

Climate and Great Lakes Data Sources

Great Lakes (Hydroclimate) Dashboard: The Great Lakes Environmental Research Laboratory (GLERL) tool provides a visual of lake levels and other variables for each of the Great Lakes. Future projections are available for some variables as well. <https://www.glerl.noaa.gov/data/wlevels/levels.html#observations>

<https://www.glerl.noaa.gov/data/dashboard/portal.html>

Great Lakes Water Budget: A fact sheet from the Graham Sustainability Institute discussing the amount and flow of water within the Great Lakes Basin. <http://graham.umich.edu/product/great-lakes-water-budget>

Fluctuating Great Lakes Water Levels: Another fact sheet from the Graham Sustainability Institute discussing the information, trends, and public perception of the fluctuating water levels.

<http://graham.umich.edu/media/pubs/FluctuatingGreatLakesWaterLevels.pdf>

Understanding Great Lakes water levels: This article explains some of the factors affecting Great Lakes levels (including diversions) as well economic impacts.

https://www.canr.msu.edu/news/understanding_great_lakes_water_levels

Army Corp of Engineers Detroit District: view historic water levels as well as forecasts for Great Lakes as well as connecting rivers. <https://www.lre.usace.army.mil/>

Great Lakes Ice Climate Record: National Weather Service page of data and images.

<https://www.weather.gov/cle/GreatLakesIceclimo>

Great Lakes Ice Cover: from Great Lakes Environmental Research Lab

<https://www.glerl.noaa.gov/data/ice/#historical>

Great Lakes Precipitation, Evaporation, and Runoff:

<http://lre-wm.usace.army.mil/reports/GreatLakes/GLP-ThisMonth.pdf>

<https://www.lre.usace.army.mil/Missions/Great-Lakes-Information/Great-Lakes-Information-2/Basin-Conditions/#lkmih>

Great Lakes Water Temperature from EPA:

https://www.epa.gov/sites/production/files/2016-08/documents/print_great-lakes-2016.pdf

Climate Change in the Great Lakes Region: <http://glisa.umich.edu/gl-climate-factsheet-refs>

https://mrcc.illinois.edu/pubs/docs/GL-2018_Climate-trends-and-impacts-summary.pdf

https://www.ucsus.org/sites/default/files/legacy/assets/documents/global_warming/greatlakes_final.pdf

El Nino vs La Nina Years: <https://ggweather.com/enso/oni.htm>

El Nino Effects on U.S.:

<https://www.climate.gov/news-features/blogs/enso/united-states-el-ni%C3%B1o-impacts-0>

Scientific American article “Climate Change Sends Great Lakes Water Levels Seesawing” (2019)

<https://www.scientificamerican.com/article/climate-change-sends-great-lakes-water-levels-seesawing/>

Issues to consider [Depending on the age and advancement of your students, one or more of these concepts could be explored in conjunctions with this investigation.]

- A. Student need to be aware of **time scale, units of measurement, and area of measurement** (e.g. all lakes or just one lake) when analyzing data. Some graphs for example show anomalies (differences from average) rather than direct measurements.
- B. Difference between “**correlation**” and “**cause and effect**”
- C. **Rate of changes** in addition to simple changes. (e.g. does climate change result in ever higher lake levels or more rapid changes between extreme lake levels)
- D. **Trends vs cycles** over time
- E. **Synergistic complexity** (e.g. two factors together have greater effect than both separately just added together)
- F. **Positive and negative feedback** (e.g. more solar energy absorbed -> more heating of the atmosphere -> less ice -> more exposed water which absorbs more solar energy -> more heating)
- G. The impact of **El Nino/La Nina, Arctic Oscillations, and hurricanes** (moving on shore and into the Great Lakes region as extra-tropical storms) all can impact weather in the region.

Alternative ideas about how you can help student **analyze and think about data**:

<https://www.calacademy.org/educators/collecting-and-analyzing-data>

<http://www.mtscienceducation.org/toolkit-home/scientific-engineering-practices/analyzing-interpreting-data/>

<https://ngss.nsta.org/Practices.aspx?id=4>



Enter query here...

Scope: GLERL Search

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Changing water levels can have both positive and negative impacts on water-dependent industries such as shipping, fisheries, tourism, and coastal infrastructure. GLERL research analyzes components of the Great Lakes water cycle to improve models, which are used by agencies and industry to plan for water management and operations.

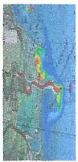


NOAA GLERL and its partners conduct innovative research on the dynamic environments and ecosystems of the Great Lakes and coastal regions to provide information for resource use and management decisions that lead to safe and sustainable ecosystems, ecosystem services, and human communities.

Research Programs



Ecosystem Dynamics: Collects ecological data and conducts experimental research on the ecosystem processes of the Great Lakes.



Integrated Physical and Ecological Modeling and Forecasting: Conducts research to predict the effects of changes on the Great Lakes system.



Observing Systems and Advanced Technology: Develops and operates technology for scientific observations in the Great Lakes.

Tweets by @NOAA_GLERL

NOAA Great Lakes Environmental Research Laboratory Retweeted



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@NOAA_GLERL

Replying to @NOAA_GLERL

Why model the movement of fish larvae? Alewife is a primary food source for stocked salmon in the #GreatLakes, supporting a multi-billion dollar recreational fishery. Understanding alewife distribution in the lakes will ultimately help improve fishery management.

@USFWS



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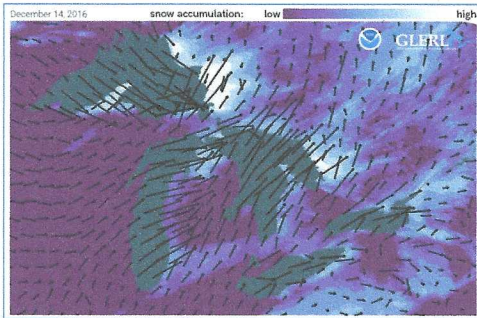
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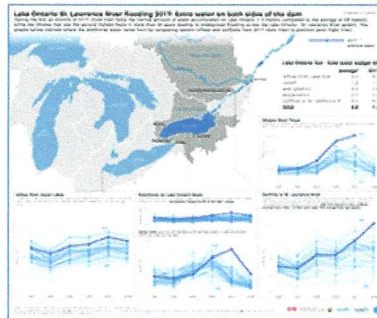
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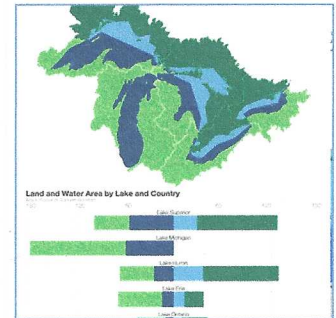
Infographics



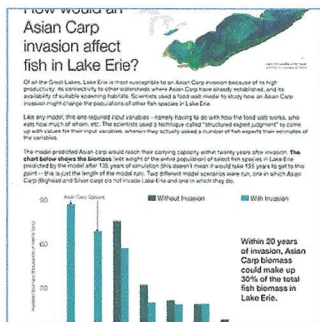
[Lake Effect Snow - December 2016](#)



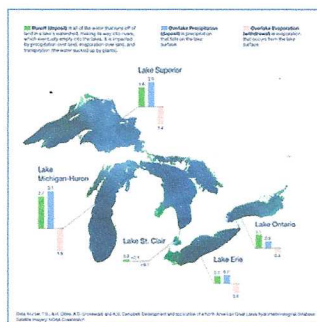
[Lake Ontario-St. Lawrence River Flooding 2017](#)



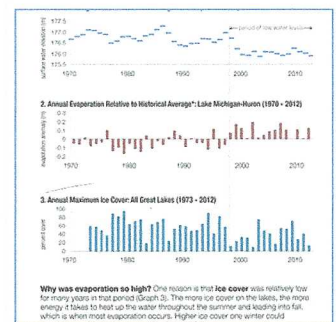
[Sharing the Great Lakes Basin](#)



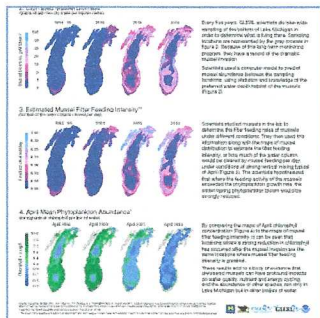
[Potential Asian Carp Impacts](#)



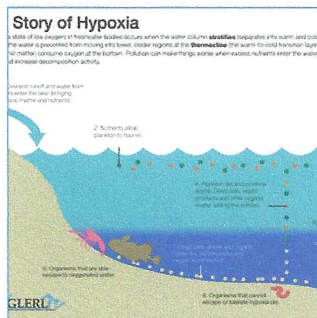
[Water Budgets](#)



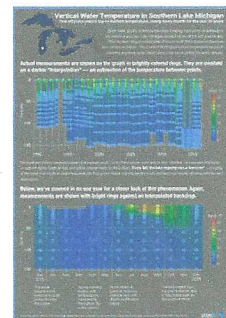
[Record Setting Water Level Rise](#)



[Invasive Mussels and Lake Productivity](#)



[The Story of Hypoxia](#)



[Vertical Water Temperature in Southern Lake Michigan](#)





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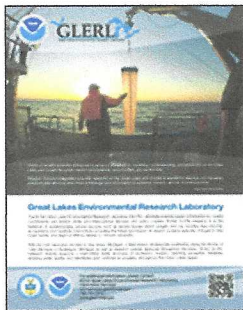
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NOAA PROGRAMS in the GREAT LAKES



Great Lakes Environmental Research Laboratory, Mission and Research Programs



Lake Michigan Field Station

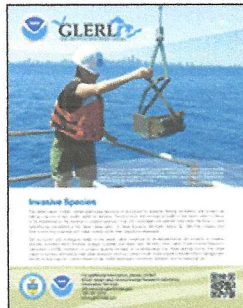


NOAA in the Great Lakes

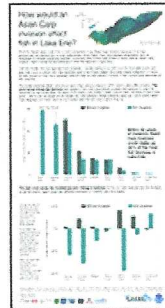


Great Lakes Restoration at NOAA and GLERL

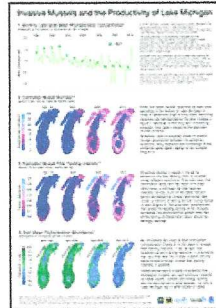
AQUATIC INVASIVE SPECIES



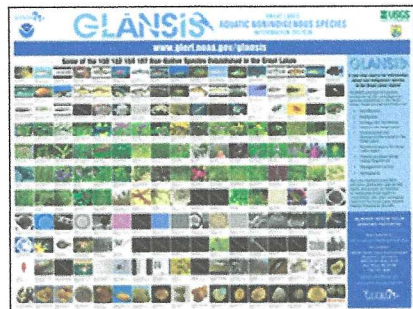
Aquatic Invasive Species Research at GLERL



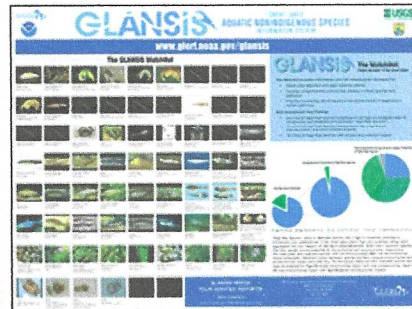
How would an Asian Carp invasion affect fish in Lake Erie?



Invasive Mussels and the Productivity of Lake Michigan

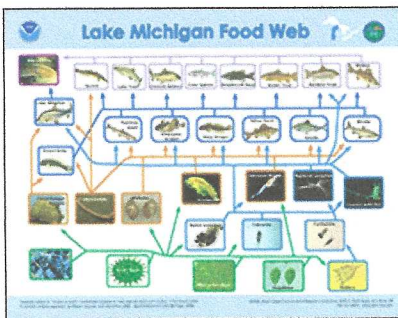


GLANSIS (Poster)

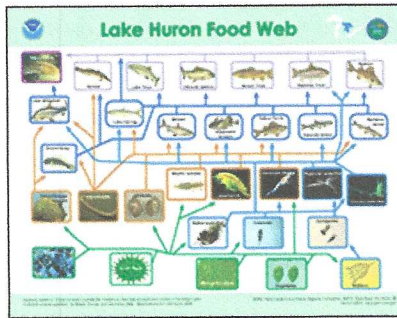


GLANSIS Watchlist (Poster)

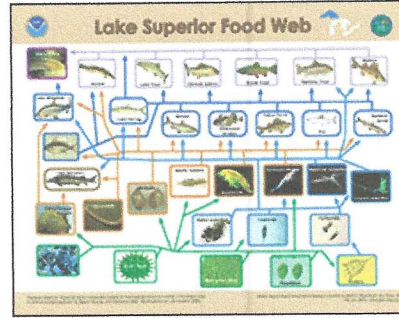
GREAT LAKES FOODWEB



Lake Michigan Foodweb



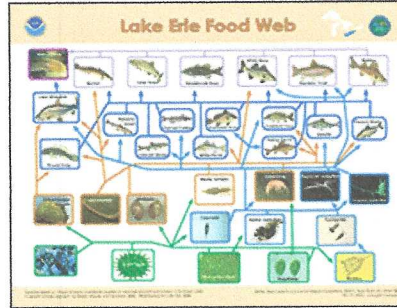
Lake Huron Foodweb



Lake Superior Foodweb



Lake Ontario Foodweb



Lake Erie Foodweb



Lake St. Clair Foodweb

HARMFUL ALGAL BLOOMS (HABs)



HABs Research at GLERL



Harmful Algal Blooms in the Great Lakes

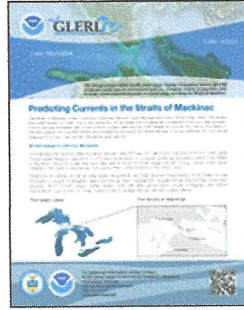
CURRENTS, TEMPERATURE, and WATER LEVELS



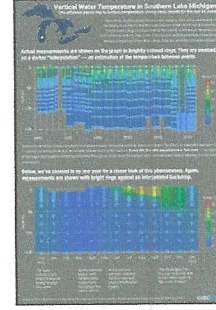
Water Levels Research at GLERL



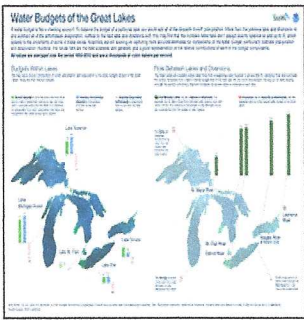
MET Stations and Webcams



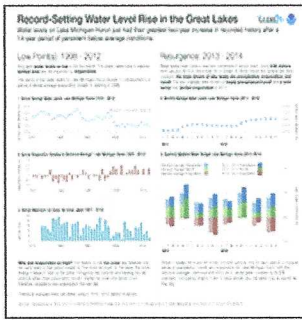
Predicting Currents in the Straits of Mackinac



Vertical Water Temperature in Southern Lake Michigan

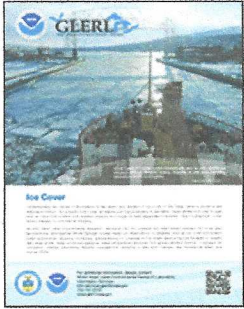


Great Lakes Water Budgets

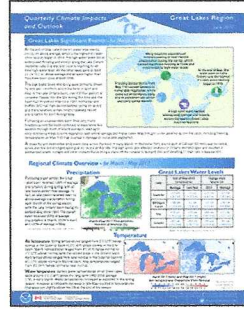


Record Setting Water Level Rise in the Great Lakes

ICE, and CLIMATE IMPACTS

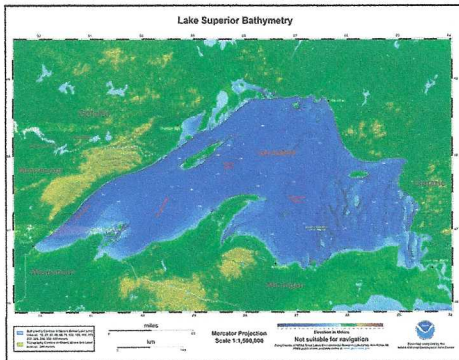


Ice Cover Research at GLERL

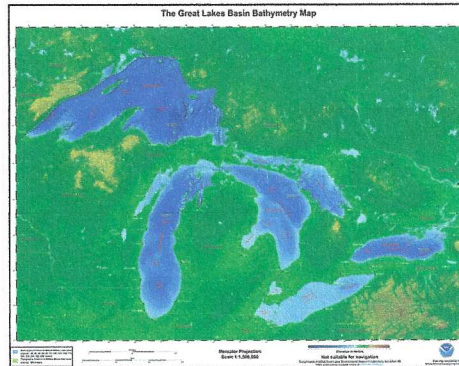


Quarterly Climate Impacts and Outlook for the Great Lakes Region (external link)

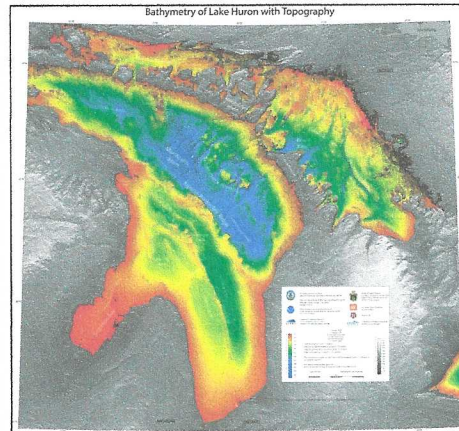
GREAT LAKES BATHYMETRY



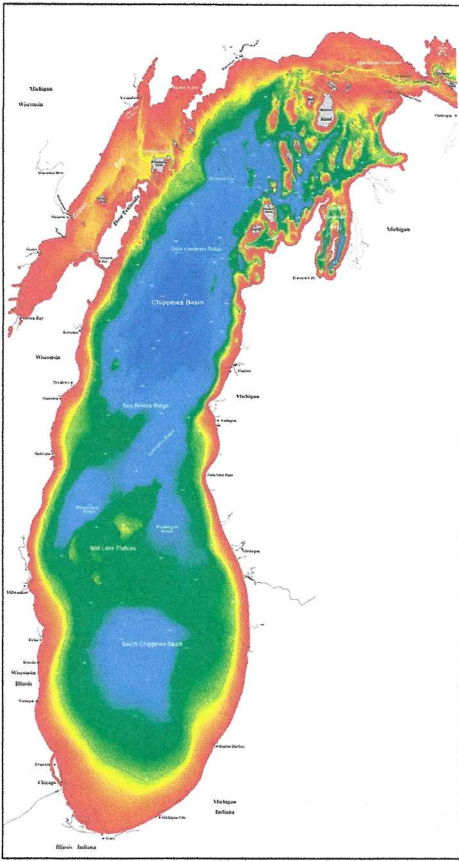
Bathymetry of Lake Superior (poster)



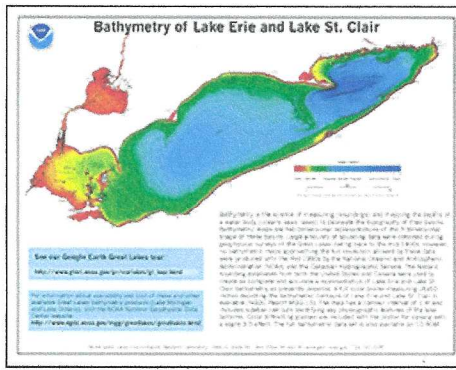
Bathymetry of Great Lakes Basin (poster)



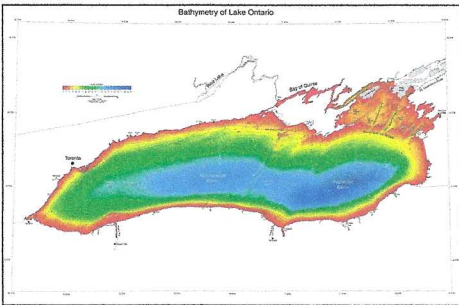
Bathymetry of Lake Huron (image only)



Bathymetry of Lake Michigan (image only)

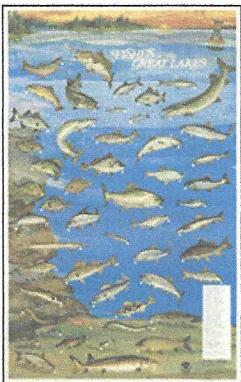


Bathymetry of Lake Erie and Lake St. Clair (poster)



Bathymetry of Lake Ontario (image only)

OTHER



Fishes of the Great Lakes (poster)

