

Plan Overview

A Data Management Plan created using DMP Tool

Title: ERI: Standardized Assessment of the Fate and Evolution in the Great lakes for Unmapped Antibiotic Resistance Dissemination (SAFEGUARD)

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Template: NSF-ENG: Engineering

Project abstract:

The goal of this research project is to identify sources of point and non-point source pollution in Lake Superior's Portage Lake canal using molecular and culture methods. This will be done by measuring fecal indicators, total bacteria, and antibiotic resistance genes in order to discriminate anthropogenic from agricultural and natural wildlife pollution.

Start date: 05-01-2024

End date: 04-30-2026

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ERI: Standardized Assessment of the Fate and Evolution in the Great lakes for Unmapped Antibiotic Resistance Dissemination (SAFEGUARD)

Products of Research

What types of data (experimental, computational, or text-based), metadata, samples, physical collections, models, software, curriculum materials, and other materials will be collected and/or generated in the course of the project? The DMP should describe the expected types of data to be retained, managed, and shared, and the plans for doing so. What descriptions of the metadata are needed to make the actual data products useful and reproducible for the general researcher? For collaborative proposals, the DMP should describe the roles and responsibilities of all parties with respect to the management of data (including contingency plans for the departure of key personnel from the project) both during and after the grant cycle.

Experimental data will be generated throughout this project in the form of collected water samples, extracted DNA, and culture isolates, and metadata. Sample data and metadata generated will consist of latitude and longitude, gene copy measurements of antibiotic resistance gene concentrations, fecal indicators, physiochemical water parameters (pH, metals, etc.), E.coli concentrations, reports and reviews, and project summaries.

Data Formats and Standards

In what format and/or media will the data or products be stored (e.g., hardcopy notebook and/or instrument outputs, ASCII, html, jpeg or other formats)? Where data are stored in unusual or not generally accessible formats, how may the data be converted to more accessible formats or otherwise made available to interested parties? When existing standards are absent or deemed inadequate, this should be documented along with any proposed solutions or remedies. In general, solutions and remedies to providing data in an accessible format should be offered with minimal added cost.

Materials will be created as hardcopy notes, digital notes, and instrument output. All materials will be transcribed into standard Microsoft Office applications (Word, Excel, and PowerPoint) and PDF documents. Data will be processed in R on university owned computers and will be made publicly available upon publication. Figures will be produced in JPEG or PNG formats.

Data and metadata will be generated in alignment with the current best practices in the field. Metadata will be named and collected using standardized environmental ontology (ENVO). qPCR data will be generated following the Environmental Microbiology Minimum Information Guidelines and reported in alignment with the Minimum Information for Publication of Quantitative Real-Time PCR Experiments. Culture data will be generated according to the Environmental Protection Agency and World Health Organization protocols which insure high confirmation rates from complex environmental samples.

Dissemination, Access and Sharing of Data

What specific dissemination approaches will be used to make data available and accessible to others, including any pertinent metadata needed to interpret the data? In this case, "available and accessible" refers to data that can be found and obtained without a personal request to the PI, for example by download from a public repository. What plans, if any, are in place for providing access to data, including websites maintained by the research group and contributions to public databases/repositories? For software or code developed as part of the project, include a description of how users can access the code (e.g., licensing, open source) and specific details of the hosting, distribution and dissemination plans. If maintenance of a website or database is the direct responsibility of the research group, what is the period of time the website or database is expected to be maintained? What are the practices or policies regarding the release of POST-AWARD MANAGEMENT data – for example, are they available before or after formal publication? What is the approximate duration of time that the data will be kept private? "Data sharing" refers to the release of data in response to a specific request from an interested party. What are the policies for data sharing, including, where applicable, provisions for protection of privacy, confidentiality, intellectual property, national security, or other rights or requirements? Research centers and major partnerships with industry or other user communities should also address how data are to be shared and managed with partners, center members, and other major stakeholders; publication delay policies (if applicable) should be clearly stated.

Collected data will be made publicly accessible in table and figure format through the supplementary information of all published works. This will include all sample matched metadata, including gene copy measurements, and culture concentration data. Table format is included to increase accessibility and clarity as interpretation from figures is often inaccurate.

Findings will be published in peer-reviewed journals and presented at conferences by the researchers based on this data. All data will be made public upon publication as figures in the . There will be no additional restrictions or permissions required for accessing the data. All code developed during this project for data analysis will be made publicly available through Github after publication.

In addition to peer-review publication, work will be available through Digital Commons @ Michigan Tech as allowed by the publisher. Digital Commons is the university's institutional repository, a platform that highlights the great research and research products produced by the Michigan Tech community, making this work more visible and easily accessible to the world. Digital Commons @ Michigan Tech is a digital repository offering worldwide access to research, scholarship, campus publications and other creative works by members of the Michigan Tech community. This repository is a service of the Van Pelt and Opie Library.

Re-Use, Re-Distribution and Production of Derivatives

What are your policies regarding the use of data provided via general access or sharing? For data to be deemed "re-usable," it must be accompanied by any metadata needed to reproduce the data, e.g., the means by which it was generated, detailed analytical and procedural information required to reproduce experimental results, and other pertinent metadata. Practices for appropriate protection of privacy, confidentiality, security, intellectual property, and other rights should be communicated. The rights and

obligations of those who access, use, and share your data with others should also be clearly articulated. For example, if you plan to provide data and images on your website, will the website contain disclaimers or condition regarding the use of the data in other publications or products?

Data re-use is encouraged with citation of the work. All generated data and metadata will be made publicly accessible in table format through the supplementary information of all published works.

Archiving of Data

When and how will data be archived and how will access be preserved over time? For example, will hardcopy logs, instrument outputs, and physical samples be stored in a location where there are safeguards against fire or water damage? Is there a plan to transfer digitized information to new storage media or devices as technological standards or practices change? Will there be an easily accessible index that documents where all archived data are stored and how they can be accessed? If the data will be archived by a third party, please refer to their preservation plans (if available). Where no data or sample repository exists for collected data or samples, metadata should be prepared and made publicly available over the Internet and the PI should employ alternative strategies for complying with the general philosophy of sharing research products and data as described above

The long-term strategy for maintaining and archiving the data obtained by this project will be through the use of scientific journals and conference proceedings. Articles will be written and submitted to these journals and conferences. All relevant handwritten lab notebook data will be digitally transcribed monthly to avoid data loss. In addition, all project data (including any relevant data not published) will be maintained electronically on Michigan Tech's secure computing infrastructure and backed up regularly to the universities Google Drive. All data will be retained for at least the minimum time period (three years following public release). Data likely to be useful to the scientific community will be retained and archived indefinitely.
