FARGO TO VALLEY CITY ROAD LOG
by
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Introduction

This road log is prepared especially for residents of Fargo and vicinity as a guide to the geology along U. S. highway 10 from Fargo to Valley City where the trip joins a field trip in the Valley City area. Hence this road log will be best understood when used in conjunction with the text material in the Valley City guidebook; North Dakota Geological Survey, Miscellaneous Series No. 1. The trip to Valley City is about 60 miles and the Valley City trip covers about 85 miles.

Geology of the Area

In the Pleistocene, a great continental glacier advanced from the north and dammed many north-flowing rivers. As it pushed forward it destroyed the lakes created by the dammed rivers and deposited till in the valleys. However, during retreat of the glacier, great lakes were again formed in the dammed river valleys in front of the melting ice sheet.

Since the Red River flowed north before Pleistocene times just as it does today, a vast lake, known as Glacial Lake Agassiz, formed behind the shrinking Pleistocene ice sheet.

Marginal lakes developed as soon as the ice front began to retreat and lay bare the north-sloping surface. The lakes expanded into new areas as the ice front retreated further forming, eventually, Glacial Lake Agassiz at the highest stage. At one time Lake Agassiz flooded an area of 110,000 square miles, which is greater than the combined area of the present Great Lakes. It lay mainly within Canada, but covered 15,000 square miles of Minnesota and 6,800 square miles of North Dakota and rose more than 650 feet above the level of Lake Winnipeg. Lakes Winnipeg, Manitoba, and Winnipegosis are remnants of former Lake Agassiz in Canada, as are Rainey Lake, Lake of the Woods, and Red Lake in the United States.

In a lake waves beat upon the shore piling sand and gravel into beach ridges. The highest beach ridge of Lake Agassiz has been named the Herman beach. With each major retreat of the ice, the water area so greatly expanded in the north that the level of the lake fell. At each level where the lake stood for any time a new beach with local sand bars and spits was formed. In order, down from the highest or Herman stage, these beaches in the Fargo area are called the Norcross, Tintah, Campbell, and McCauleyville shorelines. They rise in orderly succession as one goes east or west from Fargo. We will cross the Campbell beach, the first one readily seen west of Fargo, about one half mile west of the Wheatland road.

From the Herman to the McCauleyville stage, Glacial Lake Agassiz drained southeastward through Lake Traverse and Big Stone Lake into the Minnesota River. Following the McCauleyville stage the ice retreated far enough to allow the lake to drain along the ice front east to the Mississippi and later through the Great Lakes to the Hudson River or the St. Lawrence River. During this time 14 more beaches were formed by the lake; but since the southern extent of the lake then lay north of Fargo, these beaches are not visible in the Fargo area.

Eventually the ice receded enough to uncover the northward drainage through the Nelson River to Hudson Bay leaving only the lakes mentioned above.

Today we owe the fertile soil of the Red River Valley to the rich glacial material brought into Glacial Lake Agassiz by streams around the edge and spread by currents within this vast lake. Sand and gravel of the beach ridges is used in construction material and as road gravel. Water is obtained from sand spits and bars formed within the lake.

To the south of the route of this trip an area of extensive sand deposit is worthy of mention, but it will not be seen today. This is known as the Sheyenne Delta, a large deltaic area built into Lake Agassiz by the Pleistocene Sheyenne River which was much bigger then than it is today.

Specific References on this Area

Campbell, M. R., and others, Guidebook of the Western United States, Part A, Northern Pacific Route: U. S. Geological Survey Bull. 611.

Hall, C. M., and Willard, D. E., 1905, Casselton-Fargo Folio, North Dakota - Minnesota: U. S. Geol. Survey, Folio 117.

Leverett, Frank, 1913, Early Stages and Outlets of Lake Agassiz: North Dakota Agricultural College Survey, 6th Bienn. Rept., p. 17-28.

______________, 1932, Quaternary Geology of Minnesota and Parts of Adjacent States: U. S. Geol. Survey, Prof. Paper 161.

Nikiforoff, C. C., 1947, The Life History of Lake Agassiz: Alternative Interpretation: American Jour. Sci., v. 245, p. 205-239.

Tyrrell, J. B., 1896, The Genesis of Lake Agassiz: Jour. Geology, v. 4, p. 811-815.

Upham, Warren, 1895, The Glacial Lake Agassiz: U. S. Geol. Survey, Monograph 25.

Road Log

0.00	Assemble on First Avenue South east of Sixth Street, heading west opposite Island Park.
.50	
	Turn right (north) on U. S. highway 81 (Thirteenth Street South).
.10	
	Turn left (west) on U. S. highway 10.
5.20	
	Sheyenne River.
7.00	
	Road north to Mapleton.
1.40	
	Bridge over Maple River.
2.30	
	Low ridge (called "Maple Ridge") formed by silt and sand deposited in low water of Lake Agassiz as an offshore bar or spit.
3.90	
	N. D. highway 18 north to Casselton.

.50

Great Northern Railroad underpass.

2.60

Northern Pacific Railroad tracks.

3.40

Road north to Wheatland.

.60

Campbell beach of Glacial Lake Agassiz. Elevation 980 feet.

1.60

Tintah beach.

1.00

Norcross beach. Note the buff colored silt in the creek bank south of the road.

.80

A minor beach ridge. Road south to Embden.

1.20

Second Herman beach.

.30

First or highest Herman beach. This is the highest beach and most westward extent of Glacial Lake Agassiz in this area. Elevation 1100 feet. We have climbed about 220 feet since we started from Fargo.
Note the gravel pits in this beach ridge south of the road. Here we leave the Agassiz Lake Plain and come up on the Drift Prairie.

3.60

This is the typical topography of ground moraine. Note the swell and swale type of topography in contrast to the table flat land of the Glacial Lake Agassiz Plain. Ground moraine is glacial deposit spread by the retreating glacier.

1.00

Road north to Buffalo (3 miles).

1.00

Broad valley of the Pleistocene Maple River. This valley carried a large amount of glacial melt water leaving a broad shallow valley below the general ground moraine level.
Three miles north of here is the Buffalo Creek State Historical Site. A tablet set in granite boulder there relates that in August 16, 1862, General Henry H. Sibley marched by this way with 3,400 men on his return to Fort Abercrombie from driving the Indians across the Missouri River.

.60

The ditches by the highway expose till reworked by water resulting in silt and sand of the Pleistocene Maple River channel.

1.20

Road curves to northwest.

3.00

The level valley here is a tributary to the Maple River.

1.50

Highway curves to west. Road east to Tower.

.50

Small Kame (?) north of road. Kames are usually formed by streams flowing on top of the glacier which flow into a hole in the ice dumping their load of gravel, sand and clay. When the ice walls supporting this material melt, the material in the hole will slump into the form of a cone-shaped mound known as a kame.

1.00

The white house south of the road sits on a small ridge which is also visible north of the road. This ridge is called the Tower esker. An esker is a low ridge of sand or fine gravel deposited from a stream which flowed within or under the glacier.

.80

Tributary to Maple River. This was a glacial distributary of spillway which carried much meltwater in the late Pleistocene.

2.70

Road north to Oriska. Till outcrop on both sides of highway. Note that the high ground on horizon ahead trends north-south. This is an end moraine.

2.80

Start up east side of small end moraine as shown by the knob and kettle type of topography. This has been called the Fergus Falls moraine.

2.00

Going down west side of the Fergus Falls moraine.

2.50

Look to north. Large kame deposit of cross-bedded sand and gravel. More sand and silt than gravel. The kame deposit is about 50 feet thick. The hill to the northeast with the tower on it is of similar origin.

.70

Soo Line underpass.

.20

Ablation moraine on south.

.30

Landslide south of highway. Here gravels of the ablation moraine are sliding on the underlying Pierre shale. This was caused by cutting away the toe of the slope; the gravels and the Pierre shale then slip when the shale becomes wet. Fragments of fossil clam shells and coiled mautiloids are easy to find in the Pierre shale at this road cut.

1.15

Bridge over Sheyenne River.

.45

Corner of U. S. highway 10 and Central Avenue North. Turn right (north).

.10

Start of Valley City area field trip at corner of Second Street Northeast and Central Avenue North.