RECLAMATION

Managing Water in the West

Reservoir Sedimentation Information Database Stewardship

Research and Development Office
Science and Technology Program
(Final Report) ST-2017-8988
Report SRH-2017-39

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

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Mission Statements

Protecting America's Great Outdoors and Powering Our Future

The Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

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Reservoir Sedimentation Information Database Stewardship

12/15/17

Prepared by: Sean Kimbrel, M.S., P.E.
Hydraulic Engineer
Sedimentation and River Hydraulics Group (85-824000)

12-20-17

Peer Review: Blair P. Greimann, Ph.D., P.E.
Hydraulic Engineer
Sedimentation and River Hydraulics Group (85-824000)

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Executive Summary

The objective of this research study is split into two components relevant to monitoring and planning for reservoir sediment accumulation (sedimentation) impacts:

1. Developing the means to integrate previous and future Reclamation reservoir surveys into the Army Corps of Engineers Reservoir Sediment Information (RSI) database.

2. Developing a Quality Assurance/ Quality Control (QA/QC) protocol as part of uploading previous and future Reclamation reservoir sedimentation information data into RSI.

Entering data into an electronic database is nothing new in the modern age of information and technology. However, developing the means to detect errors in the entry of reservoir sedimentation data is necessary to assure quality of the database for future planning and prioritization efforts.

As part of this database stewardship project, a data call was made in February 2016 to all Reclamation Regional and Area Offices to collect any reservoir sedimentation information available at their respective facilities. Any new Reclamation data was incorporated in the RSI database. As of September 2017, this database is tentatively proposed to be publicly available once further review by multiple agencies such as Reclamation is completed.

The following future improvements in can be made in RSI with future builds:

- Adding in range of operations data for all Reclamation reservoirs
- Adding in available sediment sample data in the database
- The capability in the RSI database to add only total capacity at certain pool allocations when no historical elevation-area-capacity table is available
- Discretizing where storage loss is calculated in report card
- Adding in the original elevation-area-capacity data for reservoirs with no repeat surveys

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1 Introduction

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2 Integration of Reclamation Reservoir Survey Data

This section details the process of integrating previous and future Reclamation reservoir sediment surveys into the RSI database. Reclamation reservoir survey data was integrated into RSI in three distinct steps.

First, a data call was made in February 2016 to all Reclamation Regional and Area Offices requesting any available reservoir sediment survey information. Any new survey information was compiled with other existing and available reservoir survey data.

Second, existing reservoir survey datasets from 1) Reclamation reservoir survey reports published by Reclamation's Sedimentation and River Hydraulics Group, and 2) existing reservoir sediment survey data from the last comprehensive reservoir sediment survey database, which was the REServoir SEDimentation Database (RESSED, Gray et. al, 2010) were incorporated into an interim Microsoft Access database. The Microsoft Access database included the pertinent dam information (NID Number, Name, Area Office, BOR Region, Project Name, etc), and Elevation-Area-Capacity Data by Year of Survey, annual Reservoir Operation Range, Storage Allocation, and any succeeding survey data (e.g. Original Survey, First, Second, Third, etc.). A screen shot of the Microsoft Access Database is shown in Figure 1.

Third, the Microsoft Access database served as the common data source to incorporate Reclamation reservoir survey data into RSI by Reclamation and Army Corps Staff.

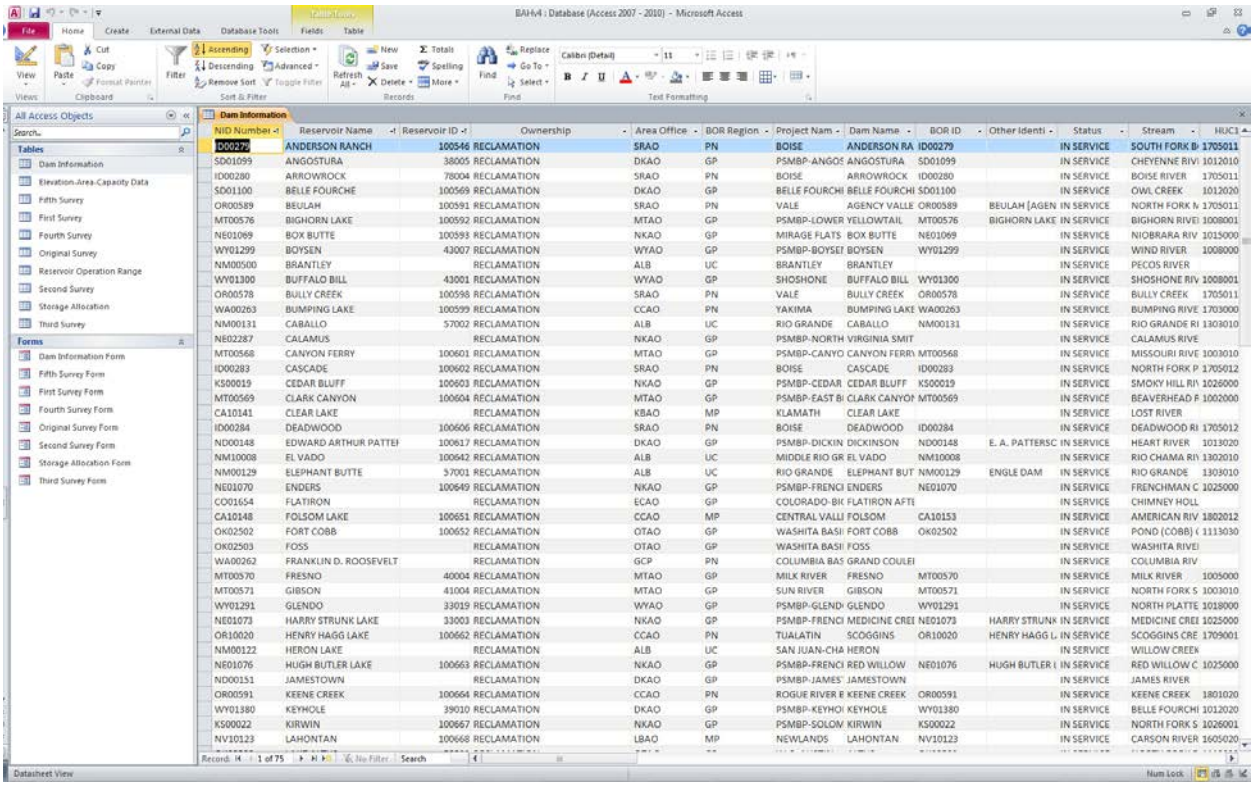

Figure 1. Screen Capture of the Reclamation Reservoir Survey Data in Microsoft Access

The website for accessing RSI is located at: https://corpsmapz.usace.army.mil/apex/f?p=303:1:

In order for Reclamation staff to gain access to the RSI database, a log-in request was made to the Army Corps of Engineers, who are Bryan Baker (bryan.e.baker@usace.army.mil) and Jim Gade (james.t.gade@usace.army.mil). Along with the log-in request, the installation of Department of Defense (DoD) certificates is provided by the database managers.

The log-in access page is shown in Figure 2. Once accessed is granted, the RSI Home Portal page shows up (Figure 2). The user the selects the 'Reservoirs' Tab to view the list of dams/reservoirs and pertinent information. With the proper administration access right, to learn how to enter in new or modify reservoir survey data, select the 'Help' tab to download the RSI Quick Guide, and the "Area-Capacity Template" spreadsheet (Figure 4).

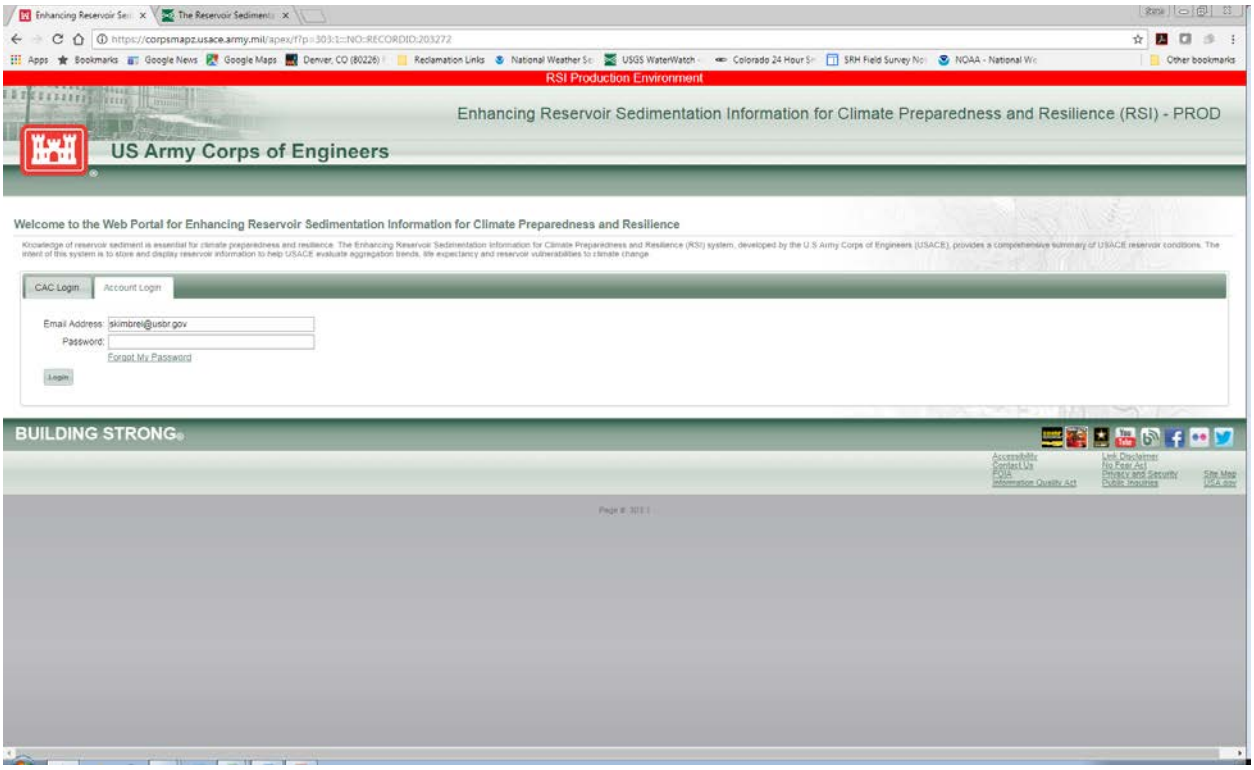

Figure 2. Screen Capture or RSI Log-in Access Page

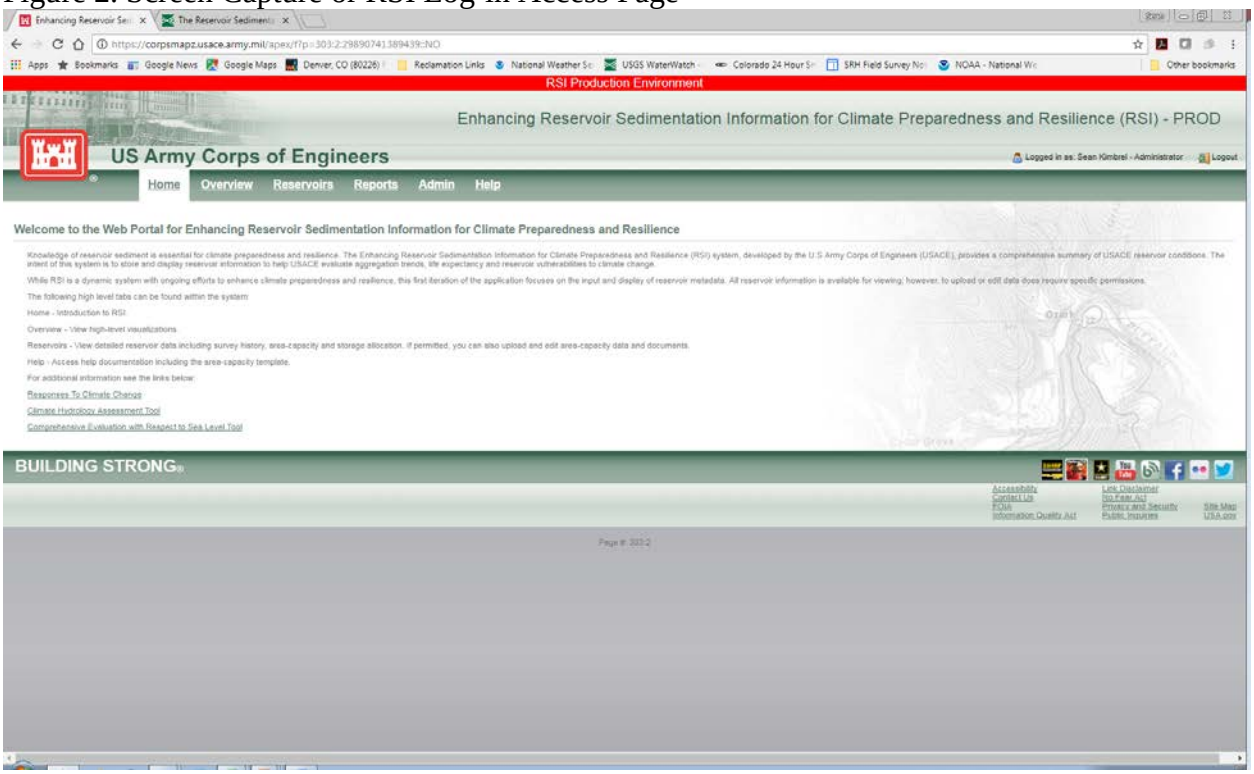

Figure 3. Screen Capture of RSI Home Portal

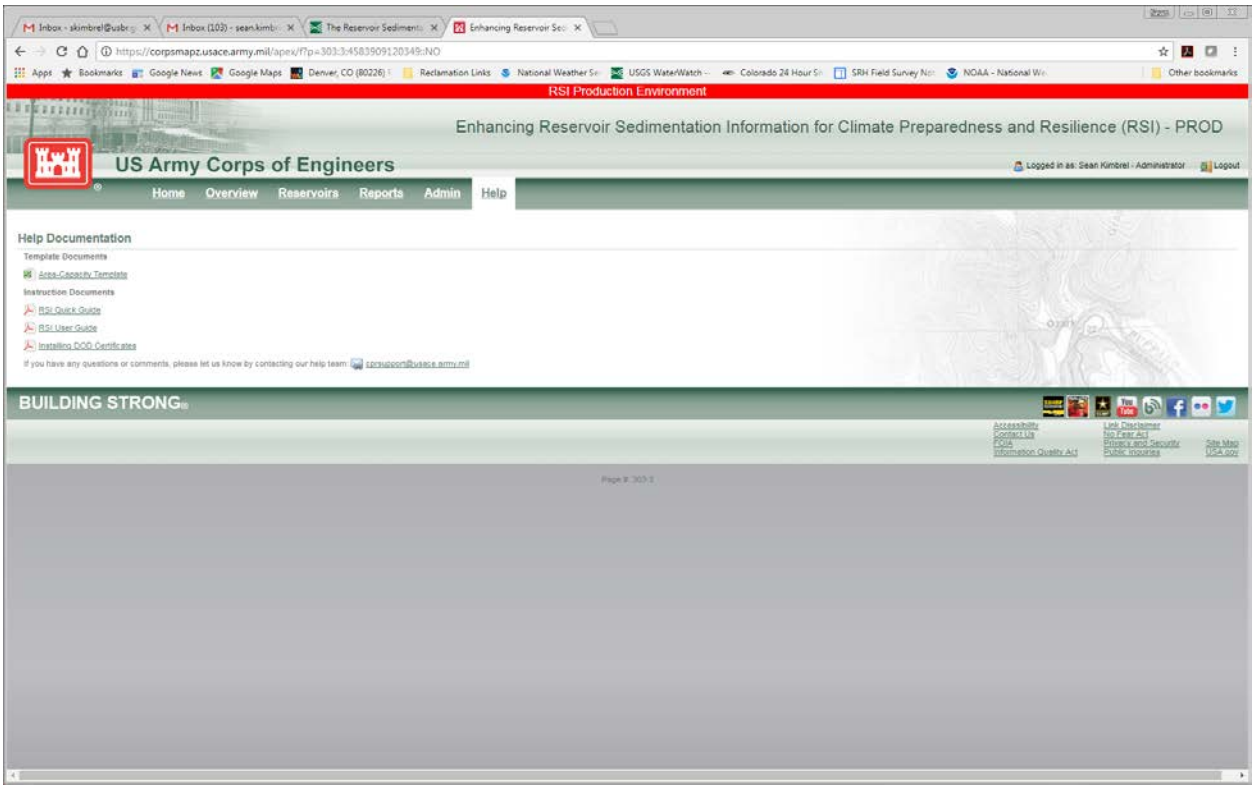

Figure 4. Screen Capture of RSI Help Documentation

3 Quality Assurance/Quality Controls with Reservoir Sediment Information Data

The Reservoir Sedimentation Information database has features which allow for Quality Assurance/Quality Control (QA/QC) of the survey data entered into the database. The RSI database keeps track of who first entered and last modified reservoir survey information, and when the modification occurred. In addition, graphics are available in the database to compare the elevation-area and elevation-capacity data between successive surveys to assure consistency.

During the period of data incorporation/entry all existing and new reservoir survey data into RSI, the entered survey data information was compare to published reservoir survey reports or from the RESSED data sheets, particularly the Form 34 data sheet for pertinent information. As a means of final quality assurance, the elevation-area and elevation-capacity graphics were used to visually compare data between successive surveys to assure consistency. In addition, the depletion analysis was compared to the storage loss estimates provided on the Form 34 data sheet.

The process to visually QA/QC the reservoir elevation-area-capacity curve data is as follows, and is shown in Figure 5 and Figure 6:

Select ‘Graphs’ and review the ‘Capacity’ Graph for visual consistency. Go back to the ‘Surveys’ data page to correct any elevation/capacity data entry errors and review the ‘Capacity’ graph for corrections. Repeat if necessary.

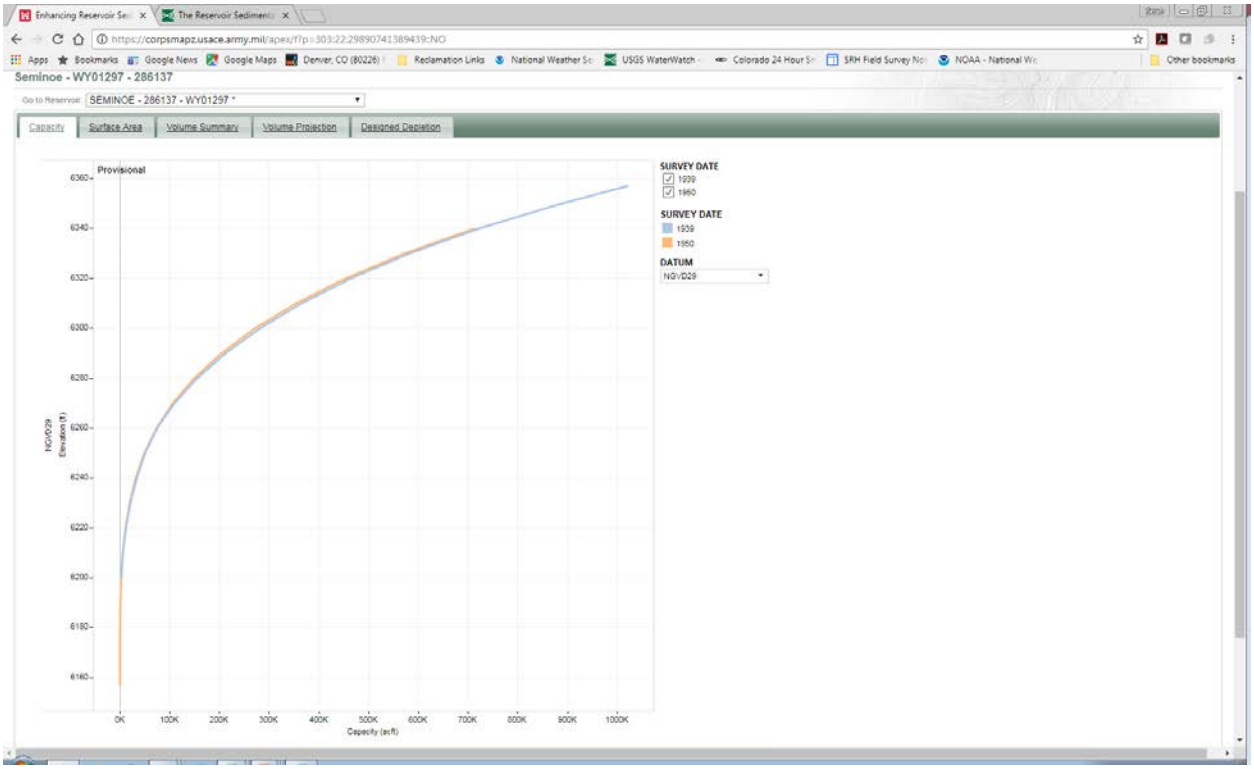

Figure 5. Screen Capture of Elevation-Capacity Curve Comparison.

Select and Review the ‘Surface Area’ Graph for visual consistency. Go back to the ‘Surveys’ data page to correct any elevation/area data entry errors and review the ‘Surface Area’ graph for corrections. Repeat if necessary.

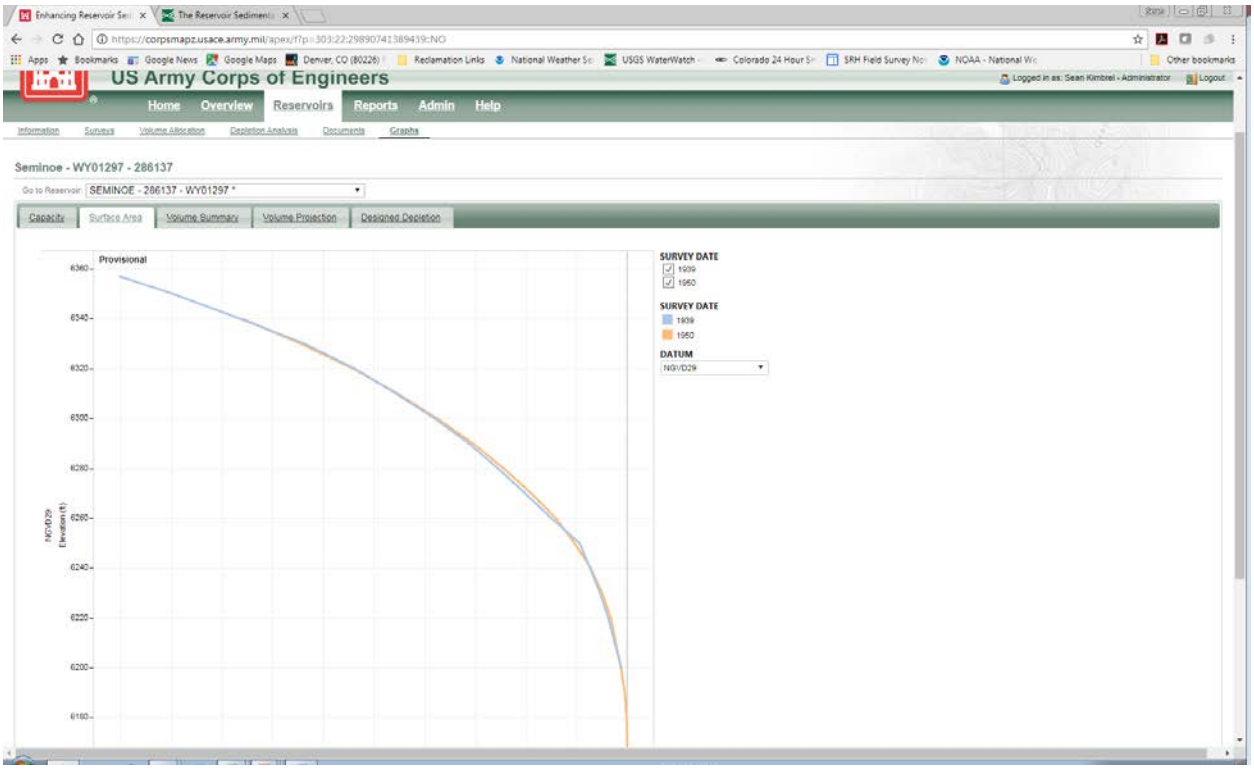

Figure 6. Screen Capture of Elevation-Area Curve Comparison

Finally, review the 'Depletion Analysis' page for consistent storage loss numbers compared to reservoir survey reports.

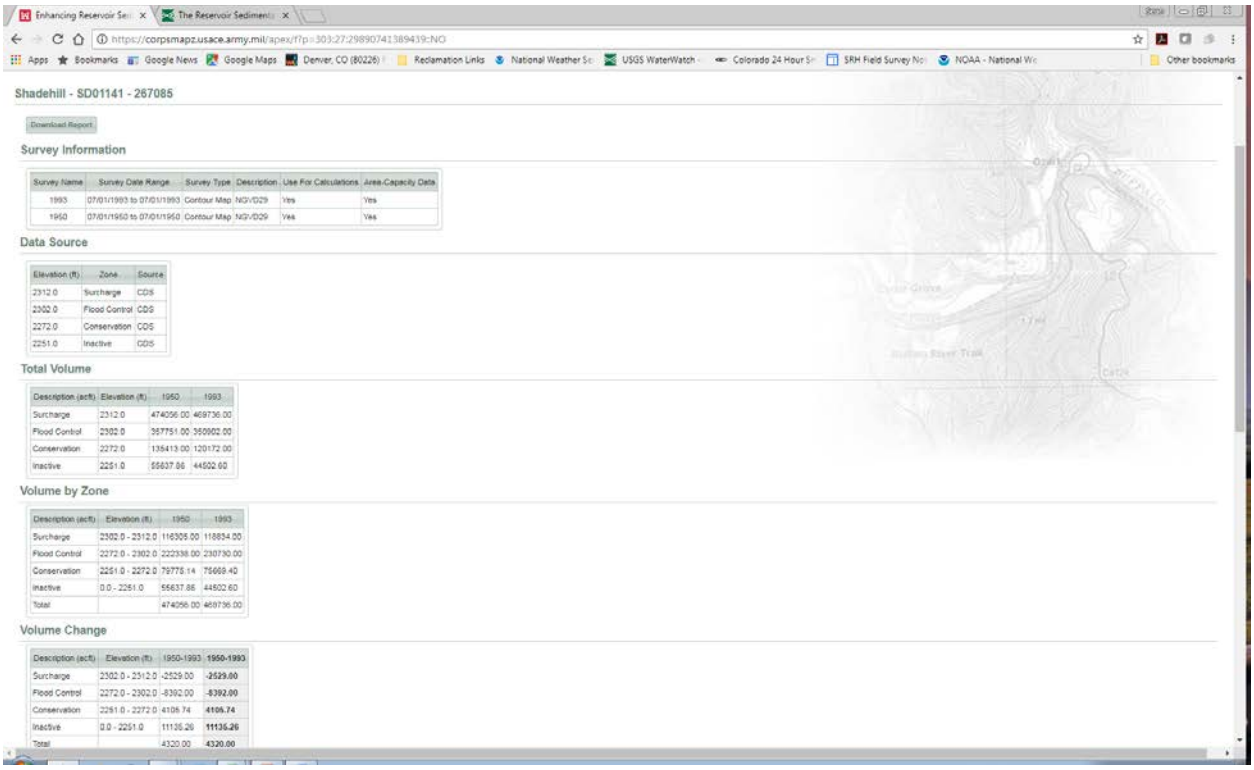

Figure 7. Screen Capture of Elevation-Area Curve Comparison

4 Summary

The objective of this research study is to develop the means to integrate Reclamation reservoir surveys into the Army Corps of Engineers Reservoir Sediment Information (RSI) database, and to develop a Quality Assurance/ Quality Control (QA/QC) protocol as part of uploading previous and future Reclamation reservoir sedimentation information data into RSI.

As an example of the current functionality of the latest build of RSI, a Report Card summary of the Top 10 reservoirs according to percent storage loss is shown in Figure 8.

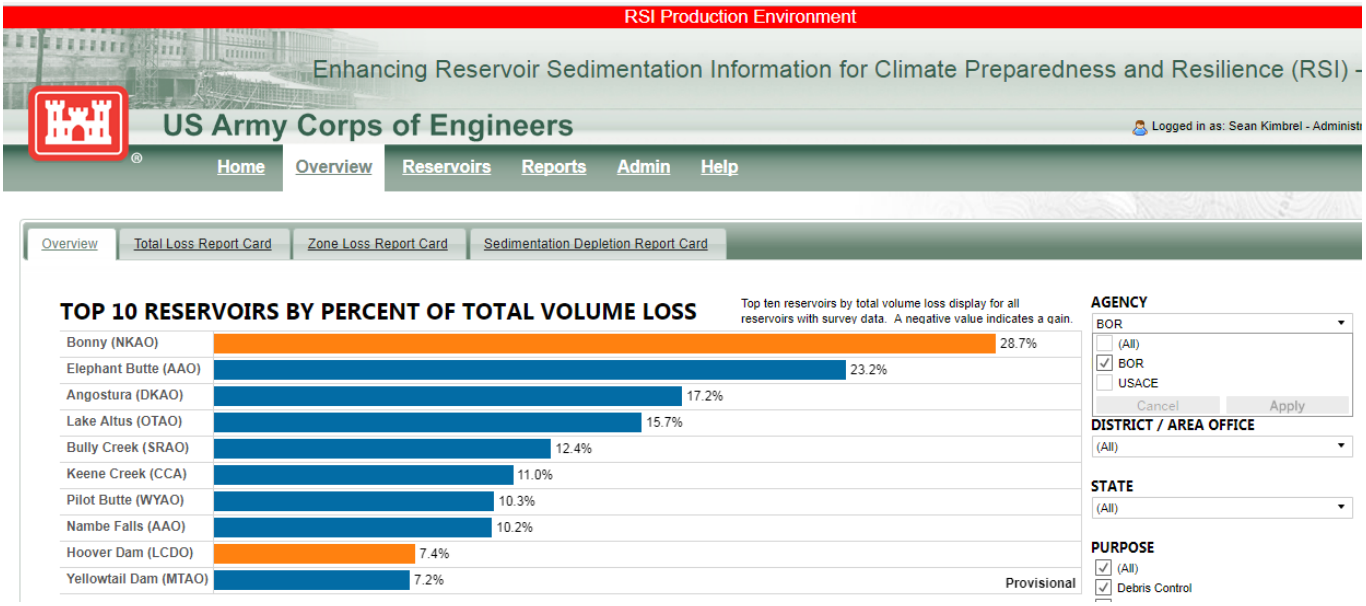

Figure 8. Screen Capture of the RSI Score Card, Showing Top 10 Reservoirs According to Percent Storage Loss

The following future improvements can be made in RSI with future builds to increase planning and management capabilities:

- Adding in range of operations data for all Reclamation reservoirs
- Adding in available sediment sample data in the database
- The capability in the RSI database to add only total capacity at certain pool allocations when no historical elevation-area-capacity table is available
- Discretizing where storage loss is calculated in report card
- Adding in the original elevation-area-capacity data for reservoirs with no repeat surveys

5 References

Gray, J.R., Bernard, J.M., Stewart, D.W., McFaul, E.J., Laurent, K.W., Schwarz, G.E., Stinson, J.T, Jonas, M.R., Randle, Timothy, and Webb, J.W. (2010) “Development of a National, Dynamic Reservoir Sedimentation Database”. Proc. 9th Federal Interagency Sedimentation Conference, June 27–July 1, Las Vegas, Nevada, 12 p.