

Level 2 Sampling Instructions

Monitoring Equipment and Materials

Volunteers Provide:

- Access to a boat and a place to launch it.
- Life jacket.
- A secure place to store monitoring equipment.
- Approximately one hour every other Sunday between early May and October.
- Pencil (pens do not work on “rite-in-the-rain” data sheets) and a hard surface to write on (e.g., a clipboard or notebook).
- Small cooler and ice to store samples for pick-up.

King County Provides:

- Training
- Data sheets
- Labeled sample bottles and field sheets delivered for each sample event
- Van Dorn sampler with thermometer inside
- Secchi disk
- Pick-up of samples and delivery to the King County Environmental Lab



Van Dorn sampler and sample bottles.

Monitoring Procedures

The following instructions are provided to ensure that all Level 2 monitors collect data in the same manner. Please read the instructions thoroughly, and contact Lake Stewardship staff if you have any questions. Proper data collection and entry will help to eliminate discrepancies and ambiguities in your data, which allows for simplified data entry and analysis. Furthermore, if all volunteers collect and record data according to these protocols, data from different lakes can more easily be compared and contrasted.

Sampling Schedule

In 2015, Level 2 monitors will collect water samples and take measurements every other week on Sundays from May through October, with the exception of two 3-week intervals in the fall (see schedule below). These longer breaks accommodate vacation and holiday schedules. Samples will be picked up by King County Staff on Mondays and delivered to the King County Environmental Lab. Sampling according to the predetermined schedule is necessary so that the lab may analyze the samples in large batches, thereby reducing costs.

Please note the special cyanobacteria sample series planned on 4 dates (noted below), once a month between July and October. This is a pilot project for evaluating cyanobacterial toxins present in small lakes across the county.

2015 Lake Stewardship Monitoring Schedule	
Date	Notes
5/3/2015	
5/17/2015	Profile
5/31/2015	
6/14/2015	
6/28/2015	
7/12/2015	Cyanobacteria
7/26/2015	
8/9/2015	Cyanobacteria
8/23/2015	Profile
9/13/2015	Cyanobacteria, 3 week interval following
10/4/2015	3 week interval following this date
10/18/2015	Cyanobacteria

Other notes about the sampling schedule:

- Collect samples at roughly the same time each sampling day, if possible.
- If you are unavailable to sample, please make arrangements with a back-up monitor and notify program staff of the change by Monday at 8am, or sooner if possible. If you do not have contact information for your back-up or do not have a back-up, please let us know as soon as possible if you cannot sample.
- Always place water samples on ice in a cooler and leave them at the pre-designated pick-up location by 8am on Monday, unless you have made other arrangements with us.

Sampling Procedures

See the ***Determining Sample Location*** section of the Volunteer Guide to locate your sampling station. Once at your sample location, you will be making observations and taking notes, getting a Secchi depth reading with the Secchi disk, and using the Van Dorn to collect water samples and take temperature readings. On two occasions, you will collect water samples from multiple depths (profile sampling).

Sampling Equipment

- Boat
- Anchor
- Life jacket
- Secchi disk
- Van Dorn sampler with thermometer
- Sample bottles
- Cooler with ice or cold pack
- Data sheet and pencil

Date, Time, Weather, and other Notes

- Ensure your name, phone number, and lake name are on the data sheet. This is extremely important!
- Use pencil only, as pens will not work on “rite-in-the-rain” data sheets.
- Record the date and time. Please enter the time using a 24-hour time format (e.g., 6 AM = 0600, Noon = 1200, 6 PM = 1800, and Midnight = 2400).
- Record observations for cloud cover and wind conditions. Draw wind direction on the lake map provided on your data sheet.
- Fill out lake use observations (number of boats, swimmers, etc.). Numbers do not need to be exact if quantities are large. Make sure to include your boat in the count, so there should always be at least one boat on the lake!
- Provide goose counts if desired (optional). On your data sheet, write the greatest number of Canada geese observed at any one time on or near the lake.
- Make any additional notes about weather, water color, wildlife, etc. on the back of your data sheet.

Secchi Depth

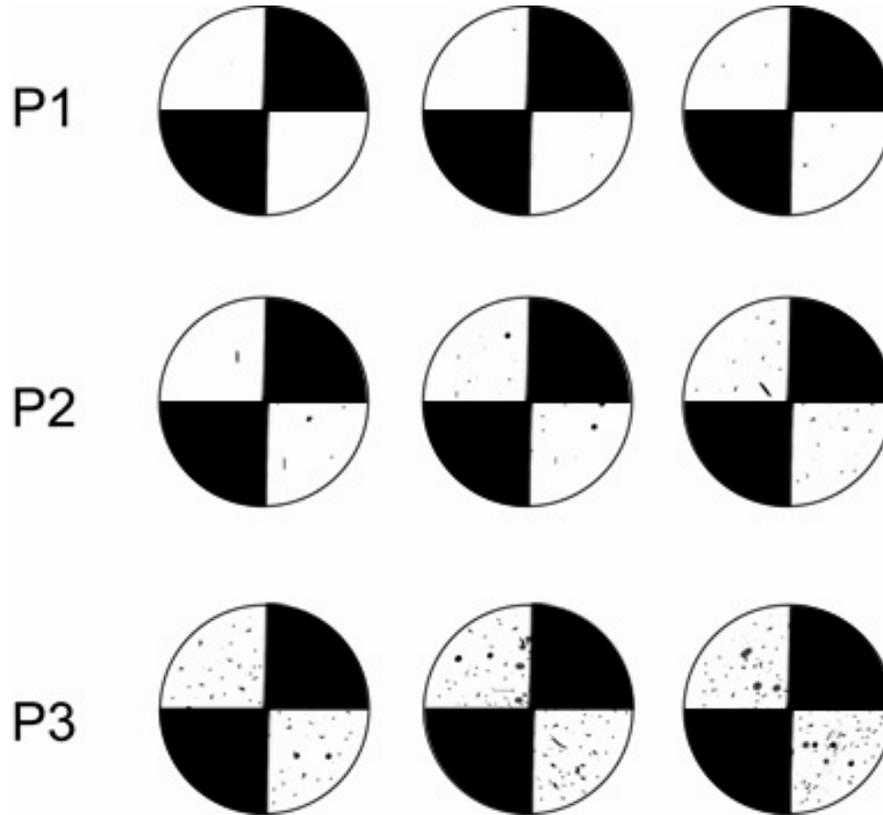
- To eliminate glare, take Secchi readings on the shady side of the boat.
- Remove sunglasses while taking Secchi measurements – some types make it easier to see into the water and may interfere with readings.
- The Secchi disk line will be marked with either 0.1 or 0.25 meter increments.

- To take a Secchi depth reading, lower the disk into the water until it just disappears from view. You may want to carefully raise and lower the disk a few times to make sure you have the most accurate reading.
- Place your finger on the line at the water's surface to make the point where the disk just disappears from view.
- Raise the disk and, using the marks on the line, measure the Secchi depth. Report on your data sheet to the nearest 0.1 or 0.25 meter.

Algae and Particle Observations

- Algae and particles are counted at the sample site located at the deepest point in your lake.
- Lower your Secchi disk to 6 inches below the surface of the water. At this depth, the volume of water above the white portions of the disk is approximately two liters.
- Look at the amount of particles in the water above the white portions of the disk. Estimate the amount of particles above *both* white portions by using the table or picture below.
- Alternatively, you can pour two liters of water into a clean white bucket to make the assessment.
- Algae in the water can appear as nebulous clouds or as small floating particles, depending on the species. Please do not count particles smaller than the period at the end of this sentence.
- Take notes about any algae scum, if present, including color and appearance.

Algae particle rating categories.



<u>Rating</u>	<u>Description</u>	<u>Particle Count</u>
P1	Few algae particles visible above disk	0-10
P2	Moderate numbers of particles	10-100
P3	A lot of algae- bloom conditions	>100

2015 Level II Monitoring Data Sheet

PLEASE FILL IN ALL INFORMATION

Volunteer Monitor: JANE SECCHI Phone: (555) 123-4567

Sample Collected: Sunday Monday 5/3/15 at 1430 Lake: Green
(Circle day) (Date) (24hr Time)

TEMPERATURE

At one meter: 12.0 °C (to the nearest 0.5°C)
Profile Sample Events (May 17 and Aug. 23):
 at ___ m depth: ___ °C (mid depth)
 at ___ m depth: ___ °C (near-bottom depth)

SECCHI DEPTH

Secchi Depth: 4.2 m (to nearest 0.10m)
 Notes: _____

WEATHER

Sunny No wind (glassy water)
 Partly cloudy Slight wind (small ripples)
 Overcast Breezy (small wavelets)
 Dark clouds Stormy (waves/whitecaps)
 Raining - light rain Rain last 24hr (mm): _____

OPTIONAL GOOSE COUNT

Greatest number of Canada geese on your lake at any one time in the last week? 2
 Other geese observations? _____

LAKE USE

Number of boats on lake: 4
 Number of swimmers at lake: 2
 Number of people on shoreline: Many
 Number of people fishing: 5-10
 Number of dogs in/ around lake: ~20
MOST ON TRAIL, ~3 IN WATER

ALGAE PARTICLE COUNT

Algae at your sampling location: (Circle one)
 P1 0-10 particles P2 11-100 particles P3 >100 particles
 Notes: _____

Is there algae scum present?
 Yes No
 (If yes, mark location on map)

Algae color: GREEN, BRIGHT

Algal form (scum, clumps, particulate):
SCUM, THICK FILM IN SPOTS

Algae sample provided?
 Yes No
 (If yes, mark location on map)

Wind direction (indicate on map)

WIND

Sample HERE

Green Lake - 1

5 10 15 20

0 1000
SCALE IN FEET

47°40'39.051" -122°20'2.649"

Questions? Please contact
 Chris Knutson at 206-477-4739 or
 chris.knutson@kingcounty.gov

Please provide any other information on the back of this sheet. THANK YOU!

King County
Revised: 04/07/15

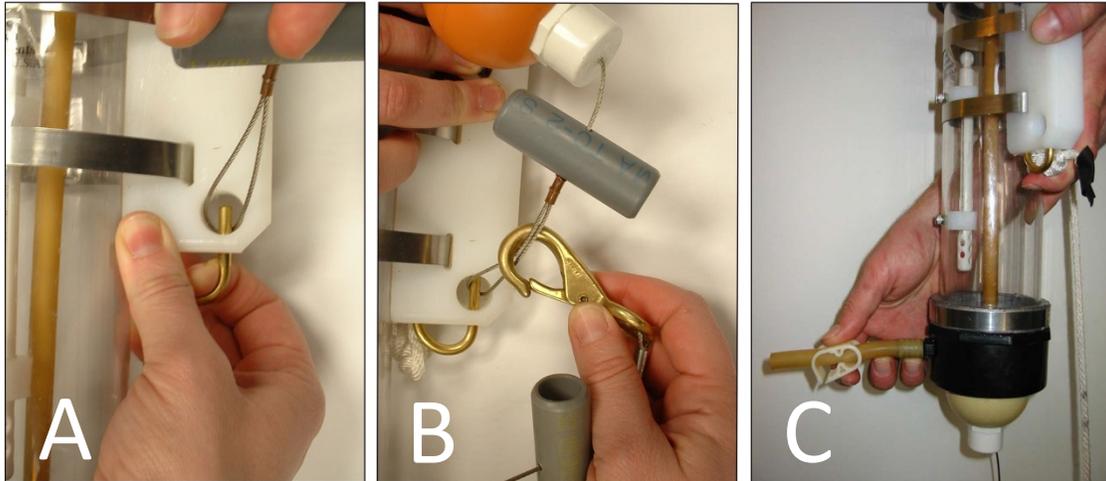
Sample of Level 2 data sheet.

Prepare the Sample Bottles

- Rinse all nutrient bottles at the sample station before collecting samples.
- To rinse a bottle, remove the cap, dip the bottle into the lake to fill it with a small amount of water, swirl the water in order to rinse all surfaces of the bottle, and pour the water back into the lake, away from where you will be collecting the sample.
- Repeat three times for each bottle. On the third rinse, use water to rinse the cap as well.
- Replace the cap and leave it on until just before you fill it with the sample.
- If there is any material visible on or near the water surface, such as pollen or algae, rinse the Van Dorn sampler first (as follows), and use the water from the first sampler drop to rinse the bottles one more time.

Prepare the Van Dorn Sampler

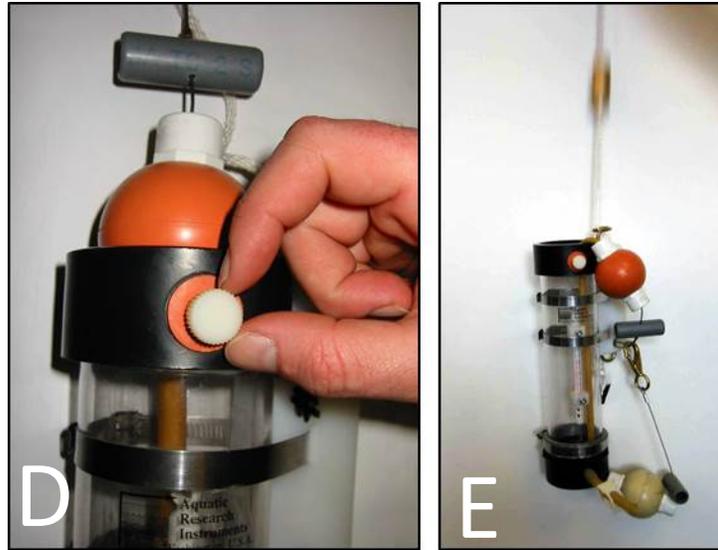
- While sitting, rest the Van Dorn across your knees so you can see the thermometer.
- With one hand, pull the rubber ball with the loop only (no clip attached) out of the tube and hold tightly. With the other hand push on the brass trigger on top of the white plastic housing so that you may insert the cable loop into the hole in the mechanism (see photo A below). Release the trigger so that it holds the cable loop in place.
- Pull the bottom ball out of the tube and towards the top ball, hooking the clip around the cable loop attached to the brass hook. Make sure the hook is around the entire loop, including both wires (see photo B below). The sampler is now set.
- To rinse the sampler, set as described above. Open the small plastic clamp on the drain tube (see photo C below). Keep the messenger (the weight attached to the Van Dorn line) with you on the boat and lower the sampler into the water until it is submerged. Gently raise and lower the sampler several times so that water passes through the chamber to rinse it.
- Raise the sampler to the boat, letting all of the water drain out, and close the drain tube clamp. You are now ready to collect your samples.



Van Dorn sampler set-up (photos A, B, and C).

Collect Water Samples and Read Temperature

- Set the Van Dorn as described above, making sure the drain tube clamp is closed. If there is a small white release valve on your Van Dorn, turn it clockwise to close it (see photo D below).
- To obtain a sample, keep the brass messenger in the boat and gently lower the sampler vertically into the lake so that the desired depth mark on the line is just visible at the surface of the water. Release the messenger down the line to activate the closure of the sampler (See photo E below).
- Turn the release valve counterclockwise to open it, open the drain tube clamp, and direct water from the Van Dorn into your rinsed sample bottles, filling the bottles to the neck.
- Reset the sampler and continue to drop to the desired depth until all samples are filled. Unless it is a profile sampling event, you will always collect your samples at a depth of **1 meter**.
- **Before emptying water from your final sample drop**, let the water sit for about one minute in the Van Dorn and read the water temperature from the thermometer located inside the sampler tube and record it on the data sheet to the nearest 0.5 °C.
- Immediately place samples in a cooler filled with ice. If you cannot fit a cooler into your boat, put the bottles in the shade, and when you get off the lake, place the samples in a cooler filled with ice as soon as possible.



Collecting water samples with the Van Dorn (photos D and E).

Profile Sampling

On two occasions, once in May and again in late August, you will collect samples from one or two additional depths. Depending on the total depth of your lake, you will collect profile samples from a mid-lake depth and/or a near-bottom depth. Sample bottles delivered for these dates will have labels indicating at what depths you should sample. Follow standard sampling methods for these sessions, and use the markings on the Van Dorn line to measure the appropriate depths.

If you hit the bottom of the lake when collecting the deepest sample, there will be sediment in the water. You may also feel the line go slack if you have contacted the bottom. If this happens, please discard the water and rinse the Van Dorn thoroughly, then take a sample 0.5 meters up from the depth marked on the label. Make a note on the field sheet so we know that the sample is from a shallower depth. This is very important, as water samples containing sediment cannot be used for laboratory tests.

Bluegreen Algae Sampling

As an addition to the Lake Stewardship Program this year, we are asking you to collect an additional sample to analyze for bluegreen algae (cyanobacteria) toxins. You will be collecting this sample on four occasions during the sample season (see above calendar for specific dates). The bottles and an additional special fieldsheet will be packaged in a separate small plastic bag to make it easy to identify them.

- Sample location: this location will be different from the routine site at the deepest part of the lake (where the other samples are collected). Because algae scums tend to gather near the shoreline due to wind and wave action, you will collect your sample in one of three locations:
 - If your lake has public access, collect your sample at **the most used public access location**.

- If there is no public access, but there is local community access, collect your sample at **the community beach or other frequently used location.**
- If your lake has neither of the above, collect your sample **along the shoreline in shallow water near your dock.**
- Make sure to collect your sample at the same location each time. Please mark this spot on the map provided on your data sheet.
- Collect your sample near the shoreline, where the lake is about 1-2 feet deep. Do not rinse the bottle before collecting this sample.
- To collect the sample, take off the cap and hold your bottle horizontally, lowering it into the water until the opening is halfway submerged. Hold the bottle steady just below the surface of the water and allow it to fill (no scooping!). When water stops flowing in, put the cap on and place on ice.
- If there is algae scum present, please be sure to wash your hands thoroughly after sample collection. Purell or similar antiseptic solutions have no effect on cyanotoxins, so there is no substitute for washing with water.
- An additional data sheet will be included with these samples. Please fill out information and presence and appearance of algae scums at the sample location.

Algae Bloom Samples

There may be occasions in which you see an algae scum at your lake that is not on a cyanotoxin sampling date or at your designated bluegreen algae sample location. We will provide extra bottles for you to collect samples in this situation. In cooperation with the Washington State Department of Ecology, we will analyze this additional sample for algae toxins. Please collect the sample in a similar manner, describe the algae scum appearance and location in the designated section of your data sheet, and mark the location on the lake map.

For additional information about harmful algae blooms, please see the Washington State Toxic Algae webpage at www.nwtoxicalgae.org.

Sample and Equipment Storage and Pick-Up

- Store your samples in the refrigerator overnight to keep cool and in the dark. On Monday, transfer your samples from the refrigerator to a cooler filled with ice. Be sure to keep the cooler in the shade and replenish the ice if necessary. Place the cooler and your completed data sheet at the designated pick-up location.
- Samples will be picked up by staff and new bottles left for the next sampling date.
- If you miss a sample date, return the empty bottles from the missed sampling date with your next set of samples. If we miss leaving the next set of bottles for any reason, staff will either drop off or mail new bottles to you prior to the next sampling date.

- To store the Van Dorn, carefully wedge the metal clip underneath the end ball so air can circulate inside the tube and dry it before your next trip. This will avoid any mold or mildew build-up from wet conditions inside the equipment. For additional information about equipment maintenance and repair, please see the **Equipment Installation, Maintenance, and Repair** section of the Volunteer Manual.

Quality Assurance

The quality of the data collected through the Lake Stewardship Program depends on the level of adherence to the standard collection methods provided in this manual. Following are some additional notes on ways to ensure you are collecting quality data.

- Sample at the same location each time and anchor your boat to prevent drifting.
- Fill out the data sheet completely and note any unusual observations or conditions. The more notes we get, the better!
- Double check the field sheet and the labels on the sample bottles to make sure they have the correct lake name, date, and sample depth. Make sure the date on the labels matches the date on your data sheet. Please let us know if you have the wrong bottle set. Note: If you sample on a different date than listed on the labels of the bottles, you can change the date on the labels to reflect your actual sample collection date.
- Sample the same way and generally at the same time (between 2 pm and 5 pm if possible).
- Rinse the Van Dorn completely before you begin, and allow it to dry completely after sampling.
- Rinse the sample bottles thoroughly three times before filling with water for proper analysis, with the exception of the bluegreen algae samples, which should not be rinsed.
- Keep your fingers out of the sampling equipment and bottles to avoid contamination, and hold bottle caps by their edges only. If you have trouble handling the equipment this way, wearing nitrile gloves can prevent contamination coming from hands.
- Fill bottles to the neck only (not full to the top) and cap tightly.
- Store samples in a refrigerator after sampling and transfer to a cooler with ice, placing it in the shade on pick-up day.
- Call Lake Stewardship Program staff when you have any questions or concerns. We like to hear from you and keep in touch.

The staff at the King County Environment Laboratory adhere to additional quality assurance procedures for water samples, including logging samples, reviewing data sheets, verifying lab work orders, and distributing the samples for analysis. Lab analysts follow detailed protocols to ensure that test results are as precise and accurate as possible. Lab staff also track samples, analyze data, and report final results.