



OUTLOOK FOR BREAK-UP OF ICE ON THE ST. LAWRENCE SEAWAY & LAKE ERIE ISSUED BY THE CANADIAN ICE SERVICE

prepared for
The Saint-Lawrence Seaway Management Corporation

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1. Average temperatures over Lake Erie, Lake Ontario and the Seaway have fluctuated greatly over the current winter and previous fall seasons. The table below indicates the departure from normal temperatures at specific locations, on a bi-weekly basis, for the period from mid-November to the end of January:

	November 16-30	December		January		16 Nov. – 31 Jan
		01-15	16-31	01-15	16-31	
Montreal	0.0°C	+1.0°C	-5.9°C	-3.3°C	+3.9°C	-0.8°C
Kingston	+0.8°C	-0.1°C	-6.2°C	-4.2°C	+3.6°C	-1.2°C
Windsor	+0.7°C	-1.4°C	-2.8°C	-3.9°C	+3.1°C	-0.8°C

The fall 2017 pre-conditioning of the lower Great Lakes for the coming 2017-18 winter ice season established anomalously warm surface lake temperatures across the region thanks in part to warmer than normal surface air temperatures. This pattern of warmer than normal air temperatures would however soon be abruptly reversed in early December and ice growth would quickly overtake Lake Ontario and Lake Erie.

Near mid-December 2017, extensive ice growth was observed in the Western Basin of Lake Erie primarily along the shores. A pattern of destruction and regrowth followed until a period of significantly colder than normal air temperatures became established near the end of the month. Widespread development and thickening of the ice in the Western Basin was noted, and additional new and thin lake ice was spotted growing along the shorelines of the whole of Lake Erie. Meanwhile in Lake Ontario, ice appeared in the Bay of Quinte and the entrance to the St. Lawrence River by mid-month and steadily thickened in the anomalous cold. The river saw elevated thin and medium lake ice coverage in the western section by month end and steadily increasing concentrations of new and thin lake ice from Brockville and to Montreal. Lake ice lined the southern and northern shores of

the lake by the end of the month as well, an unusual development this early in the season. Ice growth was approximately two weeks ahead of the normal climatological development by the end of December.

The colder than normal surface air temperatures remained in place across the lower Great Lakes for the first half of January 2018. This promoted rapid ice expansion in Lake Erie and the northeastern section of Lake Ontario. Lake Erie was predominantly ice covered by the first week of the month as well as a section of Lake Ontario from Prince Edward Point, ON to Oswego, NY. The St. Lawrence River responded similarly to the cold temperatures and was observed to be completely ice covered at this time. The ice conditions were now nearly a month ahead of the typical expected climatological state.

A major departure from the previously observed colder than normal temperatures was then observed in the second half of January 2018. This reversal in the atmospheric temperature pattern led to a stalling of the ice growth at first and then an eventual retreat of ice coverage in portions of Lake Erie and Ontario. In particular, ice cover in the central section of Lake Erie was reduced to open water after a series of major winter storms that brought strong winds and extensive rainfall along with above freezing air temperatures. The St. Lawrence River resisted the pattern of destruction and ice coverage held relatively steady until the end of January 2018.

- The table below indicates the monthly average surface air temperatures at some locations along the Seaway and in western Lake Erie:

	Average temperatures	
	December 2017	January 2018
Montreal	-8.7°C	-9.8°C
Kingston	-6.8°C	-7.8°C
Windsor	-3.5°C	-4.7°C

- The table below indicates the accumulated freezing degree days (FDD), the normal accumulated FDD and the percentage(%) of accumulated FDDs at various locations as of January 31:

	Accumulated FDDs (2017-18)	Normal accumulated FDD	% of normal accumulated FDD
Montreal	609	558	109%
Kingston	491	389	126%
Windsor	280	224	125%

4. Ice conditions in the St Lawrence Seaway are described based on Radarsat-2, Sentinel and MODIS satellite imagery from 28 to 31 January 2018. Predominantly consolidated medium lake ice is observed from Kingston to the Beauharnois Canal along the shores and in sheltered bays and inlets. From Kingston to Cornwall, the conditions were of 4 to 6 tenths of thin and medium lake ice in the main channel, whereas from Cornwall to the Beauharnois Canal 7 to 10 tenths of thin and medium lake ice was observed in the channel.
5. Average surface air temperatures will be near normal across the southern half of the Great Lakes and the St. Lawrence River valley, but below normal for the northern section of the region for February, March and April 2018. As a result of the near to below normal temperatures, the breakup of lake ice in the Seaway will be delayed 2 to 3 weeks in general and ice development will continue through February 2018.

GENERAL OUTLOOK

Further ice growth is expected to recommence during the month of February 2018 as near to below normal air temperatures return to the Great Lakes region. Given that the lower Great Lakes have been optimally conditioned for ice growth based on previous surface water cooling and ice formation during December 2017 and early January 2018, a rapid expansion of ice across Lake Erie and the near shore environment of Lake Ontario is expected.

Lake Ontario to Cornwall – 9 to 10 tenths of medium and thick lake ice in Lake Ontario until the third week of March 2018 followed by breakup beginning in the fourth week of the month. Open water conditions in northeastern Lake Ontario in the first week of April. Consolidated thick lake ice in the St. Lawrence River and the Bay of Quinte is forecasted until the first week of April. Breakup of lake ice in the river beginning in the second week of the month and in the third week of April for the Bay of Quinte. Generally open water conditions in the river by the third week of April and by the end of the month for the Bay of Quinte.

Cornwall to Montreal – 9 to 10 tenths of medium and thick lake ice with consolidated thick lake ice along the shores until the mid-April. Breakup beginning in the third week of April with open water conditions by the final week of the month.

Lake Erie – 9 to 10 tenths of medium and thick lake ice across the lake until mid-March 2018. In the third week of March, breakup beginning in the Western Basin of Lake Erie and along the northern shore of the lake from Point Pelee to Long Point. Breakup starting in the eastern section of the lake near the end of March with open water conditions in the Western Basin by the end of the first week of April. Generally open water across Lake Erie by mid-April 2018. Breakup is expected to be approximately two to three weeks later than the normal dates.

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