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## A Relocation of Part of the Mankato Drift Boundary in Hand County, South Dakota<sup>1</sup>

By EVERETT M. WHITE

Flint (1) has shown the areal distribution of the Cary and Mankato glacial drifts in South Dakota. Studies of the distribution of soils in southern Hand County (2) make possible the refinement of the Mankato drift boundary in that area. Although the area in question is relatively small (approximately 95 square miles) when compared to the distribution of the two drifts in the state, it is a significant part of the county. The criteria used in relocating the boundary are: (1) kinds of soil profiles, (2) presence or absence of loess, (3) melt water channels and outwash, (4) composition of the tills and (5) moraines.

The zonal soils derived from the Cary till are duller colored, have darker colored B-horizon clay skins and a more pronounced zone of lime accumulation than the analogous soils derived from Mankato till. Some of these soil differences may be due to the observed slightly higher shale content of the average Cary till in comparison to the average Mankato till found in Hand County. A thin, discontinuous mantle of loess occurs in association with the soils which are assumed to have been derived from Cary till and act as parent material for soils which are not present in the Mankato drift area of southern Hand County. The presence or absence of loess cannot be used by itself to differentiate the two drifts since a small area of poorly sorted loess does occur on Mankato till in the northwest part of the county. However, the loess found on the Cary drift lacks the extreme textural variations found in that local loess deposit.

A short weathering interval apparently occurred between the Cary glaciation and the period of loess deposition. In a road ditch (N.W. corner N.E.  $\frac{1}{4}$ , Sec. 33, T. 110 N., R. 66 W.), a thin dark colored leached soil was found beneath the calcareous loess. Frequently, a thin horizon with weak prismatic structure that could be attributed to soil formation occurs in the till beneath the loess. The ages of the tills may be questionable since the type site of the Mankato may be Cary in age (3). Due to the lack of conclusive evidence of the ages of the glacial drifts in Hand County, the designations used are those of Flint (1).

The terminal boundary on the Mankato glacial drift in the county

<sup>1</sup>Journal Paper No. 369, South Dakota Agricultural Experiment Station, College Station, Brookings, South Dakota.

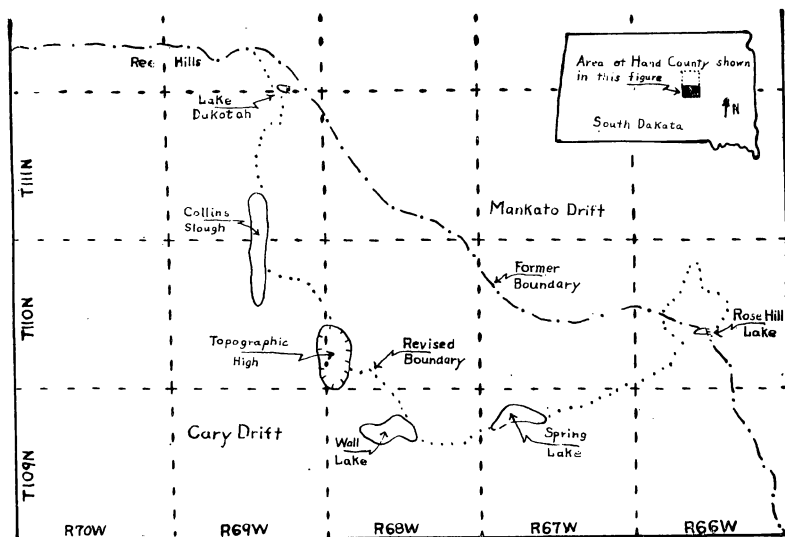


Figure 1. Location of the revised boundary of the Mankato glaciation in southern Hand County.

can be traced along the physical features shown in Figure 1. The Ree Hills segment corresponds to the boundary shown by Flint. North of Lake Dakotah the boundary follows a shallow, northwest-southeast elongated depression which contains a small stringer of outwash gravels. For a mile or so south of Lake Dakotah, the boundary lacks topographic expression.

A stream with some gravelly terraces which flows south into Collins Slough is at the margin of the Mankato drift for the next few miles. Outwash gravel also occurs along the east edge of the slough. An elongated depression, with some small oriented ridges of gravelly drift along its north side, is the boundary for a few miles east of Collins Slough. The topographic high acted as a barrier for the advancing Mankato glacier. In this hilly area with shallow soils formed from coarser drift, the boundary is difficult to ascertain. The boundary between this high and Wall Lake is also topographically indistinct since part of the area is covered with post glacial alluvium. The distribution of loess and the differences in the till derived soils were used to delineate this boundary.

Outwash terraces are present along the channel between Wall Lake and Rose Hill Lake. This channel is drained by Crow Creek which flows west and by Sand Creek which flows east. Two distinct glacial terrace levels are present at Wall Lake and on the south side of Spring Lake. The higher terrace was not found on the north side of this segment of the boundary and may have been destroyed by the Mankato glacier. Soil profile differences were found which could be

interpreted as indicating that the Mankato ice crossed and blocked the channel between Spring Lake and Rose Hill Lake. The following section occurred in a gravel pit along the south edge of the channel in S.W.  $\frac{1}{4}$  Sec. 31, T. 110 N., R. 66 W.:

- 0—30" Soil profile formed in upper part of coarse horizontally bedded gravel.  
 30—36±2" Thin lens of till which has the characteristics of the Mankato till.  
 36—60" Sands which are crossbedded and tilted.  
 60"— Gravel in the base of the cut which was exposed to a depth of ten feet in 1956.

This section cannot be interpreted with any degree of surety without a detailed study of the terrace levels. It is reported as a matter of record since this section may be destroyed in the future. The basal gravels are thought to be Cary or pro-Mankato outwash, the sands could have been deposited when the velocity of the melt water was reduced by the blocking of the stream by the Mankato (?) glacier which deposited the till lens. The upper gravel could represent the post-Mankato outwash.

The small area of Cary drift north of Rose Hill Lake is bordered by moraine and has a thin discontinuous mantle of loess. The till derived soil of the Cary drift is also found in this area.

The Mankato drift area in southern Hand County is relatively free of outwash deposits. Morainic features are all but absent even in the terminal part where discontinuous areas of coarser till and drift do occasionally occur. The characteristics of soil profiles becomes valuable guides to the location of glacier drift boundaries under such circumstances.

#### ACKNOWLEDGMENTS

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