# Glaciation of Wisconsin

#### Educational Series 36 | 2011 Fourth edition

For the past 2.5 million years, Earth's climate has fluctuated between conditions of warm and cold. These cycles are the result of changes in the shape of the Earth's orbit and the tilt of the Earth's axis. The colder periods allowed the growth of glaciers that covered large parts of the world's high altitude and high latitude areas.

The last cycle of climate cooling and glacier expansion in North America is known as the Wisconsin Glaciation. About 100,000 years ago, the climate cooled and a glacier, the Laurentide Ice Sheet, began to cover northern North America. For the first 70,000 years the ice sheet expanded and contracted but did not enter what is now Wisconsin. During the last part of the Wisconsin Glaciation, the Laurentide Ice Sheet expanded southward into the Midwest as far as Indiana, Illinois, and Iowa. The ice sheet advanced to its maximum extent by about 30,000 years ago and didn't melt back until thousands of years later. It readvanced a number of times before finally disappearing from Wisconsin about 11,000 years ago. Many of the state's most prominent landscape features were formed during the last part of the Wisconsin Glaciation.

The maps and diagrams in this publication show the timing and location of major ice-margin positions as well as the distribution of the glacial and related stratigraphic units that were deposited in Wisconsin.

Laurentide

#### Tracking the glacier

Maps showing the extent of the Laurentide Ice Sheet and changes to glacial lakes at several times. This set of maps, keyed to the graph below, shows when ice first began its advance into Wisconsin (A), ice near its maximum extent (B and C), the initial retreat (D), when ice left Wisconsin (E), and the final major readvance (F).



### Phases of glaciation



Ages of glaciation. In this map and the one on the last page, areas are distinguished by age: older or younger than about 35,000 years. Ages are determined using geochronology (radiocarbon and other dating techniques) and by studying features in the landscape. Younger glacial features are relatively fresh and uneroded; older glacial features are mostly or completely worn away. A **phase** is a geologic event rather than a period of time. Most phases represent at least a minor advance of the edge of the Laurentide Ice Sheet. Each line marks the edge of the ice sheet during a phase of glaciation. For example, during the Johnstown Phase of the Wisconsin Glaciation, the southern edge of the Green Bay Lobe (see back page for lobe locations) of the Laurentide Ice Sheet advanced to the line marked "Johnstown" in southcentral Wisconsin. Only the most recent phase is shown at any location.

		Radiocarbon	]	Des Moines Lobe		Superior Lobe		Chippewa Lobe		Ontonagon Lobe Wisconsin Va <b>ll</b> ey Lobe		Langlade Lobe		Green Bay Lobe				Lake Michigan		Calendar
		years before present												west side	east side		Lobe		years before present	
Ea Ho <b>l</b> o	rly cene	10,000 -	-			DOUGLAS MBR	R FM	Lakeview P	R FM					Marquette P						- 11,000
Pleistocene Epoch	late	11,000 -	-		TRADE RIVER FM	HANSON CREEK MBR	MILLER C	Porcupine P	MILLER C										,	– 12,000
				Pine City P		Lake Ruth P			COPPER FALLS FORMATION	Marenisco P				Iate Athelstane P MIDDLE INLET MBR	GLENMORE MBR Two Creeks Interval CHILTON MBR BRANCH RIVER MBR	ž	TWO RIV	ERS MBR	FM	- 13,000
		12,000 -				Airport P		Morse P		Winegar P CRAB LAKE MBR				KIRBY LAKE MBR early Athelstane P SILVER CLIFF MBR late Mountain P		EWAUNEE	Two Cre VALDER	eks Interva S MBR	EWAUNEE	_ 14,000
		13,000 -	-			Swiss P Beroun P Hayward P Centuria P Fox Creek P St. Croix P		Cliddon R		Muskellunge P				FLORENCE MBR		OZAUKE	E MBR	⊻ 	- 15,000	
		14,000 -	ation				ATION	Gilden P		muskellunge P		Laona & Stormy Lake P Bittersweet P		contraction of the second seco		NO	Lake Boi Tinley P Valparai	rder P so P	OAK CR FM	- 16,000
		15,000 -	G     G				LLS FORM/	Tiger Cat P		Flambeau P Harrison P	VTION	Summit Lake P		Bowler P Elderon P	Green Lake P LIBERTY GROVE MBR Lake Mills P	CON MBR FORMATIO	WAUBE	(A MBR	M	- 17,000
							PER FA	late Chippewa P MIKANA MBR				Parrish P	ATION	ON sconsi	Milton P	Milton P NUCH			AILL FI	- 18,000
		16,000 -				LSYLVAN LAKE MBR				T LAKE MB	LS FORMA	BR	LS FORMA	Almond P Almond P Hancock P Hancock P Hancock P Hancock P	Johnstown P	HOH	Darien P		NEW BEF	- 19,000
		17,000 -				Emerald P POSKIN MBR		Perkinstown P early Chippewa P POKEGAMA CR MBR		WILDCA	COPPER FAL	NASHV	COPPER FAL	BIG FLATS	HIGH CLIFF MBR CATO FALLS MBR	HAYTON FM	HIGH CL CATO FA	IFF MBR ALLS MBR	HAYTON FM	- 20,000
		25,000 -				[	-1									TISKILW	A MBR	DA FORMATION	- 30,000	
	middle					Baldwin P	RIVER FALLS FI	Dallas P PRAIRIE FARM MBR	[	Nasonvi <b>ll</b> e P BAKERVILLE MBR				Arnott P KEENE MBR		-worth	CAPRON CLINTON N ALLENS GF FOXHOLLO	i MBR MBR ROVE MBR DW MBR	ZEN	- 130,000
				northwestern lobes						L					WAL				- 790,000	
Early Pleistocene and Late Pliocene			earl	KINNICKINNIC MBR Reeve P HERSEY MBR Bridgeport P? WOODVILLE MBR EAU GALLE MBR		Marshfield P UPPER EDGAR MBR Milan P LOWER EDGAR MBI Stetsonville P MEDFORD MBR WAUSAU MBR	R	MARATHON FM MBK = WEWBER F	M =	FORMATION P = Phase	e			L_	1	J				- 2,500,000

## Correlation of Ice Age events and lithostratigraphic units across Wisconsin

Events (phases) are shown in lowercase letters, and lithostratigraphic units (members and formations) are in uppercase. A lithostratigraphic unit is a layer of geologic material having a given set of physical characteristics and a specific position within a sequence of units. Most lithostratigraphic units in this figure contain till (glacial sediment) and meltwater-stream sediment, and some glacial-lake sediment. When a specific event was responsible for a specific lithostratigraphic unit, the event is bracketed with the lithostratigraphic unit. Lobes are shown on the last page. (2017 revision: Langlade Lobe, Nashville Mbr.)

## Distribution of Pleistocene lithostratigraphic units



Lobes of the Laurentide Ice Sheet Arrows indicate the direction of ice movement.

For additional information, see the *Lexicon of Pleistocene Stratigraphic Units of Wisconsin*, Wisconsin Geological and Natural History Survey Technical Report 1.

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