G-17

REGIONAL DATA STREAM PLAN: COOK INLETKEEPER STREAM TEMPERATURE MONITORING, AUGUST 2016

1. DATA AND INFORMATION TYPES

A. Provide a contextual description of the data stream.

This data stream provides paired air and stream temperature information using in-stream loggers linked to a real-time, online interface. Each monitoring station is powered with battery and micro-solar recharging capabilities, using Iridium satellite technology. This project builds on previous work (by Cook Inletkeeper) to understand water temperature patterns in non-glacial salmon streams. This is an important next step in technology, data accessibility and long-term planning needed to engage decision-makers and local Alaskans in the implication of climate change on our freshwater salmon habitat.

Website URL: Real-Time Sensors: Source: Cook Inletkeeper: http://portal.aoos.org/#module-metadata/5da59d98-59ad-11e1-a1da-0019b9dae22b/8c5dd704-59ad-11e1-bb67-0019b9dae22b

Website URL: Historical Sensors: Source: Cook Inletkeeper: http://portal.aoos.org/#module-metadata/0cbe63ce-87aa-11e3-acbf-00219bfe5678/467dd946-87aa-11e3-9eb2-00219bfe5678

B. How many station locations are there for this data stream?

3

C. What are the specific parameters of the data.

The parameters of this data stream include: date, time, GPS (latitude and longitude), air temperature and stream water temperature.

D. Provide information about the sampling platform or instrumentation.

The sampling platform is a Beaded Stream Standard Digital Temperature Cable. http://beadedstream.com/products/standard-digital-temperature-cable/

Backup (not real-time) TidbiT v2 data logger from Onset ar often co-deployed: http://www.onsetcomp.com/products/data-loggers/utbi-001

2. DATA PATHWAY

A. Is a data sharing agreement required?

Data are available publically.

B. In which format(s) were data received by AOOS?

Retrieved by web harvest from the Beaded Stream (data host) web site

C. How can the information be accessed?

The data are available through the AOOS data portal, where it can be downloaded or explored through interactive visualizations. Specifically, data are available from two unique access points:
- File Downloads (CSV)
- ERDDAP

D. What file formats will be used for sharing data, if different from original?

Data are shared as CSV and through ERDDAP. Data are also available for exploration in the AOOS portals via interactive, graphical visualizations.

E. Describe how the data are ingested(e.g. the flow of data from source to AOOS data portals) and any transformations or modifications made to share data in the AOOS data portal.

Data are downloaded from the source to the AOOS storage. Custom Java, Scala, and Python scripts are used to convert data formats suitable for internal and external interoperability services. Data are made available in the AOOS portals through the access points and via graphic displays generated through internal JSON-format data requests from these services.

Graphic displays include a mapping service, customized interactive visualizations, and time-series plots of the unit values wherein each parameter is graphed independently. Back-end scripts handle the conversion of visualized data from CF standards to other, non-CF units that may be requested by the user. Data files may be downloaded by the user from the AOOS data portal. A user request for a CSV file request pulls the data from the server cache. A user request for ERDDAP pulls data from the ERDDAP service using the same cache. For this data, no CF-standard names or units exist, therefore custom names of abundance_of_{scientific_name} were used. Refer to Appendix I for CF standards.

Summary statistics generated within the interactive graphical displays may be requested by the user. Summary statistics may include minimum, maximum and mean values. Seasonal statistics, available on time series longer than 3 years, include mean, and 10th and 90th percentiles. Note: the number of points visually available to interactive users from the source data are limited when necessary using temporal binning, such as daily, weekly, monthly, seasonally and yearly.

F. What metadata or contextual information is provided with the data?

Data are shared in the AOOS portals with descriptive narratives describing the data and linking back to the originator's site.

G. Are there ethical restrictions to data sharing?

No

a. **If so, how will these be resolved?**

N/A

H. Who holds intellectual property rights (IPR) to the data?
Sue Mauger, Cook Inletkeeper

I. Describe any effect of IPR on data access.
None

3. Data Source and Quality Control

A. Indicate the data source type (i.e. Federal, Non-Federal, University, State Agency, Local Municipality, Military Establishment (branch), private industry, NGO, non-Profit, Citizen Science, Private individual)
Non-governmental organization

a. If Federal data source, were changes applied to the data?
N/A

b. If Yes, describe any changes to the data that require documentation?
N/A

B. Indicate the data reporting type (e.g. real-time, historical).
Real-time, Historical

C. If real-time, list the QARTOD procedures that are currently applied.
Three of the five required tests are currently applied to water temperature: Syntax, Gross Range, and Time-Gap Tests. QARTOD requires two additional tests including a location test and climatology test. A version of the Timing Gap Test, which with QARTOD, is intended to ensure ingestion of minimum hourly time series, is performed by AOOS. The AOOS version of the timing gap test changes the station color to a grey shade ("shade-flags") on the real-time sensors map display after 4 hours of missed data reports, and removes the station from the map (though not the archive) after a week of missed reports.

The Location Test will be implemented if and when there is a GPS (latitude and longitude) location provided in the station data stream.

The Climatology Test is more rigorous, and currently, the AOOS Data System does not have the historical data in place to perform meaningful climatology tests on non-federal sourced weather assets. It is a test that may be considered after there are 7+ years of data in the AOOS archive.

D. If real-time, list the QARTOD procedures that are planned for implementation.
Any remaining required tests are planned for implementation within 12 months of certification.

E. What is the status of the reported data? (e.g. raw, some QC, incomplete, delayed mode processed but not QC'd)

Some QC by originator and then by AOOS after data ingestion.

F. Describe the data control procedures that were applied by the originator.

The accuracy of the temperature data logger is verified by evaluating the results of pre- and post-deployment calibration checks. If a temperature logger fails a post-deployment calibration check (i.e. reading from a data logger is greater than 0.3 deg C from the NIST), then another calibration check must be performed. If it fails a second time, then the raw data should be adjusted by the mean difference of the pre- and post- calibration checks results to correct for the instrument bias. Temperature data collected before or after the deployment period must be deleted from the raw data set since it is not valid data (e.g. the data logger may be recording air temperature data). Field notes from the deployment and retrieval events will provide the dates and times necessary to identify the deployment period. Instantaneous temperature measurements collected during monthly maintenance checks should be compared to the data logger measurements to confirm accuracy goals. The data should be graphed to help identify anomalous data that might result from the data logger not being submerged or being tampered with by humans or wildlife.

Data are compared with Alaska's water temperature criteria to determine if water temperature exceedances have occurred, but no prescribed gross range check is known to be completed by the originator. In the future, a centralized database for Alaska's water temperature data is expected to be available and standardized reporting formats will be developed to enhance comparison across Cook Inlet salmon streams. Note: AOOS does this for this project, and performs adequate QC on their real-time data.

a. Provide a link to any documented procedures.

Project methods reference protocols described in the following three documents:

1) SOP for this project including QC is available in "Water Temperature Data Logger Protocol for Cook Inlet Salmon Streams: https://inletkeeper.org/resources/contents/water-temperature-data-logger-protocol

2) Stream Temperature Data Collection Standards and Protocol for Alaska (Dec 2014) //aknhp.uaa.alaska.edu/wp-content/uploads/2015/01/StreamTemperatureStandardsandProtocolfor-Alaska.pdf and,

3) Stream temperature data collection standards for Alaska: Minimum standards to generate data useful for regional-scale analyses, file:///Users/caroldjanzen/Downloads/Mauger%20et%20al%202015%20Journal%20of%20Hydrology.pdf

G. Describe the data control procedures that were applied by AOOS.

Data are converted on the instruments to output engineering values for temperature for originator files. AOOS ingests these data and applies 3 standard QC tests:

1. Syntax Test: checks for parity errors by testing if data can be extracted from the downloaded or scraped data. If no data can be extracted, the test fails, and no data are accessed, served or stored for that record.
2. Gross Range Test: This test checks data values against minimum and maximum values defined for each parameter. Water temperature range: 20 to 135 deg F. Data that fall outside of the prescribed parameter ranges are rejected and replaced with missing value flags in data storage connected to access points and the graphic displays.
3. Time-Gap Check: AOOS implements a “time-gap check" that informs observational assets (e.g., weather stations) displayed on its "Real-Time Sensor Map". If no data are received from an existing observational station for four hours, the icon on the map changes from a scaled color to a small grey-shade dot. If no data are received from an existing observational station for one week, the asset is automatically removed from the map, although assets are still made available on a historical sensor map. See 3C.

a. Provide a link to any documented procedures.
AOOS Data Assembly Center and Data Management Subsystem Plan (2016)

H. List the procedures taken for data that could not be QC’d as directed.
N/A

4. Stewardship and Preservation Policies

A. Who is responsible for long-term data archiving?
Data are aggregated for visualization and exploration with other layers in the AOOS data portal. AOOS stores the real-time and historical data on the AOOS data servers.

AOOS will facilitate data archival with NCEI. NCEI is interested in this data stream.

B. Which long-term data storage facility will be used for preservation?
NCEI

C. Describe any transformation necessary for data preservation.
N/A

D. List the metadata or other documentation that will be archived with the data.
N/A