
Plan Overview

A Data Management Plan created using DMPTool

Title: Continuous monitoring of biological and nutrient data at reservoir and tail water sites in central Kentucky

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Funder: United States Geological Survey (usgs.gov)

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Continuous monitoring of biological and nutrient data at reservoir and tail water sites in central Kentucky

1. Project and Contact Information

What is the name of the project?

Include any identifiers related to the project (e.g. Project ID, Funding ID etc).

Title: Continuous and discrete monitoring of biological and nutrient parameters at lake and tail water sites in Central Kentucky

Partners: U.S. Army Corps of Engineers (Water-Quality Division)

Account number(s): GR17NF00001WQ00/ GR17NF00001WL00/ GR17NF0000015000/ GR17NF0000015L00

Agreement number: W22W9K52670156

What is the name of the USGS Center/Program that oversees the project?

Include contact information (email, phone, address).

USGS Center: Indiana-Kentucky Water Science Center, Louisville District Office, 9818 Bluegrass Pkwy, Louisville Kentucky 40299, Office (502) 403-1900

Summary description of the project.

Include reason why the data is being collected.

Background:

Nolin River Lake and Rough River Lake are popular lakes for recreational activities including swimming, boating, hunting, and fishing. All of these designated uses potentially may be affected by cyanobacteria (also known as blue-green algae) and associated cyanotoxins. In 2014, the U.S. Army Corps of Engineers (USACE) and the Kentucky Division of Water (KDOW) confirmed the presence of cyanobacteria at levels exceeding recommended safety thresholds at both lakes.

Determining the causative factors for algae blooms is complex, because the production of algae is affected by a complex set of physical, chemical, biological, hydrological, and meteorological conditions, including excessive nutrients such as nitrogen and phosphorus. The role of anthropogenic nutrient enrichment is the most frequently proposed hypothesis relating to increased HABs in freshwater. Anthropogenic nutrient enrichment occurs when human activities introduce excessive nutrients into a body of water. Historically, researchers have relied on discrete sampling at limited intervals and laboratory analyses alone to understand water quality in waterbodies. This low-frequency data may miss major high or low points; thus, limiting the data for important management decisions relative to rapid changes in constituent concentrations.

Purpose:

The continuous gaging stations at Nolin River Lake (and tailwater), Rough River Lake (and tailwater), tailwater at Green river Lake and tailwater at Barren River Lake will provide data so resource managers, U.S. Army Corps. of Engineers (USACE), the ability to make timely decisions on lake resources concerning harmful biological parameters, dissolved oxygen, and nutrients. Dissolved oxygen information is used to manage for downstream ecological flows. The lake biological and nutrient information will be used by the USACE to provide timely advisories on dangerous conditions and guide their discrete sampling efforts. The USGS will use the information to understand the dynamics of factors that influence the dynamics of nutrients and biological factors in Nolin River Lake and Rough River Lake.

What is the project start date?

Start date.

2015-12-01

What is the project's expected end date?

Estimated end date. This field can be updated as needed.

2017-12-31

Are there additional information available?

Include any web links with more information related to the project, if applicable.

Objectives and Scope:

Upgrade the existing USGS gaging station at Nolin River Lake near Kyrock, KY (03310900) and Rough River Lake near Falls of Rough, KY (03318005) with:

1. continuous nitrate, phycocyanin, chlorophyll, water temperature, specific conductance, dissolved oxygen, and turbidity sensors in the reservoir epilimnion (near-surface level), and;
2. Continuous phycocyanin, chlorophyll, water temperature and dissolved oxygen in the reservoir metalimnion or hypolimnion (lower level).

This gaging station will provide continuous water-quality information on lake conditions at the intake tower near the dam.

Upgrade the existing USGS gaging station at Nolin River at Kyrock, KY (03311000) and Rough River near Falls of Rough, KY (03318010) with continuous nitrate, phycocyanin, chlorophyll, dissolved oxygen, and turbidity. Continuous water temperature already exists at this site. Currently, this site is stage-only, but will be upgraded to include discharge in the near future. This gaging station will provide continuous water-quality information and discharge in the reservoir tailwater.

Project Timeline:

Year 1 (December 2015 to December 2016)

- Procure equipment
- Install infrastructure and equipment at Rough and Nolin
- Operate and maintain the continuous monitors
- Collect discrete samples during the recreation season (May to October)

Year 2 (December 2016 to December 2017)

- Transfer the floating dock at Rough to Nolin
- Operate and maintain the continuous monitors
- Collect discrete samples during the recreation season (May to October)
- Develop a methods report

Who is the main point of contact for the project and its data?

Also list any alternate points of contact, if any.

Main Point of Contact: Mac A Cherry - Project Chief, Hydrologist, 9818 Bluegrass Pkwy, Louisville Kentucky 40299, Office (502) 403-1912, macherry@usgs.gov

Alternative Contacts: Stone, Supervisory Hydrologist, Indiana-Kentucky Water Science Center, (317) 600-2786, wwstone@usgs.gov
Angela Crain, Hydrologist, Supervisory Hydrologist, Indiana-Kentucky Water Science Center, (502) 493-1943, ascrain@usgs.gov

Are there collaborating/funding agencies and organizations?

Who are they and who are the main points of contact?

Partner: U.S. Army Corps. Of Engineers (water quality)

Partner Point of Contact: Jade Young/Jennifer Thomason

2. Plan and Acquire

How will the data be acquired?

Are they newly collected or using existing datasets?

Data from this project will be newly collected.

If acquiring existing datasets, include more information.

Include the name, format, a persistent identifier, and source citation, if any. Are there any restrictions or agreements such as Memorandum of Understandings (MOUs) for use and storage?

At this moment there are no plans to acquire data from an existing database.

If collecting new data, include more information.

Are there special processes or procedures for collecting the data (e.g. licenses, permissions, equipment, software)?

Approach:

Three continuous water-quality monitors will be deployed and maintained according to USGS approved methods. Two water-quality monitor sites [lake (upper water column) and tailwater] will have a Hach Nitratax (nitrate), and a YSI EXO2 multi-sonde (optical DO, pH, conductivity, turbidity, total algae (chlorophyll and phycocyanin), and water temperature). The third water-quality site will be located at a second lower lake level, and will have optical DO, and water temperature. Measurements will be recorded every 15 minutes. While the sensors provide unprecedented information, fouling can be an issue, particularly during productive warmer periods. The site will be serviced every 3 to 4 weeks to clean the instruments and check for drift in the sensor measurements. Discrete sample data will be used to validate the nitrate, and total algae *in-situ* measurements. Discrete nitrate samples will be analyzed by the USGS National Water-Quality Laboratory. Discrete cyanobacteria enumeration sample analysis will be performed at BSA Environmental Services, Inc., or other USGS approved laboratory.

The monitors at Nolin River Lake and Rough River Lake will be attached to the intake tower and supported from a floating dock, respectively. Samples will be collected when monitors are calibrated to evaluate the technology and validate the continuous data.

NOTE: After December 2016, the sites at Rough River will be discontinued. The floating platform at Rough will be transported to Nolin and used there. The continuous monitor at the bottom of Nolin Lake will be replaced with a YSI EXO2 with the following parameters: (optical DO, pH, conductivity, turbidity, total algae (chlorophyll and phycocyanin), and water temperature).

A Project Management Plan for Nolin Lake and tail water was submitted to the USACE on 10/16/15. The Project Management Plan was reviewed and approved.

What is the estimated volume of the data collected, transformed, and/or generated?

For example in megabyte (MB), GB, TB, or PB.

The size of all the data and associated data will be in low GBs.

Will the data be static or frequently updated?

If frequent updates, describe how frequent (e.g. Continuously, weekly, annually, irregular etc)

Once the data is approved according to the USGS Fundamental Science Practice guidelines, it will be static and will not change.

Are the appropriate equipment and staff resources accounted for in the budget?

Include estimated time and cost for such data management activities.

Personnel (per year):

- Project Management/Data Review/Data Release/Report Development: Hydrologist GS-09, 0.20 Full-Time Equivalent (FTE)
- Installation: Hydrologic Technician GS-11, GS-08, Hydrologist GS-09, 0.02 FTE
- Gage Operation /Water-Quality sampling: Hydrologic Technician GS-07; Hydrologic Technician GS-06, 0.18 FTE

3. Describe/Metadata and Manage Quality

How many new datasets will be created?

List the anticipated title of each dataset.

- Continuous and discrete biological and nutrient data at Rough River Lake and Tail Water, 2016.
- Continuous and discrete biological and nutrient data at Nolin Lake and Tail Water, 2016.
- Continuous and discrete biological and nutrient data at Nolin Lake and Tail Water, 2017.

What are the data types and formats, in which the data will be maintained?

Open data formats such as csv, tiff, mp3, are required.

Continuous and discrete data will be stored and publicly available in the U.S. Geological Survey National Water Information System (NWIS) database. All approved data can be exported from NWIS in .csv format.

Briefly describe the data processing steps or provide the scientific workflow.

Also identify any software or technology needs where applicable.

Data will be viewed and analyzed with Microsoft Excel and R statistical environment.

How will the metadata for each dataset be created?

Who will be responsible for the metadata creation and update? Include their contact information.

Main Point of Contact:

Mac A Cherry - Project Chief, Hydrologist, 9818 Bluegrass Pkwy, Louisville Kentucky 40299, Office (502) 403-1912, macherry@usgs.gov

Which metadata standard will be used to describe each dataset?

For USGS, FGDC-CSDGM or ISO 19115 series are required.

Metadata will be created according to USGS standards endorsed by the Federal Geographic Data Committee (FGDC).

What procedures will be used for ensuring data quality (QA/QC)?

If using a known standard or protocol, include the citation source.

All data will be collected according to USGS methods. The projects will be reviewed by the Midwest Water Science Field Team to ensure compliance with Office of Surface Water, Office of Ground Water, and Office of Water Quality guidelines. Guidance is additionally outlined in the USGS INKY Surface Water and Water-Quality Plans.

4. Backup/Secure and Preserve

Where will the data be stored in the short-term?

Is it properly secured, backed up, and environmentally controlled?

In the short-term, data collected by field personnel will back up their hard drives daily with portable drives. Data from field computers are stored on the District Directory once back from the field. The district directory and hard drives of the field computers are backed-up on a bi-week basis. Additional guidance is outlined in the in the USGS IN-KY WSC Center-Wide Data Management Plan (2014).

What will be the approach for routine backup of the data?

Include the frequency, duration, software, and media information. Will the data be stored in multiple places and on different media types (recommended minimum of 3 copies with 1 stored in an offsite location)?

The data will be secured according to guidelines established in the USGS IN-KY WSC Center-Wide Data Management Plan (2014).

Describe any potential access restrictions.

For example if the data contain Personally Identifiable Information (PII). Please include any practices to ensure access will be restricted.

There are no plans to place restrictions on the data.

What will be the final format of the data product?

Will there be any software needs? Will the data format be appropriate for long-term preservation? Open data formats such as csv, tiff, mp3, are required.

The data will be stored and archived according to the USGS Open Access Plan and all data will be available for the future in a machine-readable format.

Where will the data and metadata be preserved in the long-term?

And which funding Program if in collaboration, will be responsible for the preservation of the data? Who will be the point of contact?

The data will be stored and available in the U.S. Geological Survey National Water Information System (NWIS) database. Metadata will be available on Science Base.

If costs are associated with long-term storage, how will they be provided for?

Are there agreements made for the preservation of the data and metadata?

Metadata will be preserved and made available on Science Base.

5. Publish and Share

How will the data be shared and made available to the public?

For example a web page, system or application, data portal, repository, USGS Data Series, etc. Are there data release policies that need to be followed?

No release policies have been established at this point.

Will there be access or use restrictions on the data?

For example for sensitive data, restricted data, privacy, software with license restrictions, etc. Provide justification for the restriction citing any policies or legal reasons.

There are no plans to place restrictions on the data.

How can someone overcome any access restrictions?

For example are the following required? Fees, non-disclosure statements, special authorization, data embargo or hold, MOUs/MOAs.

There are no plans to place restrictions on the data.

Identify any anticipated publications or electronic outlets resulting from the data.

For example, peer-reviewed articles, information/fact sheets, web pages. If a USGS publication, indicate type (e.g. Open File Report, Provisional Release etc).

Methods report is planned. Other reports are "to-be-determined".

Where will metadata be stored to enable data discovery by the public?

USGS requires that your metadata must be available for harvest by the USGS Science Data Catalog. Contact sciencedatacatalog@usgs.gov for more information. Metadata will be stored on Science Base.

How and where will you obtain a digital object identifier (DOI) for the data?

USGS provides a Digital Object Identifier Creation Tool available at <https://www1.usgs.gov/csas/doi/>
A DOI will be provided when the data is released.