

April 21, 2014

PR Number: R1560110208

Project Code: UWY-150

Park/NPS Unit: Northern Great Plains I&M network parks

Administrated through the: Rocky Mountain Cooperative Ecosystem Studies Unit

Cooperative Agreement Number: H1200-09-0004

Title of Project: NPS Northern Great Plains Network Herbarium Imaging Project, *Phase I*.

Larry Schmidt – PI

This is the final report for the “NPS Northern Great Plains Network Herbarium Imaging Project, *Phase I*”. To complete the project specimens were imaged and processed, label information was databased, location information was georeferenced, and botanical nomenclature to of the specimen information was checked and updated. The Canon Camera RAW images have been converted to TIFF, JPEG and DNG formats for archival and web display. In all we processed 2800 images for the project. UW Libraries and UW IT worked together to provide the necessary space for the archival imaged, web served images and the systematic backup and preservation of the material. The UW Libraries Digital Resources Department has worked closely with the PI to go through and make sure that the images are acceptable for the archive and website display.

Undergraduate student workers started the work by entering information from the specimen label images onto an excel spreadsheet created from the exports provided by the NPS park units. The records from the park units needed to have a uniform data schema so that we have consistent data entry for each record. Students made sure that the fields were uniform and that the dates entered into the database were all in one format so our programmers could easily import the data into the Rocky Mountain Virtual Herbarium online database. We also cleaned up records that were inconsistent like variable date formats in the date field and all caps used sporadically throughout the data fields.

After the initial cleanup work was finished students were trained to use [USDA Plants](#) to determine the current nomenclature used by scientists. Ron Hartman and Ernie Nelson of the Rocky Mountain Herbarium provided training for our students on botanical best practices. Students used the species information on the labels, checked the USDA Plants for the current name and changed it to match. They also added the common name when available as an added feature to make the database easier to use by the general public. During this time students trained to determine the phenology of a specimen added this information to a field in the database. This added feature will help ecologists and other interested in knowing when plants were in flower or fruit for historical purposes.

The specimens were georeferenced by students using best practices supplied by the RM Herbarium and iDigBio documentation. In some cases the location information was

given as TRS and other times the locations were descriptive in nature. We converted the TRS's to longitude and latitude and used the National Geographic TOPOS to add longitude and latitude from the location information written on the labels. For the TRS data we used the [TRS-data](#) site provided by Montana State University. The Google Maps Application that we use for the online website requires coordinates be in Decimal degrees for the longitude and latitude. During the time we were georeferencing the records we learned new techniques to apply to our work through workshops provided by [iDigBio](#). The iDigBio website also provides more information on best practices for imaging, databasing, metadata creation and other issues related to digitizing and databasing natural history collections.

The database work took an unexpected turn early in 2012 as the UW IT took over the UW Libraries Systems department. UW Libraries now depends on UW IT for database work, system support, servers and storage. When we started the project we were using MYSQL server for the database and were just getting ready to bring it up for a Beta trial. We then had to start from scratch when the UW IT Program Support department informed us they would not support MySQL. We had to convert the database to SQL with the help of the programming department. We now have a programmer in the UW Libraries who is using SQL server and he has created a working prototype for students and botanists to use. This work has is now complete and the website is up and running. We have had the pleasure of working with Bonnie Heidel and Hollis Marriott who started adding specimens to the Devils Tower collection held at Mount Rushmore. Through this work we have the opportunity to learn how the database works for both editing content and adding new content (physical specimens imaged at the RM). Through this work we are using the database as we expect to in the future as collections are added to come of the parks and the new material needs to be documented virtually and physically. We now know that we are going to have to create a best practice document to help with recording annotations as they are made for either the physical specimen or the virtual specimen. If a researcher changes a specimen's annotation online it does not mean that the physical specimen annotated (on the sheet) and vice versa.

Currently the [Rocky Mountain Region Virtual Herbarium](#) website contains multiple NPS units, USFS collections and the Markow-Murie collections at the Teton Science School (Table 1). The database has been designed so new collections can be added easily while keeping the specific unit collections separate for ease of searching. Our goal is to continue to add more regional national parks as interest and funding allows. UW IT programmers continue to develop new features as we learn more about how the web site is used and what enhancements will provide a better user experience. The current system allows for both import of bulk records and individual records. Images can be added and removed easily. This will allow the NPS park units and the UW Libraries to maintain the database as new material is added to a collection.

Unit or Collection	Acronym
Bandelier National Monument	BAND
Devils Tower National Monument	DETO
Fort Laramie National Historic Site	FOLA

Grand Teton National Park	GRTE
Grand Teton National Park - RM	GRTE-RM
Jewel Cave National Monument	JECA
Markow-Murie Herbarium – Teton Science School	MAMU
Mount Rushmore National Memorial	MORU
Wind Cave National Park	WICA

Table 1.

We are also developing an export feature so users can download the data from records for their use. Another development that we now have to look into is making the data in our collections available for import to NPSpecies. We will also need to find ways to address changes made in NPSpecies or in the Rocky Mountain Region Digital Herbarium as changes in one will need to take place in the other. Hopefully at some point there will be an integrated natural history digital collection for all regional or national material. Until then we will have to make sure that we create processes to address these issues. In the future we hope to make the information available for other online collections that serve regional, national or international initiatives such as the [Intermountain Region Herbarium Network](#), [Symbiota](#), and [GBIF](#).

Images and excel files of the cleaned up data have been provided to the NPS as required in the grant. We are also in the process of creating a best practices and user guide for the web site and database interface with the help of Hollis Marriott as she adds new material and annotates specimens for the Devils Tower National Monument project.

PI - Larry Schmidt _____

Financial Report – Final

NPS Grant

Grant Number 4201-11093-1001183
Amount of Award \$13,086
Grant Period July 1, 2011 - December 31, 2013
Report Period July 1, 2011 - March 31, 2014

Principal Investigator Larry Schmidt
Title NATIONAL PARK SERVICE NORTHERN GREAT PLAINS NETWORK HERBARIUM IMAGING PROJECT, PHASE 1

<u>Expense Categories</u>	<u>Budget</u>	<u>Previous</u>	<u>Current</u>	<u>Cumulative</u>
Imaging/Processing/Database	\$7,815.00	\$6,337.51	\$2,351.19	\$8,688.70
Equipment/Supplies	\$500.00	\$195.98	\$209.59	\$405.57
Travel/ Meeting Costs	\$2,822.00	\$2,041.94	\$0.00	\$2,041.94
Indirect Costs (17.5%)	\$1,949.00	\$1,503.31	\$445.57	\$1,948.88
	TOTAL \$13,086.00	\$10,078.74	\$3,006.35	\$13,085.09
Total Payments	\$13,086.00			
Total Grant Expenditures	\$13,085.09			
Balance	\$0.91			

Signature: _____
Date: _____