# DIGITIZATION OF THE GRAND TETON NATIONAL PARK HERBARIUM 2006 - 2007

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#### ✦ INTRODUCTION

Examples of digitization projects in the history of science are understood to have lasting consequences for the intellectual history of their fields (Petersen, 2005; Roes 2001). Following this trend, herbarium collections around the world are beginning to be digitized with positive results for their institutions (Begnoche, 2002; Ong, 2002). Librarians, with their long history of making collections accessible, are participating in this trend (Foster, 2005). This project expands the University of Wyoming Libraries work in the digitizing of a unique collection of plant specimens.

The Grand Teton National Park (GTNP) herbarium is a historical record of the plant specimens collected in the National Park. Since the1920s, it has provided a physical record of vascular flora within the Park and includes examples of many rare and endangered species. Digitization of this collection reduces the necessity for handling the fragile specimens, helps maintain their current condition and contributes to management decisions. This digital collection will expand the herbarium use to local communities and extends its influence nationally.

## METHODS

The initial work was done at the University of Wyoming/National Park Service Research Station (UW/NPS) in Grand Teton National Park. The camera and other equipment were housed in a dedicated photography room. Specimens were transported from the Herbarium in the Park to UW/NPS, photographed and returned. Data was entered into the database, backed up on CD ROMs and sent to the server at the University of Wyoming Campus.

The equipment used on this project was a Canon 16.7 mega pixel EOS-1Ds Mark II camera utilizing a full-size 24x36mm CMOS sensor that eliminates focal length conversion factors, and features dramatically improved image quality. The libraries also purchased a 50 mm macro lens to use with the camera for the close up actual size images of plant specimens. Portable studio equipment includes two external flash units and an opaque photography tent used to diffuse light for optimal imaging conditions. The library also provides and maintains a computer, two monitors, and portable storage devices for the project.

Descriptive metadata, including the scientific name and collection location, was recorded in the accompanying spreadsheet as each specimen was photographed and tied to the image file with a unique identification number. Technical metadata was captured during photographing including shutter speed, aperture, camera information and imaging software used. We followed the Colorado Digitization Project (CDP) best practices throughout the project (CDP 2003; CDP 2005).

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## ✦ RESULTS AND DISCUSSION

Photography of herbarium specimens continued during the summer of 2006. The total number of photographs taken was 6342 of which 360 were overexposed. In 2007 the overexposed specimens were photographed again. Our workflow changed after our first season as we learned that trying to edit the records and take the images at the same time was too time consuming. We now edit the information at the UW Libraries using a process that will ensure quality control.

Currently we have processed approximately 3650 of the 6342 specimen's images. The Rocky Mountain Herbarium on the University of Wyoming campus has supported this effort by providing botany students interested in the project who are able to help edit the database entries. We also have library staff members helping with the data entry as well as the librarians responsible for the project. Editing is proving to be the most challenging aspect of We have decided after the project so far. reviewing previous work that database records need to be compared with their corresponding images twice. Each specimen is examined once to enter the data and a second time to make sure that the information was entered correctly.

Images of each specimen are matched to their corresponding record using the image number field in the Access database. Once the image and record are matched, the information from the specimen label can be entered into the Upon completion of editing the database. database, the specimens and their associated metadata will be ready for publication on the web. In order to present the specimens on the web for public viewing, digital imaging software needs to be used. The University of Wyoming Libraries has purchased Insight, digital imaging software available from LUNA Imaging. The web interface will allow users to search the metadata records as well as look at images of the specimens at various magnifications without long download times. Figure 1 is an example of a database page for a specimen. See Figure 2 for an example of a specimen photograph. Figure 3 is an example page from the LUNA software.

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Figure 1 is an example of a database page for a specimen.



Figure 2 is an example of a specimen photograph.



Figure 3 is an example page from the LUNA software.

It is the intention of the University of Wyoming Libraries to support the database at the Laramie campus on a Library server. The project uses architecture designed to allow technology upgrades. Images and attached metadata will be available to the public in a prevailing file format that allows a reasonable download time for the average user, such as the currently popular TIFF or JPEG formats, but may be migrated in the future as file specifications evolve. The master copy is preserved in a RAW format. This kind of data intensive work takes a lot of computer technology including data storage and server The 780+ Gigabyte GTNP project is space. hosted on a 3.0 GHz Dell network server connected to a 4 Terabyte Dell storage area network (SAN). The GTNP images are backed up using the library's disk-to-disk backup scheme. Backup images are located on a 6 Terabyte StoreVault 500 unit. In the immediate future the libraries will be replicating all the data

on the 6 Terabyte StoreVault to an offsite 12 Terabyte StoreVault unit as part of the UW Libraries disaster recovery plan.

Our project will continue during the summer of 2008 as we continue editing the database, decide on searchable fields for the online database and prepare to go live on the web. Easy access will also be available through the Grand Teton National Park webpage to insure accessibility to researchers and the general public.

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