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Catalog of North Dakota Radiocarbon Dates

By

Stephen R. Moran, Lee Clayton, Mary W. Scott, and John A. Brophy

NORTH DAKOTA GEOLOGICAL SURVEY
MISCELLANEOUS SERIES 53

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An annotated compilation of all available, geologically significant radiocarbon dates in North Dakota. The detailed discussion of stratigraphic setting and interpretation modifies existing ideas regarding the significance of some of the dates.

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NORTH DAKOTA GEOLOGICAL SURVEY

E. A. Noble, State Geologist

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INTRODUCTION

This catalog is a compilation of the approximately 90 radiocarbon dates from North Dakota that are known to us. For convenience of use, the compilation has been arranged in two parts. Part I is a complete list of the geologic dates with all available information on them. Most of the archaeological dates are not included in this list because of their limited geologic significance and because we could add no information not contained in Radiocarbon. Part II consists of a) geologic dates arranged by geological association, b) archaeological dates, and c) dates that are meaningless because of contamination or misidentification of materials dated.

There are three principal reasons for our making this compilation. The first is to spare those working on the Quaternary of this area the necessity of compiling individual lists, with attendant duplication of effort. Second, there is seldom enough stratigraphic information given in the journal Radiocarbon or other reports of radiocarbon dates to permit persons unfamiliar with the dates to evaluate their interpretations. We have attempted to give the most complete stratigraphic information possible on each date to assist others in using the dates for their own work. For some dates, little additional information has been found. The third purpose for this compilation is to present information that is not available elsewhere about the validity and significance of the dates. All too seldom has an explicit statement been made in the literature indicating that a particular date is in error because of contamination.

We have left extra space at the end of each entry so that the user of the catalog can add his own notes and comments to modify ours or supplement the information given.

Acknowledgments

We would like to thank R. W. Lemke, who provided information that clarified some conflicts in the reports of several dates, J. R. Reid, who made available correspondence that has aided us in interpreting several dates, M. G. Croft, who provided information on two unpublished dates, and W. D. Logan, who provided additional information on a number of the archaeological dates.

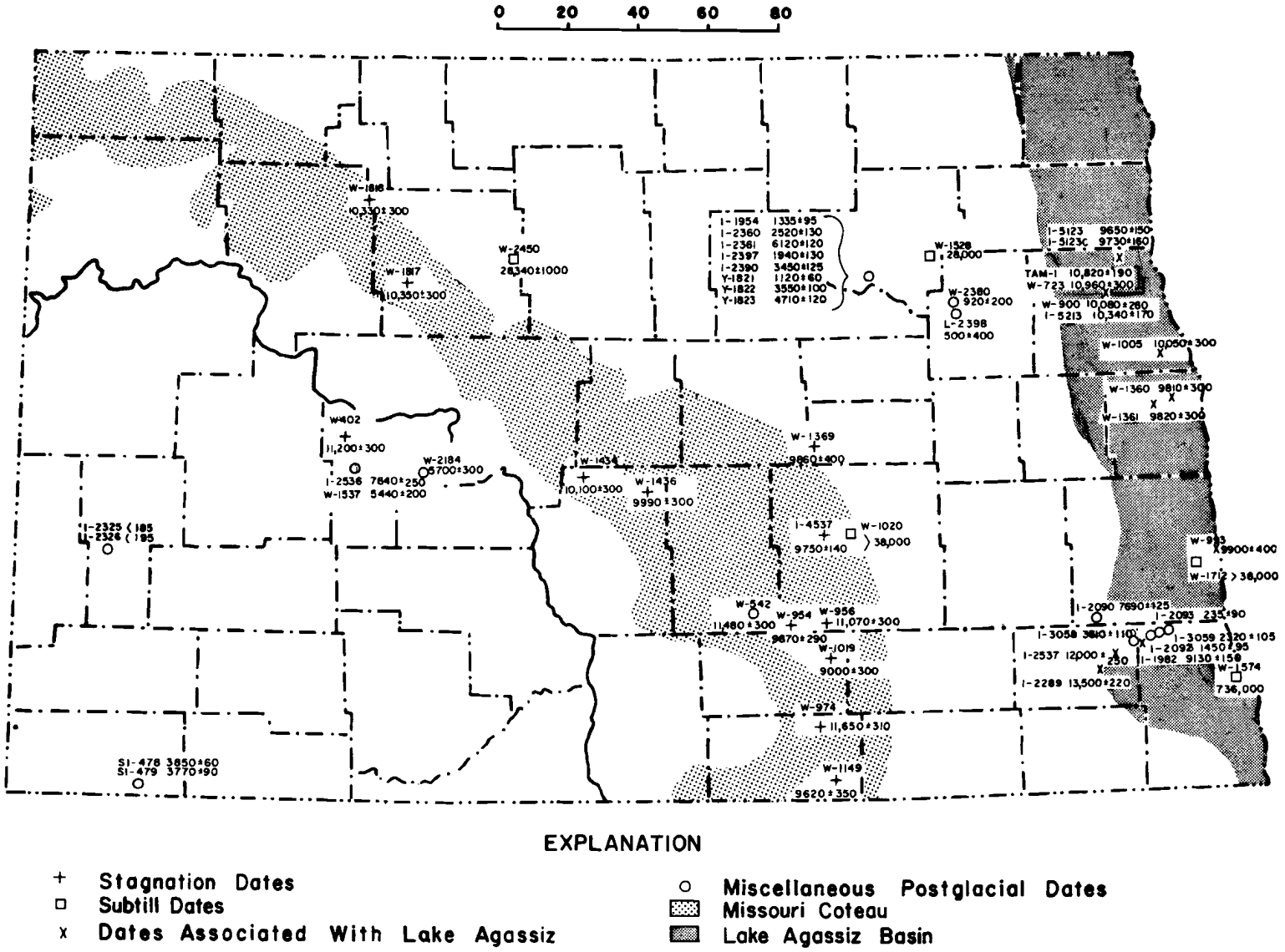

FIGURE 1. Location of radiocarbon dates in North Dakota.

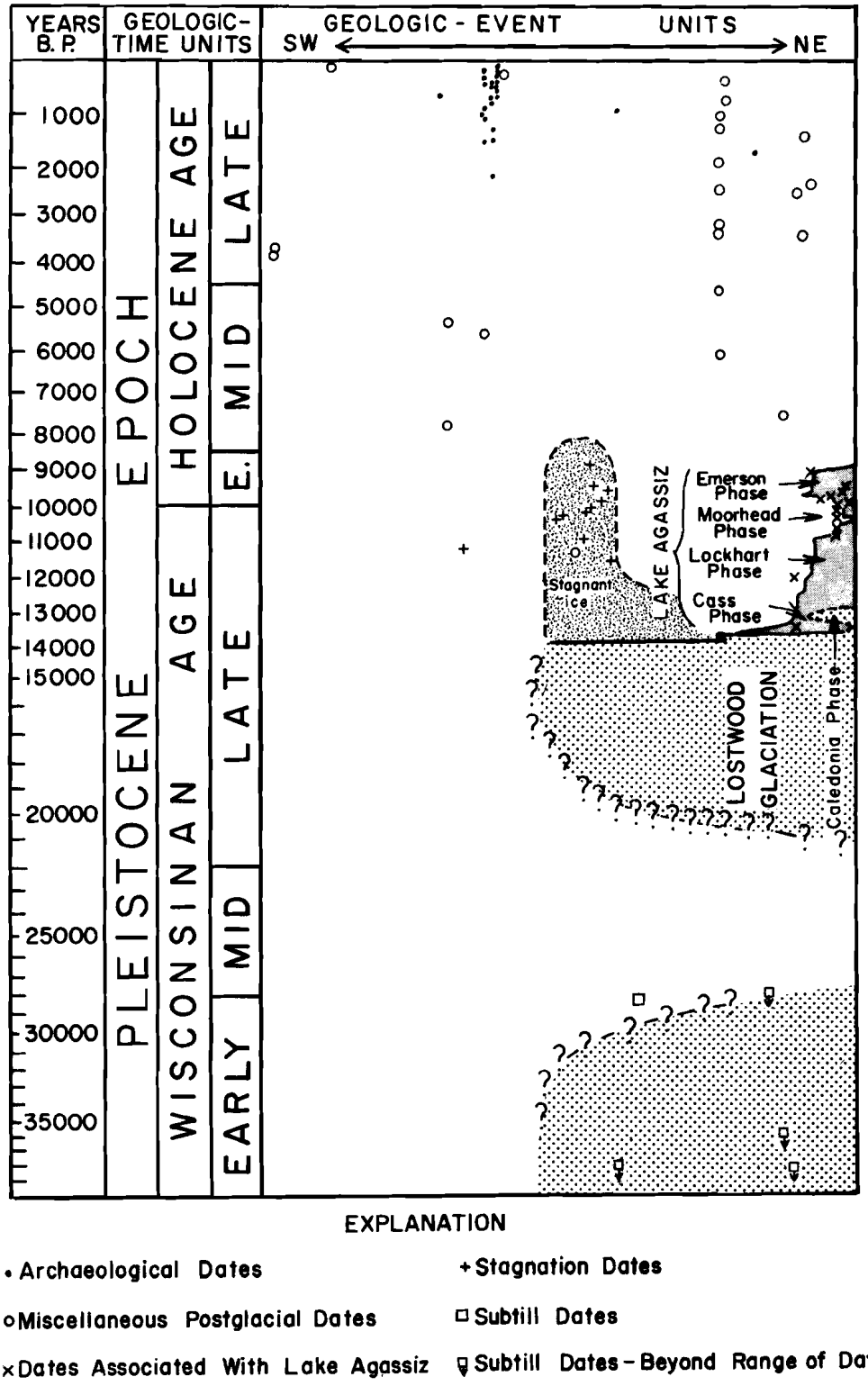

FIGURE 2. Distribution in time of radiocarbon dates along a section from northeastern to southwestern North Dakota.

PART I

Dates by Isotopes Inc.

I-1954 **1,335±95 B.P.**

Location: Ramsey County. NW¼, SE¼, Sec 7, T 153 N, R 64 W.
Site: Gravel pit on east side of Creel Bay.
Material dated: Peat.
Stratigraphy:

0'-16.5'	Sandy gravel with a few interbeds of silt.
16.5'	Peat.

Collected by: E. Callender and J. M. Erickson (1966).
Significance: Dates a low-water phase of Devils Lake (E. C.).
Reference: Callender, E., 1968.

I-1982 **9,130±150 B.P.**

Location: Richland County. NE¼, NE¼, Sec 8, T 135 N, R 52 W.
Site: Cutbank on the south side of the Sheyenne River.
Material dated: Wood.
Stratigraphy:

0'- 4'	Sand.
4'- 9'	Peaty sediment; ranges from marl, to fine sand, to gray silt, to fissile peat; contains clam and snail shells; date from wood at base of this unit.
9'-15'	Clay, brown, jointed at the top, becoming gray, massive downward; contains snail and clam shells.
15'-17'	Clay, as above; contains abundant organic matter.
17'-19'	Clay, as from 9' to 15'.

Collected by: J. A. Brophy.
Significance: The paleoecology of this site, the Mirror Pool Site, is discussed by McAndrews (1967). The sand overlying the fossiliferous clay is the edge of a large sand dune. The lacustrine clay and peat are sediments deposited in an estuary cut into the "Sheyenne Delta." They are deposited following the drop of Lake Agassiz below the Campbell level at the close of the Emerson Phase (fig. 2).
Reference: Brophy, J. A., 1967, p. 159-165.
McAndrews, J. H., 1967, p. 253-269.

I-2090 **7,690±125 B.P.**

Location: Cass County. SW¼, SW¼, Sec 21, T 137 N, R 54 W.
Site: Cutbank in the 1020- to 1025-foot terrace on the west side of the Maple River.
Material dated: Wood.
Stratigraphy:

0'-12'	Sand, silt, and clay.
12'-14+'	Sand, medium to coarse; contains shells and wood; date from here.

Collected by: John Brophy.
Significance: Date is from sediment deposited by the Maple River.
Reference:

I-2092 **1,450±95 B.P.**

Location: Richland County. SW¼, SE¼, Sec 35, T 136 N, R 52 W.
Site: Cutbank on the south side of the Sheyenne River.
Material dated: Organic sediment.
Stratigraphy:

0'-55'	Sand.
55'-66'	Fine sand and silt.
66'-69'	Clay; date from organic matter at the top of this bed.
69'-71'	Sand.
71'-72'	Sand, silt, and clay.
72'-77'	Clay.
77'-81+'	Sand.

Collected by: John Brophy.
Significance: The sand overlying the dated bed is in a sand dune, indicating considerable eolian activity after deposition of the alluvial sediment containing the date.
Reference:

I-2093 **235±90 B.P.**

Location: Richland County. SW¼, NE¼, Sec 22, T 136 N, R 51 W.
Site: Cutbank in the 960- to 965-foot terrace on the north side of the Sheyenne River.
Material dated: Charcoal.
Stratigraphy:

0'- 1'	Sand, fine; contains shells.
1'-28+'	Sand, silt, and clay; charcoal in upper 3 inches.

Collected by: J. A. Brophy.
Significance: Fluvial sedimentation has occurred very recently on the top of this terrace.
Reference: Brophy, J. A., 1967, p. 159-165.

I-2289 **13,500±220* B.P.**

Location: Ransom County. SE¼, SW¼, Sec 29, T 135 N, R 54 W.
Site: Road cut in the 1060- to 1065-foot terrace on west side of the Sheyenne River.
Material dated: Clam shells.
Stratigraphy:

0'- 3'	Silt.
3'- 6'	Sand, fine to medium, crossbedded; clam shells at the base were dated.
6'-12'	Gravel and sand, stone lag at the base.
12'-19'	Till.

Collected by: J. A. Brophy.
Significance: The sand overlying the dated clam shells is interpreted to be the sediment of a fluvial terrace incised just below the top of the "Sheyenne Delta." Lake Agassiz, therefore, was in existence and at least the head of the "Sheyenne Delta" had been deposited prior to 13,500 B.P.
Reference:

*Original date was 13,700±220. This date was adjusted by C13/C12 analysis to remove the effect of old carbon whose source was dissolved Paleozoic carbonate rock.

I-2325 **< 185 B.P.**

Location: Billings County. SW¼, Sec 6, T 140 N, R 101 W.
Site: Cutbank along Jones Creek, 1,300 feet east of the park-road bridge.
Material dated: Heartwood of tree.
Stratigraphy:

0'- 5'	Unit E is silt loam. The sediment averages 25 percent sand, 60 percent silt, and 15 percent clay and is pale yellow. This unit is lighter in color and contains less clay than unit C. The unit is devoid of bison bones, but does contain small terrestrial and aquatic gastropods. Only a faint soil zone is present on this surface; preliminary evaluation of laboratory data, however, indicates that there has been some leaching of carbonates and an accumulation of organic material.
5'- 6'	Unit D is a brown to dark brown clay ranging in thickness from 0.5 to 2 feet, but it is absent in places. Laboratory analyses indicate a higher clay content (up to 75 percent) than adjacent older and younger units and an increase in organic material. The carbonate content is 65 percent lower than the underlying unit, presumably indicating some leaching. The zone has a granular structure, although no soil horizons were differentiated. The upper 0.5 foot contains an abundance of plant remains; some living cottonwood trees rooted in this unit extend up through unit E.
6'-17'	Unit C is light gray to very pale brown, silt loam. Grain-size composition averages 20 percent sand, 50 percent silt, and 30 percent clay. The unit contains a greater amount of carbonate and organic material than unit E. An abundance of bones has been found, the majority of which belong to the modern species of bison. One big-horn sheep skull and some gastropods have also been found. This unit is present in most tributary valleys in western North Dakota and accounts for the bulk of the exposed valley fill.
17'-19'	Unit B is a light gray to yellowish brown clay loam ranging in thickness from 1 to 2.5 feet, but has been highly eroded and is absent in most areas. Many trees buried by the overlying unit were observed to be rooted in this zone. Laboratory analyses indicate a greater clay content (up to 50 percent) and a lower carbonate content than adjacent older and younger units. The tree from which I-2325 was obtained was rooted in this unit.

Collected by: T. M Hamilton.
Significance: The tree was rooted in the lower of two paleosols (unit B) in an alluvial sequence along Jones Creek in the south unit of the Roosevelt Park. The upper paleosol (unit D) truncated the tree. This tree dates a stable

episode during which the soil formed and trees grew. This period was ended by an unstable episode during which the enclosing alluvium was deposited. On the basis of this date and other evidence, the paleosol in which the tree was rooted is believed to have ceased forming about 1775 A. D. (T. M H.).

Reference: Hamilton, T. M, 1967, p. 151-157.

I-2326 **< 195 B.P.**

Location: Billings County. SE¼, Sec 6, T 140 N, R 101 W.
Site: Cutbank along Jones Creek, 4,100 feet east of the park-road bridge.
Material dated: Wood.
Stratigraphy:

0'-5'	Silt loam. The sediment averages 25 percent sand, 60 percent silt, and 15 percent clay and is pale yellow. This unit is lighter in color and contains less clay than unit C. The unit is devoid of bison bones, but does contain small terrestrial and aquatic gastropods. Only a faint soil zone is present on this surface; preliminary evaluation of laboratory data, however, indicates that there has been some leaching of carbonates and an accumulation of organic material. Wood dated was collected 0.5 feet above the base of the unit. See I-2325 for a complete discussion of the stratigraphy.

Collected by: T. M Hamilton.
Significance: This sample was collected from the alluvium of unit E (see I-2325 for discussion of stratigraphy). It presumably dates the unstable episode which ended the formation of the paleosol, unit D, and during which the upper alluvium was deposited. On the basis of other evidence, it is believed that deposition of this alluvium began about 1920 A. D. (T. M H.).
Reference: Hamilton, T. M, 1967, p. 151-157.

I-2360 **2,520±130 B.P.**

Location: Ramsey County. NW¼, SW¼, Sec 19, T 153 N, R 64 W.
Material dated: Organic sediment from 2.24 to 2.41 m in Core 120.
Collected by: E. Callender.
Significance: See Callender (1968) for a discussion of sedimentation rates in Devils Lake.
Reference: Callender, E., 1968.

I-2361 **6,120±120 B.P.**

Location: Ramsey County. NW¼, SW¼, Sec 19, T 153 N, R 64 W.
Material dated: Organic sediment from 5.83 to 6.15 m in Core 120.
Collected by: E. Callender.
Significance: See Callender (1968) for a discussion of sedimentation rates in Devils Lake.
Reference: Callender, E., 1968.

I-2397 **1,940±130 B.P.**

Location: Ramsey County. NW¼, NW¼, Sec 18, T 153 N, R 64 W.
Material dated: Organic sediment from 1.75 to 2.08 m in Core 125.
Collected by: E. Callender.
Significance: See Callender (1968) for a discussion of sedimentation rates in Devils Lake.
Reference: Callender, E., 1968.

I-2398 **3,450±125 B.P.**

Location: Ramsey County. NW¼, NW¼, Sec 18, T 153 N, R 64 W.
Material dated: Organic sediment from 4.66 to 4.94 m in Core 125.

Collected by: E. Callender.
Significance: See Callender (1968) for a discussion of sedimentation rates in Devils Lake.
Reference: Callender, E., 1968.

I-2536 **7,840±250 B.P.**

Location: Mercer County. SW¼, NE¼, NW¼, Sec 17, T. 144 N., R. 89 W.
Material dated: Bison bone.
Stratigraphy:

The skull that was dated was excavated from a ditch and was not observed in place. The position and stratigraphy are not precisely known. See W-1537 for description of stratigraphy in ditch nearby.

Collected by: The dragline operator; submitted by J. A. Brophy.
Significance: Date is from bone of the cranium of a bison identified as *Bison priscus*, which probably originally lay in the sediment deposited by Spring Creek.
Reference: Brophy, J. A., 1965, p. 214-223.

I-2537 **12,000±250* B.P.**

Location: Ransom County. NW¼, NW¼, Sec 17, T 135 N, R 53 W.
Site: Cutbank in 1030-foot terrace on south side of Sheyenne River.
Material dated: Clam shells.
Stratigraphy:

0'- 4'	Sand.
4'- 8'	Sand, soil at the top.
8'-14'	Sand, crossbedded; top is leached; clam shells at the base were dated.
14'-23.5'	Silt, clay, and very fine sand, laminated, unoxidized.

Collected by: J. A. Brophy.
Significance: The sand containing the dated clam shells is fluvial sediment that was deposited by an "ancestral" Sheyenne River flowing into Lake Agassiz during the Cass or Lockhart Phase (fig. 2). The stream had cut considerably below the surface of the "Sheyenne Delta" by this time.
Reference:

*Original date was 12,150±250. This date was adjusted by C13/C12 analysis to remove the effect of old carbon whose source was dissolved Paleozoic carbonate rock.

I-3058 **3,620±110 B.P.**

Location: Ransom County. NW¼, SW¼, Sec 1, T 135 N, R 53 W.
Site: Cutbank in the 990- to 995-foot terrace on the north side of the Sheyenne River.
Material dated: Wood.
Stratigraphy:

0'-15'	Sand, silt, and clay.
15'-18'	Sand, medium to coarse.
18+'	Silt; wood at the contact between the sand and silt.

Collected by: J. A. Brophy.
Significance: Date is from sediment of the Sheyenne River.
Reference:

I-3059 **2,320±105 B.P.**

Location: Richland County. NW¼, SW¼, Sec 31, T 136 N, R 51 W.
Site: Cutbank in the 965- to 970-foot terrace on the south side of the Sheyenne River.
Material dated: Wood.
Stratigraphy:

0'- 3'	Sand, silt, and clay.
3'-19+'	Sand, fine to medium, wood at the base.

Collected by: J. A. Brophy.
Significance: Date is from sediment of the Sheyenne River.
Reference:

I-4537 **9,750±140 B.P.**

Location: Stutsman County. SE¼, NW¼, NW¼, Sec 21, T 141 N, R 67 W.
Site: A dugout in a slough.
Material dated: Wood.

Stratigraphy:

0 -2.44 m	Silty clay, organic, black.
2.44-2.88 m	Clay, light gray, marly.
2.88-3.51 m	Clay, thinly laminated, organic material, abundant fish, leaves, and plant fragments; dated wood was 0.14 m above the base of this unit.
3.51-3.91 m	Clay, silty, fossils absent.
3.91-4.35 m	Clay as above, sandy, slightly pebbly.

Collected by: Lee Clayton, A. M. Cvancara (Oct. 2, 1969).

Significance: The upper unit is Holocene; it was deposited in an ephemeral slough surrounded by grassland. The next two units (2.44 to 3.51 m) are latest Wisconsinan (or earliest Holocene); they were deposited in a permanent pond surrounded by a spruce-poplar woodland. The lower two units are late Wisconsinan; they were deposited in a meltwater pond.

Reference: Cvancara, A. M., and others, 1971, p. 172-174.

I-5123 **9,650±150 B.P.**

Location: Grand Forks County. NE¼, NE¼, SE¼, Sec 28, T 154 N, R 52 W.

Site: A ditch.

Material dated: Wood.

Stratigraphy:

0'-17'	Silty clay, laminated; wood collected 2' above base.
17+'	Clay, dark gray to black, massive, slickensides on sheared surfaces, very soft, contains a few pebbles.

Collected by: Lee Clayton and S. R. Moran (May 23, 1970).

Significance: The dated wood was a tree stump with attached roots. It was rounded and abraded, indicating that it was driftwood, which became waterlogged. The tree was probably killed by the rising waters of Lake Agassiz at the beginning of the Emerson Phase (fig. 2) and floated as driftwood until it became waterlogged and sank.

Reference:

I-5123C **9,730±160 B.P.**

Location: Grand Forks County. NE¼, NE¼, SE¼, Sec 28, T 154 N, R 52 W.
Material dated: Wood.
Stratigraphy:

See I-5123.

Collected by: Lee Clayton and S. R. Moran (May 23, 1970).
Significance: This was a duplicate run as a lab check on I-5123. It was a completely independent preparation and count from the same piece of wood. See I-5123 for a discussion of the significance of this date.
Reference:

I-5213 **10,340±170 B.P.**

Location: Grand Forks County. NW¼, NW¼, NW¼, Sec 30, T 152 N, R 52 W.
Site: Drainage ditch.
Material dated: Forest litter, needles, twigs, and cones.
Stratigraphy:

0'-15'	Sand; forest litter is contained in a number of beds at the base of the ditch; the organic matter is disseminated in the sand.

Collected by: Lee Clayton and S. R. Moran.
Significance: See W-723, W-900, and TAM-1 (Tx-1). Date is during the Moorhead Phase of Lake Agassiz (fig. 2). During much of this phase the lake stood at the Ojata level and drained eastward into the Lake Superior basin.
Reference:

Date by Lamont Geological Observatory

L-239B **500±400 B.P.**

Location: Nelson County. SW¼, Sec 32, T 151 N, R 60 W.
Material dated: Oak stump on surface of dry part of Stump Lake.
Collected by: S. Aronow.
Significance: The oak stump is the last remnant of a forest that covered the exposed floor of Stump Lake during a dry, low-water period. The forest was killed by rising water approximately 500 B.P.

Reference: Lamont Radiocarbon Dates III, 1956, Science, v. 124, p. 158-159.
Aronow, S., 1957, p. 410-427.

SI-478 **3,850±60 B.P.**

Location: Bowman County. NW¼, NE¼, Sec 14, T 129 N, R 101 W. 32Bo213.
Site: Cutbank along Spring Creek.
Material dated: Charcoal.
Stratigraphy:

A rock-filled, basin-shaped firepit at the bottom of eolian soil zone, 2.4 ft. deep, in 3rd component (O. L. Mallory).

Collected by: O. L. Mallory (1966).
Significance: SI-478 and SI-479 are within the range of dates for late McKean complex sites elsewhere (O. L. Mallory). Although we have not visited this site, it appears from the descriptions given for SI-478 and SI-479 that several episodes of eolian or fluvial sedimentation separated by periods of stability, pedogenesis, and soil preservation occurred.

Reference: Smithsonian Institution Radiocarbon Dates VI, 1970, Radiocarbon, v. 12, no. 1, p. 194-195.

SI-479 **3,770±90 B.P.**

Location: Bowman County. NW¼, NE¼, Sec 14, T 129 N, R 101 W. 32Bo213.
Site: Cutbank along Spring Creek.
Material dated: Charcoal.
Stratigraphy:

From a rock-filled basin-shaped firepit, 3.4 feet deep, in the 4th component, at the top of a soil zone below the eolian zone of SI-478 (O. L. Mallory).

Collected by: O. L. Mallory (1966).
Significance: SI-479 and SI-478 are within the range of dates for late McKean complex sites elsewhere (O. L. Mallory). Although we have not visited this site, it appears from the descriptions given for SI-478 and SI-479 that several episodes of eolian or fluvial sedimentation, separated by periods of stability, pedogenesis, and soil preservation occurred.
Reference: Smithsonian Institution Radiocarbon Dates VI, 1970, Radiocarbon, v. 12, no. 1, p. 194-195.

Dates by University of Texas

TAM-1 (=Tx-1) **10,820±190 B.P.**

Location: Grand Forks County. NE¼, NE¼, NE¼, Sec 25, T 152 N, R 53 W. Location in Radiocarbon is incorrect. Correct location from R. W. Lemke (1970, personal communication).

Material dated: Wood.

Stratigraphy:

See W-723.

Collected by: R. W. Lemke and H. E. Wright, Jr.

Significance: This date was a lab check run by the Texas radiocarbon lab. It was an independent preparation and count on the same material as W-723. See W-723 for discussion of the significance of the date.

Reference: University of Texas Radiocarbon Dates I, 1962, Radiocarbon, v. 4, p. 45.

Texas A & M University Radiocarbon Dates I, 1964, Radiocarbon, v. 6, p. 190.

Dates by United States Geological Survey

W-402 **11,220±300 B.P.**

Location: Mercer County. NE¼, SE¼, Sec 30, T 146 N, R 89 W.
Site: Roadcut on west side of section line road at the south side of a small draw.
Material dated: Marl containing gastropods, from a local lense in till.
Collected by: W. E. Benson.
Significance: "The outcrop is within the hummocky belt that I named the Krem moraine, which seems to represent a minor readvance of Late Wisconsin ice. My best guess on the marl is that it represented a small pond in an undrained depression and that the deposit was overridden by the readvancing ice. I suppose the whole sequence could have happened in a few tens of years" (W. E. Benson, 1966, personal communication to J. R. Reid). We consider it probable that the pond in which the marl was deposited was covered by a slide or flow of saturated "till" from the adjacent slopes rather than by a glacial advance.
Reference: USGS Radiocarbon Dates IV, 1958, Science, v. 127, p. 1478.

W-542 **11,480±300 B.P.**

Location: Kidder County. NE¼, NE¼, SW¼, Sec 25, T 138 N, R 71 W.
Site: Temporary excavation 200 feet southwest of center of the section.
Material dated: White spruce wood.
Stratigraphy:

0'-15'	Sand, black to gray; wood from about 12 feet.
15'-31'	Clay.
31'-37'	Till.
37'-51'	Gravel.
51'-54'	Till.
54+'	Sandstone of Fox Hills Formation.

Collected by: G. L. Bell and D. R. Moir; submitted by R. W. Lemke.
Significance: The wood was a stump buried by alluvial and colluvial sediment deposited in a gully in a ridge. The ridge has been mapped as an end moraine but it appears to consist of sandstone of the Fox Hills Formation.
Reference: USGS Radiocarbon Dates V, 1960, Radiocarbon Supplement, v. 2, p. 152.

Moir, D. R., 1958, p. 108-114, plus supplementary material that was supplied at the time of the field trip.
Moir, D. R., 1957, p. 69-74.

W-723 **10,960±300 B.P.**

Location: Grand Forks County. NE¼, NE¼, NE¼, Sec 25, T 152 N, R 53 W. The locations given in the three issues of Radiocarbon are incorrect. This corrected location is from R. W. Lemke (1970, personal communication).

Site: East-west drainage ditch in the Grand Forks Air Force Base.

Material dated: Wood.

Stratigraphy:

0' - 4'	Sand, tan, massive.
4' - 6.5'	Silt, clayey, gray to tan, a few pebbles.
6.5'-12'	Sand, tan, crossbedded, clean, some convolutions in bedding; wood collected at ten feet.
12' -15+'	Till, very dark gray, unoxidized.

Collected by: R. W. Lemke and H. E. Wright, Jr.

Significance: This wood was deposited during the low-water Moorhead Phase of Lake Agassiz (fig. 2). Except for a brief period of 200 years ending about 10,500 B.P., Lake Agassiz stood at or below the "Ojata" level from 11,000 to 9,900 B.P. See TAM-1, W-900, W-1005, and I-5213.

Reference: USGS Radiocarbon Dates V, 1960, Radiocarbon Supplement, v. 2, p. 152.
University of Texas Radiocarbon Dates I, 1962, Radiocarbon, v. 4, p. 45.
Texas A & M University Radiocarbon Dates I, 1964, Radiocarbon, v. 6, p. 190.

W-900 **10,080±280 B.P.**

Location: Grand Forks County. SW¼, NW¼, NW¼, Sec 31, T 152 N, R 52 W.

Site: North-south drainage ditch 0.8 miles north of U. S. 2 (not 1.8 miles as in Radiocarbon).

Material dated: Wood.

Stratigraphy:

0' - 3.5'	Clay, sandy, yellow.
3.5'-11'	Sand, tan, crossbedded, a few pebbles; wood up to 3 inches in diameter collected from 10 to 11 feet.
11' -12+'	Sand, gray, unoxidized.

Collected by: R. W. Lemke (1959).

Significance: The date is from the Ojata Beach. Lake Agassiz stood at this level for most of the Moorhead Phase (fig. 2). See W-723 for a discussion of the duration of the Moorhead Phase.

Reference: USGS Radiocarbon Dates VI, 1961, Radiocarbon, v. 3, p. 88-89.

W-954 **9,870±290 B.P.**

Location: Stutsman County. SE¼, SE¼, SE¼, Sec 29, T 137 N, R 69 W.

Material dated: Clam shells from upper part of sandy to silty clay over till.

Collected by: Charles Huxel and H. C. Winters (1960); submitted by R. W. Lemke.

Significance: Dates the stagnation moraine immediately behind the proximal edge of the Streeter Moraine (R. W. Lemke). Date records the age of lake sediment in a depression formed by the melting of stagnant ice. It is not related to the beginning of stagnation in the region.

Reference: USGS Radiocarbon Dates VII, 1964, Radiocarbon, v. 6, p. 46.

W-956 **11,070±300 B.P.**

Location: Stutsman County. SE¼, SW¼, SE¼, Sec 17, T 139 N, R 67 W.

Site: Gravel pit.

Material dated: Clam shells located in deltaic remnant (?) in outwash.

Collected by: Charles Huxel and H. C. Winters (1960); submitted by R. W. Lemke.

Significance: Site is located 20 miles east of Streeter Moraine. Sample post-dates Streeter Moraine (R. W. Lemke). Date is associated with the melting of buried stagnant ice, but not with the beginning of stagnation.

Reference: USGS Radiocarbon Dates VII, 1964, Radiocarbon, v. 6, p. 46.

W-974 **11,650±310 B.P.**

Location: McIntosh County. SW¼, SW¼, NW¼, Sec 20, T 132 N, R 68 W.
Site: A road cut.
Material dated: Clam shells and shell fragments from 2 to 8 feet below surface of silty clayey lake sediment.
Collected by: J. W. Bonneville (1961); submitted by W. M. Laird.
Significance: Date is from lake sediment associated with the Streeter end moraine (not Burnstad as in Radiocarbon). Date is from a collapse complex rather than from a push ridge as stated by Clayton (1962; 1966).
Reference: USGS Radiocarbon Dates VII, 1964, Radiocarbon, v. 6, p. 46.

W-990 **>38,000 B.P. (contaminated)**

Location: Logan County. SW¼, SW¼, SW¼, Sec 32, T 135 N, R 72 W.
Site: A gravel pit.
Material dated: "Peaty material" occurring in lenses five feet or more below the surface in sandy outwash.
Collected by: Lee Clayton (1961); submitted by W. M. Laird.
Significance: Lignite contamination makes *date meaningless.*
Reference: USGS Radiocarbon Dates VII, 1964, Radiocarbon, v. 6, p. 47.

W-993 **9,900±400 B.P.**

Location: Cass County. Center of Sec 20, T 140 N, R 48 W.
Site: In artificial cutoff dug across a meander neck of the Red River.
Material dated: Wood.
Stratigraphy:

0' -28'	Clay and silt, laminated.
28' -28.5'	Silt, black, containing wood.
28.5'-41.5+'	Clay and silt.

Collected by: J. A. Brophy (1960).
Significance: Wood is from swamp deposits on the delta deposited by the ancestral Sheyenne and Maple Rivers, near the end of the Moorhead Phase of

Lake Agassiz (fig. 2). See McAndrews (1967) for a discussion of the paleoecology of the site.

Reference: USGS Radiocarbon Dates VII, 1964, Radiocarbon, v. 6, p. 45.
McAndrews, J. H., 1967, p. 253-269.
Brophy, J. A., 1967, p. 159-165.

W-1005 **10,050±300 B.P.**

Location: Grand Forks County. NE¼, SW¼, Sec 14, T 150 N, R 51 W.
Site: A gravel pit.
Material dated: Abraded wood and wood trash.
Stratigraphy:

0'-5.5'	Sand and gravel.
5.5'-?	Clay, gray containing wood.
?	Gravel.

Collected by: W. M. Laird and F. D. Holland, Jr. (1960); submitted by R. W. Lemke.
Significance: This date is from the "Ojata" Beach. Lake Agassiz stood at this level during most of the Moorhead Phase (fig. 2).
Reference: USGS Radiocarbon Dates VII, 1964, Radiocarbon, v. 6, p. 47.

W-1019 **9,000±300 B.P.**

Location: Logan County. SW¼, SW¼, NW¼, Sec 20, T 135 N, R 67 W.
Site: In a road cut 0.4 mile south of the northwest section corner.
Material dated: Clam fragments.
Stratigraphy:

0'-1.75'	Sand, silty, sample collected at the base.

Collected by: Lee Clayton (1960); submitted by W. M. Laird.
Significance: Dates melting of buried stagnant ice, but not beginning of stagnation.
Reference: USGS Radiocarbon Dates VII, 1964, Radiocarbon, v. 6, p. 46.

W-1020 **>38,000 B.P.**

Location: Stutsman County. NE¼, NE¼, NE¼, Sec 21, T 141 N, R 66 W.
Site: Testhole NDSWC 1903.
Material dated: Wood.
Stratigraphy:

0'-50'	Till.
50'-53'	Sand and gravel containing wood.

Collected by: R. W. Schmid (1961); submitted by E. Bradley.
Significance: Unknown.
Reference: USGS Radiocarbon Dates VII, 1964, Radiocarbon, v. 6, p. 47.

W-1021 **>38,000 B.P. (contaminated)**

Location: Logan County. SE¼, SE¼, SE¼, Sec 9, T 134 N, R 68 W.
Site: In gravel pit.
Material dated: "Peaty material" at a depth of 4.5 feet in gravel.
Collected by: Lee Clayton (1961); submitted by W. M. Laird.
Significance: The peaty material was contaminated with lignite, therefore the *date is meaningless.*
Reference: USGS Radiocarbon Dates VII, 1964, Radiocarbon, v. 6, p. 45.

W-1045 **28,700±800 (contaminated)**

Location: Logan County. SW¼, NW¼, NW¼, Sec 24, T 134 N, R 72 W.
Site: A road cut.
Material dated: Peaty material and organic clay.
Stratigraphy:

0'-2'	Gravel, iron-oxide cemented.
2'-?	Organic clay, dark gray to black, with carbonized plant remains in small fragments; date from here.
?	Peat or peaty clayey silt with carbonized fragments. Bedrock.

Collected by: J. W. Bonneville (1960); submitted by W. M. Laird.

Significance: Because the dated material was collected from a depth of only 2 feet below the surface, there is a high probability that the sample was contaminated with modern rootlets and therefore the *date may be meaningless*. Figure 11 in Bonneville's thesis, which is a view of the site from which the sample was collected, shows numerous plants growing immediately above the peaty material. We believe it probable that the dated material was lignite containing modern roots.

Reference: USGS Radiocarbon Dates VII, 1964, Radiocarbon, v. 6, p. 47-48.
Bonneville, J. W., 1961, p. 32, 35-36.

W-1149 **9,620±350 B.P.**

Location: McIntosh County. SE¼, SE¼, SE¼, Sec 36, T 130 N, R 68 W.

Site: A road cut.

Material dated: Clam shells. From a depth of 3½ feet in collapsed superglacial fluvial sand and gravel.

Collected by: S. J. Tuthill and Lee Clayton.

Significance: Dates melting of buried stagnant ice.

Reference: Clayton, Lee, 1966.
Tuthill, S. J., 1963, p. 52.

W-1184 **23,400±800 B.P. (contaminated)**

Location: Richland County. NW¼, NW¼, SW¼, Sec 4, T 135 N, R 52 W.

Site: Cutbank along Sheyenne River.

Material dated: Mixture of charcoal and lignite.

Stratigraphy:

0' - 1'	Sand, fine.
1' - 8.5'	Sand, silt and clay, paleosol at the top, contains abundant shells, bone and waterworn bits of charcoal.
8.5'- 9.5'	Sand, medium.
9.5'-10'	Silt.
10' -14'	Sand, medium, interbedded with silt.

14' -16'	Sand, medium.
16' -18'	Silt, date from here.
18' -19'	Sand, medium; contains wood (W-1185).

Collected by: J. A. Brophy (1962).
Significance: The date comes from sediment deposited by the Sheyenne River. The underlying date, W-1185, is 2,540±300 B.P. Therefore, this date, W-1184, *is meaningless*. Small, weathered pieces of lignite were mistaken for charcoal. This distinction is often very difficult.
Reference: USGS Radiocarbon Dates VIII, 1965, Radiocarbon, v. 7, p. 378.
Brophy, J. A., 1967, p. 159-165.

W-1185 **2,540±300 B.P.**

Location: Richland County. NW¼, NW¼, SW¼, Sec 4, T 135 N, R 52 W.
Site: Cutbank on the south side of the Sheyenne River.
Material dated: Wood (aspen and oak?).
Stratigraphy:

0' - 1'	Sand, fine.
1' - 8.5'	Sand, silt and clay, paleosol at the top, contains abundant shells, bone and waterworn bits of charcoal.
8.5'- 9.5'	Sand, medium.
9.5'-10'	Silt.
10' -14'	Sand, medium, interbedded with silt.
14' -16'	Sand, medium.
16' -18'	Silt (W-1184).
18' -19'	Sand, medium–date from wood in this unit.

Collected by: J. A. Brophy.
Significance: Date is from sediment deposited by the Sheyenne River.
Reference: USGS Radiocarbon Dates VIII, 1965, Radiocarbon, v. 7, p. 378.
Brophy, J. A., 1967, p. 159-165.

W-1360 **9,810±300 B.P.**

Location: Traill County. NW¼, SE¼, SE¼, Sec 18, T 147 N, R 50 W.
Site: Gravel pit.
Material dated: Wood.
Stratigraphy:

Sand and gravel; date from an interval containing waterworn branches, twigs, and fine-grained carbonaceous material.

Collected by: H. M. Jensen (1961).
Significance: Dates rise of Lake Agassiz at about 9,900 B. P. This is the boundary between the Moorhead Phase and the Emerson Phase of Lake Agassiz (fig. 2). The date is from the Hillsboro Beach.
Reference: USGS Radiocarbon Dates VIII, 1965, Radiocarbon, v. 7, p. 378.

W-1361 **9,820±300 B.P.**

Location: Traill County. NW¼, SE¼, SW¼, Sec 21, T 147 N, R 51 W.
Site: Gravel pit.
Material dated: Wood.
Stratigraphy:

Sand and gravel containing waterworn sticks, twigs, and organic material. Silt and clay.

Collected by: H. M. Jensen (1961).
Significance: Dates the rise of Lake Agassiz at about 9,900 B. P. This is the boundary between the Moorhead Phase and the Emerson Phase of Lake Agassiz (fig. 2). The date is from the Blanchard Beach.
Reference: USGS Radiocarbon Dates VIII, 1965, Radiocarbon, v. 7, p. 378.

W-1369 **9,860±400 B.P. (contaminated?)**

Location: Foster County. NE¼, NW¼, Sec 32, T 146 N, R 67 W.
Site: Dug well.
Material dated: Coniferous wood.
Stratigraphy:

0'-18'	Till.
18'-20'	Fossiliferous zone containing cones, wood branches, and mollusks.
20+'	Pierre Shale.

Collected by: R. J. Kresl, 1963.
Significance: The wood which was obtained from the owner of the well had been excavated several years prior to being dated. The uncertain history of the wood from the time it was excavated until it was collected makes the date questionable, especially because of its position and its age relative to other sub-till and in-till dates in the area. We believe that the sample was probably contaminated. If the date is correct and is not contaminated, it represents material that was buried by sliding or flowing of saturated debris into a depression formed by melting of a block of stagnant glacial ice. It is much too young to represent material overridden by active ice.
Reference: USGS Radiocarbon Dates VIII, 1965, Radiocarbon, v. 7, p. 377.
Kresl, R. J., 1964, p. 45-46.

W-1432 **210±200 B.P.**

Location: Burleigh County. SW¼, NW¼, NE¼, Sec 24, T 137 N, R 80 W.
Site: Testhole NDSWC 1949.
Material dated: Wood.
Stratigraphy:

0'- 21'	Clay.
21'- 81'	Sand with wood fragments and snail shells; date from here.
81'-104'	Gravel.
104'-115'	Gravelly sand.

Collected by: R. W. Schmid (1961).
Significance: Testhole was on the Missouri River floodplain.
Reference: USGS Radiocarbon Dates VIII, 1965, Radiocarbon, v. 7, p. 378.

W-1433 **> 38,000 B.P. (contaminated?)**

Location: Burleigh County. NE¼, SW¼, SW¼, Sec 34, T 139 N, R 79 W.
Site: Road cut.
Material dated: Pelecypod and gastropod shells from glaciofluvial sand overlying bedrock.
Collected by: Jack Kume and P. G. Randich (1962).
Significance: Some reworked shells from the Tongue River Formation were present with the Pleistocene shells. An attempt was made to obtain only a Pleistocene shell collection; however, there exists the possibility of older shells in the sample (Jack Kume, personal communication).
Reference: USGS Radiocarbon Dates VIII, 1965, Radiocarbon, v. 7, p. 377.

W-1434 **10,100±300 B.P.**

Location: Burleigh County. NE¼, NE¼, NE¼, Sec 12, T 144 N, R 79 W.
Site: Testhole NDSWC 2051.
Material dated: Gastropod and pelecypod shells.
Stratigraphy:

0'-23'	Sand and clay; date from here.
23'-31'	Till.
31'-35'	Sand, gravelly.

Collected by: Jack Kume (1962).
Significance: Dates lake sediment deposited in a depression formed by the melting of a block of stagnant glacial ice.
Reference: USGS Radiocarbon Dates VIII, 1965, Radiocarbon, v. 7, p. 377.

W-1436 **9,990±300 B.P.**

Location: Burleigh County. NE¼, NE¼, SE¼, Sec 19, T 143 N, R 75 W.
Site: Testhole NDSWC 2056.
Material dated: Gastropod and pelecypod shells.

Stratigraphy:

0'-13'	Silt and sand, date from here.
13'-57'	Till.

Collected by: Jack Kume (1962).
Significance: Date is from lake sediment deposited in a depression formed by the melting of a block of stagnant glacial ice.
Reference: USGS Radiocarbon Dates VIII, 1965, Radiocarbon, v. 7, p. 377.

W-1528 **>28,000 B.P.**

Location: Ramsey County. SW¼, SE¼, Sec 14, T 154 N, R 61 W.
Site: Temporary excavation.
Material dated: Wood.
Stratigraphy:

0'- 6'	Till.
6'- 9'	Clay, silt, and gravel.
9'-41'	Till.
41'-44'	Sand.
44'-48+'	Till containing wood, date here.

Collected by: J. P. Bluemle.
Significance: The date is overlain by two separate till sheets and is contained in a third till.
Reference: USGS Radiocarbon Dates IX, 1967, Radiocarbon, v. 9, p. 509.

W-1537 **5,440±200 B.P.**

Location: Mercer County. SW¼, NE¼, NW¼, Sec 17, T 144 N, R 89 W.
Site: Ditch.
Material dated: Wood.

Stratigraphy:

0'-19'	Silt and sand, tan, indistinctly bedded.
19'-23'	Sand and gravel, crossbedded; contains large clam shells.
23'-29'	Sand, silt and clay with minor interbedded gravel; contains wood, leaf imprints, clam shells, insects, and bison bones; date from here.
29'-30'	Gravel.
30'-34+'	Silt and clay, blue gray, very compact, laminated.

Collected by: J. A. Brophy (1964).
Significance: Date is from sediment deposited by Spring Creek.
Reference: USGS Radiocarbon Dates IX, 1967, Radiocarbon, v. 9, p. 509.
Brophy, J. A., 1966, p. 214-223.

W-1574 **>36,000 B.P.**

Location: Richland County. NE¼, NE¼, NW¼, Sec 9, T 134 N, R 48 W.
Site: Testhole NDSWC 2309.
Material dated: Wood.
Stratigraphy:

0'- 38'	Clay.
38'- 44'	Till.
44'- 59'	Sand and gravel containing wood at 59 feet.
59'-317'	Till.

Collected by: Claud Baker.
Significance: Unknown.
Reference:

W-1712 **>38,000 B.P.**

Location: Cass County. SE¼, SE¼, SE¼, Sec 35, T 139 N, R 50 W.
Site: Testhole NDSWC 3107.
Material dated: Wood.

Stratigraphy:

0'- 52'	Clay.
52'- 94'	Till.
94'-104'	Sand containing wood.
104+'	Till.

Collected by: R. Schmid (1964).
Significance: Unknown.
Reference: USGS Radiocarbon Dates IX, 1967, Radiocarbon, v. 9, p. 509.

W-1817 **10,350±300 B.P.**

Location: Ward County. NW¼, NE¼, SE¼, Sec 3, T 153 N, R 86 W.
Site: Testhole NDSWC 3206.
Material dated: Wood, conifer cones, and grass.
Stratigraphy:

0'-135'	Till.
135'-143'	Clay, sandy, black; sample from here.

Collected by: W. A. Pettyjohn.
Significance: This date is from material buried by flowing or sliding of saturated debris into a depression formed by the melting of a block of stagnant glacial ice.
Reference: Pettyjohn, W. A., 1966, written communication to J. R. Reid.
Pettyjohn, W. A., 1967, p. 128.

W-1818 **10,330±300 B.P.**

Location: Ward County. NW¼, NW¼, SE¼, Sec 18, T 157 N, R 87 W.
Material dated: Wood, log.
Stratigraphy:

0'-12'	Till.
12+'	Sand, wood at top.

Collected by: W. A. Pettyjohn.
Significance: This date is from material buried by flowing or sliding of saturated debris into a depression formed by the melting of a block of stagnant ice.
Reference: Pettyjohn, W. A., 1966, written communication to J. R. Reid.
Pettyjohn, W. A., 1967, p. 128.

W-2184 **5,700±300 B.P.**

Location: Mercer County. SW¼, SE¼, NE¼, Sec 18, T 144 N, R 86 W.
Site: Testhole NDSWC 2677.
Material dated: Wood.
Stratigraphy:

0'- 9'	Clay, sandy, silty, gravelly, dark yellowish brown.
9'-20'	Sand, fine to medium grained, dark yellowish brown.
20'-25'	Sand, fine to coarse grained, gravelly, dark greenish gray, lignitic.
25'	Wood from soil here.
25'-60+'	Sand as above.

Collected by: M. G. Croft (1967).
Significance: The date is from sediment underlying the intermediate terrace in the Knife River valley.
Reference: USGS Radiocarbon Dates XI, 1970, Radiocarbon, v. 12, no. 1, p. 322.

W-2388 **920±200 B.P.**

Location: Nelson County. SW¼, SW¼, NW¼, Sec 7, T 151 N, R 60 W.
Site: Testhole NDSWC 5352.
Material dated: Wood.

Stratigraphy:

0'- 10'	Sand, gravelly, silty, clayey.
10'- 30'	Clay, silty, bluish gray, cohesive, very plastic, very calcareous; wood from the base of this unit.
30'-118'	Till.

Collected by: J. S. Downey (July 24, 1969).
Significance: Date the beginning of modern Stump Lake (J. S. D.).
Reference: Downey, J. S., 1971, p. 206.

W-2450 **28,340±1,000 B.P.**

Location: Ward County. SE¼, SE¼, SE¼, Sec 13, T 154 N, R 81 W.
Site: Testhole NDSWC 5420.
Material dated: Wood.
Stratigraphy:

0'- 80'	Till.
80'- 95'	Sand.
95'-134'	Clay.
134'-155'	Sand.
155'-190'	Gravel.
190'-270'	Sand.
270'-308'	Gravel.
308'-310'	Boulder, wood just below boulder.
310'-340'	Siltstone and claystone.

Collected by: M. O. Lindvig (July 21, 1969).
Significance: The position of the wood is quite definite. No wood was present throughout the entire testhole until after the carbonate boulder at 310 feet was drilled. At that point wood appeared abundantly in the mud. The log was apparently resting on the bedrock floor of the buried valley (M. O. Lindvig 1970).

The stratigraphic sequence in the buried valley indicates that it was occupied by meltwater from an early Wisconsinan (pre-Farmdalian) glacier. It is not clear whether more than one till sheet is present in this testhole. On the basis of stratigraphic and morphologic evidence just to the east, we consider it probable that more than one ice advance occurred after this date.

Reference:

**

16,900 B.P.*

Location: Mercer County. NE¼, SE¼, Sec 11, T 144 N, R 86 W.
Site: Water well.
Material dated: Water from 1000 feet from the Fox Hills Formation.
Collected by: M. G. Croft.
Significance: A series of water dates such as this could be used to delimit flow paths, and give very accurate values for the permeability of the aquifer involved.
Reference:

*Original date was 23,000. This date was adjusted by C13/C12 analysis to remove the influence of carbonate dissolved from the aquifer.

**This sample was dated in the Denver lab of the U.S.G.S., Water Resources Division, under the direction of S. W. West.

Y-1821 **1,120±60 B.P.**

Location: Ramsey County. NW¼, SW¼, Sec 19, T 153 N, R 64 W.
Material dated: Organic sediment from 0.66 to 0.86 m from Core 120.
Collected by: E. Callender.
Significance: See Callender (1968) for a discussion of sedimentation rates in Devils Lake.
Reference: Yale University Radiocarbon Dates IX, 1969, Radiocarbon, v. 11, no. 2, p. 577-578.
Callender, E., 1968, p. 91, 119, 177-180.

Y-1822 **3,550±100 B.P.**

Location: Ramsey County. NW¼, SW¼, Sec 19, T 153 N, R 64 W.
Material dated: Organic sediment from 3.40 to 3.58 m in Core 120.
Collected by: E. Callender.
Significance: See Callender (1968) for a discussion of sedimentation rates in Devils Lake.
Reference: Yale University Radiocarbon Dates IX, 1969, Radiocarbon, v. 11, no. 2, p. 577-578.
Callender, E., 1968, p. 119, 177-180.

Y-1823 **4,710±120 B.P.**

Location: Ramsey County. NW¼, SW¼, Sec 19, T 153 N, R 64 W.
Material dated: Organic sediment from 4.94 to 5.17 m in Core 120.
Collected by: E. Callender.
Significance: See Callender (1968) for a discussion of sedimentation rates in Devils Lake.
Reference: Yale University Radiocarbon Dates IX, 1969, Radiocarbon, v. 11, no. 2, p. 577-578.
Callender, E., 1968, p. 119, 177-180.

PART II

Dates that Precede the Last Till *

28,340±1,000 (W-2450)	Wood from the base of a valley cut into bedrock. At least two tills overlie the valley fill.
>28,000 (W-1528)	Wood from the third till below the surface.
>36,000 (W-1674)	Nothing is known of the stratigraphy of this area at this time.
>38,000 (W-1712)	Nothing is known of the stratigraphy of this area at this time.
>38,000 (W-1020)	Nothing is known of the stratigraphy of this area at this time.

Stagnation Dates *

11,650±310 (W-974)	Clam shells from collapsed lake sediment.
11,220±300 (W-402)	Marl lens in "till" in hummocky moraine.
11,070±300 (W-956)	Clam shells from collapsed gravel.
10,350±300 (W-1817)	Forest litter from 135 feet in "till" in high relief hummocky moraine.
10,330±300 (W-1818)	Wood from "till" in hummocky moraine.
10,100±300 (W-1434)	Clam and snail shells from ice-walled lake.
9,990±300 (W-1436)	Clam and snail shells from ice-walled lake.
9,870±290 (W-954)	Clam shells from ice-walled lake.
9,860±400 (W-1369)	Wood and cones from below 18 feet of "till" (may be contaminated with modern carbon).
9,750±140 (I-4537)	Wood from fossiliferous lake clay in hummocky moraine area.
9,620±350 (W-1149)	Clams in collapsed fluvial sand and gravel.
9,000±300 (W-1019)	Clams in collapsed lake sediment.

Dates Associated with Lake Agassiz *

Date	Comments
Beginning of the lake	
13,500±220 (I-2289)	Dates incision of the head of the "Sheyenne Delta" below the "Herman" level.
12,000±250 (I-2537)	Fluvial terrace inset into the "Sheyenne Delta."

Beginning of the Moorhead Phase—eastern outlets opened into the Lake Superior basin permitting Lake Agassiz to drop below the Campbell level.

10,960±300 (W-723) 10,820±190 (TAM-1)	Wood in sandy sediment associated with the Ojata Beach.
10,340±170 (I-5213)	Wood in Ojata Beach.
10,080±280 (W-900)	Wood under sand in Ojata Beach.
10,050±300 (W-1005)	Wood under gravel in Ojata Beach.
9,900±400 (W-993)	Wood in swamp deposits overlain by deep-water lake sediment.

Beginning of the Emerson Phase—eastern outlets blocked by readvancing glacial ice causing Lake Agassiz to rise to the Campbell level.

9,820±300 (W-1361)	Wood under gravel of Blanchard Beach.
9,810±300 (W-1360)	Wood under gravel of Hillsboro Beach.
9,730±160 (I-5123C) 9,650±150 (I-5123)	Driftwood 2 feet above base of deep-water lake sediment.

End of the Emerson Phase—eastern outlets were reopened permitting Lake Agassiz to drop below the Campbell level.

9,130±150 (I-1982)	Wood in estuary sediment deposited in the trench incised into the "Sheyenne Delta."

Miscellaneous Postglacial Dates *

11,480±300	(W-542)	Stump buried by alluvium or colluvium.
7,840±250	(I-2536)	Alluvium of Spring Creek.
7,690±125	(I-2090)	Alluvium of Maple River.
6,120±120	(I-2361)	Sediment of Devils Lake.
5,700±300	(W-2184)	Alluvium of Knife River.
5,440±200	(W-1537)	Alluvium of Spring Creek.
4,710±120	(Y-1823)	Sediment of Devils Lake.
3,850±60	(SI-478)	Firepit in eolian or alluvial sequence.
3,770±90	(SI-479)	Firepit in eolian or alluvial sequence.
3,620±110	(I-3058)	Alluvium of Sheyenne River.
3,550±100	(Y-1822)	Sediment of Devils Lake.
3,450±125	(I-2398)	Sediment of Devils Lake.
2,540±300	(W-1185)	Alluvium of Sheyenne River.
2,520±130	(I-2360)	Sediment of Devils Lake.
2,320±105	(I-3059)	Alluvium of Sheyenne River.
1,940±130	(I-2397)	Sediment of Devils Lake.
1,450±95	(I-2092)	Sheyenne River alluvium under sand dune.
1,335±95	(I-1954)	Shoreline sediment of a low stand of Devils Lake.
1,120±60	(Y-1822)	Sediment of Devils Lake.
920±200	(W-2388)	Sediment of Stump Lake overlying wood.
210±200	(W-1432)	Alluvium of Missouri River.
<195	(I-2326)	Alluvium of Jones Creek.
<185	(I-2325)	Alluvium of Jones Creek.

3,850±60 (SI-478) Bowman County Red Fox Site 32BO213
3,770±90 (SI-479)
Reference: Smithsonian Institution Radiocarbon Dates VI, 1970, Radiocarbon, v. 12, no. 1, p. 194-195.

2,200±125 (I-414) Sioux County Boundary Mound Site
1,540±160 (I-499)
1,340±150 (I-498)
Reference: Isotopes Radiocarbon Dates III, 1963, Radiocarbon, v. 5, p. 72.
Wood, R. W., 1960, p. 71-78.
Neuman, R. W., 1961, p. 57-58.

1,620±150 (SI-373) Sioux County Ben Standing Soldier Site 32SI7
1,170±100 (SI-372)
1,050±150 (SI-368)
1,030±150 (SI-374)
560±150 (SI-369)
510±140 (SI-371)
370±150 (SI-370)
Reference: Smithsonian Institution Radiocarbon Dates V, 1969, Radiocarbon, v. 11, no. 1, p. 166-167.

770±140 (SI-182) Morton County Huff Site 32MO11
600±300 (SI-448)
530±100 (SI-181)
500±130 (SI-447)
470±90 (SI-179)
390±130 (SI-446)
310±190 (SI-178)
180±120 (SI-180)
Modern (SI-183)

Reference: Smithsonian Institution Radiocarbon Dates III, 1966, Radiocarbon, v. 8, p. 416.
Smithsonian Institution Radiocarbon Dates IV, 1967, Radiocarbon, v. 9, p. 371.
Smithsonian Institution Radiocarbon Dates V, 1969, Radiocarbon, v. 11, no. 1, p. 167.

840±90 (I-4202) Sioux County South Cannonball Village Site 32SI19
820±100 (I-4205)
630±95 (I-4204)
610±95 (I-4203)

Reference: Isotopes Radiocarbon Dates VIII, 1970, Radiocarbon, v. 12, no. 1, p. 117-118.

1,860±150 (I-497) Barnes County 32BA1

Reference: Isotopes Radiocarbon Dates III, 1963, Radiocarbon, v. 5, p. 73.
Hewes, G. W., 1949, p. 322-328.

950±85 (I-496) Stutsman County Kropp Mound Site
Reference: Isotopes Radiocarbon Dates III, 1963, Radiocarbon, v. 5, p. 73.

720±80 (SI-213) Fire Heart Creek Site
Reference: Smithsonian Institution Radiocarbon Dates III, 1966, Radiocarbon, v. 8, p. 416.

1,650±200 (SI-310) Sioux County Alkire Mound Site 32SI200
Reference: Smithsonian Institution Radiocarbon Dates IV, 1967, Radiocarbon, v. 9, p. 371.

6,700 B. P. Apparent age (Y-1507) McLean County Fort Berthold Site

This date is on cast iron from a wagon thimble at Fort Berthold.
Reference: Yale University Radiocarbon Dates IX, 1969, Radiocarbon, v. 11, no. 2, p. 549.

730±100 (M-2362) Emmons County Havens Site 32EM1
720±100 (M-2363)

Reference: University of Michigan Radiocarbon Dates XIV, 1972, Radiocarbon, v. 14, p. 179-180.

920±100 (M-2364) Sioux County Paul Brave Site 32SI4
850±100 (M-2365)

Reference: University of Michigan Radiocarbon Dates XIV, 1972, Radiocarbon, v. 14, p. 180.

770±110 (M-2367) Mercer County Clark's Creek Site 32ME1
670±100 (M-2366)

Reference: University of Michigan Radiocarbon Dates XIV, 1972, Radiocarbon, v. 14, p. 180.

590±100 (M-2369) Oliver County Cross Ranch Site 32OL14
420±100 (M-2368)

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