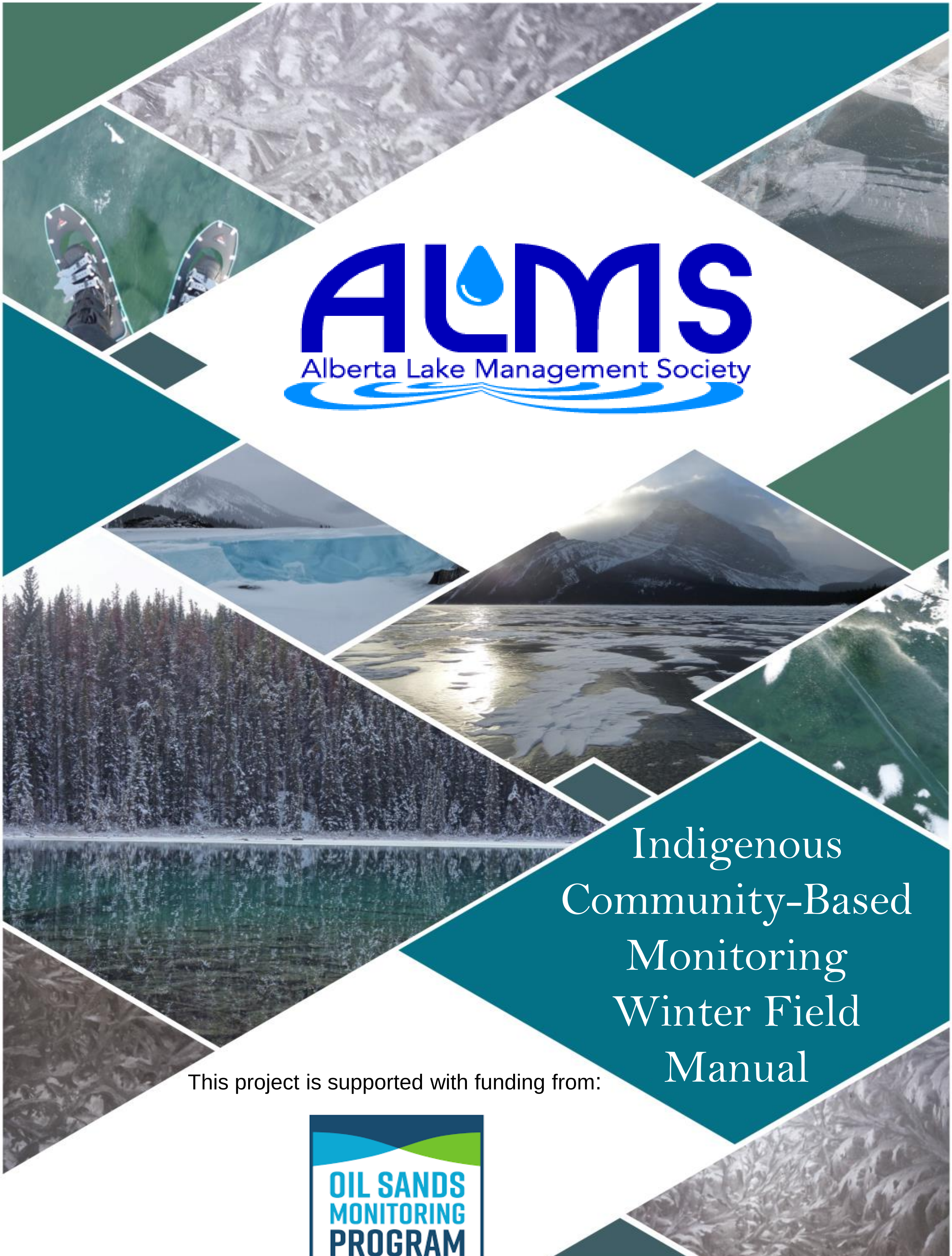

ALMS
Alberta Lake Management Society

Indigenous Community-Based Monitoring Winter Field Manual

This project is supported with funding from:

OIL SANDS MONITORING PROGRAM

Table of Contents

Appendix:

For the ICBM Quiz, field sheets, shipping information, and a list of ice safety gear, visit: https://alms.ca/icbm/

This manual was prepared by Kurstyn Perrin. For more information, please contact: kurstyn.cappis@alms.ca

Manual last updated: Nov 24th , 2025

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1) BEFORE YOU HEAD OUT:

a) **Fill your hot water bottle** and place it in your YSI kit. This will protect the probe from freezing.

b) Make sure your probe is charged (see the battery on the top right of the probe screen).

c) Review your GPS coordinates from the last trip if you have already been out to the site.

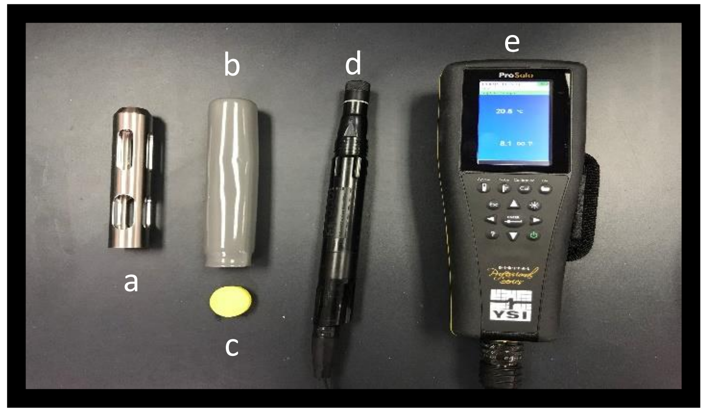
d) **Freeze a few ice packs the night before** a sampling trip to have ready for shipment

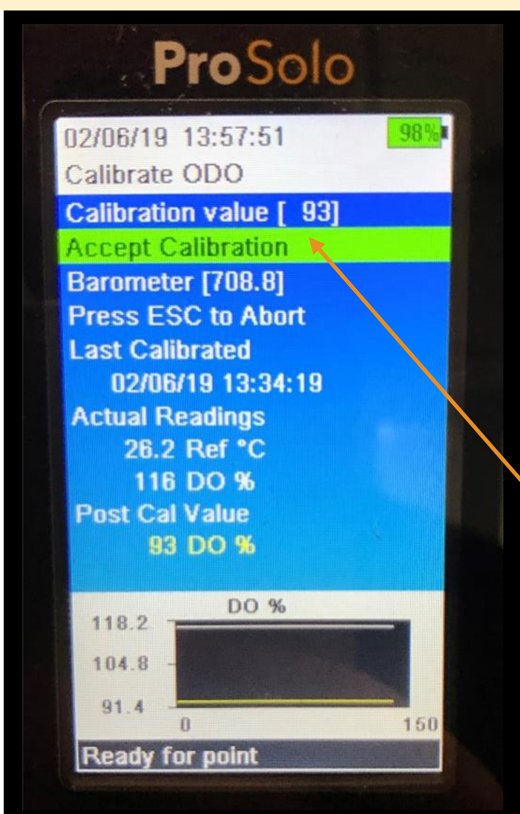
e) Plan a timeline for sample return with ALMS. If you are sampling in the morning, plan to filter either shortly after the trip or in the afternoon so that you can ship samples the next day at the latest.

f) Bring the cooler with the bottle set out.

g) Have a sampling plan, check the weather before going out, and always bring a cellphone in case of emergencies.

***Do not sample at temps colder than -20 °C with windchill**





2) CALIBRATE PROBE FOR DISSOLVED OXYGEN :

a) Calibrate your probe in your vehicle to avoid freezing.

b) Remove the **grey sleeve** (b) from your **probe** (d).

c) Remove the **metal probe guard** (a) and gently wipe any water droplets from the probe with a Kimwipe (supplied tissue).

d) Carefully place the metal guard back over your probe.

e) There is a yellow sponge inside the grey calibration sleeve. Using water from the calibration bottle, wet the **yellow sponge** (c) with a few millilitres of water.

f) Place the grey sleeve (with yellow sponge inside) over the metal guard.

g) Wait five minutes to allow the air in the probe to become saturated with moisture from the sponge.

h) Connect your probe to your **handheld unit** (e).

i) Press the green power button on your handheld unit.

j) Press Cal

k) Choose ODO or DO by pressing Enter

l) Choose DO % by pressing Enter

m) Wait one minute or until the lines stabilize in black graph.

n) Record the Barometer value on the front of your field sheet.

o) Choose ‘Accept Calibration’ by pressing Enter.

p) Press escape until you see the ‘log one sample ‘ screen.

q) Keep the metal guard on the probe but keep the grey sleeve off as the probe needs to be calibrated for conductivity next.

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3) CALIBRATE PROBE FOR CONDUCTIVITY:

a) Calibrate your probe in your vehicle to avoid freezing.

b) Remove the **grey sleeve** (b) from your **probe** (d) and place inside the graduated cylinder.

c) Fill up the graduated cylinder to the top with the conductivity calibration solution, so that the conductivity sensor (see below) is submerged. Let sit for 5 minutes.

d) If not done already, connect your probe to your **handheld unit** (e).

e) Turn on the handheld unit, and navigate to the conductivity calibration window: Press Cal [Cal]

f) Choose Conductivity by pressing Enter.

g) Choose Sp. Conductance by pressing Enter.

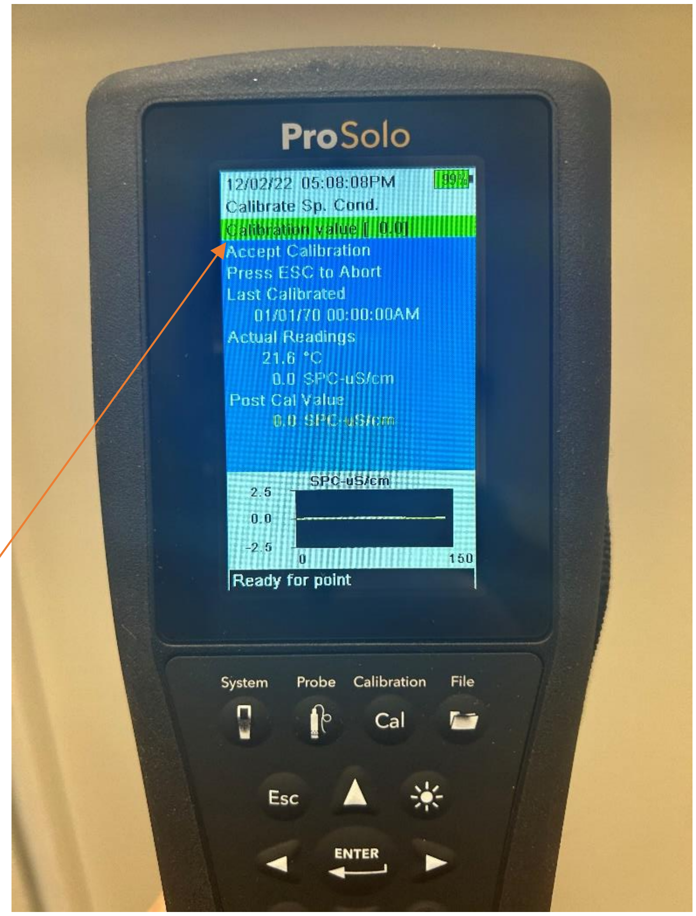
h) Change the "Calibration" value to the conductivity calibration solution used (this will be marked on the bottle, units are in µS/cm).

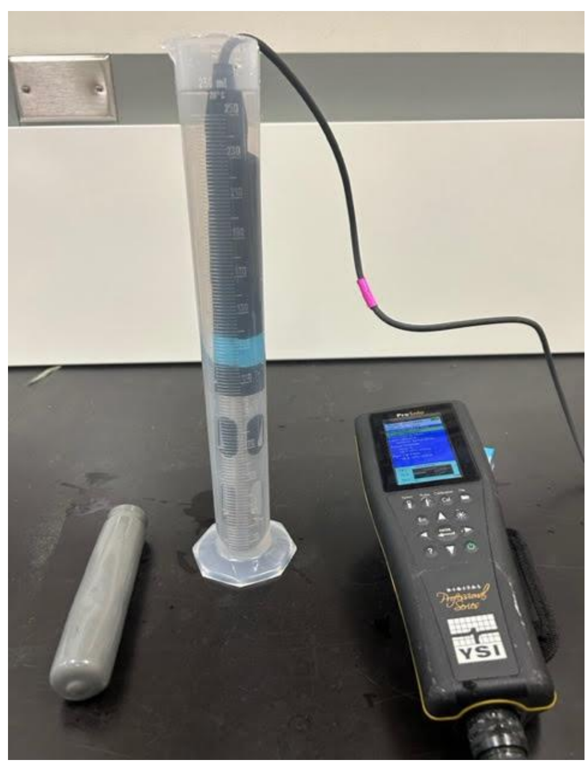
i) Watch the line on the bottom and wait 1 minute, or until the line stabilizes and then press "Accept Calibration".

j) Calibration is complete. Rinse the probe with water before putting the grey sleeve back on the probe.

k) Press 'ESC' until back at the home screen. Power down the handheld.

Do not re-use the conductivity solution





Conductivity sensor

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4) RECORD BOTTOM DEPTH AND PROFILE MEASUREMENTS:

a) Fill in the Environmental Observations portion of your field sheet. See Appendix (A5) for **white ice** identification tips. For 'Ice & White Ice Thickness' measurements, **use the ice measuring stick** included in the kit.

b) Auger **two separate holes** (one for the probe work and one for collecting bottles).

c) Use the 'tape and weight' to determine the bottom depth and record the depth in the '**Approximate Bottom Depth**' box on the back of the field sheet.

d) With your probe turned on to the 'Log One Sample' screen, remove the grey sleeve, keep the metal guard on, and lower the probe until the 0.1 m marker is at the surface of the water. **The cable is already marked in meters, please don't measure in feet.**

e) If your backlight turns off during sampling, press any key to reactivate it.

f) Record the temperature, dissolved oxygen, and conductivity measurements on your field sheet following the depths indicated in the 'Depth (m)' row (see Appendix: step A3 on page 13 for guide on cord depth markings)

g) You may need to wait 30-60 seconds for your dissolved oxygen readings to stabilize at each depth.

h) Continue this process until you have hit the bottom of the lake.

i) Hold the Power Button to turn off your probe.

j) Place the grey sleeve with wet sponge inside back over the metal guard. **Return the probe to the warm sampling kit.**

5) COLLECT WATER SAMPLE WITH G2-Preserved BOTTLE:

a) Using a Sharpie, label your **G2-Preserved Bottle** (a) with the Lake Name, Location Name, Date, and Time.

b) Wearing the **sampling gloves** (b), fill your **G2-Preserved Bottle** with water from below the surface.

c) Add one **yellow capped preservative** (c) to your **G2-Preserved Bottle** . Wear disposable gloves and goggles as this preservative contains **sulfuric acid**.

d) Place the bottle into your cooler.

Preservative MSDS information can be found on the ALMS website at: https://alms.ca/winter-lakekeepers/

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6) COLLECT WATER SAMPLE WITH ISOTOPES BOTTLE:

a) Using a Sharpie, label your **Isotopes Bottle** (a) with the Lake Name, Location Name, Date, and Time.

b) Wearing the **sampling gloves, fi**ll your **Isotope Bottle** with water from below the surface.

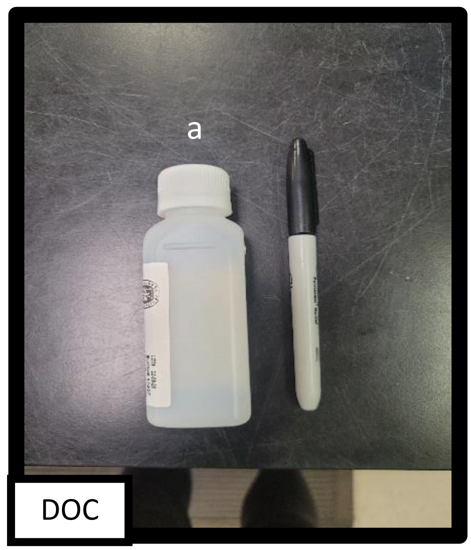
c) Place the sample into your cooler.

7) COLLECT WATER SAMPLE WITH Dissolved Organic Carbon (DOC) BOTTLE:

a) Using a Sharpie, label your **DOC Bottle** (a) with the Lake Name, Location Name, Date, and Time.

b) Wearing the **sampling gloves,** fill your **DOC Bottle** with water from below the surface.

c) Place the sample into your cooler.



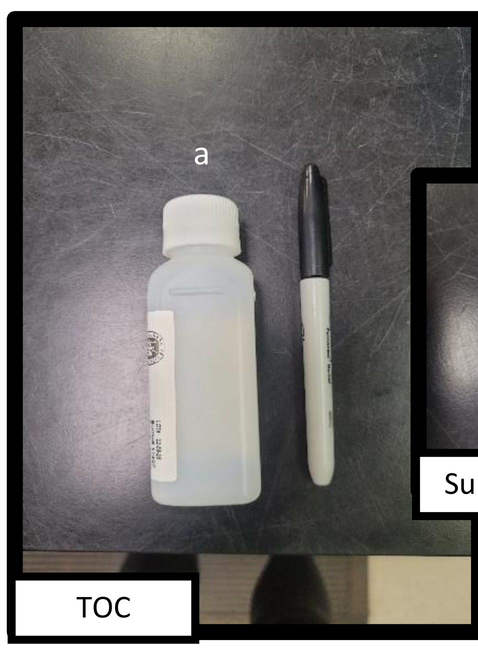
8) COLLECT WATER SAMPLE WITH Total Organic Carbon (TOC) BOTTLE:

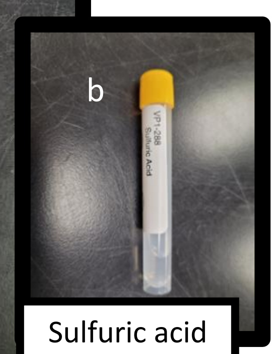
a) Using a Sharpie, label your **TOC Bottle** (a) with the Lake Name, Location Name, Date, and Time.

b) Wearing the **sampling gloves,** fill your **TOC Bottle** with water from below the surface.

c) Add one **yellow capped preservative** (b) to your **TOC Bottle** . Wear disposable gloves and goggles as this preservative contains **sulfuric acid.**

d) Place the sample into your cooler.





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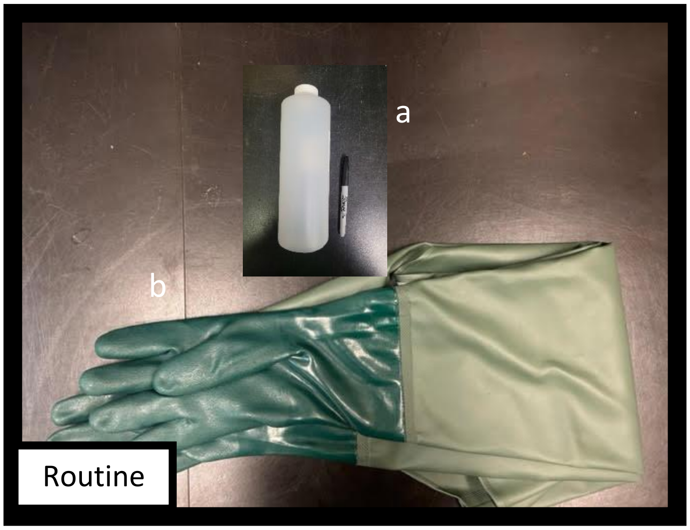
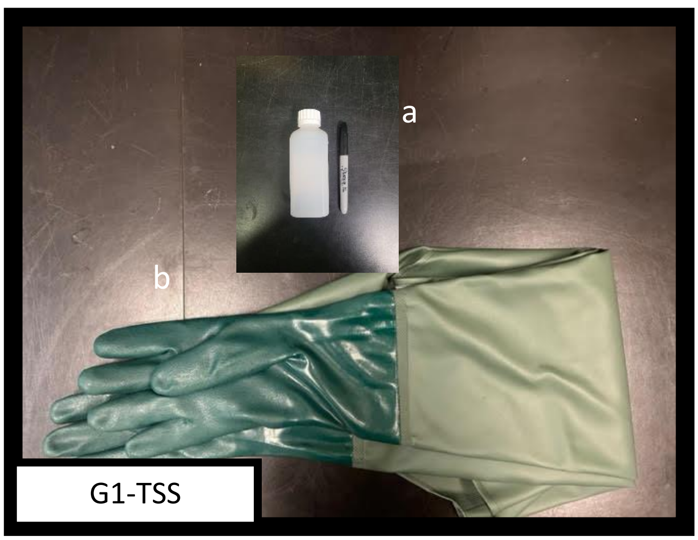


9) COLLECT WATER SAMPLE WITH ROUTINE BOTTLE:

a) Using a Sharpie, label your **Routine Bottle** (a) with the Lake Name, Location Name, Date, and Time.

b) Wearing the **sampling gloves,** fill your **Routine Bottle** with water from below the surface.

c) Place the sample into your cooler.



10) COLLECT WATER SAMPLE WITH G1-TSS BOTTLE:

a) Using a Sharpie, label your **G1-TSS Bottle** (a) with the Lake Name, Location Name, Date, and Time.

b) Wearing the **sampling gloves,** fill your **G1-TSS Bottle** with water from below the surface.

c) Place the sample into your cooler.

11) COLLECT WATER SAMPLE WITH MICROCYSTIN BOTTLE:

a) Using a Sharpie, label your **Microcystin Bottle** (a) with the Lake Name, Location Name, Date, and Time.

b) Wearing the **sampling gloves,** fill your **Microcystin Bottle** with water from below the surface. **Be sure to leave some head room in the bottle** (fill ¾ of the bottle). This will prevent the sample from bursting when placed in the freezer.

c) Place the sample into your cooler.

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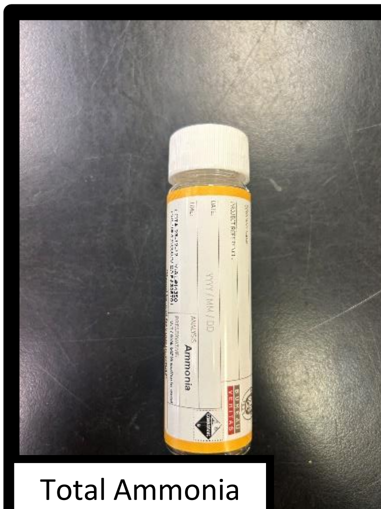
12) COLLECT WATER SAMPLE WITH Total Ammonia BOTTLE:

a) Using a Sharpie, label your **Total Ammonia Bottle** (a) with the Lake Name, Location Name, Date, and Time.

b) **IMPORTANT NOTE: This bottle is pre-charged meaning the preservative is already in the bottle.**

c) Carefully fill this bottle with some water from your **Routine** bottle. Do not overfill this bottle.

d) Close the bubble pack. Place the sample into your cooler.



Total Ammonia

This bottle is pre-charged with the preservative. Do not fill in the lake!

13) COLLECT WATER SAMPLE WITH Dissolved Ammonia BOTTLE:

a) Using a Sharpie, label your **Dissolved Ammonia Bottle** (a) with the Lake Name, Location Name, Date, and Time.

b) Wearing the **sampling gloves,** fill your **Dissolved Ammonia Bottle** with water from below the surface.

c) Close the bubble pack. Place the sample into your cooler.

Dissolved Ammonia

14) COLLECT WATER SAMPLE WITH CHLOROPHYLL-a BOTTLES:

a) Using a Sharpie, label your **Chlorophyll-a Bottle** (a) with the Lake Name, Location Name, Date, and Time.

b) Wearing the **sampling gloves,** fill your **Chlorophyll-a Bottle** with water from below the surface.

c) Place the sample into your cooler.

d) **FOR FILTERING WATER FROM CHLOROPHYLL-A BOTTLES, PROCEED TO STEP 18.**

Chlorophyll-a

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15) COLLECT WATER SAMPLE WITH METALS, POLYCYCLIC AROMATIC HYDROCARBONS (PAHs) & MERCURY BOTTLES

These will be collected once per season by both an ALMS staff member and a community member

**** Due to quicker hold times, these bottles will be collected when ALMS visits so that they can be delivered quickly to the labs****

Contaminant Bottle Set

IBCM Base Bottle Set

Preservative MSDS information can be found on the ALMS website at: https://alms.ca/winter-lakekeepers/

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16) WHAT TO DO AFTER SAMPLING

a) Bottle storage

Once sampling has finished, return to the office or home. It is important to properly store the different bottles to preserve the sample until you are ready to ship. Please refer to the chart below for hold times and proper storage location.

Table 1. Bottle storage & shipping for ICBM Program

Bottles	Hold Times	How to Store Until Shipment
Routine, G1-TSS, G2-Preserved, DOC, TOC, Total Ammonia, Dissolved Ammonia, Isotopes, PAHs, Metals	**3 days**	Store in fridge to keep cold, **DO NOT FREEZE**
Mercury	**48 hours**	Store in fridge to keep cold, **DO NOT FREEZE**
Microcystin	**3 months when frozen**	Store in freezer after returning from the sample site
Chlorophyll-a	***Filtering must be done within 24 hours of collection time***	**Before filtering:** Store in fridge to keep cold **After filtering:** All 3 filters can be stored in a Ziploc bag in the freezer *Refer to Chlorophyll Filtering guide on page 10

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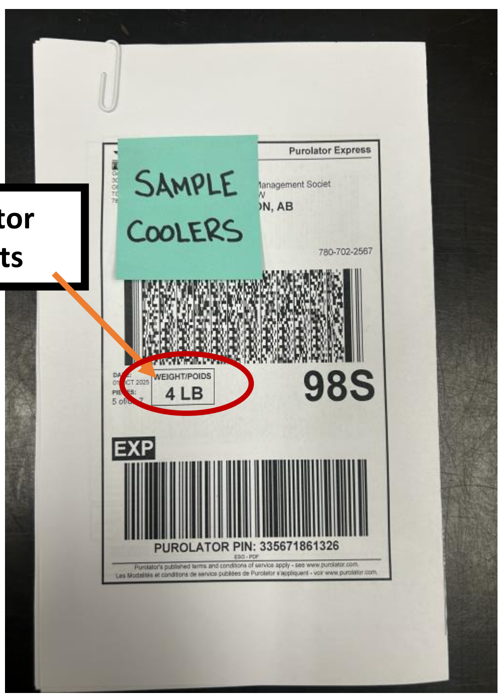
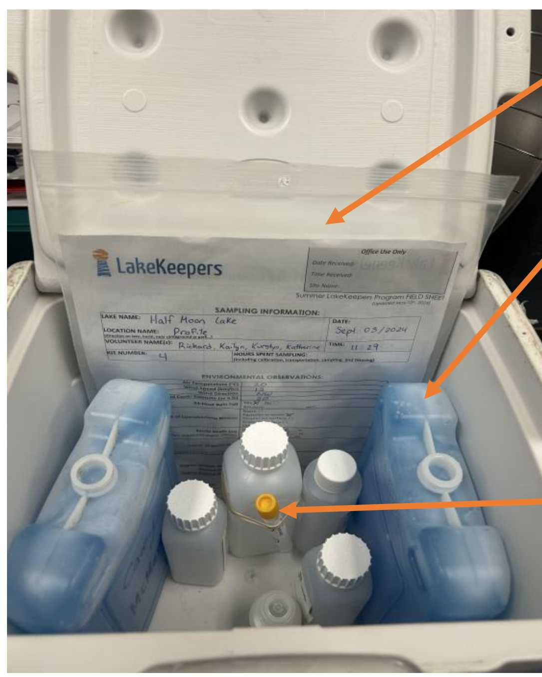
17) WHAT TO DO AFTER SAMPLING

b) Shipping Samples

1. Pack all your bottles, including the chlorophyll filters and microcystin bottle from the freezer, into a cooler.
2. Make sure to include a frozen ice pack or two depending on the size of your cooler.
3. Please **include a copy of the field sheet in a Ziploc bag** and email/text a copy.
4. Tape the cooler shut.
5. Use the appropriate **provided return label** (i.e., probe kit, filter kit or sample cooler) and place inside the provided sleeves with the barcode visible for scanning. Pull the tabs off the back, close the top of the sleeve and stick the label top of the cooler. Make sure the label is sticking well. Add extra tape if needed. Please send a picture of the **tracking number** to Kurstyn.cappis@alms.ca or by text message.
6. Drop off at your nearest Purolator location (see Appendix 6; page 16).

Purolator weights





1. Field sheet in Ziploc bag

2. Frozen ice packs

3. All bottles including frozen microcystin and Chlorophyll filters (if relevant)

Important Reminders:

- ❖ Check with your courier for the daily cutoff times for overnight shipments. Samples must be submitted before these times if they are to arrive at our office the next day.
- ❖ Sampling any day between Sunday-Wednesday is ideal and will ensure samples are received before hold times. Thursday mornings can work if samples can be shipped by the afternoon and before the courier cutoff time.
- ❖ Our office will be closed for holidays from **December 22nd to January 4th and February 16th** and cannot receive samples.

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Indigenous Community-Based Monitoring

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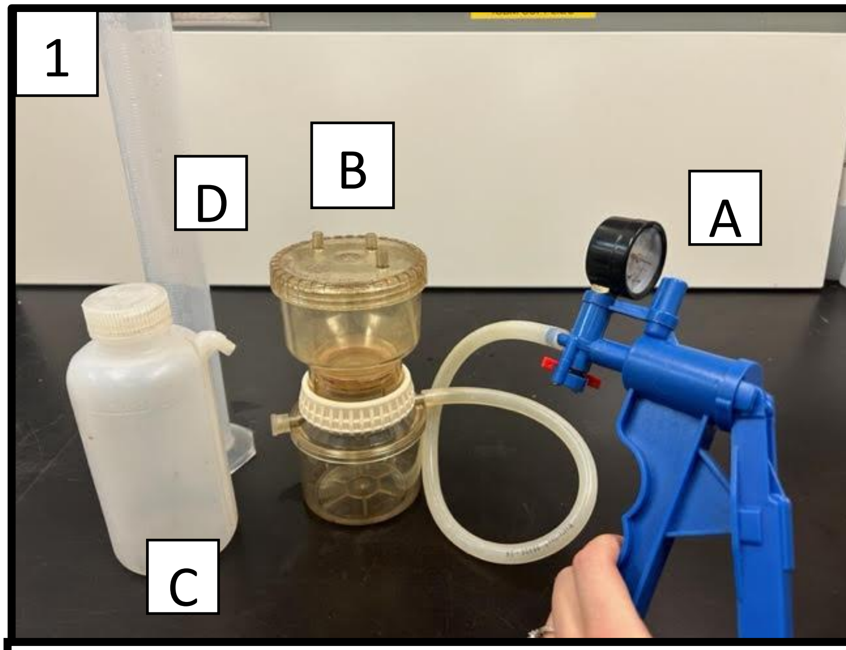
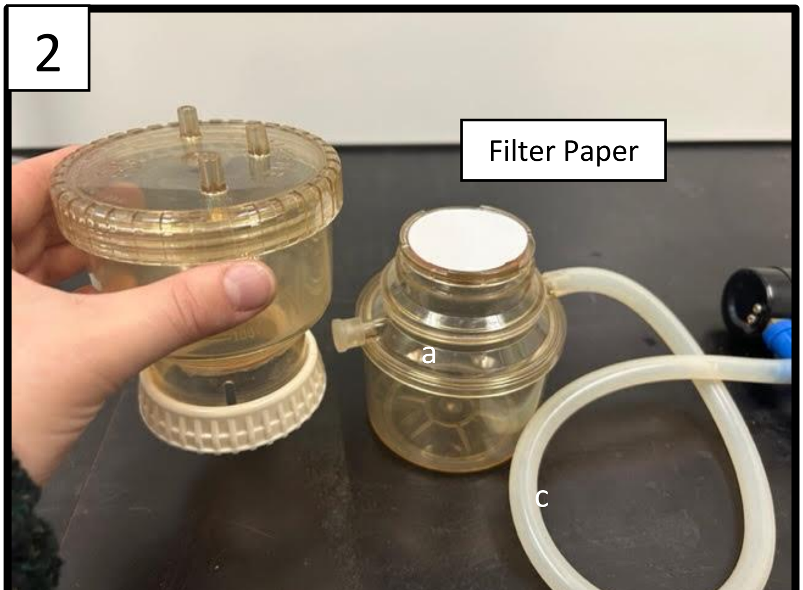
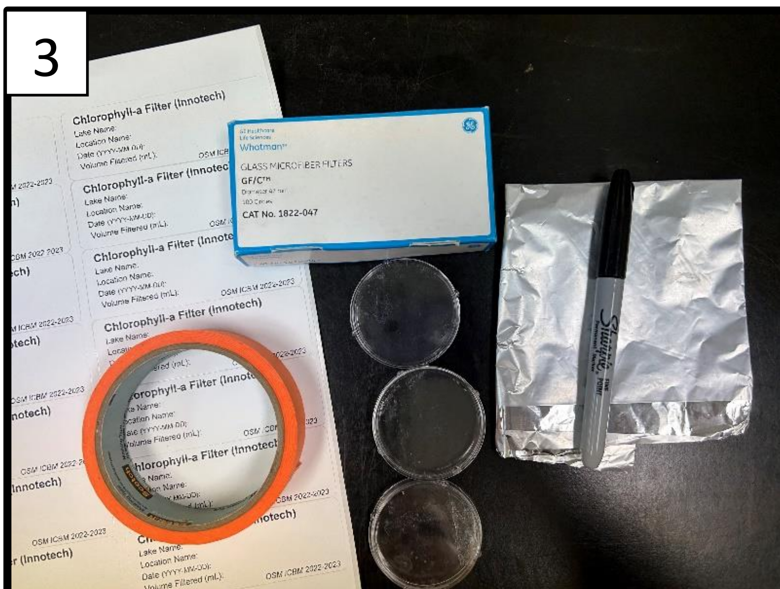
18a) CHLOROPHYLL-a FILTERING



A. Hand pump connected with rubber tubing to filtration system
B. Filtration system
C. Wash bottle
D. Graduated cylinder



1. Unscrew filter top
2. Place filter paper on filter bottom
3. Screw top back on
4. Begin filtering process (page 11)



1. Label petri dishes with provided labels
2. Tape petri dishes closed
3. Wrap petri dishes in aluminum foil
4. Put into freezer until ready to ship

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19b) FILTER WATER FROM CHLOROPHYLL-A BOTTLES:

Goal: The purpose of filtering is to capture a slight colour on the filter paper for the lab to analyze chlorophyll-a.

- Each chlorophyll-a sample is filtered in **triplicate (3 filters)**. You will use the **first filter** to determine how much lake water to measure for the **second and third filters** — try to match volumes as closely as possible.

-Filtering must be done **within 24 hours** of sampling. Keep the brown chlorophyll-a bottle **in the fridge** until you are ready to proceed with these steps.

*****Please visit the ICBM webpage at www.alms.ca to view our 'ICBM Training Video' which includes a visual step by step of the filtering process*****

---

1. Set-Up:

a) Put on **nitrile gloves**.

b) Set up the **filter apparatus (see page 9)** on a level surface **away from direct light**.

c) Place **Filter paper #1** on the funnel using tweezers and secure the top.

d) **Pour some pure water** into the squirt bottle and **wet the filter paper** lightly.

2. Filter #1 (Determine Volume):

a) **Invert or shake** the brown chlorophyll-a bottle to mix the sample.

b) Measure **50 mL** of sample water in the graduated cylinder and pour it onto the filter.

c) Use the **hand pump** to gently filter the water through.

d) If no colour appears, continue filtering in **50 mL increments**, up to **300 mL total**, **until a faint colour is visible**.

- If no colour is visible by **300 mL**, **stop** — this is acceptable.

e) **Record the total volume filtered** for Filter #1 on your field sheet and provided label.

f) **Rinse** the graduated cylinder and inside of filter apparatus **three times** with pure water.

3. Preserve Filter #1:

a) Add **3–5 drops of $MgCO_3$** directly onto the filter while pumping gently.

b) Use tweezers to **fold the filter paper in half twice** (avoid touching the center of the paper).

c) Place the filter in a **petri dish**, **wrap in foil**, **fill out provided label information** and stick-on tinfoil

4. Filters #2 and #3:

a) Repeat the same steps measuring **approximately the same volume** determined from Filter #1 (i.e., if Filter #1 was 150 mL, measure 150 mL for Filter #2 and Filter #3)

b) Record each volume and paper colour on the field sheet.

5. After Filtering:

a) Store all **3** wrapped petri dishes **in a Ziploc bag in the freezer** until shipping.

b) When shipping, include the petri dishes with the other samples in a cooler with **frozen ice packs.**

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APPENDIX

A1) GPS Coordinates Instructions & Documentation

1. Go to https://www.googlemaps.com/maps, and find your lake (search its name).
2. Using your mouse, right click on the location of the lake where you collected your sample.
3. Choose "*What's Here?*"
4. The GPS coordinates will appear at the bottom of your screen in the format of: 55.217876, -113.252806. Record these coordinates exactly as they appear from your device, onto the field sheet.

IF YOU PLAN ON SAMPLING THE SAME SITE MORE THAN ONCE IN THE SUMMER, USE THE TABLE BELOW TO RECORD YOUR SITE GPS FROM THE FIRST SAMPLING EVENT TO BE USED FOR THE NEXT SAMPLING EVENTS. USE BOTTOM DEPTH AS ANOTHER REFERENCE FOR LOCATING SAME APPROXIMATE SITE LOCATION.

Table 2. Site GPS log (reference for subsequent sampling events)

SITE (Lake, Location Name) E.g. Moose Lake, Vezeau Bay	Latitude	Longitude	Bottom Depth (m)

[1]Degree Minutes Seconds example: 53°29'06.5"N 113°27'54.6"W

[2]Decimal Degrees example: 53.485127, -113.465178

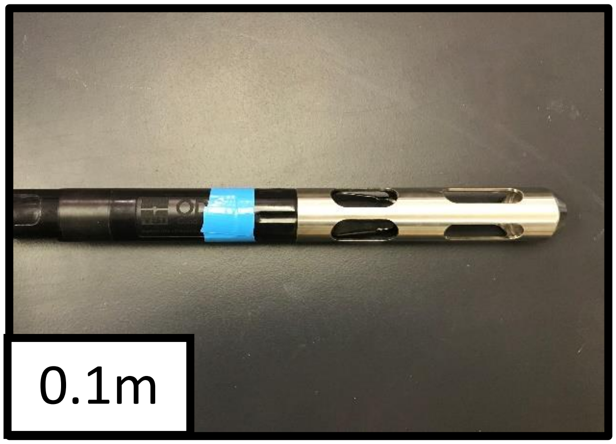
[3]Degree Decimal Minutes example: 53°29.1076'N, 113°27.9107'W

A2) USE THIS TABLE TO MAKE SURE YOU HAVE EVERYTHING YOU NEED FOR SAMPLING

Table 3. Equipment & Material List

Field Equipment	Bottle Set	Chlorophyll-a Filtering Supplies
YSI Pro Solo Probe (with marked cable)	**G2-Preserved Bottle + yellow cap preservative (2mL sulfuric acid)**	500 mL Filter Apparatus
Long green gloves	**Total Ammonia Bottle**	Hand pump & tube
Hot water bottle	**Dissolved Ammonia Bottle**	250 mL graduated cylinder
Coolers & ice packs for shipping	**Total Organic Carbon (TOC) Bottle**	Squirt bottle & pure water
Field Sheets & Manual	**Dissolved Organic Carbon (DOC) Bottle**	Tweezers
Clipboard and pens	**Routine Bottle**	Filter paper
Charging cord for probe	**1L Chlorophyll-a bottle**	Magnesium Carbonate (and pipette)
Extra disposable gloves	**Isotope Bottle**	Aluminum foil
Kimwipes (tissues)	**Microcystin Bottle**	Petri dishes & baggies
Tape and Weight	**G1-TSS Bottle**	Chlorophyll-a filter & bottle labels
Safety goggles		
Purolator Return Labels		

A3) YSI PROBE DEPTH MEASUREMENT MARKING GUIDE



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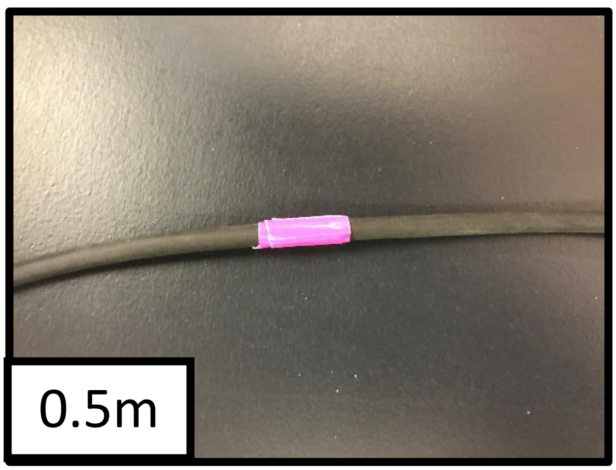

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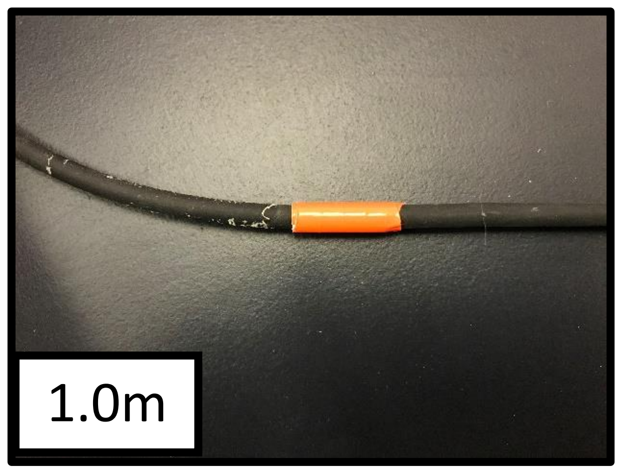

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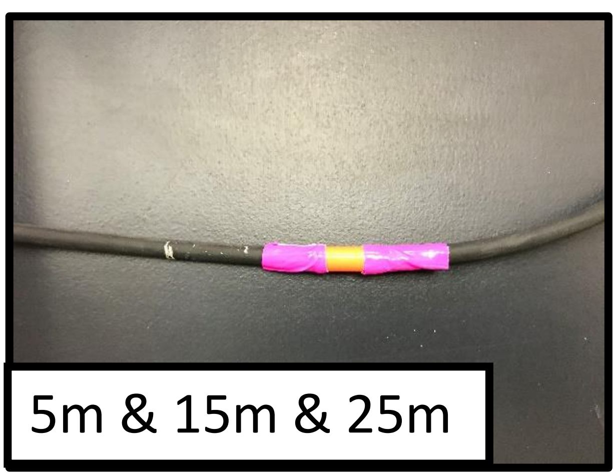
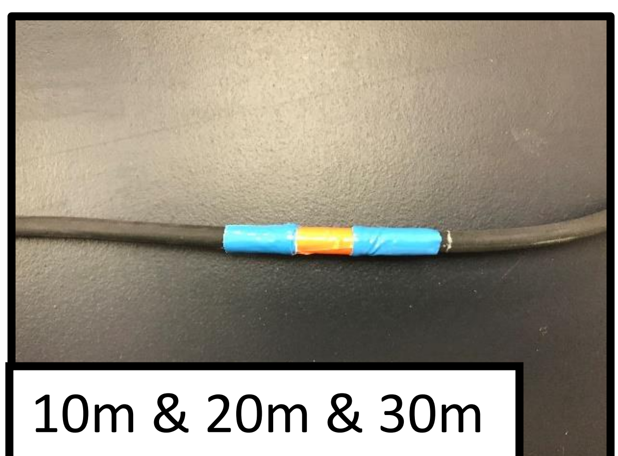


5m & 15m & 25m

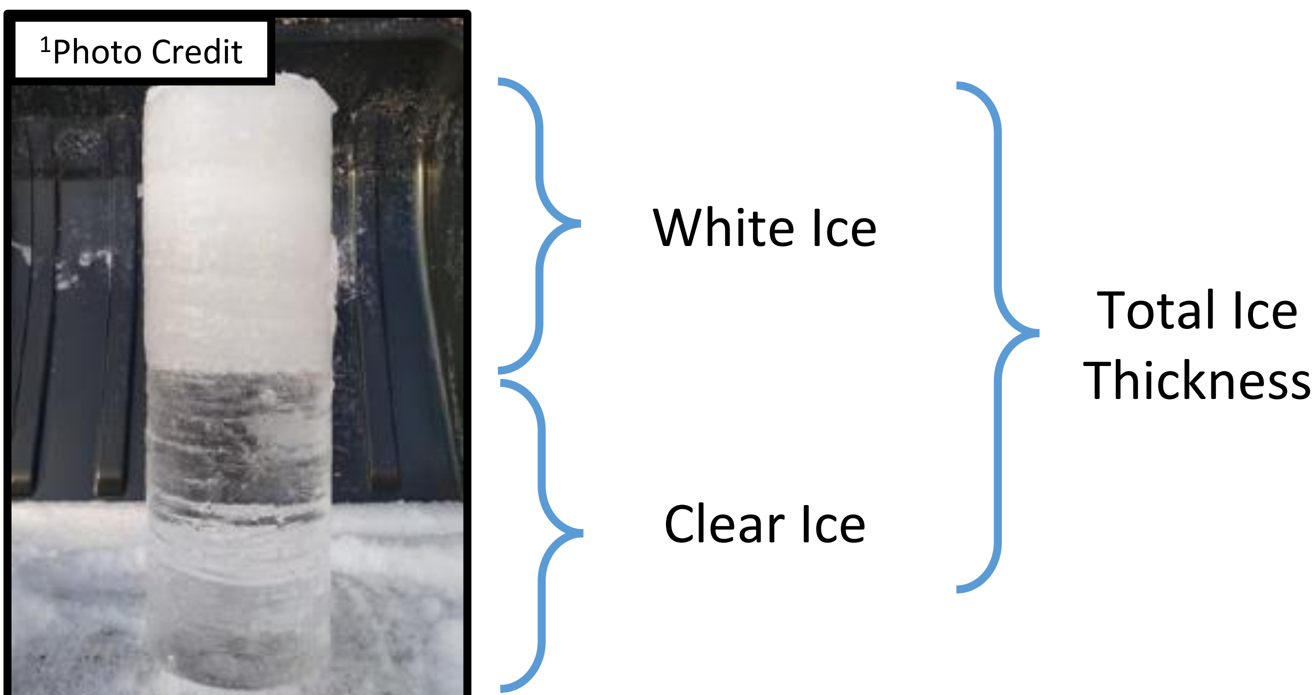


10m & 20m & 30m

A4) SNOW, SLUSH, WHITE ICE, AND CLEAR ICE

The quality, or characteristics of the snow and ice that covers lakes in the winter can be extremely variable. One of the major ways that snow and ice can vary on a lake is vertically, where snow, slush, white ice and clear ice can be identified. Snow and slush will be loose, while both white ice and clear ice will be hard. After auguring the hole in the ice, looking down the hole you should see up to two distinct layers of ice. On the top will be opaque or 'white' ice, and below will be clear, transparent 'clear' ice (also known as black ice). If you are sampling early in the season, there is a good chance that there will be little or no white ice, but later in the season, the layer of white ice may grow substantially. White ice is formed when snow melts and refreezes, which can happen during warm spells, rain events, or if the snow layer is heavy enough to force water up through cracks in the ice.[1]

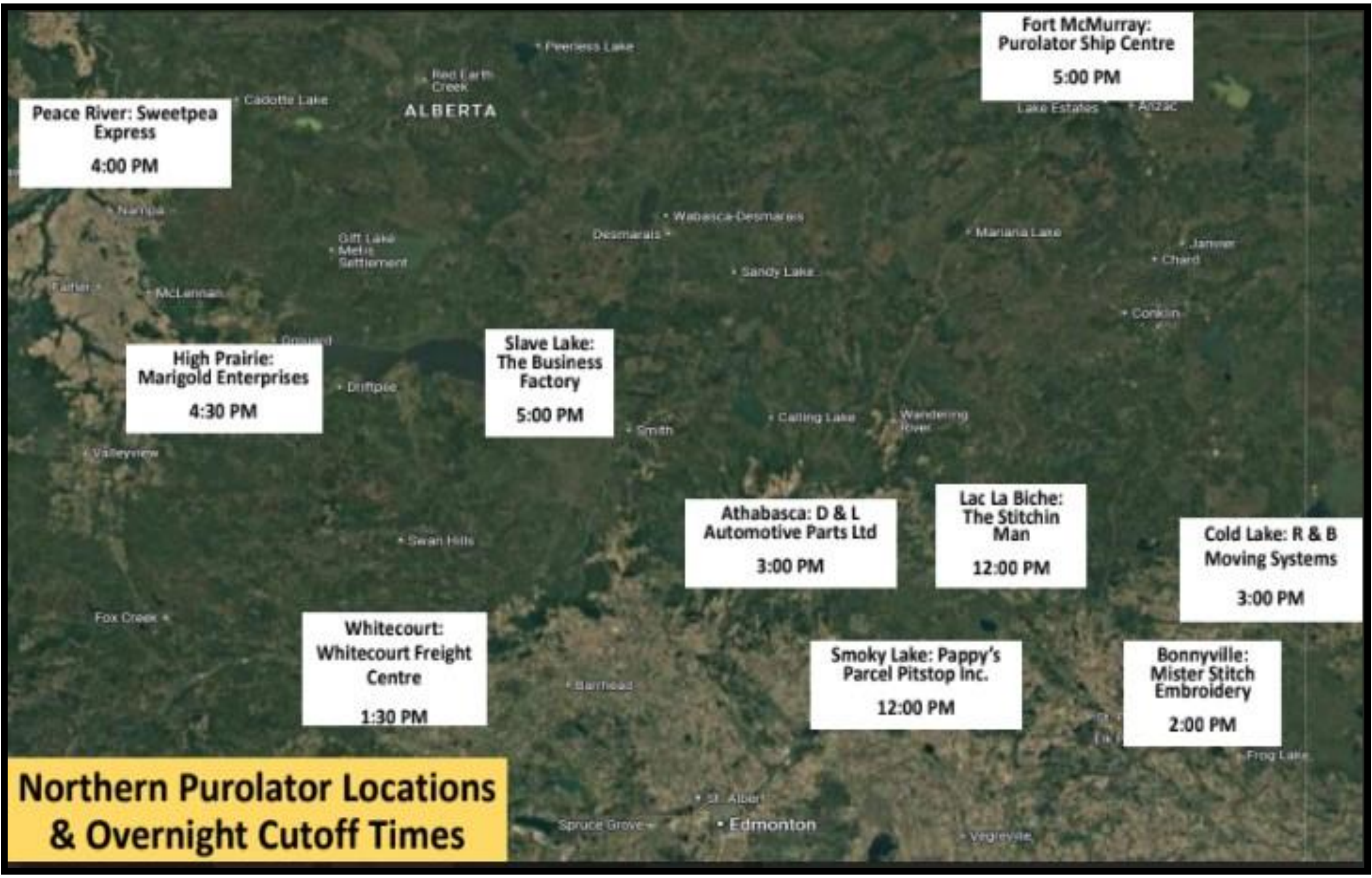
How to measure snow, slush, white ice, and clear ice: Before you clear your auger site, measure the snow and/or slush depth, or nearby the auger hole where you have not altered the snow. Next, clear the site where you will auger your hole. Make sure you clear all the way down to the hard layer of ice, if possible. After you auger your hole, measure the total ice thickness. Next, measure the thickness of the white ice layer, which will be from the surface of the ice down to the line where white ice transitions into clear ice. The thickness of clear ice is the difference between total ice thickness and white ice, which is why only total and white ice thickness is required on the field sheet.



[1]Weyhenmeyer, G.A., Obertegger, U., Rudebeck, H. *et al.* Towards critical white ice conditions in lakes under global warming. *Nat Commun* **13**, 4974 (2022). https://doi.org/10.1038/s41467-022-32633-1

This program supported with funding from

A5) PUROLATOR LOCATIONS & OVERNIGHT CUTOFF TIMES



***All these locations offer full Purolator services ***

Classification: Protected A

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A6) GLOSSARY

Below are descriptions of what the data and samples collected through the ICBM Program will be used for, and how they relate to better understandings lakes in the winter.

- **Environmental Observations:** 'Total Ice Thickness,' 'White Ice Thickness', 'Snow Coverage', Snow/Slush Thickness', 'Air Temperature', 'Water Colour', 'Water Clarity' and 'Odour Present' are all collected to put the data collected in context of the winter environment in which they were collected. Ice thickness, and snow coverage (if present) can be used to understand how much light may be penetrating the ice. Recording water colour and describing water clarity can identify algae or cyanobacteria growth, and even the type of algae or cyanobacteria. Seeing how these parameters change can create a long-term trend analysis and may help to identify water quality issues communities, in the oil sands regions, face.
- **GPS Coordinates:** Very important to collect, since the particular location on the lake where the sample is collected is used to contextualize all other data collected. Used to makes maps for presentations and reporting about the ICBM Program.
- **Probe Calibration:** Used to ensure probes are reading accurately given local environmental conditions.
- **Lake Profile Measurements:** Temperature readings from the top to bottom of the lake (lake profile) are used to understand lake mixing, dissolved oxygen levels, and for evaluating habitat for plants and animals. Dissolved oxygen readings are also taken through the lake profile to understand fish habitat. Winter can often be a stressful time for fish, as low oxygen levels often present at the end of winter can cause die-offs of certain species of fish. Determining the rate at which oxygen decreases through the winter season can also be used to understand the impact of summer algae and cyanobacteria growth, as greater growth will cause oxygen to be depleted more quickly as the algae and cyanobacteria decompose. Low oxygen levels are can impact nutrient levels, as lake sediments will release phosphorus into the lake if oxygen is absent – seasonal oxygen levels may contextualize seasonal nutrient changes. Conductivity readings helps determine water quality, identify impurities in a lake and can indicate changes in water levels over time.
- **G2-Preserved:** Water from this bottle is used to determine total phosphorus and total nitrogen levels, which are important nutrients for algae, cyanobacteria, and aquatic plant growth. High levels of these nutrients may indicate pollution and contextualize the amount and type of algae and cyanobacteria present.

- **Isotopes**: Isotopes of hydrogen and oxygen are used to help understand water balance in lakes including sources (precipitation, inflow, groundwater), losses(e.g. evaporation, outflow), and residency time.
- **Microcystins:** Microcystin is a group of toxins produced by cyanobacteria (blue-green algae) which, when ingested, can cause liver damage in mammals. Microcystin is produced by many species of cyanobacteria which are common to Alberta's lakes and are thought to be one of the most common cyanobacteria toxins. In Alberta, recreational guidelines for microcystin are set at 10 µg/L.
- **Ammonia**: A nitrogen compound found naturally in water, often resulting from the breakdown of organic matter or human activities like agriculture and wastewater discharge. In lakes, elevated ammonia levels can be toxic to aquatic life, especially in fish, and can contribute to eutrophication, promoting excessive algae growth that depletes oxygen and harms overall water quality.
- **Routine**: Water from this bottle is used to determine pH, a parameter that is used to understand the acidity of water and is important for evaluating fish habitat and general lake water chemistry. Conductivity and chloride are also determined from the Routine sample bottle and are parameters that help understand the levels of salts in lake water. As ice forms, salts are not incorporated into the ice, leading to elevated levels of salts in the winter. Salt levels are an important aspect of habitat for algae, cyanobacteria, aquatic invertebrates and fish. Levels can indicate groundwater connectivity, road salt pollution, and may also increase in lakes with large surface areas during times of low rainfall and snowmelt.
- **Chlorophyll-a**: Water from this bottle is used to determine the levels of chlorophyll-a in lake water. Chlorophyll-a is a green pigment found in all algae and cyanobacteria and is used in photosynthesis. Chlorophyll-a levels are used to understand the amount of algae and cyanobacteria in lake water. Higher levels, in conjunction with high nutrient levels, may indicate nutrient pollution, or reflect the lake's natural ability to support high levels of algal and cyanobacterial growth. Chlorophyll-a levels compared with ice conditions will also improve the understanding of what influences algae and cyanobacteria growth in Alberta lakes in the winter.
- **Total Organic Carbon (TOC):** Measure of the amount of organic material, both dissolved and particulate, present in the water. It is a good indicator of the productivity and health of aquatic ecosystems. High levels of TOC can indicate the presence of pollutants and contaminants, such as pesticides, herbicides, sewage, and industrial chemicals. It can also reduce oxygen availability and fuel bacteria growth.

- **G1-TSS:** Water from this bottle is used to measure the amount of Total Suspended Solids (TSS) in the lake. High TSS can have a negative effect on dissolved oxygen and temperature levels within the water, which can lead to a negative impact on fish habitat and plant growth. TSS is related to turbidity, but where turbidity measures how well light can pass through the water, TSS is a more quantitative measure of the amount of suspended particles in the water.

- **Metals:** Metals can be introduced into freshwater systems naturally through weathering of rocks and soils, or from human activities such as mining or refining processes. Common metals that can be found are arsenic, nickel, zinc, lead and chromium. Some metals can bioaccumulate within aquatic organisms, which can lead to a potential risk to human health. The water in this bottle will be analyzed for any presence of metal contaminants in the lake.

- **Mercury:** Mercury is a pollutant which can cause neurological damage to fish, wildlife and humans at high concentrations. Mercury can enter freshwater systems through atmospheric deposition (rain or snow) but also can enter directly from industrial and mining wastes nearby. Mercury can be easily absorbed into the food chain and will lead to bioaccumulation of more toxic levels within fish populations. This is why it is important to test for mercury levels within a lake or stream.

- **Polycyclic Aromatic Hydrocarbons (PAHs):** Water from this bottle will be analyzed to look for any presence of PAH concentrations in the lake. PAHs are a class of chemicals that naturally occur in coal, crude oil and gasoline and released by the burning of fossil fuels and carbon-containing materials (eg, wood and coal). PAHs do not dissolve or break down easily but will bind to sediment particles and can enter water bodies through atmospheric deposition, surface runoff, petroleum spills, storm water runoff and industrial discharges. In high concentrations, certain compounds of PAHs can be toxic to fish, wildlife and humans.