Winter survey data from Lake Erie from Feb 2022 to Mar 2022

Website: https://www.bco-dmo.org/dataset/949323
Data Type: Cruise Results
Version: 2
Version Date: 2025-01-31

Project
» Lake Erie Center for Fresh Waters and Human Health (Great Lakes Center)

Contributors	Affiliation	Role
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Abstract
This dataset includes winter survey data from Lake Erie collected from February 2022 to March 2022. The survey includes environmental observations, physico-chemical data, chlorophyll, total and dissolved nutrients, plankton taxonomic classification, and cell abundance. The Lake Erie Center for Fresh Waters and Human Health is a five-year, multi-institutional effort aimed at understanding the environmental factors and ongoing changes that influence the growth and toxicity of cyanobacterial harmful algal blooms (cHABs) in Lake Erie.

Table of Contents

- Coverage
- Dataset Description
  - Methods & Sampling
  - Data Processing Description
  - BCO-DMO Processing Description
- Data Files
- Parameters
- Instruments
- Project Information
- Funding

Coverage

Location: Laurentian Great Lakes (Lake Erie, Lake St. Clair, Lake Huron)
Spatial Extent: **N**:43.8873 **E**:-81.2528 **S**:41.7355 **W**:-83.1343
Temporal Extent: 2022-02-04 - 2022-03-10

Dataset Description

Lake Erie Center for Fresh Waters and Human Health

The Lake Erie Center for Fresh Waters and Human Health is a five-year, multi-institutional effort aimed at understanding the environmental factors and ongoing changes that influence the growth and toxicity of cyanobacterial harmful algal blooms (cHABs) in Lake Erie. The Center will support three research projects. Specifically these projects address the following aims: first, how environmental cues promote or constrain the proliferation of cHAB species in mixed populations; second, how environmental cues influence toxin production by cHAB species; third, how other member of the microbial assemblage influence cHAB growth and toxicity. The Center will provide a Community Engagement Core to lead outreach activities that will inform the general public on the effects of cHABs by efforts that include: (1) a community engaged scholarship training for

scientists associated with the Center, (2) community-engaged scholarship training for practitioners or community members associated with the Center, and (3) a stakeholder needs assessment for Great Lakes and environmental health literacy to inform general outreach information needs. A citizen science engagement with charter boat captains will further develop a near real-time database on cHAB severity in Lake Erie, and the Facilities Core will provide metadata that not only serve the three stated research projects, but also yield a database available to all Great Lakes scientists. The outcomes are to involve community stakeholders and researchers in the Great Lakes on issues regarding human health, climate change and awareness of threats to our fresh water resources.

Methods & Sampling

The vessel will come to a stop when the predetermined sampling station is reached, at a time decided on by the ship's command. The location and time of sampling will be recorded, as well as the environmental conditions. The trained crew members of the vessel will then use a YSI water quality sonde to collect data and that will be recorded. A Secchi disc with measurement indicators every 10 centimeters will then be deployed and recordings will be taken on both the upcast and downcast. A Van Dorn water sampler will then be used to collect water at a depth of 1 meter. Water samples are then transferred to 1 L polyethylene storage bottles or 2 L plastic storage bottles, and stored in a dark place at 4 ^{o}C until picked up by personnel on the same day. The samples will then be transported in coolers containing ice packs to Bowling Green State University (BGSU). Limited water samples were also taken from shore sampling locations, where the methodology remained the same.

Sub-samples for chlorophyll *a* will be taken at BGSU using 0.4 um polycarbonate membranes and a vacuum filtration system. The filter will be placed in a screw cap polyethylene centrifuge tube and stored in a dark freezer until extraction. The samples will be extracted using 90% acetone and kept at -20 ^{o}C for 24 hours, and chlorophyll will be measured using a TD-700 fluorometer (Welschmeyer, 1994).

Total and dissolved nutrient samples will be held in acid-washed 250 mL polyethylene bottles, and stored in a dark freezer at -20 ^{o}C until they are ready to be analyzed. Dissolved nutrient sub-samples will be taken by filtering the agitated sampled water through 0.22 um filters. The data will then be shipped to the National Center for Water Quality Research at Heidelberg University (Tiffin, OH).

Data Processing Description

The meteorological data was taken directly from readings using vessel instruments, marine forecasts, and expert observations. The physico-chemical data was obtained using a YSI 600QS multiparameter sonde, and nutrient concentrations were analyzed at the National Center for Water Quality Research at Heidelberg University. Fluorometric classification of phytoplankton was measured using a FluoroProbe (bbe Moldaenke GmbH, Schwentinental, Germany), and plankton taxonomic classification and cell enumeration was conducted by Aquatic Taxonomy Specialists (Malinta, OH). The extractive chlorophyll was read using a TD-700 Fluorometer (Turner Designs Inc., San Jose, CA), the sample concentrations were then calculated with the equation below, and the averages for each site were calculated from the triplicate samples.

$$Chla = ((reading*volume_{extracted})/volume_{filtered})* \text{ dilution factor}$$

BCO-DMO Processing Description

Version 1 (full YAML in archive)

- Imported "Winter_Lake_Erie_2022_Metadata.csv" into BCO DMO system
- Combined "Date" and "Time" to create "ISO_DateTime_UTC" field in ISO UTC format
- Added flag field for ice collection; removed strings from sample depth column
- Replace "Pseudoa-bae-" with "Pseudanabaena"
- Modified parameter names to conform with BCO-DMO system requirements
- Removed "Ice_thickness_m" parameter as instructed by submitter
- Exported "940112_v1_lake_erie_winter_survey_2023-2024.csv" as main datafile and "winter_lake_erie_2023-

2024_deployments.csv" as supplemental file
- Exported file as "949323_v1_winter_lake_erie_2022.csv"

Version 2

- Submitter submitted updated file that included more values for location, time, and depth
- Imported "949323_v1_winter_lake_erie_2022_rmm[1].csv" into BCO-DMO system
- Where there were new time values, converted to UTC datetime column
- Exported file as "949323_v2_winter_lake_erie_2022.csv"

[table of contents | back to top]

Data Files

File
949323_v2_winter_lake_erie_2022.csv (Comma Separated Values (.csv), 7.13 KB) MD5:1806ca623ea87b3a648cc7a8abd5a639 Primary data file for dataset ID 949323, version 2

[table of contents | back to top]

Parameters

Parameter	Description	Units
Station	Station identifier	unitless
Date	Date of sample collection in YYYY-mm-dd format	unitless
Time	Time of sample collection in Eastern Standard Time in HH:MM format	unitless
ISO_DateTime_UTC	Datetime of sample collection in ISO 8601 format	unitless
Lake	Lake sampled	unitless
Lat	Latitude of sample collection, South is negative	decimal degrees
Long	Longitude of sample collection, West is negative	decimal degrees
Sample_depth	Depth of sample collection	meters (m)
Sample_ice_flag	Indicator that ice was collected as sample and melted for analysis; 1 = ice was collected; 0 = water was collected	unitless
Depth	Depth of water at sampling location	meters (m)

Air_temp	Air temperature	Degrees Celsius
Water_temp	Water temperature measured at surface	Degrees Celsius
Snow_thickness_profile	Depth of snow on the surface ice	meters (m)
Ice_thickness_in	Thickness of ice	inches (in)
Percent_trans_ice_snow	Light transmission through ice and snow	percent (%)
Percent_trans_ice	Light transmission through ice without snow cover	percent (%)
Ice_Narrative	Description of Ice	unitless
Snow_Narrative	Description of Snow	unitless
Wind_speed	Wind speed	Knots (Kt)
Wind_direction	Wind direction in cardinal (compass) directions	unitless
Barometer	Barometer reading	Hg
Chl_A	Average chlorophyll concentrations	ug/L
Cl	Average chloride concentration	ppm
NO2	Average nitrite concentration	mg/L
TP	Average total dissolved phosphorus concentration	ug/L
TN	Average total dissolved nitrogen concentration	mg/L
NH4	Average ammonium concentration	mg/L
Stephanodiscus_bieranus	Cell abundance: Stephanodiscus bieranus	Cells per milliliter (cells/mL)
Stephanodiscus_spp	Cell abundance: Stephanodiscus spp	Cells per milliliter (cells/mL)

Aulacoseira_spp	Cell abundance: Aulacoseira spp	Cells per milliliter (cells/mL)
Fragilaria_spp	Cell abundance: Fragilaria spp	Cells per milliliter (cells/mL)
Nitzschia_sp	Cell abundance: Nitzschia sp	Cells per milliliter (cells/mL)
Staurosira_spp	Cell abundance: Staurosira spp	Cells per milliliter (cells/mL)
Asterionella_formosa	Cell abundance: Asterionella formosa	Cells per milliliter (cells/mL)
Acinoccl_spp	Cell abundance: Acinoccl spp	Cells per milliliter (cells/mL)
Surirella_s	Cell abundance: Surirella s	Cells per milliliter (cells/mL)
Navicula_spp	Cell abundance: Navicula spp	Cells per milliliter (cells/mL)
Diatoma_spp	Cell abundance: Diatoma spp	Cells per milliliter (cells/mL)
Tabellaria_spp	Cell abundance: Tabellaria spp	Cells per milliliter (cells/mL)
Synedra_spp	Cell abundance: Synedra spp	Cells per milliliter (cells/mL)
Gomphonema_sp	Cell abundance: Gomphonema sp	Cells per milliliter (cells/mL)
Hippodonta_spp	Cell abundance: Hippodonta spp	Cells per milliliter (cells/mL)
Phyto_centric_small	Cell abundance: Phytoplankton, centric (<9 um)	Cells per milliliter (cells/mL)
Phyto_centric_large	Cell abundance: Phytoplankton, centric (>9 um)	Cells per milliliter (cells/mL)
Microflagellates	Cell abundance: Microflagellates	Cells per milliliter (cells/mL)
Cryptophyta	Cell abundance: Cryptophyta	Cells per milliliter (cells/mL)

Pyrrophyta	Cell abundance: Pyrrophyta	Cells per milliliter (cells/mL)
Chrysophyta	Cell abundance: Chrysophyta	Cells per milliliter (cells/mL)
Eugnophyta	Cell abundance: Eugnophyta	Cells per milliliter (cells/mL)
Scenedesmus_quadricatum	Cell abundance: Scenedesmus quadricatum	Cells per milliliter (cells/mL)
Tetrastrum_staurogeniaeforme	Cell abundance: Tetrastrum staurogeniaeforme	Cells per milliliter (cells/mL)
Micractinium_pusillum	Cell abundance: Micractinium pusillum	Cells per milliliter (cells/mL)
Ankistrodesmus_spp	Cell abundance: Ankistrodesmus spp	Cells per milliliter (cells/mL)
Actistrum_hantzschii	Cell abundance: Actistrum hantzschii	Cells per milliliter (cells/mL)
Chlorobiflagellates	Cell abundance: Chlorobiflagellates	Cells per milliliter (cells/mL)
Chlamydomos_spp	Cell abundance: Chlamydomos spp	Cells per milliliter (cells/mL)
Dictyosphaerium_spp	Cell abundance: Dictyosphaerium spp	Cells per milliliter (cells/mL)
Golenkenia_spp	Cell abundance: Golenkenia spp	Cells per milliliter (cells/mL)
Tetraedron_spp	Cell abundance: Tetraedron spp	Cells per milliliter (cells/mL)
coccoid_chlorophytes	Cell abundance: coccoid chlorophytes	Cells per milliliter (cells/mL)
Lagerhemia	Cell abundance: Lagerhemia	Cells per milliliter (cells/mL)
Closterium_spp	Cell abundance: Closterium spp	Cells per milliliter (cells/mL)
Pediastrum_spp	Cell abundance: Pediastrum spp	Cells per milliliter (cells/mL)

Selestrum_spp	Cell abundance: Selestrum spp	Cells per milliliter (cells/mL)
Oocystis_spp	Cell abundance: Oocystis spp	Cells per milliliter (cells/mL)
Spermatozopsis_spp	Cell abundance: Spermatozopsis spp	Cells per milliliter (cells/mL)
picoplankton	Cell abundance: picoplankton	Cells per milliliter (cells/mL)
Planktolyngbya_spp	Cell abundance: Planktolyngbya spp	Cells per milliliter (cells/mL)
Aphanothece_spp	Cell abundance: Aphanothece spp	Cells per milliliter (cells/mL)
Aphanocapsa_spp	Cell abundance: Aphanocapsa spp	Cells per milliliter (cells/mL)
Pseudanabaena	Cell abundance: Pseudanabaena	Cells per milliliter (cells/mL)
Microcystis_spp	Cell abundance: Microcystis spp	Cells per milliliter (cells/mL)
cocoid_cyanophyte	Cell abundance: cocoid cyanophyte	Cells per milliliter (cells/mL)
Chroococcus_spp	Cell abundance: Chroococcus spp	Cells per milliliter (cells/mL)
Dolichospermum_spp	Cell abundance: Dolichospermum spp	Cells per milliliter (cells/mL)
Merismopedia_spp	Cell abundance: Merismopedia spp	Cells per milliliter (cells/mL)
Aphanizomenon_flosaquae	Cell abundance: Aphanizomenon flosaquae	Cells per milliliter (cells/mL)

[table of contents | back to top]

Instruments

Dataset-specific Instrument Name	Sample bottles, 1 or 2 L (Nalgene or equivalent), Plastic wash bottle, 500 mL
Generic Instrument Name	Bottle
Dataset-specific Description	Water samples are then transferred to 1 L polyethylene storage bottles or 2 L plastic storage bottles, and stored in a dark place at 4 oC until picked up by personnel on the same day. Total and dissolved nutrient samples will be held in acid-washed 250 mL polyethylene bottles, and stored in a dark freezer at -20 oC until they are ready to be analyzed.
Generic Instrument Description	A container, typically made of glass or plastic and with a narrow neck, used for storing drinks or other liquids.

Dataset-specific Instrument Name	FluoroProbe
Generic Instrument Name	Fluorometer
Dataset-specific Description	Fluorometric classification of phytoplankton was measured using a FluoroProbe (bbe Moldaenke GmbH, Schwentinental, Germany), and plankton taxonomic classification and cell enumeration was conducted by Aquatic Taxonomy Specialists (Malinta, OH).
Generic Instrument Description	A fluorometer or fluorimeter is a device used to measure parameters of fluorescence: its intensity and wavelength distribution of emission spectrum after excitation by a certain spectrum of light. The instrument is designed to measure the amount of stimulated electromagnetic radiation produced by pulses of electromagnetic radiation emitted into a water sample or in situ.

Dataset-specific Instrument Name	National Center for Water Quality Research at Heidelberg University
Generic Instrument Name	Nutrient Autoanalyzer
Dataset-specific Description	Total and dissolved nutrient samples will be held in acid-washed 250 mL polyethylene bottles, and stored in a dark freezer at -20 oC until they are ready to be analyzed. Dissolved nutrient sub-samples will be taken by filtering the agitated sampled water through 0.22 um filters. The data will then be shipped to the National Center for Water Quality Research at Heidelberg University (Tiffin, OH).
Generic Instrument Description	Nutrient Autoanalyzer is a generic term used when specific type, make and model were not specified. In general, a Nutrient Autoanalyzer is an automated flow-thru system for doing nutrient analysis (nitrate, ammonium, orthophosphate, and silicate) on seawater samples.

Dataset-specific Instrument Name	Secchi disc
Generic Instrument Name	Secchi Disc
Dataset-specific Description	A Secchi disc with measurement indicators every 10 centimeters will then be deployed and recordings will be taken on both the upcast and downcast.
Generic Instrument Description	Typically, a 16 inch diameter white/black quadrant disc used to measure water optical clarity

Dataset-specific Instrument Name	TD-700 fluorometer
Generic Instrument Name	Turner Designs 700 Laboratory Fluorometer
Dataset-specific Description	The extractive chlorophyll was read using a TD-700 Fluorometer (Turner Designs Inc., San Jose, CA), the sample concentrations were then calculated with the equation below, and the averages for each site were calculated from the triplicate samples.
Generic Instrument Description	The TD-700 Laboratory Fluorometer is a benchtop fluorometer designed to detect fluorescence over the UV to red range. The instrument can measure concentrations of a variety of compounds, including chlorophyll-a and fluorescent dyes, and is thus suitable for a range of applications, including chlorophyll, water quality monitoring and fluorescent tracer studies. Data can be output as concentrations or raw fluorescence measurements.

Dataset-specific Instrument Name	Vacuum manifold system to accommodate 3 filter funnels
Generic Instrument Name	vacuum manifold
Dataset-specific Description	Vacuum manifold system to accommodate 3 filter funnels
Generic Instrument Description	A device that is used for the vacuum-driven processing of multiwell strips or plates, or spin columns.

Dataset-specific Instrument Name	2 L Van Dorn water sampler
Generic Instrument Name	Van Dorn water sampler
Dataset-specific Description	A Van Dorn water sampler will then be used to collect water at a depth of 1 meter.
Generic Instrument Description	A free-flushing water sample bottle comprising a cylinder (polycarbonate, acrylic or PVC) with a stopper at each end. The bottle is closed by means of a messenger from the surface releasing the tension on a latex band and thus pulling the two stoppers firmly into place. A thermometer can be mounted inside the bottle. One or more bottles can be lowered on a line to allow sampling at a single or multiple depth levels. Van Dorn samplers are suitable for for physical (temperature), chemical and biological sampling in shallow to very deep water. Bottles are typically lowered vertically through the water column although a horizontal version is available for sampling near the seabed or at thermoclines or chemoclines. Because of the lack of metal parts the bottles are suitable for trace metal sampling, although the blue polyurethane seal used in the Alpha version may leach mercury. The Beta version uses white ASA plastic seals that do not leach mercury but are less durable.

Dataset-specific Instrument Name	YSI 600QS multiparameter sonde
Generic Instrument Name	YSI Sonde 6-Series
Dataset-specific Description	The physico-chemical data was obtained using a YSI 600QS multiparameter sonde, and nutrient concentrations were analyzed at the National Center for Water Quality Research at Heidelberg University.
Generic Instrument Description	YSI 6-Series water quality sondes and sensors are instruments for environmental monitoring and long-term deployments. YSI datasondes accept multiple water quality sensors (i.e., they are multiparameter sondes). Sondes can measure temperature, conductivity, dissolved oxygen, depth, turbidity, and other water quality parameters. The 6-Series includes several models. More from YSI.

[table of contents | back to top]

Project Information

Lake Erie Center for Fresh Waters and Human Health (Great Lakes Center)

Website: https://www.bgsu.edu/great-lakes-center.html

Coverage: Laurentian Great Lakes

NSF Award Abstract:
The Lake Erie Center for Fresh Waters and Human Health is a five-year, multi-institutional effort aimed at understanding the environmental factors and ongoing changes that influence the growth and toxicity of cyanobacterial harmful algal blooms (cHABs) in Lake Erie. The Center will support three research projects. Specifically these projects address the following aims: first, how environmental cues promote or constrain the proliferation of cHAB species in mixed populations; second, how environmental cues influence toxin production by cHAB species; third, how other member of the microbial assemblage influence cHAB growth and toxicity. The Center will provide a Community Engagement Core to lead outreach activities that will inform the general public on the effects of cHABs by efforts that include: (1) a community engaged scholarship training for scientists associated with the Center, (2) community-engaged scholarship training for practitioners or community members associated with the Center, and (3) a stakeholder needs assessment for Great Lakes and environmental health literacy to inform general outreach information needs. A citizen science engagement with charter boat captains will further develop a near real-time database on cHAB severity in Lake Erie, and the Facilities Core will provide metadata that not only serve the three stated research projects, but also yield a database available to all Great Lakes scientists. The outcomes are to involve community stakeholders and researchers in the Great Lakes on issues regarding human health, climate change and awareness of threats to our fresh water resources.

The Center is jointly supported by NSF and by the National Institute for Environmental Health Sciences (NIEHS).

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.

[table of contents | back to top]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1840715

[table of contents | back to top]