**Data Management Plan**

**Lead PI:** Jeffrey A. Runge, University of Maine
**Project Title:** Collaborative Research: Mechanisms supporting persistence of a key plankton species
             during climate change on the Northwest Atlantic continental shelf

*Overview:*
We propose a 3-year project involving field observations and coupled physical biological modeling of zooplankton. Samples will be collected at approximately monthly intervals between 2015-2017 at two stations, the Coastal Maine Time Series station (CMTS) and the Wilkinson Basin Time Series station (WBTS), in the Gulf of Maine. These samples will contribute to a time series starting in 2004 at the WBTS and in 2008 in at the CMTS.  The time series data and additional physiological observations of plankton (*Calanus finmarchicus*) will be archived at the Biological and Chemical Oceanographic Data Management Office (BCO-DMO) and also accessible through the lead PI website.

The table below summarizes the data and model results to be generated from the proposed work. Observational products listed will be submitted to and archived by BCO-DMO. Modeling products will be disseminated as described in note (5) below. Methods of data collection and analyses as well as model results will also be published in research articles. Use of data archived at BCO-DMO must adhere to its terms of use and users will be requested to consult with the appropriate PI (J. Runge, R. Ji, N. Record, C. Chen, D. Vandemark) prior to the preparation of any manuscript or report.

| Responsible PI | Data Description | Data Type | Format |
|---|---|---|---|
| Runge | Time Series metadata: date/time, location, depth, event log<br>Zooplankton species abundance and composition<br>*C. finmarchicus* population parameters<br>CTD and profile data from CMTS<br>Water samples at selected depths for chlorophyll (size fractionated) | Observation/ lab analysis | .txt and.xls files |
| Record | LOPC data (depth, size structure, and attenuation properties of particles) | Observation | .dat files |
| Salisbury | CTD and profile data from WBTS<br>Water samples at selected depths for chlorophyll and alkalinity | Observation/ lab analyses | .txt and.xls files |
| Chen | Physical model data, Gulf of Maine/ NW Atlantic including gridded temperature, salinity, & velocity | Model | See note below |
| Ji | Biological-physical modeling data, *C. finmarchicus* trajectories and distributions | Model | See note below |

*Data Policy Compliance*
We will coordinate data sharing and archiving with the Biological and Chemical Oceanography Data Management Office (BCO-DMO). In accordance with the Data and Sample Policy, we will ensure reporting of metadata for environmental data collected during our research cruise within 60 days of the end of the cruise. We will comply with the Policy requirement that data be reported/archived with the appropriate data repository within two years after the data are collected. In addition to submitting metadata and data to the national data center, we will create our own website page for data information for at least the duration of the project.

*Time series data reporting*
Data from the time series falls under 6 categories 1) Cruise level metadata,  2) Zooplankton Sampling, 3) Physiological parameters, 4) LOPC profiles, 5) CTD profiles, and 6) Water samples. The first category will log all sampling activities occurring throughout the time series. It will list the equipment used and

summarize data generated. The latter five categories organize the resulting datasets with their own metadata following BCO-DMOs recommended formats. These same data sets will be available at the project website as digital files (.xls).  Along with the data filed at BCO-DMO a report will be prepared describing the data collected at the CMTS and WBTS stations. Methods of data collection and analysis will also be published in research articles.

2. Metadata relating to the processed zooplankton samples will include the preservative, net mouth and mesh sizes, water and net depth, the water volume sampled, and the location and time of sampling. Further analysis includes species identification and enumeration of a subsample. The dilution factor, species, stage, and abundance will be included in the data file. The vertically stratified samples will also be reported with the addition of opening and closing depths of the net.
3. Physiological parameters are further segmented into datasets, and sampling metadata will be included for all datasets. The sorted and staged CV can be image analyzed for size and lipid content and then processed for: diapause state, dry weight, carbon and nitrogen content; the dataset will include all available information for each copepod sorted. The data file for egg production will list the observed eggs produced by each sorted female, while the hatching success will list the percentage for each replicate.
4. LOPC profiles will be processed and cleaned of errors and organized by cast with associated metadata. Data includes particle count and size listed for each depth.
5. CTD profiles will be processed and cleaned of errors and organized by cast with associated metadata. Only the downcast is included. Temperature, salinity, density, irradiance, fluorescence of chlorophyll, and beam attenuation at 660nm will be reported for each 1m depth bin.
6. Water sampling with Niskin bottles will be used to determine alkalinity and chlorophyll content.  The data set will include the filter used, amount of water processed, and any additional steps taken.

## *Model data reporting*

This project will produce a large amount of biological and physical model output together with up-to-date edited collections of historic hydrographic, currents, and regional satellite-derived Chlorophyll and SST data. A dedicated internet-accessible THREDDS server will be setup to allow the public to display and download the model data. An example of this type of system is the Northeast Coastal Ocean Forecast System (NECOFS) at the NECOFS website,  which can serve either the native unstructured-grid or interpolated structured-grid data. The address of this server is:
http://www.smast.umassd.edu:8080/thredds/catalog/models/fvcom/NECOFS/Forecasts/catalog.html. We will use this approach to serve the physical and biological model output generated in this project.

Access to these websites and other relevant web links will be coordinated from a central project web site that will be built at WHOI by R. Ji. We plan to create this project website that will contain the following: 1) brief descriptions of the project, work plans, and schedule, 2) descriptions of the data collections and links to obtain the data collections, and 3) descriptions of the models, model setup and forcing, and model simulations with links to obtain the model output in NetCDF format from the different experiments. The project website will be linked to the following websites to facilitate broader dissemination of information about the project, data, and results:

1. Ji's website at WHOI (http://www.whoi.edu/sites/rji);
2. Runge's website at University of Maine (http://umaine.edu/jrunge)
3. FVCOM home website (http://fvcom.smast.umassd.edu/),
4. WHOI Ocean and Climate Change Institute website (http://www.whoi.edu/page.do?pid=7399/),
5. NSF-funded Biological and Chemical Oceanographic Data Management Office (BCO-DMO) website (http://www.bco-dmo.org),
6. Northeast Regional Association of Coastal Ocean Observing Systems (NERACOOS) website (http://www.neracoos.org/),
7. Northeast Coastal and Ocean Data Partnership (NeCODP) website (http://www.necodp.org/).