

South Florida/Caribbean Network

National Park Service
Inventory and Monitoring Division



Standard Operating Procedure WT01

Testing the Precision of HOBO[®] Loggers in a Cold Bath— Version 1.1

Please cite this as:

South Florida/Caribbean Network. 2020. Testing the precision of HOBO[®] loggers in a cold bath—Version 1.1. South Florida/Caribbean Network Standard Operating Procedure NPS/SFCN/SOP—WT01. South Florida/Caribbean Network, Palmetto Bay, Florida.

Purpose

This standard operating procedure (SOP) describes the testing procedures for HOBO[®] water temperature loggers in the office before field deployment. By definition pure water changes phase from the liquid to the solid state at precisely 0°C, thus one can check the accuracy of a temperature measuring device against a standard consisting of a pure (distilled) water and ice slurry. The objective is to verify that the loggers record the temperature of the slurry to within the $\pm 0.2^{\circ}\text{C}$ accuracy range reported for the device (note that this is **not** a calibration procedure—there is no way to adjust the calibration of the loggers). It is not necessary to perform a warm water test for these devices. Although it is possible to perform such a test, a controlled laboratory setting and high precision instruments would be necessary to provide appropriately accurate and reliable results, and such a test would be time consuming and costly.

Revision Log

Revision Date	Author	Changes Made	Reason for Change	New Version #
6/29/2020	Lee Richter	Update SOP references, minor edits for clarity.	Protocol operational review	1.1

Procedures

Establishing Accuracy of HOBO® Water Temp Pro v2 Loggers:

1. Freeze one or two gallons of distilled water. Fresh water is not as precise but can be used if distilled water is not available. If fresh water is used, recordings just outside of the accuracy range could occur and still be accurate, since fresh water contains impurities and does not freeze at precisely 0°C (32°F).
2. Break the gallon ice block into smaller pieces while still inside the plastic container, preferably with a rubber mallet. As long as the container is not breached the distilled water will not be contaminated, but if some cracks occur in the container this should not significantly change the accuracy of the test. Keep in mind that some water will likely spill, thus avoid wetting any sensitive equipment.
3. Place the pieces of ice into a clean, sealable container large enough to receive all loggers. Fill the container with distilled water to make an ice and water slurry.
4. Open the current version of the HOBOWare® Pro program.
5. Plug in the HOBO® Optic USB Base Station.
6. Perform a delayed launch for all loggers to be tested to a time in which all loggers will already be sealed inside the container. Confirm that the units are set to record at one-minute intervals. Consult SOP WT02 *Launch HOBO® Temperature Pro v2 Logger—Version 1.1* (SFCN 2020a) for guidance.
7. Allow the loggers to record temperature data for at least one hour.
8. Refer to SOP WT04 *Deploying and Retrieving HOBO® Pro v2 Temperature Loggers—Version 1.1* (SFCN 2020b) and follow steps 1–10 in part B for instructions on how to retrieve and view the data. Be sure to record the serial number, date tested, and error range for each logger in the field notebook where all HOBO® information is recorded.
9. Once the loggers have reached temperature equilibrium in the slurry, all loggers should record consistent values close to 0°C (32°F) until removed. Any logger that records a value outside the reported $\pm 0.2^\circ\text{C}$ accuracy range must be rejected and returned to the manufacturer for replacement. Most loggers tested will record values well within the error range, but any logger that records average values outside $\pm 0.15^\circ\text{C}$ will not be used, as deploying a logger with initial readings so close to an unacceptable threshold is not worth the loss of precision and the consequent QA/QC personnel time needed for the resulting data.

Literature Cited

- South Florida/Caribbean Network. 2020a. Launch HOBO[®] temperature pro v2 logger—Version 1.1. South Florida/Caribbean Network Standard Operating Procedure NPS/SFCN/SOP—WT02. South Florida/Caribbean Network, Palmetto Bay, Florida. Available at: <https://irma.nps.gov/DataStore/Reference/Profile/2278933> (last accessed November 2020).
- South Florida/Caribbean Network. 2020b. Deploying and retrieving HOBO[®] pro v2 temperature loggers —Version 1.1. South Florida/Caribbean Network Standard Operating Procedure NPS/SFCN/SOP—WT04. South Florida/Caribbean Network, Palmetto Bay, Florida. Available at: <https://irma.nps.gov/DataStore/Reference/Profile/2278935> (last accessed November 2020).