SUNFISH LAKE: A KETTLE IN THE WATERLOO MORAINE

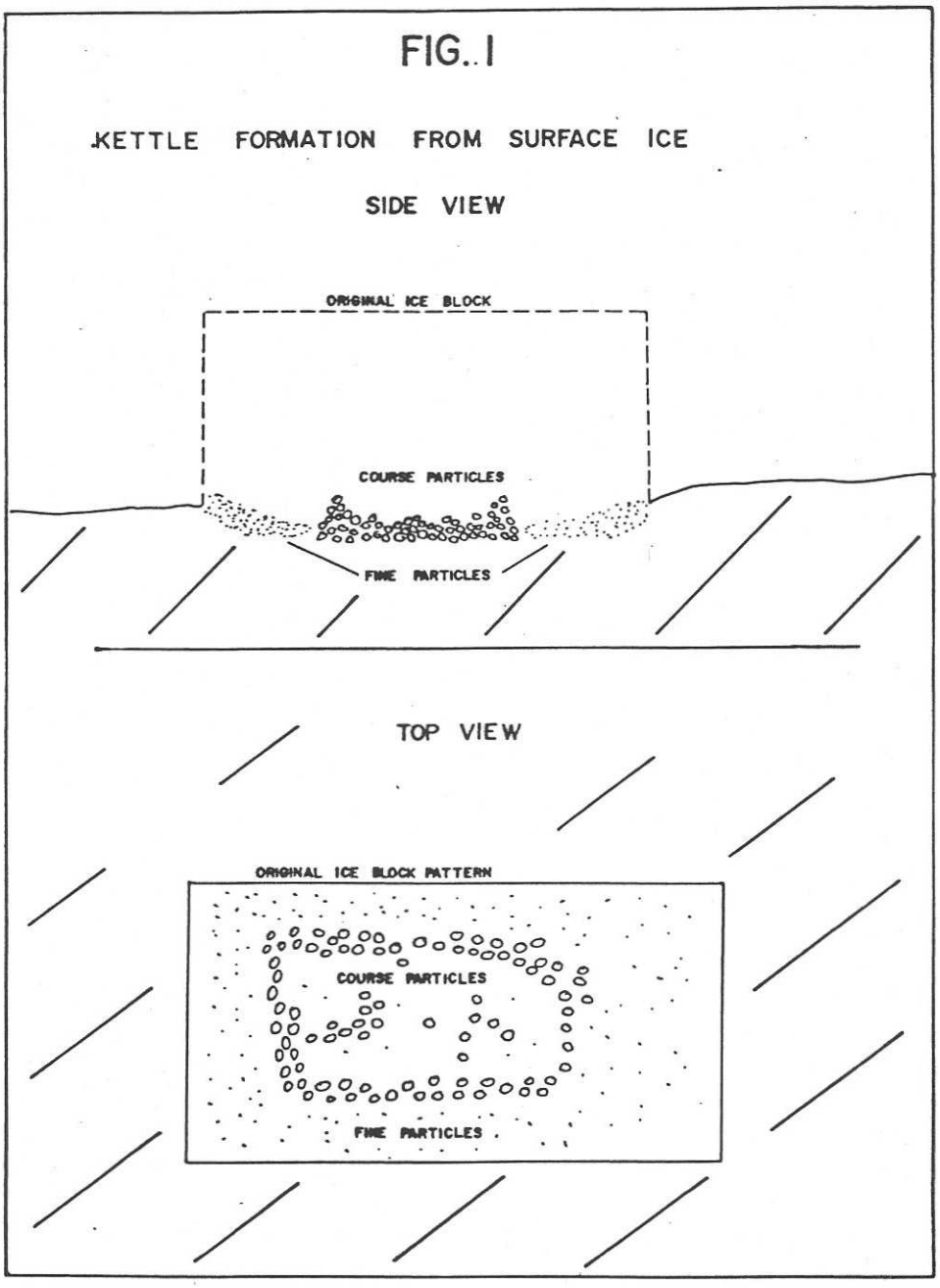
Sunfish lake is a small kettle lake located in the Waterloo moraine. Its formation is the result of the deposits left by the Wisconsin Galcier as it moved throgh this area 13,000 to 25,000 years ago. Glacial formation of the area and the charcteristics of the land make Sunfish lake a unique topic of study.

The Glacial Formation of the Waterloo Moraine

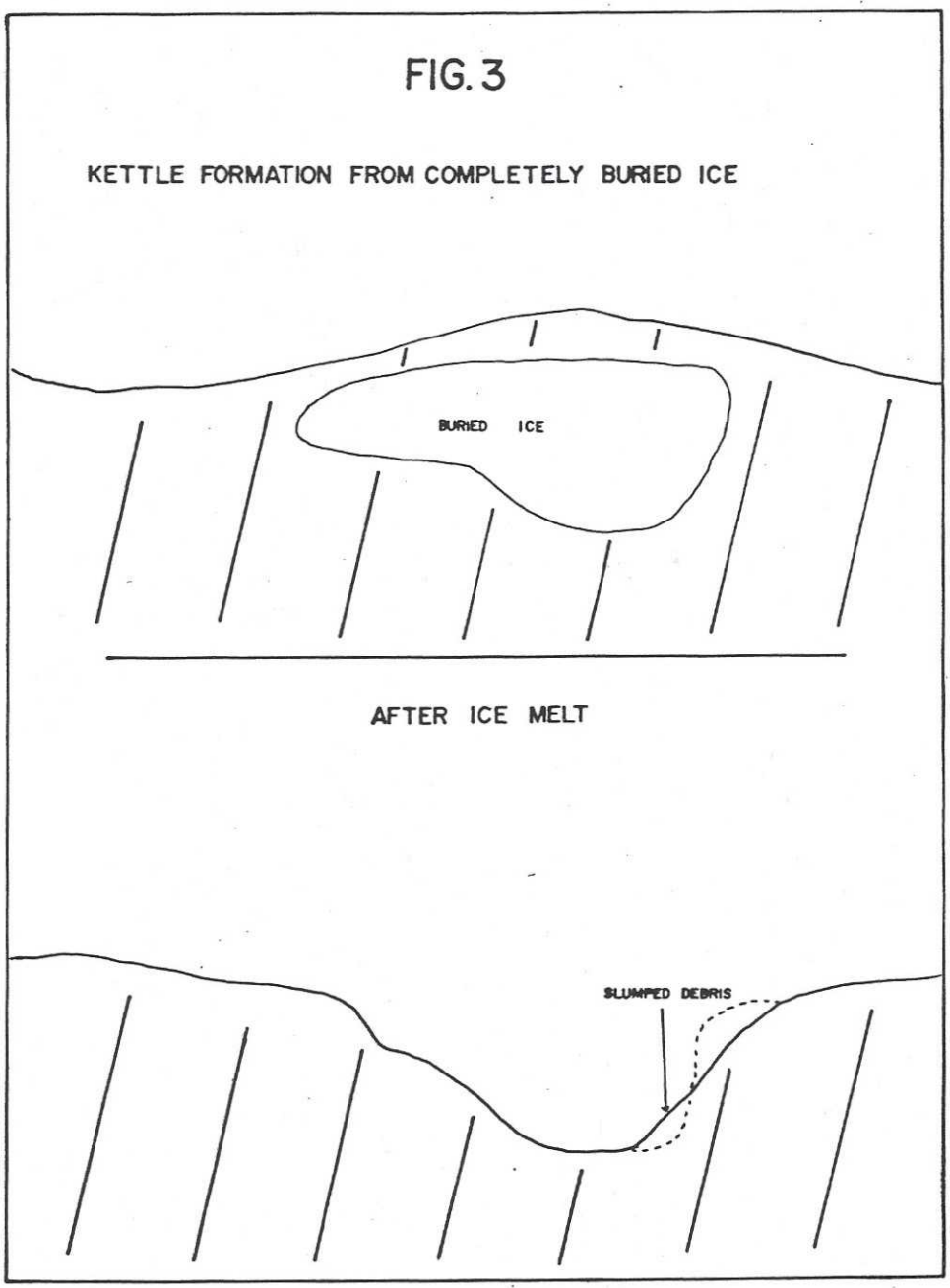
The bedrock under the Waterloo Moraine is composed of shale and dolomite, also known as a Salina formation.( ) As glaciers advanced and retreated over the bedrock over a period of millions of years, deposits were left on the bedrock gradually building up land formations such as moraines, drumlins and eskers on the rock. The primary products of the glacial till in the Waterloo area are gravel, clay, sand and silt. ( ) These make up most of the soils in the region.

The most recent glacier to pass through the area was the Wisconsin Glacier. It is largely responsible for the majority of landscape characteristics in the region. The glacier advanced and receded from many different directions over a period of time, resulting in the development of the Waterloo moraine.

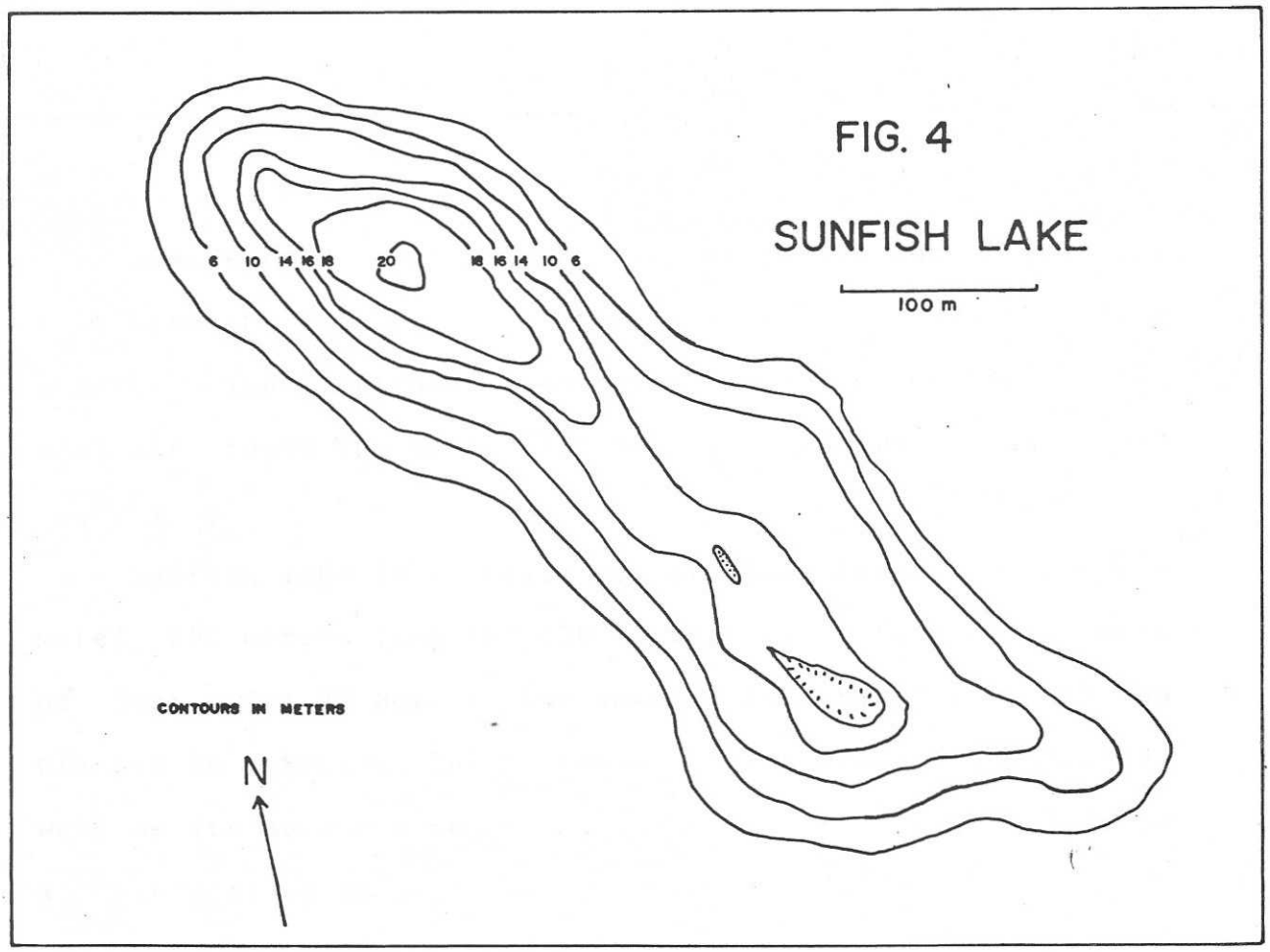
the weight of the ice and melt water from the ice washing away surrounding deposits. The large ice block causes basal melt from the pressure and the ground heat. The surface tension of the melt water causes coarser material to cling to the base of the ice while the finer materials get washed away. As the ice melts the coarse grains are deposited and what is left is a shallow depression centered with coarse material and finer materials around the periphery. ( )



the ice continued melting, growing smaller. The ice was eventually buried and when the ice melted completely the sediments collapsed. The largest holes were formed by fast moving water which deposited the least debris to fill the hole. Sunfish lake is deeper than the formation of a kettle by ice on the surface.



The third method of kettle formation is from ice completely buried in moraine materials. These depressions are distinctive pits accompanied by collapse structure. The depth and shape of the depressions correspond to the shape of the ice with the deeper pits coming from larger structures of ice. Once the ice had melted under the sediments, the sediments collapsed and where the ice was thickest the depression was deepest. The sides of the depression may have been verticle or overhanging, while the floor was concave upwards. The steep sides then collapsed which lessened the slope, and some filling of the bottom occurred. ( )



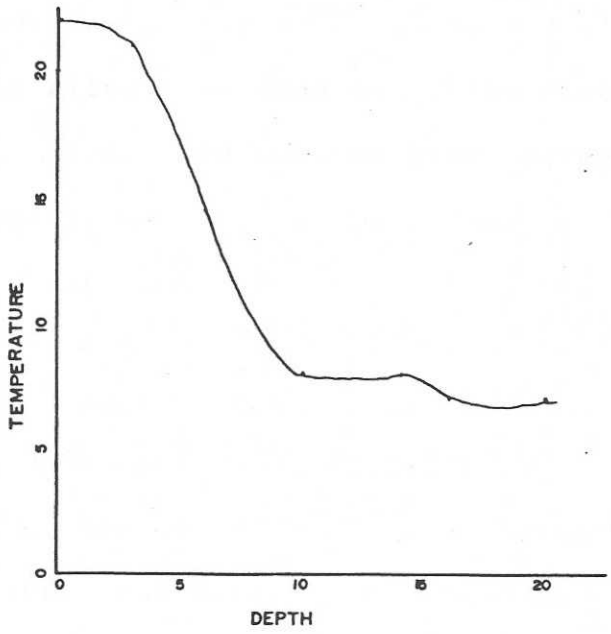
an "interlobate" moraine, meaning that the sands that make up the moraine were deposited between two ice lobes ( ).Deposits fell into the crack in the ice, which formed the kettle, and was buried among the fallen debris. The surrounding moraine is hummocky and consists of sandy hills with some silt and clay in the sand depressions.

Sunfish lake is a unique lake that exemplifies the characteristics of a kettle lake. The lake is a miromictic lake ( ), which means that the two layers, the eppilimnion (upper layer) and the hypolimnion (lower layer) are greatly different. The eppilimnion is about 3 meters deep and is well oxygenated and supports much lake life. The hypolimnion is poorly oxygenated and cold, and supports no life. The cause of this poor circulation is a factor of the lake's shape. The lake is small and deep and there is not enoough exposed surface to create total circulation. Only the top layer is circulated and only this layer has adequate oxygen and temperature levels to support growth (see table).

Major fish life includes large mouth bass, perch, suckers, and of course sunfish. The hypolimnion is stagnant. There is no life, no aquatic weeds and no animal life. the bottom is silty and a sample brought to the surface had the odour of hydrogen sulphide indicating the presence of anaerobic bacteria. the water is much cooler because of the lack of circulation. The thermocline is sharp and the transition between the two layers happens over a depth of only 1-2 metres.

TABLE. I

DEPTH (meters)	TEMPERATURE (°C)
20	7
16	7
14	8
10	8
6	14.5
3	21.0
0	22.0



Because the lake is miromectic, the local land owners take great care when using the lake as a recreational resource . The land owners have agreed to work together to preserve the lake and there is a list of ethics which the land owners are requested to follow when using the lake. These requests are all based on common sense, taking into consideration the fragile nature of the lake. These requests