the urban centres.

A very specialized land use is found in the form of an aerodrome located on a very flat area between Wiarton and Oxenden. It is operated by the Department of Transport and serves the double function of handling small private craft, and acting as an emergency stopover for large commercial craft. It has been operating for about six years only, and three years ago its two runways were lengthened in order to accomodate jet aircraft.

2. Agricultural Land Use

Certain physical limitations such as stoniness of soils, relative shortness of growing season, and inadequacy of the field patterns are prevalent. Fields are both too small for efficient mechanized operations and their shapes are often irregular because of rocky and/or poorly drained patches. Economic limitations involve high prices for capital equipment such as buildings and machinery, high prices for livestock, and the problem of market. Virtually all Keppel livestock is now sold in Toronto. Shipping is carried on either from Wiarton, Park Head, or Owen Sound. Most of it is bought in Toronto, but some farmers also buy Western cattle.

Crops

It has been stated previously that the dominant crops today are grain and hay. These are grown to support a livestock industry.



Illus. 17 Canadian Fractional Motors Ltd., producing tiny electric motors, occupies the renovated buildings of the former Wiarthon Cement Co. Colpoy Bay can be seen in the background.



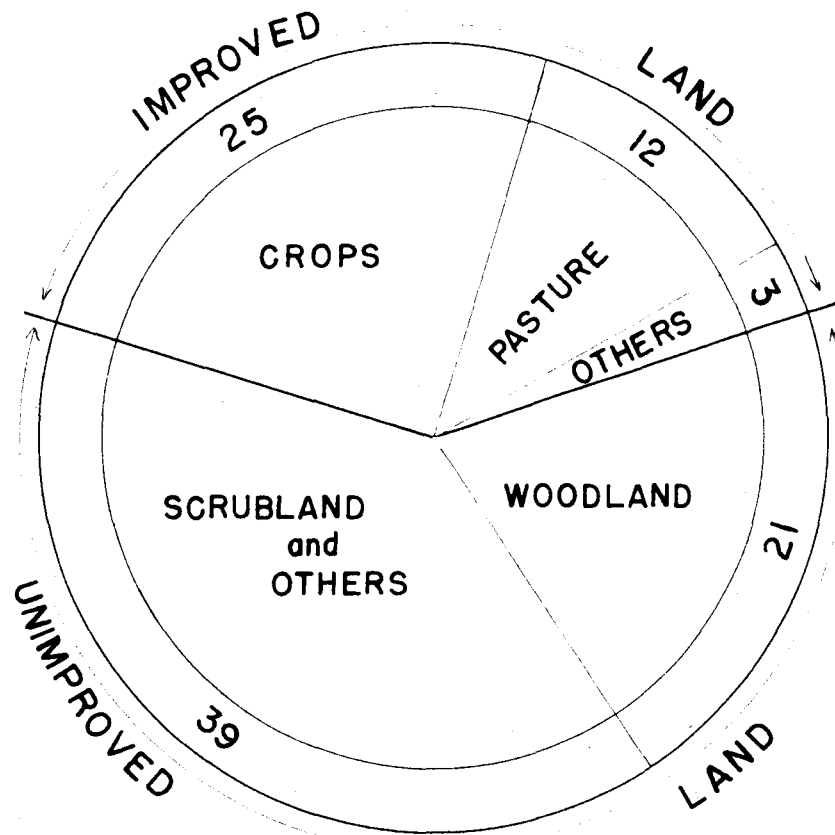
Illus. 18 Grain, fodder corn, and woods. This field is larger than most and has split by the crop change.

The greatest acreage of grain is devoted to mixed grains which are virtually always a mixture of oats and barley. Of over 19,000 acres of grain in 1956, about 5,944 were in mixed grains while oats accounted for another 2,049 and barley another 427 acres. Rye and flax seed are insignificant, but of over 600 acres for other fodder crops, corn registered 516. Wheat was reported as occupying 416 acres in 1956, but was found by the author in 1959 only in the fields near Kemble which benefit from the protection of the escarpment and from their slope position facing the south-west. Cultivated hay accounted for another 9,641 acres, but this figure is not necessarily accurate since opinions about hay and pasture may vary with the time of year and the census. Hay is usually cut and stored by mid-July, and since in only very few cases is a second cut worthwhile, cattle are usually pastured in the hay fields in late summer. These areas are designated hay-pasture (HP) on the land use map. Composition of the hay is usually of alfalfa and red clover, representing the legume component, and timothy grass.

There is a difference between the better and poorer lands of Keppel in the relationship of cropland and permanent pasture. In the latter, where the farmer has to cultivate any small patch of soil that is suitable, it is the area which is fenced in order to keep out roaming cattle. In the better areas it is the cattle which are confined in accordance with a controlled pasture-crop rotation system.

An experiment was conducted in 1958 with tobacco production. About 8 acres were planted on the sands at Hepworth and yielded fair returns. Unfortunately, due to private reasons, the farmer sold out and in 1959 there was no tobacco planted. The idea took hold, however,

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AGRICULTURAL LAND USES as PERCENTS of TOTAL AREA FARMED

(based on Census of
Canada, 1956)

- see Appendix B -

and farther west on the Sauble Beach Road in Amabel Township, a number of acres were planted to tobacco. The area is distinctly marginal, being even more risky than the area of tobacco culture at Fort Elgin.

Livestock

In recent years the swing of agriculture in Keppel has been to the production of livestock, particularly beef cattle. Other types of livestock have declined in importance as cattle increased. For instance, sheep have decreased in number. Reportedly 4,074 in numbers in 1941, there were only 1,662 in 1956. Swine have remained at roughly the same level, declining slightly. Horses were used (and still are) as draught animals but have been replaced by machines for most operations. Only 427 were reported in 1956, against 708 in 1951 and 1,323 in 1941. The numbers of poultry have remained near the same level, numbering just over 37,000 in 1956. Eggs are sold locally to village stores and to Wiarton and Owen Sound.

The large upswing in numbers and importance of livestock has been in cattle. The spectacular increase is noted in the 5 years between 1951 and 1956. The numbers increased from 8,536 to 11,811. The census reveals that cows and heifers, for milking purposes only, register only just over $\frac{1}{4}$ of the 1956 total, and remainder being either dual purpose or beef cattle.

In Keppel, the dominant varieties are the Hereford and Shorthorn cattle. The latter are often used for milking as well as beef. Many herds are mixed, and in the dual purpose cattle it is not unusual to see strains of Holstein which would increase their milk production. Cattle which are bought from western Canada are usually Herefords. It is more



Illus. 19 The Shorthorn bull is the most popular breed in Keppel. Note the poor pasture and the mixed breeds of cows.



Illus. 20 Some herds present a very motley appearance. Strains of Holstein, Hereford and Shorthorn are obvious in this group of cattle. Note the section of poorly drained land in the background where the scrubby bushes are found.

common for a farmer to buy cattle in Toronto. The most frequent practice, however, is for a farmer to keep his own bull and breed his own cattle, then market them in Toronto. The most popular breed of bull seems to be the Shorthorn, even though herds are often of mixed breeds. (Illus. 19, 20)

Fluid milk is sold in Owen Sound and Wiarton and the villages are supplied from there. Cream is not important. In marketing the beef, the farmer's greatest problem is the cost of shipment.

Machinery

The employment of the tractor in particular has greatly reduced the importance of the horse, just as the latter completely replaced the ox. The machinery owned is related to the type of crop produced, and therefore most farmers are equipped for seeding and harvesting small grains and hay. Apart from the tractor, most farmers have a modern side-delivery rake, although the older rake is still seen. With the rake goes the hay loader (Illus. 23) or baler which is becoming more popular. Grain is still usually tied with a binder. Combines are not popular (only 12 reported in 1956) not only because of their initial cost, but also they leave behind straw which most farmers in Keppel use. Automobiles are very common, the 1956 count being 317, while in the same year there were 101 trucks. The increase in the importance of machinery is concomitant with the increase in livestock production and the decrease in rural population.

Much of the information gathered about the land use was through personal interview. One farmer who spoke to the author lives north of



Illus. 21

A few farmers still use horses for some operations. Here all members of the family assist in harvestry.



Illus. 22

Modern machinery has largely replaced animal labour in farm work.



Illus. 23 The hay loader is still a very important piece of farm machinery in Keppel; but this style of rake has been largely replaced by the side delivery model.

Lake Charles. He keeps a Shorthorn bull and breeds his own cattle. His farm totals over 300 acres, but none of the land falls within Land Types 1 or 2. In 1959 he planted only about 15 acres in grain, the rest which is arable being in hay-pasture. His buildings are in fairly good repair, and most of his machinery is up-to-date, though he has no desire to own a combine. A team of horses is kept primarily for use in winter logging operations. This farmer has a problem in that yellow rocket weed is spreading all over his scrub pasture, crowding out other plants on which cattle feed. The only cure is cultivation or spraying, but the former is impossible and the latter impractical owing to the rocky nature of the land.

Another man, living in the good land near Kemble, operates 160 acres. He deals exclusively in pure bred Shorthorns, breeding and raising them and finally marketing them in Toronto. He raises hay, oats, and mixed grain. He and two other farmers handled over 14,000 bales of hay in 1959, an indication of the better land in this section than in other parts of the township. Reflecting the relative prosperity, his farm is well-equipped and has fine buildings.

The conditions described for the two farms are fairly typical of conditions without and within the better districts.

3. Detail of the Hepworth and Shouldice Blocks

Aside from the generalizations in the preceding chapters on physical geography and land use, a number of areas in Keppel can be fruitfully studied in more detail.

(i) Hepworth Block

The change from sand plain in the west of this block to drumlinized country in the east represents one of the most abrupt

physiographic changes to be seen in the township. All the well-drained sands in this block are susceptible to blowing. Where this form of erosion is currently serious, the symbol BS - blowsand - is employed. The shifting dunes of fine sand have no profile development and are very unstable. The area designated BS → RF - reforested blowsand - indicates the exact boundary of the trees which have successfully taken root in the 1931 plantation. To the west, the Tioga series (T₂) is mapped, the slope being from flat (A) to very gently rolling (M). Here erosion (1) is not serious. Aside from a very small area, the remainder of the sand plain in this block suffers from inferior drainage. The imperfectly drained land is the Brady sandy loam (T₄) and the poorly drained is the Granby sandy loam (T₆). This area of inferior drainage is flat and depressional throughout, except in the west where there is a gentle undulation. To the south two other soils are mapped, the Sargent (S₂) and Wiarnton (H₄) series. The former is a well-drained soil which is quite stony. It seems most likely that it is a feature of glacial deposition that has been modified subsequently by Lake Algonquin waters. The stones are rounded. The Wiarnton series, as found in this block, has also developed on a modified glacial feature, and its general shape and orientation would suggest that it is the remnant of a drumlin. These two features are not conspicuous, for they are just slightly raised above the surrounding sand plain and are quite flat. Erosion on them is not important.

In general, the western portion of the block is a flat, depressional sand plain rising slightly to the north where wind erosion

is serious. Associated with the sand plain is only a very extensive form of land use. To the north on the Tioga series some oats and barley are grown and there is an apple orchard at Hepworth. It is significant to note the encroachment of sand deposits on the cultivated fields. A small amount of sand had infiltrated among the plants at the time of observation. Except for a section of improved pasture and some hay, all the rest of the sand plain is open to wandering cattle which pasture not only open areas but also the wooded and scrub forest areas.

The eastern portion of the block exhibits the rolling topography of the drumlin field. One soil series, Harkaway, appears throughout. Exceptions to this occur in the north, where the transition to the sand plain is marked by a strip of the Wiarton series, and in the south, where there are sections of muck, Brady, and Wiarton soils. These areas, suffering inferior drainage, are part of an interdrumlin swamp. The Brady series mapped is found in this location due to conditions of water action in working the material around the tail of the drumlin. No wave-cut benches were observed on the sides of the drumlins, for if any ever existed they were modified by waters which submerged them.

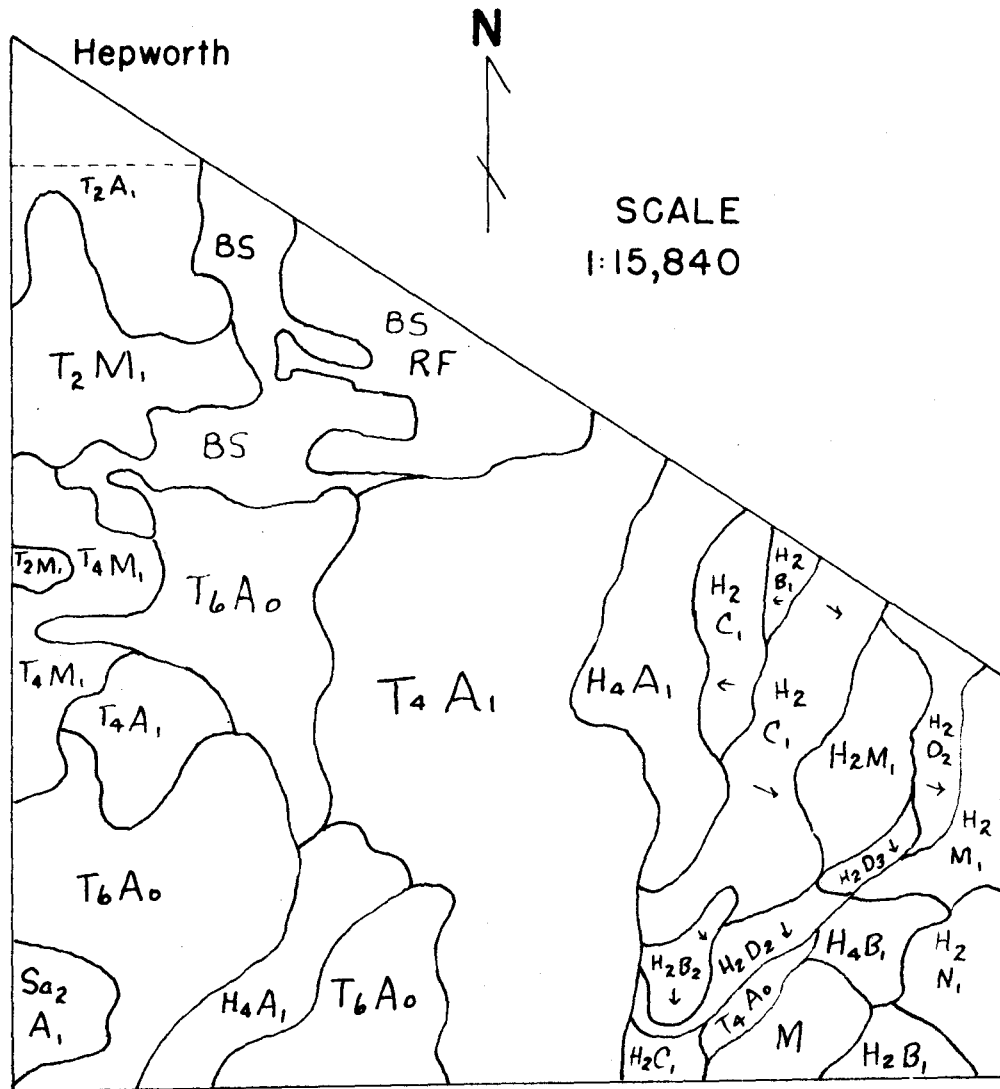
As the map shows, there are many variations of slope in this section. Variable also is the degree of stoniness. Both have a profound effect upon the land use in these fields. In some cases the field boundaries conform to the dictates of the land, and the crop boundaries are marked by north-east to south-west trending lines. Stone fences are a problem here as elsewhere, for they not only constitute barriers which are costly to move, but also occupy space which could



Illus. 24 A blowout at Hepworth leaves a fence hanging and buries grass which is thereby rendered useless in checking erosion. Cattle trampling, as seen along the sides of the blowout, is often the initial cause of a blowout.



Illus. 25 Stone fences testify to the settler's industry in clearing the land but are a great problem in present land improvement because they are very costly to remove.



SAMPLE BLOCK I

SOIL TYPE
 DRAINAGE
 SLOPE
 EROSION

(see page 80 for legend)

Fig 9

I.j.e. 1960

Legend for Sample Blocks

(Fig. 9, 11)

Soils

T ₂	-	Tioga sandy loam
T ₄	-	Brady sandy loam
T ₆	-	Granby sandy loam
H ₂	-	Harkaway silt loam
H ₄	-	Wiaraton silt loam
O ₂	-	Osprey loam
O ₄	-	Osprey loam imperfectly drained
BS	-	blowsand - area of blowouts and shifting dunes.

Drainage

2	-	well-drained
4	-	imperfectly drained
6	-	poorly drained

Slope

A	-	flat; about 0-2%
B	-	gentle slope; about 2-6%
C	-	about 6-10%
D	-	about 10-15%
E	-	about 15%-20%
F	-	about 20%-30%
G	-	30% \neq

Erosion

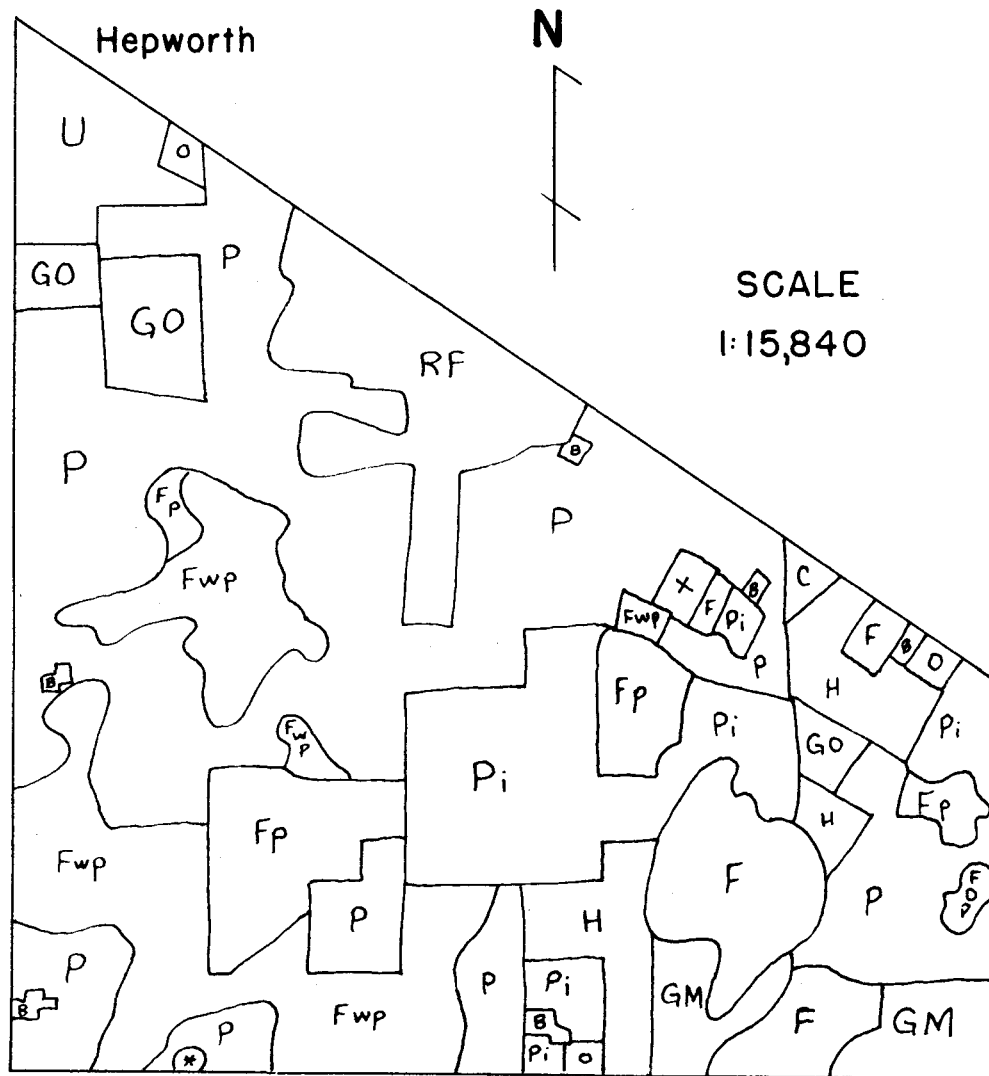
0	-	no apparent erosion
1	-	less than 1/3 topsoil removed
2	-	1/3 to 2/3 topsoil removed
3	-	2/3 \neq of topsoil removed

Phase

b	-	bouldery.
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Arrows indicate direction of slope downhill.

18



SCALE
1:15,840

SAMPLE BLOCK I

LAND USE

(see page 82 for legend)

Legend for Sample Blocks

(Fig. 10, 12)

Land Use

- C - cemetery
- B - farm buildings
- U - urban land
- O - orchard
- Go - grain - oats
- GM - mixed grain (barley and oats)
- H - hay
- Pi - improved pasture
- P - pasture and scrub pasture
- FP - forest pastured
- Fwp - wet forest scrub pasture; included here are wet pastured areas which have grown up in shrubs such as dogwood, willow, and alder.
- Fdp - dry forest scrub pasture
- F - woodlots and unpastured forest
- RF - reforested areas
- X - idle land
- (*) - farm pond. The only one shown (Block 1) is the run-off type, unfenced and generally ill-kept.
- OP - orchard pastured
- RC - corn
- R - other row crops including potatoes, mangels, and turnips
- L - summer fallow

be used in crop production, and provide a place for weeds to grow.

(Illus. 25)

Patterns of land use show that there is more crop production here than on the sand plain to the west. Mixed grain and hay are grown in the south, while to the north oats, hay and improved pasture are found. In addition, areas of permanent pasture and forest occupy unfavourable wet, stony, or steep areas. Generally, if precautions are exercised against erosion on the steeper slopes, the drumlinized section to the north particularly, can be worked satisfactorily.

(ii) Shouldice Block

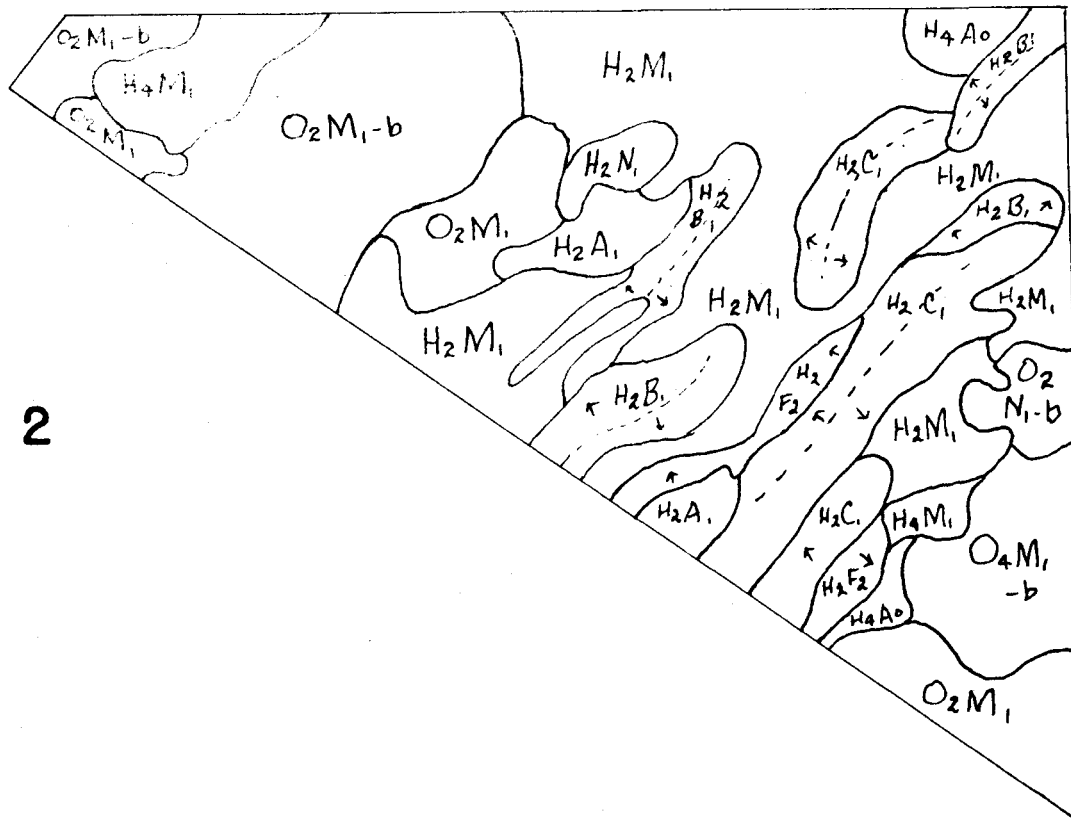
There are four soil series mapped in this block, Harkaway, Wiarton, Osprey, and an unnamed, imperfectly drained soil associated with Osprey. All soils are of till origin, but the Osprey series is developed on morainic materials, in contrast to the drumlin materials from which Harkaway and Wiarton are developed. Portions of the area were extremely stony, and it has been said that if the first Shouldice settler, William, had seen his future farm in any other season than winter when it was covered by deep snow, Keppel would never have seen him again. Be that as it may, the fields were cleared and where the land was less stony, fields have been enlarged so that now the four or five farms at Shouldice are among the most improved in the township. Where the stones have not been cleared, a bouldery phase has been mapped.

It was in this block that the author observed the only recent clearing of stones to make a new field. The field is in the extreme north-west corner, is flat and was cleared in a mass operation by machinery in 1958. In 1959 it bore its first crop, mixed grain.

SCALE
1:15,480



Shouldice



SAMPLE BLOCK 2

SOILS
DRAINAGE
SLOPE
EROSION

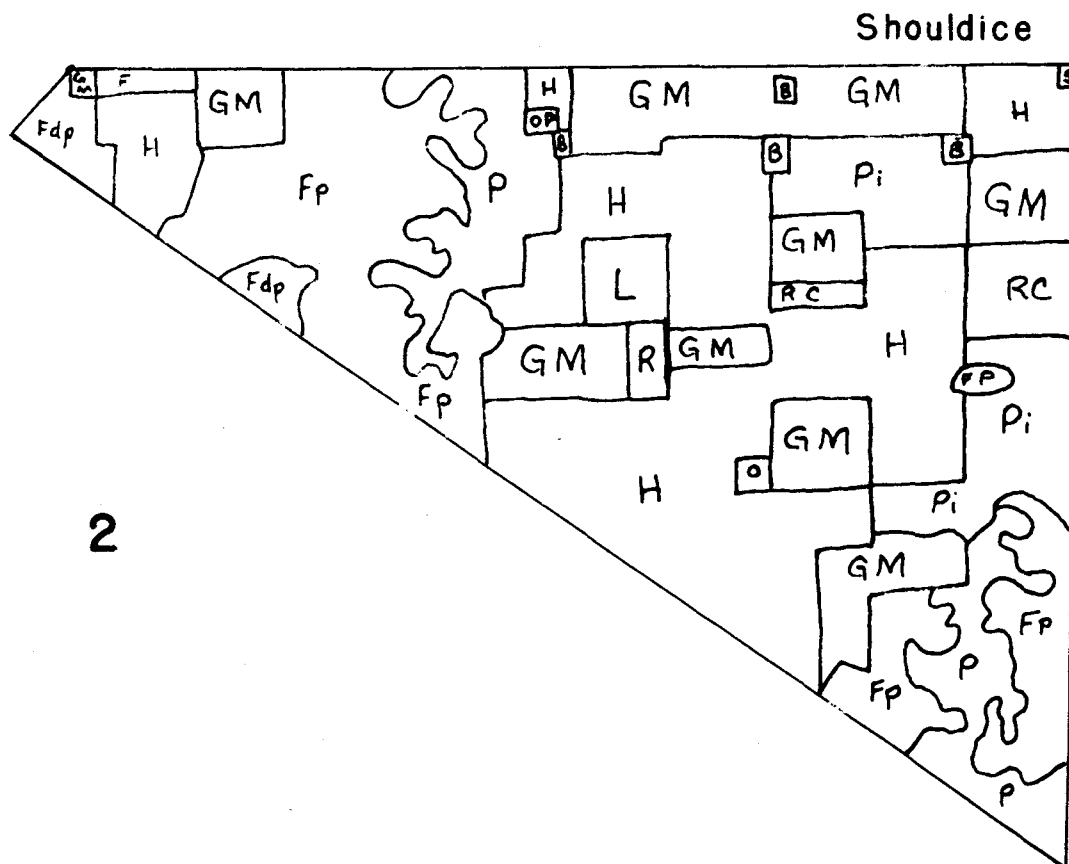
(see page 80 for legend)

Fig 11

l.j.e. 1960

48

SCALE
1:15,480



SAMPLE BLOCK 2

LAND USE

(see page 82 for legend)

Fig 12

l.j.e. 1960

85

The difference in the quality of land maintenance and suitability between the two sample blocks is at once apparent. At Shouldice, fairly large fields yield a good percentage of grain and some corn. Much hay is grown and improved pasture is common. One field lies in summer fallow. Only the steep, bouldery, or imperfectly drained areas are left in permanent pasture or pastured woods. In the south there is even a small private plantation where reforestation has been carried out.

Interviews with farmers at Shouldice revealed that these people are not necessarily well versed in the theory of modern techniques of farming, but have experience on their own land, know their own specific problems, and have the capacity to adapt their practices to the dictates of the land. The only suggestions the author^w could make are that the field boundaries be arranged to suit better the contours of the land, and that the forest areas be kept free from grazing cattle.

These two sample areas reveal that where the land is poor, agricultural pursuits are difficult and unprofitable. Where the land is better, two qualities of land use appear, with the one at Shouldice by far the superior. The difference lies partly, and only in part, in the slight difference between the quality of the land, for the slopes of the drumlins at Hepworth are slightly steeper than those at Shouldice. The more significant difference is the human element. Whereas at Shouldice, careful consideration of problems has been combined with toil to produce a charming island-like group of good farms in the midst of scrub forest and pasture, the lands of the Hepworth block have not apparently received the same care.

4. Forest Land

Of the total farmland in Keppel (77,399 acres) in 1956, some 22% (16,689 acres) were in forest. Most of the tree cover is on rocky or badly drained areas. The woods have a definite place in the agricultural economy, for during the winter, farmers will cut logs for sale in Shallow Lake and Owen Sound. Unfortunately, through unwise cutting in earlier years, the value of the forest is depleted and there are no large commercial stands at present. A limited amount of wood is cut each year for fuel and some maple syrup is made.

There are large areas of Keppel which should be reforested. A start was made some years ago by the Kiwanis Club in Owen Sound which started a tree plantation on the sands at Hepworth (Illus. 26). Pines were planted in the hope that they would be a source of income as well as a conservation measure. Although it is encouraging to note reforestation efforts by local private groups, difficulties of management are evident. Disease has been a recent problem, and sometimes sand covers small seedlings. The older trees are now much too close together, not having been properly pruned or thinned.

Several years ago Grey County purchased some land on Concession 11 near Shouldice. This was planted to pines also, but the plantation has been allowed to deteriorate.

The most recent purchases of land for reforestation were made by the Sauble Watershed Authority in 1959. The area totals 375 acres and is found in three locations, (1) on Concession 16, due south of Hepworth Lake, (2) in the southern corner of the McNab Lake Block, and (3) on Concession 10 south-east of Shouldice. No planting has



Illus. 26 Reforestation is needed badly in Keppel. This plantation helps to control the shifting sands at Hepworth but stands in need of proper care and pruning.



Illus. 27 In a pastured woodlot there is little regeneration and leaves on the lower parts of the trees have been stripped by cattle. Trees in the photograph are of the sugar maple-beech association predominantly.

Illus. 28



Illus. 29



The Old and the New

Above: the farm abandoned, the old-fashioned log barn has been allowed to fall into disrepair.

Below: the old barn, still used for storage, is dwarfed beside the modern hip-roofed structure. This farm is prosperous, having kept abreast of modern developments. (Note the difference between barn bridges. The old is indeed a "bridge", made of logs, while the new is a stone ramp.)



Illus. 30 A water hole with cattle hoofprints is evidence of the use of this land for pasture. This view is of the badly eroded lands below the escarpment in the north. The scarp can be distinguished in the background. This water hole is fed by water emerging from between strata in the escarpment face.



Illus, 31 Used in the autumn at market time, many old corrals dot the pasture landscape, particularly in the north.

been carried out to date, but since the policy of the Authority is not only to plant but also to maintain, there is hope for a good example in reforestation.

Most farmers are not well-schooled in proper woodlot management, and consequently many woods are allowed to deteriorate before they mature. Pasturing the lots is common, and this practice prevents healthy regeneration (Illus. 27). Moreover, the roots near the surface are trampled and many younger trees are killed. Education in woodlot management is a very pressing need in Keppel Township.

Forestry is the best land use throughout large areas of Keppel where soil conditions are unsuitable for agricultural pursuits. A start has been made in the scientific reforestation of the bad lands. It is a trend which is encouraging to note and should be fostered.

5. The Urban Picture

The urban centres which dot the township (Fig. 13) are much less important at present than formerly. With the decline in population only Shallow Lake and Kemble have retained much importance in the township. The latter continues to function as the centre of a prosperous agricultural region and is the home of an annual fair. The former, while declining in population to about 300 at mid-century, registered a remarkable increase to 366 by 1956. This is due mainly to the emergence of Shallow Lake as a dormitory town for Owen Sound and reflects the recent growth of that city.

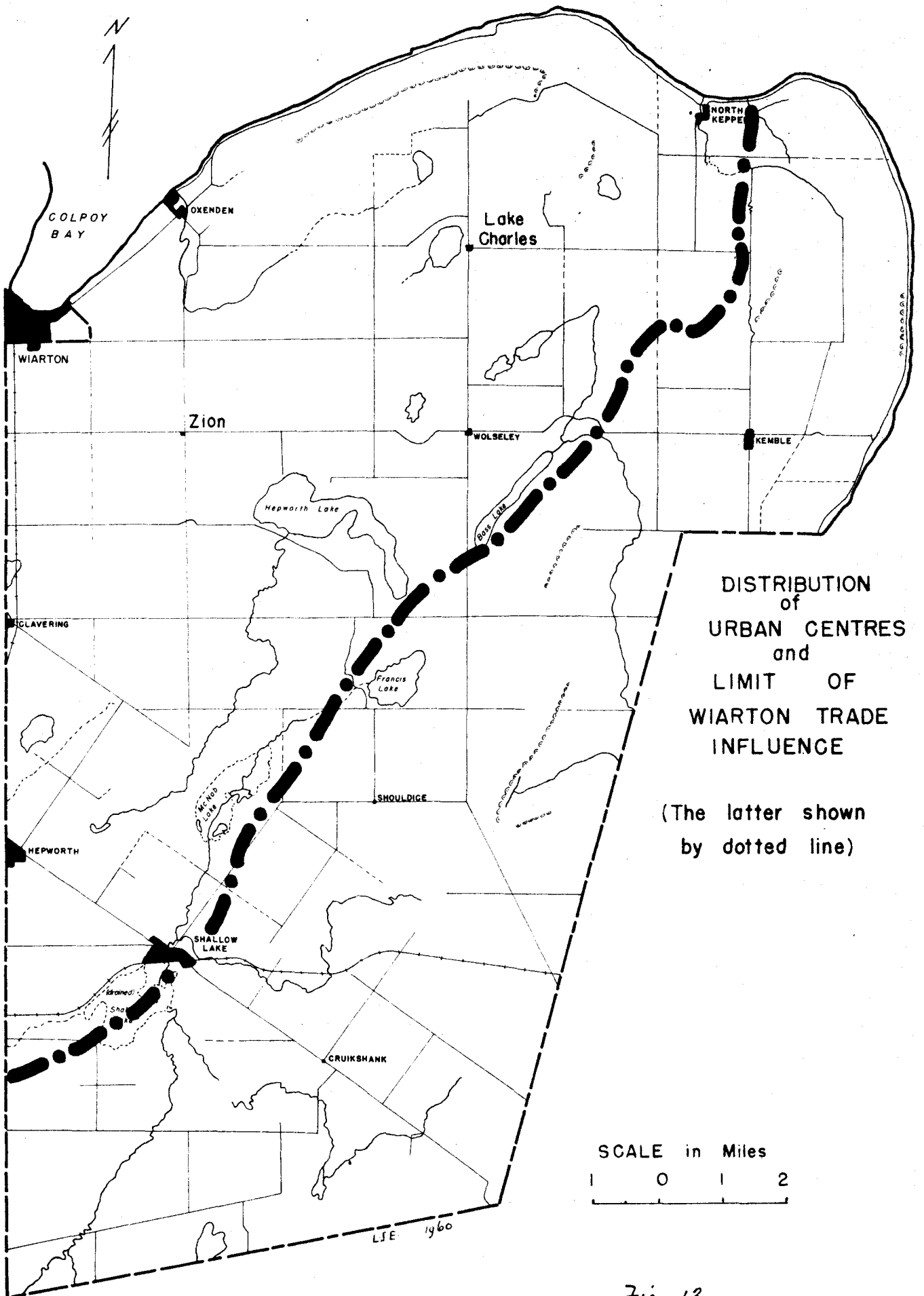
The village of Hepworth exerts an influence on areas nearby,

but as it is a regional rather than a township centre, its present land use is not described here.

There are two main urban influences from outside the township. The stronger is Owen Sound which is the largest regional centre in this part of Ontario, and includes all of Keppel within its trade area. The lesser influence is that of Wiarton, which, also a regional centre, serves the whole of the Bruce to the north, and about half of Keppel. The boundary showing Wiarton's influence extends almost in a straight line from North Keppel south-west to Shallow Lake and on to Highway 21 (Fig. 13). The boundary lies to the west of Kemble in the north-east, for even though Kemble is exactly the same distance from Owen Sound and Wiarton, greater attractions and a paved direct route to Owen Sound cuts off virtually all trade with Wiarton.

Aside from Shallow Lake, there are two classes of village. The larger include Oxenden, North Keppel, and Kemble which have at least one general store and a gasoline outlet. Like Kemble, retail trade at Oxenden and North Keppel depends upon the rural population, but in addition, summer trade from vacationers swells their trade considerably. A premature attempt to capitalize on an increase of population in summer is seen in an abandoned dance hall called the Cascades, and a closed snack bar at Oxenden. This type of enterprise may pick up in future, and at North Keppel a snack bar opened in July, 1959.

At Wolseley a confectionary and gasoline outlet profits from the location on the corner of the main north-south and east-west roads traversing the township, and also from the proximity to the Bass Lake





Illus. 32

A neat schoolhouse is the only sign of a settlement at Cruickshank. This is true of many other small centres.



Illus. 33

Adapting to the site of Shallow Lake means more than draining the swampy area in the middle of the village. Excavation of foundations on the east side of town is also a problem.

Camps where vacationers spend the summer. The other small centres exist mostly in name and tradition and are maintained as centres only because of a church, school, or both (Illus. 32).

Shallow Lake

Situated on the South Diagonal between Owen Sound and Hepworth Shallow Lake is a village of about 350 persons. Besides serving the district in a general way, it has had several specialized functions in its history. At present, the most important of these is the large mink fur ranch.

The village has a scattered development stringing out north for about a block, south to the railway, and along the main road which is the only one paved. The road to the north leads to Shouldice and there are no roads to the south. The railway station has a resident attendant who checks through six trains daily.

Retail facilities are limited. One of the general stores includes the Post Office. The development suffers because of proximity to Owen Sound. The few stores are located at the main corner, where the road to Shouldice turns off. (Illus. 34) A cold storage plant, and at least four service stations are located in the village.

Quality of residences varies a good deal, but the only zoning noticeable is that the better houses are located on the main road close to the edge of town (Illus. 35). If poor drainage has posed a problem in adapting to the village site, stoniness is also a problem, (Illus. 33) and increases the cost of excavation. Most houses in the village are very modest or poor in quality. The rural setting of the village is emphasized by the presence of one or two

LEGEND FOR FUNCTIONAL PLAN

SHALLOW LAKE VILLAGE

R	-	residence
RS	-	residence and store (general)
G	-	gasoline station
B	-	barn
S	-	school
V	-	vacant land
W	-	welding and repair shop
OL	-	Orange Lodge - 1387
GL	-	gasoline outlet and snack bar
PO	-	post office
P	-	park
C	-	cold storage plant
M	-	sawmill
Y	-	general store
H	-	hardware
E	-	empty building
A	-	arena
/	-	church
C.N.R.	-	Canadian National Railways property



Illus. 34 The main corner of Shallow Lake, looking north-west from the war memorial. Most of the commercial functions are carried on in this row of buildings.



Illus. 35 The best homes in Shallow Lake were built recently by members of the Noble family. This lovely house on the main road to the east of the village, is backed by a swamp and is just across the road from the sawmill. There is no residence zoning!

barns, now used mainly for storage.

Two churches whose buildings date from before 1900 serve the religious needs of the people. Both are United, and with an Orange Hall, indicate strong Protestant religious leanings. A school, built before 1900, and later enlarged to 3 rooms is located on the western fringe of the village. On the road to Shouldice an arena was built recently, and provides something of a focus in the district for recreation. A certain amount of civic pride is seen manifested in a small park around a war memorial, which bears a total of 17 names. There is a rather poorly-kept ball field to the south.

The industrial enterprises comprise the Casemore sawmill on the east side of town, and the Lakeside Fur Ranch on the shores of the drained lake. The sawmill produces such things as fence posts and railway ties, and draws its lumber from the north of the peninsula. The fur ranch is Shallow Lake's most profitable enterprise. The owner, Mr. Percy Noble M.P., started it in 1929. The climate is not adverse and about the only positive reason it is located in the village is that it is the home of the owner, a descendent of pioneers. Seeing his success, others in the general district have started fur farms. At present Mr. Noble has some 12,000 minks which he markets almost exclusively in New York. A few are sent to Montreal. A fine dark pelt can currently draw up to \$125.00. The animals here are among the finest in North America, and representatives have won first prize in two consecutive world competitions, 1958 and 1959.

Next to the fur ranch lie the ruins of the former cement plant (Illus. 7 and 8). A couple of lime kilns are still standing. The



Illus. 36 The Casemore Sawmill, Shallow Lake. Railway ties and fence posts are stacked in front awaiting shipment.



Illus. 37 In these sheds are housed minks of the Lakeside Fur Ranch, Shallow Lake's most profitable business.

property has recently been purchased by a Toronto man who hopes to reopen it and make bricks and tile as formerly. The initial cost of the property added to costs of heavy electrical lines and new machinery is substantial. The venture is a brave one in which success is by no means assured.

Kemble

Kemble is the centre of the most extensive agricultural district in the township. Like Shallow Lake, it is located on a direct paved route to Owen Sound. In function, it is a supplier of local retail and gasoline needs and has a repair shop. There is also a post office, two United Churches and a school. The church is on the main corner and was built in 1900, burned in the 1940's and rebuilt in 1950 on the old foundation. It has two cornerstones. Quite a few trees grace the roads and lend a pleasing appearance to the village. Residences are mostly old and are found slightly removed from the corner. There will be no growth of the village unless its essential function changes.

Only four villages in Keppel now have retail function. Importance of the other centres is limited to church and school facilities. Owen Sound exerts an influence over the whole of the township, and Wiarton over part of it. Shallow Lake and Kemble are the most important township centres, both serving an agricultural district. The former has more possibility of growth because of its emergence as a dormitory village. However, marked urban expansion is not predicted for the near future.

LEGEND FOR FUNCTIONAL PLAN

Kemble Village

R	-	residence
S	-	school
G	-	general store and gasoline outlet
B	-	barn
PO	-	post office
Q	-	old livery stable
X	-	garage and repair shop (former blacksmith)
<u>+</u>	-	church
D	-	driveshed behind church

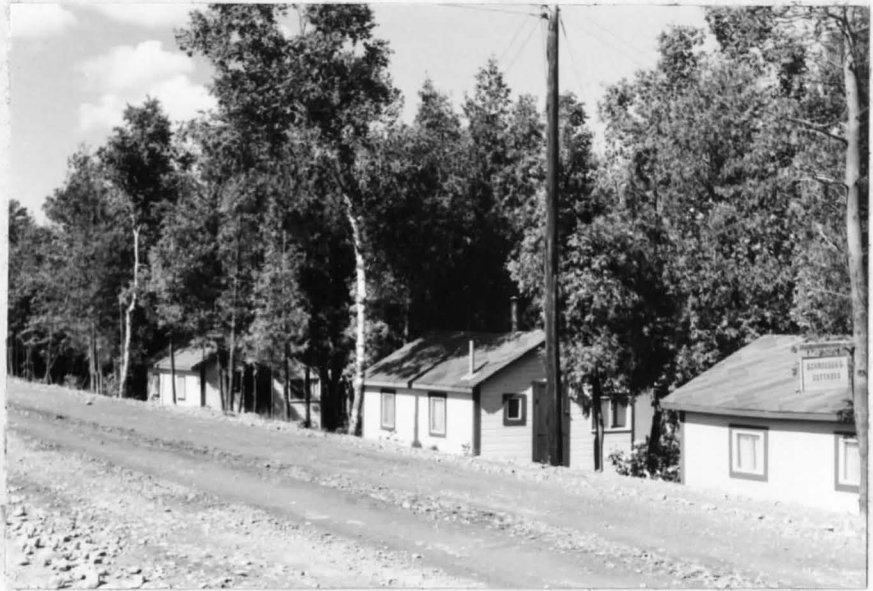
6. The Recreational Spread

Keppel township has two main areas which could be developed for recreational purposes. By far the more important is the shoreline from Wiarton around to Sarawak Township. The other area is the inland lakes. Only recently has Keppel been opened up for recreation, and it is probably the last frontier in "the Bruce". Most cottages found along the north shore have been there fewer than five years. About ten miles of the shoreline is owned by those wishing to use it primarily in the summer. At present about 75-100 lots are for sale, and the realtor* expects these to sell at about the same rate, i.e. they will be sold in about three years. There is some concentration of cottages at Oxenden and especially at North Keppel, but the size of these villages is not expected to change. The highest priced lots are near North Keppel.

As for the inland lakes, it is expected that they will develop also, but property values are less because the lakes are marshy and small and therefore less attractive. The general trend of values in both areas is upward.

Two camps are in regular summer operation. One is a Boy Scout camp at North Keppel, the other a commercial camp at Bass Lake which is the deepest and most attractive of the inland lakes. There are construction difficulties, however, since very steep rock walls line the lake. To overcome this the camp has located at the upper level, on top of the rocks, and one descends a steep winding path to the water and dock. (Illus. 40)

* Mr. R. Patterson, Owen Sound, supplied information at this point.



Illus. 38 It would have been better had the development road not been laid so close to the cottages. They are squeezed between the water's edge and the road and are open to the direct-sun all afternoon.



Illus. 39 Part of the problem of developing the recreational industry lies in the rocky character of sections of the north shore.



Illus. 40 Part of the recreational potential of Bass Lake has been realized by the establishment of the Bass Lake Camps. This view overlooks the south end of the lake, the deepest part.

Part of the rapid sale of north shore lots is due to the improved road constructed around the whole shore and locally known as the Blue Water Road. It is a development road with the cost split evenly between the Department of Highways and the township. Plans call for it to be paved, an ambitious scheme since there are few permanent residents along it. Unfortunately the road is built very close to the water for the most part, and runs directly behind cottages. (Illus. 38) Dust and noise are annoying, and tend to lower the value of the location.

Two other limiting factors are involved in the development of the north shore. One is the rocky nature of the shore, and in some places the limestone shelves right into the bay. (Illus. 39) Further, the water tends to be very cold for swimming and can be used only on certain days during the hottest season or whenever the wind is onshore.

Despite the limiting factors involved, there are those to whom these are unimportant and who would appreciate the beautiful scenery across Colpoy Bay, the convenience of being near an urban centre (Warton, Owen Sound) and of being within easy driving distance of the large cities of Ontario. At the present rate of sale, the shore lots will be sold within a very few years.

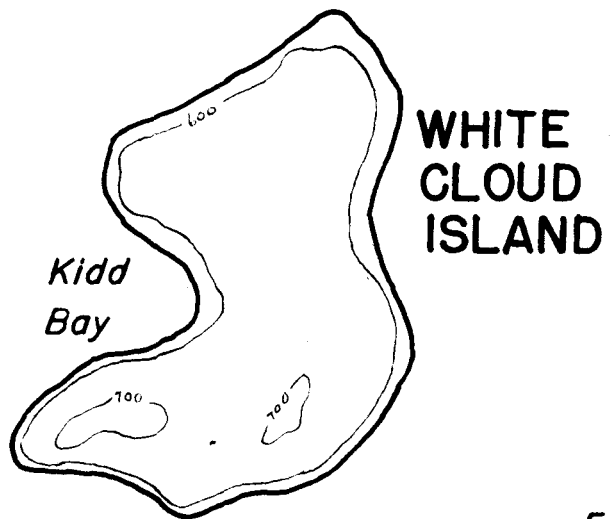
CHAPTER IV
THE ISLANDS
White Cloud and Griffith

Included within Keppel Township administration are two islands, White Cloud and Griffith, which are located to the north of Cameron Point and Cape Commodore. (Fig. 16) They are outliers of the escarpment, and while White Cloud is 700 feet ASL at its highest, Griffith Island is almost 800 feet. Each island is about two miles from north to south, but whereas White Cloud has a large bay, Kidd Bay, Griffith has none. Areally, Griffith is the larger island.

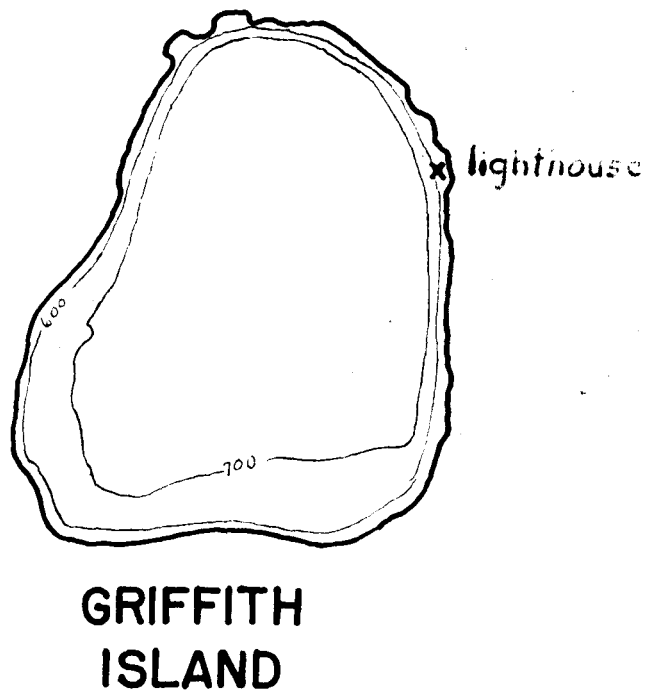
In the early days there were up to half a dozen pioneer farmers on White Cloud. Connexions with the mainland were maintained by boat in summer and across the ice, sometimes by horse and cutter, in winter. One cattle farmer remained until recently. Now there are none. Timbering was carried on and one man built pleasure yachts and skiffs. A government dock was constructed in 1910 and is still in repair. In that year also a school was constructed and twelve pupils attended. Between 1900 and 1905 the island yielded marl for the Wiaraton Cement Plant whose property is now occupied by Caframo Ltd.

Today the only activity centres upon recreation. The Boy Scout Association uses the island for a camp and two or three cottages are being constructed. Stretches of sandy beach could be exploited for recreational purposes.

109



581'



Cameron Point

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Big Bay

Cape Commodore

Fig. 16

Until 1865, Griffith Island remained Indian, but except in summer none of the natives reside there. The government constructed a lighthouse of dolomitic blocks on the north-east shore in 1958. One or two farmers tried working on the island, and the last, the lighthouse keeper, kept up to 50 head of cattle and grew enough hay to winter them. In addition, he ran a small sawmill. When automatic ignition was introduced to the lighthouse, the farmer left the island.

General Motors of Canada now owns Griffith Island and uses it as a recreational centre for its higher ranking executives. It is also used for business conferences.

White Cloud and Griffith Islands are two of a group of three islands at the opening of Colpoy Bay into Georgian Bay. The third, Hay Island, is north of White Cloud and belongs to Albemarle Township. An interesting Indian legend states that the three were once joined together and connected to Cape Croker.

Future importance of White Cloud Island lies in the recreational industry. The future of Griffith Island is entirely in the hands of its owners.

CHAPTER V

C O N C L U S I O N S

The physical conditions of Keppel Township have posed many problems to those who would derive their living from the land. The story of adaptation to those conditions can be read in the landscape by the careful observer. In the better districts, particularly Kemble where the soil is shallow and Shouldice where it is stony, one can see the relative prosperity as an index of the resourcefulness and industry of the people. In less successful areas, the chief inhabiting factor has sometimes been the failure of the people to adapt their ways of life to the land. To cite the sample blocks discussed in Chapter III Part 3,---whereas at Shouldice farmers have thought through their problems in each generation and have been flexible enough to change with altering conditions, at Hepworth, fields have been allowed to deteriorate to weedy permanent pasture, and apparently little effort has been made to maintain the productivity of the land.

Throughout the township, cleared land that ought to have been left in trees should be reforested and cattle should be kept out of woodlots. In time this would provide the basis for a logging industry near the chief Southern Ontario markets. As much as possible, fields should be enlarged and their boundaries adapted to the contour of the land. Concomitant with this change would be cultivation on the contour. Good crop rotations should be worked out. In these ways, the acreage of arable land would be augmented, crop production would increase, and

the land would be preserved against erosion.

Such a plan cannot be rigid. On each farm the remedy would normally be the most convenient and the most economical. Before a field pattern is changed, the relation of each new field to the rest of the farm should be considered. Involved here would be factors such as suitability of the land for machinery, the distance and ease of access of each field from the barn. Finally, the load of crops and numbers of animals desired helps to determine the final form of the plan.

The trend to beef cattle production should be encouraged as crops for this use are perhaps those best adapted to the climate. Shipping costs of market cattle will be a continuing problem for the farmer and no solution can be sought locally.

A progressive agriculture is not impossible in Keppel Township. This does not imply intensive exploitation of the land, but it does mean that the enlightened use of available land resources is essential. The farm operator must act in an efficient manner according to a plan which he has worked out. A few farms are setting the example. Let us hope that the assistance and training now available through governmental agencies will be sought and used for improvement.

Industry should be encouraged to locate in Keppel, but since the township is removed from Ontario's main trade thoroughfares, they must have relatively low shipping costs and fairly high quality products. Examples of these are the fur industry, the small electrical motors plant, and the window blind company. It is doubtful whether the proposed brick and tile producing enterprise will be successful.

The recreational industry is increasing in importance. Since they are not characterized by shallow water and marsh as are most of the lakes the Colpoy shore and Bass Lake are the best areas for development. A definite incentive to visitors will be the development road around the north shore.

With careful planning, the whole township can anticipate a prosperity based on its own physical and human resources. The appearance of such desirable conditions as agricultural stability, forest wealth, a successful recreational industry, and some manufacturing of light goods, could be hastened by a concerted effort on the part of the people of Keppel Township.

A P P E N D I X A

Explanation of Land Use Categories in Figure 17

- U - urban land
- UR - urban-recreational land; i.e. land used for summer recreational purposes only.
- G - grain; includes all small grains, oats, barley, mixed, and also feed corn since its acreage is small.
- GW - wheat; separated from grain as special reference is made to it in the text.
- O - orchards; all of them are apple orchards; only the better and larger ones are shown, there being a great many small and ruined ones which are not attended now.
- HP - since one cut of hay is usual, cattle are commonly pastured in hay fields following haying operations. Much improved pasture falls into this category.
- P - includes all permanent pasture and much scrubby, essentially idle land which is occasionally used by wandering cattle.
- F - forest land of all kinds except plantation.
- RF - reforestation areas in existence.
- M - milk farms, Shallow Lake and Oxenden.
- L - lime kiln, Shallow Lake.
- I - industrial land, including quarrying operations, and a gravel pit, both producing a finished product at that location.
- X - idle land.

A P P E N D I X B

Acreages of land use in Keppel Township

(based on the Census of Canada, 1956)

	<u>Acres</u>
Farmland - total area	77,399
Improved land - total	30,508
- cropland.	19,283
- pastureland	9,639
- others.	1,586
Unimproved land - total	46,891
- woodland.	16,689
- scrubland and others.	30,202

B I B L I O G R A P H Y

Books and Pamphlets

- (1) Chapman and Putnam. Physiography of Southern Ontario. Toronto: University of Toronto Press, 1951.
- (2) Cruickshank, Mrs. Percy (ed.). Township of Keppel. Centennial Publication, 1955.
- (3) Hough, J. L. Geology of the Great Lakes. Urbana: University of Illinois Press, 1958.
- (4) Marsh, E. L. A History of the County of Grey. Owen Sound: Fleming Publishing Co. Ltd., 1931. By authority of the Grey County Council.
- (5) Rutherford, Audry (ed.) Grey County Centennial 1852-1952
- (6) Sims, J. P. and Preston, Mrs. Eleanor. Oxenden History 1854-1955
- (7) Smith, W. W. Gazeteer and Directory of the County of Grey for 1865-1866. Toronto: The Globe Stream Press, 1865.

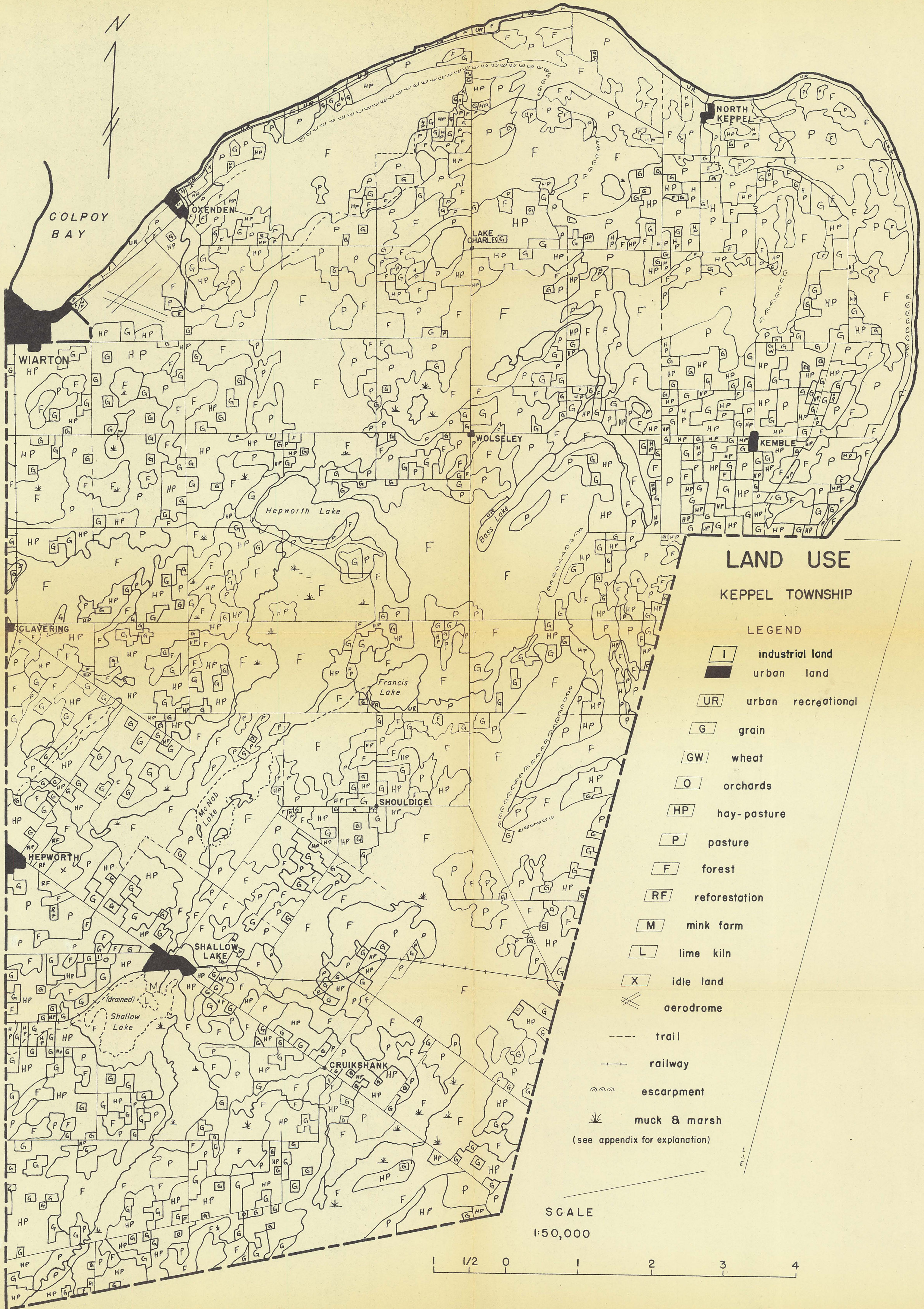
Periodicals

- (8) Chapman and Putnam. "The Climate of Southern Ontario". Scientific Agriculture. 18, pp.401-446. August, 1938.
- (9) Chapman and Putnam. "Physiography of South-western Ontario". Scientific Agriculture. 24, pp. 101. November, 1943.
- (10) Chapman and Putnam. "Drumlins of Southern Ontario". Transactions of the Royal Society of Canada. 37, Section 4, pp. 75-88. 1943.

Government Publications

- (11) Gillespie and Richards. "Soil Survey of Grey County". Ontario Ontario Soil Survey Report 17. 1954.
- (12) Goudge, M. F. "Preliminary Report on the Limestones of Quebec and Ontario". Ottawa: Canadian Department of Mines, Mines Branch. Number 682, 1927.

- (13) Hills, G. A. "The Ontario Approach to Forest Site Classification".
Research Paper, Ontario Department of Lands
and Forests, 1954.
- (14) Stockwell, C. H. (ed.) "Geology and Economic Minerals of Canada".
Geological Survey of Canada. Economic
Geology Series No. 1. Fourth edition.
- (15) Canada Census Reports. Dominion Bureau of Statistics. Ottawa:
1871-1956.
- (16) Canada Climatic Summaries for Selected Meteorological Stations.
Department of Transport, Meteorological
Division.
- (17) Illustrated Atlas of the Dominion of Canada, Grey County. Toronto:
H. Belden and Co., 1880.
- (18) Our Valley. Ontario Department of Planning and Development,
Conservation Branch. Vol 5. Numbers 1
and 2, 1959.

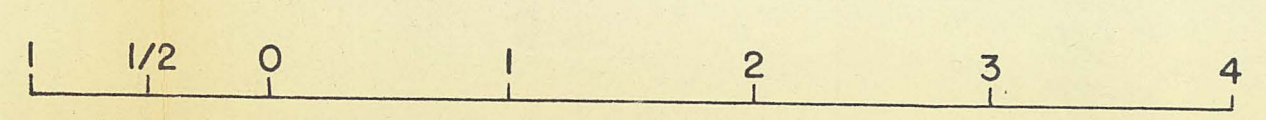


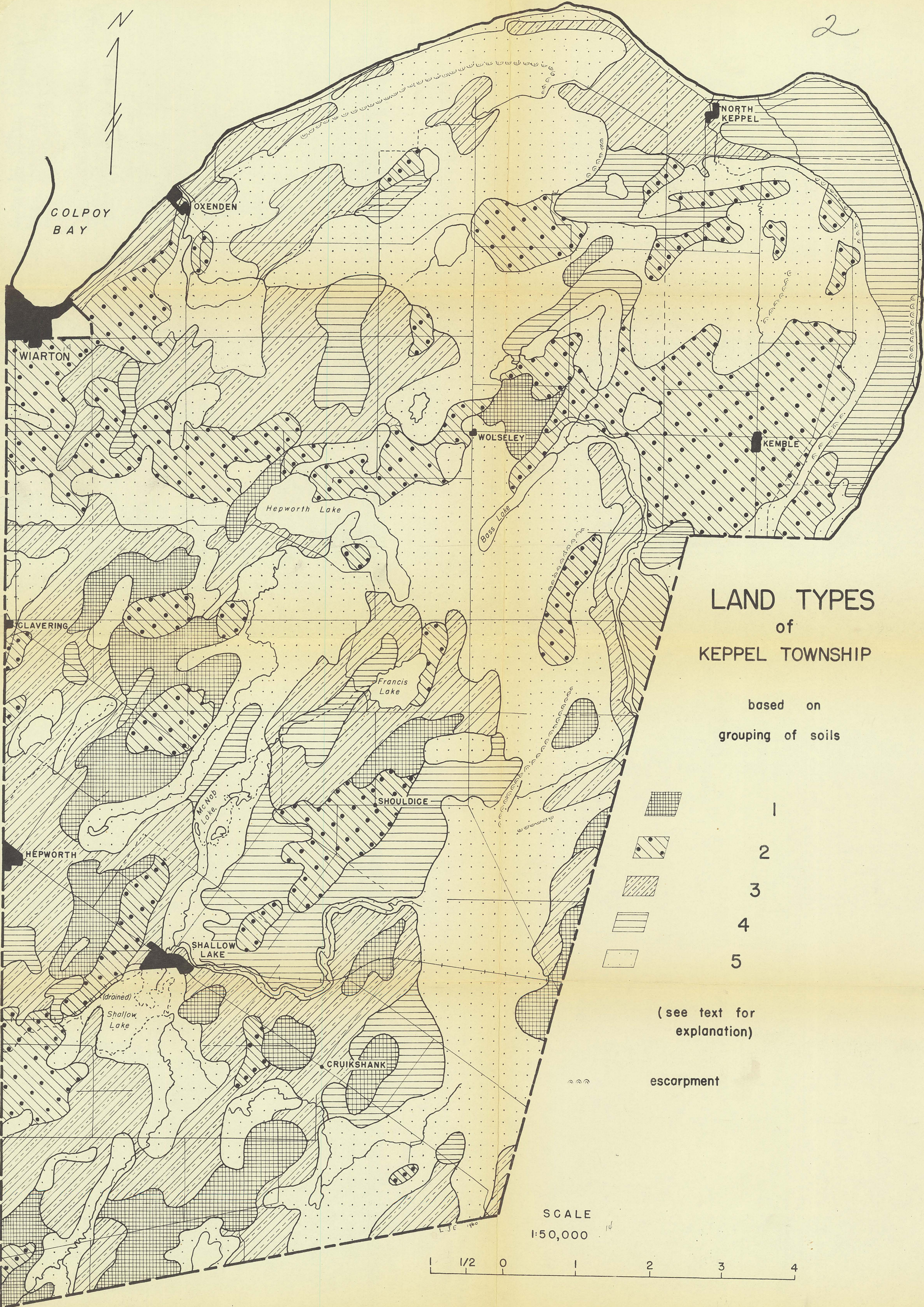
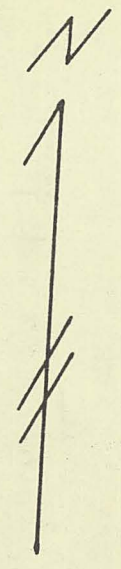
LAND USE
KEPPEL TOWNSHIP

LEGEND

- industrial land
 - urban land
 - UR urban recreational
 - G grain
 - GW wheat
 - O orchards
 - HP hay-pasture
 - P pasture
 - F forest
 - RF reforestation
 - M mink farm
 - L lime kiln
 - X idle land
 - aerodrome
 - trail
 - railway
 - escarpment
 - muck & marsh
- (see appendix for explanation)

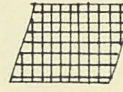
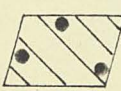
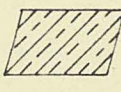
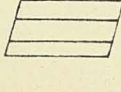
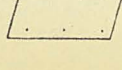
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LAND TYPES of KEPPEL TOWNSHIP

based on
grouping of soils

-  1
-  2
-  3
-  4
-  5

(see text for
explanation)

escarpment

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