

# Lake Erie Ice from stations occupied during Winter 2012, 2013, and 2016 from USCGC and CCGS vessels from the Laurentian Great Lakes (mainly Lakes Huron, Michigan, Erie and connecting waterways) (Lake Erie Ice project)

**Website:** <https://www.bco-dmo.org/dataset/4044>

**Data Type:** Cruise Results

**Version:** 1

**Version Date:** 2017-08-08

## Project

» [RAPID Response to an extreme low ice year on Lake Erie](#) (Lake Erie Ice)

## Program

» [Laurentian Great Lakes Ecosystem Studies](#) (Laurentian Great Lakes Ecosystem Studies)

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## Coverage

**Spatial Extent:** N:46.49865 E:-78.94251 S:41.52567 W:-85.71513

**Temporal Extent:** 2012-01-04 - 2016-03-04

## Dataset Description

Lake Erie Ice - Stations Occupied - Winter/2012 and Winter/2013

For additional information see:

[Collecting Winter Data on U.S. Coast Guard Icebreakers](#)

[Study Plan for the U.S. Coast Guard Survey of Lake Erie in Winter 2011-12](#)

[Study Plan for the U.S. Coast Guard Survey of Lake Erie in Winter 2012-13](#)

[Study Plan for the Canadian Coast Guard Survey of Lake Erie in Winter 2012-13](#)

[Study Plan for the Canadian Coast Guard Survey of Lake Erie in Winter 2016](#)

[Study Plan for the US Coast Guard Survey of Lake Erie in Winter 2016.](#)

## Methods & Sampling

Generated by BCO-DMO staff from spreadsheets contributed by Robert McKay

## Data Processing Description

Generated by BCO-DMO staff from spreadsheets contributed by Robert McKay

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## Data Files

File
<b>STATIONS.csv</b> (Comma Separated Values (.csv), 7.64 KB) MD5:f2c3868dbae9f6a5c1e90e2f3beb0963 Primary data file for dataset ID 4044

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## Parameters

Parameter	Description	Units
Station	Station Number	unitless
Station_EC	Station identifier provided by Environment Canada for "process" stations that are routinely occupied during EC surveys. All other stations were sampled while "underway" and were not provided unique EC identifiers.	unitless
Date_Local	Date Local	YYYYMMDD
Time_local	Time Local	HHMMSS
Lat	Station Latitude; South is negative	decimal degrees
Lon	Station Longitude; West is negative	decimal degrees
Station_Depth_Feet	Station Depth in Feet	feet
Station_Depth_Meters	Station Depth in Meters	meters
Platform_Year		unitless

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## Deployments

**NEAHBAY\_Winter2012**

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/59088">https://www.bco-dmo.org/deployment/59088</a>
<b>Platform</b>	USCGC NEAH BAY
<b>Start Date</b>	2012-01-04
<b>End Date</b>	2012-04-05
<b>Description</b>	<p>Note: There is no official cruise id. "NEAHBAY_Winter2012" was generated by BCO-DMO staff. The 2012 winter Coast guard ice-breaking operation on Lake Erie is called "Operation Coal Shovel" which has been assigned as a primary synonym for the cruise. The locations list was generated from the station locations contributed with the data. For additional information see:Collecting Winter Data on U.S. Coast Guard IcebreakersStudy Plan for the U.S. Coast Guard Survey of Lake Erie in Winter 2011-12</p> <p><b>Methods &amp; Sampling</b> For additional information see:Collecting Winter Data on U.S. Coast Guard IcebreakersStudy Plan for the U.S. Coast Guard Survey of Lake Erie in Winter 2011-12</p>

### **MACKINAW\_Winter2013**

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/59091">https://www.bco-dmo.org/deployment/59091</a>
<b>Platform</b>	USCGC MACKINAW
<b>Start Date</b>	2013-01-29
<b>End Date</b>	2013-02-02
<b>Description</b>	<p>Note: There is no official cruise id. "MACKINAW_Winter2013" was generated by BCO-DMO staff. The 2013 winter Coast guard ice-breaking operation on Lake Erie is called "Operation Taconite" which has been assigned as a primary synonym for the cruise. The locations list was generated from the station locations contributed with the data. For additional information see:Collecting Winter Data on U.S. Coast Guard IcebreakersStudy Plan for the U.S. Coast Guard Survey of Lake Erie in Winter 2012-13</p> <p><b>Methods &amp; Sampling</b> For additional information see:Collecting Winter Data on U.S. Coast Guard IcebreakersStudy Plan for the U.S. Coast Guard Survey of Lake Erie in Winter 2012-13</p>

### **GRIFFON\_2013-01-801**

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/59092">https://www.bco-dmo.org/deployment/59092</a>
<b>Platform</b>	CCGS GRIFFON
<b>Start Date</b>	2013-02-18
<b>End Date</b>	2013-02-23
<b>Description</b>	<p>The locations list was generated from the station locations contributed with the data. For additional information see:Study Plan for the Canadian Coast Guard Survey of Lake Erie in Winter 2012-13</p> <p><b>Methods &amp; Sampling</b> For additional information see:Study Plan for the Canadian Coast Guard Survey of Lake Erie in Winter 2012-13</p>

### **GRIFFON\_2016046-001-008**

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/708889">https://www.bco-dmo.org/deployment/708889</a>
<b>Platform</b>	CCGS GRIFFON
<b>Report</b>	<a href="http://dmoserv3.bco-dmo.org/data_docs/LakeErie_Ice/2016046-001-008_Melee_CruiseReport.pdf">http://dmoserv3.bco-dmo.org/data_docs/LakeErie_Ice/2016046-001-008_Melee_CruiseReport.pdf</a>
<b>Start Date</b>	2016-02-15
<b>End Date</b>	2016-02-19
<b>Description</b>	PURPOSE: Characterize the spatial and vertical distribution in Lake Erie of i) benthic seed populations ii) physico-chemical parameters (temperature, conductivity etc.) and major nutrients in water column iii) primary productivity, carbon processing and bacterial activity iv) algal nutrient and physiological status; toxins v) phytoplankton, picoplankton and algal taxa; samples for DNA barcoding and metagenomic analyses

### NEAHBAY\_Winter2016

<b>Website</b>	<a href="https://www.bco-dmo.org/deployment/712503">https://www.bco-dmo.org/deployment/712503</a>
<b>Platform</b>	USCGC NEAH BAY
<b>Report</b>	<a href="http://data.bco-dmo.org/LakeErie_Ice/Study_Plan_BGSU_USCoastGuard_Winter_2016-1.pdf">http://data.bco-dmo.org/LakeErie_Ice/Study_Plan_BGSU_USCoastGuard_Winter_2016-1.pdf</a>
<b>Start Date</b>	2016-01-14
<b>End Date</b>	2016-03-04

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## Project Information

### RAPID Response to an extreme low ice year on Lake Erie (Lake Erie Ice)

**Website:** <http://www.bgsu.edu/arts-and-sciences/biological-sciences/faculty-and-staff/alphabetical-listing/robert-michael-mckay.html>

**Coverage:** Laurentian Great Lakes

#### *Description from NSF award:*

Winter presents a logistical obstacle to our understanding of lake ecosystems. A recent collaboration of the PIs with the Canadian- and U.S. Coast Guards and their icebreaking programs has facilitated annual winter surveys of Lake Erie since 2007. Conducted during times of expansive ice cover, these surveys have documented high phytoplankton biomass, often in discrete formations and dominated by a filamentous diatom, *Aulacoseira islandica*. Whereas Lake Erie is characterized by a high annual median ice cover [AMIC] consistent with its relative shallow bathymetry, it also shows extremes in maximum ice extent ranging from ~10% in low ice years to > 99% in high ice years. While maximum ice cover on Lake Eries has reached ~95% each winter from 2007-2010, the winter of 2011-12 is shaping up much differently, with unseasonably warm conditions and almost no ice cover.

**The PIs will use a Rapid Response Research (RAPID) grant to investigate the changes in phytoplankton community structure and function during this warm and practically ice-free winter. Specifically, they will test the hypothesis that the warm monomictic mixing regime that occurs in the absence of expansive ice cover suppresses diatom growth in Lake Erie's central basin. This project will provide synoptic data on the concentration of chlorophyll a in near-surface waters at stations throughout Lake Erie during the winter season.**

Suppression of abundant winter diatom growth may have important implications for events occurring during summer in Lake Erie. The documentation of abundant winter diatom growth, combined with low measured rates of bacterial decomposition results in net accumulation of algae on the lake bottom. As summer

progresses and the hypolimnion warms, bacterial remineralization of the exported diatom biomass accelerates, depleting the hypolimnion of oxygen. These observations are consistent with a new hypothesis on lake function, namely that winter phytoplankton production drives Lake Erie summer hypoxia. Oxygen depletion in Lake Erie's central basin is well documented with effects ranging from enhanced internal nutrient loading to loss of habitat for macrofauna. At its full expanse, the area can exceed 10,000 km<sup>2</sup>, comparable in surface area to the low oxygen 'dead zone' in the Gulf of Mexico. Thus, deviation from the high phytoplankton biomass accumulation associated with 'typical' winter ice cover may be reflected in higher hypolimnetic dissolved oxygen measured during summer. This research opportunity can help define environmental changes that might be expected in a warming climate.

For additional information see:

[Collecting Winter Data on U.S. Coast Guard Icebreakers](#)

[Study Plan for the U.S. Coast Guard Survey of Lake Erie in Winter 2011-12](#)

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## Program Information

### Laurentian Great Lakes Ecosystem Studies (Laurentian Great Lakes Ecosystem Studies)

**Website:** <http://www.tc.umn.edu/~stern007/>

**Coverage:** Laurentian Great Lakes

A series of studies concerned with the chemistry and biology of the Laurentian Great Lakes. These different studies share a focus on the dynamics of organic pools of carbon, nitrogen and phosphorus, and the stoichiometric linkages among these elements. At different times, work also has focused on trace metal dynamics and interactions with biota, the rates of primary production and herbivory, rates and patterns of primary productivity, and the century-long, steady trend of increasing nitrate in Earth's largest lake by area. Microbial populations have been investigated and linked to these chemical properties.

This Program was created by BCO-DMO staff to bring various Laurentian Great Lakes Research projects under one umbrella for improved discovery and access.

Dates: 1998 - 2014

Funding: NSF/OCE and Minnesota Sea Grant

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## Funding

Funding Source	Award
<a href="#">NSF Division of Ocean Sciences (NSF OCE)</a>	<a href="#">OCE-1230735</a>

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