

Factors influencing Great Lakes ice extent and thickness

Air temperatures: Ice forms and thickens when air temperatures drop below freezing and water temperatures cool. While winter air temperatures can fluctuate greatly due to winter storms, the northern lakes are more likely to experience consistently cold temperatures through the winter months. For this reason, northern areas are more likely to see thicker ice at the end of the season, and the last ice to melt is typically found in the northern bays of Lake Superior and in the North Channel of Lake Huron.

Water depth: Because shallow waters cool more quickly than deeper waters, ice forms first in coastal areas and this is usually where the thickest ice will be found. Lake Erie, being very shallow, is often completely ice covered in mid-winter. Other lakes with deeper basins will often remain ice free in their central parts.

Winds and storms: Winds and transient winter storms modify the distribution and form of the ice. Warm air from the south can melt thinner areas of ice. Large waves can break up areas of ice into smaller floes. Where winds push the ice away from the shore, it will disperse and open water leads may form. Where winds push the ice against a shore, it will become compact and may pile up into ridges.



Lake Superior

Median ice season: late-November to mid-May
Latest ice presence: early-June
Max ice cover: mid-March (37%)
Variability in max cover : 10% - 98%
Ice thickness : 45-85 cm (along coast)
Max thickness : ~25 m (pressure ridges)
Special ice features : In Whitefish Bay, shallow water and funneling of winds from the northwest cause ridging and compressed lake ice during the winter. Ice tends to be thicker than the rest of the mobile ice in Lake Superior.

Lake Erie and Lake St. Clair

Median ice season: mid-December to mid-April
Latest ice presence: early-May
Max ice cover: mid-February (85%) [Lake St Clair 100%]
Variability in max cover : 8% - 100%
Ice thickness : 25-45 cm (in coastal bays)
Max thickness : up to 20 m (pressure ridges)
Special ice features : Because of its shallow profile the water temperature can change fairly rapidly. This causes lake ice to form and melt much more rapidly in this lake than the other Great Lakes. Atmospheric temperature changes between above and below freezing can cause large fluctuations in ice cover on the Lake.

Lake Michigan and Green Bay

Median ice season: early-December to mid-April
Latest ice presence: early-May
Max ice cover: mid-February (20%) [Green Bay 100%]
Variability in max cover : 12% - 88%
Ice thickness : 45-75 cm (coastal harbours and bays)
Max thickness : 25-35 m (ridges in Straits of Mackinac)
Special ice features : Due to prevailing westerly winds, the Straits of Mackinac often becomes a congestion point for lake ice, with ice often converging and ridging, leading to some of the thickest ice on the Great Lakes.

Lake Ontario

Median ice season: end-December to early-April
Latest ice presence: late-April
Max ice cover: mid-February (14%)
Variability in max cover : ≤10% - 65%
Ice thickness : 20-60 cm (in bays)
Max thickness : significantly >60 cm (pressure ridges)
Special ice features : Lake Ontario has the lowest maximum ice coverage of all of the Great Lakes owing to its depth and its relatively warmer winters compared to the other lakes.

Lake Huron and Georgian Bay

Median ice season: early-December to late-April
Latest ice presence: mid-May
Max ice cover: mid-February (43%) [Georgian Bay late-February 85%]
Variability in max cover : 25% - 98%
Ice thickness : 45-75 cm (coastal harbours and bays)
Max thickness : up to 18 m (pressure ridges)
Special ice features : The lake ice in the St. Mary's river and North Channel becomes land fast during the winter. Breakup of the ice in these areas in the spring is influenced by icebreaking operations, speeding up the ice melt and breakup process.

*Median Ice Season is defined as the period during which median ice concentrations in the region are ≥1/10.