

Seasonal Summary

Great Lakes
Winter 2012-2013



By the North American Ice Service

Summary for the Great Lake

The 2012-2013 winter over the Great Lakes was divided into three main periods: in the first period, from November to mid-January, air temperatures averaged 1.5°C to 2.5°C above normal and ice formation on the Great Lakes was slow compared to normal (Figure 1). Air temperatures dipped in the second half of January and this heralded the start of the second period, in which air temperatures averaged normal from mid-January to mid-March (Figure 2). As a result ice grew more rapidly on the Great Lakes but ice coverage was still below normal. The third period, starting mid-March and ending from mid-April to sometime in May, depending on the area, was characterized by steadily cold weather. Mid-March to mid-April temperatures averaged 2.0°C to 4.5°C below normal over the Great Lakes (Figures 3 and 4). The average air temperature from mid-March to mid-April was one of the coldest of the last 40 years and resulted, especially in Green Bay and around Lake Superior, in delayed clearing of the ice. Overall, the total ice coverage on the Great Lakes for the 2012-2013 winter season was below normal.

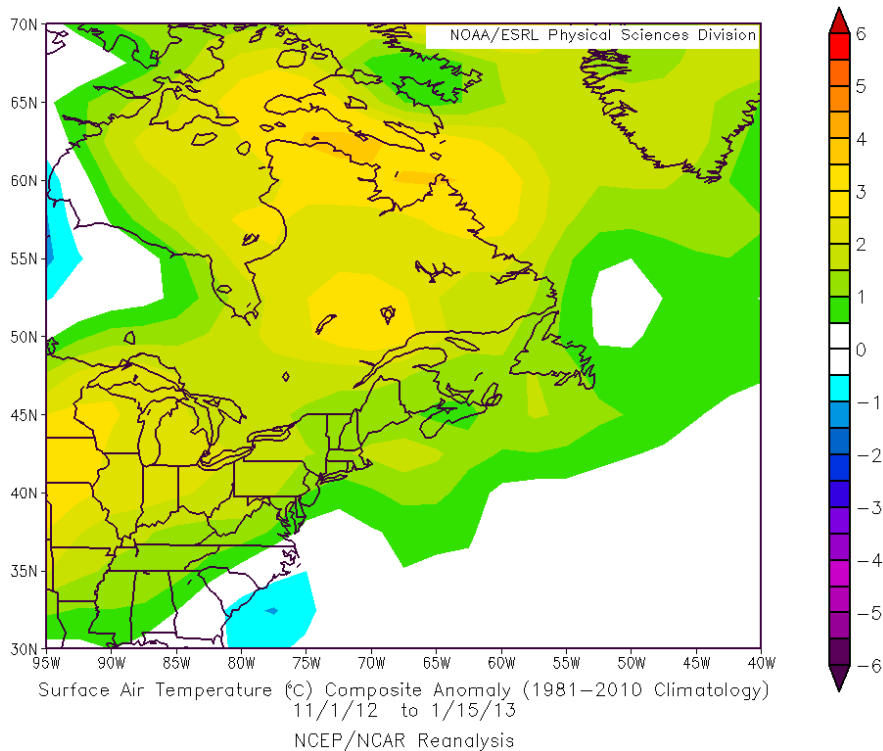


Figure 1: Surface Air Temperature Anomaly - November to Mid-January

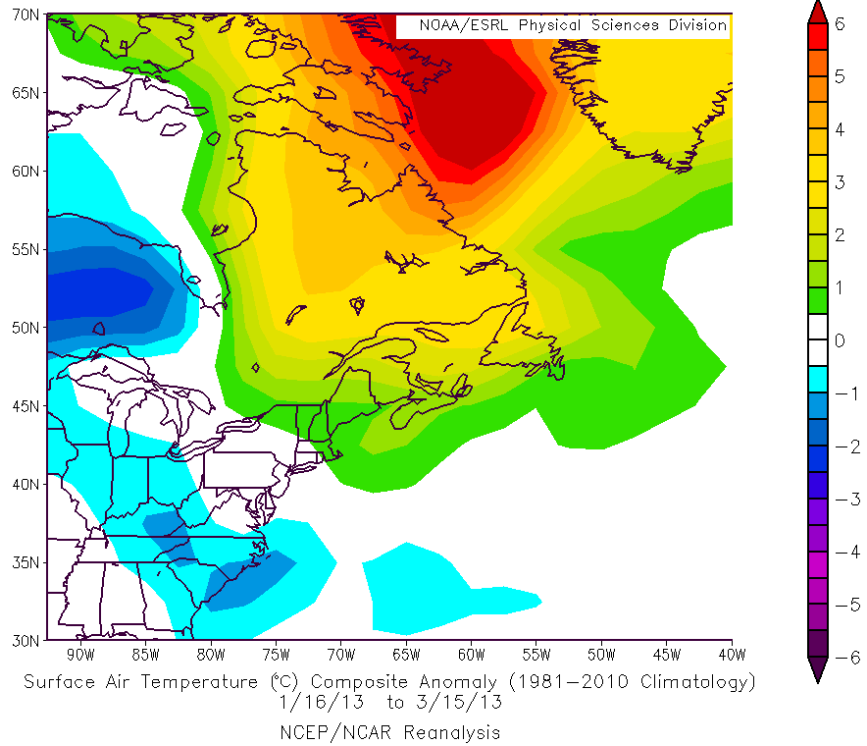


Figure 2: Surface Air Temperature Anomaly - Mid-January to Mid-March

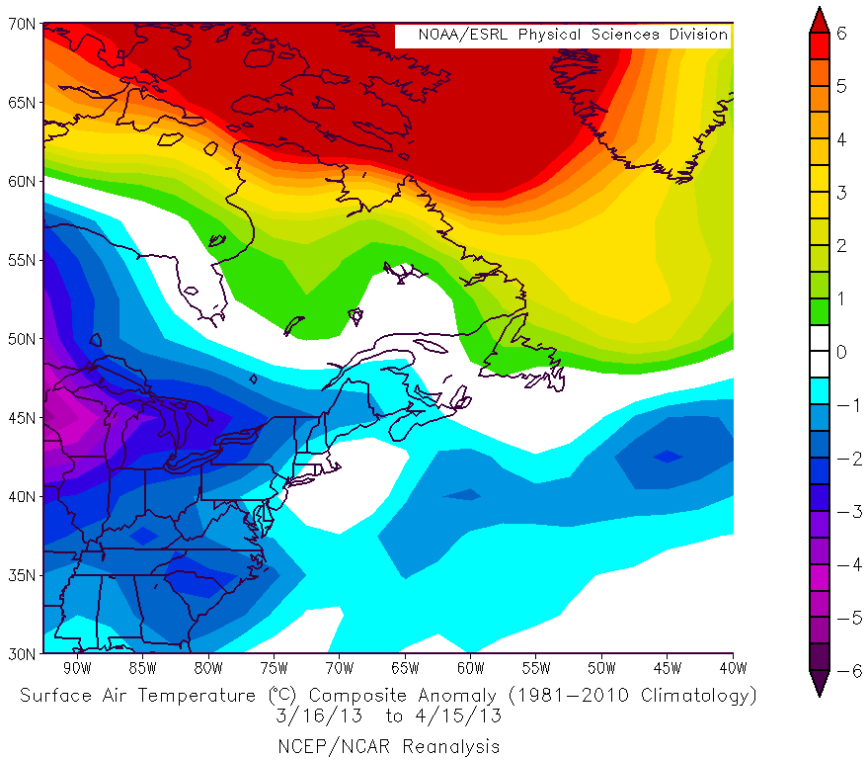


Figure 3: Surface Air Temperature Anomaly - Mid-March to Mid-April

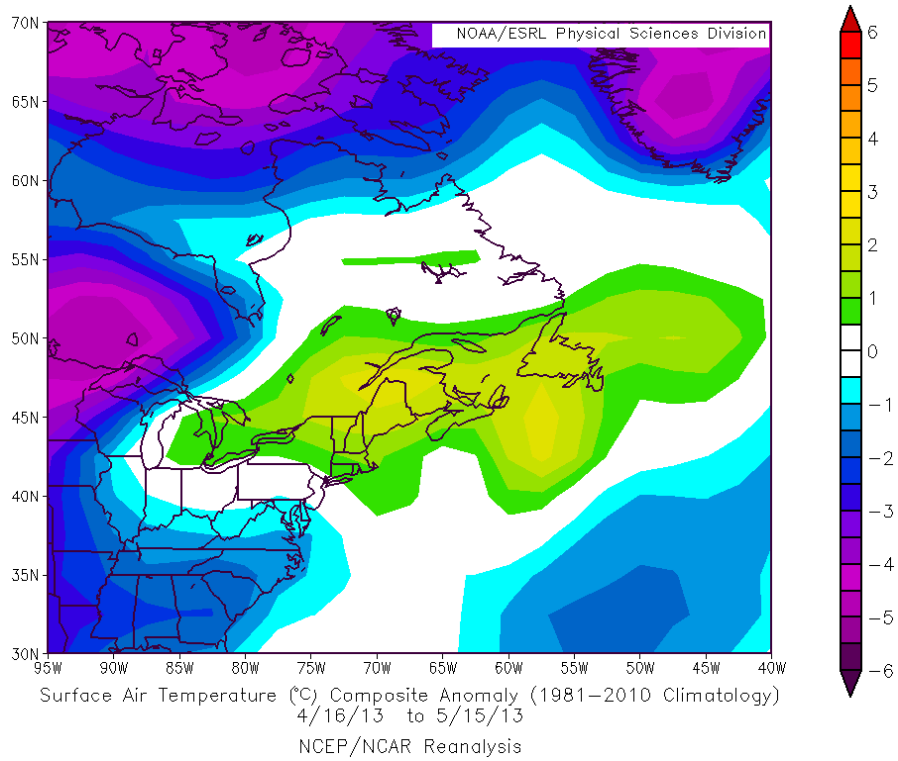


Figure 4: Surface Air Temperature Anomaly - Mid-April to Mid-May

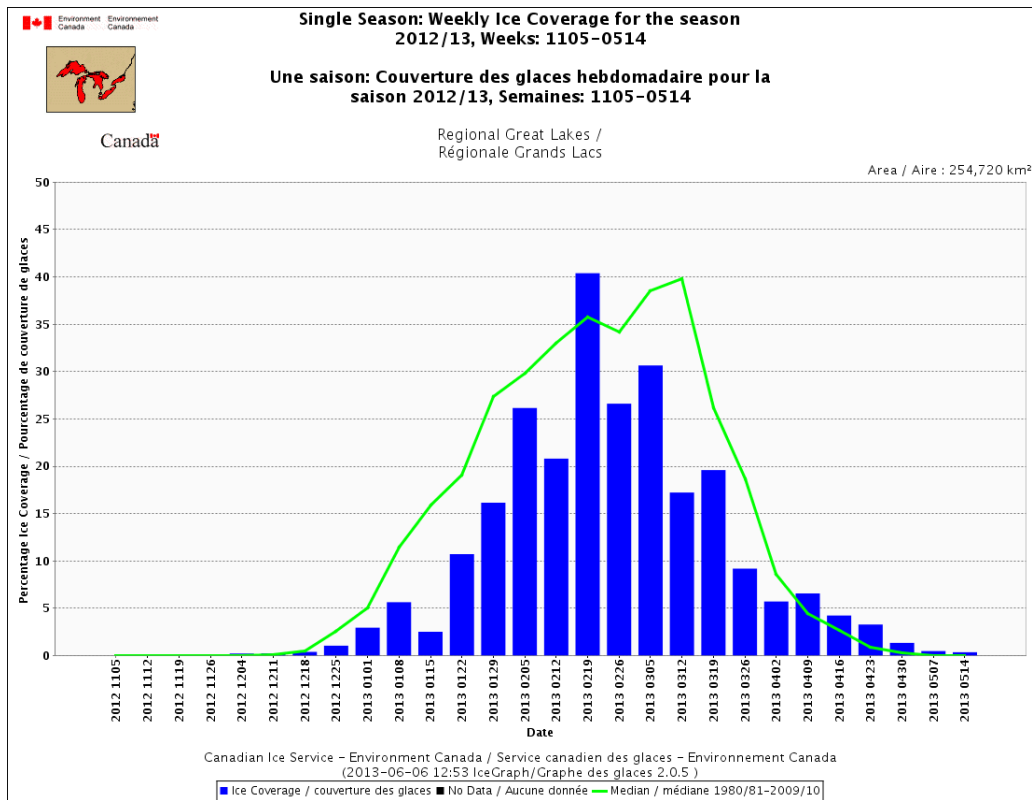


Figure 5: Great Lakes Weekly Ice Coverage - November 5 to May 14

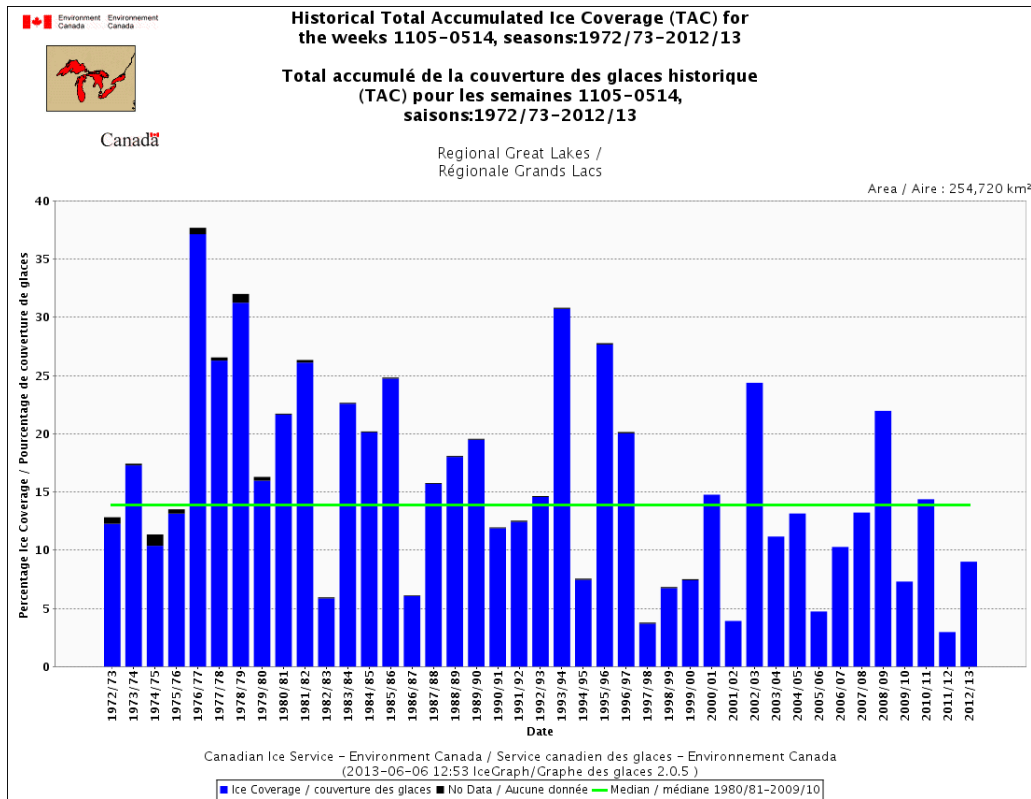


Figure 6: Great Lakes Total Accumulated Ice Coverage - November 5 to May 14

Lake Superior

2012-2013 Season temperatures: November to mid-May.

The season started with mild weather as air temperature averaged 1.5°C to 2.5°C above normal from November to mid-January. Then much colder than normal air temperatures occurred in the second half of January. That was followed by near-normal air temperatures from mid-January to mid-March. Finally, air temperatures turned colder than normal in the second half of March and were on average below normal until mid-May. During that last period, air temperatures averaged 3.0°C to 4.5°C below normal over the western half of Lake Superior and 1.5°C to 3.0°C below normal over the eastern half of the Lake Superior.

November - December ice conditions:

New lake ice started developing in Black and Nipigon Bays in the last week of November and into early December, which was normal. The ice cover on Black Bay on November 26th was lower than normal with only a few tenths of new lake ice instead of a normal 9 tenths ice coverage.

In the second week of December, a few tenths of new lake ice was present in Chequamegon Bay, less than the normal 4 to 9 tenths. Ice development in Black and Nipigon Bay was one to two weeks behind normal. Some new lake ice was present along the shores of Thunder Bay. This was the first permanent ice in Thunder Bay and was one week sooner than normal.

Black and Nipigon Bay became consolidated with medium lake ice by the last week of December, which was near normal for Nipigon Bay but one to two weeks later than normal for Black Bay. At that time, the first permanent ice developed in Whitefish Bay, as small areas of 8 tenths of new and thin lake ice were present along the eastern and southern shores. Also near the end of December, a narrow area of new lake ice developed along the shore west of the Apostle Islands towards Duluth.

January ice conditions:

In the first-week of January, very open drift new lake ice developed in the western portion of Thunder Bay and open drift new lake ice developed within 10 nautical miles of the shore from the Keweenaw Peninsula to Duluth. At that time, Chequamegon Bay consolidated with thin lake ice, one to two weeks later than normal. A few tenths of new lake ice developed in shallower coastal waters near Grand Island.

By mid-January, ice coverage was lower than normal on Lake Superior, with less ice than normal from the Keweenaw Peninsula to Duluth, in Thunder Bay and in Whitefish Bay.

In the third week of January, Thunder Bay became covered with new and thin lake ice and fast ice in Black and Nipigon Bays thickened to the thick lake ice stage. At the end of the month, Thunder Bay was covered with consolidated medium lake ice and fast medium lake ice was present around the Apostle Islands. At that time, the total ice coverage on Lake Superior was lower than normal, mostly because Whitefish Bay was still mostly open water with some new and thin lake ice, and some consolidated thin lake ice, present along the shores of the Bay. Whitefish Bay is typically covered with ice at the end of January. Ice coverage around the rest of the lake was near normal.

February ice conditions:

In the first week of February, 9 plus tenths of new and thin lake ice developed on Whitefish Bay, one to two weeks later than normal. There was more ice than normal around the Keweenaw Peninsula, with new and thin lake ice extending 20 to 30 nautical miles east of the peninsula and thin and medium lake ice within 20 nautical miles of the shore west of it, but there was generally less ice than normal elsewhere and it was generally closer than normal to the shore by about 10 nautical miles and in lower concentrations than normal. Ice coverage on Lake Superior reached its maximum extent for the season in the

third week of February with ice growing to normal coverage amounts. This was one month faster than normal. At that time, relatively thin ice extended up to 30 nautical miles off portions of the coast. In the last week of the month, consolidated thin lake ice developed northeast of Duluth and the fast ice expanded by a few nautical miles offshore in southern Whitefish Bay. Ice destruction occurred elsewhere and ice coverage was below normal at the end of the month.

March ice conditions:

In a normal ice year the peak ice coverage on Lake Superior is around mid-March and then the ice cover declines for the rest of the season. The season started with mild weather and in spite of often colder temperatures from mid-January onward, ice coverage generally remained below normal. However, ice grew to reach normal extent on March 18th, one of the few instances since the start of the season that a normal ice coverage had been reached. This was the peak ice coverage for March and was lower than the seasonal maximum reached in February. Of note during the month of March was the persistent fast ice northeast of Duluth and the larger than normal areas of fast ice in Chequamegon and Keweenaw Bays. Whitefish Bay never consolidated completely. In a normal year it becomes covered with consolidated ice in the third or fourth week of February.

Fast ice in Thunder Bay started breaking-up in the third week of March. In the last week of the month, significant ice destruction occurred and most of the ice left at the end of March was in the smaller bays around Lake Superior and around the Apostle Islands.

April - May ice conditions:

A cold spring meant that ice persisted longer in some areas.

Ice normally clears northeast of Duluth by the second week of April, but this year some ice persisted in that area throughout April and finally melted in the second week of May, three to four weeks later than normal.

Break-up of the ice around the Apostle Islands usually occurs in the first week of April and in the second week of April in Chequamegon Bay. Both areas are usually clear by mid-month. This year the ice around the Apostle Islands melted in the third week of April and break-up in Chequamegon Bay occurred in late April - early May. Ice in Chequamegon Bay melted in the second week of May, about three weeks later than normal.

Ice in Keweenaw Bay is usually gone by mid-April but there was still fast ice in Keweenaw Bay in late April. Break-up occurred there in late-April early May. Ice in Keweenaw Bay melted in the second week of May, about three weeks later than normal.

Whitefish Bay normally clears in the third week of April but this year cleared in early May.

Thunder Bay cleared in the third week of May instead of the second week of May.

Break-up in Black and Nipigon Bays occurred after mid-May instead of late April. The bays cleared in the last week of May whereas they normally are mostly clear of ice by mid-May.

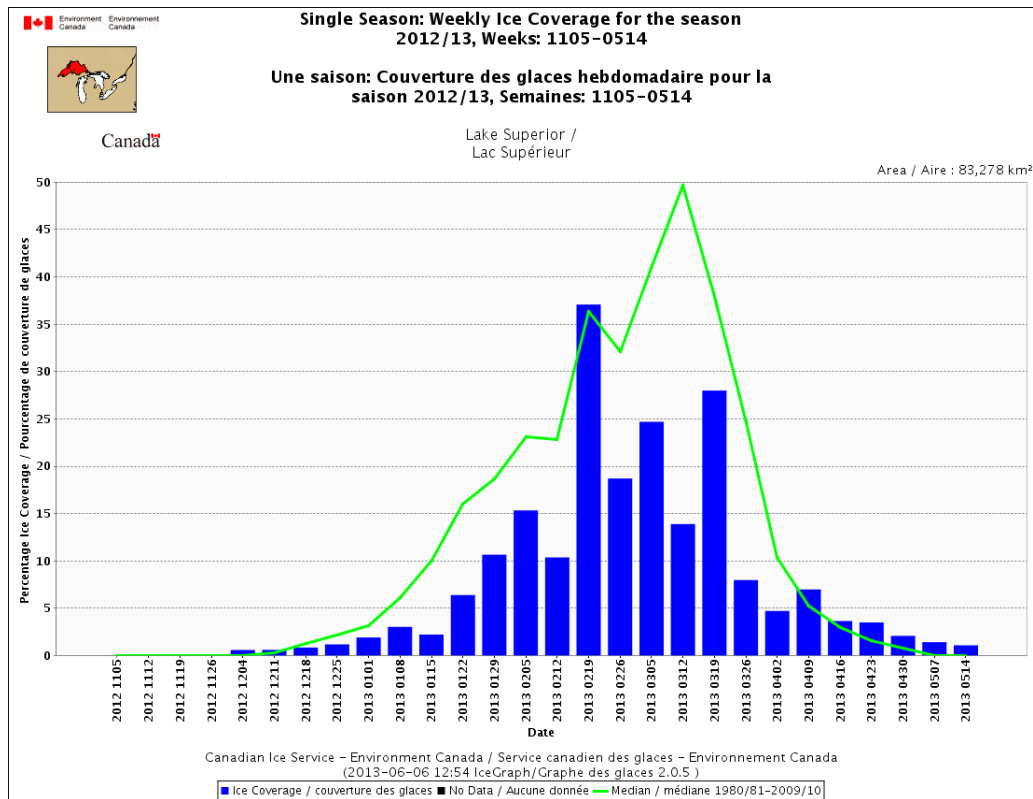


Figure 7: Lake Superior Weekly Ice Coverage - November 5 to May 14

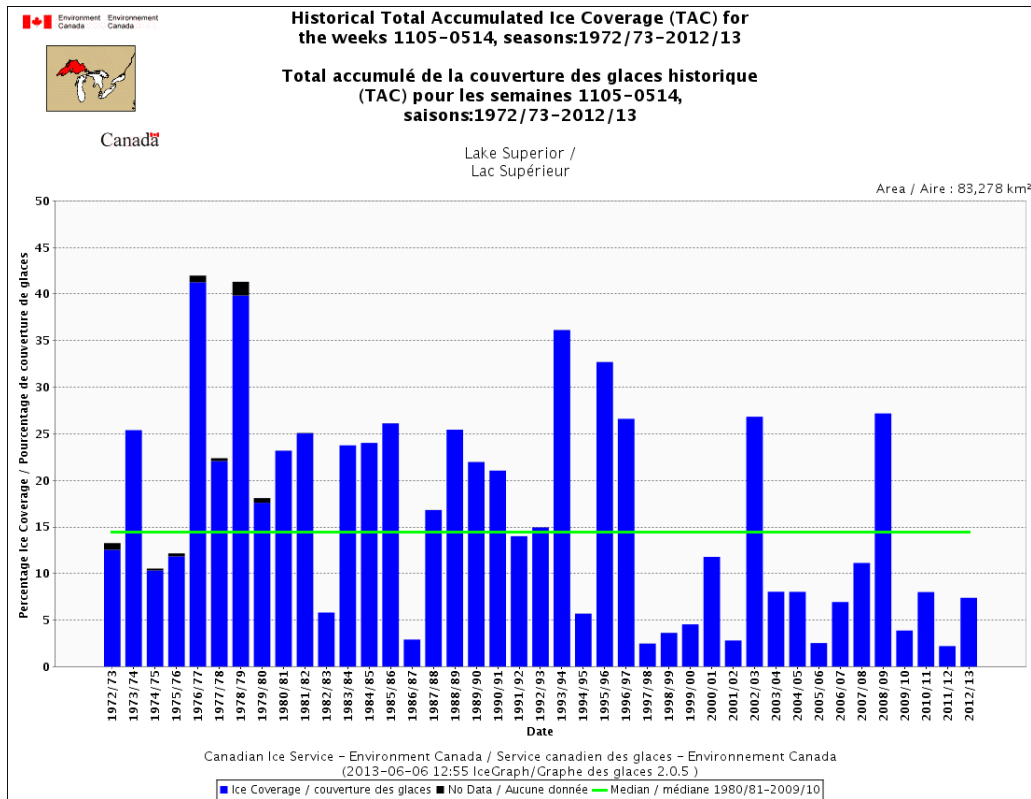


Figure 8: Lake Superior Total Accumulated Ice Coverage - November 5 to May 14

Lake Michigan

2012-2013 Season temperatures: November to mid-May.

The season started with mild weather as air temperature averaged 2.0°C to 2.5°C above normal from November to mid-January. Air temperatures turned colder after mid-January and average air temperatures were near normal from mid-January to mid-March. Cold weather prevailed from mid-March to the end of April and temperatures were 2.0°C to 3.5°C colder than normal on average. Air temperatures were near to above normal in the first half of May.

December ice conditions:

A few tenths of new lake ice developed in the Bays de Noc near mid-December, about a week later than normal. 8 tenths of new and thin lake ice was present in the southern end of Green Bay by the last week of December,

which was about two weeks later than normal for the first ice in southern Green Bay. At the end of December, there was up to 9 plus tenths of new and thin lake ice in the southern end of Green Bay and 9 plus tenths of new and thin lake ice in the Bays de Noc. A narrow band of new lake ice was present along the western shore of Green Bay and along the shore in north-eastern Lake Michigan. The ice extent in Lake Michigan was less than normal for the end of December.

January ice conditions:

The Bays de Noc consolidated with thin lake ice in the first week of January, about a week later than normal. At that time, 9 plus tenths of new and thin lake ice was present in the southern third of Green Bay and 2 to 4 tenths of new and thin lake ice developed in the Straits of Mackinac and along a portion of the northeast shore of Lake Michigan. Ice destruction occurred subsequently and by mid-month the ice in northeast Lake Michigan was gone. Ice re-formed and at the end of the third week of January, Green Bay was covered with new, thin and some medium lake ice and the Bays de Noc were consolidated with medium lake ice. 9 plus tenths of thin and new lake ice was present in the Straits of Mackinac and along the northeast shore of Lake Michigan, including Little Traverse Bay. Bands of new lake ice had developed along the western shore of the lake. At the end of the month, all of Green Bay was consolidated with thin and medium lake ice. Consolidated thin lake ice was present along the shores in the Straits of Mackinac. Bands of new lake ice formed along the south-eastern shore of the lake.

February ice conditions:

The northern third of Green Bay became mobile again in the first week of February, which was a more normal ice condition. Little Traverse Bay became consolidated with thin lake ice. Ice grew to a normal extent in the third week of the month, as a somewhat greater ice extent and greater concentrations developed in the northeast part of the lake, and bands of new and thin lake ice developed along most of the rest of the shores. This was the peak ice coverage of the season, and the third week of February is when peak ice coverage is normally reached on Lake Michigan. From this point to the end of the season, ice coverage on Lake Michigan was mostly near normal.

March ice conditions:

Consolidated ice in Green Bay reached the thick lake ice stage in the first week of March. The Straits of Mackinac consolidated with medium and thick lake ice in the second week of the month, but some of the ice was mobile again just one week later. The southern portion of Lake Michigan was clear of ice after mid-March.

April ice conditions:

Break-up in Green Bay started around mid-April, about two weeks later than normal. Break-up in the Bays de Noc occurred in the last week of April, about two weeks later than normal. The Straits of Mackinac became mostly clear of ice in the last week of April, about two weeks later than normal. Green Bay and the Bays de Noc cleared in late April - early May, two to three weeks later than normal.

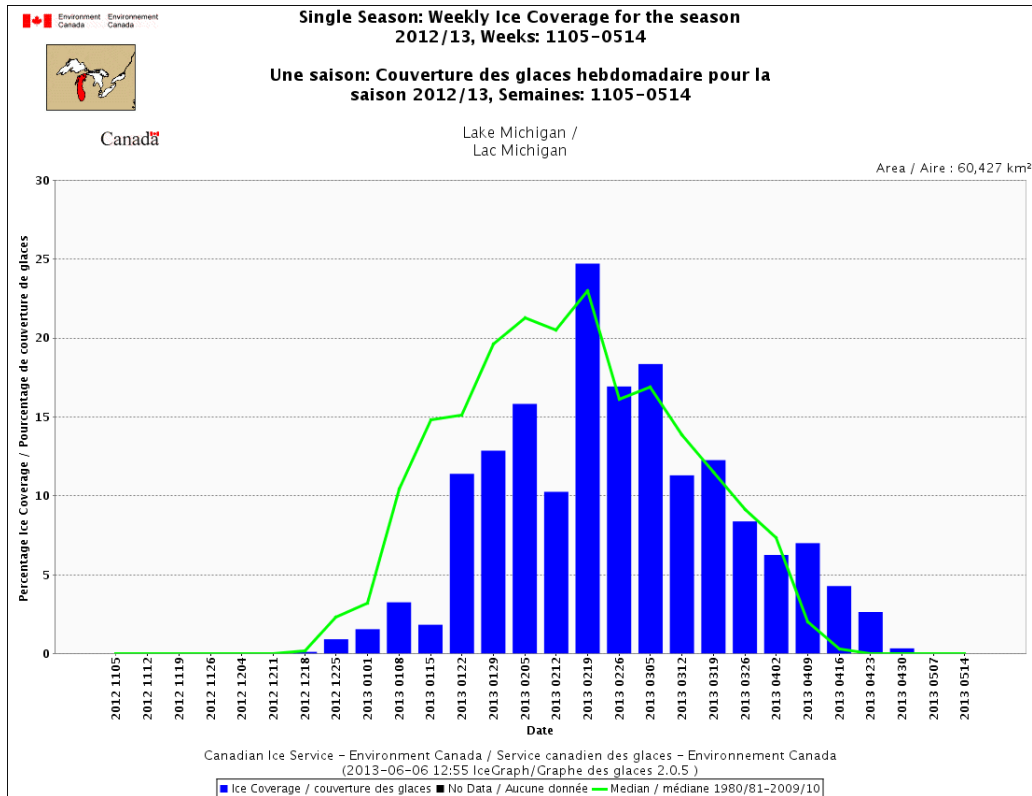


Figure 9: Lake Michigan Weekly Ice Coverage - November 5 to May 14

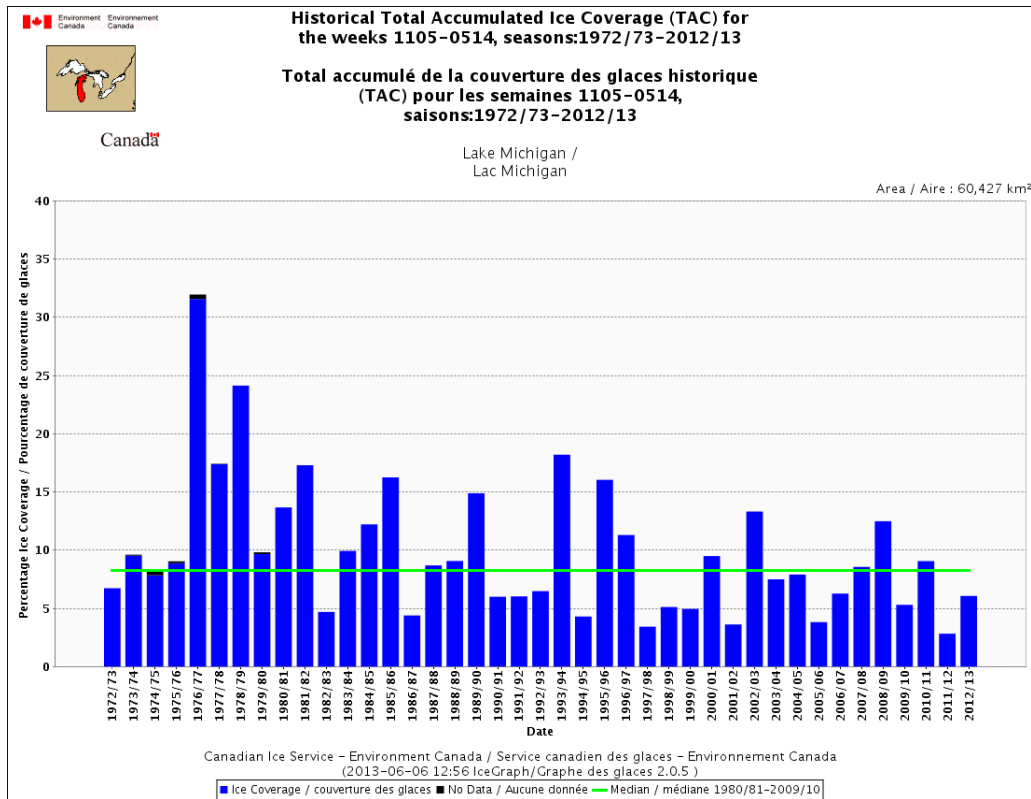


Figure 10: Lake Michigan Total Accumulated Ice Coverage - November 5 to May 14

Lake Huron

2012-2013 Season temperatures: November to mid-May.

The season started with mild weather as air temperature averaged 1.5°C to 2.5°C above normal from November to mid-January. Air temperatures turned colder after mid-January and average air temperatures were near normal from mid-January to mid-March. Cold weather prevailed from mid-March to the end of April and temperatures were 1.5°C to 2.5°C colder than normal on average. Air temperatures were above normal in the first half of May.

November - December ice conditions:

New lake ice started developing in the North Channel and St. Mary's River in late November to early December. Some new lake ice developed along the eastern shore of Saginaw Bay in the second week of December. By mid-month, new lake ice had developed along the northern shore of Georgian Bay. In the last week of the month Saginaw Bay became mostly covered with new and thin lake ice. 5 to 9 plus tenths of new and thin lake ice was present in St. Mary's River and along the shores of the North Channel and along the northern and eastern shores of Georgian Bay.

January ice conditions:

In the first week of January, consolidated thin lake ice developed in the shallower waters of St. Mary's River, along portions of the shore in the North Channel, in the shallower coastal waters of eastern and northern Georgian Bay and along the southeast shore of Saginaw Bay. Narrow Bands of new lake ice developed along portions of the shore elsewhere on Lake Huron. Ice destruction occurred subsequently and by mid-month the new lake ice along the shore of Lake Huron and a part of the ice in Saginaw Bay was gone. In the third week of January, St. Mary's River, the North Channel and Saginaw Bay became covered with new and thin lake ice. New and thin lake ice was present within about 10 nautical miles of the northern and eastern shores of Georgian Bay. In the last week of the month, St. Mary's River, the North Channel and Saginaw Bay consolidated with thin and medium lake ice. Consolidated thin lake ice formed along the shores near Bois Blanc Island. Consolidated medium lake ice was found within 5 to 10 nautical miles of the northern and eastern shores of Georgian Bay. 5 to 10 nautical miles wide band of new and thin lake ice were present elsewhere along the shore of Lake Huron.

February ice conditions:

In the first week of February, new, thin and medium lake ice covered most of north-eastern Georgian Bay. 10 to 20 miles wide bands of new and thin lake ice were present elsewhere along the shore of Lake Huron. Ice coverage on Lake Huron reached its seasonal peak around February 18, which was near normal. At that time, new, thin and medium lake ice was present within about 20 nautical miles of the shores of Lake Huron and Georgian Bay, except for the south-western shore of Georgian Bay, which remained open water. Fast ice in the middle portion of Saginaw Bay had fractured, about 3 weeks earlier than normal. The ice coverage decreased a little by the end of February, in line with the normal trend.

March ice conditions:

Ice coverage around the shores of Lake Huron and in Georgian Bay decreased significantly in the second week of March. Areas of 9 plus thin and medium lake ice remained in the southern and northwestern ends of the lake, in Saginaw Bay and in western Georgian Bay. The ice west of Bois Blanc Island consolidated with thick and medium lake ice. Open water prevailed on the rest of the lake. In the third week of March, the ice in the southern end of Lake Huron was reduced to a very narrow band of medium lake ice along the south shore. A portion of the ice west of Bois Blanc Island, in the Straits of Mackinac, became mobile again. Some ice growth occurred in Georgian Bay and up to one tenth of thick lake ice was present in the north-eastern portion of the bay. In the last week of the month, Saginaw Bay became open water. Mostly rotting fast ice was left elsewhere at month's end.

April - May ice conditions:

Break-up in St. Mary's River, the North Channel and in northern and eastern Georgian Bay started in the first week of April, near normal for St. Mary's River and Georgian Bay and about a week faster than normal for the North Channel. Most of the ice in the north-western portion of the lake, near the Straits of Mackinac, and at the

southern end of the lake, cleared by mid-April. This clearing was near normal for northwest Lake Huron, but about two weeks later than normal for southern Lake Huron. Georgian Bay cleared around the end of April, about one week later than normal. The North Channel and St. Mary's River cleared around the end of the first week of May, also about one week later than normal.

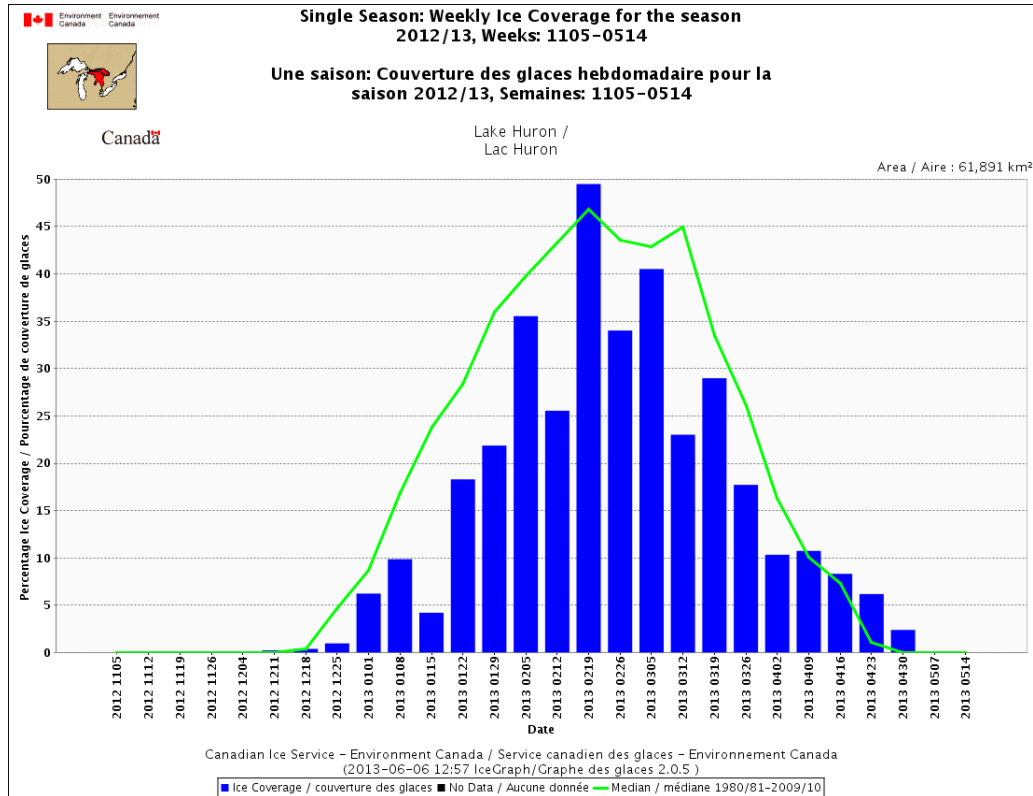


Figure 11: Lake Huron Weekly Ice Coverage - November 5 to May 14

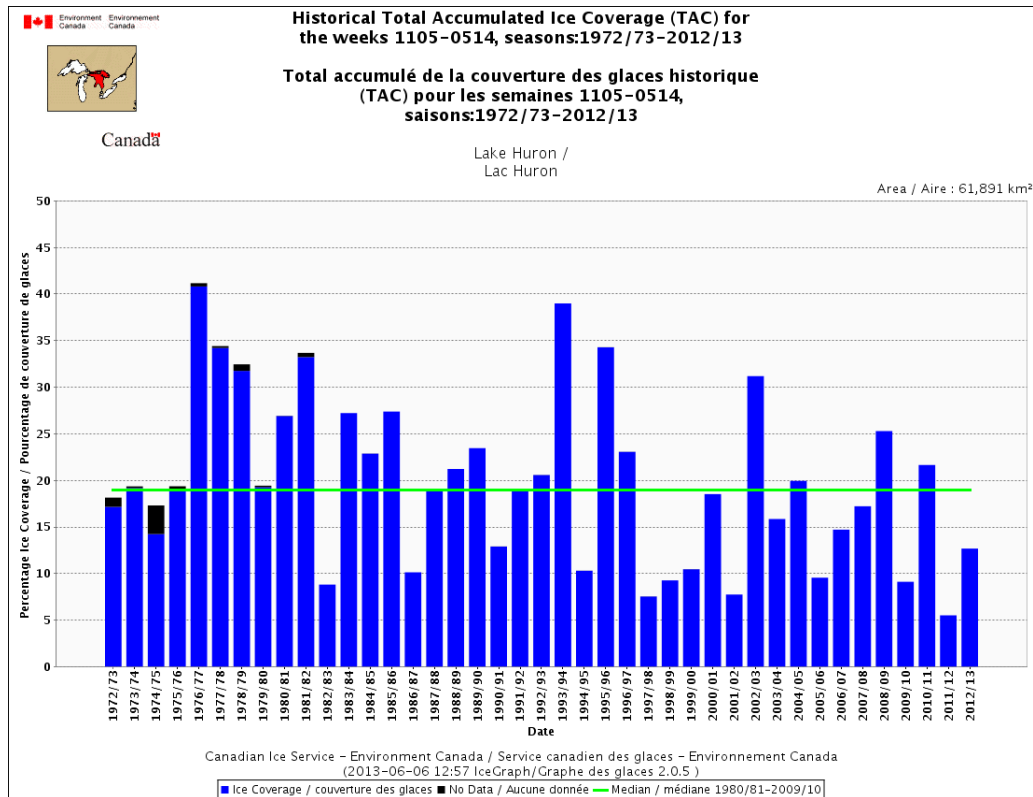


Figure 12: Lake Huron Total Accumulated Ice Coverage - November 5 to May 14

Lake Erie

2012-2013 Season temperatures: November to mid-May.

The season started with mild weather as air temperature averaged 1.5°C to 2.5°C above normal from November to mid-January. Air temperatures turned colder after mid-January and average air temperatures were near normal from mid-January to mid-March. Cold weather prevailed from mid-March to mid-April and temperatures were 2.0°C to 2.5°C colder than normal on average. Air temperatures averaged near normal from mid-April to mid-May.

December - January ice conditions:

New lake ice started developing along the eastern shore of Lake St. Clair and in Long Point Bay by the last week of December. At the end of the month, more new lake ice had developed along the shores of Lake St. Clair and 5 tenths of new lake ice was present in Sandusky Bay. Some new lake ice had also developed along portions of the south-western shore of the Western Basin. In the first week of January, the greater part of Lake St. Clair and of the Western Basin became covered with 8 or 9 tenths of new and thin lake ice. Ice destruction occurred in the second week of January but some ice was still present in Lake St. Clair, in the Western Basin, in Sandusky Bay and in Long Point Bay at mid-month. At the end of January, most of Lake St. Clair became consolidated with thin lake ice. Consolidated thin lake ice could be found from Pelee

Island to the south shore of the Western Basin. Sandusky Bay and Long Point Bay had also consolidated with thin lake ice. Areas of new and thin lake ice were present along the shore elsewhere around the lake. The areas of consolidated ice on Lake St. Clair and in the Western Basin would decrease the following week and remain smaller during the rest of the season.

February – March ice conditions:

Rapid ice growth occurred in early February and ice coverage increased to near normal. However fast ice had decreased to cover only the eastern and northern portions of Lake St. Clair and had decreased to a narrow band along the shore of the Western Basin. Long Point Bay and Sandusky Bay remained consolidated. During the first week of February, most of the lake became covered with new, thin and some medium lake ice. An open water areas persisted in the eastern portion of Lake Erie. In the second week of the month, a narrow area of consolidated medium and thin lake ice formed near Buffalo. Maximum ice coverage occurred around February 18th, around the date the normal seasonal peak ice coverage occurs. At that time, an area of open water was still present in the eastern end of Lake Erie. Break-up started in the last week of the month, which is normal. In the last week of February and in the first week of March, open water areas developed or widened in Lake St. Clair and in Lake Erie. Break-up in Sandusky Bay occurred in the first week of March. More ice destruction occurred in the second week of March and around mid-month Lake St. Clair was clear of ice and the only ice left in Lake Erie was consolidated medium lake ice near Buffalo with a few tenths of medium lake ice within a few nautical miles west of the fast ice. Ice coverage on Lake Erie had been near normal from the first week of February to the second week of March, and below normal the rest of the season. Ice thickness always remained below normal as little if any thick lake ice developed on the lake and there was less medium lake ice than usual at the peak of the season. Ice near Buffalo cleared in the second week of April which is normal, but the ice remained fast two to three weeks later than normal.

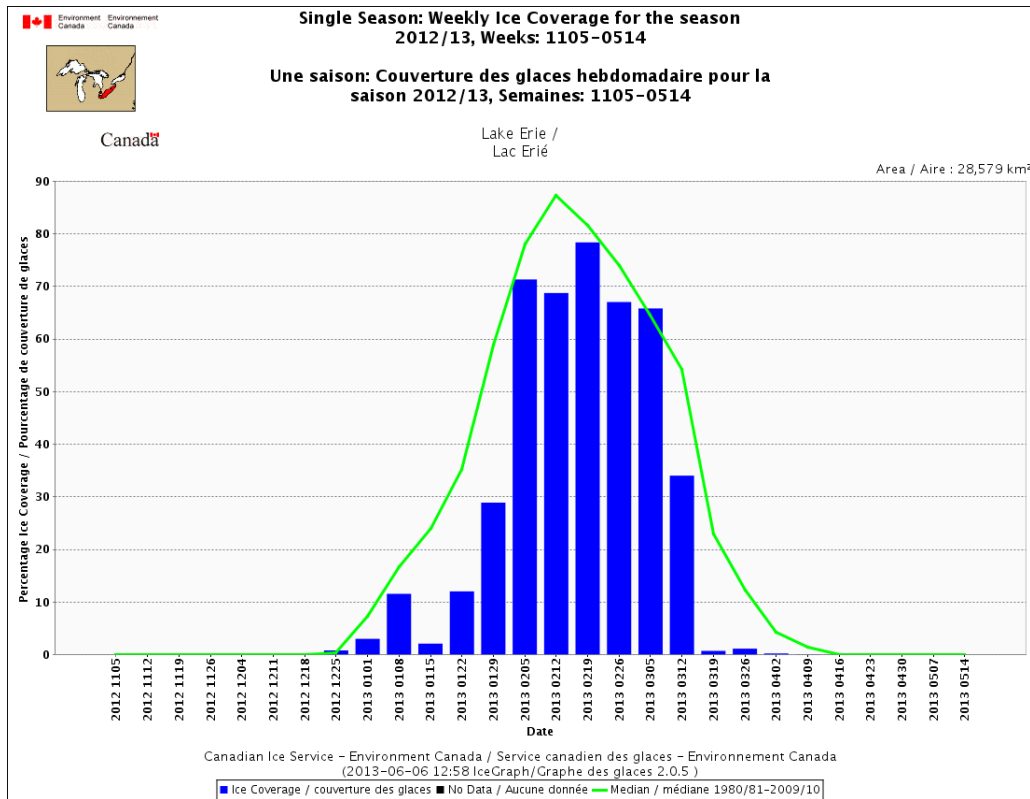


Figure 13: Lake Erie Weekly Ice Coverage - November 5 to May 14

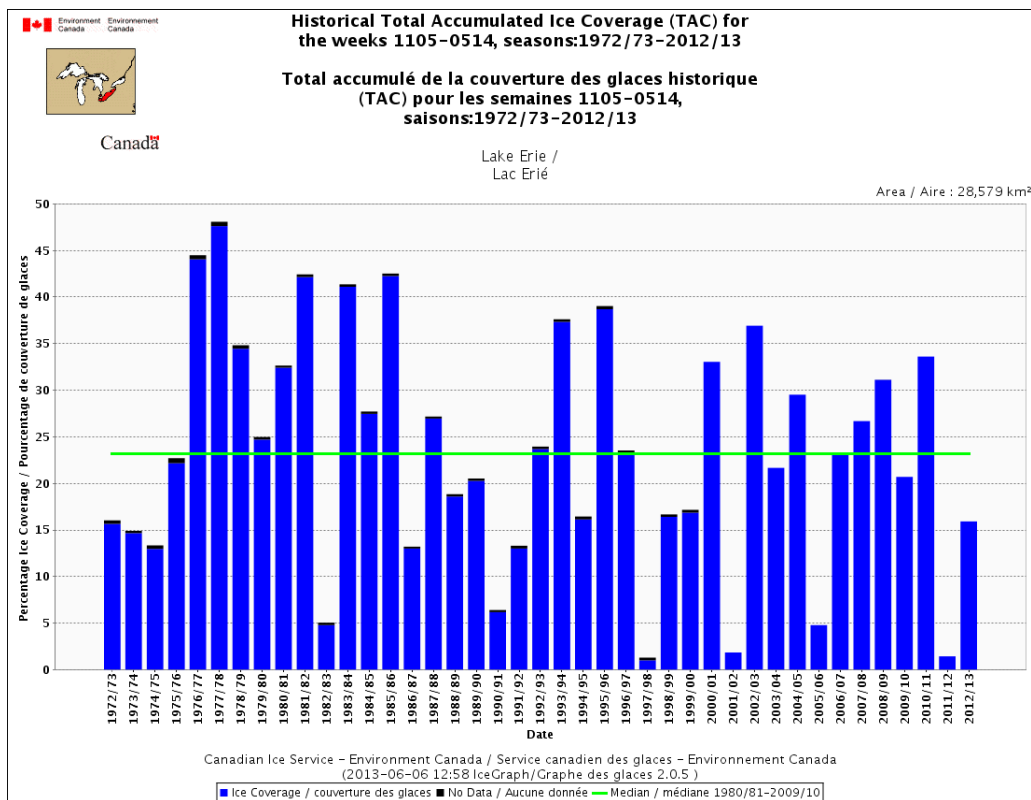


Figure 14: Lake Erie Total Accumulated Ice Coverage - November 5 to May 14

Lake Ontario

2012-2013 Season temperatures: November to mid-May.

The season started with mild weather as air temperature averaged 1.5°C to 2.0°C above normal from November to mid-January. Air temperatures turned colder after mid-January and average air temperatures were near normal from mid-January to mid-March. Cold weather prevailed from mid-March to mid-April and temperatures were 2.0°C to 2.5°C colder than normal on average. Air temperatures were slightly above normal from mid-April to mid-May.

December - January ice conditions:

New lake ice started developing in the Bay of Quinte and on the Seaway near Kingston by the last week of December. Bay of Quinte consolidated with thin lake ice in the first week of January, near normal, but the ice became mobile again by mid-January, before re-consolidating in the third week of the month. At the end of January, the Bay of Quinte was consolidated with medium lake ice, and the Seaway near Kingston was consolidated with thin lake ice. 9 plus tenths thin and medium lake ice was present between Prince Edward Point and Stoney Point, and there was an area of 9 plus new and thin lake ice along the shore between Oswego and Stoney Point.

February – March ice conditions:

More narrow bands of new lake ice developed along the north-eastern and south-western shores of the lake in the first and second week of February, but the ice around Kingston became mobile again. The maximum ice coverage of the season was reached around February 18th, which is when the peak ice coverage is usually reached on Lake Ontario. At that time, the Bay of Quinte and the ice on the Seaway near Kingston were consolidated with medium lake ice and 7 to 9 tenths new, thin and medium lake ice was present along the eastern shore of the lake. Narrow bands of thin and new lake ice had developed along the shore elsewhere around the lake, except the western shore which remained open water. Ice destruction occurred in the last week of February and the only ice left was 7 to 9 plus tenths thin lake ice between Prince Edward Point and Stoney Point, and the fast ice in the Bay of Quinte and across the river near Kingston. A large area of 4 tenths new and thin lake ice re-developed in the north-eastern portion of the lake in the first week of March and some new and thin lake ice persisted in that area until the third week of the month. Fast ice on the Seaway near Kingston and in the Bay of Quinte started breaking-up by around mid-March.

April ice conditions:

Most of the ice in north-eastern Lake Ontario and on the Seaway near Kingston cleared in the first week of April, except for the Bay of Quinte which cleared in the second week of the month. Clearing was near normal.

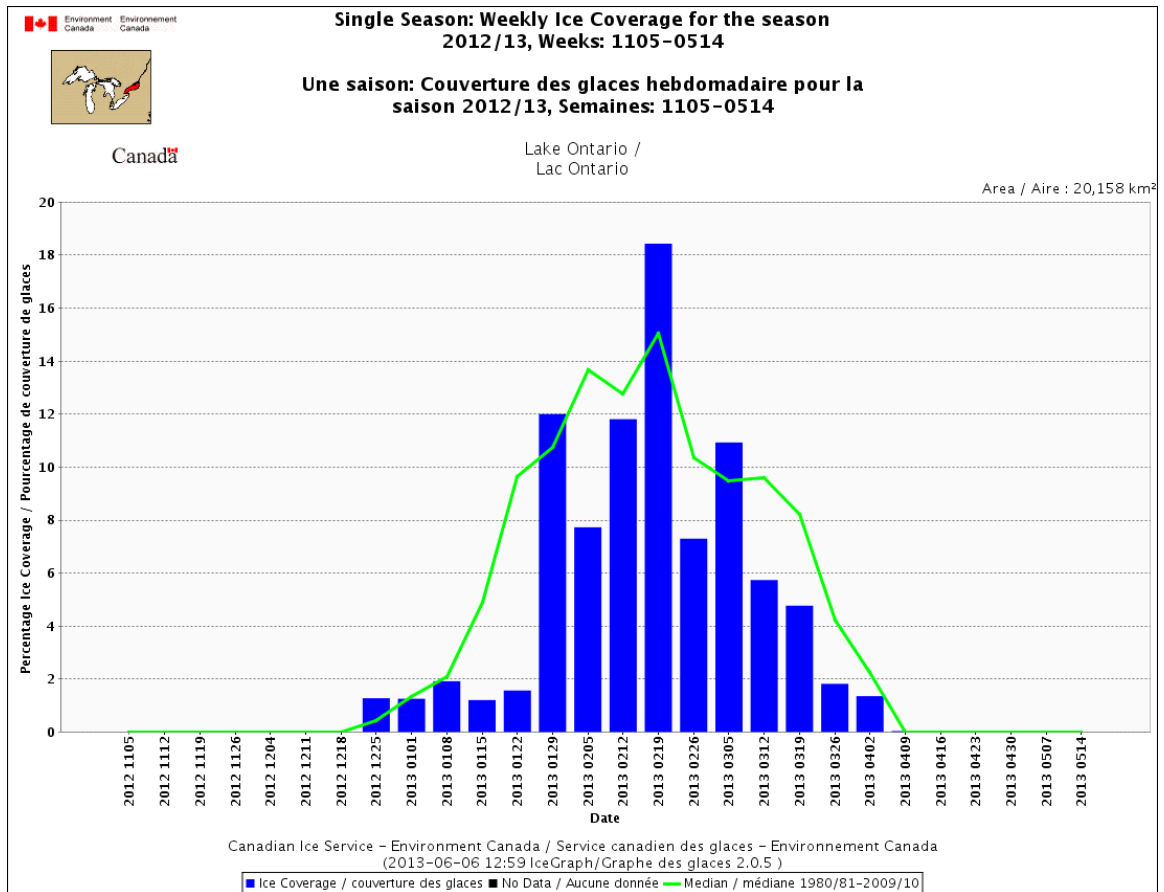


Figure 15: Lake Ontario Weekly Ice Coverage - November 5 to May 14

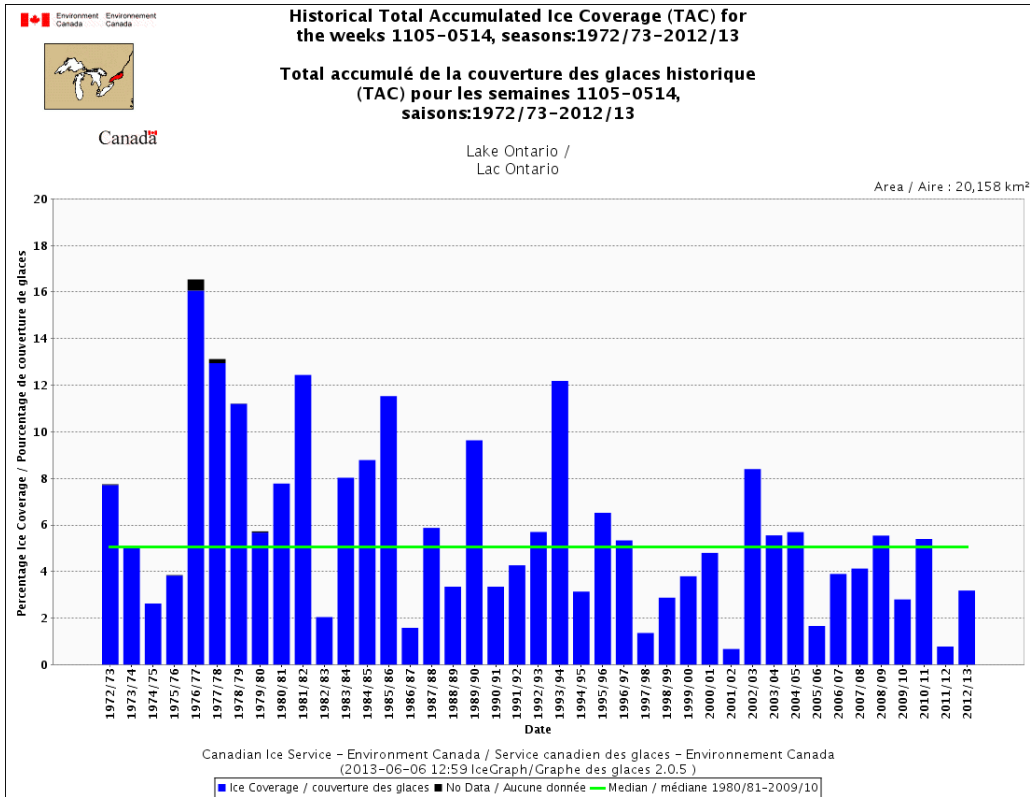


Figure 16: Lake Ontario Total Accumulated Ice Coverage - November 5 to May 14

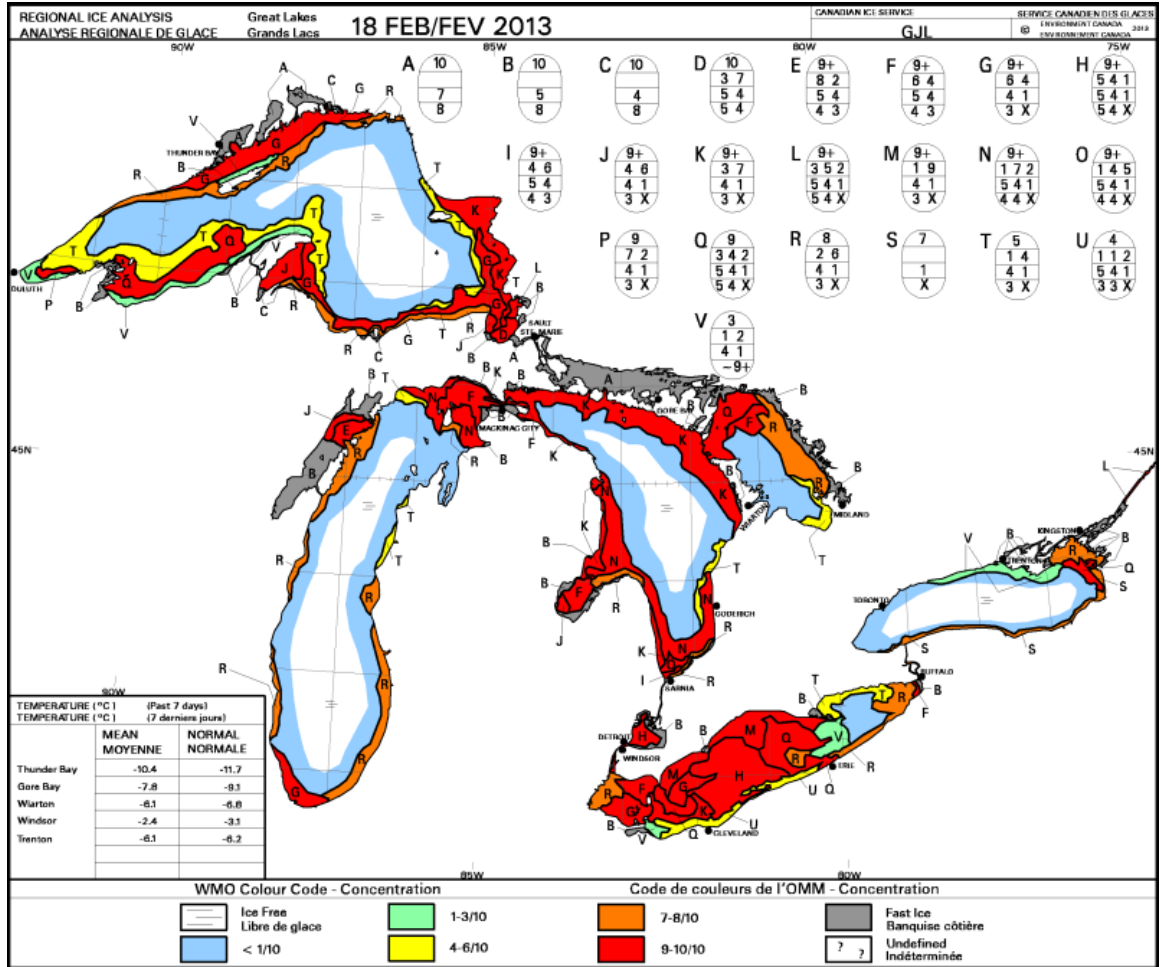


Figure 17: Maximum Ice Coverage on the Great Lakes, Winter 2012-2013