



Northwest Montana Lakes Network

**Volunteer Handbook
2025**



Table of Contents

NMLN History	1
Volunteer Sampling	2
Requirements	2
Sampling Timing	2
Volunteer Training	2
Volunteer Match	2
Sampling Instructions	3
Sampling Parameters Background	4
Water Temperature	4
Trophic Status	4
The Secchi Disk.....	4
Monitoring AIS	5
Aquatic Invasive Species.....	6
Instructions for Submitting Data through the Program Website	7
Volunteer Safety	8

NMLN HISTORY

The Northwest Montana Lakes Network (NMLN) is a partnership between Montana Fish, Wildlife & Parks and the Whitefish Lake Institute (WLI). Our mission is to recruit and train citizen scientist volunteers to monitor water quality, identify and report Aquatic Invasive Species (AIS), and to promote watershed stewardship in Northwest Montana. The program currently has more than fifty volunteers that monitor a total of fifty locations on forty-one lakes in Flathead, Lake, Lincoln, and Missoula counties. Monitored lakes are selected to represent ecological and recreational diversity. Lake sites include those with high quality ecological conditions and no known apparent AIS introductions. Lakes vary in size, depth, surrounding land ownership, and boat accessibility.

Volunteers are asked to collect data twice a month at a mid-lake deep site. Among the most important parameters monitored by the volunteers are Secchi disk depth, temperatures, and the presence of AIS; however, qualitative atmospheric and water condition data are also recorded. Volunteers are provided with the necessary equipment for lake monitoring and educational materials related to the prevention and early detection of zebra and quagga mussels and other AIS to assist them in monitoring their lake.

In 2011, the program launched an interactive website nmln.info that allows volunteers to view all program information, download field data forms and submit data electronically. The program relies on citizen involvement for success and provides training and instruction. The project coordinator from WLI visits each lake with its volunteer between mid-July and mid-August to ensure data consistency and to collect additional data to help address the question of whether nutrients are on the rise due to anthropogenic activity around the lakes. AIS early detection and monitoring is also conducted on each lake at this time using a plankton net to collect microscopy samples for analysis by Montana Fish, Wildlife & Parks.

In 2020, the program was renamed from the Northwest Montana Lakes Monitoring Network the Northwest Montana Lakes Network (NMLN) and a logo was developed. An annual report is prepared by WLI detailing water chemistry results and dissolved oxygen and temperature profiles and provides interpretation and discussion for management purposes. We transitioned this report from a printed document to web-based interactive content in 2021-2022.



VOLUNTEER SAMPLING

Requirements

The requirements to become a registered volunteer with the Northwest Montana Lakes Program are as follows. You must:

- Be 18 years of age or older, or supported by an adult
- Be willing to help protect and enhance water quality throughout northwestern Montana
- Be available during the spring/summer/early fall seasons to help with data collection at monitored sites
- Have transportation to the specified lakes monitored and a watercraft from which to conduct monitoring efforts
- Be available for a brief spring training session (see NMLN website for date)
- Be able to record and submit data online or by mail

Sampling Timing

Volunteers collect and record lake data measurements pertaining to physical conditions and visual observations. Among the most important parameters monitored by the volunteers are temperature, Secchi disk depth, and the presence/absence of AIS. Qualitative atmospheric and water condition data are also recorded. We ask that volunteers sample their assigned location **twice per month**, at roughly two-week intervals at a **mid-lake site**. More sampling is encouraged; however, volunteers are asked to please **allow at least three days between sampling**. **Midday** (11am – 3pm) is the best time to insure optimum sunlight penetration, regardless of cloud cover. Within that four-hour period, random times for observations are preferable to always using the same exact time.

The project coordinator from WLI visits each program lake between mid-July and mid-August to ensure data consistency and to obtain additional data addressing the question of whether nutrients are on the rise due to anthropogenic activity around the lakes. AIS early detection monitoring is also conducted at this time using a plankton net to collect microscopy samples for analysis by Montana Fish, Wildlife & Parks. A schedule for these visits is determined annually by June 1. Please notify Durae (durae@whitefishlake.org or 406.862.4327) if you are able to join her in the field on the day she plans to visit your lake.

Volunteer Training

Volunteer training is held in late spring each year in Whitefish to reacquaint existing volunteers with collection procedures and to train new volunteers. The training takes approximately two hours. At the training session, trainers and volunteers will review sampling protocols, safety issues, and have a general discussion of lake issues, including the identification of AIS of concern. All volunteers will be trained to collect data in a consistent format to compare and contrast lake systems and will receive a volunteer handbook. The training also includes a Q&A session to answer any of your lake related questions.

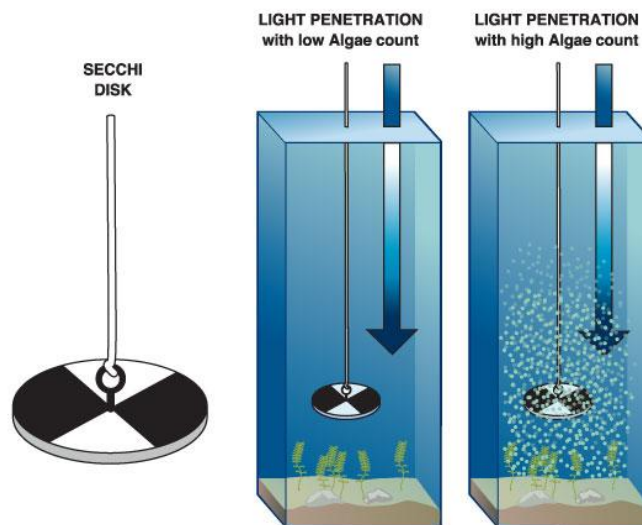
SAMPLING INSTRUCTIONS

Taking Water Temperature

- Make sure that the measurement end of the thermometer is 18 inches from the bobber or lake surface.
- Place the thermometer in the lake and allow it to remain submerged while you are taking the Secchi disk measurement.
- Remember to attach the end of the thermometer string to the boat so it doesn't float away.
- Remove the thermometer from the water and record the temperature on the field data form.

Using a Secchi Disk

Secchi readings should be taken twice a month at the same location throughout the monitoring season. GPS coordinates for your monitoring site will be provided by the program coordinator. This is the middle and deepest site in the lake. If you have access to a GPS unit, please use it to ensure that you are monitoring the correct location every time. Secchi readings should be taken midday (11am – 3pm) to insure optimum sunlight penetration.



Instructions for taking the Secchi Measurement:

- Travel to your monitoring site and anchor the boat if possible.
- Remove your sunglasses to reduce glare. If you are wearing prescription sunglasses, please make note of that on the monitoring form.
- Use the shaded side of the boat and your body to reduce surface glare and to improve visibility.
- Lower the Secchi disk slowly into the water until it disappears.
- Record on the field data form the depth at which the Secchi disk disappears.
- Lower the disk an additional five feet then slowly retrieve the disk until it reappears.
- Record on the field data form the depth at which the disk reappears.
- Average the two depths and record the depth on the field data form.
- This process can be repeated to ensure accuracy.

Recording Water and Weather Conditions

Atmospheric observations are qualitative and are important for reporting information that may not be otherwise captured during the taking of physical measurements. Record your observation based on viewing the expanse of water at your monitoring site. Check only one box for each item except for “other observed substances” which can have more than one box checked.

SAMPLING PARAMETERS BACKGROUND

Water Temperature

Water temperature plays a significant role in the stratification of lakes. Most of the lakes in the NMLN are *dimictic*, meaning they mix twice per year. Water is most dense around 39°F and is less dense at temperatures above and below 39°F. After the ice melts off in the spring, the surface temperature of a lake begins to increase until it reaches 39°F. When this happens, the surface water sinks and mixes with the water below it. This is known as *spring turnover*. In the fall, the same thing happens only the water is cooling to 39°F. Some program lakes are *polymictic*, meaning they may mix and stratify multiple times a year based on meteorological conditions.

Water temperature and dissolved oxygen are inversely related. As water temperature goes up, the amount of oxygen goes down. Oxygen is produced through plant metabolism (*photosynthesis*) and is consumed during respiration and decomposition. Oxygen in lake water is also influenced by wind and wave action through weather events and the exposure of surface water to the atmosphere.

An adequate supply of dissolved oxygen (DO) in lake water is essential to fish and other aquatic life forms. DO can also indicate change in water quality, and of the ability of a water body to support aquatic life. The loss over time of DO in the deep areas of a lake, especially during summer months, may indicate that the ecosystem is stressed and/or changing. The NMLN staff member will measure DO with the help of the volunteer if they are present.

Trophic Status

The trophic status of a lake is determined by the amount of nutrients (nitrogen and phosphorus). Lakes are classified as either *oligotrophic*, *mesotrophic* or *eutrophic*. Eutrophic lakes are high in nutrients and plant growth, whereas oligotrophic lakes have relatively low levels of nutrients. Mesotrophic lakes fall somewhere between the eutrophic and oligotrophic range. Most of the lakes in the NMLN are oligotrophic thus having good water quality, clarity and lower nutrient levels. The trophic status of a lake is determined by many factors of nutrient supply. Nutrients can come from geologic bedrock, soils, and vegetation. Anthropogenic sources of nutrients include fertilizer, agricultural runoff and wastewater effluent. As human interaction with lakes grows in terms of use and development, water quality tends to decline. As part of the NMLN, you are collecting baseline trend data in lakes that will be valuable in making future management decisions.

The Secchi Disk

The Secchi disc is a weighted disc that is attached to a measuring tape. The Secchi disk is one of the least expensive and easiest pieces of equipment to use for monitoring lakes. Named after Fr. Pietro Angelo Secchi, a scientific advisor to the Pope, the Secchi was first used in the mid-19th century to measure the transparency of the Mediterranean Sea. Since then, the Secchi disk has been used to measure transparency of water bodies throughout the world.

The NMLN uses a black and white quadrant weighted Secchi disk to determine lake transparency or water clarity. The Secchi disk tells scientists a few things. First, a Secchi reading indicates the amount of light penetration into a lake. Because many living organisms in a lake depend on sunlight, the Secchi reading is an important indicator of the biological health of a lake. The Secchi reading is also a measure of the amount of suspended material or algae in a lake. The amount of suspended algae is important in determining the trophic status of lakes, and repeated consistent Secchi data gives scientists an idea of water quality trends occurring in the lake.

MONITORING AIS

Please spend some time reviewing AIS information before going into the field. The NMLN website (nmln.info) has many useful links with photos and information for identification. Montana Fish, Wildlife & Parks' website also has a complete list of aquatic invasive species found in Montana.

When doing visual or tactile observations for zebra or quagga mussels, inspect rocks near the shorelines, dock pilings, retaining walls and other hard surfaces that could provide a place for mussels to attach. Please attempt to get a GPS location. Data is recorded on the data sheet provided and should be submitted to WLI. If you suspect a positive sighting, please contact the WLI office immediately. WLI will then coordinate with partner agencies to further evaluate the situation.

WHAT YOU CAN DO TO PREVENT THE SPREAD OF AIS



CLEAN. Completely remove all mud, water, and vegetation before leaving the access area.

- Inspect your boat, trailer, and all gear. Pay attention to crevices and hidden areas.
- Remove all vegetation (by hand or sprayer).
- Remove all mud (use a pressurized power sprayer, found at most do-it-yourself car washes). The hot water kills organisms and the pressure removes mud and vegetation. No need to use chemicals or soap.
- Dispose of debris in trash or on dry land away from water or ramp.

DRAIN. Drain all water from watercraft and equipment.

- Drain or remove water from boat, bilge, live well, engine, internal compartments, and bait buckets by removing drain plugs before leaving the access area.

DRY. Aquatic invaders can survive only in water and wet areas.

- Dry your watercraft and fishing equipment thoroughly; this will kill most invasive species. The longer you keep your watercraft, trailer, waders, and other equipment outside in the hot sun between fishing trips, the better.

Help spread the word about AIS and encourage friends to follow decontamination procedures. If you suspect AIS in your lake, immediately contact Montana Fish Wildlife and Parks Region 1 at 752-5501.

Aquatic Invasive Species (AIS)

Zebra and quagga mussels have devastated waterways and water systems throughout the United States and were recently found in Montana reservoirs. Once established, zebra and quagga mussels are impossible to completely eradicate. They also can reproduce and spread rapidly. One female zebra mussel can produce up to one million eggs per year. It is important to do everything you can to help prevent the spread of these invasive non-native mussels. As a volunteer in this program, we do not want to be part of the problem, so never travel from one lake to another without completely decontaminating your boat and equipment.



A Portland sampler that has been colonized by zebra mussels

All volunteers should be on the lookout for AIS, including zebra and quagga mussels, New Zealand mudsnails, Eurasian watermilfoil, curly-leaf pondweed, and flowering rush. Zebra mussels reproduce when water temperatures exceed 50 degrees Fahrenheit, and the microscopic *veligers* (mussel larvae) are most abundant in late July through August.

Small zebra mussels will feel like sandpaper when you run your fingers over them. Adult zebra mussels are typically $\frac{3}{4}$ " long. Zebra mussels will attach themselves to plants, rocks, boat docks or any other hard surfaces. There are native mussels that live in northwest Montana lakes; however native mussels lack the ability to attach themselves to substrates.

Eurasian Watermilfoil (EWM) is a plant that roots to the bottom of water bodies. EWM can grow up to 21 feet tall from the bottom of a lake and can spread very easily because it reproduces through stem fragmentation. This means that even a small piece of EWM the size of a thumbnail transported on a boat and launched in another lake can reproduce and spread rapidly. EWM is an especially large threat to lakes in northwest Montana because it is already present in several locations throughout Montana including Beaver Lake in Whitefish and Noxon Reservoir in Sanders County. Other AIS found locally include curly-leaf pondweed and flowering rush.

INSTRUCTIONS FOR SUBMITTING DATA

You can collect data and record your findings in one of two ways. Go to nmln.info from your browser. 1. Download and print the appropriate Field form, OR 2. Click and submit your data using one of the online forms.

1. Submitting data online through the program website

Go to nmln.info from your browser. From the menu on the left, select Volunteers and then Data Forms from the dropdown. From the Data Forms page you can select a WQI Volunteer Online Form or an AIS Volunteer Online Form. Please remember to record the date and time that you collected the data rather than the date and time you submit the data. Once the online form is completed. After the data is submitted, WLI staff will download the information. If you feel you have made an error in transferring the data, please call WLI so we can verify.

2. Printing and submitting data sheets

The NMLN website was designed so that volunteers can submit collected data with ease, as well as stay informed about local issues pertaining to the network. Volunteers are encouraged to use the site to submit data, however if you still prefer to send completed field data sheets through the mail, that is okay. Download the appropriate field form from the program website and print for use in the field. If you don't have access to a printer, data forms can be mailed to you. Please send data sheets to:

Whitefish Lake Institute
Attn: NMLN
550 East 1st Street #103
Whitefish, MT 59937

The NMLN volunteer database is available to management agencies in the Flathead Basin. In addition, a biennial report is produced describing the trends found in sampled lakes. The NMLN website has additional information that is of use to volunteers including field sampling methods, program reports and publications.

VOLUNTEER SAFETY

Safety is of great importance. Please make sure your training is up to date, that you are prepared for your volunteer days in the field, and that you never go out on the lake if you think that your safety might be at risk.

Safety Tips

- Check the weather report prior to each outing
- Let somebody know where you are going and when you will return
- Always wear a personal floatation device (PFD) when boating
- Monitor with a partner when possible
- Return to shore if there are strong winds, thunder or lightning

Safety Equipment

- PFD
- Flashlight
- Bailing device
- Small tool kit
- First aid kit
- Compass or GPS unit
- Cell phone



Personal Safety

- Wear clothing appropriate to changing weather conditions
- Always bring a water bottle and drink plenty of water to prevent dehydration