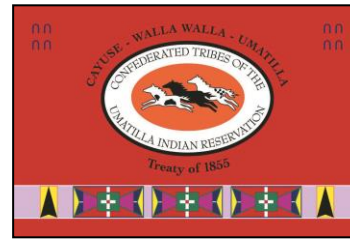


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Surface Water Temperature Data Standards

Objective: The primary goal of the **Water Temperature** dataset in the Centralized Data Management System is to collect all data of this type in a central location in order to reduce the time needed to provide summary level water temperature information and publishing of data for internal and external use.

Disclaimer: CTUIR makes no warranty, expressed or implied, including the warranties of merchantability and fitness for a particular purpose, nor assumes any legal liability or responsibility for the accuracy, reliability, completeness or utility of these geospatial data, or for the improper or incorrect use of these geospatial data. These geospatial data and related maps or graphics are not legal documents and are not intended to be used as such. The data and maps may not be used to determine title, ownership, legal descriptions or boundaries, legal jurisdiction, or restrictions that may be in place on either public or private land. Natural hazards may or may not be depicted on the data and maps, and land users should exercise due caution. The data are dynamic and may change over time. The user is responsible to verify the limitations of the geospatial data and to use the data accordingly

Scale: Location accuracy is variable. Accuracy is estimated at 1:100,000 scale.

Data Entry Field Standards
Location Information

Attribute Name	Attribute Description	Type	Validation/Units
Site ID	System assigned id number associated with the Site Name		Assigned by system
Site Name	Name of the site where the data logger is deployed		Unique to the site
GPS Easting	NAD 83 Zone 11N UTM Easting (X or Longitude) coordinates for the site	Integer	6 digit number (i.e. 428317)
GPS Northing	NAD 83 Zone 11N UTM Northing (Y or Latitude) coordinates for the site	Integer	7 digit number (i.e. 5066588)
Water Body	Name of the water body the data logger is placed	Select	See Appendix A (in the future it will be auto generated from utm coordinates)
Elevation	Elevation at the logger site	Integer	
Site Description	A description of the site where the data logger is deployed.		
Other Agency ID	This location may have a reference number or ID that is used by another agency	String	
Original Site Name	The original site id and name for those locations that already exist in the current CTUIR database	String	
Photograph	Picture of the site	Photo	url multi photo's
River Mile	Approximate river mile the site is located at.	Integer	
Wetted width	Approximate distance across the water body at site	Integer	ft
Wetted depth	Approximate depth of water to the bottom of the site	Integer	ft

Instrument Information

Attribute Name	Attribute Description	Type	Validation/Units
Name	Name of the Instrument	String	
Description	Description of the Instrument	String	
Owning Department/Org	Organization or Department that owns the equipment (this could be an outside agency)	Select	
Purchasing Project	Program or Project name that purchased the piece of equipment	Select	Current CTUIR Project Tracker Projects
Serial Number	Specific Serial Number of the Instrument	String	
Manufacturer	Manufacturer of the Instrument	String	
Model	Model name and/or number of the instrument	String	
Instrument Type	Type of Instrument	Select	Temperature Logger Stick Thermometer Multifunctional Lab
Purchase Date	Day the instrument was purchased	Date	
Entered Service Date	Day the instrument entered service	Date	
Ended Service Date	Day the instrument left service	Date	
Instrument Status	In the instrument still in service or in active for the project	Select	Active Inactive

Accuracy Check Information

Attribute Name	Attribute Description	Type	Validation/Units
Check Date	Date the Accuracy Check occurred	Date	NIST check in warm and cold baths
Check Method	Method used to do the accuracy check	Select	NIST Ice bath only Manufacturer Calibration No Accuracy Unknown Accuracy Method
Bath 1 Grade	Grade for bath one	Select	A, B, C
Bath 2 Grade	Grade for bath two	Select	A, B, C
Comments	Any comments that were made about the accuracy check	String	

Field sheet – notes information or general site information

Attribute Name	Attribute Description	Type	Validation/Units
Location	Site the activity is occurring at. Selected from the location	Select	
Activity Date	Date activity was performed	Date	mm/dd/yyyy
Deploy Time	Time that the instrument was deployed	Date/Time	00:00
Reading Time Zone	What time zone is the reading taking place in	Select	Pacific Standard Time Pacific Daylight Time Mountain Standard Time Mountain Daylight Time
Instrument	Instrument being used for the activity	Select	Selected from your list of instruments Air Temperature
Collection Type	Surface water or groundwater collection	String	Groundwater Surface
Comments	Comments about the site or any other observations	String	
Sampling Interval	The interval in which the logger is set to sample	Select	1 hr 1 min 1 sec None
Technicians	Name of the technician who visited the site and performed the activity	String	
Weather Conditions	Current weather conditions	String	
Field Activity Type	Launch, retrieval, or field audit	Select	Launch; Field Audit; Retrieval; Uploaded Data
QA Status	Status of the activity	Select	Ready for QA (default) Approved
QA Comments	Any comments made about the QC method	String	

Attributes for each data logger or instrument (this varies depending on the logger type)

Attribute Name	Description of attribute	Type	Validation/Units
Reading Date	Date the reading was taken	Date	MM/DD/YYYY
Reading Date/Time	Date and time the reading was taken	Date/time	MM/DD/YYYY 00:00
Reading Time	Time the reading was taking	Time	00:00
Water Temperature (C)	Temperature reading for a given date and time in Celsius (C)	Integer 0.000	
Water Temperature (F)	Temperature reading for a given date and time in Fahrenheit (F)	Integer 0.0	
Absolute Pressure	Absolute Pressure, psi	Integer	Ground water (source adjusted from)
Air Temp (C)	Temperature of the ambient air in Celsius	Integer	C
Air Temp (F)	Temperature of the ambient air in Fahrenheit	Integer	F
Battery Volt (V)	Battery charge level for a given date and time (volts)	Integer	Volts
Conductivity	Conductivity is a measure of the ability of water to pass an electrical current (microseimens)	Integer 0.00	s/m

Pre and Post Deployment Accuracy Methods

Draft Example Standard Levels for Water Temperature collection

Level

I	Description of Method	Citation
1	NIST ¹ check in warm and cold baths	OWEB 1999; Bogan et al. 2003
2	NIST Ice bath only	OWEB 1999; Dunham et al. 2005
3	Manufacturer Calibration	factory specifications ²
4	No Accuracy	
5	Unknown Accuracy Method ³	

Data quality level (based on the DEQ lab matrix chart)⁴

Calculate the difference between the NIST thermometer and the logger. Calculate the NIST correction factor (average of all the differences) for both the warm and cold water bath.

Data quality level
A = $\pm 0.5^{\circ}\text{C}$
B = $\pm 2.0^{\circ}\text{C}$
C = Un-calibrated or $> 2.0^{\circ}\text{C}$

Field Checking Instrument Performance (OWEB, 1999)

In addition to pre- and post-deployment checks, check temperature recorders during the field measurement period. A field check compares the continuous temperature recorder reading with the reading on a field audit thermometer. The purpose in conducting field checks is to insure data accuracy.

Attempt to obtain at least two field temperature audits— one at the time of deployment and one just before temperature units are removed from the stream. Additional field checks, while not critical, are useful as they can minimize loss of data in case loggers

¹ National Institute of Standards and Technology

² No accuracy check was conducted by the user or the agency/tribe

³ This is associated with historic files that have no information connected to them as to the accuracy of the data logger.

⁴ The Water Resources Program uses the Data Quality Level for their loggers. Attempting to only deploy loggers with a grade of A-A for the level one calibration. Loggers with an A-B will be deployed if necessary.

malfunction during the sample period. Field audit thermometers used for field checks should have an accuracy of $\pm 0.5^{\circ}\text{C}$ ($\pm 1.0^{\circ}\text{F}$) and resolution of $\pm 0.2^{\circ}\text{C}$ ($\pm 0.4^{\circ}\text{F}$).

Check the temperature by placing the field audit thermometer next to the continuous monitoring instrument's sensor. The temperature is recorded when a stable reading is obtained. A stable reading is usually achieved within 10 "thermal response times". For example, a thermometer with a 10-second response time (refer to manufacturer specifications) should give a stable reading within 100 seconds.

Most temperature recorders interrupt data collection when the unit is connected to a computer. With this type of unit, field checking data can only be applied by "post-processing" (i.e., after the units are retrieved and the stored data are offloaded). For this reason, field audit times should be scheduled close to the temperature recorder's logging time. Otherwise, rapidly changing water temperatures may cause the audit thermometer to record a different temperature than the logger.

QA Standards

1. Upon upload of data file, refer to field notes for information on the day and time of deployment or retrieval and QA flag the entire day as such.
2. When field notes indicated errors with the data logger (dead battery or out of water) the entire day from midnight to midnight is given a QA flag.
3. Good data refers to a full day with the data logger in the water.

QA Flags

1. Ok-No problems (default)
2. Pre-deployment
3. Post-deployment
4. Sediment
5. Out of Water
6. Malfunctioning

Accessibility

QA Level data will be freely available to the public via website.

References

- Bogan, T., Mohseni, O., and H.G. Stefan. 2003. Stream temperature-equilibrium temperature relationship. *Water Resources Research* 39(9): 1245.
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- Dunham, J.B., Chandler, G.L., Rieman, B.E., and D. Martin. 2005, Measuring stream temperature with digital data loggers- A user's guide: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Center General Technical Report RMRS-GTR-150WWW, p. 15.
- Oregon Watershed Enhancement Board. (updated 2001 Version 2.0). *The Oregon Plan for Salmon and Watersheds Water Quality Monitoring Technical Guide Book*. http://www.oregon.gov/OWEB/docs/pubs/wq_mon_guide.pdf. April 1, 2014
- Patten, Steven. WWBWC Watershed Monitoring Program Standard Operating Procedures. Walla Walla Basin Watershed Council . (updated April 2013 version 1.2) http://www.wwbwc.org/images/pdf/WWBWC_QAPP.pdf. June 27, 2014

Appendix A- Bodies of Water

Battle Creek
Bear Creek
Bobsled Creek
Buck Creek
Buckaroo Creek
Butcher Creek
Butter Creek
Camp Creek
Catherine Creek
Clear Creek
Coonskin Creek
Couse Creek
Dark Canyon Creek
Dry Creek
Eagle Creek
East Eagle Creek
East Pine Creek
End Creek
Fir Creek
Grande Ronde River
Greasewood Creek
Griffon Fork
Hermiston North Drain
Imeques Acclimation Facility
Imnaha River
Isquulktpé Creek
Jordan Creek
Little Buckaroo Creek
Lookingglass Creek
McCoy Creek
McKay Creek
McKay Creek (North Fork)
Meacham Creek
Meacham Creek (East)
Meacham Creek (North Fork)
Meadow Creek
Mill Creek
Mission Creek
Moonshine Creek
Patawa Creek

Reser Creek
Rock Creek
Ryan Creek
Spring Hollow Creek
Stanfield Drain
Thomas Creek
Thorn Hollow
Three Mile Dam
Touchet (South Fork)
Umatilla River
Umatilla River (North Fork)
Upper Grande Ronde
Walla Walla
Walla Walla (South Fork)
Wildhorse Creek
Willow Creek
Willow Creek (South Fork)

