Plan Overview

A Data Management Plan created using DMP Tool

Title: RAPID: A comparison of acute heat stress and fish abundance influencing coral survival.

Creator: Michael Childress

Affiliation: Clemson University (clemson.edu)

Funder: National Science Foundation (nsf.gov)

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

Project abstract:

Overview

Rising global temperatures continues to place coral reefs in severe peril. The symbiotic relationship between corals their algal symbionts (zooxanthellae) break down under extreme temperatures leading to increased coral bleaching, the expulsion of their protective algal symbionts. Without zooxanthellae, the transparent “bleached” corals are vulnerable to elevated UV exposure which can be lethal. Yet some corals seem to show higher resilience and recovery during these periods of extreme heat. One potential reason for increased resilience may be positive interactions with reef fishes that associate with corals. Many reef fish graze directly on coral polyps or on harmful fleshy algae that compete with corals for space and nutrients. As these reef fish establish territories on and around coral, they have the potential to benefit corals through disruption of boundary layers, fecal deposition of nutrients and zooxanthellae, and in some cases even shading from direct sunlight. Understanding how these community interactions influence coral survival and recovery from bleaching is essential to our efforts to restore reef communities.

Intellectual Merit

In this study, we examine how reef fish abundance and behaviors associated with massive corals that have bleached influence the degree and the rate of recovery of impacted corals. By leveraging a long-term dataset on reef community structure and local heat load in the middle Florida Keys, we seek to tease apart the environmental factors and potential benefits/costs of reef fish associations

on the recovery of individual bleached corals and the influence of severe bleaching on reef community structure. Observational data collected over a nine month recovery period from October through June will allow us to analyze the factors most associated with individual coral recovery and estimate how bleaching severity in turn influences coral reef community structure. The analyses proposed will help distinguish if coral resilience is strictly determined by local abiotic conditions or are moderated by the abundance and behaviors of associated reef fishes during the period of recovery. Such a study will help inform resource managers as to the role that community structure and dynamics play in ecological resilience of fragile corals under increasing heat stress.

Broader Impacts

The need for public understanding of connections between climate change, ocean health, and coral reef ecosystem services is of paramount if we hope to galvanize support for a sustainable future. This project addresses this need through the professional development of graduate and undergraduate student researchers that are also mentors to elementary school children. Our Something Very Fishy Marine Science STEAM program is a musical theatre approach to the teaching of NOAA's Ocean Literacy Principles. What makes our program unique is the direct connection of the research we conduct on fish behaviors and coral reef health translated into imaginary field trips to the Florida Keys which highlight the diversity of careers that contribute to solving our ocean crisis. Children involved in our Something Very Fishy program get to learn about marine science from undergraduate docents that have been diving and conducting research in the Keys. This connection between seeing individuals that look like them doing marine science is a fantastic way to build interests in STEM disciplines while raising awareness of the links between how we live our lives and the health of the ocean. Children in the Something Very Fishy program show an increased awareness of the ocean literacy principles and an increased interest in marine science related STEM careers. Helping children to better understand what is happening to the oceans and how it impacts everyone's lives is a powerful broader impact addressing the world's most challenging problem.

Start date: 10-15-2023

End date: 10-14-2024

Last modified: 07-08-2024

Copyright information:

RAPID: A comparison of acute heat stress and fish abundance influencing coral survival.

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).

As project administrator, I will comply with the dissemination policies and data management requirements 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?**

1. Daily float plans will be shared with the FWC law enforcement. 2. The only sampling equipment will be YSI multiprobes, video cameras, and thermal loggers. 3. The actual sampling events will be recorded on paper logs (scanned into PDF documents) and/or in a digital event log using the R2R event logger application (if available). 4. A cruise report will not be required for this project.

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.

Observational Data Sets

1. Individual coral survival. This dataset will include metadata on each individual coral censused (n = 240) including photos (5 views X 4 sampling dates), and fish association videos (.mp4 file type X 4 sampling dates). Percent cover status, fish presence, and fish behaviors will be included in the analysis of these photos and videos. Data preserved as a flat ASCII file will be uploaded to the BCO-DMO (Biological and Chemical Oceanography - Data Management Office)

2. Reef community census. This dataset will be taken at each location sampled for each sampling period (30 locations X 4 sampling dates - n = 120). In addition, previous summer reef census data from the previous six years 2018-2023 will be contributed from archival data from the Clemson Marine Research program (mchildr@clemson.edu). Substrate photos (12 per location X 30 locations X 4 sampling periods - 1440 substrate photos will be uploaded into CoralNet and will be made available to the public. From these photos the dataset will estimate substrate % cover including hard corals, soft corals, sponges, fleshy algae, calcareous algae, and turf algae. Video transects from along each 50 m transect will also be made available and will be censused for reef fish families present or absent on each sampling date. Water quality data from YSI sampling and from HOBO temperature loggers will also be included in this dataset. Sampling period is from 10/15/2023 through 10/14/2024.

All datafiles will be made publicly available at https://childress.weebly.com and in the BCO-DMO repository.

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?**

1. Substrate census, fish abundance, and daily temperature data will be stored in flat ASCII files, which can be read easily by different software packages. 2. Field data will include date, time, latitude, longitude, and depth, as appropriate. 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. 4. A code list of abbreviations will be included in the metadata file. 5. 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.

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?**

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 Clemson University CCIT One Drive.

The Principal Investigator (PI) has also has RAD external drive for data storage. Personal computers in all laboratories are backed up instantaneously to the University One Drive Cloud storage system.

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?**

Data will make publicly available within 12 months of the end of the grant. It will be posed both on the publicly accessible Childress lab website and also in the BCO-DMO repository. There is no sensitive data being collected on this project.

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?**

All data collected with this project will be uploaded to the BCO-DMO repository and will be archived with the other Clemson Marine Research databases stored on the One Drive Cloud storage system at Clemson University with emergency backup on the Synology RAD array external drive housed in 105 Jordan Hall, Clemson University, Clemson, SC 29634.

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?**

The person primarily responsible for the data collection, data entry, data storage, data archiving and data dissemination will be the grant PI Michael Childress. Signatories to the Clemson Marine Research Memorandum of Understanding for Field Data will continue to have equal access and co-ownership of the data. The Lead PI, Michael Childress, will coordinate the overall data management and sharing process and will submit the project data, including metadata, to the Biological and Chemical Oceanography Data Management Office (BCO-DMO).
