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U. S. GEOLOGICAL SURVEY
FIELD SECTION BOOK

9-891

LAKE SUPERIOR DIVISION.

INSTRUCTIONS.

1. Ordinarily at least two pages of this book will be devoted to one section. On the left-hand page, place a map of as much of the section as has *actually been seen*. Denote rivers, lakes, marshes, etc., by the usual topographical signs. Denote the ledges of rock, when no structure is made out, by cross-hatching, making the cross-hatching cover as nearly as possible the areas occupied by the exposures. If the rock is a massive one, but still more or less plainly bedded, use the same sign with a dip arrow and number attached, showing the direction and amount of the dip. Denote a *slaty* or other very plainly bedded ledge by right parallel lines, and a ledge having a secondary structure by wavy parallel lines running in the direction of the strike, with dip arrow and number attached as before. The greatest care must be taken to avoid confusing slaty or schistose structure with bedding, and in all cases where there is the least doubt about the true bedding direction, indicate it by a query. To each exposure on the face of the map attach the number of the specimen representing it. In mapping the section count each of the spaces between the blue lines as 100 paces, and twenty of these spaces to one mile, or 2,000 paces. Usually the southeast corner will be placed at the bottom of the page, or at the first black line above the bottom of the page, and at the right-hand side. If, however, for any reason, it is desirable to show portions of an adjoining section, the southeast corner may be shifted up, or the map may be turned around and the north placed at the left-hand side of the page. The ruling of the left-hand pages is also arranged so that, if desirable, a larger or a smaller scale can be used, eight inches, two inches, one inch, or one-half inch to the mile. With the two-inch scale, the squares outlined in black represent sections, and those in red, quarter sections and "forties," while the space between the blue lines is 200 paces.

2. On the right-hand page place the notes descriptive of the exposures. Begin in each case with the number of the specimen, placing the number on the left-hand side of the red line, after which give in order on the right of the same red line the position of the ledges as reckoned in paces from the southeast corner of the section and the dip and strike when observable, the latter always being expressed from the north; for instance 4025, 250 N., 300 W., *Strike, N. 78° E., Dip 50° S.* Then follow with a full description of the ledge. When topographical maps are used for locations this paragraph applies only in part.

3. Collect a specimen from every ledge, or wherever there is a change of rock on any one ledge, taking care to get fresh material, unless for a special purpose the weathered surface is desired. In case of trips made on foot or in canoes, for long distances, neighboring ledges, unquestionably of one kind of rock, need not be specimened. The position and extent of the ledges not specimened should be marked on the map, with notes that each is of a rock identical with specimen so-and-so. Under the same conditions small-sized specimens, trimmed to a uniform size of $2 \times 2\frac{1}{2} \times \frac{1}{2}$ inches will be allowed, but in all other cases *large-sized specimens*, trimmed to a size of $3 \times 4 \times 1$ inches, must be selected, in accordance with section 3, chapter IV, p. 44, Regulations of the U. S. Geological Survey. Specimens should not be placed together without protection in the collecting bag, as the fresh surfaces, important in determining the character of rocks, are thus destroyed. They should be damaged by no temporary mark, but the numbers should be at once marked in at least two places upon the inclosing paper or cloth bags. Specimens may be permanently marked in camp by painting the numbers upon them in white upon a black background, using Silver White and Ivory Black oil tubes for color, with turpentine as a diluent.

4. On the last twenty-five pages of the book give, as may seem desirable, a general account of the examination of the region mapped in the previous pages, correlation of observations, sketches, cross sections, etc.

5. Forward this note book as soon as filled as registered mail matter to C. R. Van Hise, U. S. Geologist, Madison, Wis.

#197

Sept 4.

S. side of Falls Lake to the end then N.
on East side, S. on West side.

27642
28057

Fine grained green-schist or slate at
N.E. corner of Little Bay near E 1/4
post Dec 17. Its schistosity is vertical.

27643
28058

More massive rock with bedded
with this.

27644
28059

The same rocks extend along shore
across Dec 16, till the N.E. cor. of Section
is reached, where we find a schistose
gray slate striking N. 45° E and dip-
ping vertical.

27645
28060

Beyond this is a dark rock that re-
sembles a green-schist. Strike N.E.
dip 80° S. It may be a slate or
slate, from center of N.E. 1/4 Dec 10
dip 75° S. Strike N.E.

27646
28061

The Little island N.E. of 28061 is com-
posed of a very white schistose rock,
that is fairly massive. It may be
a decomposed green schist, though
it is more probably a schistose grit
Its strike and dip conform to those
of the slate?

27647
28062

- 27648
Sl. 28063 Slate or green schist, near W Sec
line Sec 11. Strike N. 55° E. Dip 71° S.
- 27649
N. 28064 Massive greenstone from island in
NW 1/4 Sec 11
- 27650
N. 28065 Green schist from near S. 1/4 Sec
2.
- 27651
Sl. 28066 White schist from SE 1/4 Sec 2.
Near the end of the lake on south
side of passage trail into Saturday
lake is a great knob of a white rock
that is apparently a conglomerate
and a grit interbedded
is a grit
- 27652
Sl. 28067 is a massive graywacke
The latter rock is in contact with the west
with a well exposed conglomerate that
is more or less slaty. Its beds, judg-
ing by the arrangement of the peb-
bles, strike N. 55° E and dip about
vertically. The matrix of the conglom-
erate is a light green slate. This
is dotted with angular and rounded
pebbles that we at first white. There
seem to be spheroidal greenstone.
Many of the pebbles are sharp edged,
angular and in lines, so that at

first thought the rock might be
a pressure conglomerate. Think now
that there can be no question but
that the rock is a water conglomer-
ate, and that the green schist^d and
white schist^d collected to the south and
west are also fragmentals.

27654
28069
27655
28070
27656
28071

Matrix of conglomerate^d
Specimen showing pebbles
Piece of large pebbles

The north of the conglomerate^d from
the contact with the gray wack to the
north side, when it is covered with
soil is at least 75 paces (175 feet)
white^d schist, probably schistose gneiss
from Little island. Found near O. H. Box
Sec 35. Strike of schist^d - N. 35° E.
dip 75° to 80° N.

27657
28072

Coarse, green gray wack from
shore, north of island

27658
28073

27659
28074

Gray white^d schist, little furrows
west

27660
28075

White^d schist. Coarser phase of rock
like 28074. On strike of 28074, further
west.

27661

N.S. 28076

From near Center Sec 3. Strike about
N.E. dip 75° N.W.

27662

N.S. 28077

From west side little bay, near outlet
Falls lake. Strike N. 50° E. dip 75° N.W.

27663

N.S. 28078

Green, fragmental schist. Strike
N. 50° E. dip 75° N.W.

27664

N.S. 28079

White schist. From west side outlet
Falls lake. Dip and strike very much
like others.

From this point followed down the
East side of the outlet to Newton Lake.
We first meet with a series of ledges
about 70 paces wide, composed of
rocks striking N. 50° E and dipping
about 80° N.

27665

N.S. 28080

The first rock is a schistose grit

27666

N.S. 28081

The next is a white chert, or decum-
posed greenstone, not unlike the rocks
from small islands in East end
of Falls lake.

27667

N.S. 28082

Then follow a schistose slate or gray-
wacke, and

27668

95 28083

a schistose grit that weathers like gray wacke or quartzite?

These rocks strike generally N. 55° E. and dip 80° N.

Following these ledges is a space devoid of rock and then appear other ledges in which the rocks strike and dip as before.

27669

95 28084

The most southerly of these rocks is a white cherty or calcareous grit. With joints are other rocks that weather in knotty, cellular surfaces. On their more covered surfaces the rocks resemble conglomeratis in their mode of weathering. On fresh surfaces, however, they show white, dense, rounded bodies in a schistose matrix. The material of the rounded bodies, that look like pebbles, and of the matrix is very similar — a light gray or grayish purple greenstone.

27670

95 28085

Schistose rock on South side of the conglomeratis rock. From top of hill.

27671

95 28086

Conglomeratis rock containing pebbles.

27672

9.2 28087

28088

27673

Conglomeratic rock showing pebbles
Piece of pebble.

A little distance from the water
edge on the immediate strike of the
Conglomeratic rock is a white weath-
ering rock that looks as though
it might be the source of the pebbles.
This rock is jointed and broken to such
an extent that it looks as though
it may easily have given rise to the
Conglomeratic Movement along
planes of schistosity.

27675

9.5 28090

27676

9.5 28091

Schistose grit from north side of Con-
glomerate ledge.

Another specimen from 45 paces
north of Conglomerate ledge.

27677

9.5 28092

Schistose gneiss, from east
side of bay in Sec. 34. The strike
of the schistosity is a little W of N.

The topography of this lake in
the lake flats is so bad that it
is difficult to locate points so that
they may be identified. The topo-
graphical map was not at hand for me,
but think that the ledges can be
marked in it from memory, with

the aid of the land plants.

27678

N.S. 28093

On the island in the North part of the South Bay of Newton Lake is an island on whose West side and in whose interior is a greenstone-schist filled with stringers and apparent boulders of chert or a chert-like rock. The schist looks very much like a conglomerate. It is apparently a dymanic schist.

27679

N.S. 28094

Greenstone schist from little island West of large island.

27680

N.S. 28095

In the little bay near West $\frac{1}{4}$ Sec 26 is a fine grained rock that looks like mica schist.

27681

N.S. 28096

and at the point S.E. of $\frac{1}{4}$ Sec 27 is a coarse grained dark green columnar schist that looks like a squeezed eruptive.

27682

N.S. 28097

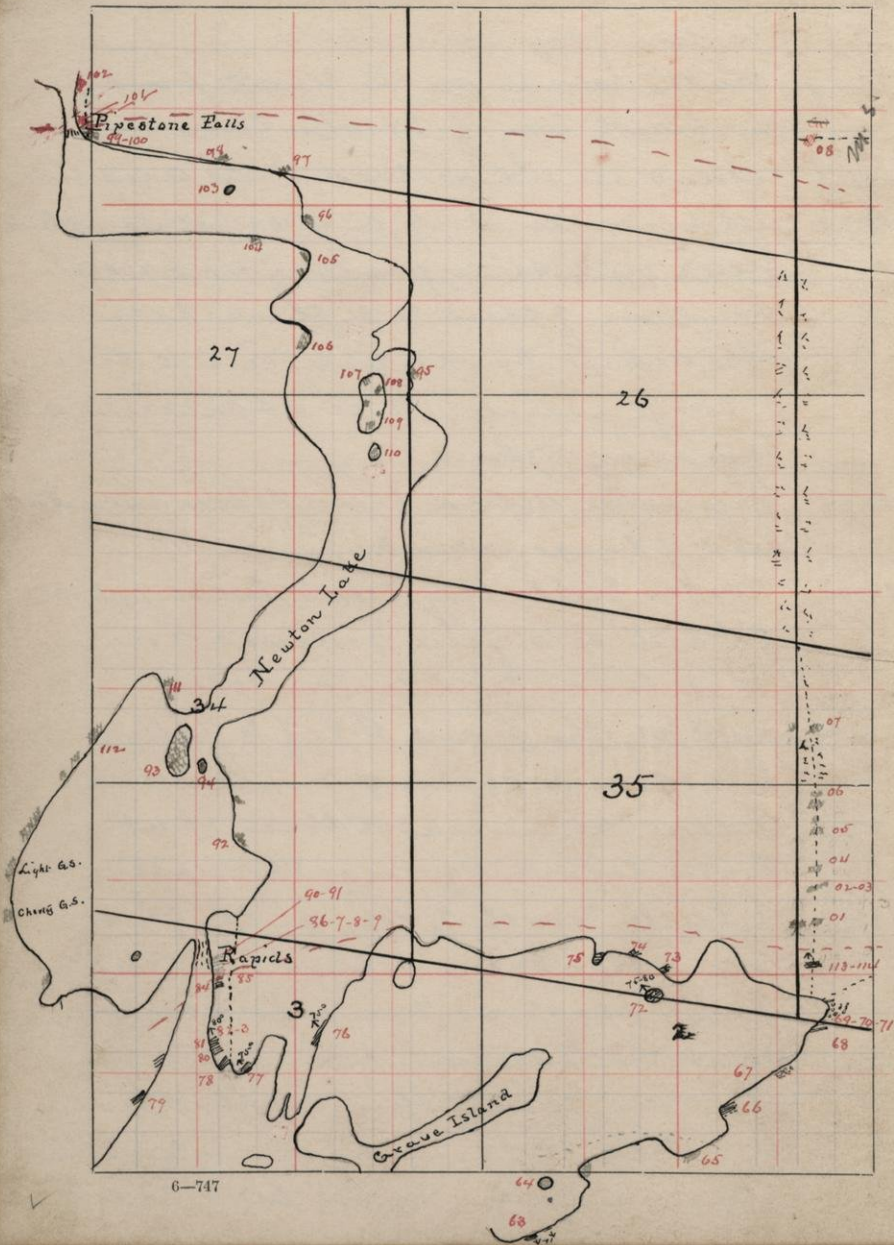
A little North of this in the Shene is another green schist that differs from 28096 in being friable and sandy in texture.

The rocks west of this in the Shene are like 28097, until they north to Pipestone Falls. On the East side of

S.

T. $\frac{64}{63}$

R. 11



- 27683
H 28098 the stream running from the lake, above the falls is a green schist^d porphyry, that was evidently once a lava or a dyke rock.
- At the falls on the East side the rocks are schist^d and granite^d. The southernmost ledge, immediately south of the 2 ft. plunge constituting Pinesburg Falls, is a breccia schist - a fine grained green schist in which are lenticles of a fine grained diabas^d or basaltic rock.
- 27684
H 28099 A little further north, in the next ledge, the lenticles predominate^d, and at the north end of the exposure is a fine grained granite^d, whose relations to the schist were not discovered.
- 27686
H 28100 Below the falls, on the East bank of the stream is the typical Passwood granite^d.
- 27687
H 28102 Returning from few rocks on the west side of the lake than on its East side.
- 27688
H 28103 is a green-schist from Little island near N. W. post Dec 27. Its strike is a few degrees N of E.

27689

4.5 28104

27690

4.5 28105

dense green-schist from shore S.E. of island

from W. side northern narrows.

Strike 25° S of E. The rock is very much like 28093. It contains white or light colored streaks in a light green ground mass. In fractures across the schistosity the rock looks very much like a conglomerate.

NB. The strike as recorded does not agree with mapping. In the field the strike makes a direct line into the little island from which 28110 was afterwards taken. When the recorded strike is plotted however, it by no means shows this relation to the island.

27691

4.5 28106

Greenstone-schist containing actinolite or hornblende crystals

On the large island near West 1/2 Port Sec 27 nothing but green-schist were observed. Of these three specimens were taken

27692

4.5 28107

Very light green-schist, so hard that it is supposed to be a fragmental rock. From N.W. side of island. The strike

of bands that were taken for bedding bands is N. 30° - 35° W. These bands may be planes of schistosity? They are thin and indefinite, so that no great dependence can be placed on the observation.

27693

H.S. 28108

Massive greenstone - or slightly schistose green schist from N.E. and of island

27694

H. 28109

Green-schist. S.E. and of island

27695

H. 28110

Green, porphyritic schist from island south of large island

27696

H.S. 28111

Dense, light green schist from bay near center Rec. 34.

The west side of the great Outermost portion of Newton Lake is bordered by green-stone schist? nearly all of the same general character. The

27697

H. 28112

rock is represented by the single specimen (28112) taken from a high ledge near the water's edge, near the W. L. Point. Rec 34

S.

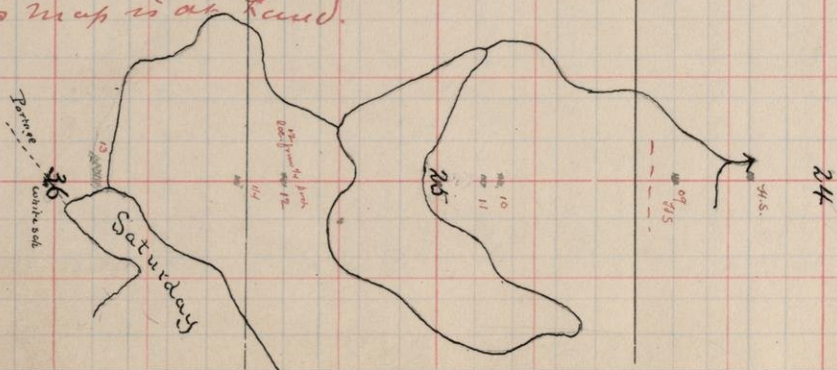
T. 64

R. 11

The locations in this plat are unquestionably
 wrong because of the departure of the supposed E-W
 lines from E-W direction. Locations can easily be
 corrected by reference to these lines of lakes when true.

See page 8 for locations on this line.

Davis map is at hand.



Sept 5.

Moved to Saturday Lake.

Sept 6.

Ran north on Dec. line between
Decs. 35 and 36 T. 64 R. 11 from Falls
Lake. Went north $2\frac{1}{4}$ miles then east
 $\frac{1}{2}$ mile and back.

27698

h.s. 28113

At about 125 paces N of Falls Lake on
hill found ridge of a fragmental schist
dipping very high to the north and striking
N. 80° E. The schistosity strikes about N.E.

27699

h.s. 28114

28113 is a fine grained phase and
a schistose phase.

h.s. 28001

About 300 paces N of lake are small
ledges of a green schist that looks as
though it might be fragmental.

h.s. 28002

At about 500 N of lake are numerous ex-
posures of a green schistose rock (28002)
that appears to be cut by irregular
masses of a red weathering material that
may be a decomposed greenstone or
possibly an acid rock.

h.s. 28003

In the red rock are large lentils of
a chloritic hornblende schist too soft

Wetfield Specimens

The appearance suggested by these rocks is that of a complex of acid and basic lavas made schistose by pressure.

G.A.
28004

Schistose granitic fine of little holes like amygdalites - 600 ft of lake. 100 ft of ling.

G.S.
28005

750-800 ft of lake are several hillocks green schist weathering white.

G.S.
28006

Green schist, almost like massive crumpling. 950 ft of lake shore.

G.S.
28007

At 1300 north of the lake, north of a little swamp is a number of hummocks of a purple, dense rock that looks not unlike the fine grained granite found at Pipestone rapids. The rock is massive but is much jointed.

Just west of the ling, immediately west of 28007 is a mass covered ledge exposing the rock only in a few places. There is at least some chlorite-lamellated schist in the ledge, but the predominant rock seems like 28007.

M.G.
28008

600 ft. 50 E of O.E. cr. sec.
Barrow granite?

7.
28009

1000 W. 150 N of D.E. Cor Sec 24.

Ledge of greenstone schist, probably
part of granite series, from side of
large hill of the same rock.

h.s. ?
28010

1000 W. 1300 N of D.E. Cor Sec. 25.

Thin covered ledge of a white-schist.
Can see no better of rock that cannot
determine whether decomposed green-

h.s. ?
28011

stone or fragmental schist.

A few paces further south is a
larger ledge of the same rock. It
possesses a more distinctly-green
tinge. South of this near the north
shore of lake is an undisturbed
green schist. This seems to indi-
cate that 28010 is a decomposed
greenstone.

h.s.
28012

1200 N. 250 W of D.E. post Sec 25.

on the north side of a high hill are
thin covered ledges of green-schist,

h.s.
28013

and just south of a creek as you
south of this the best is another simi-
lar ledge

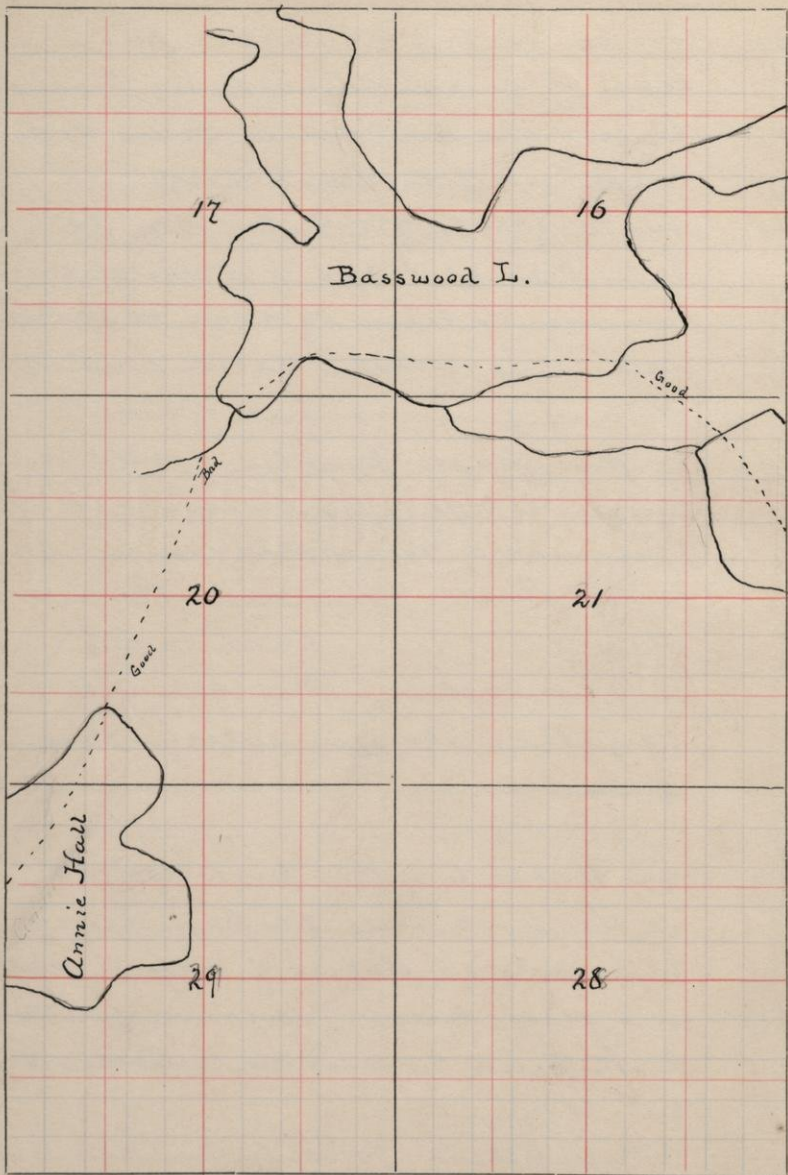
best
28014

White schist, probably fragmental
from center of Sec. 36.

S.

T. 64

R. 10



Sept 6-12.

During balance of field season made a run over country east to look over country in which beginning of next year's work is to be laid.

From Saturday lake portaged into³ Annie Hall, then into³ Basswood.

From Basswood went through several lakes in Pine Lake, then into Wind and from this into³ Moose Lake.

From Moose portaged into Flash then into³ Snobank.

From Snobank attempted to go into³ Disappointment but could not find portage trail, so went into³ Boot Lake, Assenig, Cap, Corp, Duck, and Basswood into³ Falls.

One of the objects of the trip was to plan for next season's work, but another object was to examine Mr. Leptman's localities of *Corygonia* etc. This geologist, as will be seen by a glance at the maps, supposed that two *Corygonia* are present

in this district, but he did not discriminate clearly between the lower and the upper ones.

— — —

Copy of the Eftimov's
Paper on the Geology of the Balkan
Lake and vicinity.

I. General Structure. The entire region has been subjected to several orographic movements which have complicated the structure by intricate folding together of several formations and the production of structures like schistosity, folding, etc., common to all the formation in a particular locality.

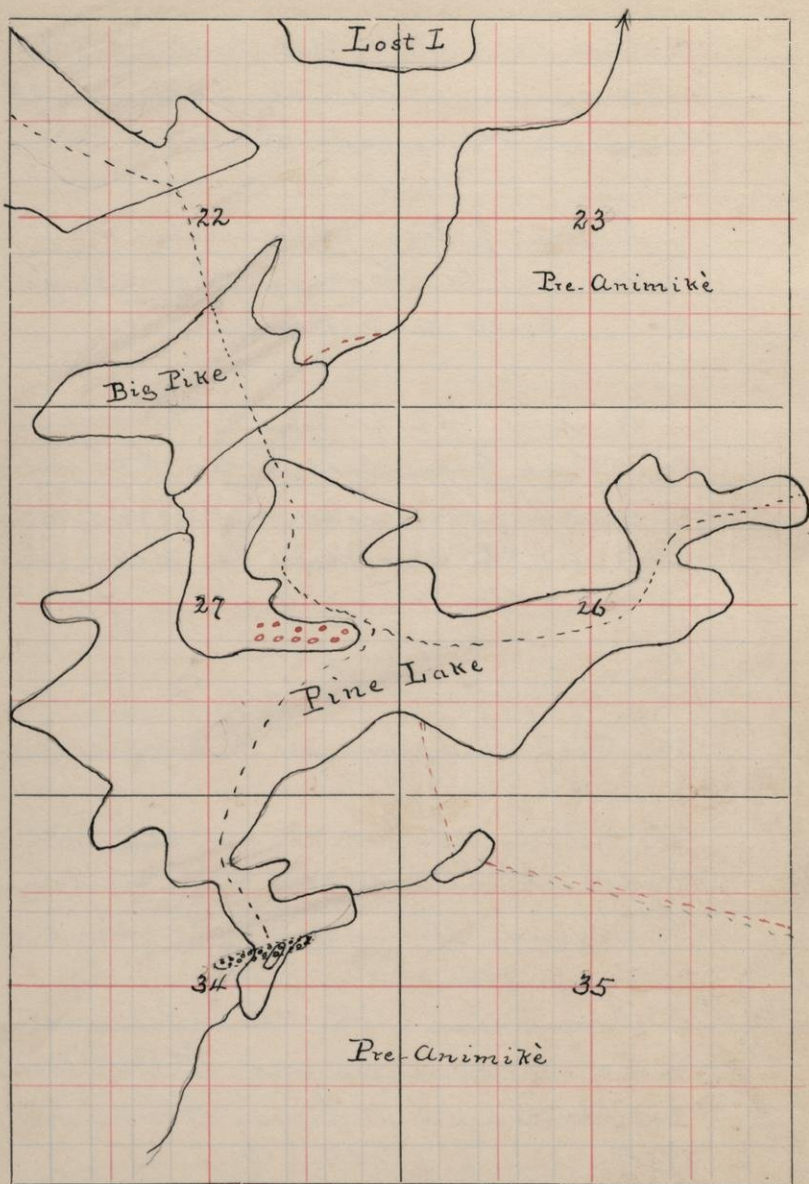
The intrusions of the granites and the Keweenaw gabbro have destroyed the original character and structure of many of the older rocks.

II. Formations. The three formations easily recognized are 1st Pre-Auriferous (Archean and Lower Huronian), 2nd Auriferous (Upper Huronian), and 3rd Keweenaw Gabbro.

S.

T. 64

R. 10



Pre-Ammike

Until a further investigation and consideration of materials at hand, I prefer to designate the rocks below the Ammike as simply Pre-Ammike, because a satisfactory division between the Archean and Lower Huronian has not been made in Minnesota and especially in this area.

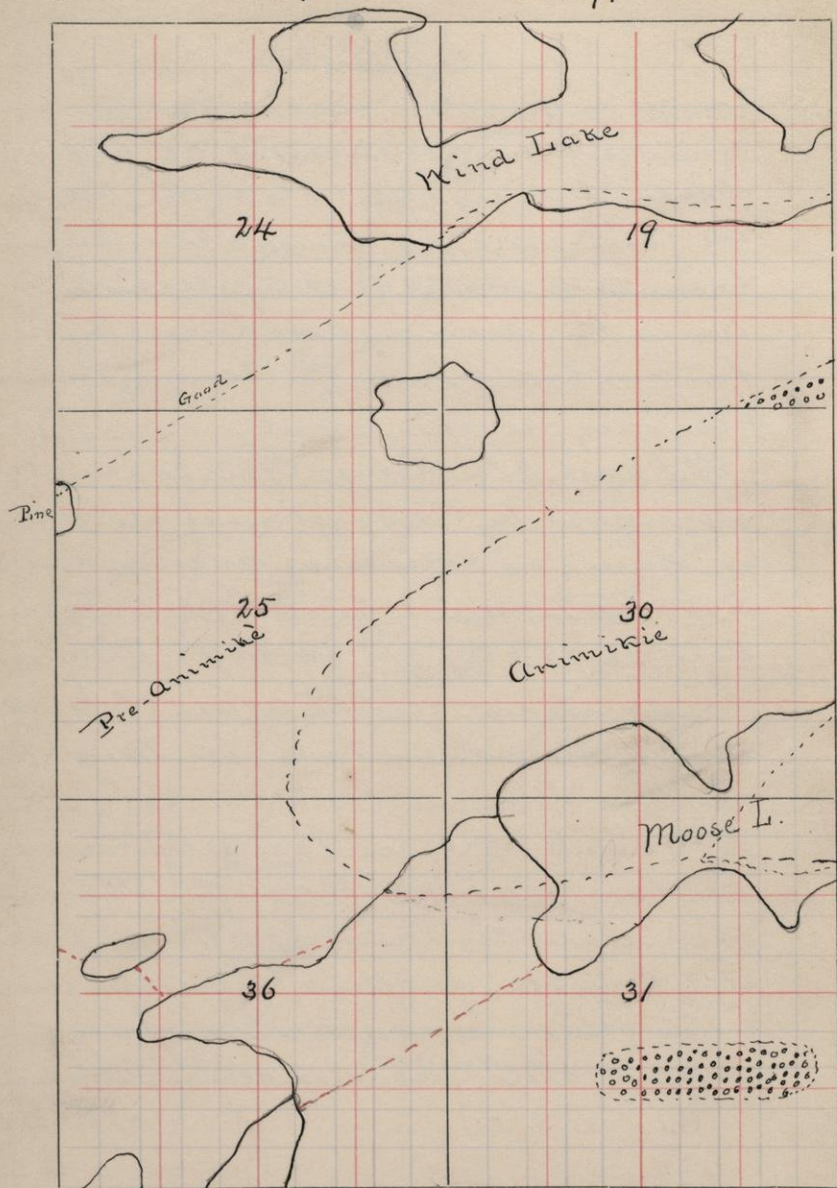
The base of the Lower Huronian is represented by the Conglomerate which is found in extensive outcrops around Disappointment Lake especially in Secs. 28, 33, & 34 of T. 64 R. 8. The same Conglomerate occurs along the North shore of Snowbank Lake, in Boot Lake in Pine Lake in the N.E. 1/4 Sec 27 T. 64 R. 10 and at other localities west of the last named location. This conglomerate contains boulders of granite, hornblende schist, silicious and micaceous schist in abundance. Quartz and Jasper like pebbles occur very rarely.

All the occurrences of this Conglomerate, except those in Disappointment Lake were visited. In Pine Lake the

S.

T. 64

R. 10/9



rock was not so well characterized that could determine much from it. In places it looks conglomeratic, but in the thick lying could spend at the place, could not decide whether it was a good and genuine conglomerate or not.

From very rapid glance at this and the neighboring rocks I would conclude that it is an Archaean conglomerate, in the north side of a trough whose south side is marked by the conglomerate near center of Sec 30 at South End place.

The Dubouant conglomerate is a granite conglomerate, whose richness in granite pebbles is due to the presence of the Dubouant granite in the vicinity.

I could find no sufficient difference in the character of the two conglomerates at Dubouant to warrant their separation. The distribution of the two conglomerates (see map) is likewise fatal to this assumption, if an Upper Huronian trough exists.

North of Snowbank. [WV 13].

Above the Lower Huronian Pughnucate are the green schists around Sock Lake (Sec 27. T 64 R 8), and those of Disappointment Hill, the gneisses and green-schists in Secs. 31, 32, 33. T. 64 R. 9, & schists and greenstones around and south of Pine Lake.

The schists around Wind Lake, the Basswood granite and part of the granite in Snowbank are doubtfully referred to the Archean.

The Lower Huronian rocks are cut by quartz porphyry dykes and the Boot Lake and part of the Snowbank Lake granite.

Aminike

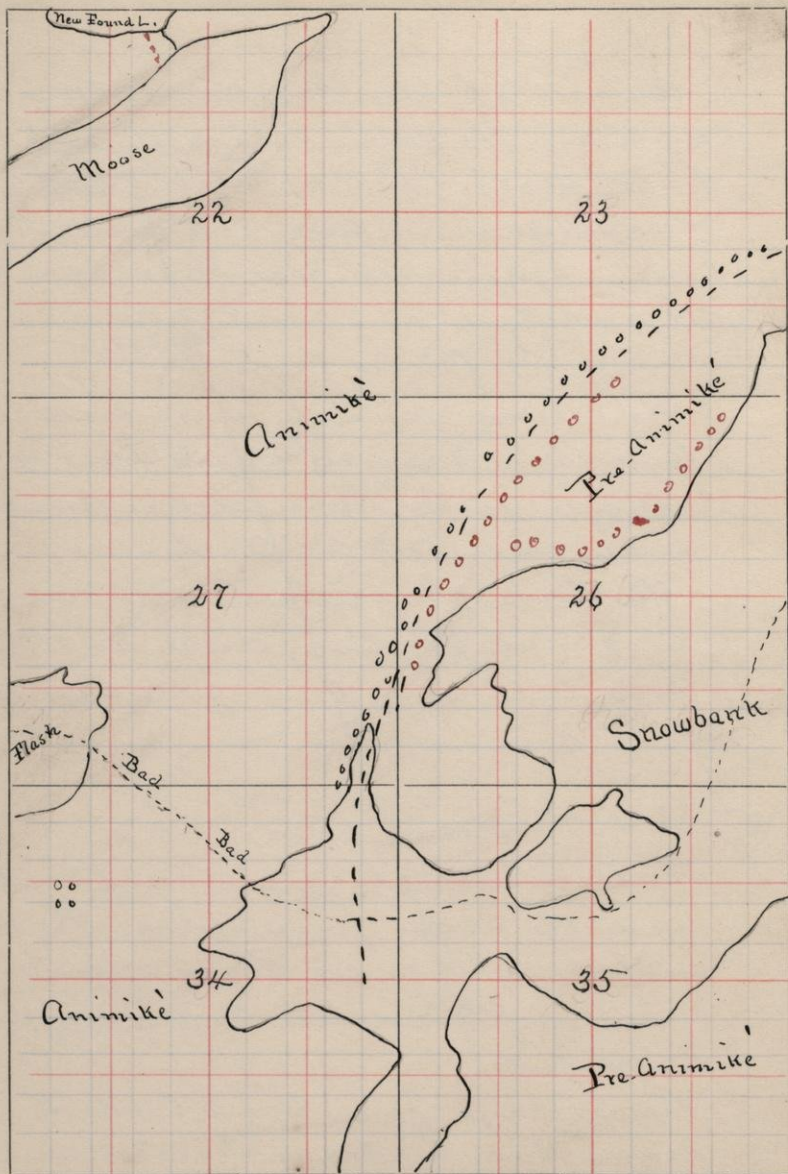
The Aminike lies unconformably upon the older formations. The unconformity is easily recognized in a number of localities especially in Moose Lake.

The passage from Wind Lake to Moose Lake in Sec 20. T. 64 R. 9 crosses a ridge which is about 75 ft. above

S.

T. 64

R. 9



Woods Lake. The Wind Lake Schists² are found on the North side of the Mdg. Upon these lies a conglomerate 400 ft. thick, above this are interstratified beds of jasper and conglomerate aggregating about 200 ft in thickness, of which the jasper comprises about half. Above these beds are alternating layers of conglomerate and finer material, some of which are highly ferruginous. The dip is to ward the S.E.

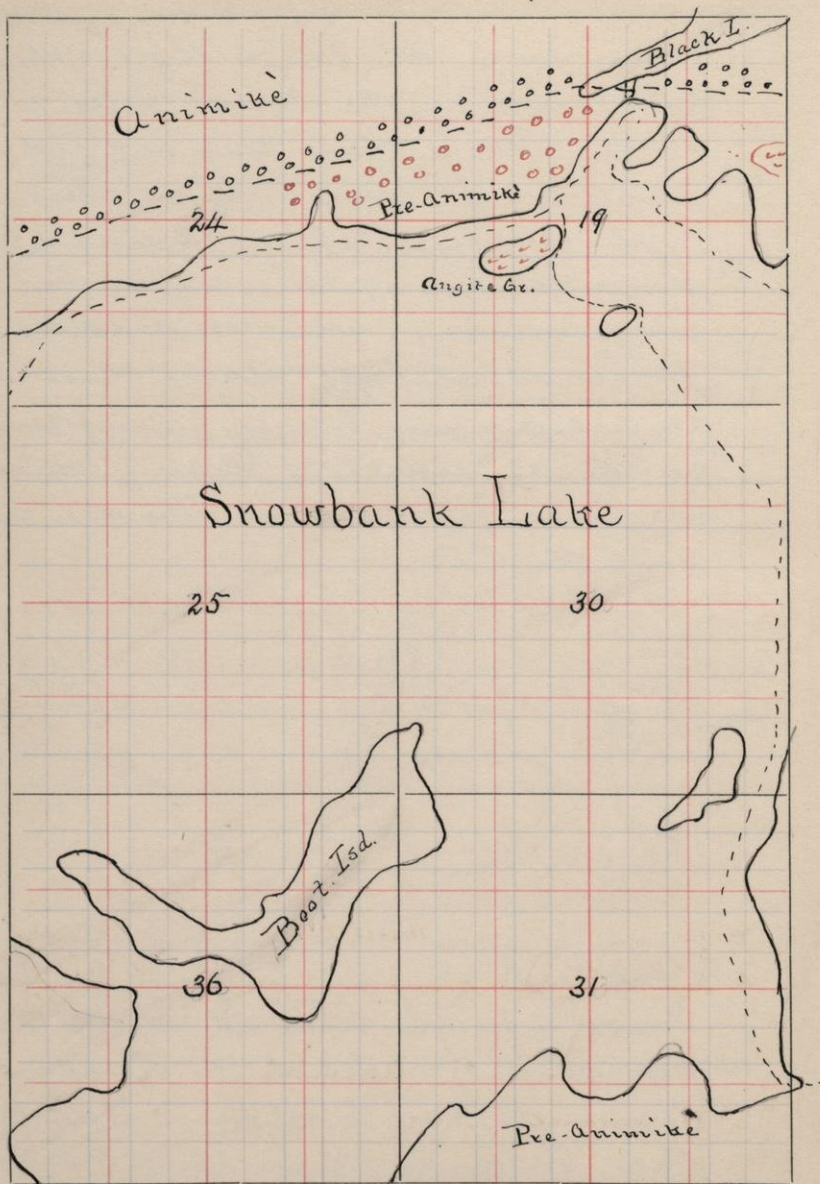
These exposures were studied all the afternoon. The conglomerates are beautifully exposed, but could not find an undoubted unconformity anywhere, though of course it may exist.

The jasper in most places looks like an included mass, though in some places it appears to be interstratified with the conglomerates [W13] South of Woods Lake the the SE part of Sec 29. and in Sec 28 the conglomerate forms the bare hills seen from the lake. In the northern parts of Secs 32 and 33 T 64 R 9. The conglomerate

S.

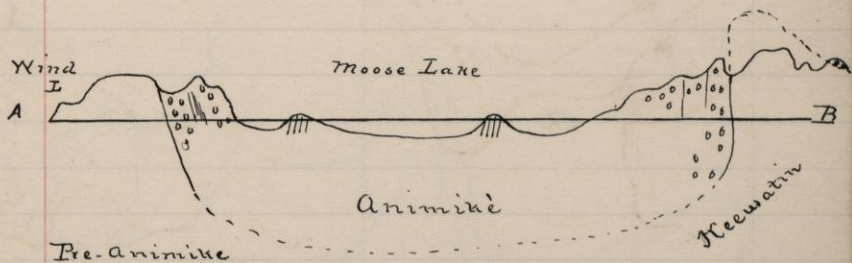
T. 64

R. 9/8



rests unconformably upon the Lower Huronian gneiss. Some of the conglomerate the prevailing rock is the greenstone. Small patches of Animikie conglomerate are found in this area.

The ridges south of Pinkey and Warrens Exploring Camp on Moose Lake are composed of greenstone and jasper. The tops of the ridges have several small areas of Animikie conglomerate. The structure of the Animikie on Moose Lake (along line A-B) is roughly represented by the section.



S.

T. 64

R. 8



On the west shore of Pine Lake in Sec 30
T. 64 R. 10 near the grassy bay forming
the extreme southern end of the lake is
a small patch of *Ammiota cingulata*.
The north east end of the island East
there is made up of the *Cingulata*.

North of Snowbank Lake the uncon-
forming between the upper and lower
Huronian is not so easily determined.
The two formations are found in con-
tact in the passage between Snowbank
and Black lakes.

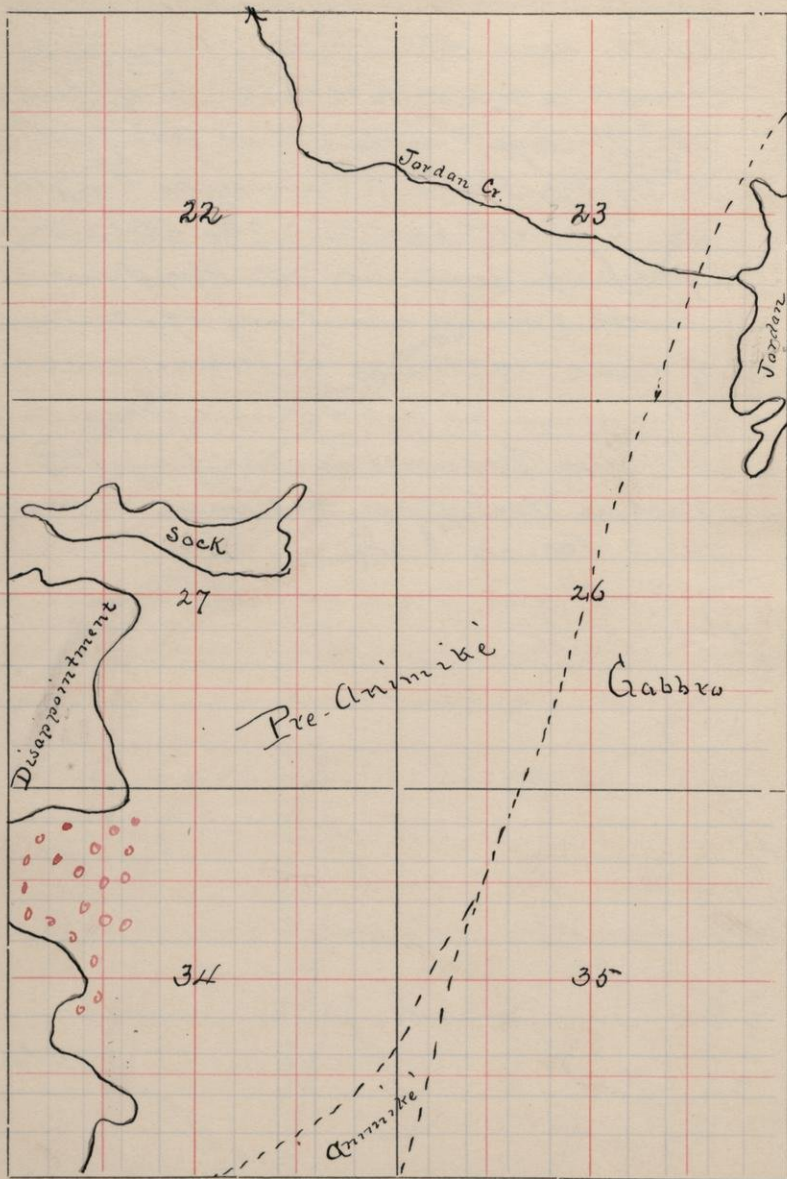
The *Cingulata* above described on
the south end of Pine Lake is beautiful
exposed in the island

The passage from Snowbank to Black
Lake reveals nothing of interest. Was
not even sure that *Cingulata*
of any kind exist there. There are
however beds of a red granite-look-
ing rock that may be composed
material. If so it was undoubtedly
attained from the red granite of Snow-
bank Lake. Since this rock cuts the
Lower Huronian the rock, if a fragmen-
tal one, is Upper Huronian. [WFB]

S.

T. 64

R. 8



On Boot Lake the Upper Huronian Conglomerate lies upon the Lower Huronian Conglomerate, & chert etc.

The iron ore and its associated Conglomerate on the South side of Disappointment Lake. I regard as a part of the Antrim.

Above the Conglomerate are argillites, siliceous and black slate, which become the prevailing rocks between Antrim and Knife Lakes.

The chief distinguishing characters of the Upper Huronian Conglomerate is the presence of abundant jaspers and greenstone pebbles derived from the Lower Huronian. Granite and quartz porphyry pebbles are also abundant.

26. 1888

Keweenawian

The gabbro breaks across all the formations and forms a series of interesting contact rocks which are well exposed on the South shore of Disappointment Lake.

S.

T. 64

R. 8

0-747

8

Ensign Lake

Ensign

17

16

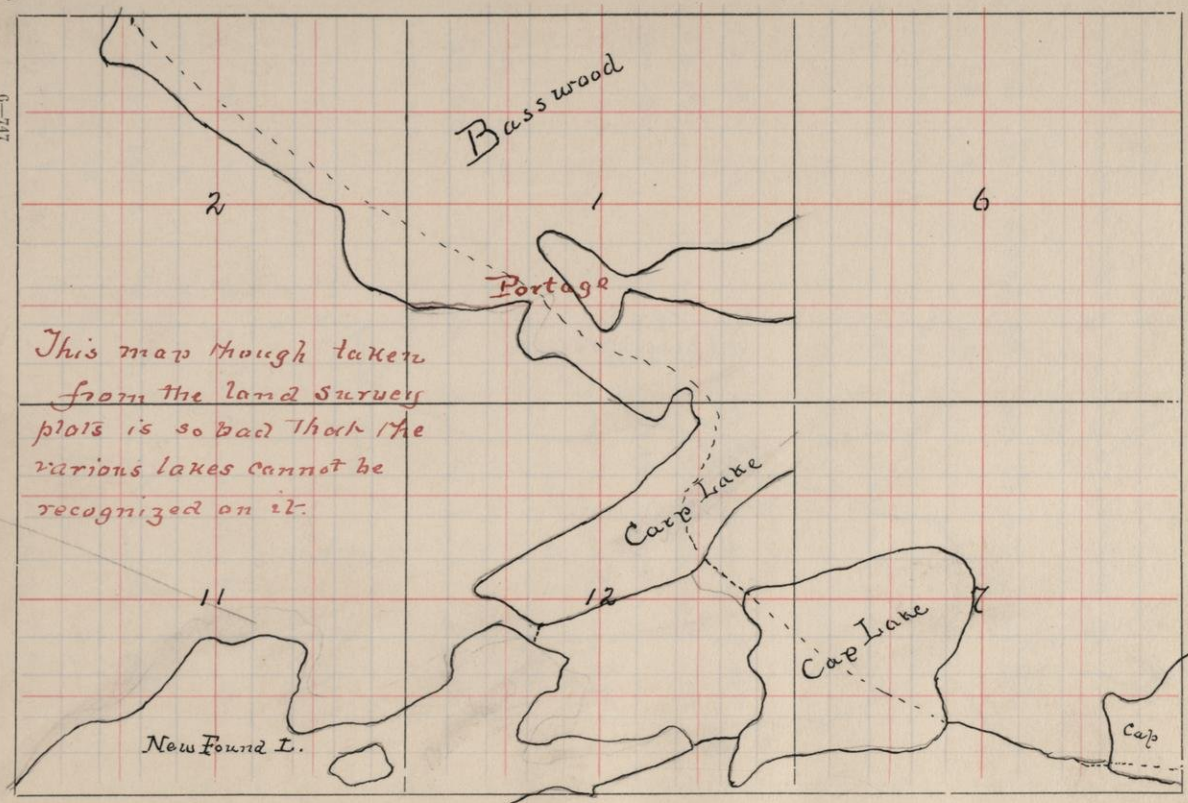
15

Good

Good

Principal references in this region
to publications of the Union Survey

Snowbank Lake -	22" report.	p. 151-159
	20" "	p. 60-69
	18" "	p. 124-130
Moose Lake -	22" "	p. 151-159
	18" "	p. 122
Hekaguabig Lake	21" "	p. 18-59
N.K. Rep. p 148-156	20" "	69-82
	361-369	16" " 99-109
Kainshini River	20" "	p. 38-59
	with map.	
	15" "	p. 90-92, 305-map.
Saganaqa Lake	20" "	p. 83-96
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Round Lake	20" "	p. 67
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This map though taken
from the land survey
plots is so bad that the
various lakes cannot be
recognized on it.

S.

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Ogishtemansie Lake 17th Rep. p. 108-111, 168

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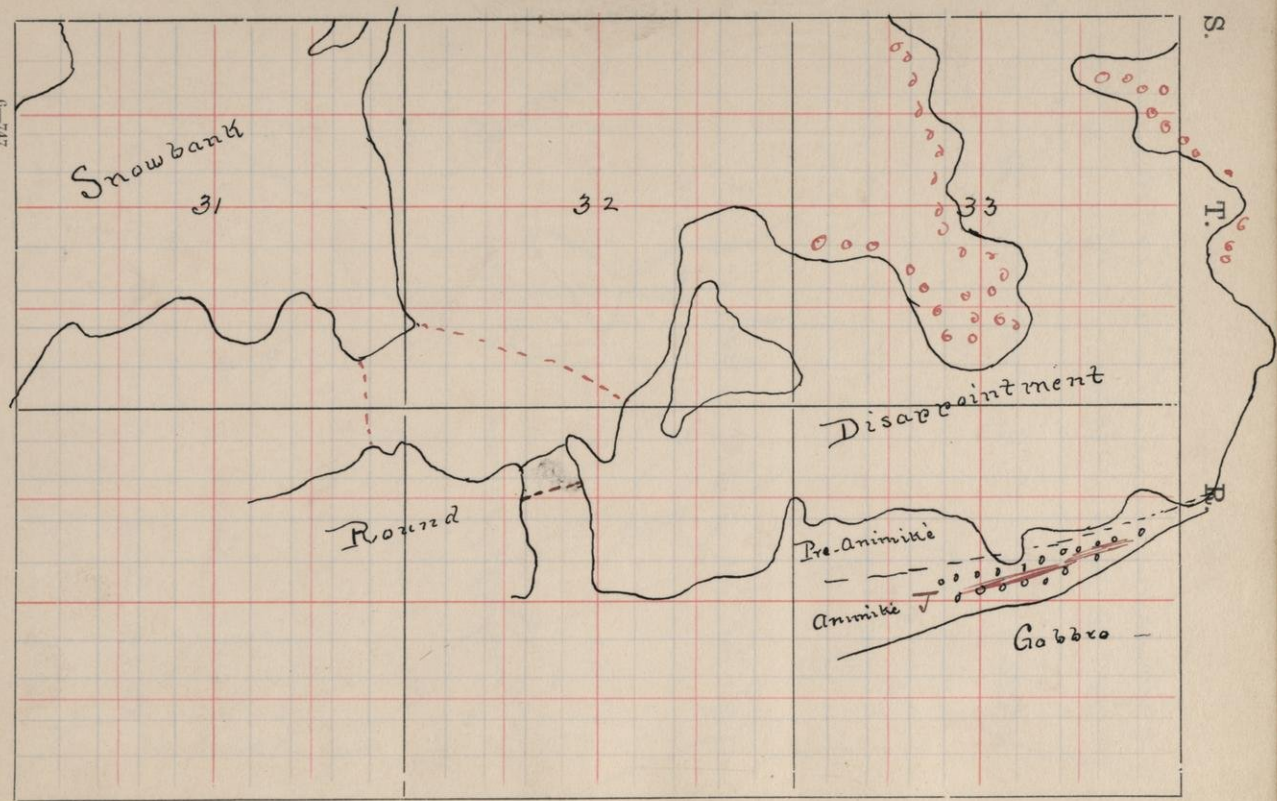
15th .. p. 67, 326-329

Crab Lake

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- Granite Lake 16" Rep. - p. 226-229
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