

DATA MANAGEMENT PLAN

Our data management plan is based on guidelines established by the National Science Board and the National Science Foundation and covers dissemination and sharing of materials and data that will be collected through the completion of the proposed research. In addition, to ensure availability of the interdisciplinary datasets produced by this study, we will submit the results of the experimental work proposed here to the Biological and Chemical Oceanography Data Management Office (BCO-DMO; <https://www.bco-dmo.org/>). The data management plan has five categories:

- (1) Types of data, samples, physical collections: Data types, repository, and data standard are listed in the table below. Geochemical measurements include stable carbon isotope measurements, total organic carbon content, carbonate content, intestinal fluid chemistry, and morphological descriptions. Controlled experiments will result in quantification of ichthyocarbonate production rate, CO_3^{2-} content, wet and dry mass, morphological and crystalline descriptions using SEM and EDS traces, and stable carbon isotope composition of the carbonate and organic matter within the context of fish size, metabolic rate, and lifestyle for four teleost species (Gulf Toadfish, Olive Flounder, Cobia, Damselfish) in varying temperature conditions. Measurements of ichthyocarbonate produced under ambient conditions by ~15 species will also be included. Finally, we will include a table of results of predicted ichthyocarbonate production rates for 130 species of teleost fish for which metabolic rate information exists in the peer-reviewed literature (Killen et al. 2016).

Data Type	Repository	Data Standard
Wet/Dry mass and CO_3^{2-} content of Ichthyocarbonate produced/day by species	BCO-DMO	Excel or CSV
Stable Carbon Isotopes of Carbonate, Diet, Fish Muscle, DIC, Intestinal fluid, Organic matter	BCO-DMO	Excel or CSV
Total organic carbon content, PIC:POC ratios	BCO-DMO	Excel or CSV
Mol%Mg content and mineralogy	BCO-DMO	Excel or CSV
Intestinal fluid elemental chemistry	BCO-DMO	Excel or CSV
SEM-EDX descriptions of crystallite morphology	BCO-DMO	.jpg with text descriptions in Word
Table of 130 teleost species prediction of ichthyocarbonate production rate per day	BCO-DMO	Excel or CSV

- (2) Standards to be used for data and metadata formatting and content: All primary data will be archived in native analytical format, and also compiled in standard spreadsheet formats to facilitate synthesis and dissemination. All analytical measurements will be validated against reference materials (internal standards and certified reference materials) and will use published standardization methods.
- (3) Mechanisms for access and sharing including provisions for appropriate protection of privacy, confidentiality, security, intellectual property, or other rights or requirements. Our team will use Basecamp 3, a project management software that Oehlert currently uses with her lab group to maintain a sample chain of custody, and a common framework for project management. PIs will convene to establish data recording protocols, including naming, processing, storage conventions and Basecamp reporting mechanisms at the start of funded period. All project personnel will undergo data management training to implement data collection standards, protocols, and best practices. PI Oehlert will conduct this training after consultation with co-PI Grosell and project collaborators and will ensure continued compliance. Data will be made freely available through the Biological and Chemical Oceanography Data Management Office

(BCO-DMO; <https://www.bco-dmo.org/>). Data will be submitted following their data submission guidelines no later than 2 years of collection. We will work with BCO-DMO to assign Digital Object Identifiers (DOIs) to datasets for ease of citation, dissemination, community access and version control. DOIs will be referenced in all publications with a note about redundancy to ensure interdisciplinary use of data products. PIs welcome email contact from the community regarding questions about datasets and products. Investigators will store data on laboratory computers backed to the cloud on Google Drive for easy sharing and quality assurance between the interdisciplinary laboratory groups with University of Miami. Unlimited storage on Google Drive is supported by the RSMAS IT Department. All data generated through the proposed project shall be the intellectual property of the PIs.

- (4) Policies and provisions for re-use, re-distribution, and production of derivatives. We will disseminate our results broadly via publications, presentations, and through a dedicated section on our future project website. Peer-reviewed papers will be written throughout the project timeframe, and we will reference to publicly available datasets and DOIs listed above.
- (5) Plans for archiving data, samples, and other research products, and for preservation of access. PIs will be responsible for maintaining data associated with their research group's activities and will maintain data in accordance with any UM-Rosenstiel School institutional requirements. Basic practices are outlined here. **Sample archival.** Any dried and unused samples will be archived for 2 years after completion of this project. **Lab notebooks.** All information collected during sample analysis, and results shall be kept in a laboratory notebook provided by the PIs. Digital copies of data collection will also be preserved on Google Drive. Hard-copy notebooks will be retained by the PI upon completion of the project; all research notebooks are property of the lab. **Short-term storage and data management.** Short-term data storage will be held on laboratory computers backed up to UM maintained cloud drives with unlimited storage (Google Drive). Educational material will be freely available on dedicated section of the future team website. Additionally, all data will be retrievable from primary computers used in data collection and will be reasonably protected from accidental loss to due to corruption, power loss, or failure of computer hardware. **Data security.** Data will be stored on either off-network external hard drives or off-site cloud resources. Password protection will be enabled, and the data will be made available to senior institution officials as needed. **Data backup.** Data will be backed up regularly.