Protocols for Testing Temperature Logger Precision

1. **Equipment List**

   A. Temperature loggers
   B. 3 plastic trays
   C. Sturdy objects to keep trays off work surface

2. **Procedure**

   A. Preparing Data Loggers
   (1) Enter test information (date, person performing test, equilibration time start, start and end time of test) and logger numbers in precision test form (App. Ai). Use a new worksheet for each year.
   (2) Set the delay start time of each data logger so they will all begin recording temperature at the same time (e.g., 11:00 a.m.) and at the same interval (i.e., every 3 minutes). Set up all loggers to be tested prior to setting up the test.

   B. Logger Precision Test
   (1) Place prepared loggers on plastic trays. Mix loggers of different age cohorts (year purchased) in trays, i.e., put approximately on third of each cohort in each tray; also mix cohorts within each tray.
   (2) To allow for temperature equilibration, place trays into fume hood (ventilation and lights turned off) 30 minutes before they are to begin recording temperatures for precision testing purposes. Put trays side by side on sturdy objects (cardboard boxes, glass sample jars without metal lids) to keep trays away from metal work surface and airstreams at bottom of fume hood.
   (3) Close fume hood (there will be a ~1 inch space at the bottom). Stick note on hood to indicate that precision testing is in progress (from … to …) and a contact name and phone number.
   (4) Leave loggers in the fume hood for 2 h.
   (5) Remove loggers and upload the temperature information. Transfer the time and temperature recorded by each logger into the precision test form (App. Ai), H:\L&W\WATERSHED\Monitoring & Assessment\Program\Biomonitoring\SOPs-Instructions\BIOMON TRACKING LISTS\Tracking temp loggers accuracy.xls.
   (6) Calculate the mean temperature recorded by each logger during the 2-h test period, and the grand mean (GM, the mean of all loggers means). Next, calculate the GM + 0.5 ˚C and GM - 0.5 ˚C.
   (7) Graph logger means, GM, and GM +/- 0.5 ˚C as shown in App. Ai. Add lines to graph to indicate GM +/- 0.5 ˚C.
   (8) Any logger whose mean falls between the GM +/- 0.5 ˚C lines is considered acceptable and can be marked 'Y' in the row 'Acceptable?' in App. Ai.

(9)   Any logger whose mean falls below or above the GM +/- 0.5 ˚C lines is considered problematic and must be marked 'N' in the row 'Acceptable?' in App. Ai. Repeat the test procedure for all out of bounds loggers and four loggers considered acceptable. Enter data from re-run in precision test form (App. Ai) under 'Sample run 2', and proceed with calculations as for run 1 [i.e., 2. B. (5) – (7)]. If the mean of a re-run logger falls within the GM +/- 0.5 ˚C lines, the logger is considered acceptable and can be marked 'Y' in the row 'Acceptable?' in App. Ai (Sample run 2). If the mean of a re-run logger again falls below or above the GM +/- 0.5 ˚C lines, the logger must be either repaired or removed from use.

3.   References

Idaho Division of Environmental Quality, 1999.   Protocol for placement and retrieval of temperature data loggers in Idaho Streams. Water Quality Monitoring Protocols-Report No. 10