Volunteer Lake Level Monitoring Protocol

Citizen Lake Monitoring Network

EGAD # 3200-2018-42

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I. Project Background and Goals

Lake levels naturally fluctuate over time. These fluctuations are important for maintaining healthy populations of many aquatic plants and other organisms, but extreme highs and lows can also present challenges. Low water levels can strand dead branches above water, reducing important cover for fish. They can also leave piers far from shore and render boat launches and public beaches unusable. Conversely, high water levels can erode the shore and flood homes. To address the growing concern of changing lake levels brought on by climate and groundwater withdrawals, the Wisconsin Department of

Natural Resources (WDNR) and the University of Wisconsin - Extension have created a statewide lake-level monitoring that relies on volunteers.

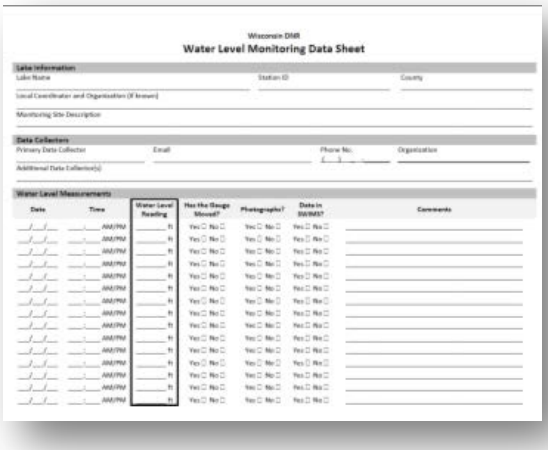
Although long-term water level records exist, current monitoring efforts do not cover all areas of the state. With over 15,000 lakes, partnerships with local volunteers, nonprofit groups, and county staff are crucial for filling gaps in the current water level records. This effort builds upon the existing network of volunteers participating in the Citizen Lake Monitoring Network (CLMN) and was piloted on 17 lakes in 2015. Following two pilot years, the program is being integrated into CLMN. Lakes are prioritized for lake level monitoring based on the following characteristics: seepage lakes, regions with little to no existing lake level monitoring data, regions vulnerable to groundwater withdrawal, and lakes currently monitored for water quality by volunteers or for game fish by WDNR.

Volunteers will take lake level measurements by visually reading a staff gauge (an enameled steel scale marked every 0.02 feet) placed in the lake bed. The elevation of the staff gauge is determined by referencing the numbered height on the gauge to the surveyed elevation of permanent reference marks on land at the time of installation (Harrelson et al., 1994). Volunteers will also enter their lake level data into the Surface Water Integrated Monitoring System (SWIMS) database. Trained professionals will: install and survey the staff gauge in spring, adjust and resurvey midsummer if the gauge is bumped, and survey and remove the gauge in fall.

II. Volunteer Time Commitment

Lake level monitoring volunteers must attend a one-hour training prior to participating in this monitoring project. Once trained, most volunteers will monitor lake levels *on a weekly basis* from spring (April-May) to fall (October-November). Volunteers will spend approximately 10-30 hours per field season monitoring lake levels in addition to their other CLMN monitoring responsibilities.

III. Volunteer Duties


Wisconsin DNR
Water Level Monitoring Data Sheet

In the spring, CLMN volunteers will be trained how to read lake levels and how to enter lake level data into the SWIMS database. Lake levels should be recorded once a week on the same day (e.g. every Monday) at approximately the same time of day under calm conditions. Less error will be introduced to your lake level readings if there are not large waves or white caps.

For each monitoring event, a visual reading of the lake level should be recorded on the datasheet. Volunteers are asked to

enter their field data into the SWIMS database *following each survey event* so that extreme water level changes can be documented as soon as possible. In addition to the water level reading, the staff gauge must be checked to verify that it has not shifted since the previous monitoring activity. If the gauge has been bumped or appears to have shifted, the volunteer should contact their surveyor to resurvey the gauge.

Volunteers are not responsible for surveying the staff gauge at the beginning and end of each field season. This will be carried out by professional surveyors. In some cases, volunteers may coordinate with the surveyor to help install and remove the staff gauge in spring and fall.

IV. Equipment

- Lake Map (with staff gauge location marked)
- Lake Level Monitoring Datasheet
- Clipboard and pen or pencil
- Watch
- *If monitoring from a boat:*
    - Boat
    - Life Jackets and paddles
    - Anchor and rope
    - Binoculars
- *If monitoring in the water:*
    - Chest or hip waders
    - Life Jackets
- *If monitoring from land:*
    - Binoculars

V. Safety

Safety precautions of a general nature should be recognized when monitoring lake levels. Monitoring lake levels in extremely hot and humid weather carries the risk of dehydration and heat stroke. Never monitor during electrical storms or high wind events. A personal flotation device (PFD) should be worn if monitoring lake levels from a boat or while wading in the water. If using binoculars to read the staff gauge from land, do so from a safe location and be aware of noxious plants. Please carry a first aid kit with you while out on the water. Discontinue monitoring if you feel unsafe at any time.

Volunteers from CLMN are not DNR employees and must complete the program-specific liability waiver (Appendix C) and return it to your regional CLMN coordinator.

Volunteers under the age of 16 must be accompanied by a parent or group leader who will be responsible for their actions if part of a group volunteer activity. Volunteers under 18 must have written permission from a Parent or legal guardian to participate. A completed Parent Permission and Acknowledgement Form or similar written permission should be submitted prior to participation.

VI. Lake Level Monitoring

A lake gauge should be read *once per* week at approximately the same time (e.g. every Tuesday morning around 9am). Please be sure that the weather and water conditions are ideal for monitoring: winds should be calm with relatively flat water. Avoid monitoring when there are white caps or thunderstorms. This ensures that volunteers can effectively and safely read the staff gauge. If ideal weather conditions cannot be met on the regularly scheduled monitoring day, please suspend monitoring activities and reschedule the effort as soon as possible within the week. Continue with the normal monitoring schedule the following week.

Please use the following protocol to properly read the water level on the staff gauge:

1. Fill out the top portion of the datasheet *before conducting the first monitoring event of the season*. Be sure to have a Station ID number specifically for the staff gauge location.

Wisconsin DNR

Water Level Monitoring Data Sheet

Lake Information

Lake Name	Station ID	County
Lake Monona	1234567	Dane

Local Coordinator and Organization (if known): Joshua Wied / Katie Hein - WDNR

Monitoring Site Description: Staff Gauge is installed near walking path along west side of lake, across from Broom St

Data Collectors

Primary Data Collector	Email	Phone No.	Organization
Joshua Wied	joshua.wied@wisconsin.gov	(715) 421-7824	WDNR

   a. Contact your CLMN regional coordinator if you have questions about attaining the Station ID number for the staff gauge.

2. Navigate to the staff gauge.
   a. If monitoring from land, feel free to use binoculars for a better view of the staff gauge.
   b. If monitoring from a boat, please idle your engine or drop anchor and use binoculars for a better view of the staff gauge. Do NOT touch the staff gauge. Bumping up against the gauge may cause the fence post to shift and make the results inaccurate.

3. Take a picture of the staff gauge before making the first observation of the season,

and use it to help you determine if the staff gauge has moved when making subsequent observations.

4. Record the date and time of the monitoring event on the datasheet (see next page). Dates should be recorded as mm/dd/yyyy and time as a 12-hour clock with AM/PM.
5. Read the water level on the gauge to the nearest 0.02 ft. and record on the datasheet (ex. 2.06 ft on 6/1/2018).

Record date, time, level and details

Date	Time	Water Level Reading	Has the Gauge Moved?	Comments
6/1/2018	9:15 AM/PM	2.06 ft	Yes ☐ No ☒	Gauge installed yesterday
6/8/2018	8:20 AM/PM	2.00 ft	Yes ☐ No ☒	Drizzle this morning
6/15/2018	8:45 AM/PM	2.04 ft	Yes ☐ No ☒	
6/22/2018	9:30 AM/PM	2.10 ft	Yes ☐ No ☒	
6/29/2018	8:00 AM/PM	2.12 ft	Yes ☐ No ☒	
7/6/2018	8:10 AM/PM	2.34 ft	Yes ☐ No ☒	Heavy rain overnight, large change in level
7/13/2018	9:00 AM/PM	2.28 ft	Yes ☐ No ☒	
7/20/2018	10:10 AM/PM	2.18 ft	Yes ☒ No ☐	Gauge moved - surveyor contacted
7/27/2018	8:30 AM/PM	2.16 ft	Yes ☒ No ☐	
8/3/2018	7:45 AM/PM	2.22 ft	Yes ☐ No ☒	Gauge resurveyed yesterday
8/10/2018	8:00 AM/PM	2.30 ft	Yes ☐ No ☒	some rain yesterday afternoon
8/17/2018	7:30 AM/PM	2.26 ft	Yes ☐ No ☒	

6. Determine if the staff gauge was bumped or moved since the last observation. If so, **please contact the CLMN coordinator or surveyor as the staff gauge will need to be resurveyed.**
    a. If the gauge has not moved, check "No" under "Has the gauge moved?" (ex. see 6/8/2018 on the sample data sheet).
    b. If the staff gauge has moved, check the "Yes" box and make a note under "Comments" (ex. see 7/20/2018 on the sample data sheet). Continue to record the water level reading with the gauge as is, and continue checking the "Yes" box until the gauge is resurveyed (ex. 7/27/2018). Include a comment when the staff gauge is resurveyed (ex. 8/3/2018).
7. Record comments about the monitoring process or status of the staff gauge in the 'Comments' column. If the lake level is more than 0.2 feet higher or lower than it was on the previous sample date, confirm that the large change is correct in the comments section (ex. 7/6/2018). This will avoid confusion when the data are checked for errors at the end of the season.

VII. Data Management

To enter data into SWIMS so that your results may be stored and shared, data managers setup:

- **A project to house the lake level readings** (this is where you will enter data)
    - "Citizen Water Level Monitoring - *Lake Name* - *County Name*"

- **A subproject to house the survey data**
  - "Citizen Water Level Monitoring - *Lake Name* - Calibration"

- **A station (location of gauge) where the data was gathered – data is associated with this station)**

- In most cases the projects and the station will already be set up. However, to access this information, you must have a Wisconsin Web Access Management System (WAMS) ID to log on to SWIMS and you must be given access to the correct project above.

SWIMS Permissions

If you do not have a WAMS ID and password, register at: https://on.wisconsin.gov/WAMS/SelfRegController.

If you are not assigned to the lake level project or have other SWIMS questions, see http://dnr.wi.gov/topic/surfacewater/swims/.

Contact information for WDNR SWIMS support staff is found on the bottom right of the page.

Setting up account in SWIMS

If you already participate in the CLMN program, you or a member of your monitoring team already has an account and the necessary login permissions to enter data in the SWIMS database. However, you will still need to a role or connection to the correct lake level project.

After *each* lake level monitoring event, data must be entered into the SWIMS database (https://dnrx.wisconsin.gov/swims). This is done so that errors, such as a shift in the staff gauge, can be rectified as soon as possible.

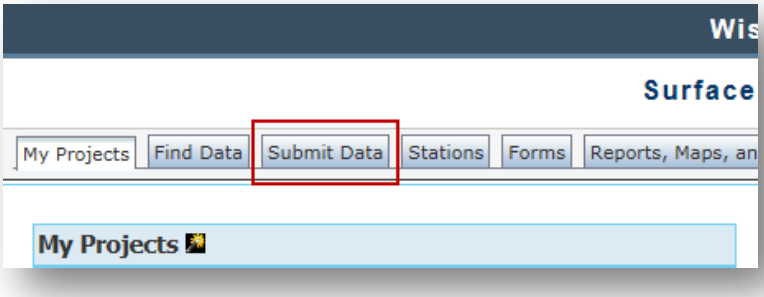
Enter Data in SWIMS

Please use the following protocol to enter the lake level monitoring data into SWIMS:

1. Check your data for accuracy:
   a. Do you have the correct Station ID for the staff gauge?
   b. Are the date and time correct?
   c. Is the lake level similar to previous readings?

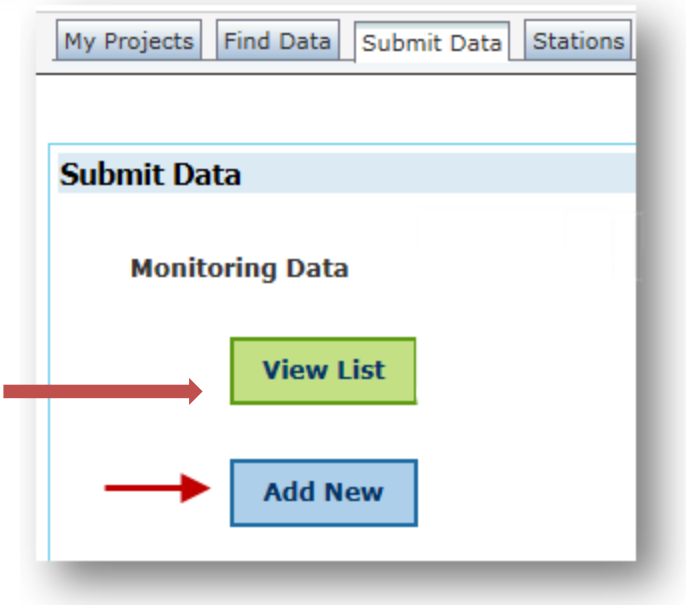
2. Open Internet Explorer and log into the SWIMS database (https://dnrx.wisconsin.gov/swims) with your WAMS ID and password (see red box below).

3. Click on the 'Submit Data' tab at the top of the screen.

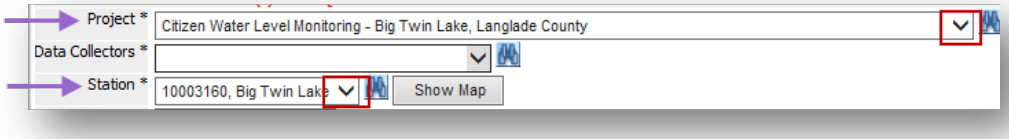


4. Click the **'Add New'** link in the second box on the screen to enter a new fieldwork event into the system.

Use the 'View List' link in the top box to view and edit previously entered data.

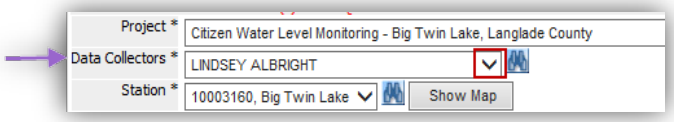


5. Select the **Project** and then the **Station**
   a. From the **Project** dropdown menu, select the correct monitoring project for your lake. The project is called '**Citizen Water Level Monitoring – YOUR LAKE NAME**'.



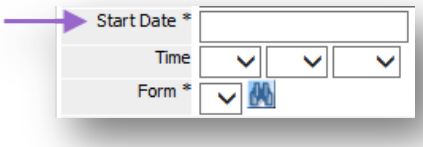
   b. Select the station you wish to enter data for from the Station dropdown menu. **Make sure you are entering data to the "Staff Gauge" station, NOT the deep hole** where other normal lake monitoring data is entered.

6. Select your own name from the list of **Data Collectors**.
   a. If you do not find your name, double check that the **Project** is correct. If so, contact SWIMS support staff.

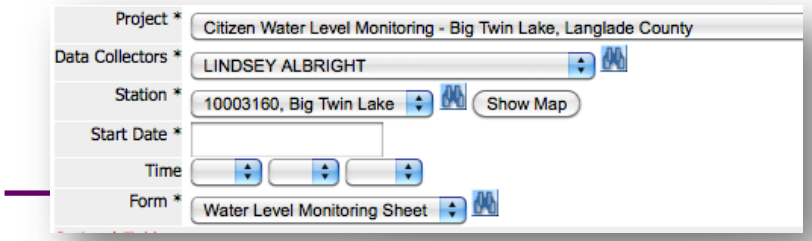


7. Click the 'Select Date' button to enter the **Start Date**.
    a. The monitoring date must be entered in the mm/dd/yyyy format

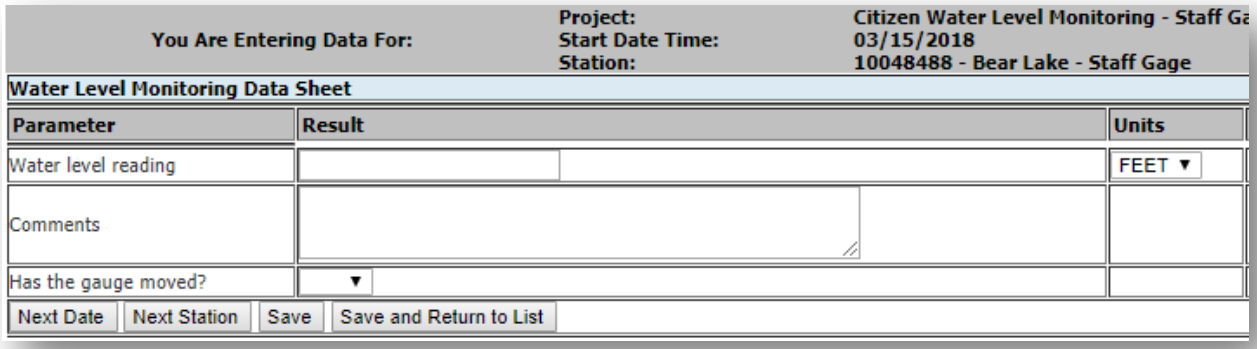
8. Enter the **Time** that you started your data collection work.
    a. SWIMS requires the start time information (enter AM or PM) for all monitoring data.



9. Select the **Water Level Monitoring (Staff Gauge)** form.
    a. If the form is not available, contact SWIMS database manager to correct this before you will be able to enter your monitoring data.



10. Ignore **End Date and Time** field which are not necessary.
11. Click **Next** to go to the field work data entry screen.
12. Add any **Comments** you recorded from your field data sheet



13. Review your field datasheet and input the water level data accordingly:

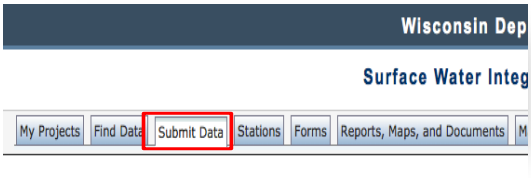
    a. **Water level reading** — Enter the value and select 'Feet' as the Units
    b. **Comments** — Enter comments or field observations
    c. **Has the Gauge Moved?** — Select either the 'Yes' or 'No' response

14. Check the data you just entered against the field sheet to ensure you entered it correctly.

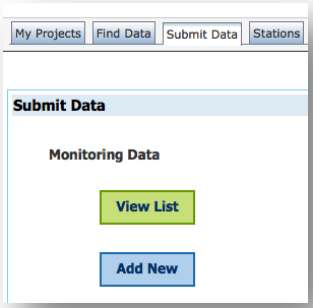
15. Once you finish entering data, select **'Next Date'** to enter more data for the same site, or 'Save and Return to List' to save and view the data you have entered.

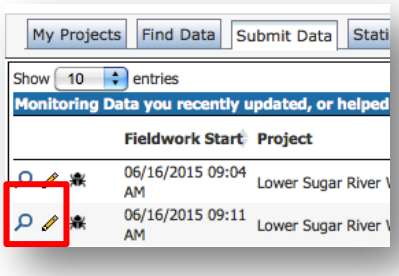
16. Review previous lake level records. Is your most recent record similar to the previous one (within ~0.2 ft.)? If not, make sure you entered the data correctly and that the jump in lake levels makes sense (e.g., recent rain storm or the lake level looked a lot higher or lower than before).

How to edit lake level monitoring data:

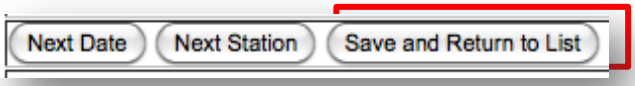


1. Login to SWIMS at: https://dnrx.wisconsin.gov/swims
2. Click the 'Submit Data' tab.
3. Click 'View List'.
4. Click the pencil for the date you want to edit.



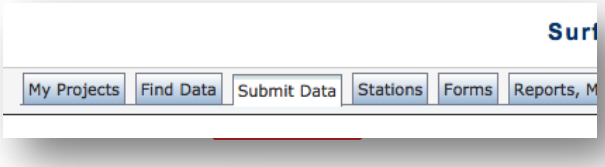


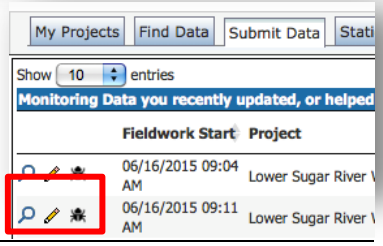
5. You can edit comments, etc. on the first page, and then click **Next**.
6. You can edit results on this screen.
7. Click **Save and Return to List** to save your changes.



View lake level monitoring data

1. Login to SWIMS at: https://dnrx.wisconsin.gov/swims
2. Click the '**Submit Data'** tab.
3. Click '**View List'**.
4. Click the magnifying glass to view previously entered data.





VIII. Quality Assurance Field Monitoring

Take a photograph of the staff gauge the first time you monitor each year so that you can easily tell if the gauge has shifted when you return. Always record data on your data sheet at the time of monitoring, and keep the physical copy of your data sheet as a backup.

Data Entry in SWIMS

Volunteers will use standardized CLMN lake level monitoring datasheets (see Appendix B) to record all water level data. Volunteers will be asked to check whether their data makes sense before entering it into the SWIMS database and to double check that they entered data correctly. After the field season ends, they will be asked to compare their field data sheets to the data report generated in SWIMS to identify data entry errors.

The statewide lake level coordinator will review lake level data in SWIMS monthly during the field season and again at the end of the field season. This review will include:

1. Scans for data completeness
2. Queries to search for outliers or extreme lake level changes (>0.2 ft. in 1 week)
3. Queries to mark data taken after a staff gauge had been unintentionally moved
4. Should suspect data be identified, the statewide coordinator will contact volunteers and/or compare to historical data if available.

IX. Aquatic Invasive Species

Wisconsin has various laws in place to prevent the introduction and control the spread of aquatic invasive species (AIS) and diseases in Wisconsin. Please observe the regulations in NR 40.

The laws under NR 40 for aquatic invasive species:

1. Prohibit the transportation of any vehicle, including boats and trailers, on a public highway with aquatic plants or aquatic animals attached.
2. Require removal of aquatic plants and aquatic animals and draining of all water from any vehicles or equipment immediately upon removal from the water and before leaving any boat launch or parking area.
3. Prohibit the placing of any boat, vehicle or equipment into waters of the state (statewide) if they have any aquatic plants or aquatic animals attached.

When exiting the lake, please be sure to take the following steps to prevent the spread of AIS:

1. INSPECT your boat, trailer, and equipment.
2. REMOVE any attached aquatic plants or animals (before launching, after loading, and before transporting on a public highway).
3. DRAIN all water from boats, motors and all equipment.

Please go to https://dnr.wi.gov/lakes/invasives/ for more information about invasive species in the state of Wisconsin or contact your regional AIS coordinator (https://dnr.wi.gov/lakes/invasives/topics.aspx). For more information on the invasive species rule (NR40), go to https://dnr.wi.gov/topic/invasives/classification.html

X. References

Elias, J. E, R. Axler, and E. Ruzycki. 2008. Water quality monitoring protocol for inland lakes. Version 1.0. National Park Service, Great Lakes Inventory and Monitoring Network. Natural Resources Technical Report NPS/MWR/GLKN/NRTR—2008/109. National Park Service, Fort Collins, Colorado.

Harrelson, C. C, C. L. Rawlins, J. P. Potyondy. 1994. Stream channel reference sites: an illustrated guide to field technique. Gen. Tech. Rep. RM-245. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station.

U.S. EPA. 2014. Best Practices for Continuous Monitoring of Temperature and Flow in Wadeable Streams (Final Report). U.S. Environmental Protection Agency, Office of Research and Development, National Center for Environmental Assessment. Washington D.C. EPA/600/R-13/170F.

Appendix A. Volunteer Lake Level Monitoring Instructions – Quick Sheet

A lake gauge should be read *once per* week at approximately the same time (e.g. every Tuesday morning). Winds should be calm with relatively flat water. Avoid monitoring when there are white caps or thunderstorms.

Please use the following protocol to properly read the water level on the staff gauge:

1. **Fill out the top of the datasheet *before conducting the first monitoring event of the season*.** Be sure to have a Station ID number specifically for the staff gauge location.
2. **Navigate to the staff gauge using the provided lake map.**
    a. Do NOT touch the staff gauge. Bumping the gauge may make the results inaccurate.
    b. Use binoculars if needed.
3. **Record the date and time of the monitoring event on the datasheet.**
4. **Take a photograph of the staff gauge if it is the first monitoring event of the season or if the gauge has been recently surveyed.** The photo is to help you tell if the gauge has moved on subsequent visits.
5. **Read the water level on the gauge to the nearest 0.02 ft.** Record on the datasheet.
6. **Assess whether the gauge has been moved.** To help with this, locate the mini bubble level on the staff gauge.
    a. **I**f the bubble is perfectly centered between the lines, the gauge has likely not moved. Check 'No' under 'Has the Gauge Moved?'
    b. If the bubble is not centered and/or the staff gauge is not vertical, it may have been bumped. Please contact your surveyor to arrange for the gauge to be resurveyed. Proceed with observations, check 'Yes' under 'Has the Gauge Moved?', and write a comment.
7. **Review the water level readings from the previous week.** If the water level changed more than 0.2 feet since the last reading on the datasheet, determine if this is an error or a real change. If real, confirm that the readings are correct in the comments section (e.g. "heavy rain", "observed large change").
8. **Record any additional comments** about the monitoring process or the status of the staff gauge.

Appendix B. Volunteer Lake Level Monitoring Datasheet

Wisconsin DNR

Water Level Monitoring Data Sheet

Lake Information

Lake Name ________________ Station ID ________________ County ________________

Local Coordinator and Organization (if known) ________________

Monitoring Site Description ________________

Data Collectors

Primary Data Collector ________________ Email ________________ Phone No. (___)___-____ Organization ________________

Additional Data Collector(s) ________________

Date	Time	Water Level Reading	Has the Gauge Moved?	Comments
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________

Wisconsin DNR

Water Level Monitoring Data Sheet

Date	Time	Water Level Reading	Has the Gauge Moved?	Comments
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
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___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________
___/___/______	____:____ AM/PM	________ ft	Yes ☐ No ☐	________________

Appendix C. Citizen Lakes Monitoring Network (CLMN) Liability Form

State of Wisconsin
Department of Natural Resources
Box 7921, Madison, WI 53707-7921
dnr.wi.gov

Citizen Lake Monitoring Network Release of Claims
Form 3200-101 (1/07)

Notice: Information provided on this form is voluntary, and authority for use of it is under s. 23.11, Wis. Stats. Personally identifiable information, including such data as volunteer name, address, phone number, will be used for management of DNR programs. Wisconsin's Open Records laws, s. 19.32-19.39, Wis. Stats., require the Department to provide this information upon request.

Lake and Volunteer Information

Lake	Summer Postal Address
County	
Summer Day Telephone Number	Winter Address (if different)
Winter Telephone Number (if different)	
Lake Telephone Number (if different)	Lake Address for Equipment Delivery (if different)
E-mail Address	

Citizen Lake Monitoring Network Release of All Claims

The volunteer signing below understands and acknowledges that:

1. The Volunteer has agreed to sample a lake pursuant to the Citizen Lake Monitoring Network (hereinafter referred to as the "Program").
2. The Volunteer is not an employee or agent of the Department of Natural Resources while performing these activities.
3. The Volunteer may encounter hazards from the presence of individuals using the body of water or from natural occurrences.

Waiver

I have read and fully understand this document. In consideration of being accepted as a Volunteer, I hereby waive any and all claims against the State of Wisconsin, the Department of Natural Resources, or any agent or employee of the State or Department acting lawfully and within the scope of his/her official duties during the course of my participation in the Program. This includes, but is not limited to, 1) claims by the Volunteer, his or her estate, executor, administrator, heirs and assigns for wrongful death, personal injury, or property damage arising during the course of sampling, or while traveling to and from sampling location(s), 2) claims for fines or other civil or criminal penalties or damages imposed upon the Volunteer by a court of law arising in any way from the Volunteer's participation in the Program.

Signature

Name (please print)

Date