

Temperature and dissolved oxygen from a post-urban fire water quality study in Lahaina, West Maui, Hawaii from Dec 2023 to Feb 2024

Website: <https://www.bco-dmo.org/dataset/1001818>

Data Type: Other Field Results

Version: 1

Version Date: 2026-06-26

Project

» [RAPID: Coral reef stress responses to an urban fire](#) (Reef stress urban fire)

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Abstract

These data include temperature and dissolved oxygen measurements recorded by a MiniDOT Logger. This dataset was collected as part of a coastal water quality study using sensors to measure salinity, conductivity, temperature, pressure, water flow direction and velocity, dissolved oxygen, pH, chlorophyll, and turbidity.

Sensors were all deployed in West Maui in coral reef systems that were within and adjacent to the burn zone of the Lahaina fires. The temporal range of deployments in the project span from October of 2023 to October of 2024 with this data set spanning from December of 2023 to February of 2024. The aim of these data is to understand the effects on coral reef health in response to the urban fires that occurred in August of 2023. Samples were collected by a collaborative effort of scientists Dr. Andrea K Kealoha, Dr. Craig Nelson, Dr. Eileen Nalley, and Dr. Nicholas Hawco. These high-resolution time series provide critical baseline and post-disturbance information for assessing short- and long-term environmental change. The dataset is intended to support ongoing monitoring efforts and inform management strategies aimed at enhancing reef resilience and recovery.

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Coverage

Location: Lahaina, Maui, Hawai'i 20.878525, -156.683746

Spatial Extent: N:20.8825 E:-155.60674 S:20.80881 W:-156.68846

Temporal Extent: 2023-12-18 - 2024-02-16

Methods & Sampling

Sensors were deployed within the benthic reef system at the listed sites.

Precision Measurement Engineering, Inc MiniDOT Logger:

The instruments were factory calibrated prior to deployment. The MiniDOTs were configured using PME's MiniDOT software to log at 10 minute intervals and were deployed attached to a weight resting on the benthos. DO was automatically internally corrected for temperature and atmospheric pressure.

Data Processing Description

Data were plotted to calculate delta (the rate of change between each pair of data points)

Regions of bad data to exclude using the following criteria:

1. Sensor is out of the water (identified visually by sudden drop in pressure)
2. Rapid changes in temperature (large deltas, indicates sensor out of water)
3. Drastic sensor drift (Example: negative values, or regions of data over long periods of time with a slope)

BCO-DMO Processing Description

- Loaded Minidot.csv as table "minidot" with header row 1; treated empty strings and "nd" as missing values
- Applied find/replace on UTC_Date_Time and Hawaii_Standard_Time to insert a space between the date and time portions (pattern: YYYY-MM-DDHH:MM:SS → YYYY-MM-DD HH:MM:SS) for consistency with other project datasets.
- Converted UTC_Date_Time from "%Y-%m-%d %H:%M:%S" format to ISO 8601 UTC string format "%Y-%m-%dT%H:%M:%SZ"
- Set explicit data types: Unix_Timestamp as integer; Battery, Dissolved_Oxygen, Dissolved_Oxygen_Saturation, Q, Temperature, lat, long as number; Hawaii_Standard_Time, Site_name, UTC_Date_Time, sensorID as string
- Reordered columns to: Site_name, sensorID, lat, long, Unix_Timestamp, UTC_Date_Time, Hawaii_Standard_Time, Battery, Temperature, Dissolved_Oxygen, Dissolved_Oxygen_Saturation, Q
- Renamed table to "1001818_v1_lahaina-minidot"
- Renamed columns for consistency across related datasets: UTC_Date_Time to ISO_DateTime_UTC, Hawaii_Standard_Time to DateTime_HST, sensorID to Site_ID, Site.name to Site_Name
- Updated Site_ID values: replaced prefix "Sen_" with "SEN_" for consistency with site list and related datasets
- Updated Site_Name values: replaced "BabyBeach" with "Baby Beach" for consistency with site list and other project datasets
- Applied BCO-DMO metadata (descriptions, standard name IDs, units) to all columns; ISO_DateTime_UTC, lat, and long flagged as primary parameters
- Output to final file 1001818_v1_lahaina-minidot.csv

Supplemental files:

* Supplemental site and deployment tables formatted from listed information provided in the original dataset submission metadata section "Location." Added as lahaina_site_list.csv and lahaina_sensor_deployment.csv. These tables list all sites and deployments of the related datasets in the study.

Related Datasets

IsRelatedTo

Kealoha, A., Calil, P. H., Hawco, N. J., Masessa, G., Mattos, J., Nalley, E., Nelson, C. E., Summers, T., Swift, S., Peterman, J., Rohrbaugh, N., Tegler, L. (2026) **HydroCAT data from a post-urban fire water quality study in Lahaina, West Maui, Hawaii from Nov 2023 to Feb 2024**. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2026-06-26 <http://lod.bco-dmo.org/id/dataset/1001844> [[view at BCO-DMO](#)]

Relationship Description: Lahaina sensor deployment datasets conducted as part of the same study. These datasets all contain the same lahaina_site_list.csv and lahaina_sensor_deployment.csv tables which includes supplemental site and deployment information for all these related datasets.

Kealoha, A., Calil, P. H., Hawco, N. J., Masessa, G., Mattos, J., Nalley, E., Nelson, C. E., Summers, T., Swift, S., Peterman, J., Rohrbaugh, N., Tegler, L. (2026) **Sea and Sun Sensor data from a post-urban fire water quality study in Lahaina, West Maui, Hawaii from Nov 2023 to Feb 2024**. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2026-06-26 <http://lod.bco-dmo.org/id/dataset/1001870> [[view at BCO-DMO](#)]

Relationship Description: Lahaina sensor deployment datasets conducted as part of the same study. These datasets all contain the same lahaina_site_list.csv and lahaina_sensor_deployment.csv tables which includes supplemental site and deployment information for all these related datasets.

Kealoha, A., Calil, P. H., Hawco, N. J., Masessa, G., Mattos, J., Nalley, E., Nelson, C. E., Summers, T., Swift, S., Peterman, J., Rohrbaugh, N., Tegler, L. (2026) **Tilt Current Meter data from a post-urban fire water quality study in Lahaina, West Maui, Hawaii from Oct 2023 to Mar 2024**. Biological and Chemical Oceanography Data Management Office (BCO-DMO). (Version 1) Version Date 2026-06-26 <http://lod.bco-dmo.org/id/dataset/1001896> [[view at BCO-DMO](#)]

Relationship Description: Lahaina sensor deployment datasets conducted as part of the same study. These datasets all contain the same lahaina_site_list.csv and lahaina_sensor_deployment.csv tables which includes supplemental site and deployment information for all these related datasets.

Parameters

Parameter	Description	Units
Site_Name	local name	unitless
Site_ID	Sensor specific ID	unitless
lat	latitude	decimal degrees
long	longitude	decimal degrees
Unix_Timestamp	unique time stamp (unix timestamp), UTC time zone	unitless
ISO_DateTime_UTC	Coordinated Universal Time	unitless
DateTime_HST	Hawai'i Standard Time	unitless
Battery	battery life	Volts
Temperature	temperature	degrees Celsius (degC)
Dissolved_Oxygen	Dissolved Oxygen	milligrams per liter (mg/L)
Dissolved_Oxygen_Saturation	Dissolved Oxygen	Percent (%)
Q	Quality Control	unitless

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Instruments

Dataset-specific Instrument Name	
Generic Instrument Name	PME MiniDOT Logger
Dataset-specific Description	Precision Measurement Engineering, Inc MiniDOT Logger: The miniDOT Logger is a fully submersible logger that records dissolved oxygen and temperature measurements. The PME oxygen sensor is an optode that measures dissolved oxygen concentrations in water through a fluorescence method.
Generic Instrument Description	The PME miniDOT logger is a submersible sensor designed to measure water temperature and dissolved oxygen concentration. Dissolved oxygen is measured by an optode that measures lifetime-based luminescence quenching of a thin membrane. The sensing foil contains a coating with a variable fluorescence depending on the oxygen concentration of the surrounding water. The miniDOT reports in milligrams per liter (mg/L) and logs all measurements to an internal SD card. Also featured is a temperature sensor and batteries. Data can be offloaded to a computer via USB cable. The logger has an accuracy of +/- 5 percent (+/- 0.3 mg/L) for oxygen, and +/- 0.1 degrees Celsius for temperature. Temperature range is 0 to 35 degrees Celsius, oxygen range is 0 to 150 percent saturation. Depth-rated to 300 meters. Instrument description from the manufacturer: https://www.pme.com/products/minidot

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Project Information

RAPID: Coral reef stress responses to an urban fire (Reef stress urban fire)

Coverage: Lahaina, Maui, Hawai'i

NSF Award Abstract:

Maui's coral reefs support subsistence, recreational, and commercial fishing, particularly for the large Native Hawaiian population. In August 2023, hurricane winds and low humidity combined with the recent drought to cause an unprecedented fire in Lahaina, an urban coastal town on the island of Maui. The fire quickly burned over 2170 acres and 2200 structures, releasing ash, particulate matter and potentially toxic materials into the adjacent coastal waters. This project provides novel information on the ecological impacts of wildfires to coral reefs to aid in climate change adaptation and emergency response planning. Cultural perspectives and traditional knowledge of Native Hawaiian community members are incorporated throughout the research process. The project directly supports four students, including a Native Hawaiian student, to participate in activities including field work, data collection, analyses and interpretation, and communication of research results.

A wildfire in an urban city located adjacent to a coral reef is unprecedented but may become more common as expanding shoreline development intersects with potentially increased fire risk with climate change. The overall objective of this study is to examine the direct effects of urban wildfires and associated potential stressors - such as reduced water quality, acidification, hypoxia, and heavy metals - on coral reef ecosystem function and the potential for regime shifts favoring benthic algae instead of corals. Using the 2023 Lahaina wildfire as a case study, the project employs a "before-after control-impact" design to compare three west Maui reefs both affected and unaffected by wildfire, with special attention to the anticipated remobilization of organic matter, toxic compounds (e.g., polycyclic aromatic hydrocarbons) and metals following rain events in autumn. Physical and chemical water parameters will constrain the reef-scale carbon cycle and coral metabolism before, during and after runoff events to document the ecological responses to urban fire impacts. This project will support three Early Career Researchers, contribute toward research training for multiple graduate and undergraduate students, and provide valuable information about contaminants and water quality to a community that relies heavily on coral reef resources.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-2345201

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