

RECLAMATION

Managing Water in the West

River Sedimentation Information Database Stewardship

Research and Development Office
Science and Technology Program
Final Report ST-2016-8961-1



Joel G. Murray



U.S. Department of the Interior
Bureau of Reclamation
Research and Development Office

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Mission Statements

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

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(Signature)

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ACRONYMS AND ABBREVIATIONS

OLE DB – Object Linking and Embedding Database

RSI – Reservoir Sediment Information (Database)

RivSI – River Sediment Information (Database)

USACE – U.S. Army Corps of Engineers

USBR – U.S. Bureau of Reclamation

EXECUTIVE SUMMARY

USBR river survey data is available by request; however, the data are stored in numerous locations and in disparate formats. Likewise, a percentage of USBR river surveys are found to have data entry errors. The purpose of this research was to improve the management of USBR river sedimentation information by designing and storing the data within a centralized river sedimentation database.

As part of their studies to evaluate facility vulnerability as a result of climate change, the USACE has developed a powerful, adaptable, and updatable reservoir sedimentation database (RSI). The current iteration of the RSI database is not capable of incorporating river sedimentation data, thus an Access database (RivSI) was developed in the interim to store this information until a version of the RSI database is available that can accept river sedimentation data.

Recommended next steps include:

1. Developing the means to integrate previous and future USBR river surveys (and other Public/Private river surveys) into a modified version of the USACE RSI database.
2. Developing a Quality Assurance/ Quality Control (QA/QC) protocol as part of uploading previous and future USBR and other agencies' river sedimentation information data into the modified RSI.

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INTRODUCTION

River sedimentation data are imperative for water quality, habitat restoration and general river restoration studies. Thus, developing and integrating USBR river sediment information into a standardized database is key to improving data quality and data access. An easily usable and updatable river sediment information database will benefit scientists, engineers, and natural resource managers and planners in understanding the relative impacts of river sedimentation, both temporally and spatially, on the aforementioned river studies.

Development of this proposal was completed in conjunction with the development of the 'Reservoir Sedimentation Information Database Stewardship' (Project ID: 8988) proposal. This work is complimentary to the above-mentioned proposal and will result in a connate and standardized database for both river and reservoir survey information.

The original scope of the project included developing the means to integrate previous and future USBR river surveys (and other Public/Private river surveys) into a modified version of the USACE RSI database. However, the current iteration of the RSI database is not capable of incorporating river sedimentation data, thus an Access database (RivSI) was developed in the interim to store this information until a version of the RSI database is available that can accept river sedimentation data.

MATERIALS AND METHODS

Three river sedimentation studies were used to develop the RivSI database schema and identify the best storage procedures for the bathymetric data (Table 1). Sedimentation study assessments generally consist of the final report and an associated dataset folder. These datasets were reviewed and analyzed to identify common fields for inclusion in the database.

Table 1. Test Case River Sedimentation Studies.

Report	Data Collection Dates	Watercourse	State	BOR Region
SRH-2012-11	01/27/12 – 02/03/12	Middle Rio Grande River	NM	UC
SRH-2013-04	04/24/12 – 04/26/12	Catherine Creek	OR	PN
SRH-2014-11	05/21/13 – 05/24/13	North Fork Gunnison River	CO	UC

2012-2013 Data Collection on Paonia Reservoir, Muddy Creek, and North Fork Gunnison River (Reclamation, 2014)

The purpose of this assessment was to establish a baseline for monitoring downstream impacts of future sediment management activities at Paonia Reservoir and to map the main channel for potential future numerical modeling.

Catherine Creek Reach Assessment 1 and 2 Hydraulics (Reclamation, 2013)

The purpose of this assessment was to define existing habitat conditions, present use, and habitat potential within the Catherine Creek Tributary Assessment Area for Endangered

Species Act (ESA) listed salmonids, such that habitat enhancement project locations could be identified and prioritized for implementation. The Bureau of Reclamation (Reclamation) and Bonneville Power Administration contribute to the implementation of salmonid habitat improvement projects in the Grande Ronde River subbasin to help meet commitments contained in the 2010 Supplemental Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp) (NOAA Fisheries Service, 2010). This BiOp includes a Reasonable and Prudent Alternative (RPA), or a suite of actions, to protect listed salmon and steelhead across their life cycle.

2012 Longitudinal Profile Data Collection Report (Reclamation, 2012)

The purpose of this assessment was to document the Middle Rio Grande longitudinal profile data collection effort which occurred during late January and early February of 2012. Monitoring of the Middle Rio Grande has provided valuable insight into the form and process changes that have occurred over decadal time periods.

RESULTS

Numerous design meetings were held with river sedimentation experts to develop the structure of the RivSI database (Figure 1). The database consists of a ‘master’ survey information table detailing information for the surveys contained in the database and a survey data table for each river sedimentation assessment. The original concept was based off of the RSI database, but eventually the fields were reduced to only include information that was pertinent to river sedimentation studies. Furthermore, as more river sedimentation data are included in the RivSI database it will be split into USBR Regional databases. This will allow for continued expansion without the databases becoming overly large.

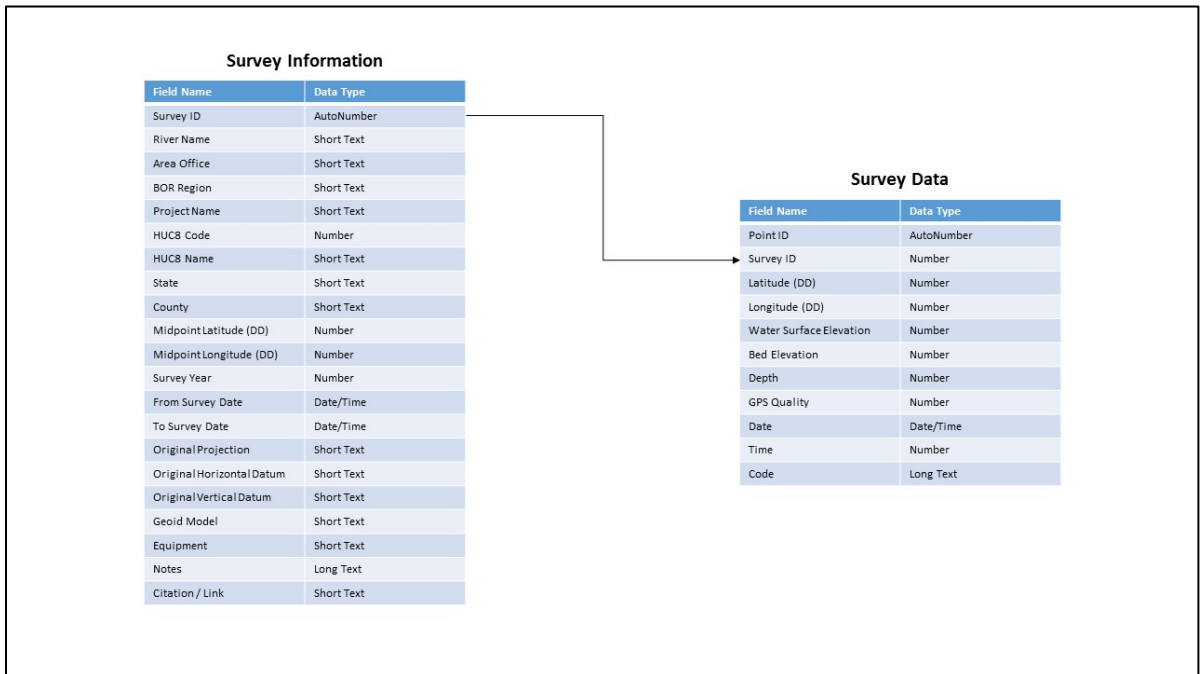


Figure 1. RivSI database schema.

Additionally, a user can ‘read’ tables from a Microsoft Access database in ESRI ArcGIS desktop software through an OLE DB connection. OLE DB is a standard for sharing data between applications, enabling you to view the Access database in ArcCatalog. This functionality eliminates the need for storage of the spatial information in a separate geodatabase. Refer to ESRI online help documentation for further information: [‘Connecting to a Microsoft Access database in ArcGIS’](#).

DISCUSSION

USBR's mission is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

River sedimentation data are necessary to accurately evaluate the hydraulic and geomorphic processes occurring throughout river systems. This technical information is routinely utilized to help guide the development of management plans and management alternatives associated with the improvement of aquatic habitat as well as sediment characterization activities.

A ‘Distribution ‘A’ email (Appendix A) was sent to USBR personnel in February 2016 to solicit for any past reservoir or river survey (topographic or bathymetric) data that has been collected, for inclusion in the database. Responses to this email are still being processed and will be added to the RivSI database as time permits.

REFERENCES

Reclamation. (2014). 2012-2013 Data Collection on Paonia Reservoir, Muddy Creek, and North Fork Gunnison River. Technical Memorandum No. SRH-2014-11. Sedimentation and River Hydraulics Group, Technical Service Center, Bureau of Reclamation, Denver, CO.

Reclamation. (2013). Catherine Creek Reach Assessment 1 and 2 Hydraulics - Tributary Habitat Program for the Federal Columbia River Power System Biological Opinion, Grande Ronde River, OR, Pacific Northwest Region. Report SRH-2013-04. Sedimentation and River Hydraulics Group, Technical Service Center, Bureau of Reclamation, Denver, CO.

Reclamation. (2012). 2012 Longitudinal Profile Data Collection Report, Middle Rio Grande Project, NM, Upper Colorado Region. Technical Report No. SRH-2012-11. Sedimentation and River Hydraulics Group, Technical Service Center, Bureau of Reclamation, Denver, CO.

DATA SETS THAT SUPPORT THE FINAL REPORT

Share Drive folder name and path where data are stored:

\\BOR\DO\GIS\Research and Development\ST-2016-8961-1

Point of Contact name, email and phone:

Kurt Wille

kwille@usbr.gov

(303) 445-2285

Short description of the data:

Access Database, River Sedimentation Reports / Datasets

Keywords:

Access Database / RSI / RivSI / Sedimentation

Approximate total size of all files:

278 MB

APPENDIX A

8/17/2016

DEPARTMENT OF THE INTERIOR Mail - Request for Reservoir and River Survey Data



Murray, Joel <jmurray@usbr.gov>

Request for Reservoir and River Survey Data

BORDistrib_A, DoNotReplyToSender <distrib_a@usbr.gov>
Reply-To: DistA_DoNotReply@noreply.usbr.gov
Bcc: bordistalle@usbr.gov

Thu, Feb 11, 2016 at 9:07 AM

Hello,

The TSC is currently soliciting all BOR employees for any past reservoir or river survey (topographic or bathymetric) data that has been collected, whether in digital or hard copy format. Reservoir and river survey data are necessary to accurately evaluate the hydraulic and geomorphic processes occurring throughout reservoir and river systems. This technical information is routinely utilized to help guide the development of management plans and management alternatives associated with the improvement of aquatic habitat as well as sediment characterization activities. We are partnering with the U.S. Army Corps of Engineers (USACE), who has developed an adaptable and updatable Reservoir Sedimentation Information (RSI) database to store repeat reservoir surveys. The TSC staff, in partnership with USACE staff, intends to store and manage reservoir and river survey data in this database for a variety of technical analyses.

Through data stewardship, our goal is to improve the management of Reclamation survey information and ultimately develop a means to integrate previous and future Reclamation surveys (and other Public/Private surveys) into a modified version of the RSI database to establish an Interagency and central repository for this information.

Please remit any correspondence to Joel Murray [jmurray@usbr.gov] (303) 445-3182 or Sean Kimbrel [skimbrel@usbr.gov] (303) 445-2539 at the TSC.

Thank you for your assistance.

<https://mail.google.com/mail/u/0/?ui=2&ik=1028497b358&view=pt&q=Request%20for%20Reservoir%20and%20River%20Survey%20Data&qs=true&search=qu...> 1/1

