

DATA MANAGEMENT PLAN:

1.) Types of data created

Produced data will consist of two primary types: transects of elemental concentrations across individual otoliths and associated growth rate increment measurements. Otoliths from the Baltic Sea will be retrieved from the Swedish National Board of Fisheries archive, which has associated fish information (length, weight, capture dates & locations). The same holds for Lake Erie yellow perch otoliths from the Ohio Department of Natural Resources. For field collected fish from the Gulf of Mexico, basic information (length, weight, capture dates and locations) will be recorded at time of capture.

Fish & Otolith data

Field-collected fish will be measured for length and weight. Measurements recorded by hand in notebooks and later converted to electronic format. Laser ablation ICP-MS analysis will be used to produce individual otolith transects of elemental concentrations from the core to the edge of each sample. ICP-MS results will be output first as raw counts (uncorrected) as well as molar ratios calculated after conversion using accompanying analyses of certified reference materials (CRMs). Raw counts, corrected molar ratios, and associated CRMs will all be contributed to public databases. ICP-MS data are output in electronic format by instrument software, and remain in electronic form through correction processes. Otolith increments will be counted and widths will be measured using image analysis software connected to cameras and recorded electronically.

2.) Standards for data & metadata format and content

Metadata will be created by taking careful notes in laboratory notebooks that refer to specific data files and describe all columns, units, abbreviations and missing value identifiers. Notebooks will be scanned weekly to make .pdf backup files of handwritten notes. Notes will also be transferred weekly to .txt documents that will be stored with the associated data file. These notes will be used to create metadata in the Ecological Metadata Language (EML) using Morpho software (knb.ecoinformatics.org/morphoportal.jsp). EML syntax will be consulted prior to the beginning of the experiments and modeling to ensure that appropriate metadata tags and information are documented.

Field and laboratory data will be documented by both manual entry into lab notebooks and direct electronic quantification (e.g. in the case of ICP-MS measurements). All data will then be copied into Excel spreadsheets weekly and checked for accuracy after entry by having one person enter data and a second person check entries. Excel spreadsheets will be saved as comma-separated value files (.csv) daily and backed up to servers in-house and off site. Metadata .txt files associated with each .csv spreadsheet will be stored with the associated document. PIs Walther, Limburg, and Lu will be responsible for data management pertaining to experiments conducted in each of their labs, and PI Walther will be responsible for coordinating overall data management and consolidation.

3.) Data stewardship & preservation standards

Short-term data preservation will occur by storing (1) data in Excel spreadsheet saved as .csv files and (2) metadata saved as .txt files. Files will be saved to computers automatically and continuously backed up to on-site servers. These computers are also backed up nightly to off-site cloud server storage for redundancy. Hard copies of laboratory notebooks will be also be kept and scanned weekly as .pdf files and entered digitally into spreadsheet form.

Data and associated metadata will be submitted to the **Biological & Chemical Oceanography Data Management Office (BCO-DMO)** database for long-term preservation and storage after all publications are submitted or within 2 years of the project's termination, whichever is first. An accession number will be obtained from the BCO-DMO for persistent identification of the data set. Metadata will be created in EML language using Morpho software and associated with all uploaded data files to BCO-DMO. PI Walther will be responsible for uploading data and metadata to BCO-DMO and serve as the primary contact for the BCO-DMO.

4.) Previous data sharing experience

All PIs have many years of experience collecting, storing, preserving and managing data. This includes experience training students and other personnel in proper data management techniques. All PIs have had a history of providing data on request to interested parties, sharing data outputs with relevant management bodies, or sharing data with open access databases. PI Walther has attended recent workshops on Best Practices for Data Management conducted by the DataONE consortium and the California Digital Library. Policies in this document follow recommended procedures by those entities.

5.) Policies for security, access, and sharing

Security of data during storage of produced data will be maintained by strict control of access to relevant personnel only (limited to PIs, students and technicians directly involved in the project). All computers and servers housing associated data will be password protected and data files will be inaccessible by non-involved personnel.

The authors will retain rights to the data until the resulting publication is produced or within two years after the project ends, whichever is first. At this time, authors will provide data for public use. This will consist of uploading data to BCO-DMO and allowing open access to any users. Interested parties will not be required to contact authors prior to downloading, but any use of data will require acknowledgement of authors by citing a BCO-DMO accession number in any resulting publication based on re-use of provided data. Data will also be available for sharing via direct electronic requests to the authors by interested parties; acknowledgement of authors will also be required.