Plan Overview

A Data Management Plan created using DMPTool

Title: Riparian Vegetation Monitoring downstream of Glen Canyon Dam

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Project and Contact Information

The USGS DMP template generally follows the USGS Science Data Lifecycle Model, a high level view of how data relates to project workflows from data planning to preservation and publishing. This template is not prescriptive but meant as guidance for individuals and Centers/Programs who want to create their own Data Management Plans.

Project element 11.1 Ground-based Vegetation Monitoring related to Project 11 in Grand Canyon Monitoring and Research Center's (GCMRC) 3-year study plan supporting the Glen Canyon Adaptive Management Program. This work is overseen by GCMRC, a part of the Southwest Biological Science Center.

Project Summary: Riparian vegetation affects physical processes and biological interactions along the channel downstream of Glen Canyon Dam. The presence and expansion of riparian vegetation promotes bank stability, diminishes the magnitude of scour and fill during floods, and has a role in wildlife habitat and recreational values. This project utilizes annual field measurements to monitor changes in vegetation assessed within a hydro-geomorphic context. These data support other research project elements that are under the larger Project 11 of a 3-year workplan. This project provides information that supports stakeholder needs as identified by guiding documents developed by the Adaptive Management Program, and furthers our understanding of the role of riparian vegetation in ecosystem processes in a regulated river ecosystem.

The objectives and elements of this monitoring and research project are:
1. Measurement and analysis of plant cover and species presence to assess change as related
to the geomorphic setting, elevation above the channel, and flow regime (Project Element
11.1)

Project Start: October 1, 2014

Project End: Sept 30, 2017

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Plan and Acquire

Plan and Acquire elements of the USGS Science Data Lifecycle: Plan refers to planning considerations before the handling of the project's data assets. Acquire describes the activities related to new or existing data that are collected or generated.

Each year, new vegetation and ground cover data will be collected between Glen Canyon Dam and river mile 240, where the influence of Lake Mead on geomorphology and vegetation becomes apparent. New data will be added each year as part of an annual monitoring program. Procedures for preparing for data collection are outlined in the associated monitoring protocol and include instructions for permitting, acquiring and organizing gear, scheduling field technicians, preparing data collection tablets, etc.

Each year, between 140 and 150 sites will be sampled. Each site will have 27 to 36 sample quadrats, each of which has associated foliar cover data for each recorded species and percent cover estimates for each of 12 ground cover elements. Slope and aspect measurements and one to six high quality pictures will be associated with each site. Additionally, elevation data associated with each sample quadrat will be collected. This is a total of 24 - 36 elevation data points per site. The fixed sample sites, 42 of the sites, will also have coordinates collected for each quadrat. The other sample sites, random samples, will only have the beginning and the end of each transect mapped, resulting in six geographic data points per random sample site.

Most data will be recorded on tablets in the field using the Vegetation GIS Data System (VGS). Some data may be collected on paper data sheets while the functionality of VGS is improved. If problems arise with electronic data collecting in the field, paper datasheets will be used as a back-up. VGS is a SQL Server database, so all data entered into it will be stored as a part of that database. Data entered into the field tablets will be synced with a master database that is stored on a GCMRC server. Any data not able to be entered into VGS will be stored in Microsoft Excel files until an appropriate database storage solution is developed.

The elevation data and coordinate data for the random sample sites are not entered directly into VGS. Elevation data is collected on paper data sheets and entered into an Excel file. A form in VGS is being developed so that these data will eventually be able to be put into the database. Coordinate data is written on paper maps in the field and digitized by GCMRC staff in the office. These data are added to an ArcGIS geodatabase once they are digitized.

Geomorphic survey data for the fixed sites is collected separately as a part of a different monitoring program, the NAU sandbar monitoring program. These data will be primarily managed by the other research team and delivered electronically to the riparian vegetation research team when it has been processed. The files received from the sandbar monitoring program are text files, which are then stored on the GCMRC server with the rest of the riparian vegetation electronic data. These data will also be added to an ArcGIS geodatabase containing each year's geographic data points for each monitoring site.

Data resulting from annual monitoring will be stored electronically on GCMRC servers and backed up as part of the regular GCMRC back-up schedule. Any hard copy data sheets will be scanned, and then stored in filing cabinets in the GCMRC building. Electronic scans will be stored with the rest of the electronic data on the GCMRC server. Data organization and the creation and management of metadata are the responsibility of the Monitoring Ecologist.

Describe and Manage Quality

Describe and Manage Quality elements of the USGS Science Data Lifecycle: Describe emphasizes documentation of every stage of the lifecycle to ensure the data assets and methods can be understood, evaluated for validity, and potentially reused. Manage Quality includes considerations for quality assurance and quality control (QA/QC) measures.

Each year data will be collected on foliar and ground cover, quadrat elevations, environmental characteristics, and photos for both randomly selected sites and repeat sites. The cover data and environmental characteristics for both random and repeat sites will be stored in the VGS Sequel Server database. Quadrat elevations will be stored in text files and Excel files until they can be incorporated into the VGS database. Photos will be stored as .jpg files in separate files for each year and labeled with the river mile, river side, and direction the picture was taken. Each photo also contains an information board with the date it was taken, the location, and the direction it was taken.

Data that is entered directly into VGS is managed for quality by built in error checks and a pick list of species names. Additionally, technicians entering the data will check each form before closing it to make sure all the entered data is logical and complete. Before leaving a site, the crew lead will check to make sure all data was collected and was done correctly. At the end of each day, the Monitoring Ecologist will look over all data collected to make sure it is complete, organized, and legible.

Data that is written on paper data sheets and entered into the computer separately will go through an extra error check procedure. Once the data is entered into the computer, each data sheet will be compared to the entered data to look for data entry mistakes. Any mistakes that are found are corrected.

Backup/Secure and Preserve

Backup/Secure and Preserve elements of the USGS Science Data Lifecycle: Backup/Secure involves managing risks and accessibility to the data throughout the lifecycle. Preserve highlights important activities that should be taken to ensure long-term preservation of data, metadata, ancillary products, and additional documentation.

While collecting data in the field, electronic data from all tablets will be backed up daily onto multiple external drives. Each drive will be stored on separate boats in waterproof containers during the day. Completed paper data sheets are stored in a waterproof container that is strapped to the frame of one of the boats.

In the office, all data will be transferred to the GCMRC server for storage and back-up. Data will be backed-up as a part of the standard back-up procedures for GCMRC servers. Storing these data in the "Vegetation" folder on the GCMRC server will enable all riparian vegetation monitoring personnel to access them.

New data will be added to the VGS database yearly. When new data is added to the database, the Monitoring Ecologist will look for new versions of the database and upgrade as necessary. All the past data will be simultaneously upgraded.

Long-term storage of electronic and hard copy data will be provided by GCMRC on the servers and in the building. Long-term organization and management of the data in those locations is the responsibility of the Monitoring Ecologist.

Publish and Share

Publish and Share elements of the USGS Science Data Lifecycle: Publish and Share highlight important considerations related to traditional peer-reviewed publications and dissemination of the data through Web sites, data catalogs, social media and other outlets.

Two kinds of reports will be regularly generated from the data collected as a part of this project. Annual monitoring reports will provide basic summaries of species encountered, diversity estimates, measures of richness, and average covers of herbaceous and woody vegetation. The 5-year status and trends report will be published as a USGS Open File Report and will analyze all available data to assess the status and trends of riparian vegetation, particularly as it relates to hydrologic changes. The topics covered and analyses used in these reports will change over time, but will include at a minimum how the riparian vegetation, especially in the active channel, has responded to differing flow regimes over time.

Data collected a part of this protocol will also be used to answer new, specific research questions over time. Research of this nature will be published in peer-reviewed journals as they are developed and need not be associated with the required reporting.

Data resulting from the long-term monitoring of riparian vegetation will be shared publicly as 5-year reports and scientific publications are published. Accompanying each 5-year Status and Trends report, all monitoring data will be made available to the public. As scientific publications are published, the data associated with each publication will be published, too. These data can be shared via ScienceBase, the GCMRC Data Portal, or through the publishing entity (journal or publishing network) as appropriate. For each of these publications, the data used to generate analyses will be shared.