

Water Quality and Permafrost Run-off Monitoring

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YSI Professional Plus, handheld water quality meter. This is a high quality instrument that is very easy to use, only needing to be calibrated once a month. Some of the possible measurements and sensors include pH, conductivity, dissolved oxygen, temperature and ORP. These are all indicators of water quality and daily measurements over time can produce trend data. These are purchased from Hoskin Scientific in Canada and come in 3 parts: 1) the handheld meter, 2) the cable (quatro cable), and 3) the sensors (purchased individually). The drawback is that these meters are expensive, costing around \$3000. Sensors must also be maintained and calibration fluids need to be purchased yearly. Calibration is easy to learn and instructions are included.



Extech handheld water quality meters. There are two types of Extech meters, one for measuring dissolved oxygen and another for pH and conductivity. These meters are relatively inexpensive compared to the YSI Professional Plus, costing around \$200. Extech and other handheld meters can be purchased from Hoskin Scientific and Canadawide Scientific. The Extech type meters are good because they are easy to use, relatively inexpensive and handy when you cannot carry a lot of equipment. The drawback is they are not as high quality as the YSI's and tend not to last as long. It is handy to carry both the YSI and a smaller handheld in case one isn't working.

Community Based Monitoring Fieldsheet

Date: <u>August 17-2020</u>	Time On Water: <u>14:00</u>	Weather Conditions: <u>Overcast + fog</u>
Site Name: <u>RAY-US</u>	Time Off Water: <u>17:40</u>	Air Temp (°C): <u>77.8</u>
Latitude:	Community Members: <u>M. Kelow</u>	Water Conditions: <u>cal choppy</u>
Longitude:		Site/Debris conditions: <u>None</u>
Boat Operator: <u>Mike Low</u>		Wind Direction: <u>NW-E</u>
NAMES: <u>Mike Low</u>		Wind Speed: <u>Gusting</u>
		(Calm, breezy, gusting, etc)
Grab Samples:		
Time: <u>14:15</u>		
CoC ID #: <u>280-0005-001</u>		
v/v Checklist v/v (Please check if you have done the following?)		
Bacteriological (sterile bottle)	<input checked="" type="checkbox"/>	
L.L. Total Hg	<input checked="" type="checkbox"/>	
L.L. Dissolved Hg	<input checked="" type="checkbox"/>	
Dissolved Metals	<input checked="" type="checkbox"/>	
Total Metals	<input checked="" type="checkbox"/>	
Preservative added to Total metals	<input checked="" type="checkbox"/>	
Routing	<input checked="" type="checkbox"/>	
Nutrients	<input checked="" type="checkbox"/>	
Chlorophyll	<input checked="" type="checkbox"/>	
Quality assurance / quality control samples:		
Did you take a Field blank? Yes/No	<input checked="" type="checkbox"/> No	
If yes - Field Blank CoC ID #:		
Did you take a Travel Blank? Yes/No	<input checked="" type="checkbox"/> No	
If yes - Travel Blank CoC ID #:	<u>0005-002</u>	
Did you take replicate samples? Yes/No	<input checked="" type="checkbox"/> No	
If Yes - CoC ID # (2):		
If Yes - CoC ID # (3):		
Citizen Science Kits	<u>Extra 500ml</u>	
Water Temp (°C):	<u>17</u>	
Secchi Water Depth:		
Specific Conductivity:	<u>326</u>	
Dissolved Oxygen:	<u>9.26</u>	
Alkalinity:		
pH:	<u>8.08</u>	
Total Hardness:		
Total Chlorine:		
Additional Notes:		
Photos: <u>AMD-1000-NWQSS@14:25</u> Photo numbers for this site: Photo descriptions:		

Field Sheet. This is a copy of the field sheet that is used for collecting water quality “grab” samples. Field sheets like this should be used with any type of sampling to record all observations including date, time, location, weather, map, and meter data. A field sheet is meant to describe the sampling site and actual sampling process in case there is a significant measurement that needs explanation. A very important piece of information needed for water quality grab samples is the inclusion of chain of custody (COC) numbers. This number gives the sample an anonymous ID number so that there is no way the lab knows where the sample came from. This increases the quality assurance and quality control of the sampling. Quality assurance and control (QA/QC) refers to the standardization of the sampling protocol to avoid bias. The COC number will be provided by the laboratory and it should be included on all samples and field sheets.



Water quality grab set. When setting up a monitoring plan that involves analyzing water samples, you will have to get in contact with a lab. The most common place to find a lab is with university researchers, government researchers and private labs like ALS. When setting up monitoring, it is good to have a researcher to partner with as they have the resources to analyze samples and present data. Many researchers and/or grad students are fairly happy to partner with other groups, otherwise you can always pay to have the samples analyzed. This grab set was put together by Taiga Labs in the Northwest Territories. They are a government run lab and they have the ability to both analyze the sample and have a specialist look at the data. Most labs will ask what parameters you want to look at. The one pictured here includes a general suite of sample jars that include from left to right: chlorophyll to look at the amount of algae and productivity of a waterbody, nutrients which include compounds that plants need to grow, metals which are needed by some organisms but in small amounts, an acid preservative for the metal samples, ultra-low mercury and routine which includes pH, conductivity, hardness, salinity, etc.



This “grab” set is specifically for monitoring run-off from melting permafrost and was put together by the University of Alberta. A partnership was formed after talking with a researcher who was already doing research in the area. An agreement was made where Indigenous Guardians are responsible for collecting samples and the researchers will analyze data and provide a plain language explanation for communities. This grab set includes sample jars for the following parameters: 2 sample jars for ultra-low mercury, 2 acid preservatives for the ultra-low mercury, 2 vials for dissolved ions, 1 vial for water quality and one vial for dissolved organic compounds along with an acid preservatives. As with all water sampling, a set of gloves is included and must be worn, vials and bottles must be rinsed 3 times (some special types of sample bottle may not require rinsing, but you will be informed) and the “clean hands, dirty hands” method must be used. The “clean hands, dirty hands” procedure is a method of collecting samples while decreasing the risk of contamination. Two individuals are used. One (“dirty hands”) to open all bags and

containers, while the other (“clean hands”) is responsible for collecting the sample. This is shown in the video.



Gloves. Gloves are required to carry out all water sampling and new ones are needed for each sampling site. A pair of gloves should be put on immediately before sampling occurs and touch nothing but the sample bags, bottles, and pencil/Sharpie. For most sampling that requires gloves, latex is fine. However, when using DGTs for measuring dissolved metals, vinyl gloves are required. These can be purchased from medical stores or provided by the researcher.



Generic ice packs. These are needed to transport samples and they should be put into coolers along with samples immediately after collection. Once back, the samples should immediately go into a refrigerator and shipped as soon as possible (Usually 24-48 hours after collection). When shipped, it should be indicated that samples need to be kept refrigerated.



Syringe and filter. Some sampling requires filtration, which can be done several ways. For the permafrost run-off monitoring, a syringe and screw on filter is used to collect the ion and dissolve organic compounds samples. Instructions were sent by the lab that said the syringe first hand to be rinsed once with the local water then the filter is attached and another 20 mL of water is expelled to condition it. After the filter is conditioned, you must condition the sample bottles 3x with 20 mL of filtered water then filled completely. Cloudy water with high turbidity will plug up the filter making it hard to expel the water. When this happens a new filter must be attached and conditioned.