

# **GLENDAGIS:**

**AN ON-LINE, INTERACTIVE GIS TOOL FOR  
ACCESSING, VIEWING AND USING GREAT  
LAKES WATER QUALITY MONITORING DATA**

Andriy V. Zhalnin, Jacqueline Adams,  
Elizabeth Hinchey Malloy, and Richard L. Farnsworth

# Great Lakes National Program Office



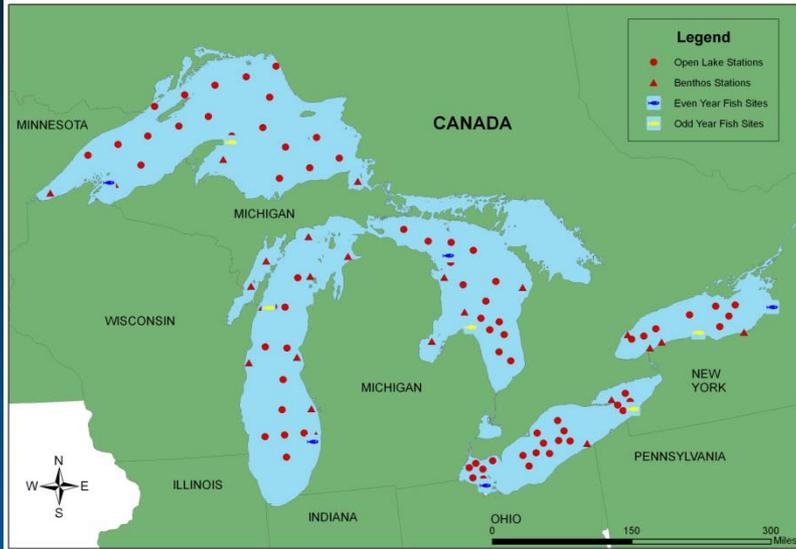
# U.S. EPA Great Lakes Program Mission

- Protect and restore the physical, chemical, and biological integrity of the Great Lakes
- Monitor water, aquatic life, sediments, and air to assess the health of the Great Lakes
- Sample the Great Lakes with the *R/V Lake Guardian*



# Limnology Program

GLNPO'S Water Quality Survey Sampling Stations



Sampling Stations



40+ parameters/analytes measured



# Great Lakes Environmental Database (GLENDA)

- Developed to provide data entry, storage, access and analysis capabilities to meet the needs of mass balance modelers and other potential users of Great Lakes data.
- All GLNPO data is currently housed in GLENDAs
- [http://www.epa.gov/greatlakes/monitoring/data\\_proj/glenda/glenda\\_query\\_index.html](http://www.epa.gov/greatlakes/monitoring/data_proj/glenda/glenda_query_index.html)

# How to Get the Data out to the Public

- Have 20+ years of data
- Can download excel sheets, but wanted more visualization for the data
- Local Decision Maker can provide a means for a Geodatabase so that people can match data up with the locations in the lakes
- Data can be pulled from multiple agencies to create a multi-layer geodatabase

# GLNPO'S Water Quality Survey Sampling Stations



# Why a GIS service?

1. Improve accessibility of GLEND A database (water quality samples)
  - Improve search time
  - Make search more focused with option to filter data
  - Allow user to select data based on visual information
2. Provide online mapping tool for the GLEND A database
  - Provide ancillary mapping data – terrestrial and aquatic
  - Allow user to enhance and customize map using website tools
  - Allow user to save, download and print customized maps

# Current GLEND A database

Great Lakes Monitoring - Windows Internet Explorer provided by Yahoo!

US EPA http://www.epa.gov/glnpo/monitoring/data\_proj/glenda/index.html

U.S. ENVIRONMENTAL PROTECTION AGENCY

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### Great Lakes Environmental Database

[GLEND A Query System](#)  
Retrieve data from GLEND A

[Reporting Standards](#)  
Guidance on specific formats for data submissions

[Allowable Codes Tables](#)  
Tables of GLEND A-recognized codes

#### About the Great Lakes Environmental Database

The [Great Lakes National Program Office](#) (GLNPO) collects environmental data on a wide variety of constituents in water, biota, sediment, and air. Long after the studies are completed, the data remain and must be managed. Central to the data management effort is a computerized relational database system to house [Lake Michigan Mass Balance](#) and other project results. That system, the **Great Lakes Environmental Database (GLEND A)**, was developed to provide data entry, storage, access and analysis capabilities to meet the needs of mass balance modelers and other potential users of Great Lakes data.

Development of GLEND A began in 1993 with a logical model based on the modernized STORET concept and requirements analysis. This was followed in 1994-1995 with the development of field and laboratory reporting requirements, preliminary reference tables, and the initial creation of the physical tables. Recent years have seen the completion of the physical database and most reference tables, the creation of software tools to access the database, and the creation and use of upload routines to load Lake Michigan Mass Balance data.

#### Subject Areas

GLEND A was designed to include data from four subject areas: project/organization, station/location, field monitoring activities, and results.

- The **project/organization** subject area includes such information as the name and description of the project, the contract, co-operative agreement or grant that the data were collected under, the organization and persons involved in the project along with their mailing addresses, electronic addresses, and telephone numbers.
- The **station/location** subject area includes such information as the name of the sampling station and its description, the latitude and longitude of stations and any offsets or areas, the geopositioning technique and accuracy, and names and codes of counties, states, and similar geographic information.
- The **field monitoring activities** subject area includes such information as visits to stations for monitoring, any observations or measurements taken during sampling or in the lab, and any remarks during field sampling or lab activities.
- The **results** subject area includes such information as analytical results, analytes, units of measure, correction factors, quality assurance codes and flags, and any remarks on laboratory analyses.

```
graph TD
    PERSON[PERSON  
%_org_glnpo_code] --- ORGANIZATION[ORGANIZATION  
glnpo_code]
    PERSON --- PROJ_SPEC_STUDY[PROJ_SPEC_STUDY  
glnpo_code  
%_organization_glnpo_code]
    ORGANIZATION --- PROJ_SPEC_STUDY
    ORGANIZATION --- SAMP_SOURCE_MEASURE[SAMP_SOURCE_MEASURE  
%_fma_code_int  
%_fma_code_int]
    ORGANIZATION --- FMA[FMA  
%_stn_visit_code_int  
code_int]
    ORGANIZATION --- LAB_ACTIVITY[LAB_ACTIVITY  
code_int  
%_fma_code_int  
%_lab_%_org_glnpo_code]
    ORGANIZATION --- LABORATORY[LABORATORY  
%_org_glnpo_code]
    PROJ_SPEC_STUDY --- FMA
    PROJ_SPEC_STUDY --- RESULT[RESULT  
code_int  
%_lab_activity_code_int  
%_fma_code_int]
    FMA --- STN_VISIT[STN_VISIT  
%_station_glnpo_code  
code_int]
    STN_VISIT --- LAB_ACTIVITY
    STN_VISIT --- STATION[STATION  
glnpo_code]
    STATION --- ABS_LOCN_PT[ABS_LOCN_PT  
%_station_glnpo_code]
```

# Current GLENDa database

The screenshot shows a web browser window titled "GLENDa Query System (GLNPO) - Windows Internet Explorer provided by Yahoo!". The address bar contains the URL: <https://cdx.epa.gov/glnpo/Query.do?method=start&serviceName=GetWQSResults>. The page header includes the EPA logo and the text "U.S. Environmental Protection Agency" and "Great Lakes Environmental Database (GLENDa)". A search bar is present with a "GO" button. The main content area is titled "GLENDa Query System" and contains a description: "The Great Lakes National Program Office conducts monitoring programs that sample the water, aquatic life, sediments, and air in order to assess the health of the Great Lakes ecosystem." Below this is a form for querying the database. The form includes a "Select Query:" dropdown menu set to "Water Quality Survey Data", a "Year:" dropdown menu with options 1996, 1997, 1998, and 1999, a "Lake:" dropdown menu with options Erie, Huron, Michigan, and N/A, a "Station:" dropdown menu with options ER01: Open Lake sampling station, ER09: Open Lake sampling station, ER09H8501: Open Lake sampling station (pre-LMMB), and ER09H8502: Open Lake sampling station (pre-LMMB), and an "Analyte Code:" dropdown menu with options Seabird: Trans-h, Seabird: pH, Secchi: Secchi, and Temperature: Temp. At the bottom of the form are two buttons: "Query GLENDa Database" and "Clear Selection".

**GLENDa Query System**

The Great Lakes National Program Office conducts monitoring programs that sample the water, aquatic life, sediments, and air in order to assess the health of the Great Lakes ecosystem.

Make 1 or more selections in each parameter box below as desired (You do not have to make a selection in every box. Not making a selection is equivalent to selecting all in that box).

Select Query: Water Quality Survey Data

Year: 1996, 1997, 1998, 1999

Lake: Erie, Huron, Michigan, N/A

Station: ER01: Open Lake sampling station, ER09: Open Lake sampling station, ER09H8501: Open Lake sampling station (pre-LMMB), ER09H8502: Open Lake sampling station (pre-LMMB)

Analyte Code: Seabird: Trans-h, Seabird: pH, Secchi: Secchi, Temperature: Temp

Query GLENDa Database Clear Selection

~1,200 sample point locations,  
>400,000 records  
Time line: 1983-2008

# Current GLENDa database

GLENDa Query System (GLNPO) - Windows Internet Explorer provided by Yahoo!

https://cdx.epa.gov/glnpo/Query.do?method=delay

U.S. Environmental Protection Agency

## Great Lakes Environmental Database (GLENDa)

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Please wait, the system processing your request.

**Waiting time: ~20 sec**

Done Internet 100%

- GLNPO Links
  - GLENDa Query System
  - Transaction History
- GLENDa References
  - Allowable Codes
  - Monitoring Stations
- Monitoring Links
  - R/V Lake Guardian
  - Indicators
  - Limnology
  - Sediments
  - Air
  - Data Projects
  - Fish
  - Beach closings
  - Plankton
  - Biology
  - Benthic invertebrates
- CDX Links
  - About CDX
  - MyCDX
  - Inbox
  - Change Password
  - Frequently Asked Questions
  - Help & Support
  - CDX Home
  - Terms & Conditions
  - Logout

# Current GLENDa database

GLENDa Query System (GLNPO) - Windows Internet Explorer provided by Yahoo!

https://cdx.epa.gov/glnpo/Query.do?method=delay

GLENDa Query System (GLNPO)



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### Query Result for: Water Quality Survey Data

Here you will see the results of the executed query (No more than 1000 records will be displayed).  
You can see ALL records by clicking on the [Download](#) link.

**298 Records found, displaying 1 to 20.**  
[[First/Prev](#)] [1](#), [2](#), [3](#), [4](#), [5](#), [6](#), [7](#), [8](#) [[Next/Last](#)]

Year	Month	Lake	Cruise ID	Visit ID	Station	Latitude	Longitude	Sampling Date	Time Zone	Station Depth M	Sample depth M	Depth Code	Medium	QC I
1996	April	Erie		9611ER 09	ER09	42.538333	-79.616667	1996/04/16 12:40	EDT	49.348	1.5	Surface	surface water	rou
1996	April	Erie		9611ER 09	ER09	42.538333	-79.616667	1996/04/16 12:40	EDT	49.348	4.901	Five Meter	surface water	rou
1996	April	Erie		9611ER 09	ER09	42.538333	-79.616667	1996/04/16 12:40	EDT	49.348	10.142	Ten Meter	surface water	rou
1996	April	Erie		9611ER 09	ER09	42.538333	-79.616667	1996/04/16 12:40	EDT	49.348	19.985	Twenty Meter	surface water	rou
1996	April	Erie		9611ER 09	ER09	42.538333	-79.616667	1996/04/16 12:40	EDT	49.348	25	Middle Depth	surface water	rou
1996	April	Erie		9611ER 09	ER09	42.538333	-79.616667	1996/04/16 12:40	EDT	49.348	40	Bottom Minus 10	surface water	rou
1996	April	Erie		9611ER 09	ER09	42.538333	-79.616667	1996/04/16 12:40	EDT	49.348	48.5	Bottom Minus	surface water	rou
1996	April	Erie		9611ER 10	ER10	42.68	-79.691667	1996/04/16 10:40	EDT	31.373	1	Surface	surface water	rou
1996	April	Erie		9611ER 10	ER10	42.68	-79.691667	1996/04/16 10:40	EDT	31.373	5.24	Five Meter	surface water	rou
1996	April	Erie		9611ER 10	ER10	42.68	-79.691667	1996/04/16 10:40	EDT	31.373	10.093	Ten Meter	surface water	rou
1996	April	Erie		9611ER 10	ER10	42.68	-79.691667	1996/04/16 10:40	EDT	31.373	16	Middle Depth	surface water	rou
1996	April	Erie		9611ER 10	ER10	42.68	-79.691667	1996/04/16 10:40	EDT	31.373	21.144	Twenty Meter	surface water	rou
1996	April	Erie		9611ER 10	ER10	42.68	-79.691667	1996/04/16 10:40	EDT	31.373	31	Bottom Minus	surface water	rou
1996	April	Erie		9611ER 15	ER15M	42.516667	-79.893333	1996/04/16 08:38	EDT	61.682	1	Surface	surface water	rou
1996	April	Erie		9611ER 15	ER15M	42.516667	-79.893333	1996/04/16 08:38	EDT	61.682	5	Five Meter	surface water	rou
1996	April	Erie		9611ER 15	ER15M	42.516667	-79.893333	1996/04/16 08:38	EDT	61.682	10	Ten Meter	surface water	rou
1996	April	Erie		9611ER 15	ER15M	42.516667	-79.893333	1996/04/16 08:38	EDT	61.682	20	Twenty Meter	surface water	rou
1996	April	Erie		9611ER 15	ER15M	42.516667	-79.893333	1996/04/16 08:38	EDT	61.682	30	Thirty Meter	surface water	rou
1996	April	Erie		9611ER 15	ER15M	42.516667	-79.893333	1996/04/16 08:38	EDT	61.682	40	Fourty Meter	surface water	rou
1996	April	Erie		9611ER 15	ER15M	42.516667	-79.893333	1996/04/16 08:38	EDT	61.682	52	Bottom Minus 10	surface water	rou

Internet 100%

# GLEND A-GIS webpage: The flow



**SDE  
database**

**ArcIMS  
service**

**Geocortex  
Web framework**

**Table of  
WQS data**

**Map of  
WQS data**

<http://ldm.agriculture.purdue.edu/imf/imf.jsp?site=GLEND A>

# Tools and layers on GLENDa-GIS website

The screenshot displays the 'Great Lakes Water Quality Data Mapping Tool' in a Mozilla Firefox browser window. The URL is <http://devlwm.agriculture.purdue.edu/imf/imf.jsp?site=GLENDa>. The interface includes a navigation menu with 'About', 'Layers', 'Legend', 'Locate', 'Keymap', 'Bookmarks', 'Print PDF', 'Help', and 'Exit'. A toolbar below the menu contains icons for search, zoom, pan, and other map functions. The main map area shows the Great Lakes region with state boundaries and labels for Minnesota, Wisconsin, Michigan, Illinois, Indiana, Ohio, Pennsylvania, and New York. A scale bar indicates 105 miles. A 'Map Layers' panel on the right lists 'Water Quality Samples', 'Terrestrial features', 'Bathymetry', and 'Depth and relief', with 'Automatically Refresh Map' checked. The status bar at the bottom shows a scale of 1:5,978,329, a 'go' button, a 'Quick View' dropdown, a 'Map Tool' set to 'Zoom In', and an 'Active Layer' status of '\* NO ACTIVE LAYER \*'. The page is powered by Geocortex.

Great Lakes Water Quality Data Mapping Tool - Mozilla Firefox

http://devlwm.agriculture.purdue.edu/imf/imf.jsp?site=GLENDa

Jump to: Return to start page

About Layers Legend Locate Keymap Bookmarks Print PDF Help Exit

Water Quality Samples  
Terrestrial features  
Bathymetry  
Depth and relief

Automatically Refresh Map

Hints: (click to expand)

Scale: 1:5,978,329 go Quick View: Select a location Map Tool: Zoom In Active Layer: \* NO ACTIVE LAYER \*

Map center: 1068500, 970000

powered by Geocortex

# Maps of terrestrial features

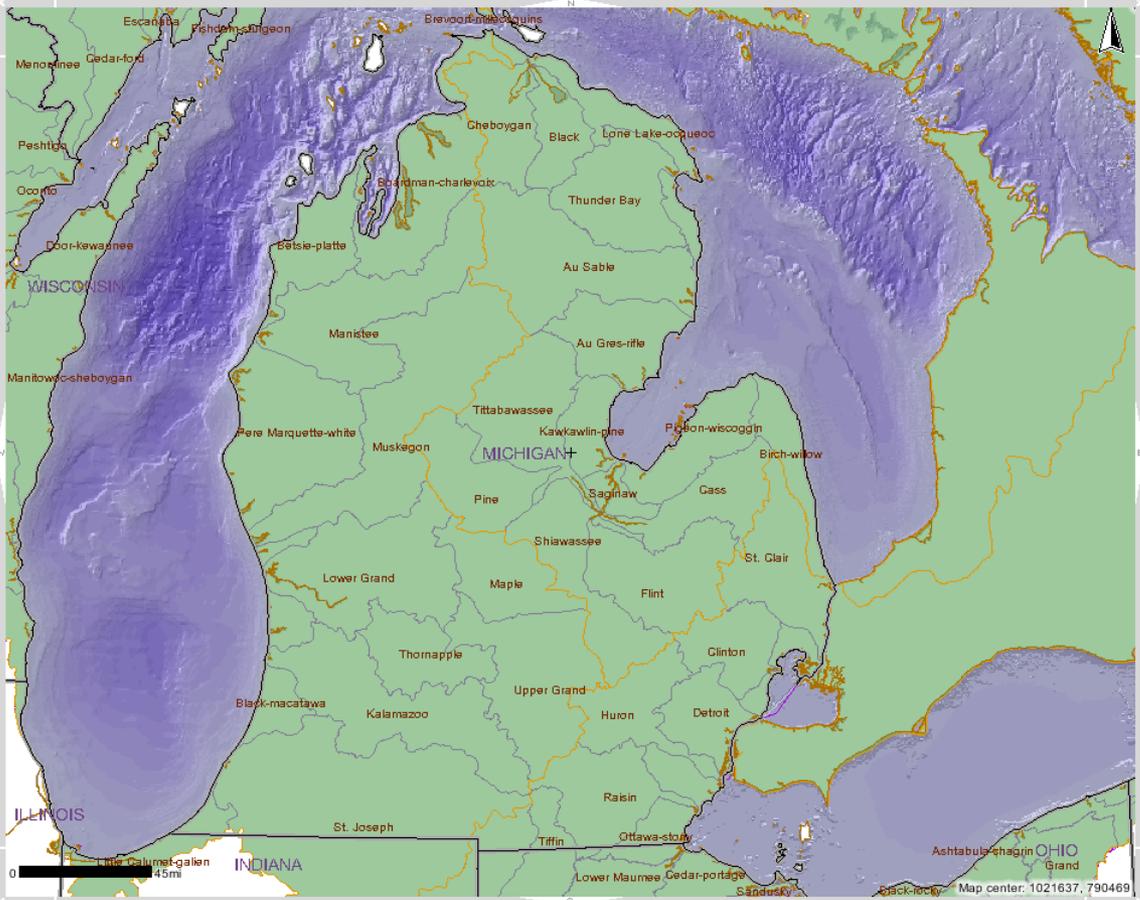
Great Lakes Water Quality Data Mapping Tool - Mozilla Firefox

http://devltdm.agriculture.purdue.edu/imf/imf.jsp?site=GLEND

Geocortex® IMF 5.2

Jump to: Return to start page

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Water Quality Samples

Terrestrial features

- Hydrological units (8 digit) M
- Great Lakes basins M
- Great Lakes shoreline M
- Great Lakes states M
- Counties - Ohio M
- Counties - New York M
- Counties - Minnesota M
- Counties - Wisconsin M
- Counties - Pennsylvania M
- Counties - Michigan M
- Counties - Indiana M
- Counties - Illinois M

Bathymetry

Depth and relief

Automatically Refresh Map

Hints: (click to expand)

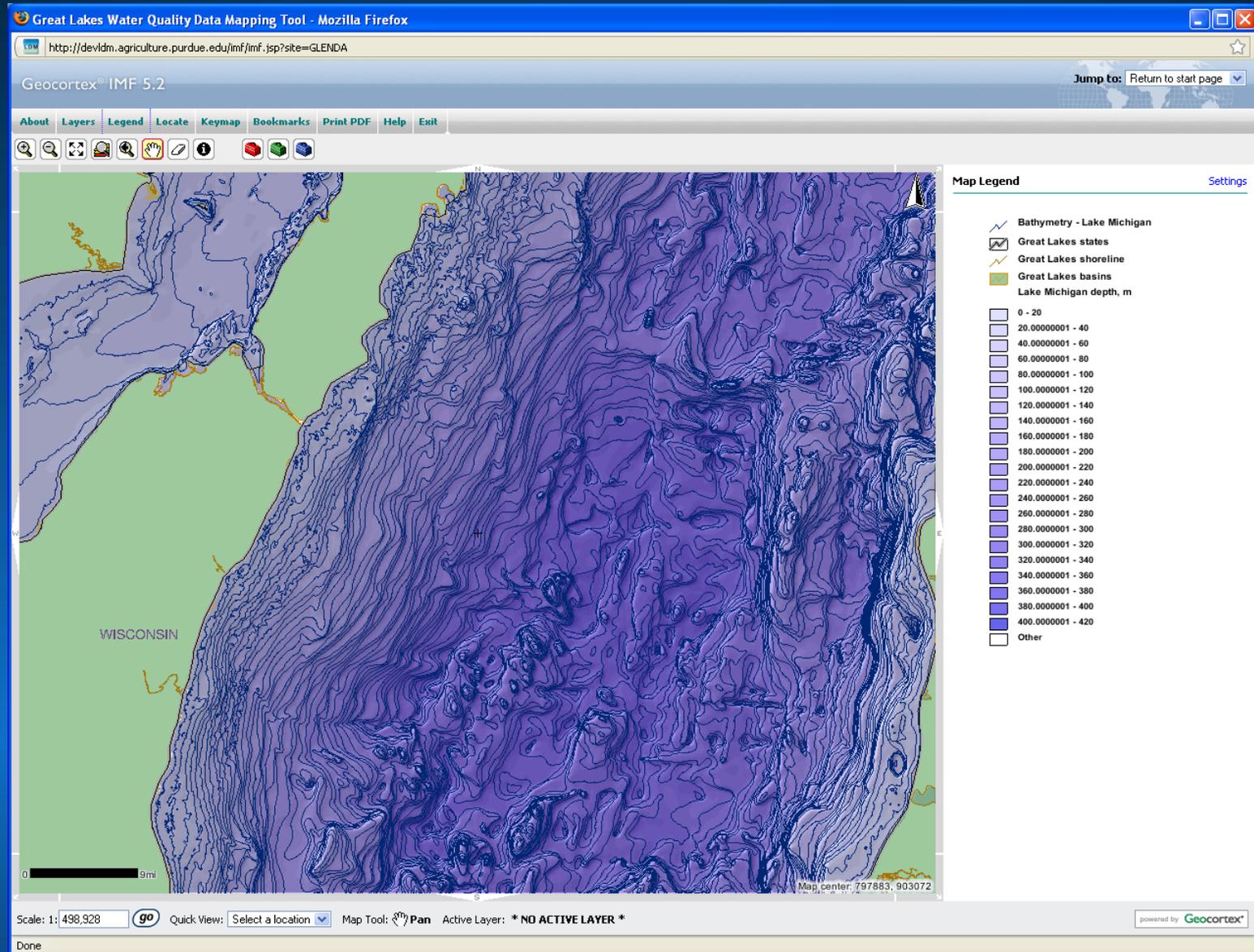
Scale: 1: 2,494,642

Quick View: Select a location

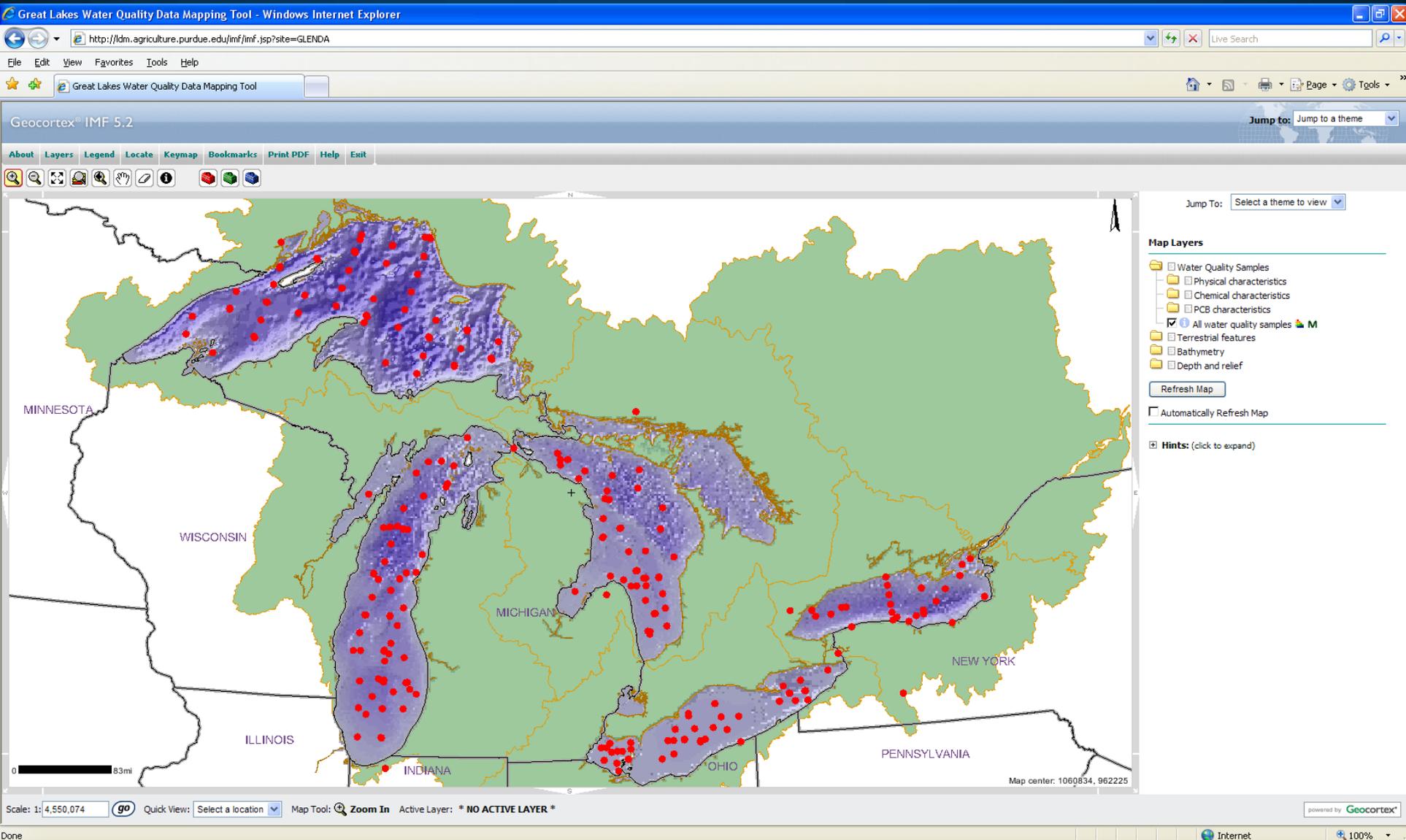
Map Tool: Pan Active Layer: \* NO ACTIVE LAYER \*

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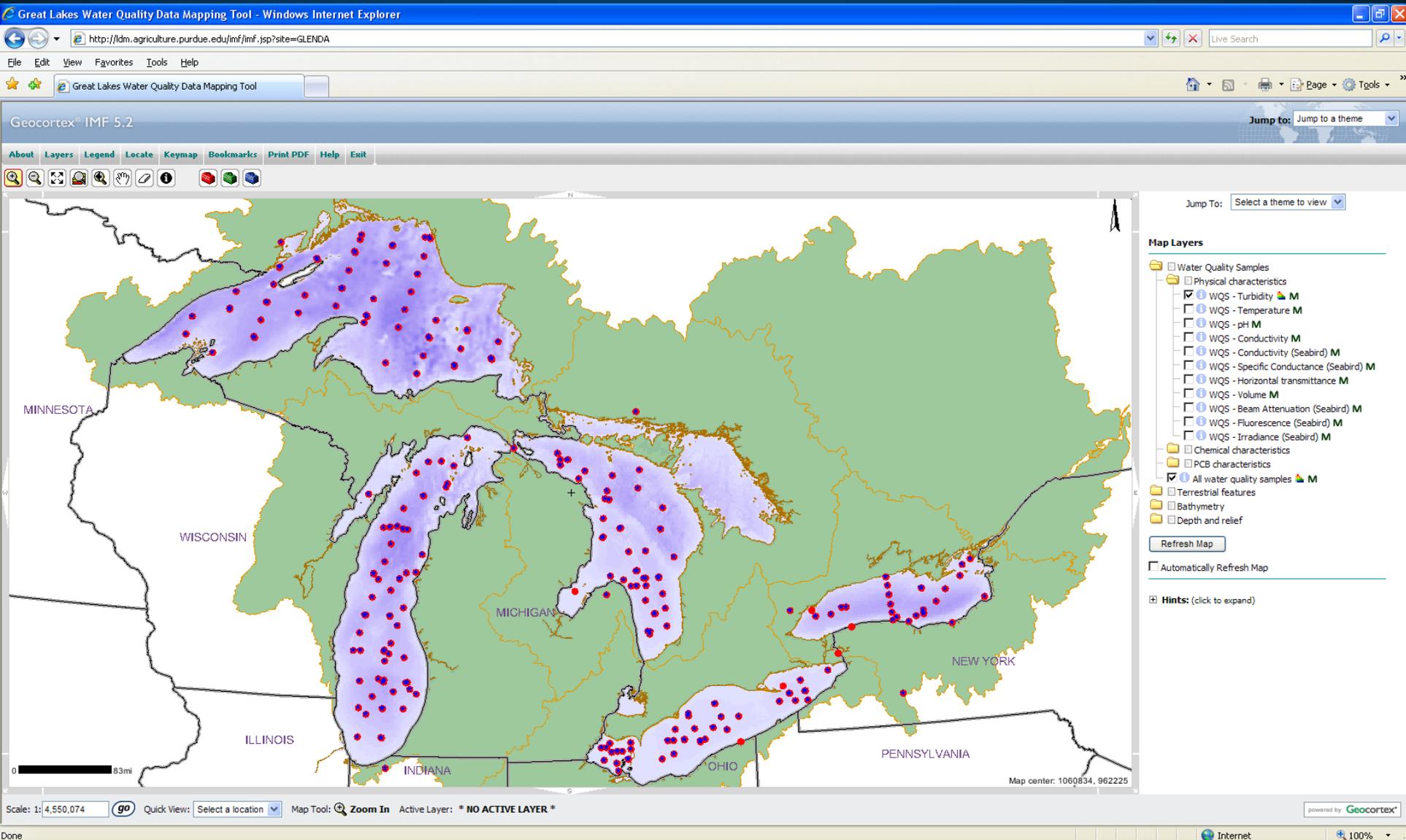
# Maps of aquatic features



# GLENDA water quality survey data:



# GLENDa water quality data: Physical characteristics



# GLENDa water quality data: Chemical characteristics

Great Lakes Water Quality Data Mapping Tool - Windows Internet Explorer

http://ldm.agriculture.purdue.edu/imf/imf.jsp?site=GLENDa

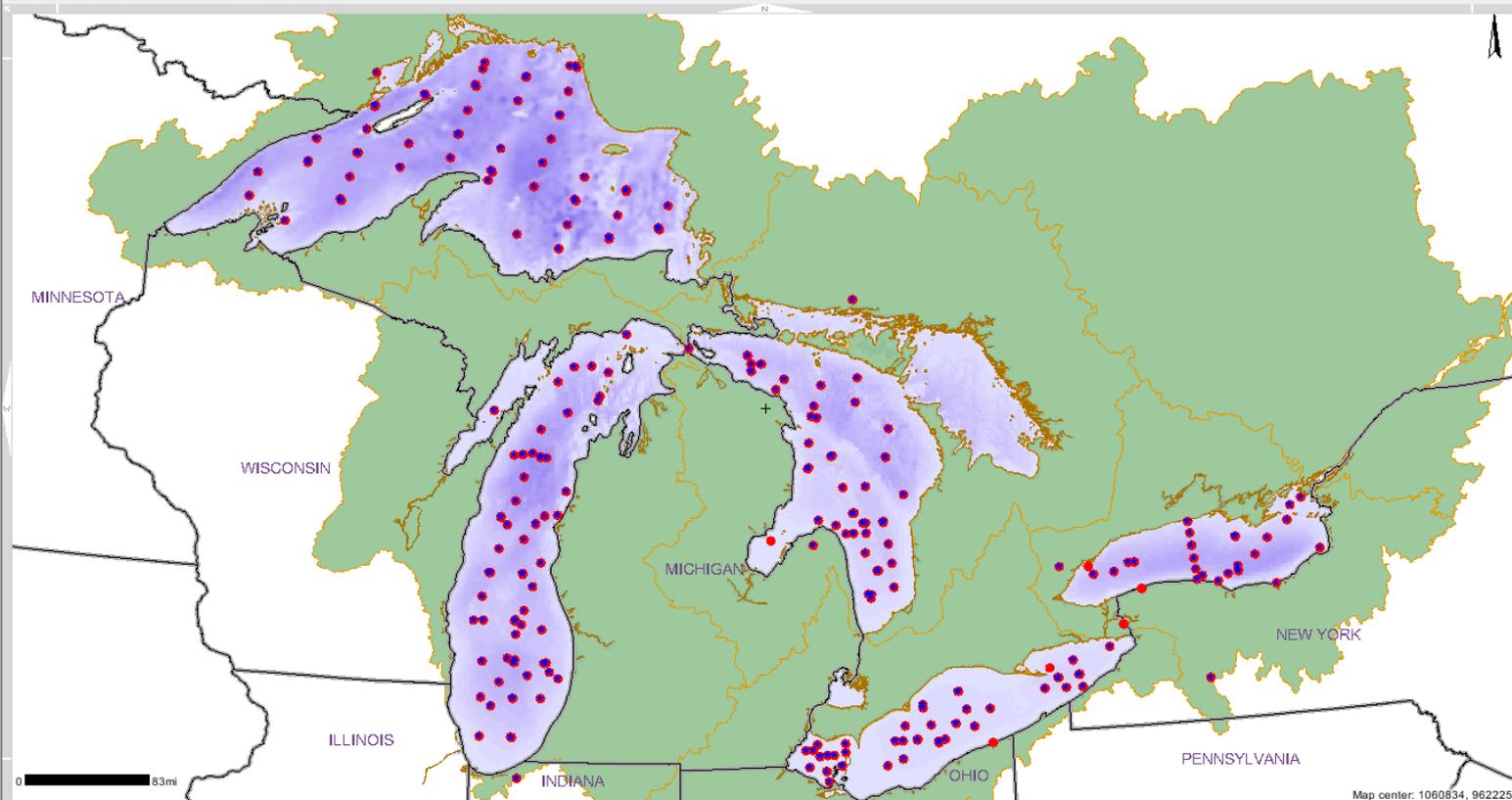
File Edit View Favorites Tools Help

Great Lakes Water Quality Data Mapping Tool

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Jump to: Jump to a theme

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Jump To: Select a theme to view

### Map Layers

- Water Quality Samples
  - Physical characteristics
    - Chemical characteristics
      - WQS - alpha-Chlordane
      - WQS - alpha-HCH (aLindane)
      - WQS - Alkalinity, Total as CaCO3
      - WQS - Calcium
      - WQS - Chlorophyll-a
      - WQS - Chloride
      - WQS - cis-Nonachlor
      - WQS - Carbon, Organic
      - WQS - Chlorthal-dimethyl
      - WQS - Total DDD
      - WQS - Total DDE
      - WQS - Total DDT
      - WQS - gamma-Chlordane
      - WQS - gamma-HCH (Lindane)
      - WQS - Hexachlorobenzene
      - WQS - Heptachlor Epoxide
      - WQS - Magnesium
      - WQS - Mirex
      - WQS - Sodium
      - WQS - Ammonia-Nitrogen
      - WQS - Nitrogen, Total Oxidized
      - WQS - Oxygen, Dissolved
      - WQS - Octachlorostyrene
      - WQS - Oxychlorane
      - WQS - Phosphorus, Orthophosphorus as P
      - WQS - Phosphorus, Total as P
      - WQS - Silica, Total
      - WQS - Silica, Dissolved as Si
      - WQS - Nitrogen, Total Kjeldahl
      - WQS - trans-Nonachlor
      - WQS - total solids
    - PCB characteristics
  - All water quality samples
  - Terrestrial features
  - Bathymetry

Scale: 1:4,550,074 Quick View: Select a location Map Tool: Zoom In Active Layer: \*NO ACTIVE LAYER\*

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Internet

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# GLENDa water quality data: PCB samples

Great Lakes Water Quality Data Mapping Tool - Windows Internet Explorer

http://ldm.agriculture.purdue.edu/imf/imf.jsp?site=GLENDa

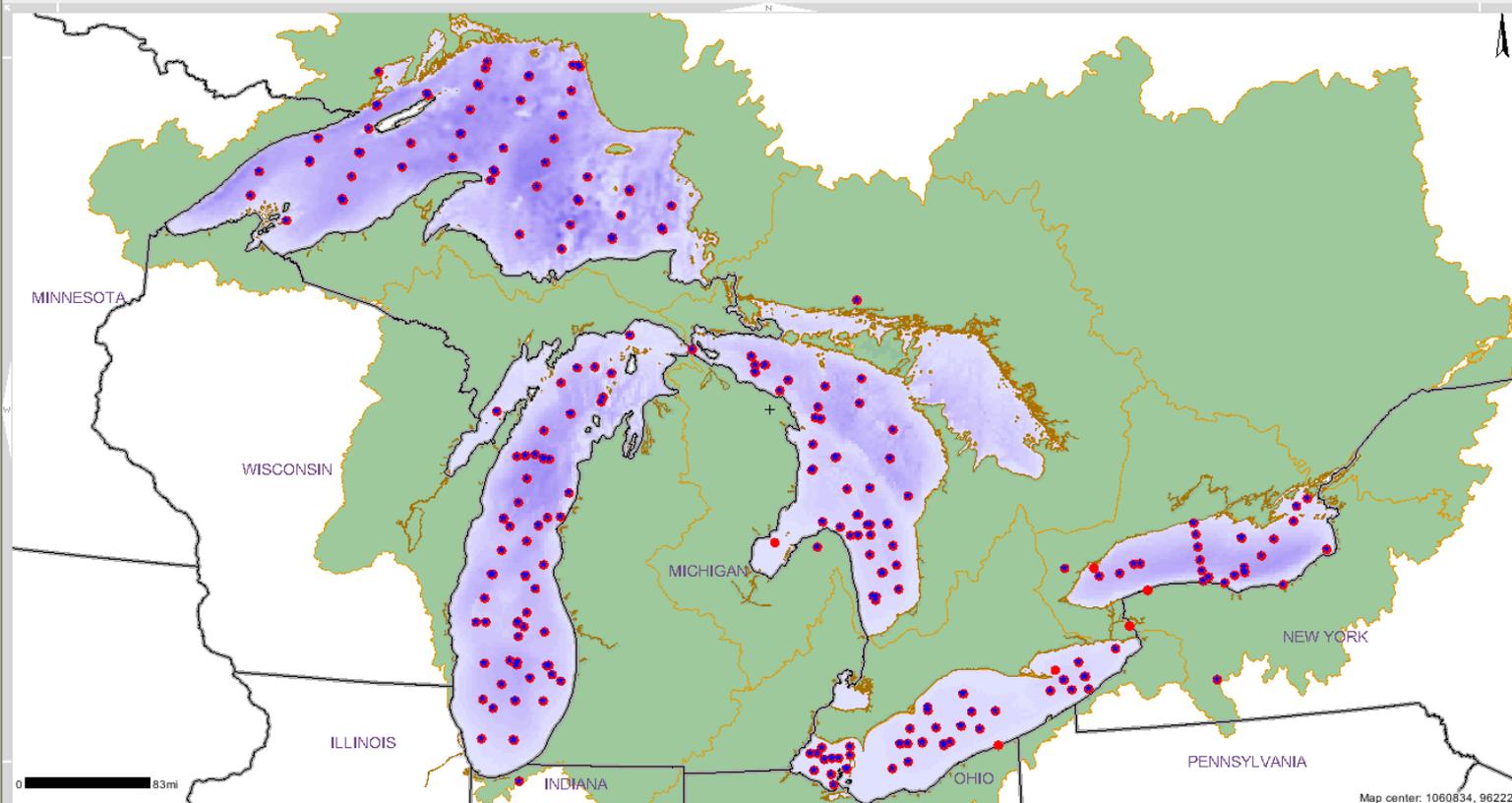
File Edit View Favorites Tools Help

Great Lakes Water Quality Data Mapping Tool

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Jump To: Select a theme to view

### Map Layers

- Water Quality Samples
  - Physical characteristics
  - Chemical characteristics
    - PCB characteristics
      - WQS - 2,3'-Dichlorobiphenyl
      - WQS - Isomer/Congener 8+5 mixture
      - WQS - 3,5-Dichlorobiphenyl
      - WQS - Isomer/Congener 16+32 mixture
      - WQS - 2,2',4-Trichlorobiphenyl
      - WQS - Isomer/Congener 18+15 mixture
      - WQS - Isomer/Congener 21+33 mixture
      - WQS - 2,3,4'-Trichlorobiphenyl
      - WQS - Isomer/Congener 24+27 mixture
      - WQS - 2,3',4-Trichlorobiphenyl
      - WQS - 2,3',5-Trichlorobiphenyl
      - WQS - 2,4,4'-Trichlorobiphenyl
      - WQS - 2,4,5-Trichlorobiphenyl
      - WQS - Isomer/Congener 37+42 mixture
      - WQS - 2,2,3,3'-Tetrachlorobiphenyl
      - WQS - Isomer/Congener 41+71 mixture
      - WQS - 2,2',3,5-Tetrachlorobiphenyl
      - WQS - 2,2',3,5'-Tetrachlorobiphenyl
      - WQS - 2,2',3,6-Tetrachlorobiphenyl
      - WQS - 2,2,3,6'-Tetrachlorobiphenyl
      - WQS - 2,2',4,4'-Tetrachlorobiphenyl
      - WQS - 2,2',4,5-Tetrachlorobiphenyl
      - WQS - 2,2',4,5'-Tetrachlorobiphenyl
      - WQS - 2,2,4,6'-Tetrachlorobiphenyl
      - WQS - 2,2,5,5'-Tetrachlorobiphenyl
      - WQS - 2,2,5,6'-Tetrachlorobiphenyl
      - WQS - Isomer/Congener 56+60 mixture
      - WQS - 2,3,4',6-Tetrachlorobiphenyl
      - WQS - 2,3,5,6-Tetrachlorobiphenyl
      - WQS - 2,3',4,4'-Tetrachlorobiphenyl
      - WQS - Isomer/Congener 70+76 mixture
      - WQS - 2,4,4',5-Tetrachlorobiphenyl

Scale: 1:4,550,074 Quick View: Select a location Map Tool: Zoom In Active Layer: \*NO ACTIVE LAYER\*

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# GLENDa water quality survey: Extracting data - Query

Great Lakes Water Quality Data Mapping Tool - Mozilla Firefox

http://proldm.agriculture.purdue.edu/imf/imf.jsp?site=GLENDa

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Jump to: Return to start page

About Layers Legend Locate Keymap Bookmarks Print PDF Help Exit

MINNESOTA WISCONSIN MICHIGAN NEW YORK ILLINOIS INDIANA OHIO PENNSYLVANIA

Scale: 1:6,389,446 Quick View: Select a location Map Tool: Identify Active Layer: WQS - Temperature

Done

### Query Builder - Mozilla Firefox

http://proldm.agriculture.purdue.edu/imf/imfSelectQueryBuilderForm.jsp?popup

**Query Builder** [Close window](#)

Find features from layer:  
WQS - Temperature

Within visible extent:

Having:  
Lake

=

[Get Samples](#)

[Add To Query](#)  Case sensitive

Query:  
UPPER(GLD.GLENDa\_POINTS\_WQS.LAKE) = 'MICHIGAN'  
AND GLD.GLENDa\_POINTS\_WQS.YEAR = 1996  
AND UPPER(GLD.GLENDa\_POINTS\_WQS.MONTH) = 'SEPTEMBER' AND  
GLD.GLENDa\_POINTS\_WQS.SAMPLE\_DEPTH\_M < 2

[And](#) [Or](#) [Not](#)  
[\(](#) [\)](#)

[Execute](#) [Undo](#) [Clear](#)

# GLENDa water quality survey: Extracting data - Query

**Great Lakes Water Quality Data Mapping Tool - Mozilla Firefox**

File Edit View History Bookmarks Tools Help

http://proldm.agriculture.purdue.edu/imf/jmf.jsp?site=GLENDa

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Selection Set [Help](#)

Layer: WQS - Temperature

Selection: 12 features selected.

Options:

- Default Report: Show the default report for the selected features.
- Tabular Report: Show a tabular report for the selected features.
- Zoom to extent: Zoom the map to the extent of the selected features.

This layer is defined as a selected set type of layer. You may use the selection tool to refine your selected set so that it contains the desired features before executing the reporting routines.

**Query Results**

Lake	Year	Month	Sampling date	Time zone	Cruise ID	Visit ID	Station ID	Sample ID	Station depth, m	Depth code	Sample depth, m	Sample type	QC type	Analyte code	Analyte name	Value	Measurement unit	Filter
Michigan	1996	September	1996/09/04 05:00	EDT		9621MI 11	MI11	96GA45S01	125	Surface	1.172	Individual	routine field sample	Temp	Temperature	23.53809929	C	
Michigan	1996	September	1996/09/04 05:00	EDT		9621MI 11	MI11	96GA45S0A	125	Surface	1.172	Individual	routine field sample	Temp	Temperature	23.51239967	C	
Michigan	1996	September	1996/09/03 17:25	EDT		9621MI 17	MI17	96GA44S81	101	Surface	1.697	Individual	routine field sample	Temp	Temperature	23.32150078	C	
Michigan	1996	September	1996/09/03 21:50	EDT		9621MI 18	MI18M	96GA44S61	157	Surface	1.524	Individual	routine field sample	Temp	Temperature	24.01350021	C	
Michigan	1996	September	1996/09/04 01:22	EDT		9621MI 19	MI19	96GA44S41	90	Surface	1.205	Individual	routine field sample	Temp	Temperature	23.26160049	C	
Michigan	1996	September	1996/09/04 23:25	EDT		9621MI 23	MI23	96GA44S21	91	Surface	1.42	Individual	routine field sample	Temp	Temperature	23.64410019	C	
Michigan	1996	September	1996/09/05 02:58	EDT		9621MI 27	MI27M	96GA44S01	104	Surface	1.247	Individual	routine field sample	Temp	Temperature	23.3029995	C	
Michigan	1996	September	1996/09/05 09:18	EDT		9621MI 32	MI32	96GA43S61	161	Surface	1.008	Individual	routine field sample	Temp	Temperature	21.96730042	C	
Michigan	1996	September	1996/09/05 06:40	EDT		9621MI 34	MI34	96GA43S81	156	Surface	1.015	Individual	routine field sample	Temp	Temperature	22.53050041	C	
Michigan	1996	September	1996/09/05 13:34	EDT		9621MI 40	MI40	96GA43S41	165.5	Surface	1.326	Individual	routine field sample	Temp	Temperature	22.04840088	C	
Michigan	1996	September	1996/09/05 16:50	EDT		9621MI 41	MI41M	96GA43S21	259	Surface	1.608	Individual	routine field sample	Temp	Temperature	22.39629936	C	
Michigan	1996	September	1996/09/05 21:13	EDT		9621MI 47	MI47	96GA43S01	187	Surface	1.516	Individual	routine field sample	Temp	Temperature	21.78919983	C	

Scale: 1:6,389,446

Quick View: Select a location

Map Tool: Identify Active Layer: WQS - Temperature

powered by Geocortex®

# GLENDa water quality survey: Exporting data – options

Great Lakes Water Quality Data Mapping Tool - Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://proldm.agriculture.purdue.edu/imf/imf.jsp?site=GLENDa

Most Visited Getting Started Latest Headlines

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Extract Data

Select a format to extract to:

- Shapefile
- GML File
- KML File
- XLS (Excel) File
- Map Image
- Markup Shapefile

MINNESOTA WISCONSIN MICHIGAN ILLINOIS INDIANA

Scale: 1: 6,389,446 Quick View: Select a location Map Tool: Identify Active Layer: WQS - Temperature

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Mozilla Firefox

File Edit View History Bookmarks Tools Help

http://proldm.agriculture.purdue.edu/imf/imfSelectSetTabular.jsp?layerid=003&vis=false&sel=true&loid=1425&sspop=true

Query Results

Lake	Year	Month	Sampling date	Time zone	Cruise ID	Visit ID	Station ID	Sample ID	Station depth, m	Depth code	Sample depth, m	Sample type	QC type	Analyte code	Analyte name	Value	Measurement unit
Michigan	1996	September	1996/09/04 05:00	EDT	9621MI 11	MI11	96GA45501	125	Surface	1.172	Individual	routine field sample	Temp	Temperature	23.53809929	C	
Michigan	1996	September	1996/09/04 05:00	EDT	9621MI 11	MI11	96GA4550A	125	Surface	1.172	Individual	routine field sample	Temp	Temperature	23.51239967	C	
Michigan	1996	September	1996/09/03 17:25	EDT	9621MI 17	MI17	96GA44581	101	Surface	1.697	Individual	routine field sample	Temp	Temperature	23.32150078	C	
Michigan	1996	September	1996/09/03 21:50	EDT	9621MI 18	MI18M	96GA44561	157	Surface	1.524	Individual	routine field sample	Temp	Temperature	24.01350021	C	
Michigan	1996	September	1996/09/04 01:22	EDT	9621MI 19	MI19	96GA44541	90	Surface	1.205	Individual	routine field sample	Temp	Temperature	23.26160049	C	
Michigan	1996	September	1996/09/04 23:25	EDT	9621MI 23	MI23	96GA44521	91	Surface	1.42	Individual	routine field sample	Temp	Temperature	23.64410019	C	
Michigan	1996	September	1996/09/05 02:58	EDT	9621MI 27	MI27M	96GA44501	104	Surface	1.247	Individual	routine field sample	Temp	Temperature	23.3029995	C	
Michigan	1996	September	1996/09/05 09:18	EDT	9621MI 32	MI32	96GA43561	161	Surface	1.008	Individual	routine field sample	Temp	Temperature	21.96730042	C	
Michigan	1996	September	1996/09/05 06:40	EDT	9621MI 34	MI34	96GA43581	156	Surface	1.015	Individual	routine field sample	Temp	Temperature	22.53050041	C	
Michigan	1996	September	1996/09/05 13:34	EDT	9621MI 40	MI40	96GA43541	165.5	Surface	1.326	Individual	routine field sample	Temp	Temperature	22.04840088	C	
Michigan	1996	September	1996/09/05 16:50	EDT	9621MI 41	MI41M	96GA43521	259	Surface	1.608	Individual	routine field sample	Temp	Temperature	22.39629936	C	
Michigan	1996	September	1996/09/05 21:13	EDT	9621MI 47	MI47	96GA43501	187	Surface	1.516	Individual	routine field sample	Temp	Temperature	21.78919983	C	

Done

Map center...1068500, 970000

# GLENDa water quality survey: Building custom maps

Great Lakes Water Quality Data Mapping Tool - Mozilla Firefox

http://proldm.agriculture.purdue.edu/imf/imf.jsp?site=GLENDa

Geocortex® IMF 5.2

Jump to: Return to start page

Map Layers

- Water Quality Samples
  - Physical characteristics
    - WQS - Turbidity IM

Filter Builder - Mozilla Firefox

http://proldm.agriculture.purdue.edu/imf/imfFilterBuilderForm.jsp

Filter Builder

Find features from layer

WQS - Temperature

Having

Sample depth, m

<

2 Get Samples

Add To Query  Case sensitive

Query:

```
UPPER(GLD.GLENDa_POINTS_WQS.LAKE) = 'MICHIGAN'  
AND GLD.GLENDa_POINTS_WQS.YEAR = 1996 AND  
UPPER(GLD.GLENDa_POINTS_WQS.MONTH) =  
'SEPTEMBER' AND  
GLD.GLENDa_POINTS_WQS.SAMPLE_DEPTH_M < 2
```

And Or Not  
( )

Execute Undo Clear

Scale: 1:2,733,384

Quick View: Select a location

Map Tool: Identify Active Layer: WQS - Temperature

Done

# GLENDA water quality survey: Building custom maps

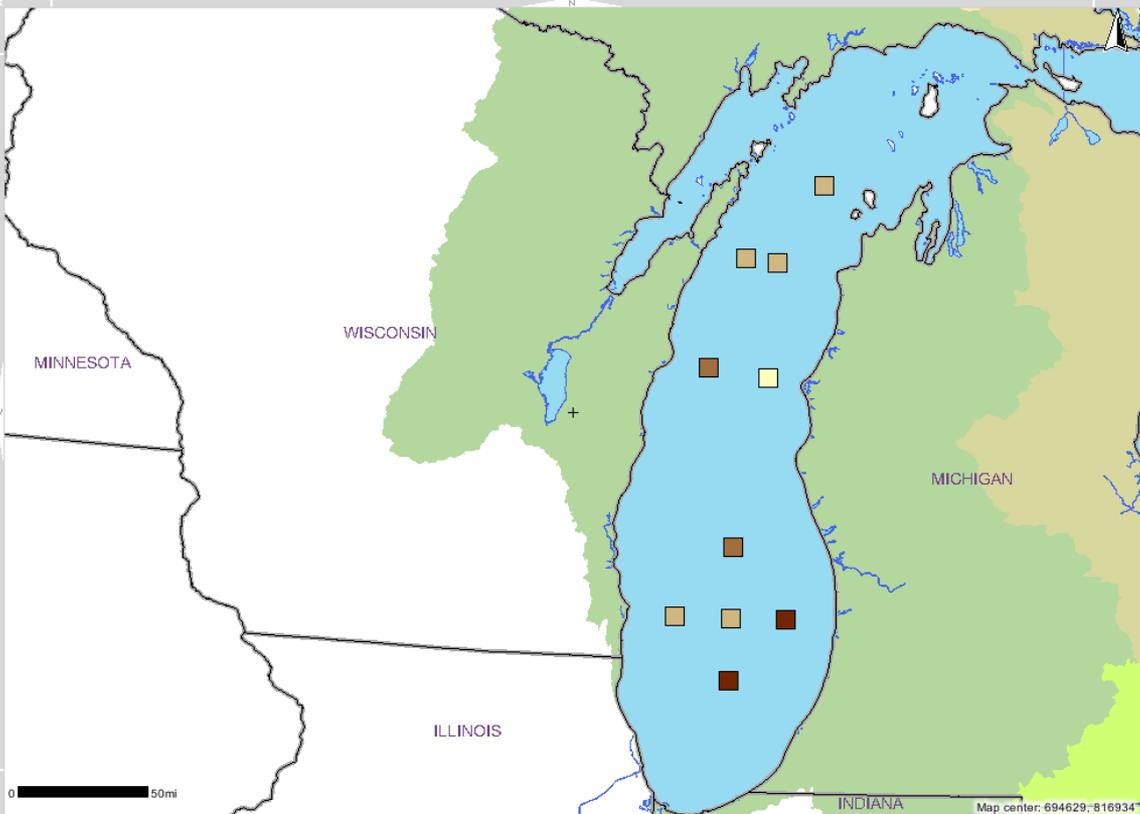
Great Lakes Water Quality Data Mapping Tool - Windows Internet Explorer

http://ldm.agriculture.purdue.edu/imf/imf.jsp?site=GLENDA

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Jump to: Jump to a theme

About Layers Legend Locate Keymap Bookmarks Print PDF Help Exit



Dynamic Layer Theming - Standard Deviation

Color Ramp

Select a color ramp:

<input type="radio"/>				
<input checked="" type="radio"/>				

Value Range Symbolization

	Value - 1.17 or less
	Value - 1.17 to 1.99
	Value - 1.99 to 2.81
	Value - 2.81 or more

Advanced Options

Point Symbolization

Fill color: #00FF00 change

Fill transparency: 0% (opaque) v

Outline color: #000000 change

Symbol type: square v

Symbol size: 16 points v

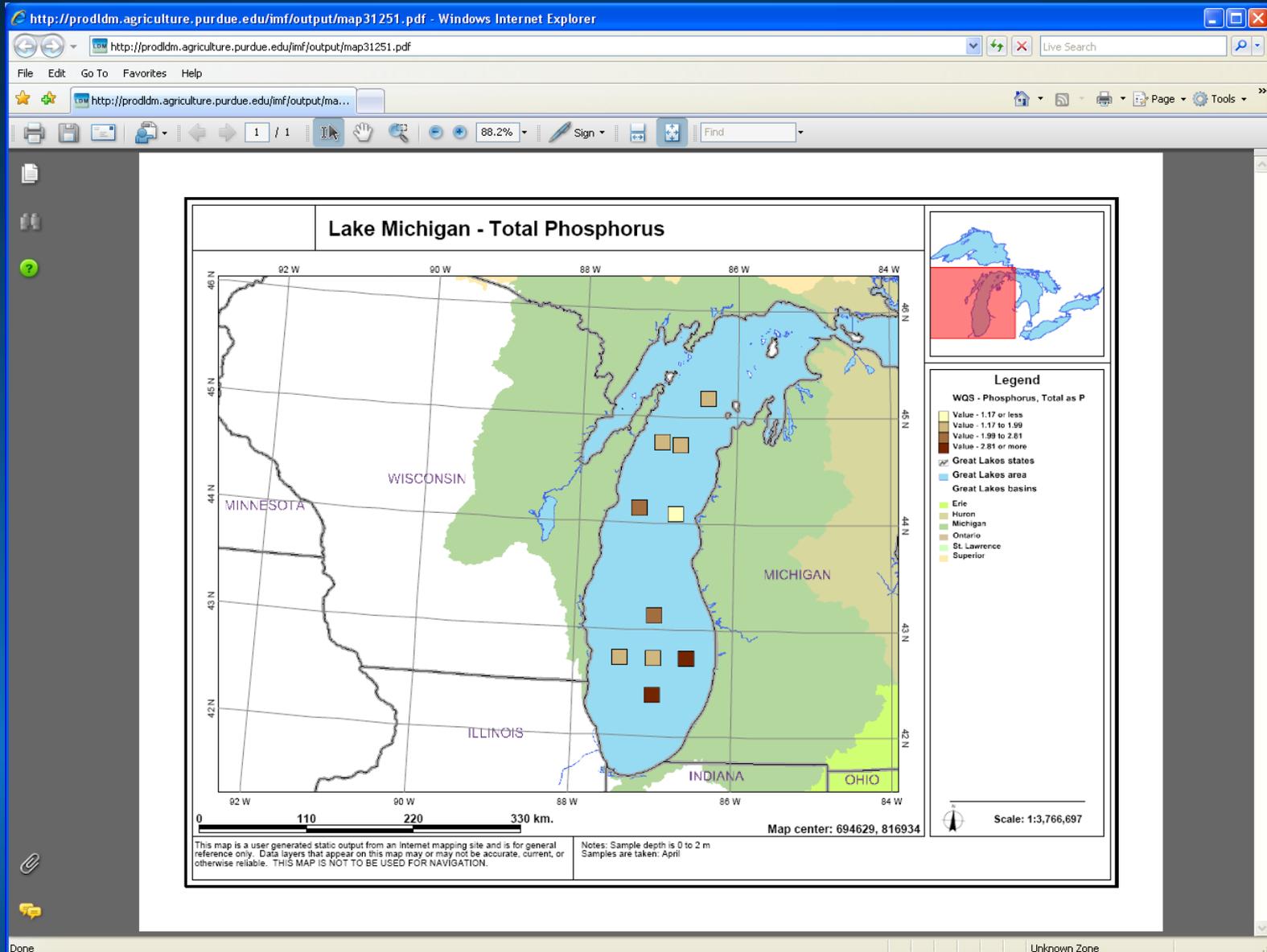
Label Symbolization

Label color: #000000 change

Label field: No labels v

Scale: 1:2,717,809 go Quick View: Select a location Map Tool: Pan Active Layer: WQS - Phosphorus, Total as P (by Value) powered by Geocortex

# GLENDa water quality survey: Saving and printing custom maps



# GLENDa-GIS: Connecting to a third party mapping service

Great Lakes Water Quality Data Mapping Tool - Mozilla Firefox

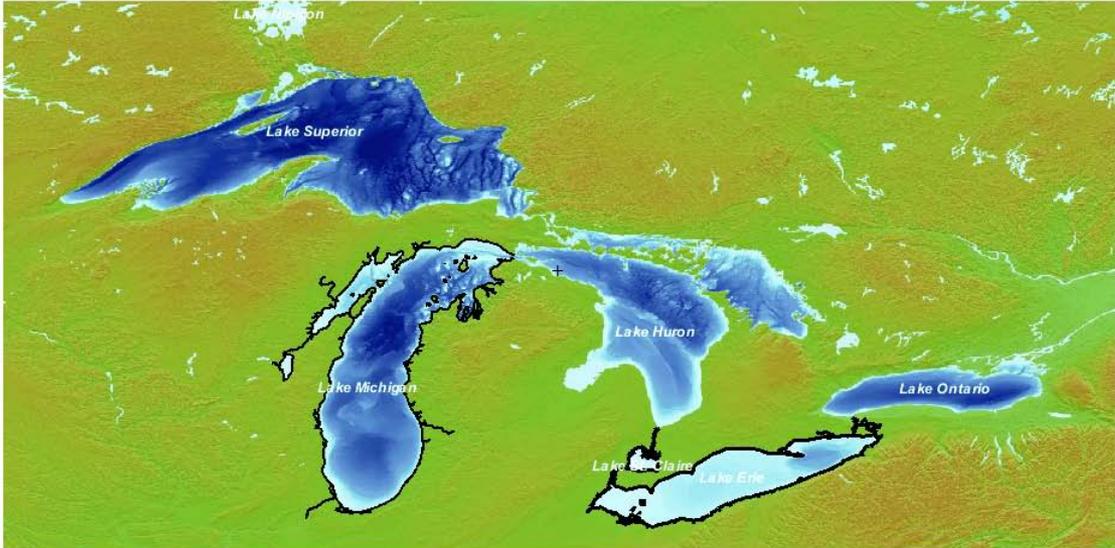
File Edit View History Bookmarks Tools Help

http://ldm.agriculture.purdue.edu/imf/imf.jsp?site=GLENDa

Geocortex® IMF 5.2

Jump to: Great Lakes - NOAA

About Layers Legend Locate Keymap Bookmarks Print PDF Help Exit



Map Layers

Jump To: Great Lakes - NOAA  
Select a theme to view  
Great Lakes - NOAA  
Return to start page

- All Layers
- Lake Michigan Bathymetry
- Lake Erie Bathymetry
- Lake Ontario Bathymetry
- Lake Huron Bathymetry
- Lake Michigan Coastline
- Lake Erie Coastline
- Lake Ontario Coastline
- Lake Huron Coastline
- Relief
- Lake labels

Automatically Refresh Map

Hints: (click to expand)

Map center: -84.041314, 45.587924

Scale: 1:8,177,622 go Quick View: Select a location Map Tool: Zoom In Active Layer: \*NO ACTIVE LAYER\*

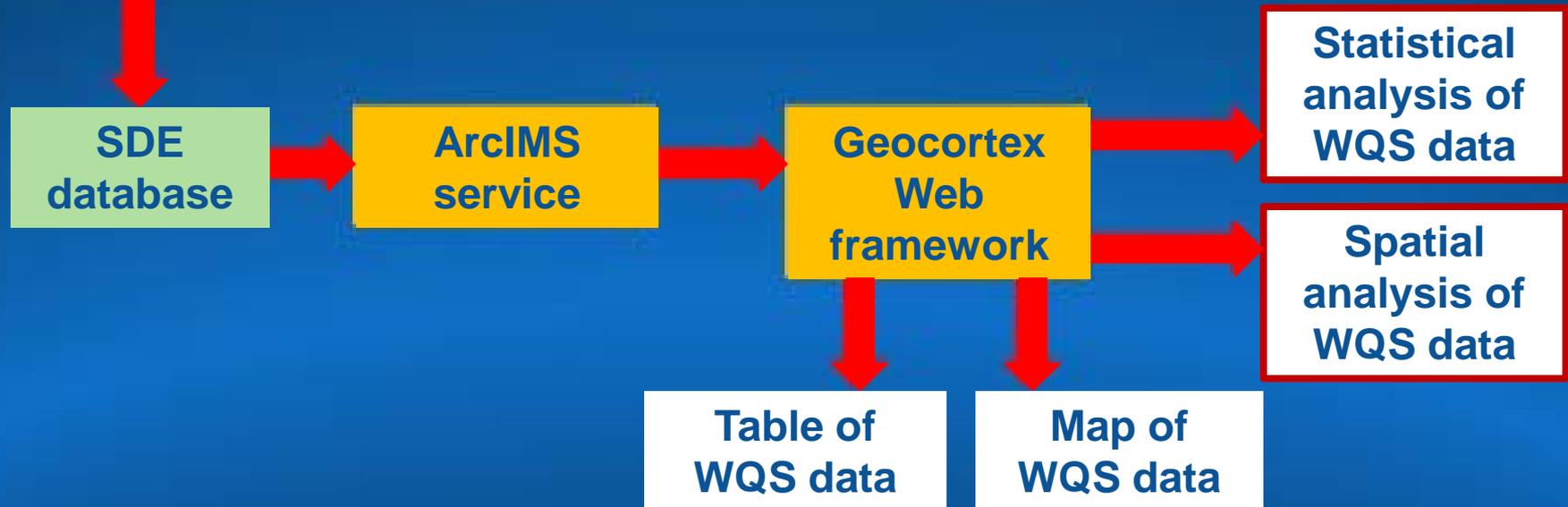
powered by Geocortex®

Done

# Future objectives (Phase 2):

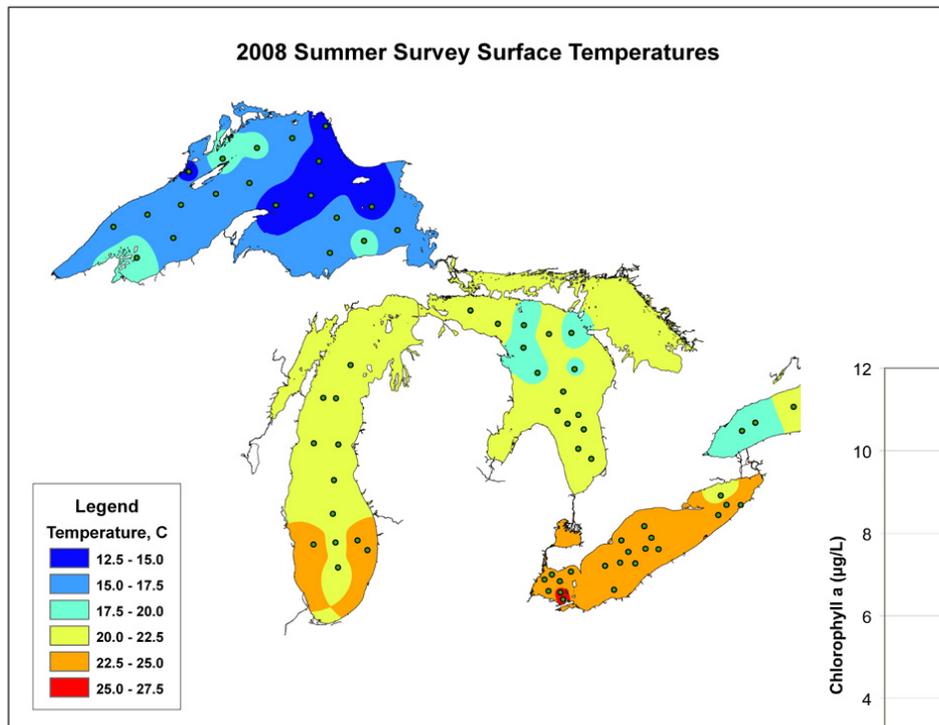
1. Provide connection to additional mapping resources related to the Great Lakes region
  - Third party GIS services (e.g. NOAA Great Lakes bathymetry)
  - Third party individual maps (WMS)
2. Add statistical tools to examine relationships within individual data sets
  - Descriptive statistics (mean, SD, etc.)
  - Relationships (regression analysis)
  - Time series (e.g. single variable, multiple years)

# GLENDA-GIS webpage: The flow

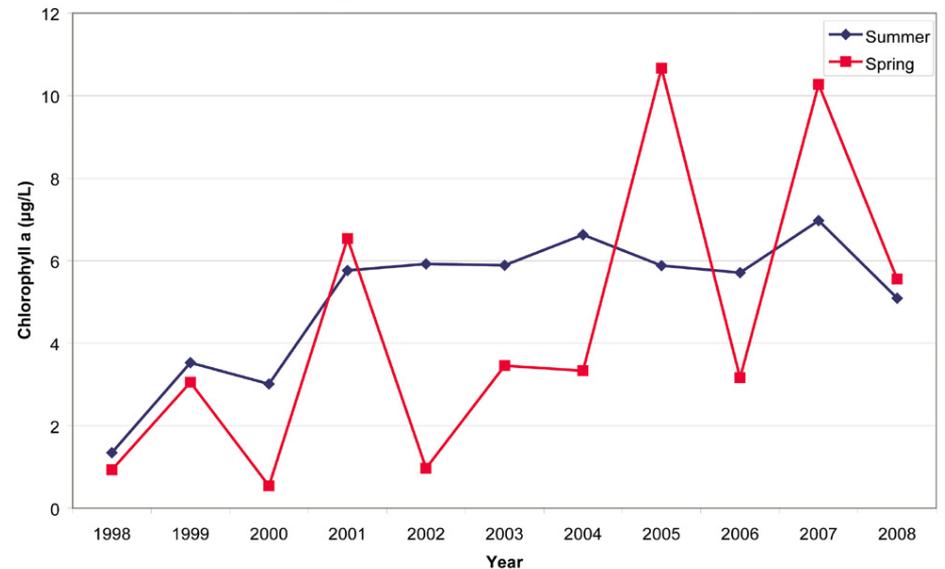


# GLENDa-GIS webpage: Future output

2008 Summer Survey Surface Temperatures



Chlorophyll a at LE91M



Questions?