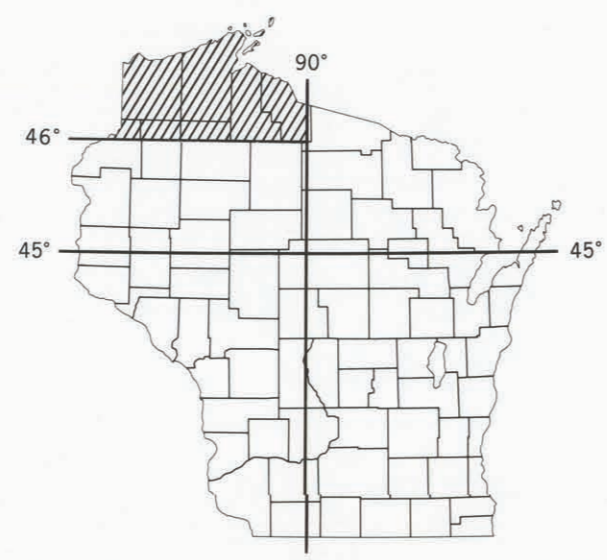


PLEISTOCENE GEOLOGY OF THE SUPERIOR REGION, WISCONSIN

by
Lee Clayton

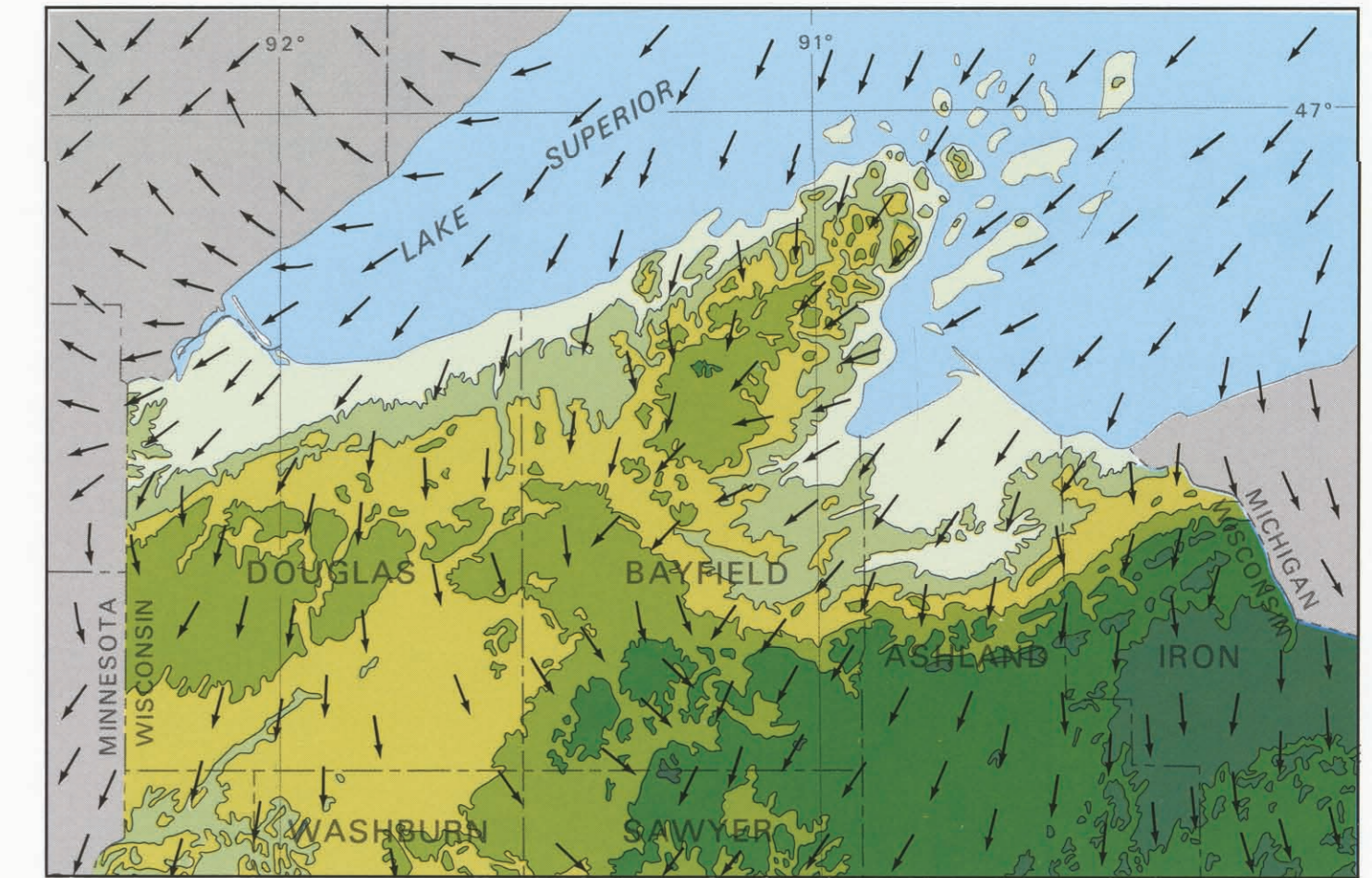
University of Wisconsin—Extension
GEOLOGICAL AND NATURAL HISTORY SURVEY
Meredith E. Ostrom, Director and State Geologist

1985

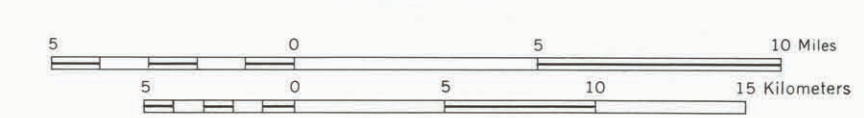


LOCATION MAP

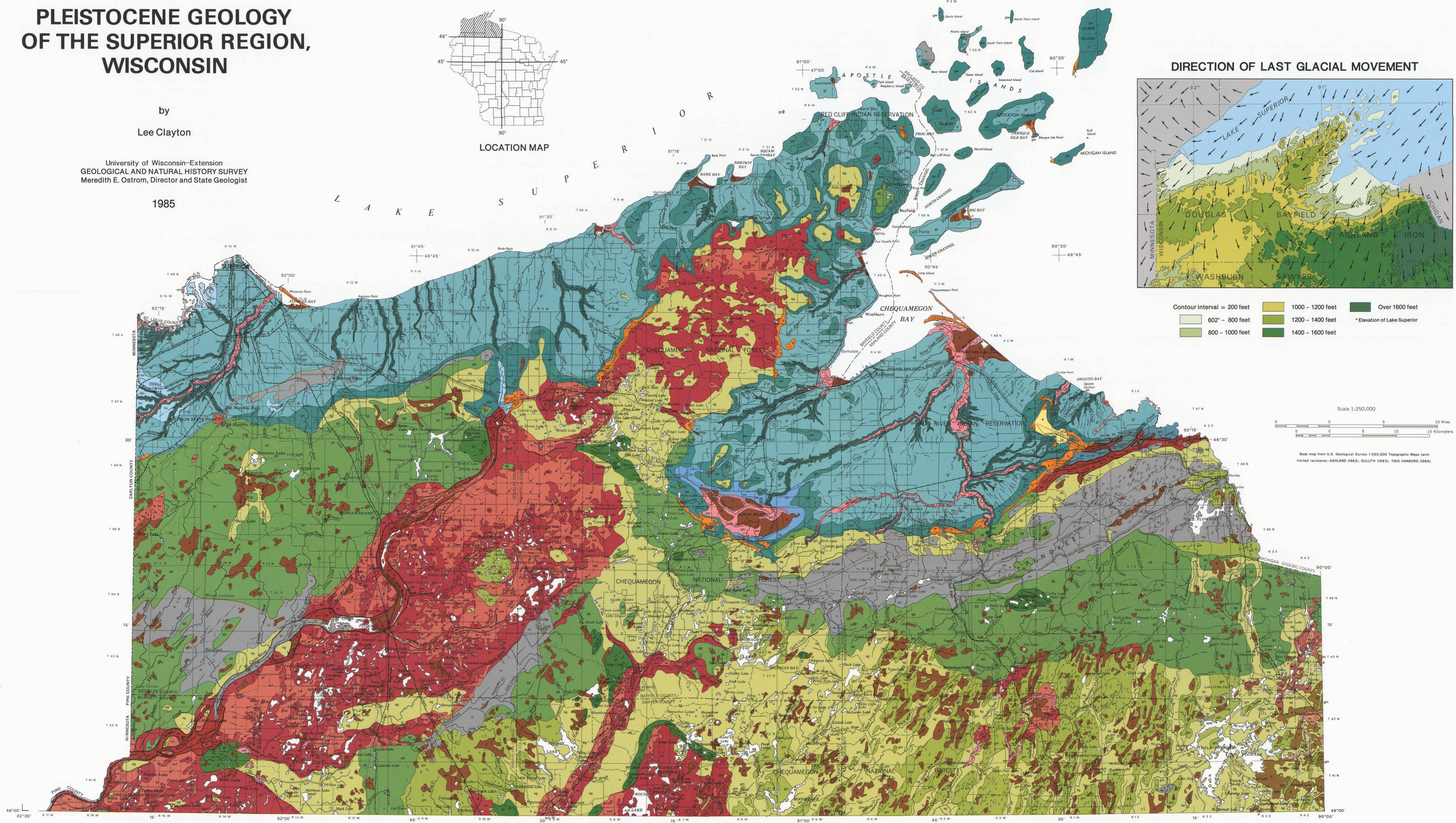
DIRECTION OF LAST GLACIAL MOVEMENT



Scale 1:250,000



Base map from U.S. Geological Survey 1:250,000 Topographic Maps (with limited revisions)—ASHLAND (1963), DULUTH (1963), TWO HARBORS (1964)



EXPLANATION

POSTGLACIAL DEPOSITS

- sc** SHORELINE SEDIMENT. Well sorted sand and gravel (no more than a few metres above the present level of Lake Superior). Deposited after about 5000 B.P.
- sm** STREAM SEDIMENT. Sand and gravel (channel deposits); generally more than 1 m thick. In many places overlain by silt and clay (overbank deposits) or peat. Floodplains of modern streams. Most deposited since about 10,000 B.P.
- p** ORGANIC SEDIMENT. Peat; less than 1 m thick in some areas, but typically probably a few metres thick. Low-lying, flat swamps, bogs, and marshes. Most deposited since about 10,000 B.P.
- w** WIND-BLOWN SEDIMENT. Well sorted sand; a few metres thick. Transverse dunes with slipfaces sloping north. Probably deposited shortly after 9500 B.P.
- su** SPILLWAY SEDIMENT. Boulder gravel, commonly overlain by sand or gravelly sand (deposited in bottoms of channels of deep meandering rivers discharging from proglacial lakes). Deposited between about 11,500 and 9500 B.P.
- o** SHORELINE SEDIMENT. Well sorted sand and gravel (deposited along beaches of proglacial lakes); generally 1 to 10 m thick. Individual beach ridges shown by line symbol (see below). Deposited between about 11,500 and 9500 B.P.
- ou** UNCOLLAPSED OFFSHORE SEDIMENT. Horizontal bedding (deposited on solid ground). Flat topography.
- oc** COLLAPSED OFFSHORE SEDIMENT. Folded bedding (deposited on glacial ice). Hummocky topography.

- su** LOST LAKE SURFACE.
- su** AIRPORT SURFACE.
- su** IRON RIVER SURFACE.
- su** SWISS SURFACE.
- su** VALHALLA SURFACE.
- su** HAYWARD SURFACE.
- su** LAKE RUTH SURFACE.
- su** TIGER CAT SURFACE.

- sc** COLLAPSED PROGLACIAL STREAM SEDIMENT. Faulted bedding (deposited on stagnant glacial ice). Hummocky collapse topography. Rare surface boulders.
- sg** HUMMOCKY STREAM SEDIMENT OVERLAIN BY SILTY MATERIAL. Collapsed proglacial stream sediment, angular stream sediment, or subglacial stream sediment overlain by a thin (about a metre) layer of till or wind-blown or offshore silt mixed with the underlying stream sediment. Surface boulders fairly common.
- gc** THICK MASS-MOVEMENT TILL. Supraglacial mass-movement till (probably several metres thick) with steep, hummocky topography resulting from collapse during ice melt. Surface boulders moderately abundant.
- gd** THIN MASS-MOVEMENT TILL. Hummocky topography composed of mass-movement till (a few metres thick) and probably also melt-out till and lodgement till, draped over till of earlier glacial advances. Surface boulders moderately abundant.
- gm** SUBGLACIALLY MOLDED TOPOGRAPHY. Drumlinized lodgement till, typically a few metres or less in thickness; commonly overlain by thin mass-movement till and melt-out till. Drumlins are commonly cored by older till, stream sand and gravel, or pre-Pleistocene rock. Surface boulders abundant.
- gt** GLACIAL THRUST MASSES. Transversely ridged topography, probably resulting from glacial thrusting of pre-existing till or stream sediment. Surface boulders moderately abundant.
- r** PRE-PLEISTOCENE ROCK. Cambrian or Precambrian rock at the surface in much of the area, but till or stream sediment may be a few metres or more thick in many areas.
- rs** Middle Proterozoic lithic sandstone, mudstone, and conglomerate of the Oronto Group and Late Proterozoic or Cambrian quartz sandstone of the Bayfield Group.
- rv** Middle Proterozoic volcanic rock.
- ri** Middle Proterozoic intrusive rock.

CAUTION

The accuracy and precision of this map varies considerably from place to place, depending on the quality of the available information.

Even in the most precisely mapped areas, a deposit is shown only if it is wider than about 0.3 km. That is, as much as half of any map unit might be made up of small unmapped inclusions of other materials. For example, numerous small unmapped peat bogs occur throughout the region, many small outcrops of Precambrian rock have not been shown, and as much as half of the area of uncollapsed proglacial stream sediment (map unit su) may actually be collapsed. Some features narrower than 0.3 km are indicated by line symbols.

Map units are least accurate in forested and roadless areas. Fieldchecking was largely restricted to areas near roads. Much of the map was interpreted from 1:50,000 and 1:20,000 air photos. Contacts were originally plotted on 7.5-minute (10-ft contour interval) or 15-minute (20-ft contour interval) topographic maps.

MAP SYMBOLS

- Abandoned beaches and wave-cut bluffs.
- Cutbanks of large abandoned river channels.
- ↖ Direction of flow of proglacial streams.
- ↖ Low, narrow drumlins formed during the last glacial advance. Arrowhead indicates direction of glacial movement.
- ↖ High, wide drumlins formed during an earlier glacial episode and only slightly modified during the last glacial episode.
- ↖ Direction of subglacial scratches on rock surfaces.
- ↖ Glacial ridges, transverse to ice-movement direction, including ice-thrust masses in map unit gt and small end moraines in map units gu, gc, gd, gm, sg, and p.
- ↖ Eskers; arrowhead point in direction of stream flow.

Cartography by T.R. Rowland and M.L. Czechanski.