

# How to Use Lake Tools in the Wisconsin Water Explorer (WEx)

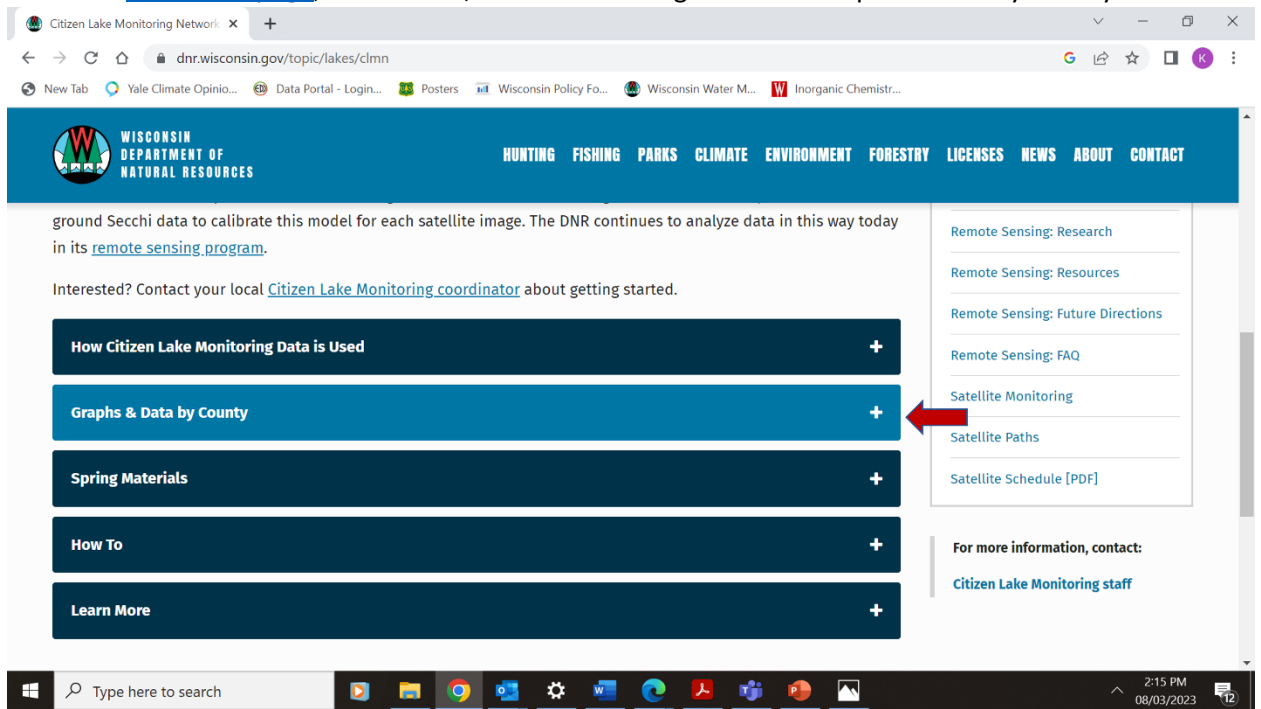
The technology used to create the Water Quality Reports has been retired. Please use the new Wisconsin Water Explorer (WEx) to fulfill your data reporting needs instead.

## How to Access WEx

You may access WEx by selecting a lake station through a DNR webpage and then clicking the WEx button or by navigating directly to the WEx web address.

Option 1 (Recommended for CLMN volunteers):

1. Go to the [CLMN webpage](#), scroll down, and click the + sign next to “Graphs & Data by County”



2. Select the county that your lake is in



- Click "Details" under the "Reports" column for the lake station you wish to view

Wisconsin Lakes

apps.dnr.wi.gov/lakes/waterquality/Stations.aspx?location=1&year=ALL

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Lake Name:  Go!

Lakes

Find a lake.

Lake Monitoring Reports

- Citizen Lake Monitoring
- Interpretive Guide to CLMN Water Quality Reports [PDF]
- Log in to enter your data

Contact information

For information on Lakes in Wisconsin, contact:

DNR SWIMS  
Division of Water  
Bureau of Water Quality

Station Name	Station ID	Map	Most Recent Data	Reports
503 Barnum Bay Trail	10034892	Map	2010	Details
Arkdale Lake (Millpond) - Deep Hole	013159	Map	2023	Details
Arrowhead Lake (#6)	10028945	Map	2017	Details
Arrowhead Lake (#7)	10028946	Map	2017	Details
Arrowhead Lake - A	10021585	Map	2007	Details
Arrowhead Lake - B	10021586	Map	2007	Details
Arrowhead Lake - C	10021587	Map	2007	Details
Arrowhead Lake - D	10021588	Map	2007	Details

- Scroll down and click on the blue button that says: Open the "Water Explorer" (WEx)

WISCONSIN DEPARTMENT OF NATURAL RESOURCES

Lake Name:  Go!

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Find a lake.

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## Arkdale Lake (Millpond) – Deep Hole

The DNR has launched a new online tool called the "Water Explorer" that will help users review lake data. The setup is a bit different than the previous reports, so it may take some getting used to. On the plus side, this tool provides more information about the watershed, trends in water quality over time, comparisons between multiple lakes of the same type, and the ability to estimate nutrient loads to a lake.

Differences that users need to be aware of:

- The data gets updated approximately every 4 days rather than every night.
- Two pieces of information that were displayed previously will not show up at this time:
  - VISUAL WATER LEVEL: low, normal, or high
  - WATER COLUMN APPEARANCE: clear or murky
- Temperature and dissolved oxygen results are not currently included. A new module is being worked on and will be released soon.
- The source of the data displayed on the Water Explorer is the EPA Water Quality Portal. Unfortunately, not all data found in SWIMS is submitted to the EPA Water Quality Portal (e.g., pre-2000 lab results). If needed, users can still download data directly from SWIMS (see below).
- Because of the amount of data being loaded, the Water Explorer may take a few moments to load.

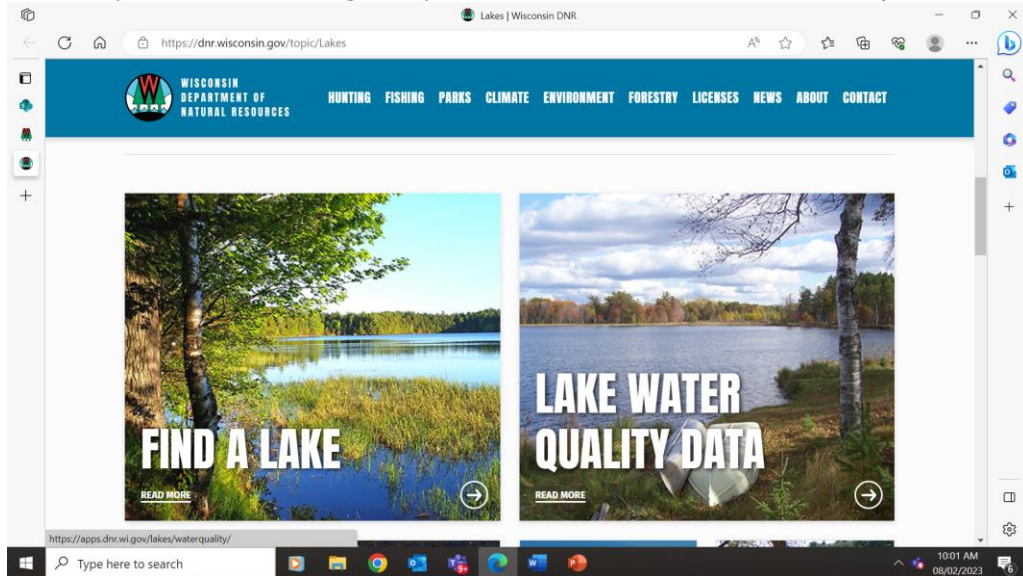
Open the "Water Explorer" (WEx)

WEx Quick Tips

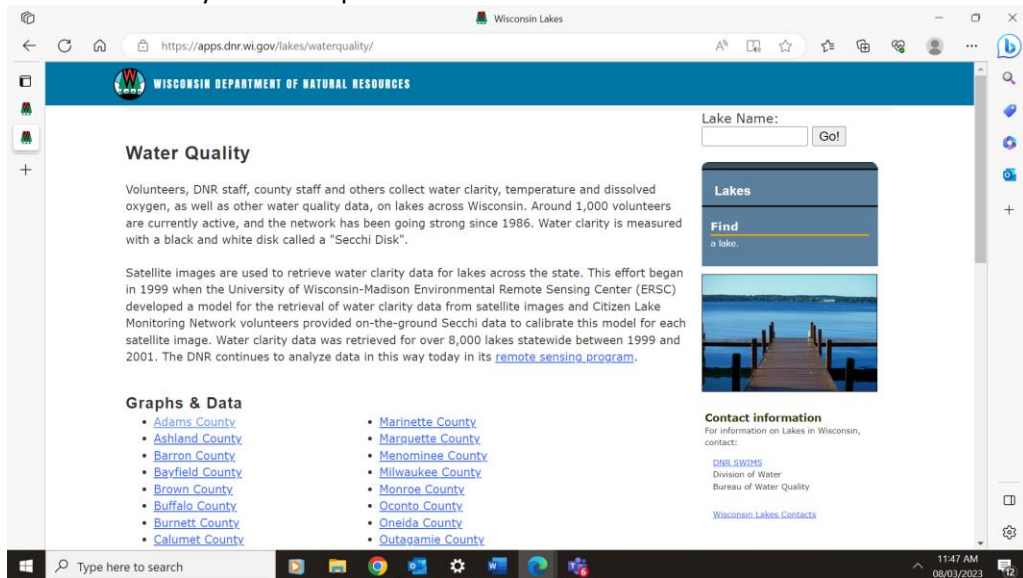
- View the results under the various tabs in Lake Tools

## Option 2

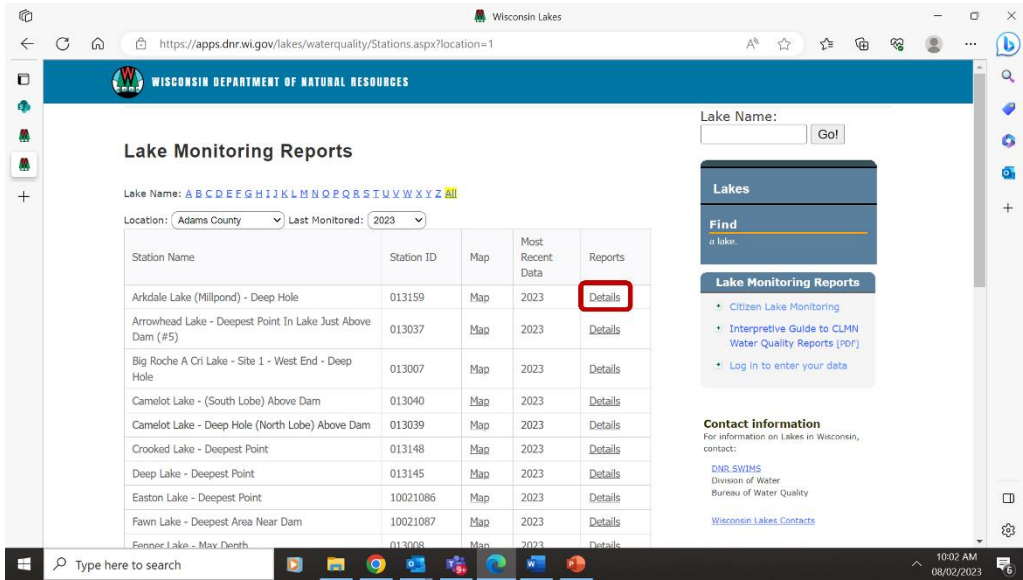
1. Go to <https://dnr.wisconsin.gov/topic/Lakes> and click “Lake Water Quality Data”



2. Select the county under Graphs & Data



- Click “Details” under the “Reports” column for the lake station you wish to view



- Scroll down and click on the blue button that says: Open the “Water Explorer” (WEx)

The screenshot shows the 'Water Explorer' (WEx) page for 'Arkdale Lake (Millpond) - Deep Hole'. The page header includes the Wisconsin Department of Natural Resources logo and name. On the right, there's a search bar for 'Lake Name:' and a 'Go!' button. Below that is a 'Lakes' section with a 'Find a lake.' search bar and a 'Wisconsin Lakes' section with links for 'Citizen Lake Monitoring' and 'Log in to enter your data'. A 'Contact information' section is also present, listing 'DNR SWIMS' as the contact.

The main content area features a description of the WEx tool: "The DNR has launched a new online tool called the “Water Explorer” that will help users review lake data. The setup is a bit different than the previous reports, so it may take some getting used to. On the plus side, this tool provides more information about the watershed, trends in water quality over time, comparisons between multiple lakes of the same type, and the ability to estimate nutrient loads to a lake."

Below the description is a list of differences that users need to be aware of:

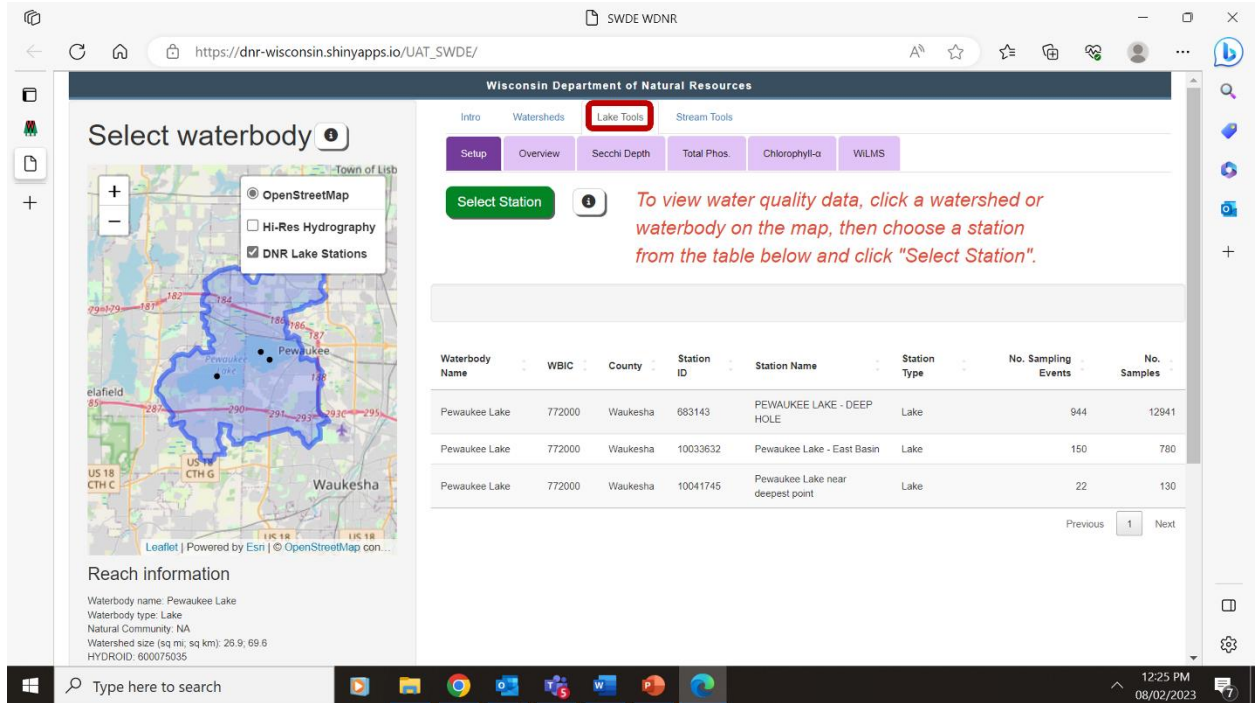
- The data gets updated approximately every 4 days rather than every night.
- Two pieces of information that were displayed previously will not show up at this time:
  - VISUAL WATER LEVEL: low, normal, or high
  - WATER COLUMN APPEARANCE: clear or murky
- Temperature and dissolved oxygen results are not currently included. A new module is being worked on and will be released soon.
- The source of the data displayed on the Water Explorer is the EPA Water Quality Portal. Unfortunately, not all data found in SWIMS is submitted to the EPA Water Quality Portal (e.g., pre-2000 lab results). If needed, users can still download data directly from SWIMS (see below).
- Because of the amount of data being loaded, the Water Explorer may take a few moments to load.

At the bottom of the page, there is a blue button labeled "Open the “Water Explorer” (WEx)" with a red arrow pointing to it. Below the button is the text "WEx Quick Tips".

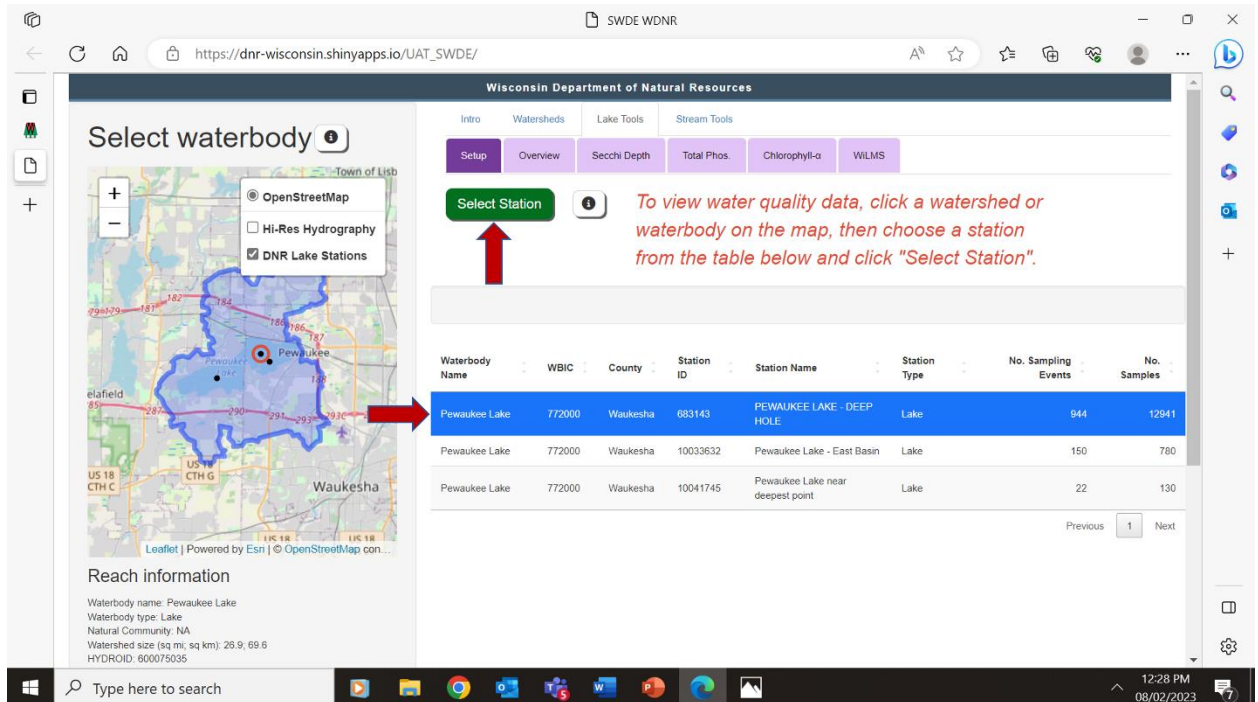
- View the results under the various tabs in Lake Tools

### Option 3

1. Go to [WEx WDNR \(shinyapps.io\)](https://shinyapps.io)
2. Use the map to navigate to the lake of interest and click on it
3. If the lake does not show up, click the “Hi-Res Hydrography” option on the map
4. Click on the Lake Tools tab



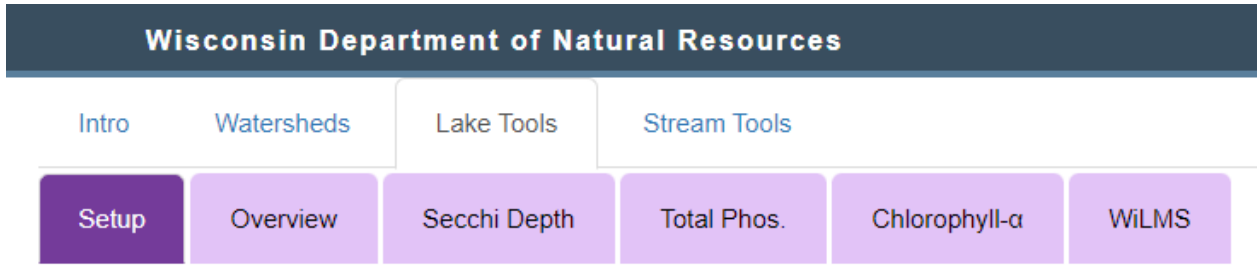
5. Under the Setup tab, select the station you wish to view and then click the “Select Station” button.



6. Now view the results under the various tabs in Lake Tools

## Orientation

There are six tabs within “Lake Tools”. Here is a brief explanation of each. Please be aware that WEx also includes advanced statistical techniques for DNR staff and water resource professionals to use. Please do not be concerned if the trend analysis and some other features are not intuitive to you. You may focus on the outputs you typically used in the past.



## Setup

If you use Option 3 to access the lake information, you must select the station of interest as described above to view results in the other tabs. After selecting a station, two buttons will appear to download trend analysis reports.

If you use Option 1 or 2 to access the lake information, you may go back to the Setup tab to view data from a different monitoring station. Select a different station and then click the “Select Station” button.

The screenshot displays the 'Select waterbody' interface. On the left, a map shows the location of Pewaukee Lake in Waukesha, WI, with several monitoring stations marked. A legend indicates that 'DNR Lake Stations' are selected. On the right, a search result summary states: 'search for PEWAUKEE LAKE - DEEP HOLE returned 497 Secchi depths, 148 total phos. results, and 62 chlorophyll-α results.' Below this is a table of monitoring stations:

Waterbody Name	WBIC	County	Station ID	Station Name	Station Type	No. Sampling Events	No. Samples
Pewaukee Lake	772000	Waukesha	683143	PEWAUKEE LAKE - DEEP HOLE	Lake	944	12941
Pewaukee Lake	772000	Waukesha	10033532	Pewaukee Lake - East Basin	Lake	150	780
Pewaukee Lake	772000	Waukesha	10041745	Pewaukee Lake near deepest point	Lake	22	130

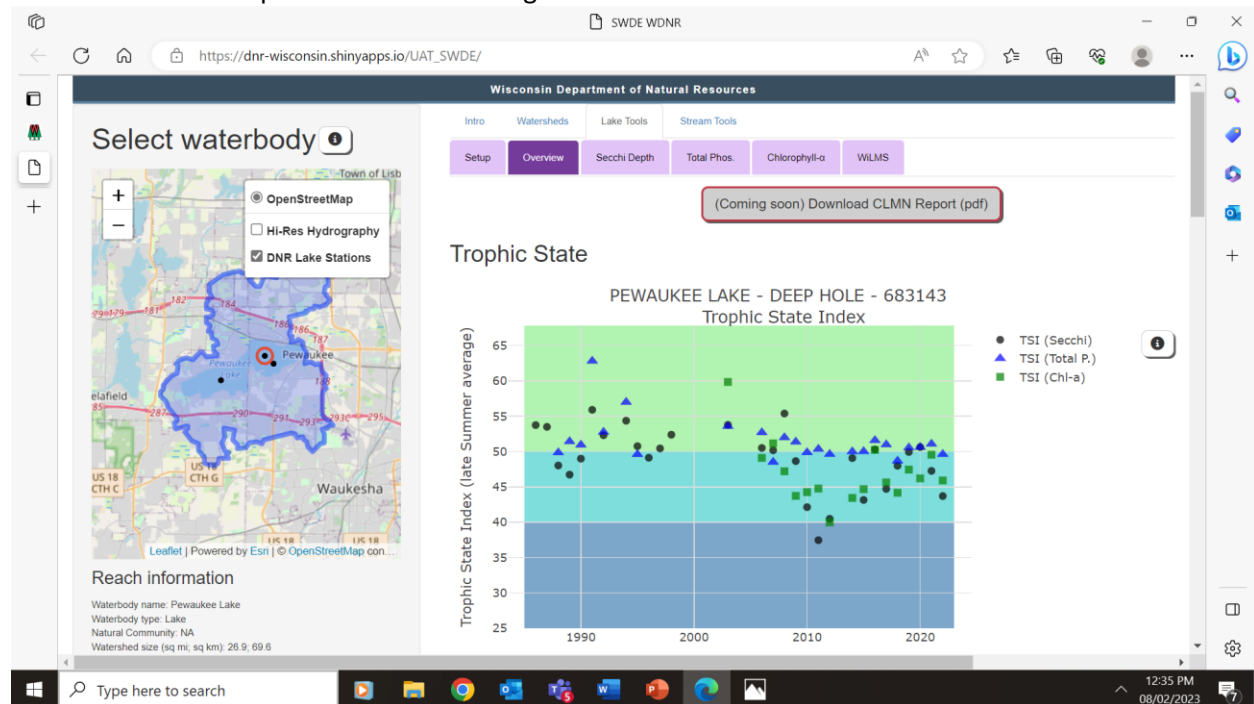
Below the table, there are two buttons: 'Download Trend Report (basic)' and 'Download Trend Report (full)'. The 'Reach information' section on the left provides details for the selected waterbody: Pewaukee Lake, a lake in Waukesha, WI, with a watershed size of 26.9 sq km.

## Overview

This tab gives basic information similar to the Water Quality Reports.

COMING SOON: Downloadable Citizen Lake Monitoring Network reports

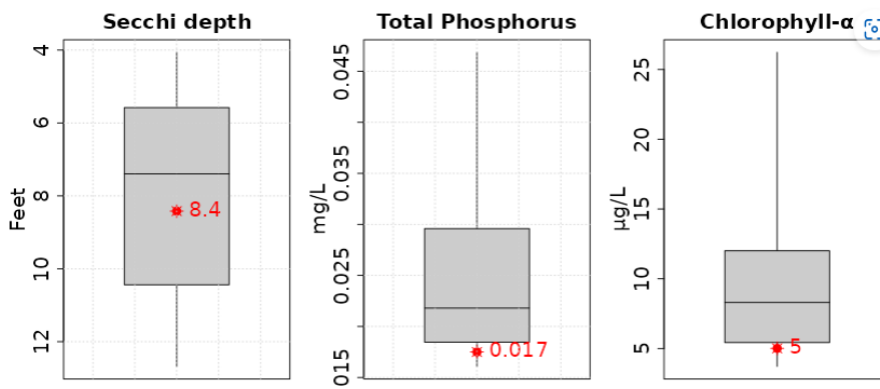
You can view the Trophic State Index through time.



NEW FEATURE: View how the results from the lake of interest compare to all other lakes of the same type in Wisconsin! In this example, Pewaukee Lake has slightly deeper Secchi depths and lower total phosphorus and chlorophyll- $\alpha$  concentrations than most other deep lowland lakes in Wisconsin.

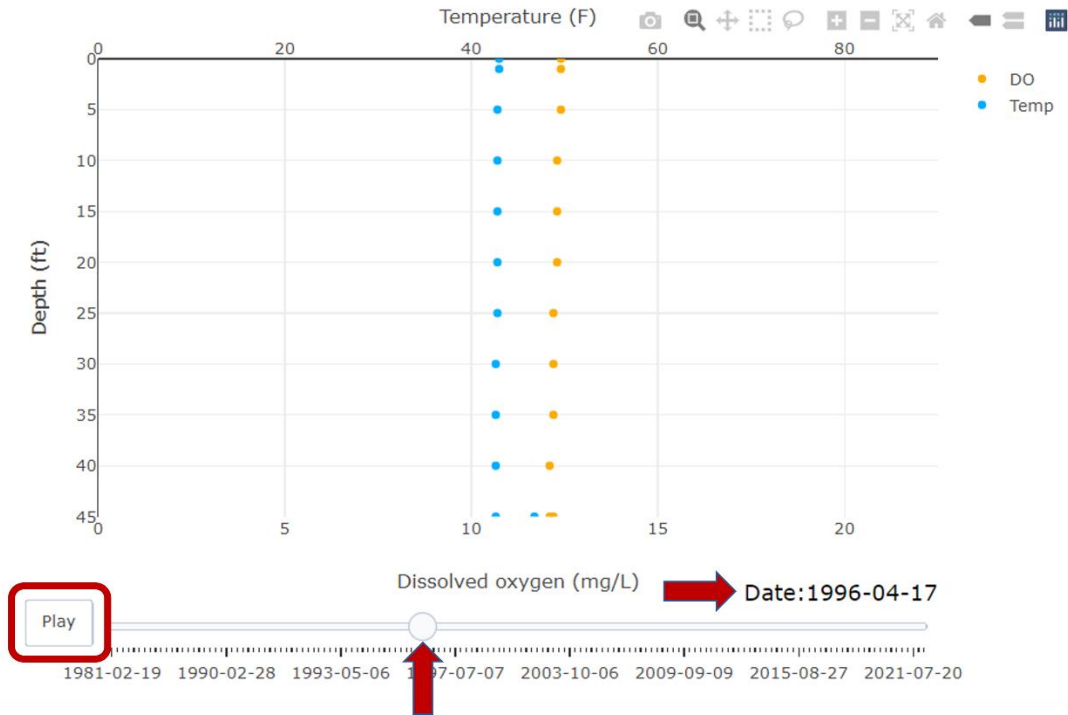
Trophic status compared to similar lakes

Late summer trophic indicator averages (red) from the last 10 years compared to other **DEEP LOWLAND** lakes (gray box and whiskers). If red dots are absent, not enough recent data exists to calculate an average.



View the Temperature and Dissolved Oxygen concentrations from the lake surface to the lake bottom through time. Click the play button to view the data from the first date to the last date. The date of the sample event will display on the bottom right. You can also click the circle on the scroll bar at the bottom of the graph and drag it left or right to go directly to the date of interest. In this example, the temperature was 42.62°F and the dissolved oxygen was 12.2 mg/L from top to bottom on April 17, 1996.

### Lake profile data



Last, you can view a table of your results and download all Secchi depth, total phosphorus, and chlorophyll-*a* data to an excel file by clicking the “Download Data” button at the bottom of the page. Choose from a single year or all years at the upper right.

Surface water quality data from this site View results from...

Source: EPA Water Quality Portal (may not include all records in SWIMS)

Show  entries

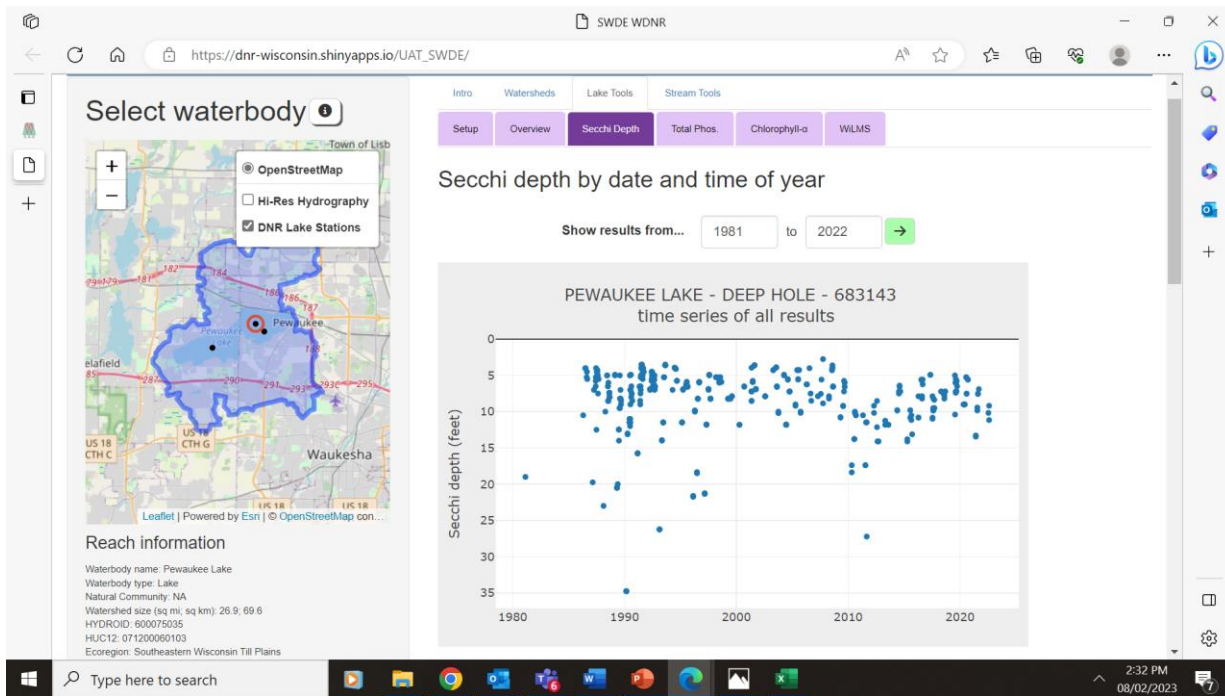
Date	Secchi depth (ft)	Secchi hit bottom	Total phosphorus (mg/L)	Chlorophyll-a (ug/L)	Water color	User perception
2022-08-09	10.2		0.016	4.0		
2022-07-18	10.2		0.016	4.7		

Showing 1 to 2 of 2 entries Previous  Next



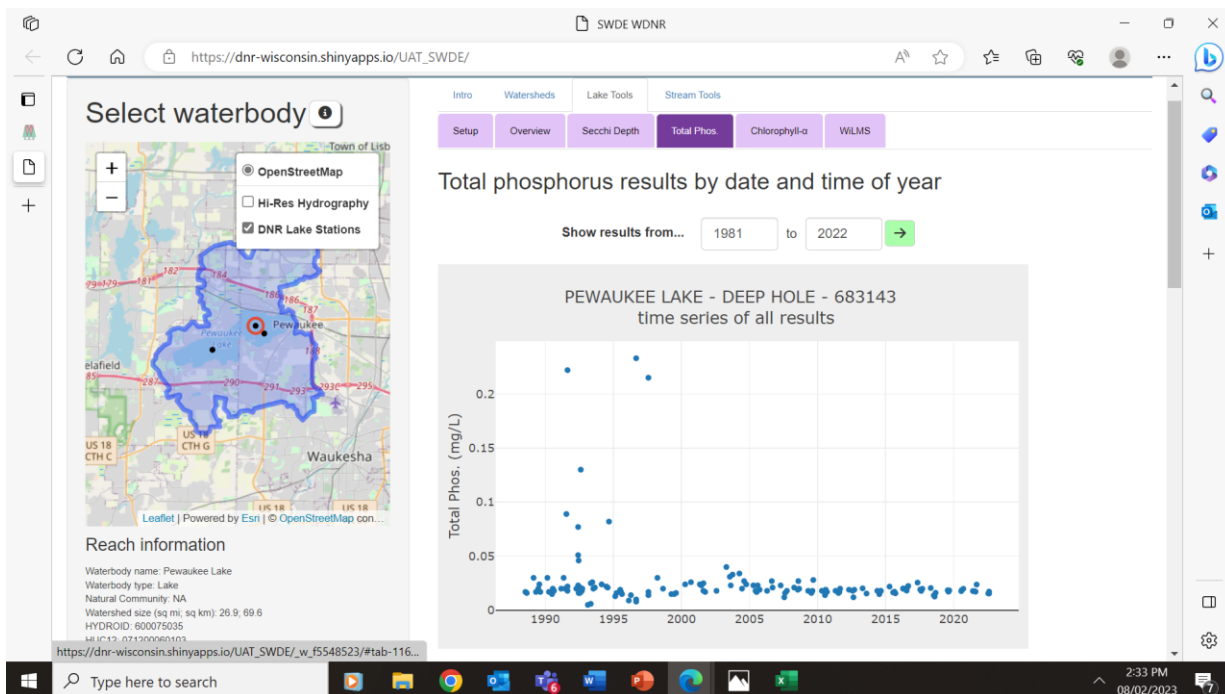
## Secchi Depth

View two graphs of Secchi Depth. The top graph shows the full time series from the first date to the last date. The second graph shows data from all years seasonally from spring through fall. If there are at least 10 years of data available, a graph analyzing trends over time will display with a table summarizing the statistical results.



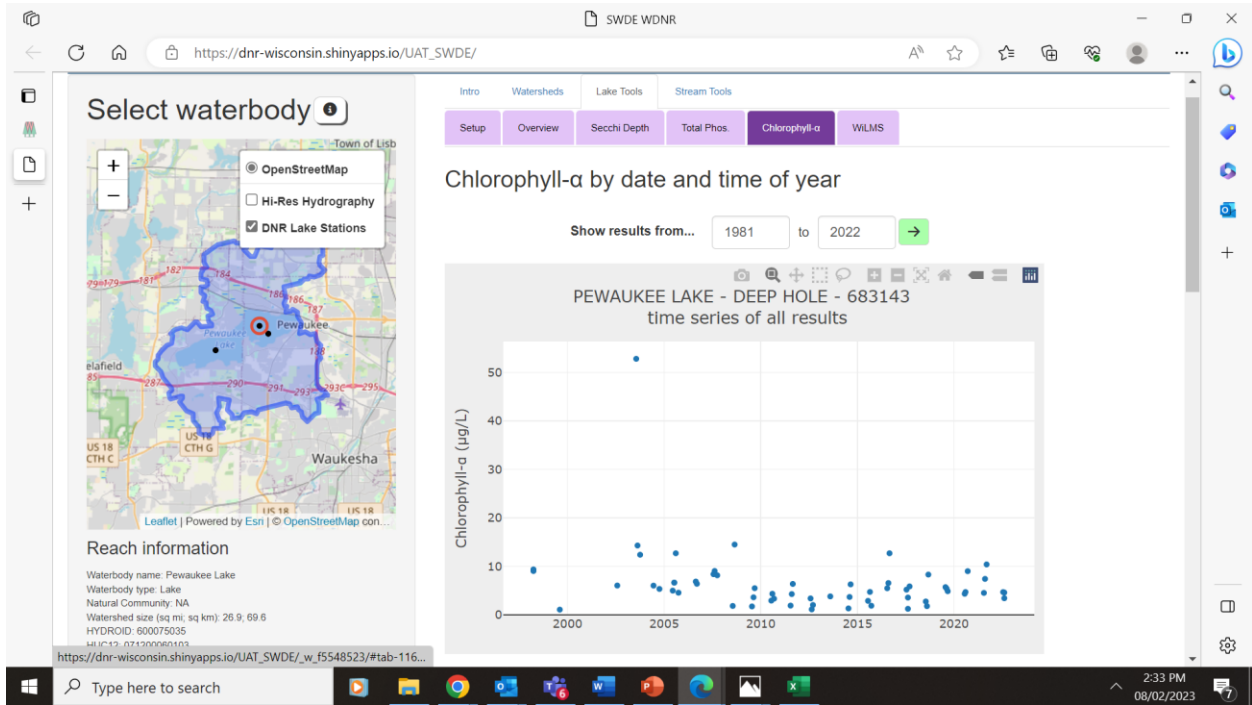
## Total Phos.

This tab shows the same types of graphs as the Secchi Depth tab, but for Total Phosphorus.



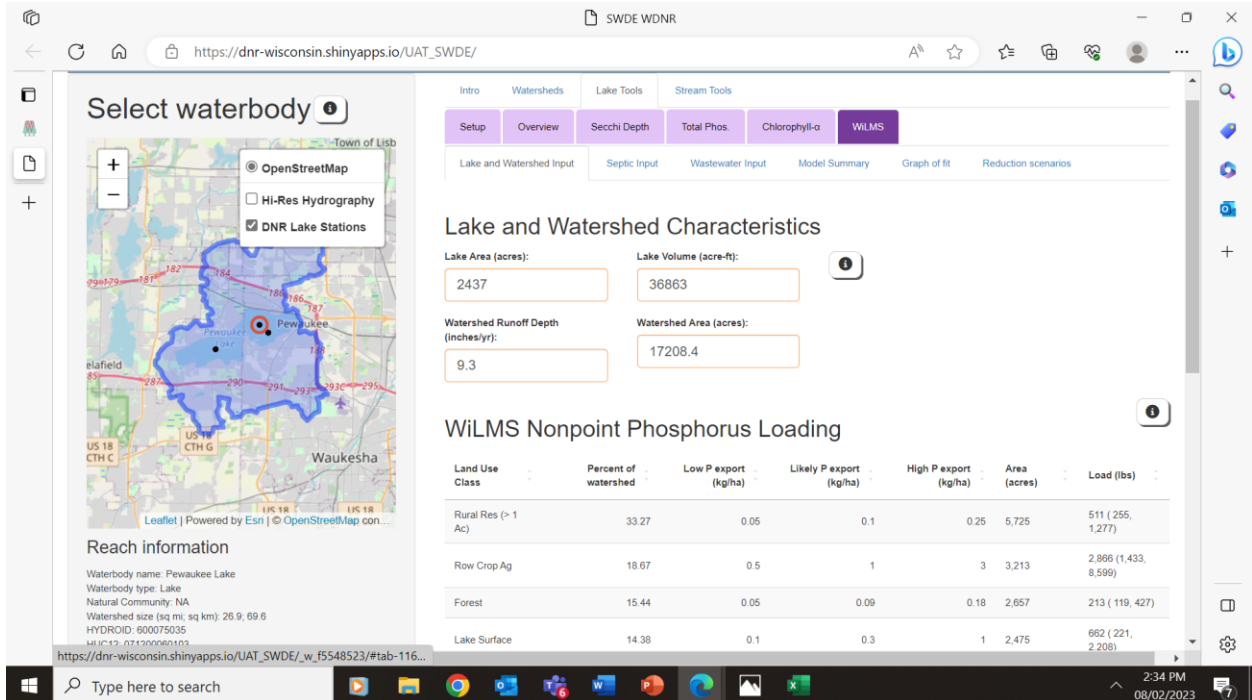
## Chlorophyll-*a*

This tab shows the same types of graphs as the Secchi Depth tab, but for Chlorophyll-*a*.



## WiLMS

This tab is geared toward water resource professionals who wish to estimate how much phosphorus is coming into the lake. One can use the tabs within this tool to run the Wisconsin Lake Modeling Suite.



## Quick Tips

Use the “i” button!

The “i” buttons found throughout WEx give important contextual information and explanations.

The screenshot shows the Wisconsin Department of Natural Resources website. On the left, there is a map titled "Select waterbody" showing the location of Pewaukee Lake. Below the map is "Reach information" for Pewaukee Lake, including its name, type, natural community, and watershed size. On the right, there is a "Trophic State" graph for "PEWAUKEE LAKE - DEEP HOLE - 683143". The graph shows the "Trophic State Index (late Summer average)" on the y-axis (ranging from 25 to 65) and years on the x-axis (1990 to 2020). The graph is divided into three horizontal bands: green (top), cyan (middle), and blue (bottom). Data points are plotted for TSI (Secchi) (black circles), TSI (Total P.) (blue triangles), and TSI (Chl-a) (green squares). A red arrow points to an information button (i) on the right side of the graph.

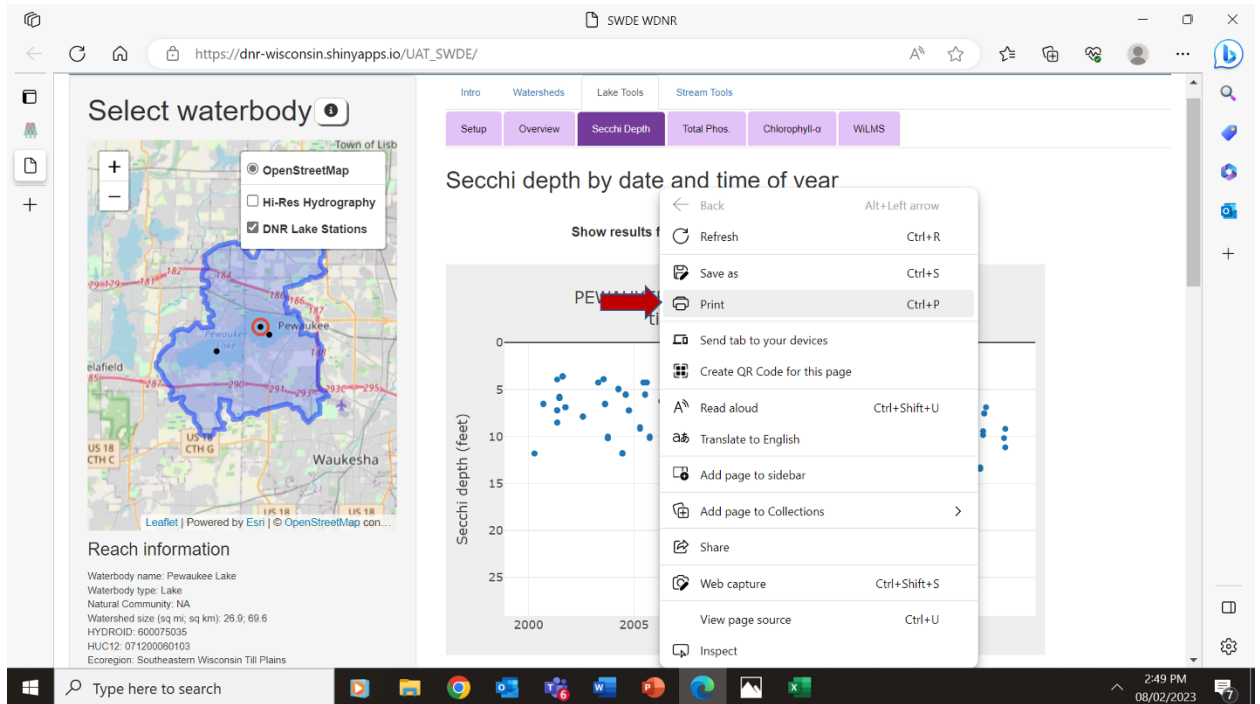
## Display a Single Year or Time Frame

1. Click on the Secchi Depth, Total Phos., or Chlorophyll-*a* tab
2. At the top of the page, enter the year or years of interest after “Show results from...” (e.g., “2022 to 2022” or “2022 to 2023”)
3. Click the green arrow button

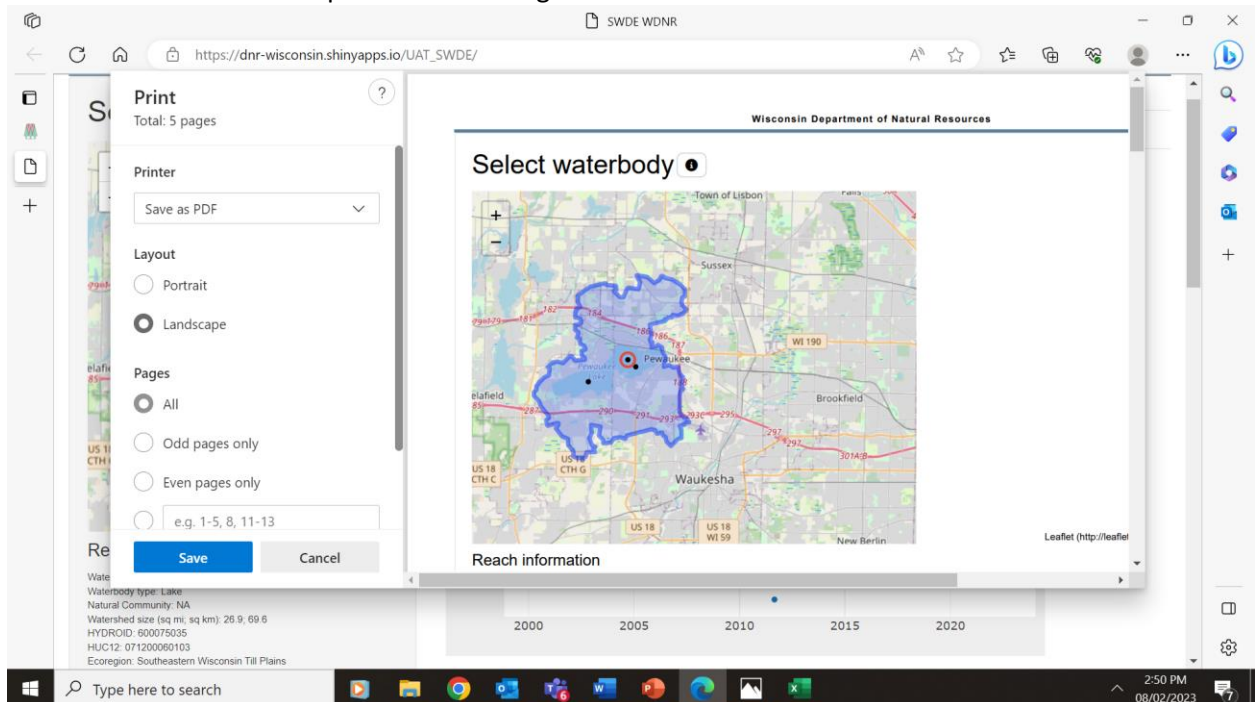
The screenshot shows the Wisconsin Department of Natural Resources website. On the left, there is a map titled "Select waterbody" showing the location of Pewaukee Lake. Below the map is "Reach information" for Pewaukee Lake, including its name, type, natural community, and watershed size. On the right, there is a "Secchi depth by date and time of year" graph for "PEWAUKEE LAKE - DEEP HOLE - 683143". The graph shows the "time series of all results" for "Secchi depth (feet)" on the y-axis (ranging from 0 to 25) and years on the x-axis (2000 to 2020). A red box highlights the "Show results from..." input field with "2000" and "2022" entered, and a green arrow button.

## Print a Report from SWDE

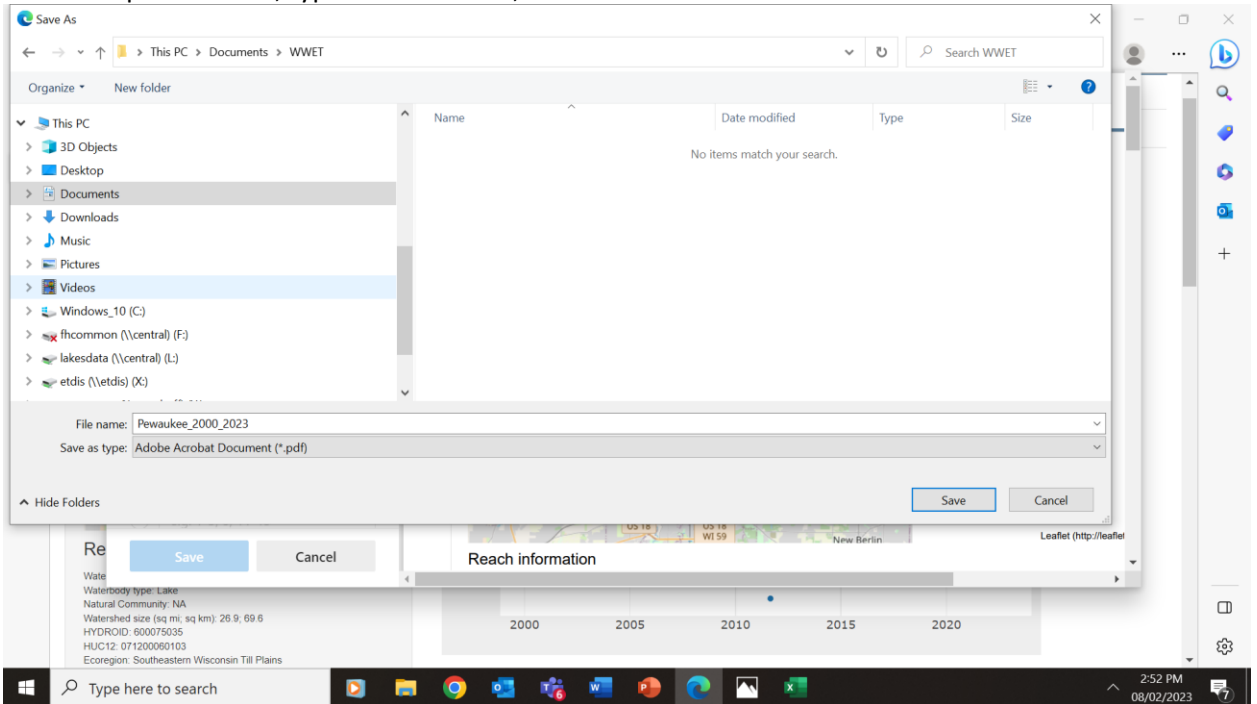
1. Select the years of interest
2. Right-click on screen
3. Click Print



4. Choose Portrait or Landscape orientation to get the best format and click "Save"

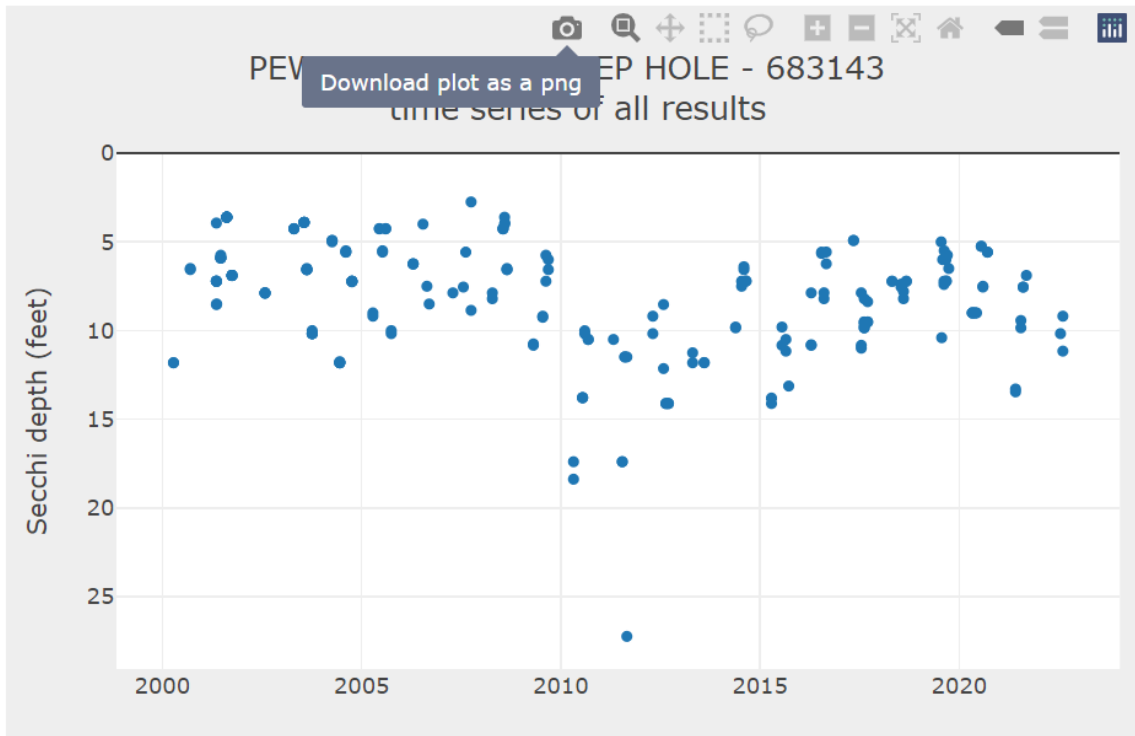


5. Select Output Location, type a "File Name", and click "Save"



## Print a Graph

1. Move cursor over the graph making the toolbar visible
2. Click on the Camera ("Download plot as a png")

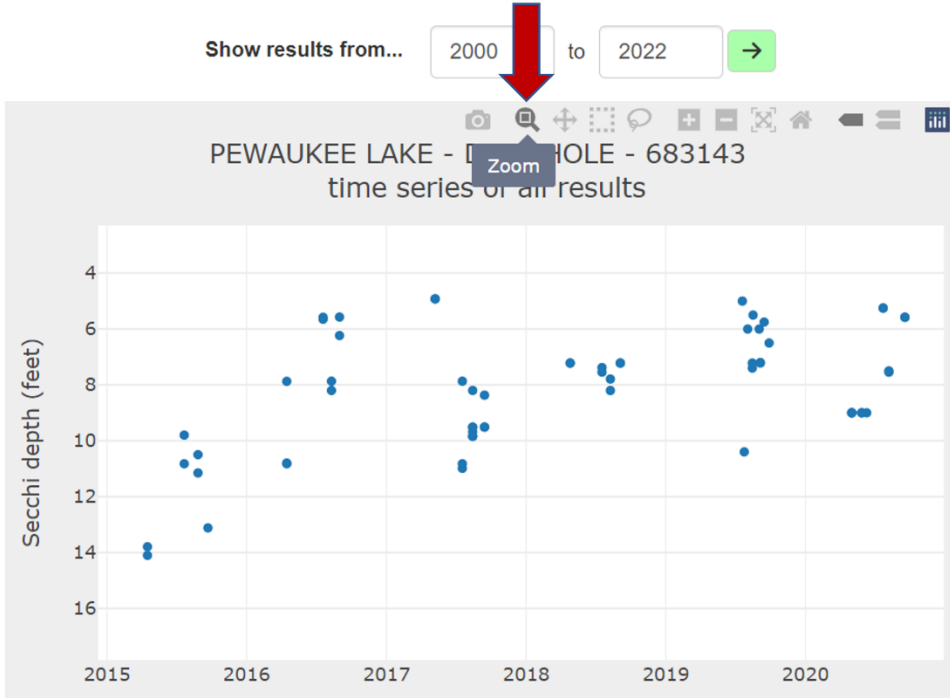


3. Image will be saved to your Download folder

### Zoom into a Plot

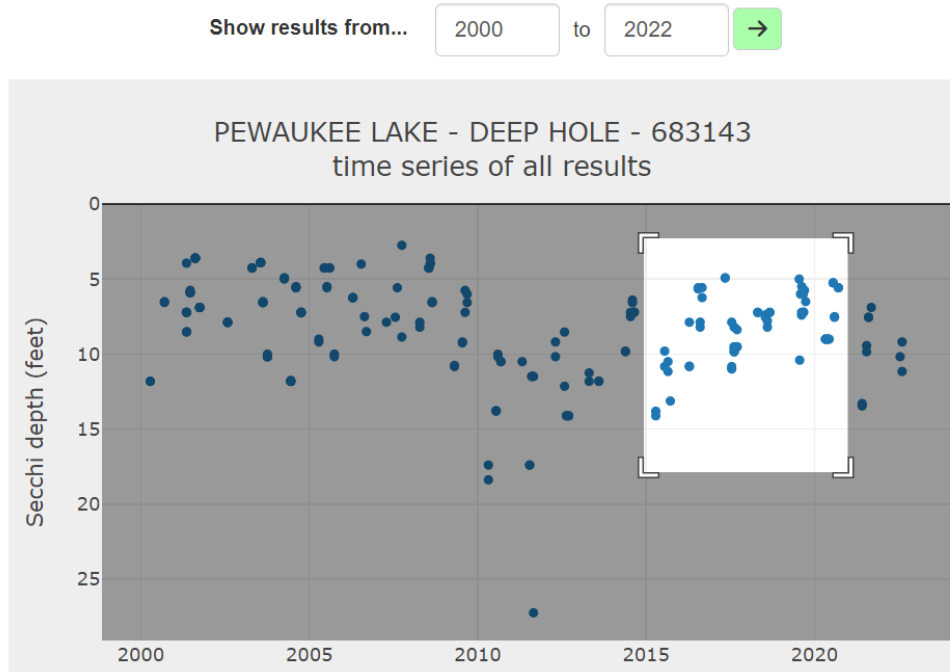
1. Move cursor over the graph making the toolbar visible
2. Click on the magnifying glass

### Secchi depth by date and time of year



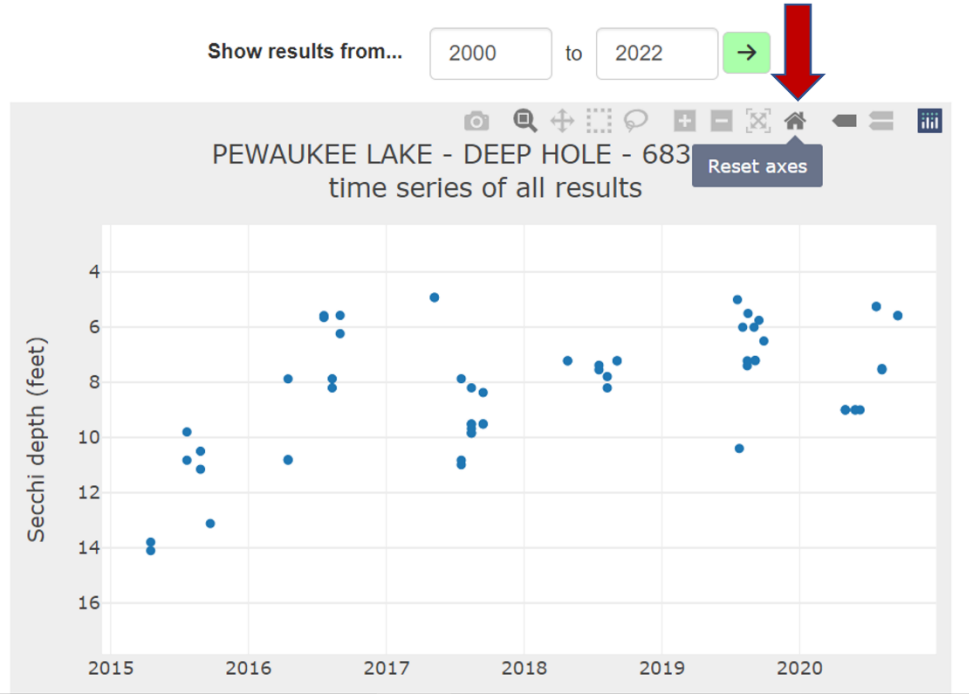
3. Draw a box around the data you wish to zoom in on

### Secchi depth by date and time of year



4. To return to viewing all data, click the Autoscale button or the Reset Axes button

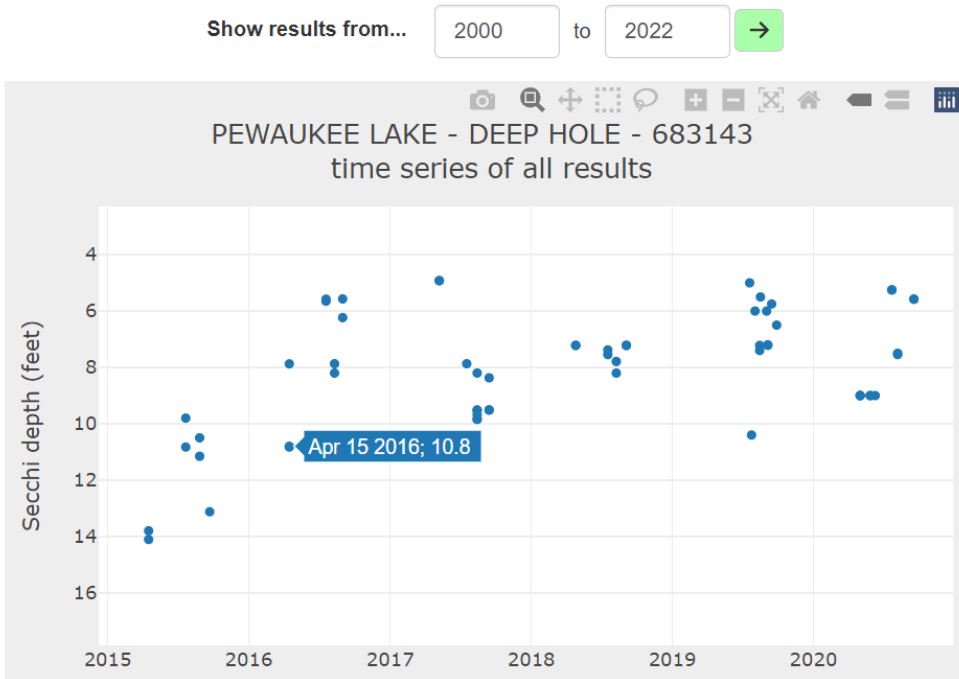
### Secchi depth by date and time of year



### View Numeric Results on Plot

1. Hover the cursor over individual points on the plot to view the date and numeric result

### Secchi depth by date and time of year



## Download Data

### Using WEx

1. Navigate to the “Overview” tab within the “Lake Tools” tab (if you entered WEx through the Lakes Pages, you will already be on the “Overview” tab)
2. Click the “Download Data” button at the bottom of the page

The screenshot shows a web browser window displaying a data table. The table contains 10 rows of data with columns for date, numerical values, and text descriptions. A red arrow points to a 'Download Data' button located at the bottom of the table. The browser's address bar shows the URL: https://dnr-wisconsin.shinyapps.io/UAT\_SWDE/. The Windows taskbar is visible at the bottom of the screen.

2021-09-09	6.9	0.024	10.4	GREEN	2-Very minor aesthetic problems
2021-08-10	7.5	0.017	7.4	GREEN	2-Very minor aesthetic problems
2021-07-20	9.6	0.018	4.5	GREEN	3-Enjoyment somewhat impaired (algae)
2021-06-01	13.4	0.018		GREEN	3-Enjoyment somewhat impaired (algae)
2020-09-17	5.6	0.020	9.0	GREEN	
2020-08-06	7.5	0.019	4.7		
2020-07-22	5.2	0.018	4.3	GREEN	
2020-06-09	9.0	TRUE		GREEN	2-Very minor aesthetic problems

### Using the Lakes Pages

1. For Secchi Depth or Lab Results, click on the “Download Secchi / Lab Results” link
2. For Temperature / D.O. Results, click on the “Download Temperature / D.O. Data” link
3. Depending on your browser, the file may be downloaded to the Downloads folder, a notification may pop up in the browser, or you may be asked where to save the file.

 [Download Secchi/Lab Results \(raw data\)](#)

 [Download Temperature/D.O. Data \(raw data\)](#)

**Download Note:** Depending on your browser, the file may be downloaded to the Downloads folder, a notification may pop up in the browser or you may be asked where to save the file.



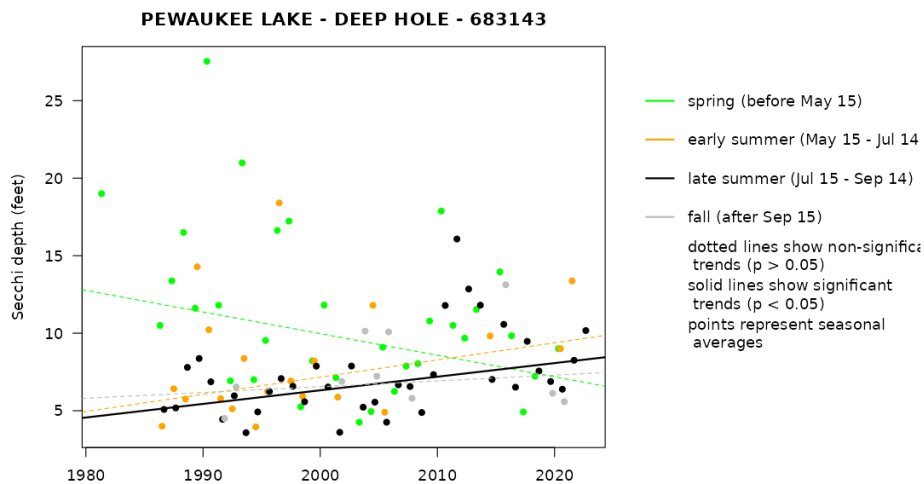
## Trends Analysis

Here is a brief explanation of the trends analysis in case you are interested. We know that water clarity, phosphorus, and chlorophyll-*a* often vary seasonally. We often see clear water with low total phosphorus and chlorophyll-*a* in the spring. After rain washes phosphorus into the lake and temperatures warm up, we often see reduced water clarity with more phosphorus and chlorophyll-*a* in summer.

We analyzed trends over 10-year periods or more within each of four seasons: spring, early summer, late summer, and fall. You will see four colors on the graph and four trend lines – one for each season. If the trend line is solid, it means that there is significant change over time, either increasing or decreasing. If the line is dashed, it may appear to be increasing or decreasing, but there really is not a significant change over time.

In the Pewaukee Lake example below, Secchi Depth is significantly increasing over time in late summer but is not significantly changing in any other season.

### Trends in Secchi depth



Legend notes: dotted lines show non-significant trends ( $p > 0.05$ ), solid lines show significant trends ( $p < 0.05$ ), and points represent seasonal averages

season	no. years	no. results	slope est. (ft/yr)	p-value	significance
spring (before May 15)	33	110	-0.139	-	
early summer (May 15 - Jul 14)	20	116	0.111	-	
late summer (Jul 15 - Sep 14)	37	243	0.088	**	
fall (after Sep 15)	10	28	0.037	-	

## Questions/Suggestions

If you have questions/concerns or have immediate data needs, please contact:

[DNRLakeb@wisconsin.gov](mailto:DNRLakeb@wisconsin.gov).

You may also reach out to your Local CLMN Volunteer Coordinator.

Do you have suggestions for improving WEx? Please tell us by filling out the survey [here](#).