

Appendix B: Equipment Installation, Maintenance and Repair

Lake Level gauge installation

The depth of a lake naturally fluctuates as seasons change. In the Pacific Northwest, most rainfall occurs from late fall through spring. As rain falls through the winter, water levels rise and usually peak in January or February. During the dry summer season, water levels drop and most lakes will be at their lowest point between September and October. The difference between the peak of winter and the low stand of fall is generally less than one meter.

The lake level gauge provided is one meter long and should accommodate the fluctuation of water levels at most lakes. The gauge should be mounted to a dock so the range of lake levels change can be measured by the gauge. (See Figure 1 on the next page.) **If you know your lake fluctuates more than one meter, discuss alternative measurement methods with the Lake Stewardship Program staff.**

Follow these steps to install your lake level gauge:

1. If there are lake level gauges at other locations around your lake, set your gauge at the same level (on a very calm day).
2. Identify a fixed object such as a dock piling or a 2x4 post that is well anchored in the lake bottom. Do not attach the gauge to a floating structure that rises and drops with the water level.
3. Identify a high water mark (a) on the dock or another post where the gauge will be mounted. Locate the top of the gauge (100cm mark) slightly above the estimated high water mark.
4. If installing the gauge during the rainy season, make sure you mount the gauge so that low water marks (b) can also be easily measured.

If water levels go above or below the gauge, call Lake Stewardship Program staff to discuss the situation.

Recombining Separated Thermometers

For environmental and safety reasons, thermometers provided contain alcohol or citrus-based fluid rather than mercury. Because the fluid in the thermometers is thinner, it has a tendency to separate, especially if thermometers are shaken or dropped.

Periodically remove the thermometer from the metal case to verify the fluid column is intact. (Be careful not to lose the small cork or foam disc that prevents the thermometer from rotating in its case.) If the thermometer fluid has separated, the readings will not be accurate. **Do not use the thermometer until the problem is corrected.**

You can attempt to recombine the fluid by placing the thermometer in a mixture of salt, ice, and a little water in the freezer for several hours. If the fluid has not recombined, contact one of the Lake Stewardship Program staff for a replacement.

Repairing the Vertical Sampler:

Tightening or reattaching latex tube to the rubber ball

It is common for the elastic tubing between the two balls to stretch out with use over time. The elastic tube can also break or separate at the attachment point with the ball. Tightening and/or reattaching the elastic tube is a fairly simple process that can usually be done without tools.

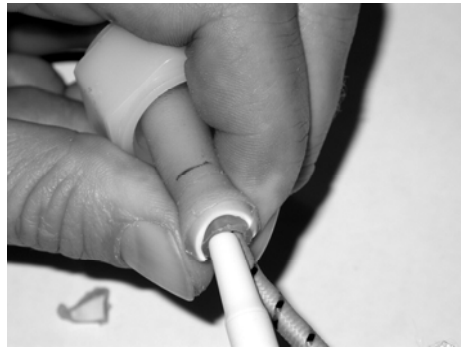
Before starting, it is helpful to know how the samplers work. The latex tubing provides the force that pulls the balls against the ends of the sampling tube, trapping the water when the sampler is tripped. The bungee cord running through the center of the latex tube is a fail-safe to prevent pieces of the sampler from sinking to the bottom of the lake if the latex tube breaks.

To reattach the latex tube to one of the rubber balls, or to shorten the latex tube to eliminate leaks, follow these steps:

1. Note the placement of the clip and loop at the ends of the sampler. Replace them so that the ball with the clip is at same end as the drain tube.
2. Stretch the balls apart until you can grasp one of the balls in one hand and the plastic cap nut with the bungee cord and elastic tubing in the other. To tighten the elastic tubing, loosen the nut on either ball (but not both). If you need to reattach separated or broken tubing, loosen the nut on the side where the tubing is no longer attached. If you cannot loosen the nut with your hands, use pliers.
3. Remove the balls and tubing and set the rest of the sampler aside.
4. To reattach broken tubing, begin by threading the tubing through the opening in the nut. To tighten, push the tubing through the nut so there is a longer tail on the ball-side (the threaded side) of the nut. This can be difficult. If it is too hard to get the tubing through, cut the end of the tubing at an angle, feed the tip through, and pull the rest through with pliers.
5. Adjust the tubing to the desired length. If you are tightening the sampler to prevent leaks, shorten the tubing until the exposed length of tubing between the plastic nuts is approximately three inches shorter than the length of the sampler tube (without the balls attached). This will differ depending on the overall length of the sampler tube and the elasticity of the latex tubing. Keep adjusting until you find a length that works.
6. You should see a small plastic “collar” that looks like a ¼-inch section of a very thick-walled drinking straw – either around the bungee cord, in a broken section of the tubing, or still in the elastic tube. When this collar is set entirely inside the tubing, it will prevent the tubing from being pulled through the plastic nut, maintaining the desired length of the tubing.



7. When you have the tubing at the desired length, make a mark with a ballpoint pen at the point where the tubing exits the nut. Then pull the tubing through the nut (so there is a long "tail") and slide the collar into the latex tube to a point just above the pen mark. This can be difficult. Use a pen, pencil, or other blunt instrument to help push the collar into the tube. Cutting off some of the excess latex tube might help you get the collar inserted to the desired point.



8. Slide the plastic nut toward the end of the tubing until it is seated against the bulge made by the plastic collar.
9. Once you have the length of the latex tube set, you should have one ball attached to the latex tube, and the other ready to attach.

10. Hold the sampler vertically and rest the attached ball at the appropriate end of the sampler (clip on the same end as the drain tube). The latex tube and nut should dangle down into the sampler tube. If you can, reach into the tube, grab the nut, and stretch the latex tube until you can screw the ball onto the nut. If you cannot reach the nut with your fingers, thread a loop of the sampler rope through the sampler, loop it around the nut and pull the nut through so that you can reattach the ball.



11. Reattach the ball to the nut, and check the tension of the elastic tube. If the tube is too short, the sampler will be very hard to set. If it is too loose, it will leak after you have collected a sample.
12. Set the sampler, trip it, and readjust the length of the tube if necessary.

Frayed Clip Wires

Another weak point of the samplers is the wire that connects the clip or wire loop to the rubber balls. It is common for the wires to fray or break after about two seasons of use. The best way to prevent this is to catch it before it happens. If you notice that one of the wires is frayed or about to break, please contact one of the Lake Stewardship Program staff to request a replacement on the next pick-up date. If you leave the equipment out with the water samples, the staff will replace the parts. Otherwise, it will be left for you to replace.

It's Just Broken!

If the sampler breaks and you are unable to fix it, you can still take a sample. Just dip the bottle directly into the lake and fill it from the surface. If there is a lot of pollen or algae collected on the surface, try to wave some of the surface scum away with your hand before dipping the bottle.

Make a note on your data sheet that the sampler was broken and you did a “surface dip” to collect the sample.