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FINAL GEOLOGICAL REPORT
on
THE SLATER RIVER, BOGGS CREEK AND HALFWAY RIVERS
N.W.T. (Canada)

A B S T R A C T

Only a small stratigraphic section is exposed in the area, the rocks being the Bosworth sandstone and siltstone of Devonian age and the Cretaceous Slater River shales. There is a major unconformity between the two, though it is not exposed anywhere in the area. The area lies in the trough of a large syncline.

The Halfway Prospect was examined in very great detail, but neither it nor any other part of this area can at present be recommended for drilling. However, seismic results show a slight suggestion of a possible terrace or structure nearby, but this can be defined only by further seismic work.

Chapter II.

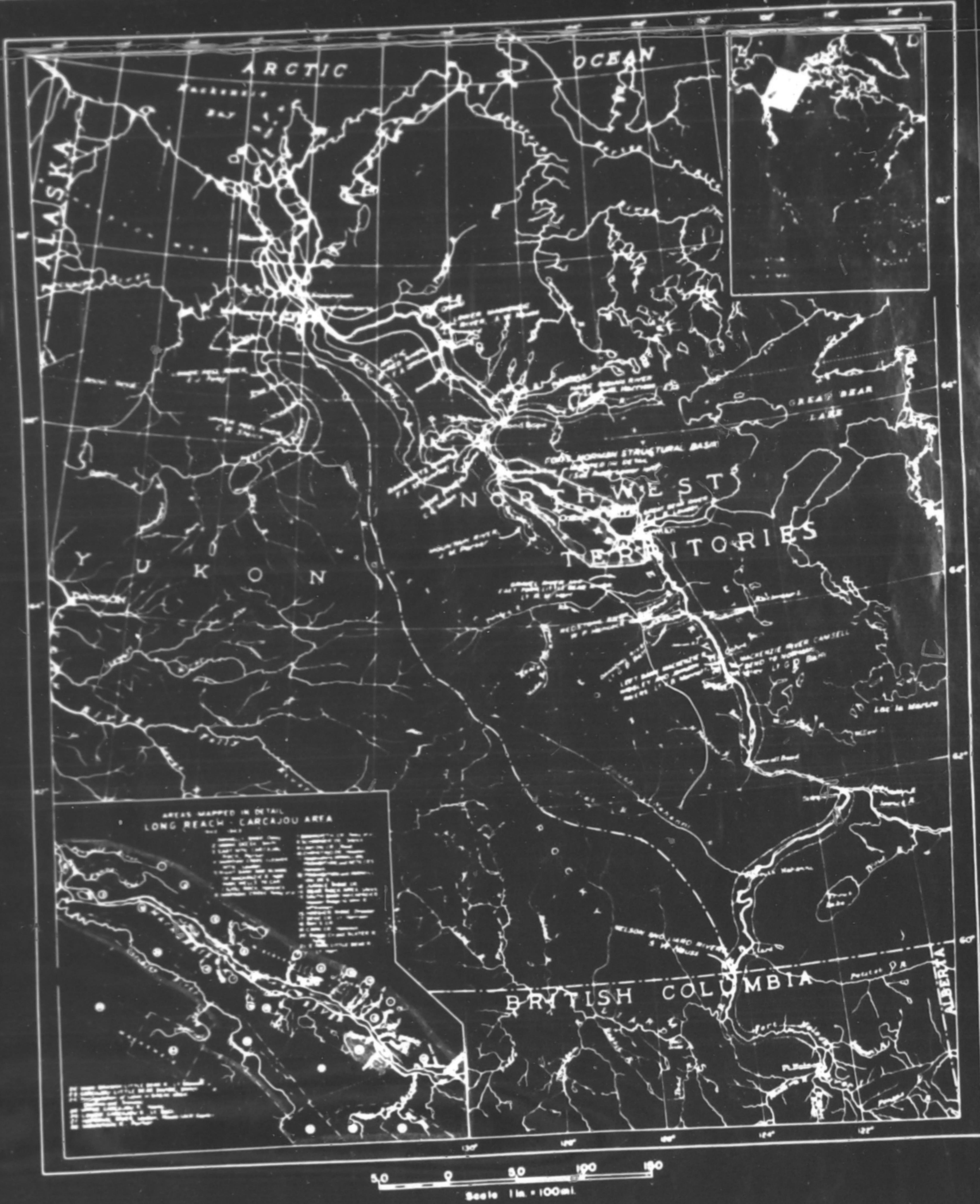
INTRODUCTION

The area studied lies on the west side of the Mackenzie River, about halfway between Norman Wells and Fort Norman. The work was done by Party "F", which consisted of Howard A. Gibson, Ross B. Pringle and the writer. The party left Norman Wells by barge on May 28th, and returned to Norman Wells by boat on June 14th.

The only way to travel inland is on foot. Slater River was traversed for about 12 miles, and its west fork about $2\frac{1}{2}$ miles. Roggs Creek was traversed for about 20 miles. No air reconnaissance was made previous to the survey.

The writer has benefited from discussions with other geologists who have worked in the same general area. They are Lt. R. H. Hart (3), Lt. V. B. Monnett (8), Dr. T. A. Link (5,6,7), C.R. Stelck (10), S. E. Houston (4), and W. P. Hancock (2). Dr. Link also went over the Halfway Prospect with the writer. The area between Wade Creek and Big Point, which was studied by the writer last winter (1) has since been investigated by Mr. Stelck. The writer is indebted to Mr. Gibson and Mr. Pringle for carrying on under rather difficult conditions of travel, and to Mr. Gibson again for drawing up the maps. Mr. Stelck and Mr. Keith Huff made the fossil determinations.

Three maps, an index map; "Detailed Geological Survey of Halfway Prospect", 4 inches - 1 mile; and "Reconnaissance Geological Map of Slater River, Roggs Creek, and Halfway Area", 1 inch - 1 mile; and one Columnar Section 1 inch - 100 feet, are submitted with this report. The preliminary report for Assignment No. 3 has been submitted previously.



INDEX MAP OF
NORTH WESTERN CANADA SHOWING
SLATER RIVER, BOGG'S CREEK and HALFWAY AREA

Chapter II.

TOPOGRAPHY

The only topographic feature is the bench bordering the Mackenzie River. The bench may attain an elevation of five or six hundred feet at the southwestern limits of the area studied, and it slopes gently northeastward to the river. It is covered with very thick brush and some spruce and there is a good deal of muskeg and many small lakes.

The streams are deeply incised and meander back and forth across the narrow valleys. The meander necks are often very compressed, and the visibility so poor in the thicket, that one is apt to wander around one of these loops without realizing that he is not making any progress along the valley.

Subjects such as climate, transportation, flora, fauna, etcetera, are sufficiently covered in other reports for this general vicinity.

Chapter III.

STRATIGRAPHY

The deposits exposed in the area are as follows:

Recent	River silts, sands and gravels	
Pleistocene	Till	5 ft. $\frac{1}{2}$
Cretaceous - Slater River shale (Ksr)	Shales with bentonite	200 ft. $\frac{1}{2}$
Devonian - Bosworth Sandstone (Db)	Siltstones and shale	650 ft. $\frac{1}{2}$

The stratigraphy is shown in detail on the accompanying columnar section. Shale samples have not yet been studied with the microscope, and it should also be remembered that the classification of beds described herein is subject to later revision.

Devonian Bosworth (Db)

The oldest beds are those exposed along the Mackenzie River in the Halfway Area. They are a series of gray siltstones with a few thin bands of limestone that contain many corals. There is about 18 feet of shale near the top.

Above this series is a gap, with no outcrops, and the next beds are 350 feet of grey siltstone with a little interbedded silty shale near the top. The contact between the siltstones and the Cretaceous shales was not seen.

The lower siltstones have bands of limestone which contain Pleurotomaria, Atrypa devoniana, Streptelasma, Martinia, Prismatophyllum, Alveolites, Cystiphyllum, Cyathophyllum, Cladopora, Fenestella and Phillipastrea.

The only fossils found in the upper 350 feet of siltstones

were a fucoid (worm tracks?) associated with some ostracodes, both at the very top, and it is possible that this 350 feet might be Cretaceous in age. If so, the Bosworth - Slater River contact would have to be moved about 1.5 miles to the northeast.

It seems that the siltstones seen in this area do not have enough porosity to make a very good reservoir rock.

Cretaceous Slater River Shales (Sr)

The bulk of the Slater River formation is dark grey shale that weathers grey. There are some concretions and concretionary layers, but the most important distinguishing characteristic, lithologically, is the presence of many 1/8-inch to 1-inch seams of bentonite. There is about 160 feet of this shale exposed. Fragments of a possible Inoceramus were seen. Shale samples have not yet been examined for micro-fossils.

Overlying the dark grey shale is a grey papery shale that often occurs as great sheets sagging over cutbanks. The shale is somewhat gritty and its appearance suggests the possibility of some volcanic ash being present. There are many incrustations of alum. Fish scales are abundant in this papery shale. It varies in thickness from 5 to 20 feet. In one locality, 20 feet of grey shale overlies the fish scale horizon, but in general the fish scale horizon is believed to form the surface of the upland.

The Cretaceous shales appear to be suitable source beds of petroleum, but no reservoir beds are known in this area. They would act as good impermeable cover over any reservoir, such as a possible porous zone just beneath the great unconformity.

Pleistocene

Not far from the mouth of Slater River, near the top of the bench, is 5 feet of silty clay with pebbles varying in size from $\frac{1}{2}$ inch to 3 inches. It is probably glacial in origin. In the bed of Slater River are many large granite boulders which were transported to this vicinity by the glacier.

Recent

There are deposits of Recent silts, sands and gravel along the banks of the Mackenzie.

Chapter IV.

STRUCTURAL GEOLOGY

General Structure

This area lies in the trough of the main syncline in the Long Reach-Carcassou basin. There is a major unconformity between the Devonian and Cretaceous, but it is not exposed in the area studied.

Local Structure

In Slater River, there are northeast dips in the four mile stretch that parallels the Mackenzie. The maximum dip is 8° . Otherwise all the beds in the Slater River area are horizontal, with one exception; at a place about a half mile up the west fork the beds are sharply contorted. Only minor faulting is shown at this point. This could indicate major faulting somewhere in the vicinity, though it is not impossible to see small faults and overturns surrounded by flat lying beds.

Lt. V. B. Monnett (8) found an outcrop on the small stream south of Slater River. The dip was 5° to the northwest, but he states that the outcrop was not dependable.

In Boggs Creek the only outcrops are within a mile of the Mackenzie River. The beds dip southwestward at about two or three degrees.

The Halfway Prospect was studied in great detail. The river bank was examined for $2\frac{1}{2}$ miles north of Post No. 1 of the Prospecting Permit. The edge of the high bank inland from the edge of the river was also examined, and the cut line of the claims was traversed. But the only outcrops are those in the area that is shown on the detailed

map. The normal dip is a few degrees to the south. There is only one reversal, (20° NE), a small rock surface that is very probably not in place. It has attained its present position by common slump, by being transported from up river by ice, or by ice gouge during break-up. If, however, this particular rock is in place, and the reversal is genuine, the structural relief would be not more than 10 feet, covering a horizontal distance of not more than 70 feet, the latter being the distance between the nearest normal outcrops on either side. So the Halfway Prospect, as far as can be seen on the surface, offers no structural conditions favorable for the accumulation of petroleum.

Seismic coverage in this area is not complete. The results show a rather uniform dip to the southwest, although the gradient is somewhat less than farther upstream, near the mouth of Wada Creek. Surface dips in Vermilion Creek and at Halfway also suggest a flattening between these two localities. In addition, the seismic map shows a slight structural nose about 1 mile downstream from the mouth of Vermilion Creek. Therefore, there is a possibility of a terrace or a small structure in the vicinity of Halfway, but additional seismic work will be necessary to prove or disprove these possibilities.

Chapter V.

HISTORICAL GEOLOGY

The geologic history of this area is not appreciably different than that of nearby areas, and does not merit discussion here.

Chapter VI.

OIL AND GAS MANIFESTATIONS AND MINERAL DEPOSITS

Small pools of water in areas of Cretaceous outcrops usually have iron films on their surface. These are definitely not oil films.

The Devonian siltstones exposed here would offer rather poor reservoir conditions for the accumulation of petroleum. They are too fine grained. The Cretaceous shales make good cap rock. Beneath this general area the possible reservoir rocks are sandstone lenses in the Fort Creek formation and also the limestones below.

There are no worthwhile structures observable from surface outcrops in the area.

Chapter VII.

CONCLUSIONS AND RECOMMENDATIONS

Present evidence indicates that drilling should not be undertaken anywhere in the Slater River, Boggs Creek and Halfway Areas, but it is recommended that further seismic exploration of the area be eventually undertaken.

CONFIDENTIAL

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

1. Foley, E. J. "Jungle Ridge Area" N.W.T. Canada, Imperial Oil Ltd., Canol Project, Report No. 3, November 1942.
2. Hancock, W.P. "Loon Creek Area" N.W.T. Canada, Imperial Oil Limited, Canol Project, Assignment No. 4. Final Report, 1944.
3. Hart, Lt.R.M. "Gravel River and East Fork of Little Bear River, Kay Mountains and Summit Anticline" N.W.T. Canada. Imperial Oil Ltd., Canol Project, Assignment Nos. 2, 2A, 30 and 37. Final Report, 1944.
4. Houston, S.H. "Survey of Vermillion Gorge Anticline" N.W.T. Canada. Imperial Oil Ltd., Canol Project, Report No. 4, November 1942.
5. Link, T.A. "Lower Mackenzie River Basin", N.W.T. Canada, Imperial Oil Limited, 1919.
6. Link, T.A. "Geological Report on the Fort Norman Oil Field, Imperial Oil Limited, 1920.
7. Link, T.A. "Geological Report on the Fort Norman Area", Imperial Oil Limited, 1921.
8. Monnett, Lt.V.B. "Outcrops Reported in the Area between Little Bear and Slater River", Imperial Oil Ltd., Canol Project. Assignment No. 41. October 16, 1943.
9. Romberg, M. & Dawson Lt.W. "Reflection Seismograph Survey" Final Report. Imperial Oil Ltd., Canol Project. February 1944.
10. Stelck, C.R. "Bear Rock-Bluefish Creek Area", N.W.T. Canada. Imperial Oil Ltd., Canol Project. Assignment No. 1, January 1944. Final Report.

* * * * *

APPENDIX

A P P E N D I X

January 15, 1944.

MEMORANDUM:

TO: Dr. T. A. Link.
RE: Fossil Identification.

The attached is a tentative identification of
fossils collected by Mr. F. A. McKinnon on Assignment No.
22 - Arctic Red River.

C.R. Stelck.

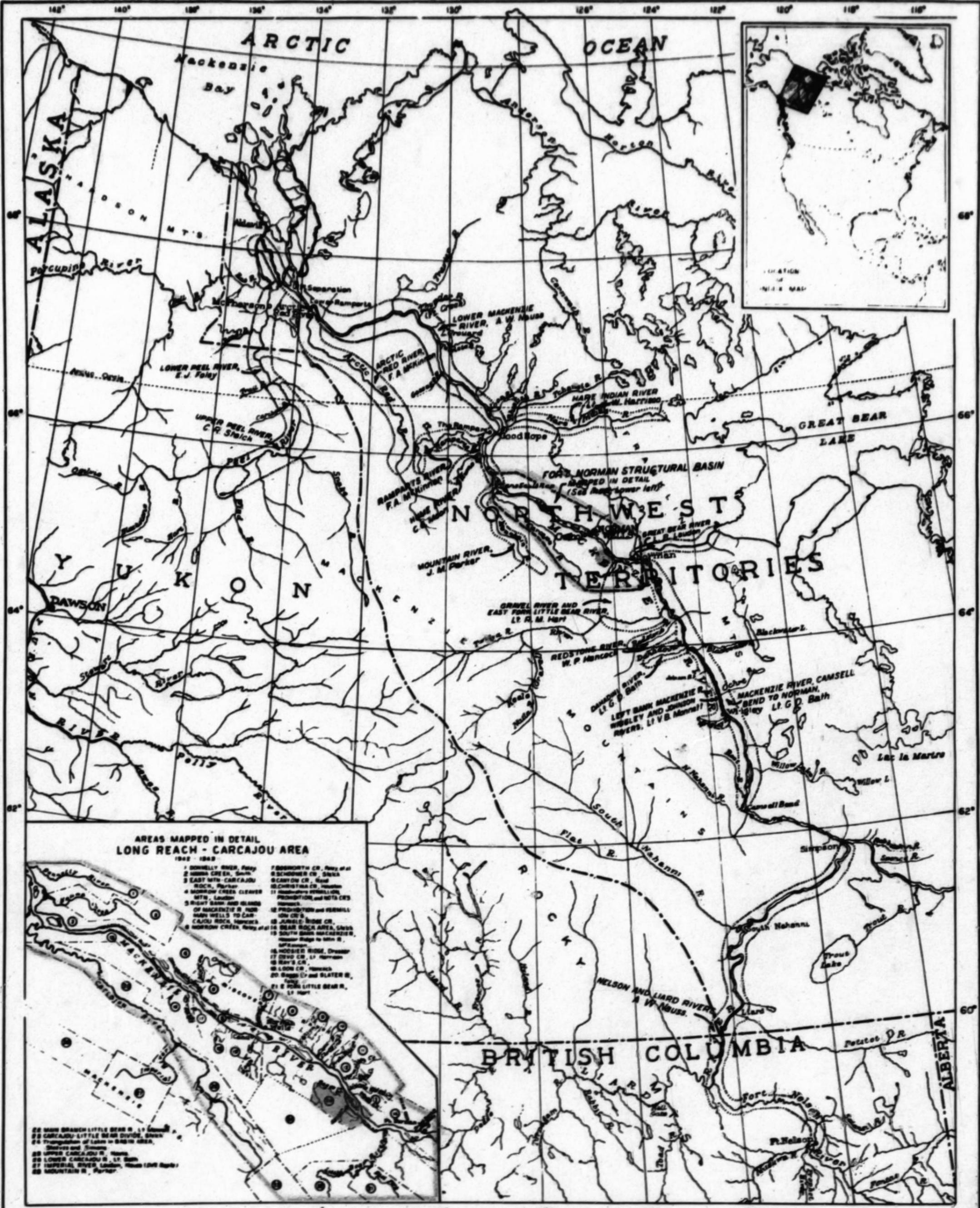
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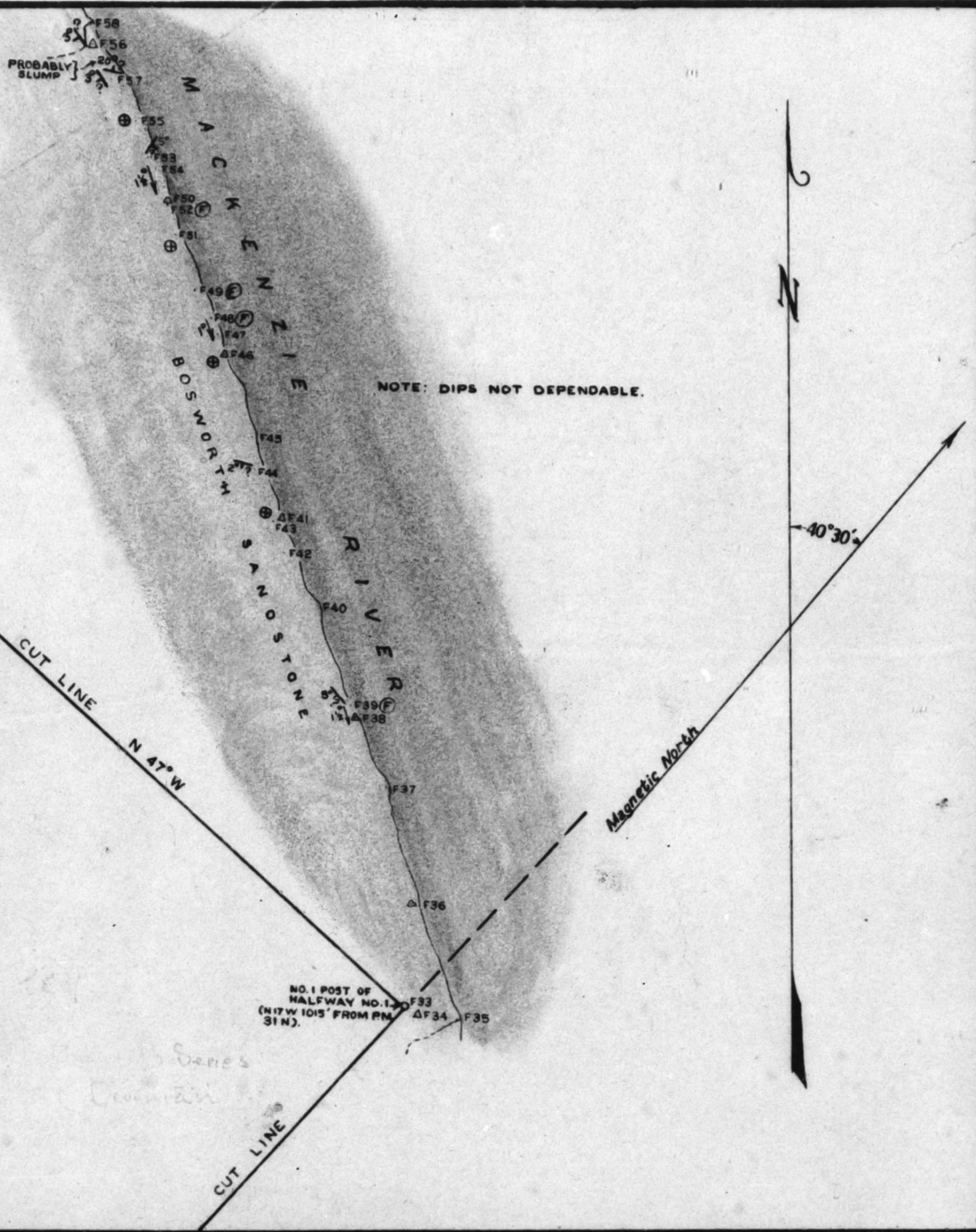
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FOSSIL IDENTIFICATION - BOOGS' CREEK - SLATER RIVER

E. J. Foley

<u>Suite No.</u>	<u>Location</u>	<u>Fossil</u>	<u>Accession No.</u>	<u>Age</u>
20012	F1	Slater River	-----	Slater River
20013	F2	Slater River	-----	Slater River
20014	F3	Slater River	-----	Slater River
20015	F6	Slater River	-----	Slater River
20016	F15	Slater River	42377	Slater River
20017	F18	Slater River	42376	Slater River
20018	F26	Slater River	42376	Slater River
20019	F28	Slater River	42378	Bosworth
20020	F38	Halfway	42379	"
"	"	Atrypa	42380	"
"	"	Streptelasma with		
"	"	Atrypa devoniana		
"	"	Martinia	42381	"
"	"	Gastropod	42382	"
"	"	Prismatophyllum	42383	"
"	"	Specks of Asphaltite	-----	
20021	(Out)			
20022	F48	Halfway	42384	Bosworth
"	"	Alveolites	42385	"
"	"	Streptelasma	42386	"
"	"	?	42387	Bosworth
20023	F49	Halfway	42388	Bosworth
20024	F52	Halfway	42389	"
"	"	Cystiphyllum	42390	"
"	"	Prismatophyllum	42391	"
"	"	Cyathophyllum	42392	"
"	"	Cystiphyllum	42393	"
"	"	Gladopora	42394	Bosworth
"	"	Fenestella		
"	"	Phillipsastraea		
"	"	Fucoid & Ostreocids		
20025	F59	Mouth Boggs Crk.		





DETAILED GEOLOGICAL SURVEY OF HALFWAY PROSPECT

SCALE: 4" = 1 MILE
ASSIGNMENT 3

E. J. FOLEY
H. A. GIBSON
R. B. PRINGLE

KEY

Dn

BOSWORTH SERIES
(DEVONIAN)

①

JUNE 8, 1943
SPECIMEN LOCALITY
STRIKE AND DIP

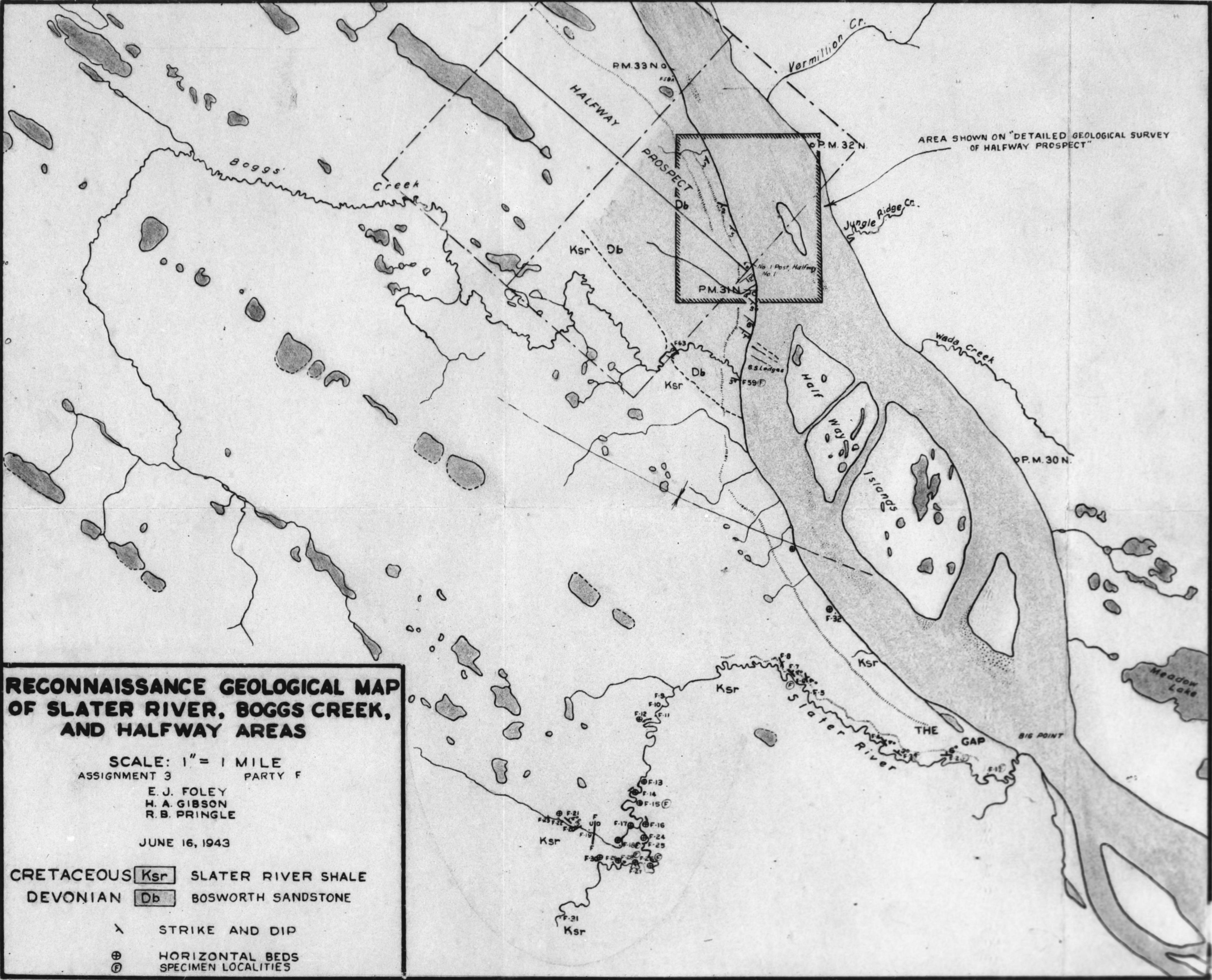
②

HORIZONTAL BEDS

③

APPARENT DIP AND DIRECTION

96-7



5
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PLATE 4

COLUMNAR SECTION
SLATER RIVER, BOGGS CREEK, AND HALFWAY AREAS

SCALE: 1" = 100'

ASSIGNMENT 3

PARTY F

E. J. Foley
H. A. Gibson
R. B. Pringle

AGE / FM	COLUMN	THICKNESS	DESCRIPTION	SPECIMENS & SUITE NOS.
CRETACEOUS	SLATER RIVER SH. - 200+	20' 5-20'	Shale, gray, weathers gray. Shale, gray, weathers gray, papery. Slightly gritty due to ash (?) Much alum. Some crops out in large, overhanging sheets.	20019, 20018, 20017: fish remains, petrified wood
		160'+	Shale, gray, weathers gray. $\frac{1}{8}$ " to 1" beds bentonite. Some selenite crystals. Concretions of limy shale and of gray limestone that weathers brown.	Inoceramus? 20016 20015 20014 20013 20012
GAP - NO OUTCROPS				
DEVONIAN	BOSWORTH SANDSTONE - 650'	350'	Siltstone, gray, weathers greenish-gray, hard, a little interbedded silty shale near top. These beds could be Cretaceous.	Fucoid Ostracods } 20025
		200'	No outcrops.	
		2'	Sandy limestone, grayish-brown, weathers same, very hard. Fine-grained.	20020: Pleurotomaria, Atrypa devonica, Streptelasma, Martina, Prismatophyllum, Gastropods
		18'	Shale, gray, weathers gray, soft. Some $\frac{1}{2}$ " layers of siltstone, greenish gray, weathers same, soft.	20021.
		40'	Siltstone, gray, brown and yellowish-brown and greenish-brown, weathers same, soft. $\frac{1}{2}$ " bedding, thinly laminated.	
		1'	Silty limestone, gray, weathers gray and grayish-brown, hard, fine-grained.	20022: Atrypites, Streptelasma
		17'	Siltstone, gray and greenish-gray, weathers same, soft.	20023: Cyathophyllum(?)
		1'	Silty limestone, gray, weathers grayish brown, hard, fine-grained.	20024: Prismatophyllum, Cyathophyllum, Cyathophyllum, Cladopora, Fenestella, Phillipsastrea.
		6'	Siltstone, gray, weathers gray, soft.	
		1'	Silty limestone, brownish-gray, weathers gray, hard.	
		14'+	Siltstone, gray, weathers gray, soft. $\frac{1}{2}$ " to 1" bedding.	

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West Canadian Graphic Industries Ltd.

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5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32