Plan Overview

A Data Management Plan created using DMPTool

Title: Advanced Biometrics: Heavy Metals in Estuarine Copepods

Creator: LaRoy Brandt

Affiliation: Non Partner Institution

Funder: National Science Foundation (nsf.gov)

Funding opportunity number: 49005

Template: BCO-DMO NSF OCE: Biological and Chemical Oceanography

Last modified: 02-17-2020

Advanced Biometrics: Heavy Metals in Estuarine Copepods

Data Policy Compliance

Identify any published data policies with which the project will comply, including the NSF OCE Data and Sample Policy as well as other policies that may be relevant if the project is part of a large coordinated research program (e.g. GEOTRACES).

The project investigators will comply with the data management and dissemination policies described in the NSF Award and Administration Guide (AAG, Chapter VI.D.4) and the NSF Division of Ocean Sciences Sample and Data Policy.

Pre-Cruise Planning

If the proposed project involves a research cruise, describe the cruise plans. (Skip this section if it is not relevant to your proposal.) Consider the following questions:

1. **How will pre-cruise planning be coordinated? (e.g. email, teleconference, workshop)**
2. **What types of sampling instruments will be deployed on the cruise?**
3. **How will the cruise event log be recorded? (e.g. the Rolling Deck to Repository (R2R) event logger application, an Excel spreadsheet, or paper logs)**
4. **Will you prepare a cruise report?**

Question not answered.

Description of Data Types

Provide a description of the types of data to be produced during the project. Identify the types of data, samples, physical collections, software, derived models, curriculum materials, and other materials to be produced in the course of the project. Include a description of the location of collection, collection methods and instruments, expected dates or duration of collection. If you will be using existing datasets, state this and include how you will obtain them.

The project will produce several observational and experimental datasets, described in the list below. In addition to the datasets described below, educational resources produced by the project, including data and images, will be made available for public use on the COSEE.net website. All data resulting from this project will be published and made openly available to the research community and the public within 1 year of completion of this project through Biological & Chemical Oceanography Data Management Office (BCO-DMO; https://www.bco-dmo.org/).

Datasets:

Meteorological Observations

- Wind, wavy, cloudy, sunny, tide

Physiochemical and Other Environmental Data

- Water Temperature, dissolved oxygen, nitrates, ammonium, phosphates, turbidity, pH, and water flow rates during copepod collection at each collection site.
- Collection site depth

Copepod Population and Community Data

- Seasonal and annual copepod species richness, abundance, and distribution within the Apalachicola estuary.

Copepod Heavy Metal Concentrations from EDX

- Copepod species-specific tissue and system level of heavy metal concentrations (%)

Copepod Heavy Metal Concentrations from AA

- Comprehensive species-specific copepod heavy metal concentrations (mg of heavy meatal/mg of body mass)
- Heavy metal concentrations for water samples form each collection site (mg of heavy meatal/ml of water)
- Heavy metal concentrations for sediment samples (mg of heavy meatal/ mg of soil)

Data and Metadata Formats and Standards

Identify the formats and standards to be used for data and metadata formatting and content. Where existing standards are absent or deemed inadequate, these formats and contents should be documented along with any proposed solutions or remedies. Consider the following questions:

1. **Which file formats will be used to store your data?**
2. **What type of contextual details (metadata) will you document and how?**
3. **Are there specific data or metadata standards that you will be adhering to?**
4. **Will you be using or creating a data dictionary, code list, or glossary?**
5. **What types of quality control will be used? How will data quality be assessed and flagged?**

Field observation data will be stored in flat ASCII files, which can be read easily by different software packages. Field data will include sample collection date, collection time, GPS coordinates, collection site identifier, meteorological observations (windy, wavy, cloudy, sunny, *etc.*), collection site depth, plankton tow method (horizontal, vertical, oblique), towing depth range, towing duration (minutes), towing distance (meters), average towing speed (knots or meters), description of plankton tow (brand, mesh size, opening, length), type of flowmeter, volume of water containing copepod samples, how samples processed and sorted, specific units of measure, description of any equipment used, additional collection notes (highlight irregularities or unusual occurrences) as appropriate. Quality flags will be assigned according to the ODS IODE Quality Flag

scheme (IOC Manuals and Guides, 54, volume 3; http://www.iode.org/mg54_3). Metadata will be prepared in accordance with BCO-DMO conventions (i.e. using the BCO-DMO metadata forms) and will include detailed descriptions of collection and analysis procedures.

Data Storage and Access During the Project

Describe how project data will be stored, accessed, and shared among project participants during the course of the project. Consider the following:

1. **How will data be shared among project participants during the data collection and analysis phases? (e.g. web page, shared network drive)**
2. **How/where will data be stored and backed-up?**
3. **If data volumes will be significant, what is the estimated total file size?**

At the start of the project funding, the PIs will convene to establish standard data recording protocols that will include naming, processing, and storage conventions for all data collected in the project. This meeting will also set standards to ensure that all obtained research data will be annotated with collection meta-data (see list of metadata fields below). Once other project personnel are recruited all participating students and staff will undergo a dedicated data management training session to implement the data collection standards and protocols established by the PIs. At this time the PIs will convey the data recording standards and procedures so that project personnel are trained in data management best practices. This training will also include annotation methods of all research data with the appropriate metadata.

The investigators will store project data (including spreadsheets, ASCII files, images, and PDFs of scanned logs) on laboratory computers that are backed up by the University's central IT organization. The Principal Investigator (PI) has also established an electronic storage folder on the Lincoln Memorial University cloud server for data storage and sharing among project investigators. Personal computers in all laboratories are backed after each access to onsite external hard drives, and weekly to an offsite hard drive.

Mechanisms and Policies for Access, Sharing, Re-Use, and Re-Distribution

Describe mechanisms for data access and sharing, and describe any related policies and provisions for re-use, re-distribution, and the production of derivatives. Include provisions for appropriate protections of privacy, confidentiality, security, intellectual property, or other rights or requirements. Consider the following:

1. **When will data be made publicly available and how? Identify the data repositories you plan to use to make data available.**
2. **Are the data sensitive in nature (e.g. endangered species concerns, potential patentability)? If so, is public access inappropriate and how will access be provided? (e.g. formal consent agreements, restricted access)**
3. **Will any permission restrictions (such as an embargo period) need to be placed on the data? If so, what are the reasons and what is the duration of the embargo?**
4. **Who holds intellectual property rights to the data and how might this affect data access?**
5. **Who is likely to be interested in re-using the data? What are the foreseeable re-uses of the data?**

The data for each collection trip, be will be made available through the BCO-DMO data system within one-year from the date of collection. Additionally, all end of project data will be made available through the BCO-DMO data system within one-year from the completion of the project. The project investigators will work with BCO-DMO data managers to make project data available online in compliance with the NSF OCE Sample and Data Policy. Data, samples, and other information collected under this project can be made publically available without restriction once submitted to the public repositories.

Data produced by this project may be of interest to chemical and biological oceanographers, and climate scientists interested in the role of climatic changes on the distribution and impact of heavy metals withing an estuary. We will adhere to and promote the standards, policies, and provisions for data and metadata submission, access, re-use, distribution, and ownership as prescribed by the BCO-DMO Terms of Use (http://www.bco-dmo.org/terms-use).

Plans for Archiving

Describe the plans for long-term archiving of data, samples, and other research products, and for preservation of access to them. Consider the following:

1. **What is your long-term strategy for maintaining, curating, and archiving the data?**
2. **What archive(s) have you identified as a place to deposit data and other research products?**

As our project will be the first of its kind to utilize EDX and AA to generate pairwise assessments of heavy metal concentrations coupled with physiochemical data, there are currently no established standards for archiving our data. Consequently, project investigators will work with BCO-DMO to ensure that project data are submitted to the appropriate national data archive, and that proper and complete documentation are archived along with the data.

Roles and Responsibilities

Describe the roles and responsibilities of all parties with respect to the management of the data. Consider the following:

1. **If there are multiple investigators involved, what are the data management responsibilities of each person**
2. **Who will be the lead or primary person responsible for ultimately ensuring compliance with the Data Management Plan?**

Each PI will be responsible for sharing his/her subset of data among the project participants in a timely fashion. As data are generated, they will be entered into Morpho, a free resource for associating Ecological Metadata Language (EML) with archived datasets. Each member of the project team conducting research will take responsibility to annotate their data with the metadata. Each PI will be responsible for managing a specific research data type and supervising students working with that data type to ensure that all data is being properly processed, documented, and stored.

The Lead PI, L. Brandt, will coordinate the overall data management and sharing process and will submit the project data and metadata to the Biological and Chemical Oceanography Data Management Office (BCO-DMO) who will be responsible for forwarding these data and metadata to the appropriate national archive.

Data Type	Responsible Party
Copepod diversity and abundance; physiochemical data	LaRoy Brandt
EDX heavy metal concentrations	Stan Kunigelis
AA heavy metal concentrations	Gavin Kirton