

*Please provide the following information, and submit to the NOAA DM Plan Repository.*

### **Reference to Master DM Plan (if applicable)**

*As stated in Section IV, Requirement 1.3, DM Plans may be hierarchical. If this DM Plan inherits provisions from a higher-level DM Plan already submitted to the Repository, then this more-specific Plan only needs to provide information that differs from what was provided in the Master DM Plan.*

URL of higher-level DM Plan (if any) as submitted to DM Plan Repository:

## **1. General Description of Data to be Managed**

### **1.1. Name of the Data, data collection Project, or data-producing Program:**

Water Chemistry and Shallow Water Conductivity-Temperature-Depth (CTD) Profiles for select locations across Batangas, Philippines from 2012 to 2015

### **1.2. Summary description of the data:**

The water chemistry data described here are from discrete water samples collected by the NOAA Coral Reef Ecosystem Program (CREP), to assess the seawater carbonate systems at fixed climate survey sites located in coral reef habitats in the Philippines in 2012, 2013, and 2015. Climate sites were established by CREP to assess multiple features of the coral reef environment (in addition to the data described herein) over time. In 2015, conductivity-temperature-depth (CTD) casts were also performed to characterize the spatial structure of the physical and chemical properties of the ocean environment influencing the living coral reef resources. These water chemistry and CTD data provide a baseline for tracking reef carbonate system changes due to globally increasing levels of atmospheric carbon dioxide. The data can be accessed online via the NOAA National Centers for Environmental Information (NCEI) Ocean Archive.

To survey water chemistry, SCUBA divers collected two discrete water samples from each site; one at the reef and one at the surface directly above the reef. The samples were processed by CREP and sent to NOAA Pacific Marine Environmental Laboratory (PMEL) to be analyzed for total alkalinity (TA) and dissolved inorganic carbon (DIC). From these constituents, alongside temperature, salinity, and depth data, other parameters of the seawater carbonate system can be calculated.

CTD data are collected by lowering the CTD in a profiling mode from a small boat, resulting in vertical profiles (max 18 meter depth, downcast only) of water column conductivity, temperature, and pressure. Vertical profiles of temperature, salinity, and turbidity resulting from CTD casts provide indicators for local seawater chemistry changes.

In addition to these discrete samples, water samples were collected as part of CREP's ocean acidification diurnal suite, which also includes vertical profiles from CTD casts, current direction and magnitude from an Acoustic Doppler Current Profiler, and pH from an SeaFET sensor. The data associated with the diurnal suite are documented and archived separately; The data associated with the diurnal suite is documented and

archived separately with metadata available at  
<https://www.fisheries.noaa.gov/inport/item/45954>.

**1.3. Is this a one-time data collection, or an ongoing series of measurements?**

One-time data collection

**1.4. Actual or planned temporal coverage of the data:**

2015-05-23 to 2015-06-03, 2012-03-12 to 2012-03-15, 2013-02-02 to 2013-02-03

**1.5. Actual or planned geographic coverage of the data:**

W: 120.872, E: 120.8951, N: 13.7281, S: 13.6587

Extent of water and CTD observations in from 2012-2015 at five survey locations in the municipalities of Mabini and Tingloy in Batangas, Philippines (near the Verde Island Passage), including Batong Buhay, Koala Reserve Area, Arthur's Reef, Twin Rocks, and Batalang Bato.

**1.6. Type(s) of data:**

*(e.g., digital numeric data, imagery, photographs, video, audio, database, tabular data, etc.)*

Table (digital)

**1.7. Data collection method(s):**

*(e.g., satellite, airplane, unmanned aerial system, radar, weather station, moored buoy, research vessel, autonomous underwater vehicle, animal tagging, manual surveys, enforcement activities, numerical model, etc.)*

**1.8. If data are from a NOAA Observing System of Record, indicate name of system:**

**1.8.1. If data are from another observing system, please specify:**

**2. Point of Contact for this Data Management Plan (author or maintainer)**

**2.1. Name:**

Lori H Luers

**2.2. Title:**

Metadata Contact

**2.3. Affiliation or facility:**

**2.4. E-mail address:**

lori.luers@noaa.gov

**2.5. Phone number:**

**3. Responsible Party for Data Management**

*Program Managers, or their designee, shall be responsible for assuring the proper management of the data produced by their Program. Please indicate the responsible party below.*

**3.1. Name:**

Hannah C Barkley

**3.2. Title:**

Data Steward

**4. Resources**

*Programs must identify resources within their own budget for managing the data they produce.*

**4.1. Have resources for management of these data been identified?**

Yes

**4.2. Approximate percentage of the budget for these data devoted to data management (specify percentage or "unknown"):**

Unknown

**5. Data Lineage and Quality**

*NOAA has issued Information Quality Guidelines for ensuring and maximizing the quality, objectivity, utility, and integrity of information which it disseminates.*

**5.1. Processing workflow of the data from collection or acquisition to making it publicly accessible**

*(describe or provide URL of description):*

Lineage Statement:

NOAA's Coral Reef Ecosystem Program (CREP) assembles carbonate chemistry information from discrete seawater samples analyzed for two parameters: 1) Dissolved Inorganic Carbon (DIC), which in some literature is defined as Total Carbon (CT), and 2) Total Alkalinity (TA or AT). To examine carbonate chemistry, discrete seawater samples were taken at fixed climate sites from 2012-2015 in the Philippines. Shallow CTD profiles were also collected from climate survey sites in Batangas, Philippines (Mabini and Tingloy) by the PIFSC Ecosystem Sciences Division in 2015 to measure conductivity, temperature, pressure, depth, salinity, and density. All carbonate system collection and measurement methodologies follow the protocols accepted by the greater scientific community and outlined in Dickson et al. (2007)

Process Steps:

- Discrete water samples are collected according to the protocol established by the NOAA Pacific Marine Environmental Laboratory (PMEL). (Citation: Inorganic Carbon Sampling: Planning and Sample Collection)
- NOAA Coral Reef Ecosystem Program (CREP) collects supplementary salinity, temperature, and pressure values by deploying a Seabird Electronics SBE-19plus CTD in concert with every discrete seawater sample collection.
- NOAA Pacific Marine Environmental Laboratory (PMEL) supports NOAA Coral Reef Ecosystem Program's (CREP's) carbonate chemistry sampling through the laboratory

analysis of dissolved inorganic carbon (DIC) and total alkalinity (TA), provision of the sample bottles and transport cases, and technical consultation. The source document contains the protocols that PMEL uses to analyze water samples for DIC and TA. (Citation: Dickson, A.G., Sabine, C.L. and Christian, J.R. (Eds.) 2007. Guide to best practices for ocean CO<sub>2</sub> measurements. PICES Special Publication 3, 191 pp.)

- The Total Alkalinity (TA) analysis employs a two-stage, potentiometric, open-cell titration using coulometrically analyzed HCl. (Citation: Dickson et al (2007), SOP 3b: Determination of total alkalinity in sea water using an open-cell titration)

- The CTD package is deployed off a small boat using a hand line. The CTD is held just under the surface for 1 minute to cycle water through the instrument and tubing. Afterwards the CTD is lowered at an even pace to near the bottom depth (max 18 m). A GPS waypoint is taken at the beginning of the cast to mark the position and time. (Citation: Coral reef ecosystem integrated observing system: In-situ oceanographic observations at the US Pacific islands and atolls)

- The raw data are processed by the SeaBird data processing software (<http://www.seabird.com/software/sbe-data-processing>) using the following steps: 1) Data conversion, 2) Filter, 3) AlignCTD, 4) Loop Edit, 5) Derive, 6) Bin Average. Each header in the raw and processed files is manipulated to include the latitude, longitude, and date/time (in UTC) of the cast. The result is a standard ascii .cnv file, in addition to the raw .hex file. The data are then ingested into an Access data base. (Citation: Coral reef ecosystem integrated observing system: In-situ oceanographic observations at the US Pacific islands and atolls)

- Aragonite calculations (not provided in dataset) that are of interest to CREP researchers as part of the National Coral Reef Monitoring Program are described here. CO<sub>2</sub>Sys is a carbonate system calculator used to calculate aragonite parameters. It can be used in programs written for Excel, Matlab, R, and many more. The source document is the CO<sub>2</sub>Sys User's Manual. The CO<sub>2</sub>Sys Excel and Matlab versions most commonly used by oceanographers can be found online at <http://cdiac.ornl.gov/ftp/oceans/co2sys/>. In section 6.3 the output variable for aragonite saturation state is "Omegas for calcite and aragonite at the output conditions" Section 12 contains the "Omega" calculation of interest. With all the input conditions, including temp, salinity, pressure (depth), dissolved nutrients, and 2 of the required carbonate system parameters (CREP analyzes water samples for DIC and TA) collected in the field (and included in the dataset), the rest of the carbonate values can be calculated, one of which is the omega for aragonite (i.e., aragonite saturation state). (Citation: Program developed for CO<sub>2</sub> System Calculations (CO<sub>2</sub>Sys))

**5.1.1. If data at different stages of the workflow, or products derived from these data, are subject to a separate data management plan, provide reference to other plan:**

**5.2. Quality control procedures employed (describe or provide URL of description):**

CTD: The data is quality controlled by CRED personnel after the data is downloaded from the instrument.

Water Samples: PMEL conducts quality assurance and quality control on their analyses; the precision and accuracy of DIC analyses are on the order of  $\pm 0.05\%$  and TA analyses are on the order of  $\pm 0.1\%$  in a laboratory setting.

Data quality flags are provided by NOAA Pacific Marine Environmental Laboratory (PMEL) and included in the dataset. These flags indicate if something went wrong with the analytical equipment or with the processing of the samples. PMEL uses the World Ocean Circulation Experiment (WOCE) data quality flag system, where '2's correspond to good values, '3's to questionable data, and '4's to bad data. Most water samples collected by the NOAA Coral Reef Ecosystem Division (CRED) and analyzed by PMEL in this dataset received a '2' data quality flag and the remainder were flagged as questionable ('3').

## 6. Data Documentation

*The EDMC Data Documentation Procedural Directive requires that NOAA data be well documented, specifies the use of ISO 19115 and related standards for documentation of new data, and provides links to resources and tools for metadata creation and validation.*

### 6.1. Does metadata comply with EDMC Data Documentation directive?

No

#### 6.1.1. If metadata are non-existent or non-compliant, please explain:

Missing/invalid information:

- 1.7. Data collection method(s)

### 6.2. Name of organization or facility providing metadata hosting:

NMFS Office of Science and Technology

#### 6.2.1. If service is needed for metadata hosting, please indicate:

### 6.3. URL of metadata folder or data catalog, if known:

<https://www.fisheries.noaa.gov/inport/item/45817>

### 6.4. Process for producing and maintaining metadata

*(describe or provide URL of description):*

Metadata produced and maintained in accordance with the NOAA Data Documentation Procedural Directive:

[https://nosc.noaa.gov/EDMC/DAARWG/docs/EDMC\\_PD-Data\\_Documentation\\_v1.pdf](https://nosc.noaa.gov/EDMC/DAARWG/docs/EDMC_PD-Data_Documentation_v1.pdf)

## 7. Data Access

*NAO 212-15 states that access to environmental data may only be restricted when distribution is explicitly limited by law, regulation, policy (such as those applicable to personally identifiable information or protected critical infrastructure information or proprietary trade information) or by security requirements. The EDMC Data Access Procedural Directive contains specific guidance, recommends the use of open-standard, interoperable, non-proprietary web services, provides information about resources and tools to enable data access, and includes a Waiver to be submitted to justify any approach other than full, unrestricted public access.*

### 7.1. Do these data comply with the Data Access directive?

Yes

**7.1.1. If the data are not to be made available to the public at all, or with limitations, has a Waiver (Appendix A of Data Access directive) been filed?**

**7.1.2. If there are limitations to public data access, describe how data are protected from unauthorized access or disclosure:**

**7.2. Name of organization of facility providing data access:**

NOAA National Centers for Environmental Information (NCEI)

**7.2.1. If data hosting service is needed, please indicate:**

**7.2.2. URL of data access service, if known:**

<https://accession.nodc.noaa.gov/0157633>

<https://accession.nodc.noaa.gov/0157633>

<https://accession.nodc.noaa.gov/0242952>

<https://www.ncei.noaa.gov/archive/accession/0242691>

<https://www.ncei.noaa.gov/archive/accession/0242691>

**7.3. Data access methods or services offered:**

Data can be accessed online via the NOAA National Centers for Environmental Information (NCEI) Ocean Archive.

**7.4. Approximate delay between data collection and dissemination:**

Unknown

**7.4.1. If delay is longer than latency of automated processing, indicate under what authority data access is delayed:**

## **8. Data Preservation and Protection**

*The NOAA Procedure for Scientific Records Appraisal and Archive Approval describes how to identify, appraise and decide what scientific records are to be preserved in a NOAA archive.*

**8.1. Actual or planned long-term data archive location:**

*(Specify NCEI-MD, NCEI-CO, NCEI-NC, NCEI-MS, World Data Center (WDC) facility, Other, To Be Determined, Unable to Archive, or No Archiving Intended)*

NCEI\_MD

**8.1.1. If World Data Center or Other, specify:**

**8.1.2. If To Be Determined, Unable to Archive or No Archiving Intended, explain:**

**8.2. Data storage facility prior to being sent to an archive facility (if any):**

Pacific Islands Fisheries Science Center - Honolulu, HI

**8.3. Approximate delay between data collection and submission to an archive facility:**

Unknown

**8.4. How will the data be protected from accidental or malicious modification or deletion prior to receipt by the archive?**

*Discuss data back-up, disaster recovery/contingency planning, and off-site data storage relevant to the data collection*

The data resides in an Oracle enterprise database which is maintained and regularly backed up by PIFSC ITS.

**9. Additional Line Office or Staff Office Questions**

*Line and Staff Offices may extend this template by inserting additional questions in this section.*