

Seasonal Summary

Great Lakes
Winter 2014-2015



By the North American Ice Service

Summary for the Great Lakes

The 2014-2015 winter in the Great Lakes region was a season that was punctuated by three distinct phases. A below seasonal, cold outbreak beginning in November 2014 led to an earlier than normal start to ice formation in the northern Great Lakes by mid-November. Air temperatures averaged 1.0°C to 4.0°C below the 1981-2010 climatological normal, with the largest anomalies focused over the western Great Lakes. This period of colder than normal temperatures promoted extensive ice growth through parts of Lake Superior, Lake Huron and Lake Michigan, and continued until mid-December 2014.

Following this period, the Great Lakes then experienced warmer than normal temperatures from mid-December to early January. Average air temperature anomalies ranged from 0.5°C to 2.5°C above the climatological normal for these dates. Unsurprisingly, the ice development slowed substantially during this phase, with ice coverage dropping below the historical median values for this period. After this brief drop in ice coverage, the Great Lakes entered the third identified stage of seasonal progression.

Starting in mid-January, seasonally below normal temperatures plagued the region until the end of the winter 2014-2015 ice season. February 2015 in particular was cold with many observing stations across the Great Lakes region registering the coldest February in recorded history, with temperature anomalies peaking at over 7°C below the climatological normal in many areas. This extreme cold pushed ice coverage and thickness values to high levels once again, well above climatological normals. The maximum ice coverage on the Great Lakes of 86.2% was reached in the fourth week of February, which represents the fifth highest value in recorded history. The historical total accumulated ice coverage (calculated by adding the weekly ice coverage and dividing the seasonal total by the number of weeks in the season) for the season was the fifth highest since recording keeping began in 1972/73 for the Great Lakes as well, at 31.25%.

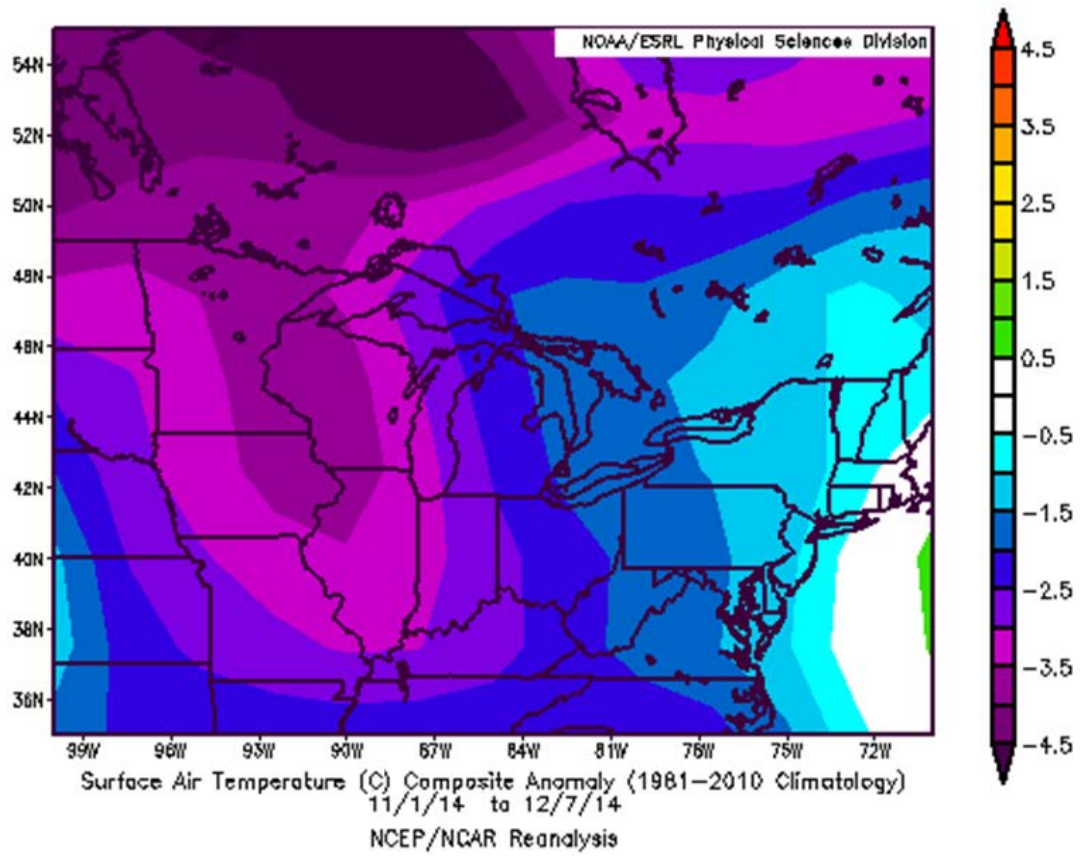


Figure 1: Surface Air Temperature Anomaly for the Great Lakes from November 1, 2014 to December 7, 2014.

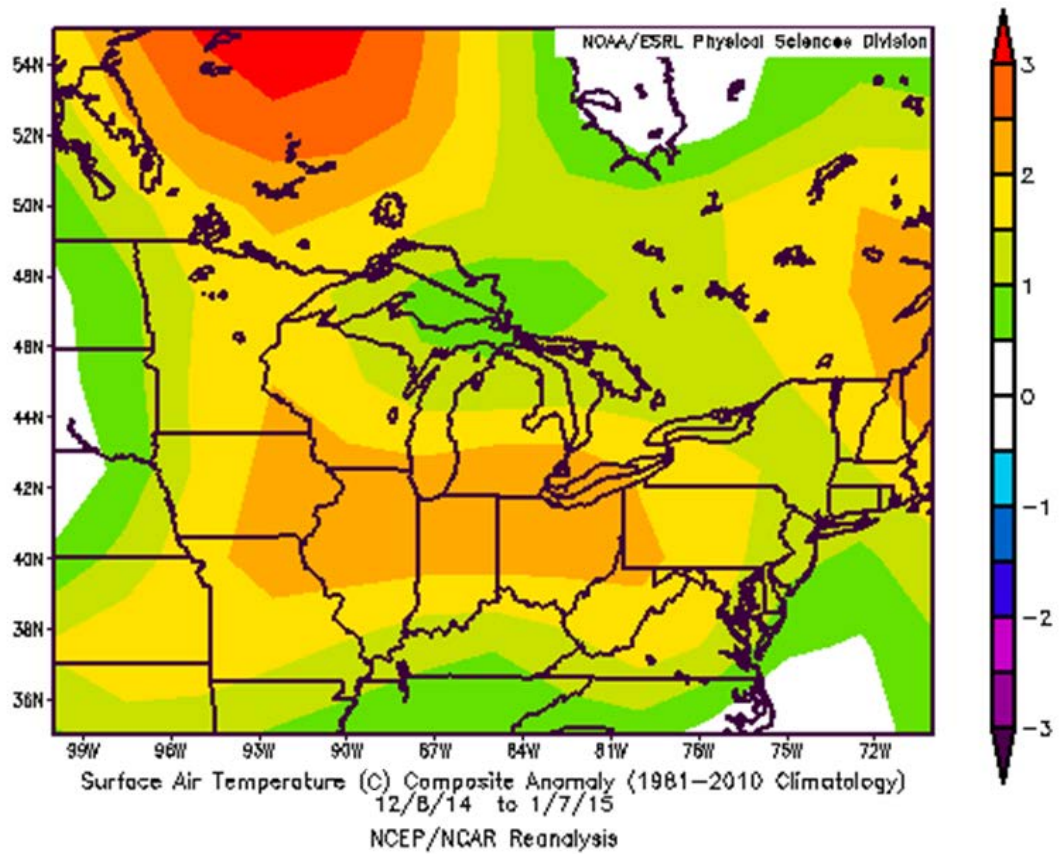


Figure 2: Surface Air Temperature Anomaly for the Great Lakes from December 8, 2014 to January 7, 2015.

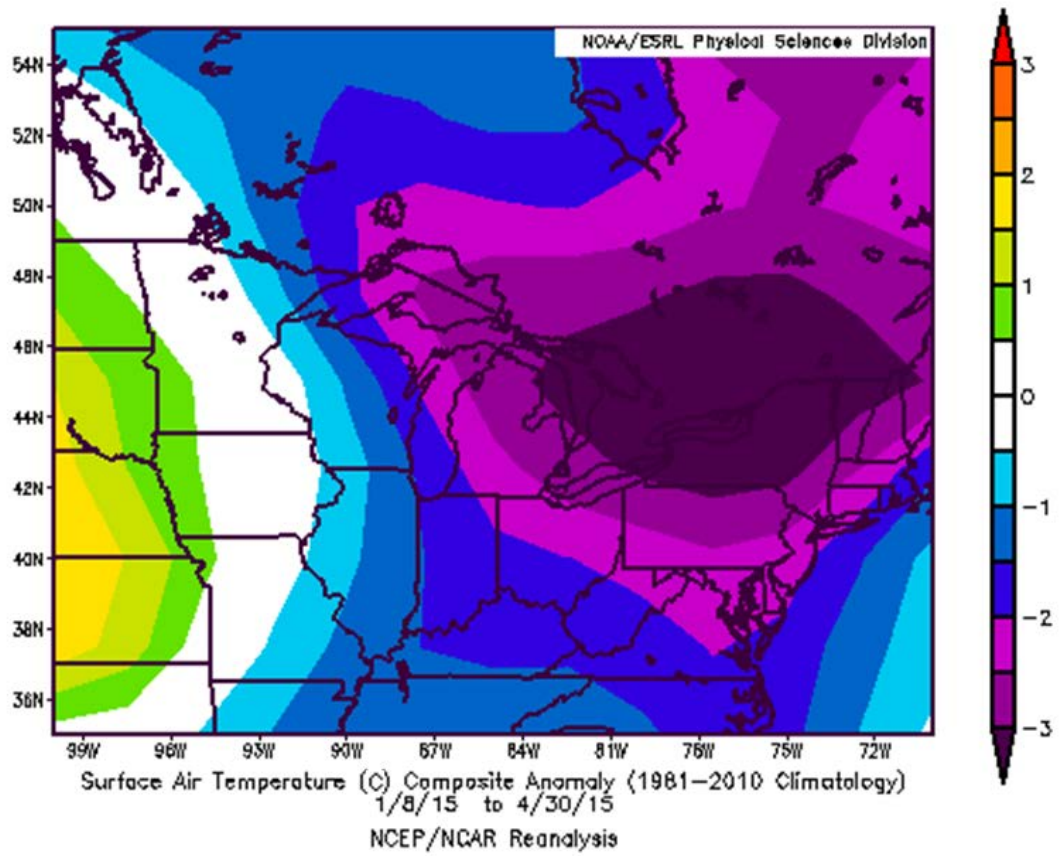


Figure 3: Surface Air Temperature Anomaly for the Great Lakes from January 8, 2015 to April 30, 2015.

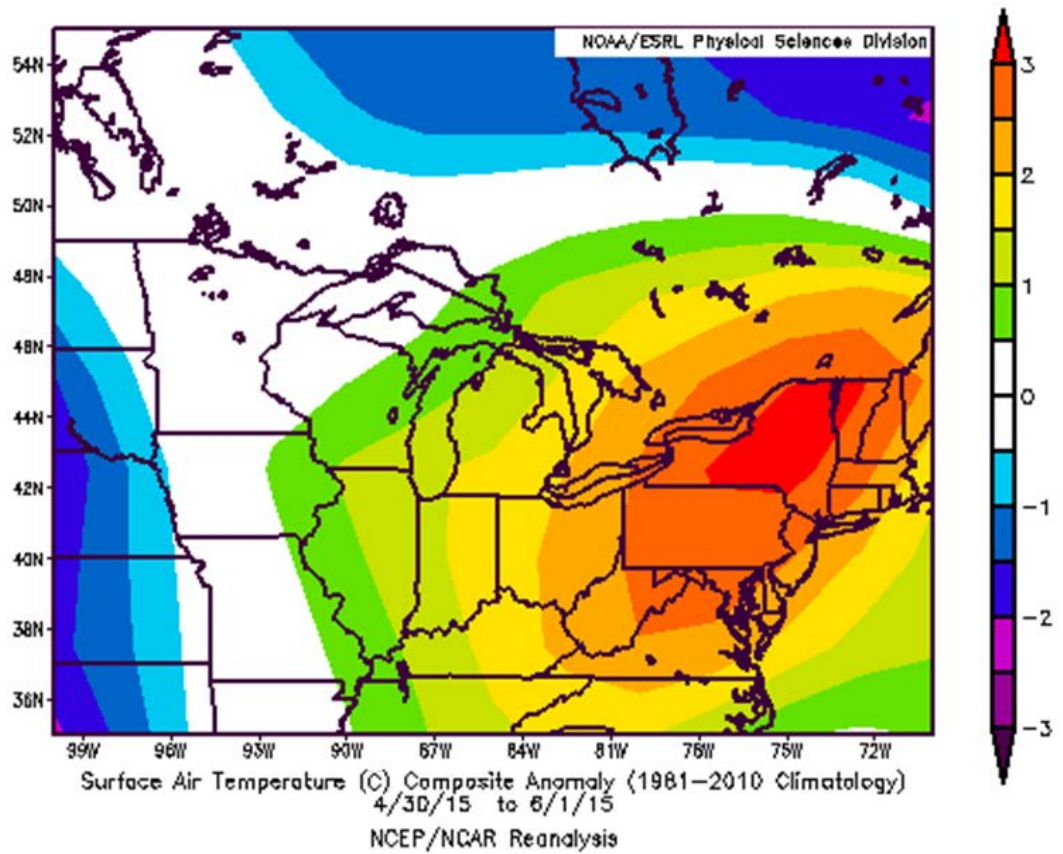


Figure 4: Surface Air Temperature Anomaly for the Great Lakes from May 1, 2015 to June 1, 2015.

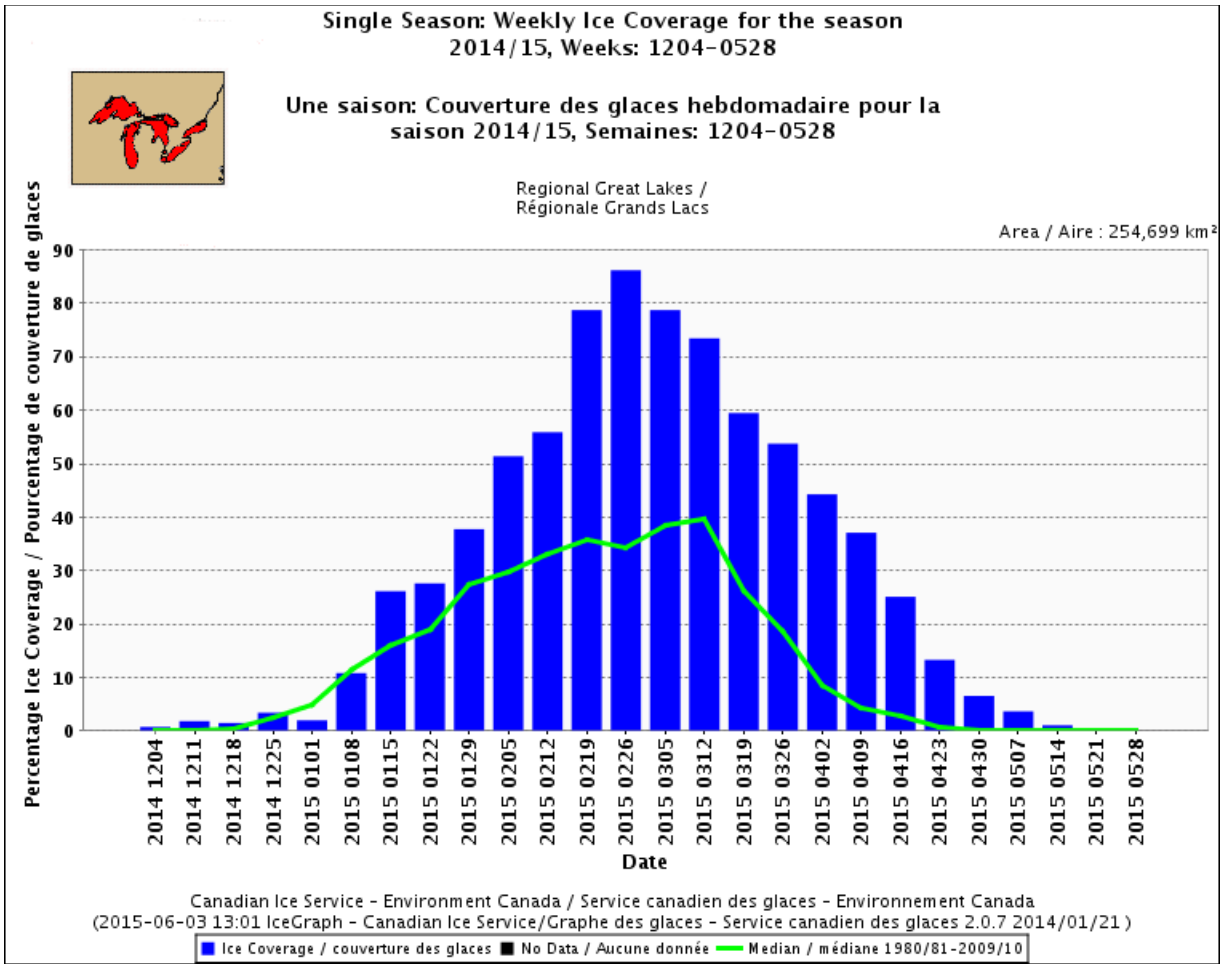


Figure 5: Weekly Ice Coverage on the Great Lakes for winter 2014-15.

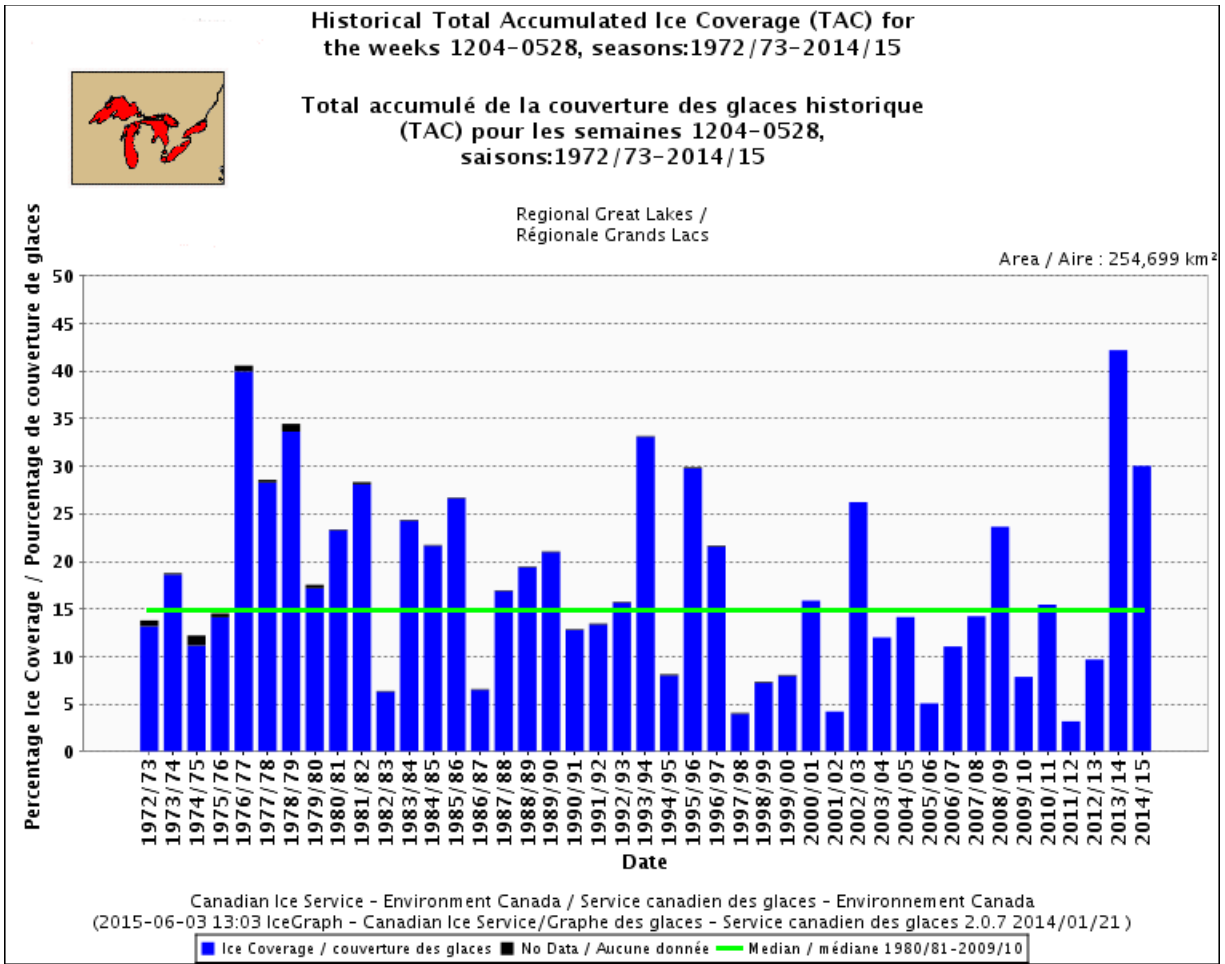


Figure 6: Historical Total Accumulated Ice Coverage on the Great Lakes for winter 2014-15.

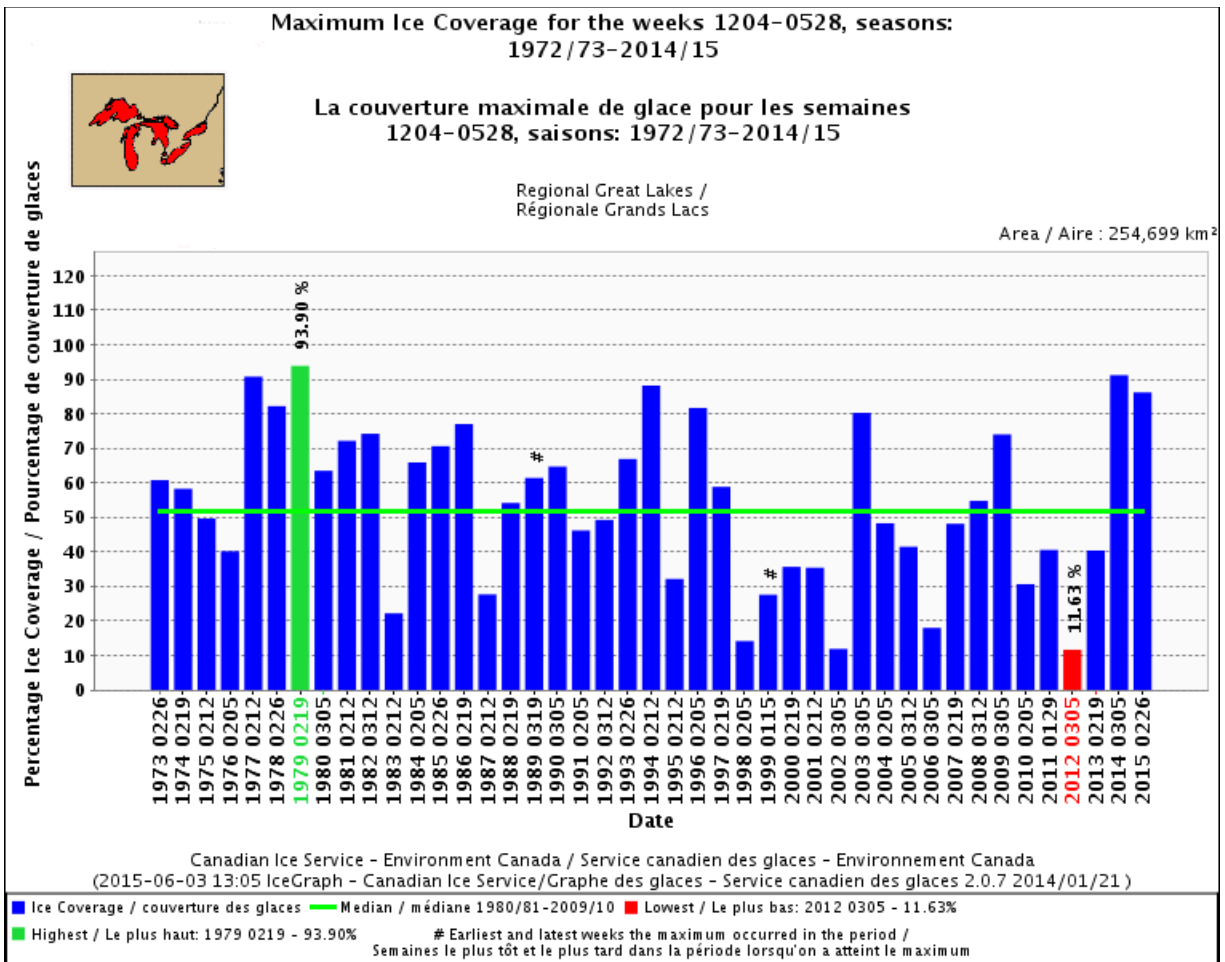


Figure 7: Maximum Ice Coverage in the Great Lakes for 1973-2015.

Lake Superior

2014-2015 Season temperatures: November to mid-May.

The season began with lower than normal temperatures (2.0°C to 4°C below normal), leading to ice formation earlier than usual in Black Bay by mid-November. A brief warm period in late December and early January saw temperatures 0.5°C to 2°C above normal, but the cold returned by late January and lasted through April over the eastern section of the lake. This final cold period saw eastern Lake Superior experience temperatures from 2.0°C to over 3.0°C below the normal climatological values. The situation over the western section was not as extreme, where surface air temperature anomalies from early January to the end of April were only in the 0.5°C to 1.5°C range below the climate normal. The month of May saw surface air temperatures near normal over the western

portion of the lake and 0.5°C to 1.5°C above normal over eastern Lake Superior.

November – December ice conditions:

New lake ice began developing in Black Bay in mid-November, followed by the appearance of new ice in Nipigon Bay, Thunder Bay and Chequamegon Bay by the end of the month. By mid-December, new ice was present in sections of Whitefish Bay and consolidated thin and medium lake ice in Black Bay, Chequamegon Bay and over the western half of Nipigon Bay. At the end of the month, ice had spread along the northwestern and southwestern shores of Lake Superior, while ice in Nipigon, Chequamegon and Black Bays had begun to thicken to the thick lake ice stage.

January ice conditions:

By the end of the first week of January, new and thin lake ice began to grow along the southeastern shore and ice in Thunder Bay had thickened to the thin stage. In the last week of January, extensive expansion of the ice edge occurred along the southern shore, with ice extending approximately 15 nm from the shore. Whitefish Bay was now completely ice covered with medium lake ice, and ice now covered the passage between Thunder Bay and Isle Royale.

February ice conditions:

In the first week, Whitefish Bay became consolidated with medium lake ice. The following week, the western half and extreme eastern portion of the lake were covered by thin and medium lake ice. Growth of the ice cover continued rapidly across the lake and peaked during the fourth week of the month at over 97%, approximately two weeks ahead of the normal seasonal peak of 12 March. Thick lake ice predominated across the southeastern section of the lake, and in the fast ice covering Whitefish, Black, Nipigon, Thunder and Chequamegon Bays.

March ice conditions:

Ice coverage remained above 90% for the first week of March and very thick lake ice developed in the fast ice covering the sheltered bays of

the lake. Thick lake ice was predominant in the eastern portion of the lake as well. During the second week, clearing and destruction of lake ice commenced, particularly over the western half of the lake. By month end, the southwestern section was open water while very thick lake ice was predominant still in the Chequamegon, Black, Nipigon and Thunder Bays.

April – May ice conditions:

In the second week of April, ice coverage fell below 60% and continued its steady decline until the end of the season. Breakup of the fast ice in Chequamegon Bay and in the Apostle Islands started this week as well. Fast ice breakup in Thunder Bay and Whitefish Bay commenced in the third week of April, and ice was mostly confined to the eastern section of Lake Superior by the end of the month. In the first week of May, fast ice began to breakup in Black and Nipigon Bays and throughout the month the remaining ice in the extreme eastern section diminished until it completely disappeared in the final week.

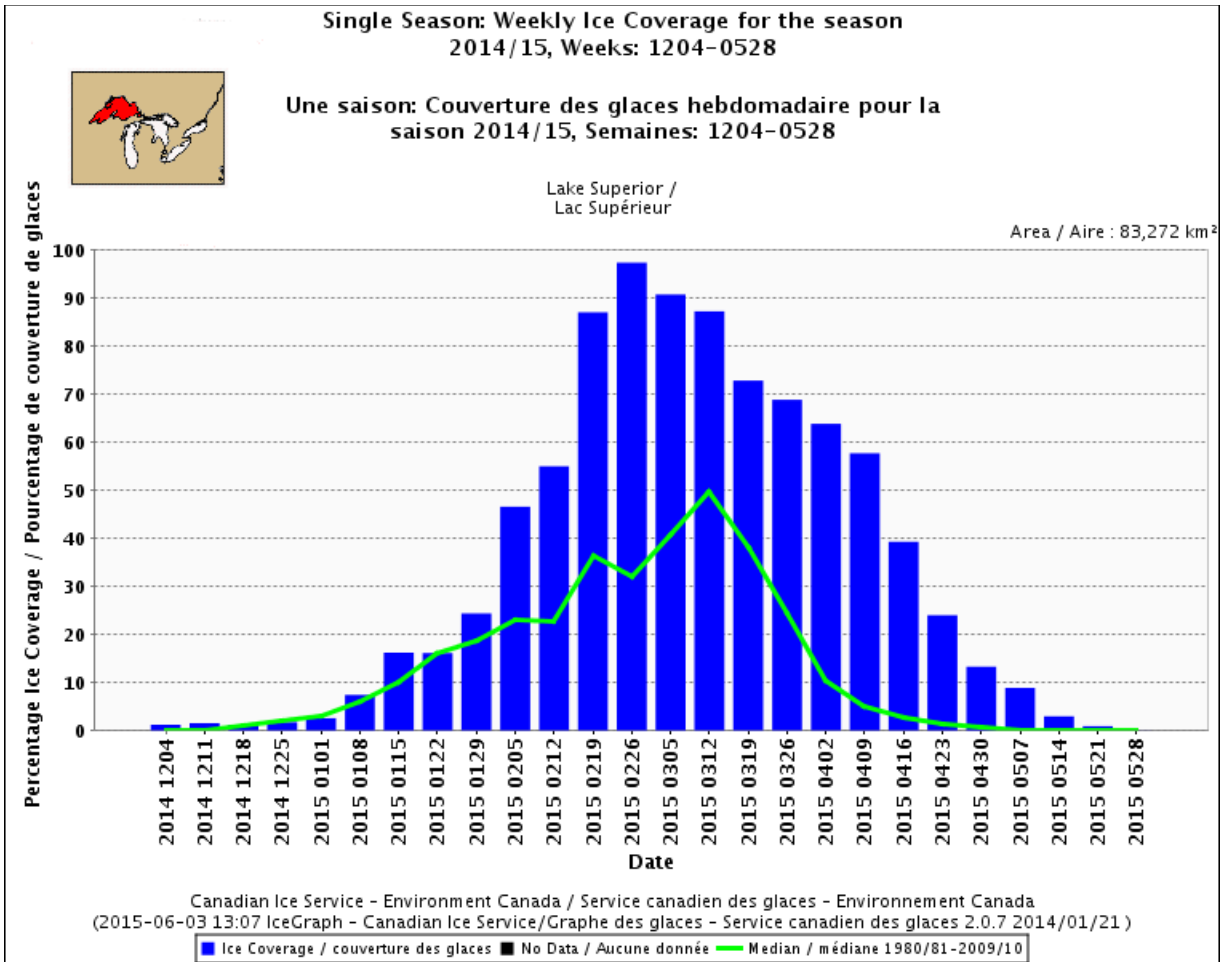


Figure 8: Weekly Ice Coverage in Lake Superior for winter 2014-15.

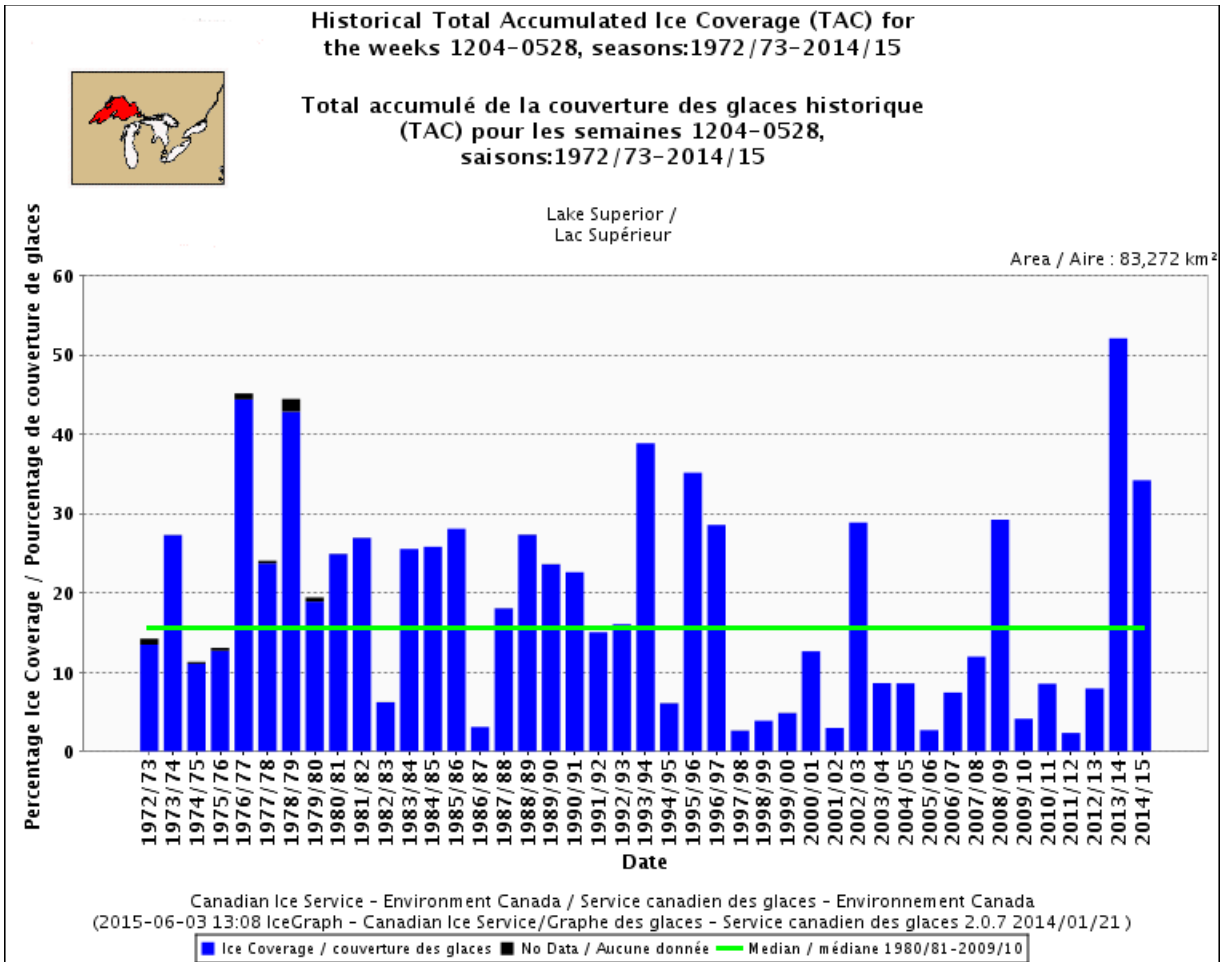


Figure 9: Historical Total Accumulated Ice Coverage in Lake Superior by season, 1972-2015

Lake Michigan

2014-2015 Season temperatures: November to mid-May.

The season began with lower than normal temperatures (2.0°C to 3.5°C below normal), leading to ice formation earlier than usual in Green Bay by the third week of November. A brief warm period in late December and early January saw temperatures 0.5°C to 2.5°C above normal, but the cold returned by late January and lasted through April. This final cold period saw Lake Michigan experience temperatures from 1.5°C to 3.0°C below the normal climatological values. The month of May saw surface air temperatures 1.0°C to 2.0°C above normal.

November – December ice conditions:

Ice development commenced in the Bays de Noc and over the southern portion of Green Bay in the third week of November and was fast medium and thin lake ice by the second week of December. By the end of December, a narrow band of new lake ice along the northern shores west of the Straits of Mackinac rapidly thickened from new to thin lake ice.

January ice conditions:

New ice growth expanded along the western shore of Lake Michigan and thin lake ice completely covered Green Bay and the western entrance to the Straits of Mackinac by the end of the first week. The second week of January saw continued ice expansion with the eastern shore of the lake now fringed with a narrow band of new and thin lake ice, and the ice over Green Bay became predominately medium lake ice. A period of ice destruction followed for the second half of the month, with noticeable losses of ice along the eastern and western shores. However, consolidated ice developed in the final week across southern and northern Green Bay and over the extreme northeastern portion of Lake Michigan.

February ice conditions:

In the first half of the month, ice redeveloped along the eastern and western shores and advanced to the thin ice stage again. Ice growth over the northern section of the lake moved southward past the entrance to Green Bay, with a mixture of medium, thin and new lake ice covering the region. During the second half of the month, the fast ice in Green Bay and near the Straits of Mackinac became predominately thick lake ice and Grand Traverse Bay became consolidated. The ice along the eastern and western shores grew significantly leading to Lake Michigan achieving its peak ice coverage of over 60% by the fourth week.

March ice conditions:

Ice destruction began in the first week of March and by the second week open water was present all along the western shore. Consolidated ice in Green Bay began to breakup in the second half of the month, and continued ice destruction along the eastern shore of the lake significantly reduced the ice coverage to a small area over the extreme southeastern portion of the lake.

April – May ice conditions:

Fast ice breakup accelerated over the northeastern section of the lake, with Grand Traverse Bay breaking up in the second week of April and the remaining fast ice near the Straits of Mackinac free by the third week. By the second week of May, the last remaining ice in Little Traverse Bay melted to end the season.

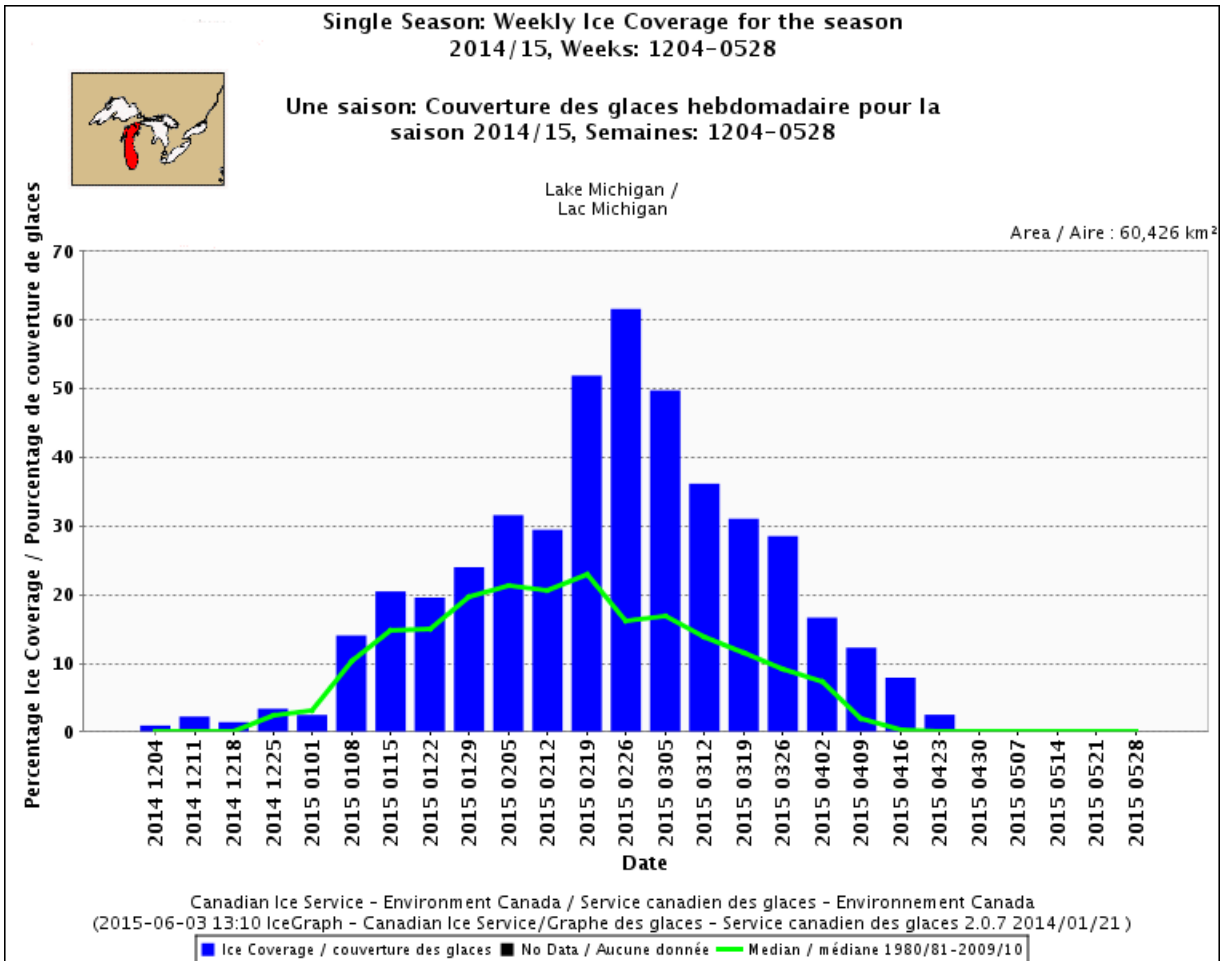


Figure 10: Weekly Ice Coverage in Lake Michigan for winter 2014-15.

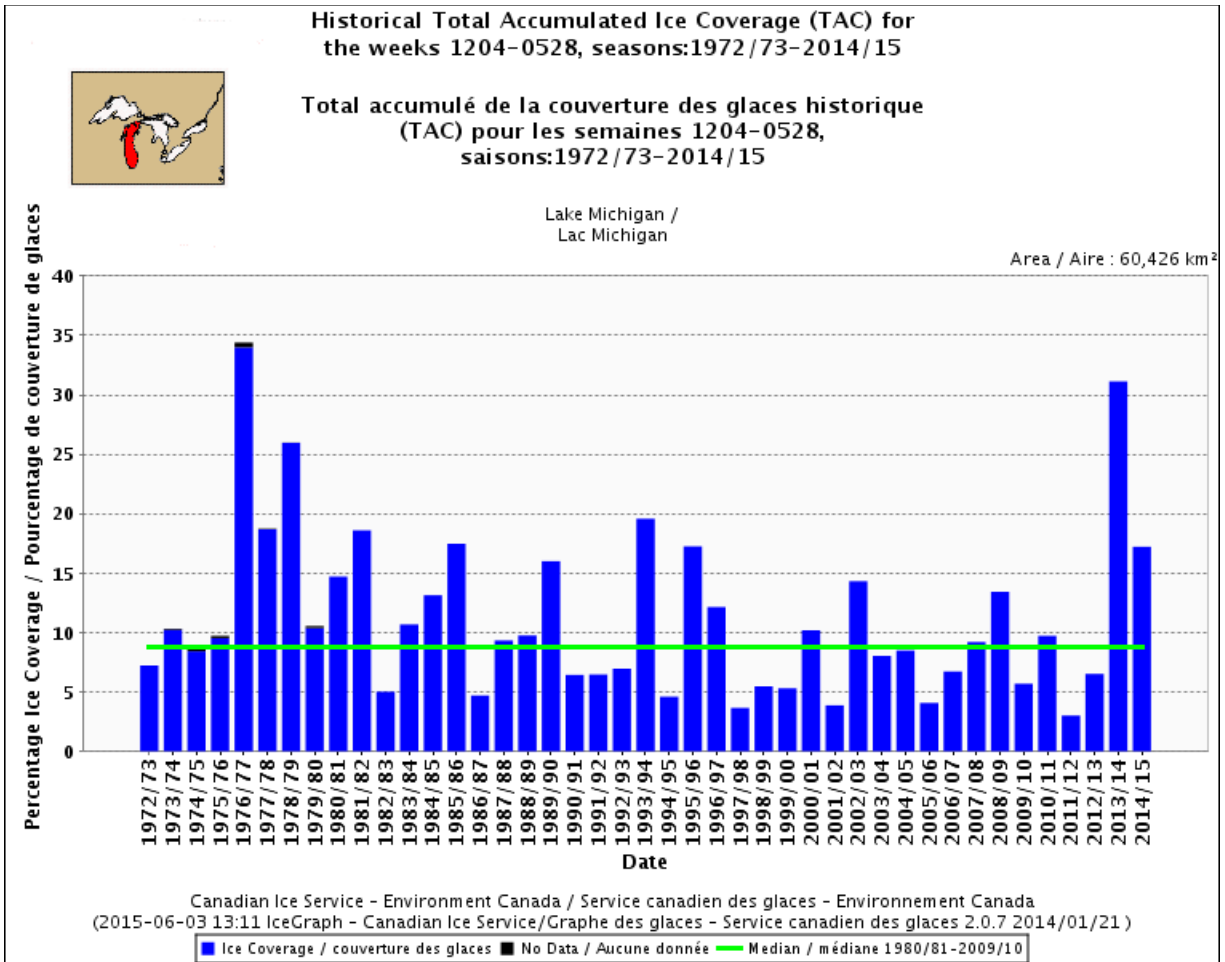


Figure 11: Historical Total Accumulated Ice Coverage in Lake Michigan by season, 1972-2015.

Lake Huron

2014-2015 Season temperatures: November to mid-May.

The season began with lower than normal temperatures (1.5°C to 2.5°C below normal), leading to ice formation earlier than usual in Georgian Bay, Saginaw Bay and the North Channel by the third week of November. A brief warm period in late December and early January saw temperatures 1.0°C to 2.0°C above normal, but the cold returned by late January and lasted through April. This final cold period saw Lake Huron experience temperatures from 2.0°C to 3.5°C below the normal climatological values. The month of May saw surface air temperatures 1.5°C to 4.0°C above normal.

November – December ice conditions:

In the second half of November, new lake ice began developing in the North Channel and Saginaw Bay. By the second week of December, ice had covered the southern portion of Saginaw Bay, and started to form along the eastern shore of Georgian Bay and in the Straits of Mackinac. But over the final two weeks of December, a substantial portion of this ice was destroyed.

January ice conditions:

Ice redevelopment commenced in the first week of January, with the North Channel completely frozen over and fast in the eastern end and in the St. Mary's River. Ice was present along all the shores of Lake Huron and Manitoulin Island, and an area of fast ice was present along the eastern shore of Georgian Bay. By mid-month, the mobile ice was predominately thin lake ice and areas of fast ice had progressed to the medium lake ice stage. Saginaw Bay and the North Channel were both completely consolidated medium lake ice by the fourth week, and by month end the northern half of Georgian Bay was covered with thin and medium lake ice.

February ice conditions:

By the second week of February, Georgian Bay, the eastern entrance to the Straits of Mackinac and the southern portion of Lake Huron were ice covered with thin and medium lake ice. The progress of the ice growth was steady through the second half of the month, with the peak ice coverage of nearly 98% reached in the final week. The entrance to Georgian Bay became consolidated for a brief period in the fourth week with thick and medium lake ice. Thick lake ice was growing over the southern portions of Lake Huron and Georgian Bay, and areas of fast ice in the Straits of Mackinac, Georgian Bay, the North Channel and Saginaw Bay were predominately thick lake ice.

March ice conditions:

Ice coverage remained high through the first week of March, then slowly diminished over the remainder of the month. Areas of open water developed across western Lake Huron and northwestern Georgian Bay by mid-month. Fast ice in Saginaw Bay and along the southeastern shore of

Lake Huron broke up in the final week of March and the area of open water in Lake Huron expanded to cover the western and central sections of the lake.

April- May conditions:

The last remaining ice in Saginaw Bay and the mobile ice near the eastern entrance to the Straits of Mackinac melted by the second week of April. During this week, the consolidated ice in the Straits of Mackinac and along the Bruce Peninsula broke up. Over the final two weeks of April, the ice extent in Lake Huron rapidly diminished to a region of ice along the western shore of the Bruce Peninsula and isolated patches along the southeastern shore of the lake. A narrow band of rotting ice remained along the eastern shore of Georgian Bay, and the consolidated ice in the North Channel and St. Mary's River fractured in the third week of April. By the end of the first week of May, the St. Mary's River was clear of ice and remaining isolated patches in the North Channel and Georgian Bay cleared by the second week. A final resilient patch of ice along the western shore of the Bruce Peninsula disappeared in the third week of May.

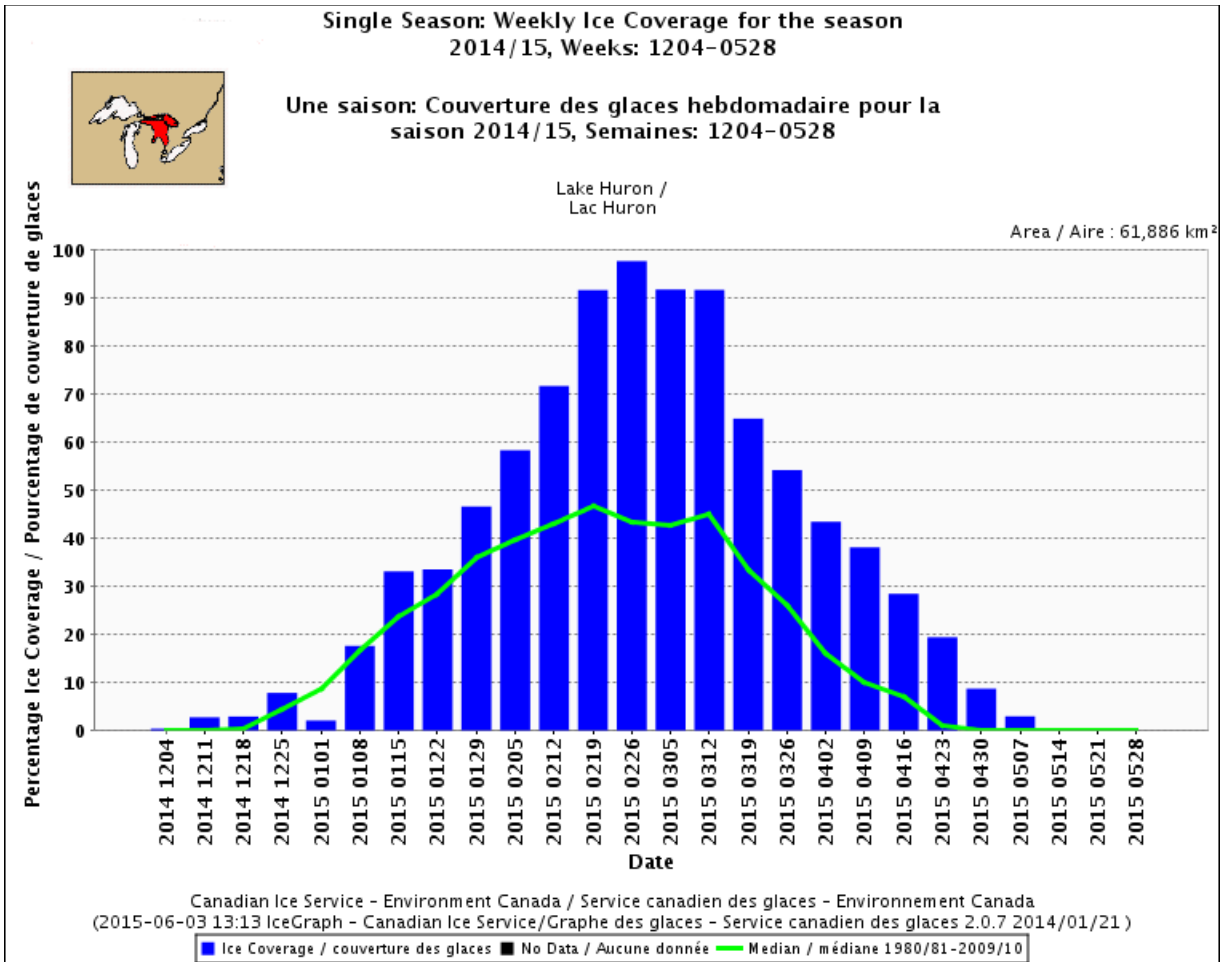


Figure 12: Weekly Ice Coverage in Lake Huron for winter 2014-15.

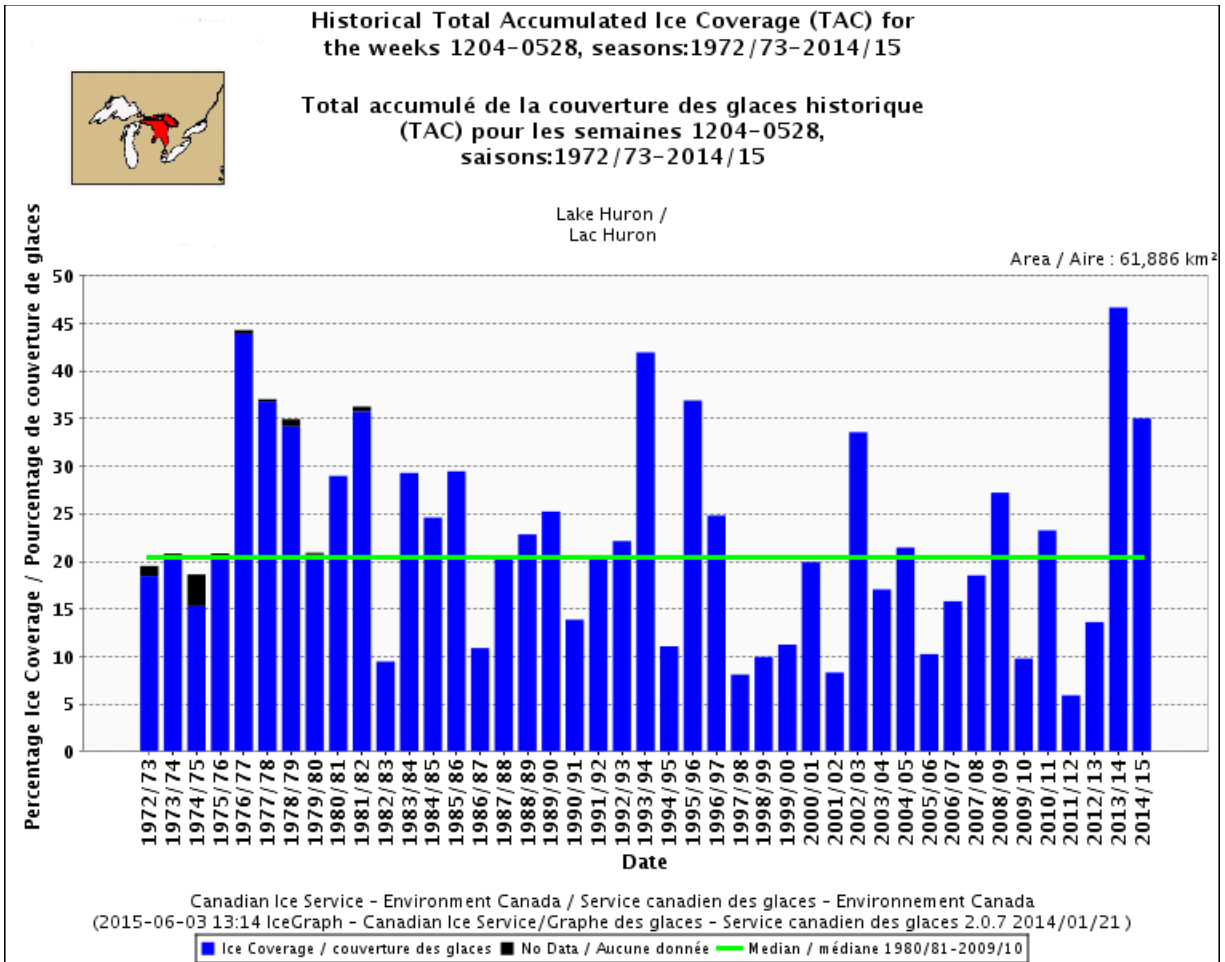


Figure 13: Historical Total Accumulated Ice Coverage in Lake Huron by season, 1972-2015.

Lake Erie

2014-2015 Season temperatures: November to mid-May.

The season began with lower than normal temperatures (1.5°C to 2.5°C below normal), leading to near normal ice formation in the Western Basin by the end of December. A brief warm period in late December and early January saw temperatures 1.5°C to 2.5°C above normal, but the cold returned by late January and lasted through April. This final cold period saw Lake Erie experience temperatures from 2.0°C to 3.5°C below the normal climatological values. The month of May saw surface air temperatures 2.5°C to 3.5°C above normal.

November – December ice conditions:

In the final week of November, some new lake ice briefly developed across Lake St. Clair, Long Point Bay and along the shores of the Western Basin before being destroyed in early December. Ice growth restarted at the end of the month in the same areas.

January ice conditions:

Significant ice growth commenced in the second week, with the Western Basin and Lake St. Clair covered with new and thin lake ice. This was rapidly followed by an expansion of the ice cover over the western half of the lake and along the shores of the eastern section. Lake St. Clair, Lake Erie near Buffalo and the Western Basin near the Southeast Shoal were consolidated with medium lake ice in the third week. Near the end of the month, Lake Erie was nearly completely covered with predominately medium lake ice.

February ice conditions:

Lake Erie remained ice covered over the course of the month. Ice thicknesses continued to climb throughout February, with thick lake ice developing in the first half of the month in Lake St. Clair and Lake Erie, and becoming predominate by mid-month.

March ice conditions:

Ice coverage peaked in the first week at nearly 98%, and then gradually declined for the remainder of the month. The first open water areas developed along the southwestern shore in the second week. Significant ice destruction occurred near month end along the northern shore of the lake, and areas of fast ice in the Western Basin and Lake St. Clair fractured.

April – May ice conditions:

Lake St. Clair and the western half of Lake Erie were completely clear of ice at the end of the first week of April. Consolidated thick lake ice near Buffalo broke up in the second week. A rapid reduction of ice was experienced in the third week of April across eastern Lake Erie and all ice was melted by the end of the month.

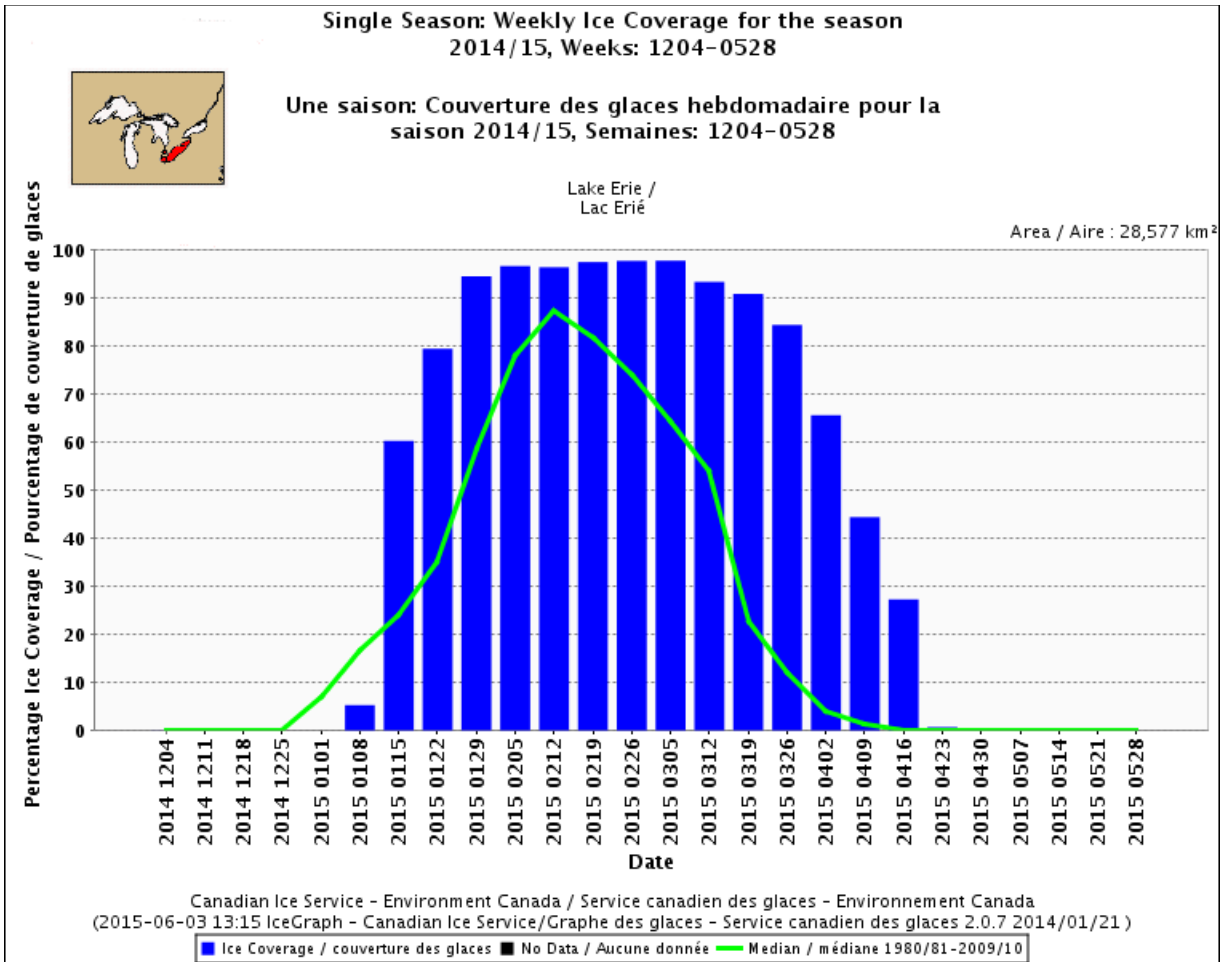


Figure 14: Weekly Ice Coverage in Lake Erie for winter 2014-15.

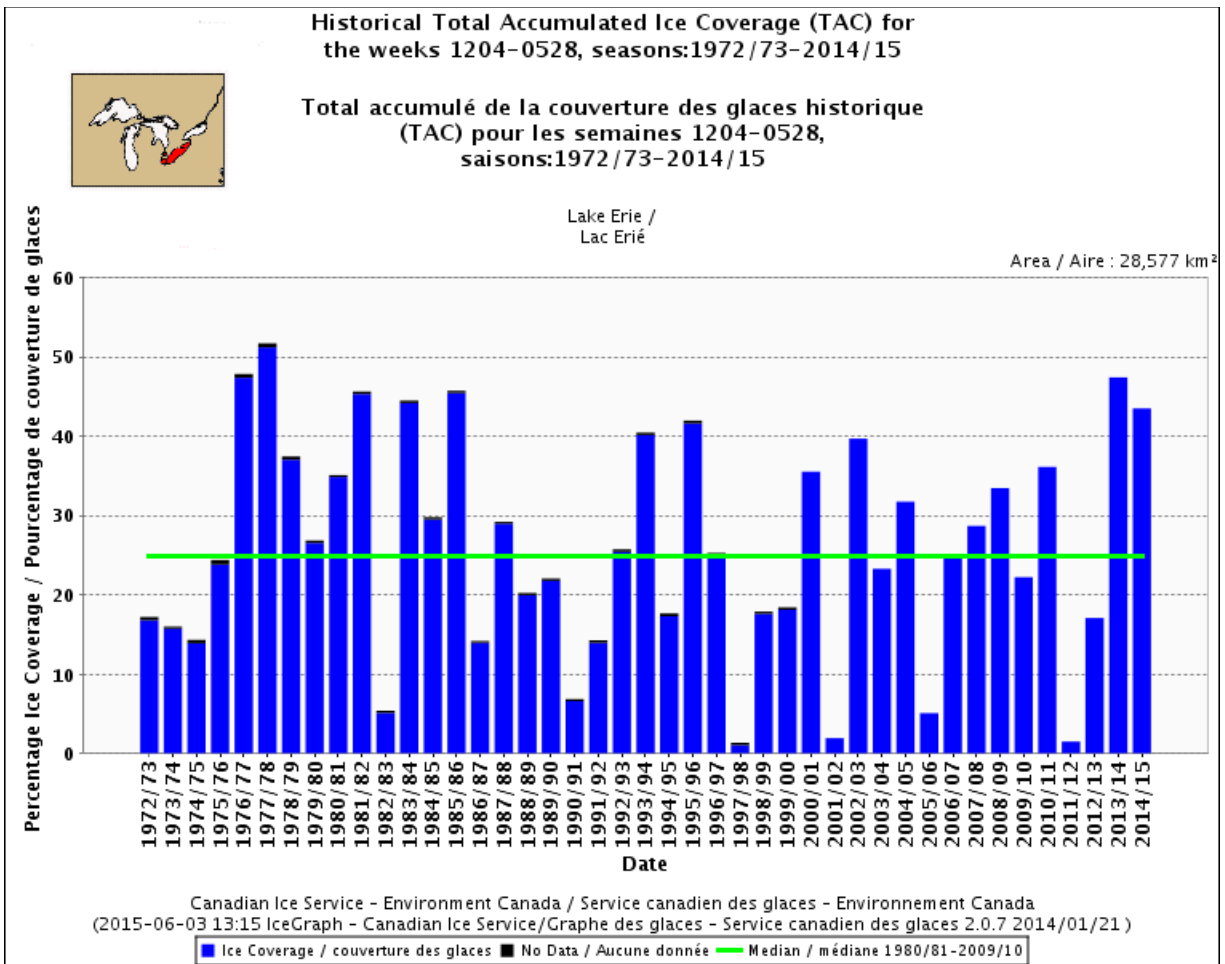


Figure 15: Historical Total Accumulated Ice Coverage in Lake Erie by season, 1972-2015.

Lake Ontario

2014-2015 Season temperatures: November to mid-May.

The season began with lower than normal temperatures (0.5°C to 1.5°C below normal), leading to ice formation earlier than usual in the Bay of Quinte in the first week of December. A brief warm period in late December and early January saw temperatures 1.0°C to 2.0°C above normal, but the cold returned by late January and lasted through April. This final cold period saw Lake Ontario experience temperatures over 3.0°C below the normal climatological values. The month of May saw surface air temperatures over 3.0°C above normal.

November – December ice conditions:

The first ice to develop in Lake Ontario formed in the Bay of Quinte during the final week of November and thickened to thin lake ice by the third week of December.

January ice conditions:

Consolidated thin lake ice was established in the Bay of Quinte during the first week of the month. In the second week of January, new lake ice developed along portions of the southern shore, along Prince Edward County and in the mouth of the St. Lawrence River. During the final week of the month, new and thin lake ice expanded over the northeastern section of the lake, around Prince Edward County and along the northern shore of Lake Ontario, and ice began to consolidate in the St. Lawrence River. Fast ice in the St. Lawrence River and the Bay of Quinte progressed to the medium lake ice stage by the end of the month.

February ice conditions:

The area of open water over the central portion of the lake quickly shrunk during the second week as ice grew substantially along the northern shore of the lake. By mid-month, the Bay of Quinte was now predominately thick fast lake ice. More development of thin, medium and now thick lake ice continued over the eastern portion of the lake as well, and by the end of the month the lake achieved its maximum coverage of the season of 62%.

March ice conditions:

Over the second week of March, significant reductions of lake ice were occurring along the southern and northern shores of the lake. At the end of the month, only the substantial thick and medium ice remained over the eastern portion of the lake, and in the Bay of Quinte and the St. Lawrence River.

April – May ice conditions:

The ice in the St. Lawrence River and Bay of Quinte fractured during the first week of April. Ice then proceeded to melt steadily over the month of April, and was completely absent by the beginning of the fourth week of April.

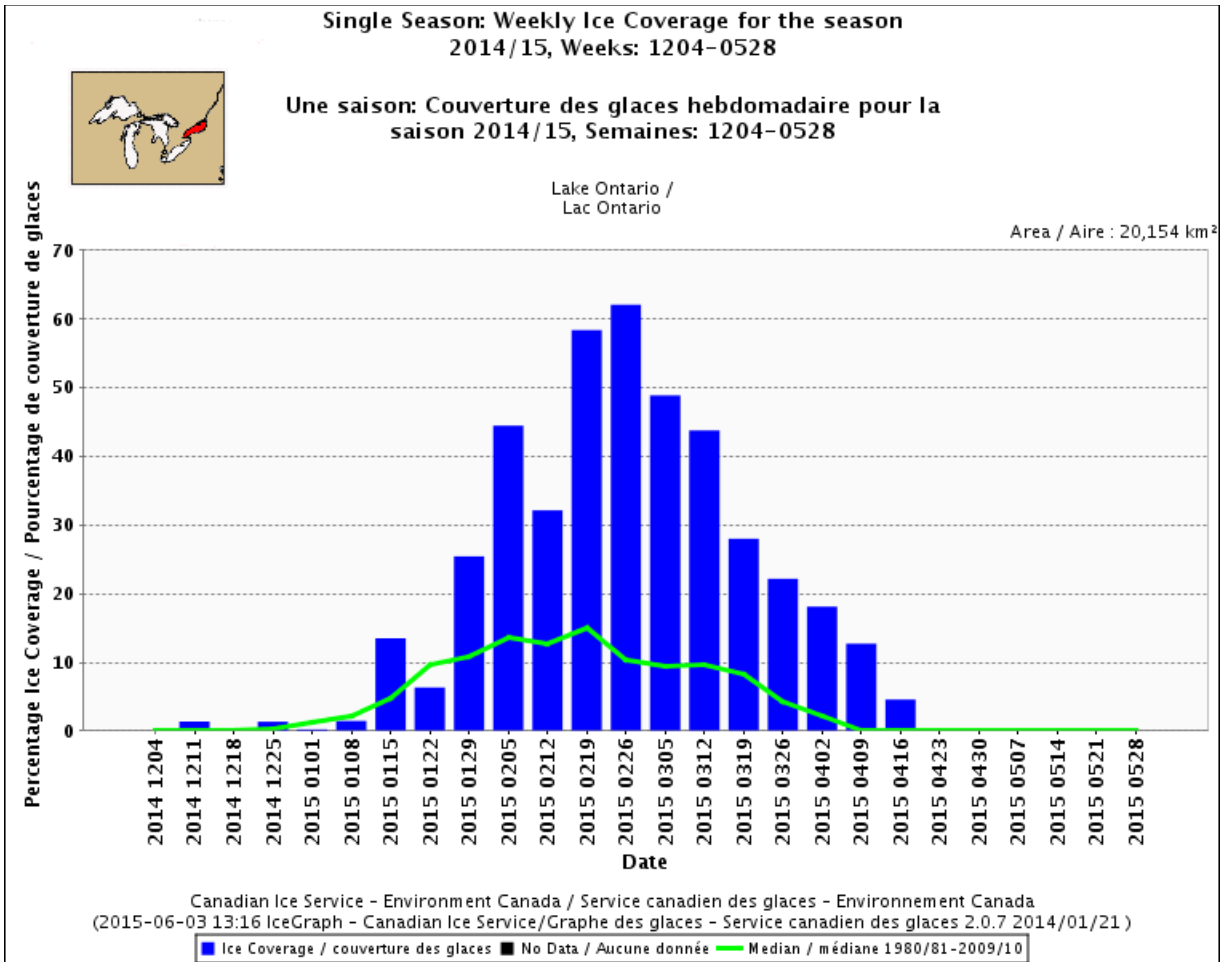


Figure 16: Weekly Ice Coverage in Lake Ontario for winter 2014-15.

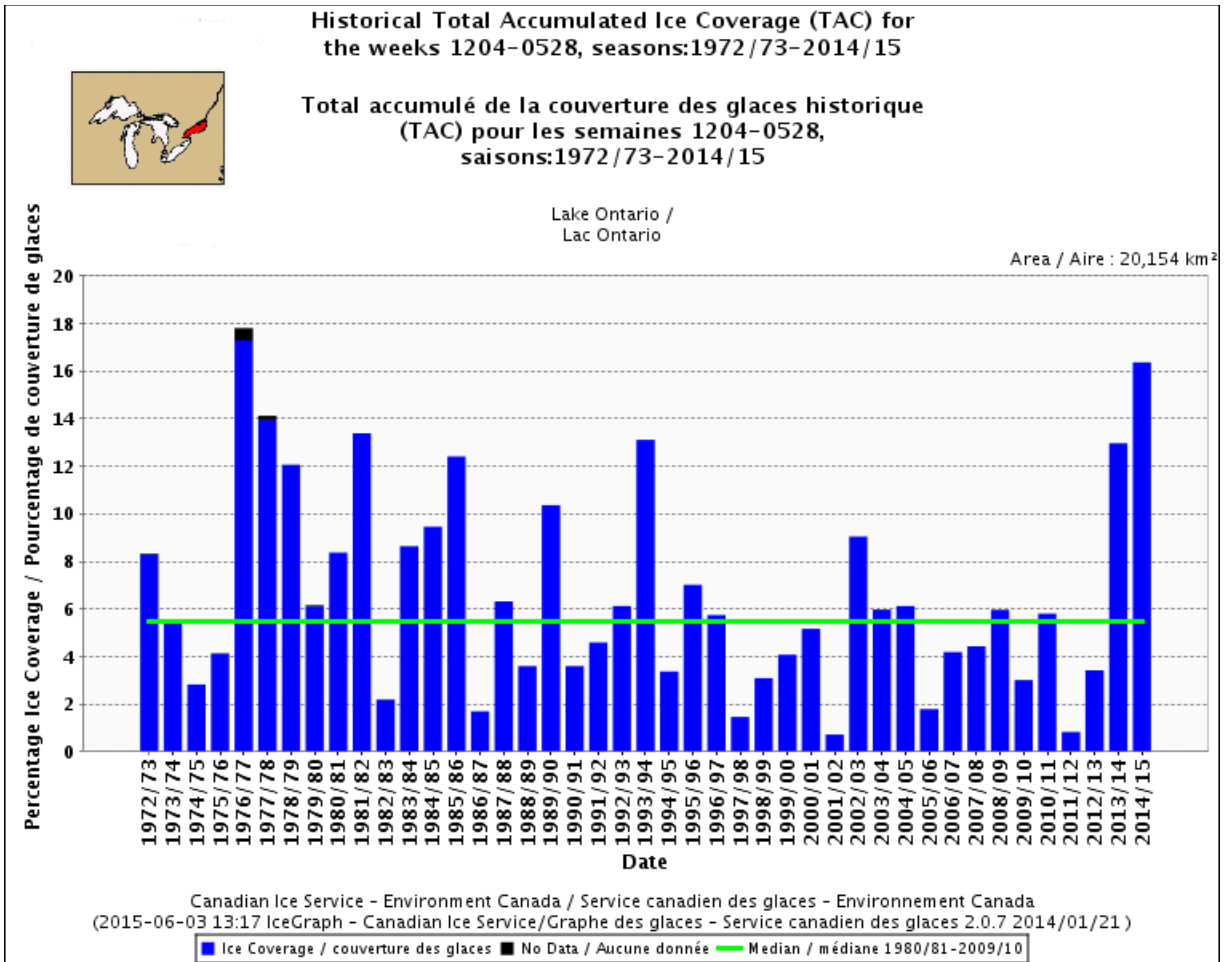


Figure 17: Historical Total Accumulated Ice Coverage in Lake Ontario by season, 1972-2015.