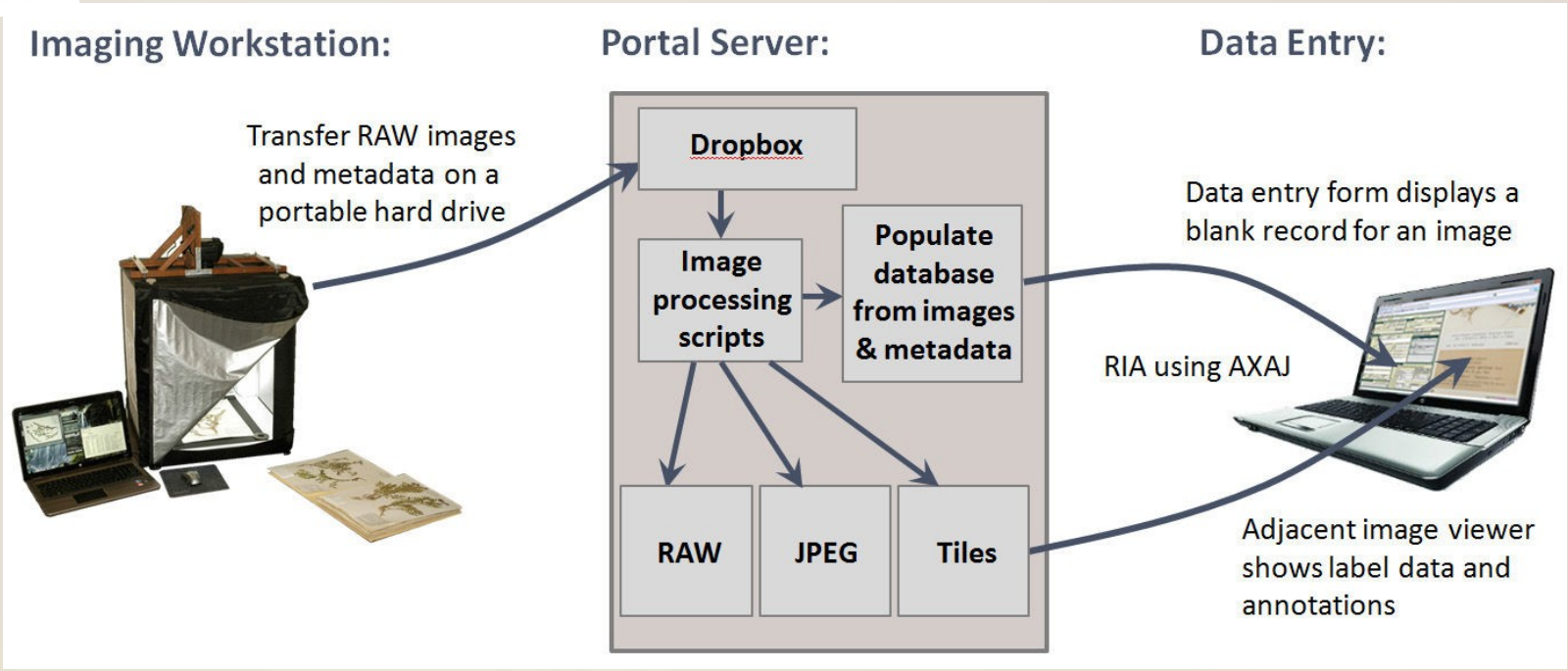
Image Capture and Processing

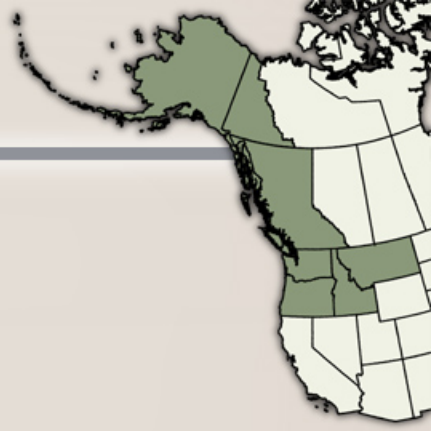
Consortium of Pacific Northwest, Ray J Davis Herbarium, Idaho Museum of Natural History



Janet Bala
Collections Manager
balajane@isu.edu
1-208-282-2815

Ben Legler
Informatics Specialist
WTU Herbarium, Burke Museum of Natural History
University of Washington
blegler@u.Washington.edu

Imaging Hardware and Software



- Ortery Light Box
  - $1,800
  - http://ortery.com/support/where to buy.php

- High-resolution digital SLR:
  - Canon EOS 5D Mark II camera with a 21 MP sensor
    - $2,399 w/rebate (Now Mark III)
  - 50 mm macro lens
    - $299
  - Canon AC Adaptor Kit (ACK-E6)
    - $149 to $189
- Computer
  - $700 to $1,000:
  - Minimum specs:
    - 17", 1600x900 pixel screen
    - 500 GB 7200 RMP hard drive
    - 3 to 4 GB RAM
    - Newer processor such as Intel T6600, i3, i5, or i7
    - Dedicated graphics card with at least 512 MB memory
    - Windows 7

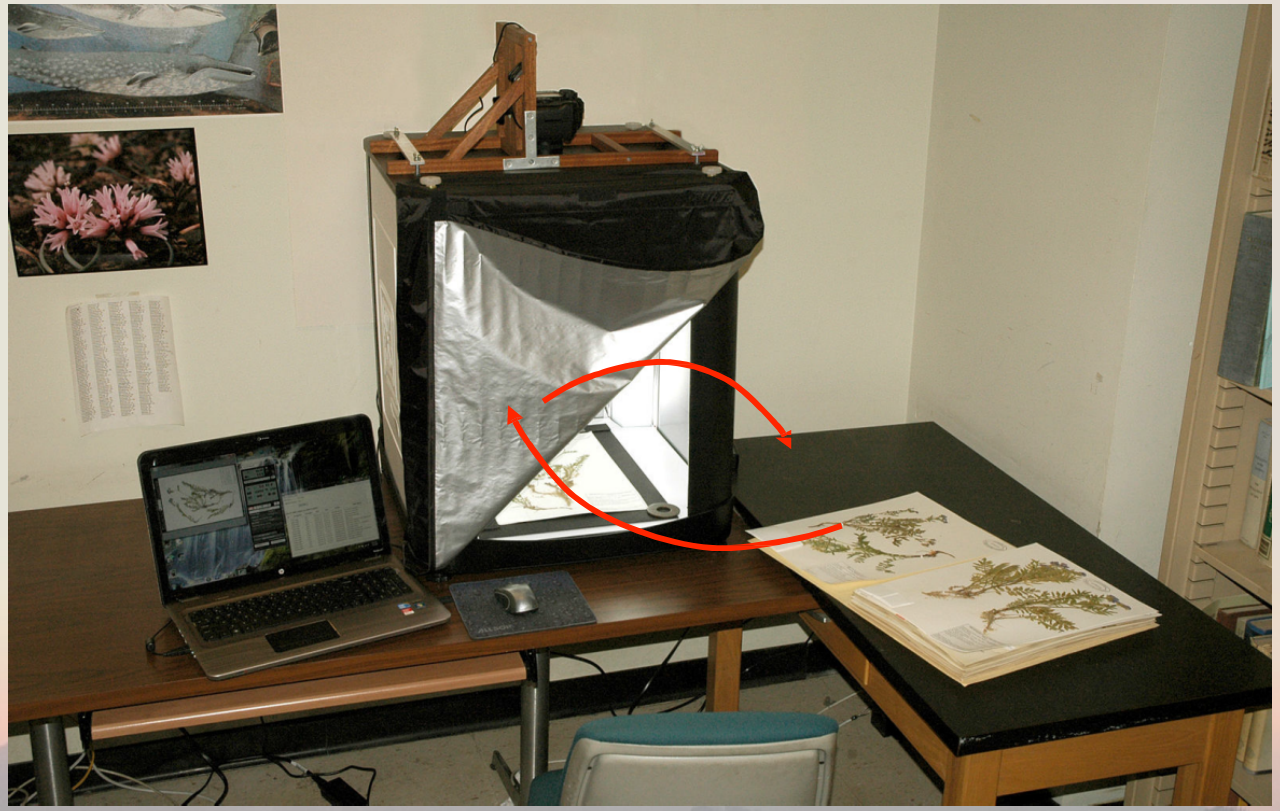
- Barcode scanner $60.00
- Barcodes 50,000/$500.00

Total Cost: approximately $5,500

Setting Up The Imaging Workstation

Find a suitable location for the equipment:

- Place light box on sturdy surface eliminating vibrations to camera
- Place specimens at right-angle to light box for ease with inserting/ removing from light box
- Minimum of three power outlets

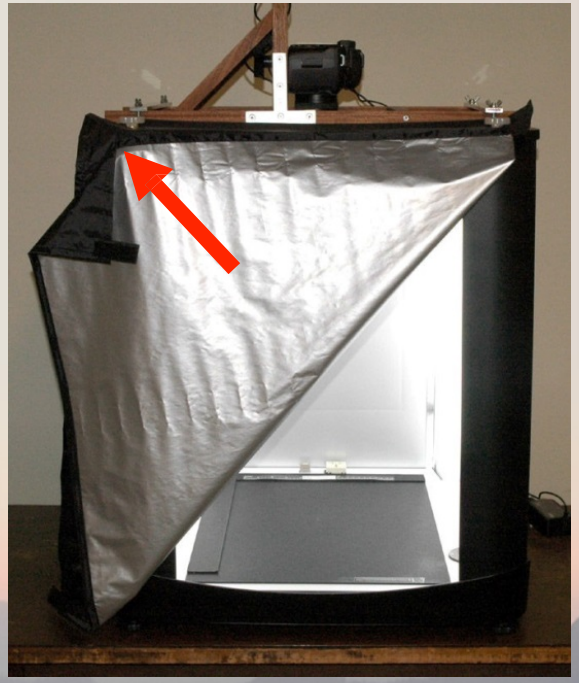


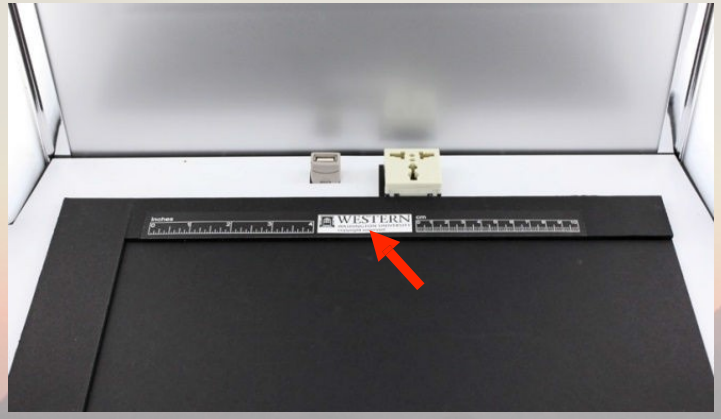
Imaging and Databasing

Imaging Equipment: Light Box

Custom ruler with logo, positioned at top of specimen holder and held in place using removable, double-sided tape.

Fabric door on front of Light Box, with Velcro tabs added to allow a corner to be easily held out of the way.



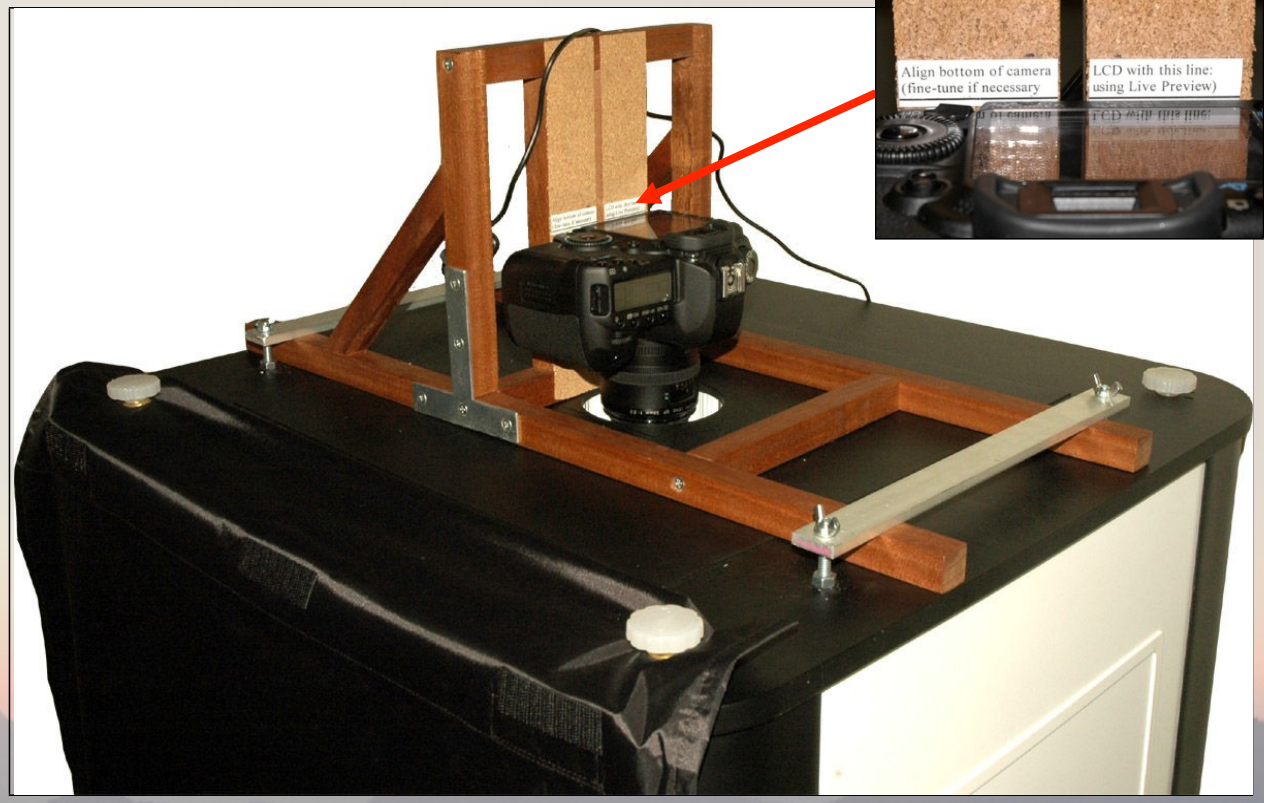


Proper position of specimen holder.

Imaging and Databasing

Imaging Equipment: Camera and Custom Mount

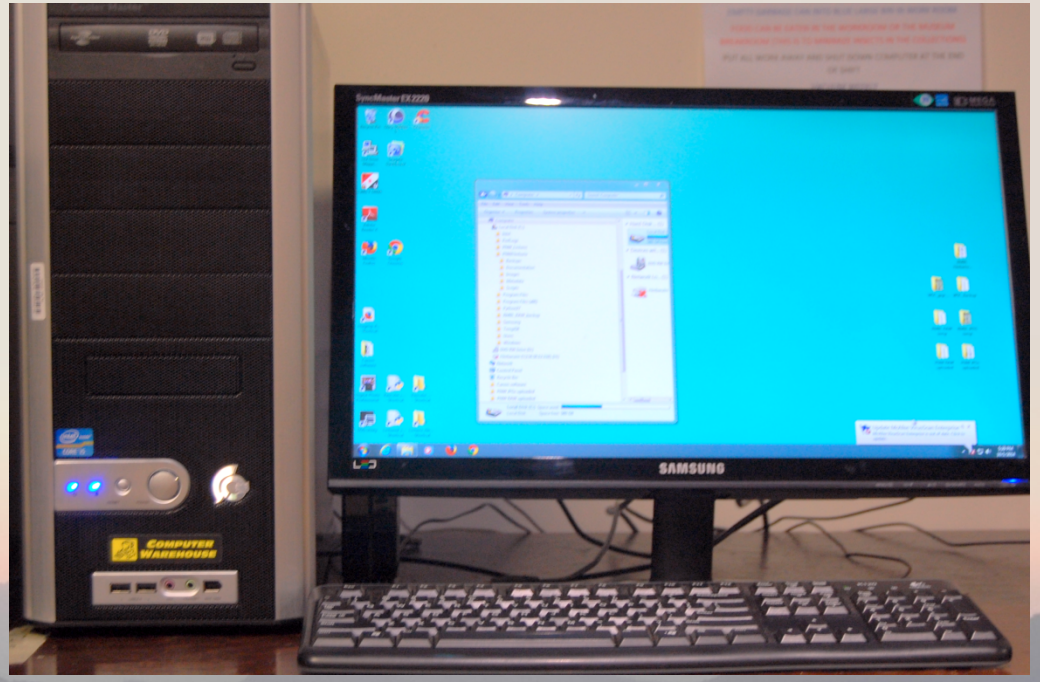
- Attach custom camera mount to top of light box
- Orient at a right angle to the front of the light box
- Aluminum bars and wingnuts secure mount in place
- Position AC adaptor and USB cords out of way of lens



Imaging and Databasing

Imaging Equipment: Computer and Monitor

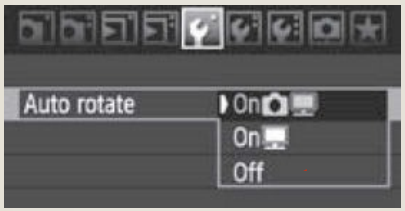
- Computer Intel Core i5
- Monitor Samsung 22” screen



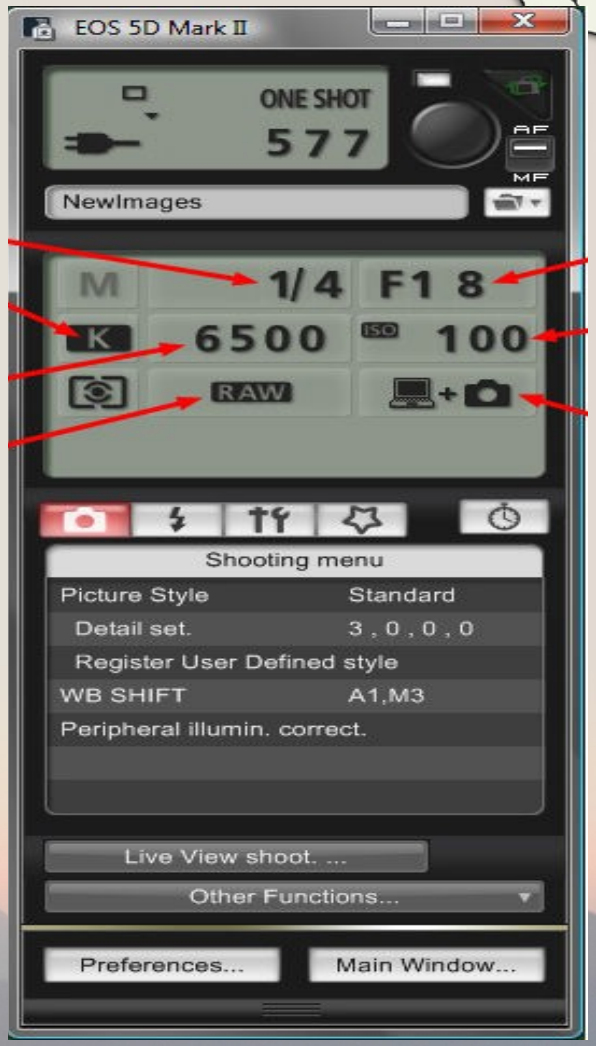
1. Imaging Workflow: Preparing for Imaging

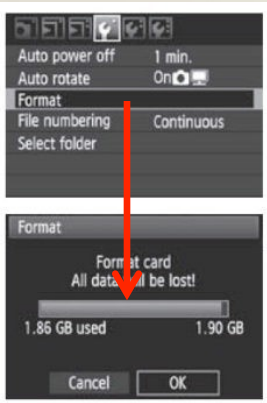
1.1 Turn on imaging equipment

- Turn on light box first to allow bulbs to warm up
- Start computer
- Turn on camera and remove lens cap



1.3. Open the EOS Utility and check settings





1 **Select [Format].**

- Under the [ ] tab, select [**Format**], then press <SET>.

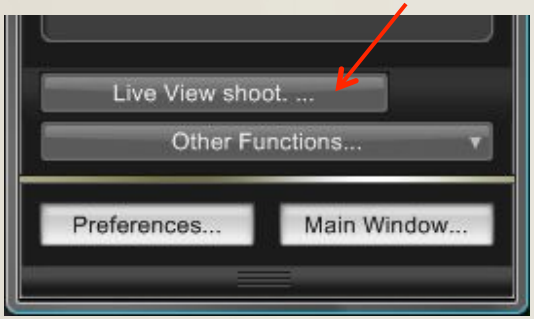
2 **Select [OK].**

- Turn the <dial> dial to select [**OK**], then press <SET>.
- ▶ The card will be formatted.
- ▶ When the formatting is completed, the menu will reappear.

1.2. Format compact flash card on back of camera

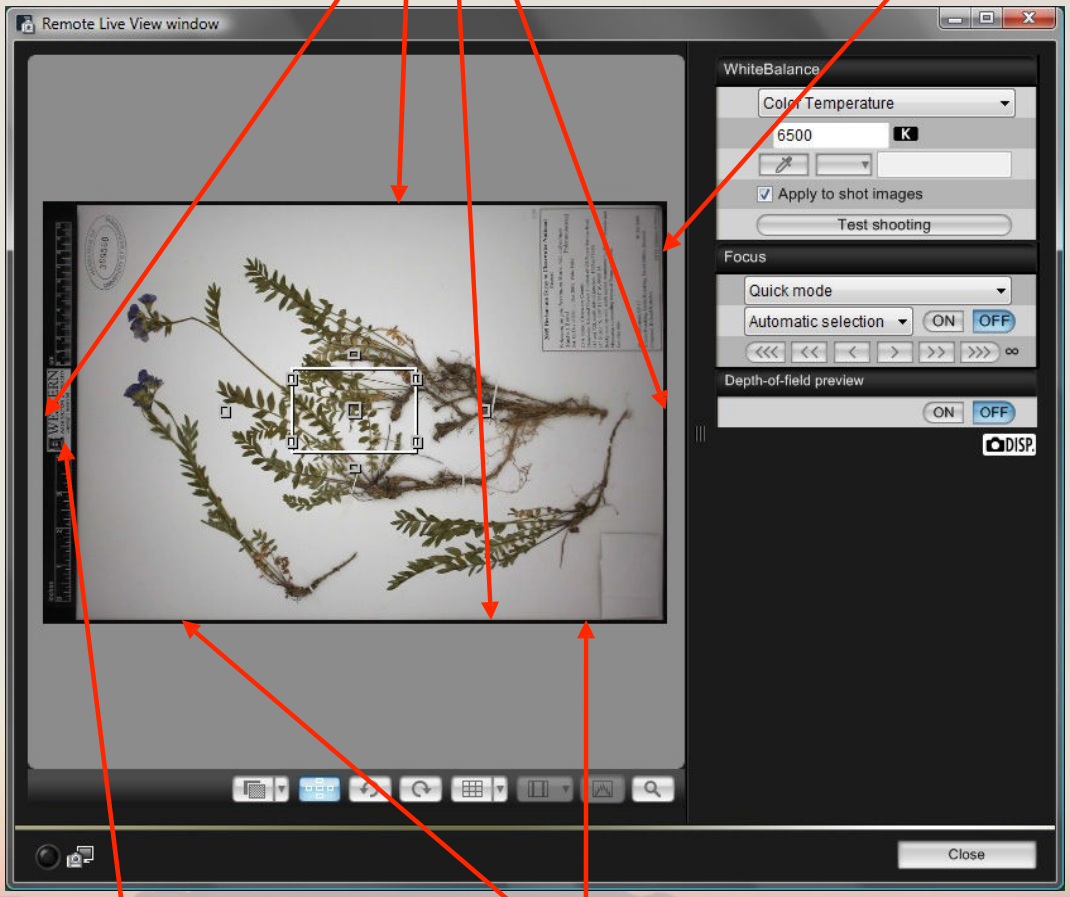
1. Imaging Workflow: Preparing for Imaging

1.4 Use Live View to double-check camera alignment



Thin black margins all the way around the specimen, about equal in thickness.

All parts of the specimen are visible, especially the edge of the label.

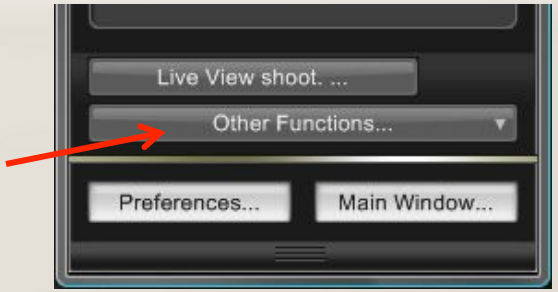


Ruler and logo are completely visible.

Margins of specimen are parallel with edge of image frame.

1. Imaging Workflow: Preparing for Imaging

1.5 Open the Quick Preview window: Keep open while imaging to visually check images as they are captured



1. Imaging Workflow: Preparing for Imaging

1.6 Open the metadata entry form and check settings

Metadata entry form allows basic metadata for each image, including:

- Person who imaged
- Herbarium acronym
- Folder where specimen is stored.

Image Metadata, PNW Herbaria

File Admin Help

Your name: Elise LaVanaway

Collection Acronym: ID

Add Folder

List of folders, in order imaged:

	Imaged By	Acronym	Date	Time	Family	Scientific Name	Folder Code
1	Harriet Hughes	ID	2010-10-08	10:57:01	Araceae	Arisaema	non-Idaho (cream)
2	Harriet Hughes	ID	2010-10-08	11:11:16	Araceae	Calla	non-Idaho (cream)
3	Harriet Hughes	ID	2010-10-08	11:15:46	Lemnaceae	Lemna	non-Idaho (cream)
4	Harriet Hughes	ID	2010-10-08	11:25:42	Lemnaceae	Lemna minor	Idaho (red)
5	Harriet Hughes	ID	2010-10-08	11:38:31	Lemnaceae	Lemna minor	non-Idaho (cream)
6	Harriet Hughes	ID	2010-10-08	11:48:34	Lemnaceae	Lemna trisulca	Idaho (red)
7	Jacob Donton	ID	2010-10-08	12:35:42	Lemnaceae	Lemna trisulca	non-Idaho (cream)
8	Jacob Donton	ID	2010-10-08	12:38:57	Lemnaceae	Lemna turionifera	Idaho (red)
9	Jacob Donton	ID	2010-10-08	12:41:06	Araceae	Lysichiton americanus	Idaho (red)
10	Jacob Donton	ID	2010-10-08	12:47:14	Araceae	Lysichiton americanus	non-Idaho (cream)
11	Jacob Donton	ID	2010-10-08	12:52:15	Araceae	Orontium	non-Idaho (cream)
12	Jacob Donton	ID	2010-10-08	12:53:47	Araceae	Peltandra	non-Idaho (cream)
13	Jacob Donton	ID	2010-10-08	12:54:46	Zosteraceae	Phyllospadix	non-Idaho (cream)
14	Jacob Donton	ID	2010-10-08	12:55:26	Araceae	Pistia	non-Idaho (cream)
15	Jacob Donton	ID	2010-10-08	12:56:30	Lemnaceae	Spirodela polyrhiza	Idaho (red)
16	Jacob Donton	ID	2010-10-08	12:59:42	Lemnaceae	Spirodela polyrhiza	non-Idaho (cream)
17	Jacob Donton	ID	2010-10-08	13:03:16	Araceae	Symplocarpus	non-Idaho (cream)
18	Jacob Donton	ID	2010-10-08	13:05:23	Lemnaceae	Wolffia	non-Idaho (cream)

Images in a folder will be associated with metadata entry via timestamps embedded in the image file and recorded in the metadata entry.

2. Imaging Workflow: Metadata and Image Capture

2.1 Metadata capture for each folder:

- Pull stack of specimens from cabinet
- Create folder entry using metadata form
- Image each specimen in folder
- Add folder for each new species

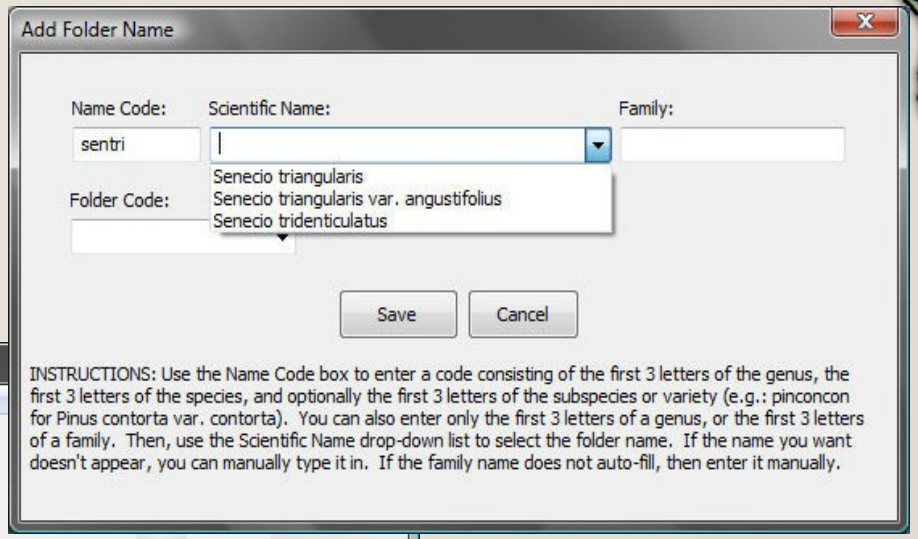


Image Metadata, PNW Herbaria

File Admin Help

Your name: Elise LaVanaway

Collection Acronym: ID

Add Folder

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18	Jacob Donton	ID	2010-10-08	13:05:23	Lemnaceae	Wolffia	non-Idaho (cream)

2. Imaging Workflow: Metadata and Image Capture

2.2 Image capture for each folder

Shutter release button on the EOS utility window.

Proper placement of specimen sheet.

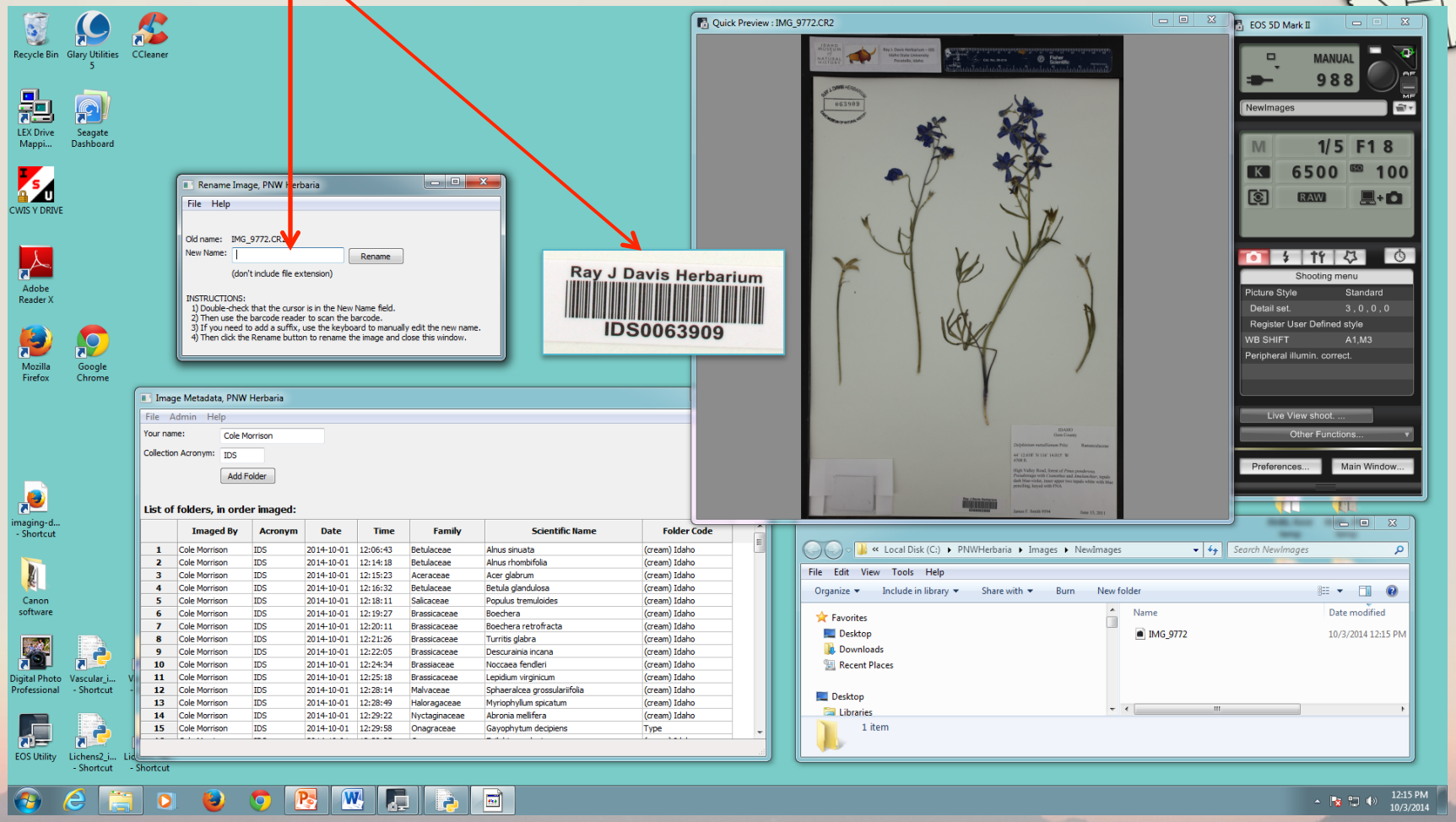
Edges of sheet tight against raised edges of holder.

Label in this corner

2. Imaging Workflow: Metadata and Image Capture

2.2 Image capture for each folder:

- Barcode popup window appears
  - Scan barcode



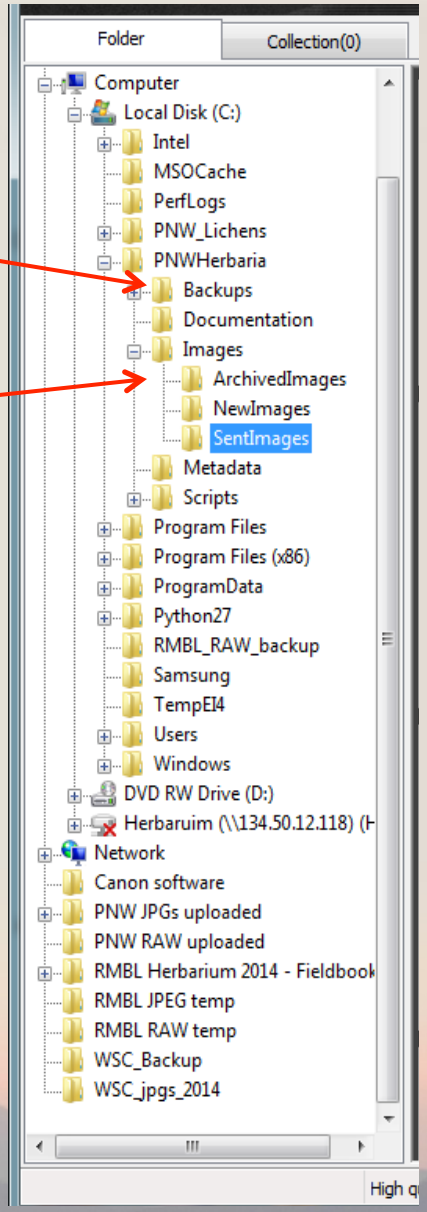
3. Imaging Workflow: Finishing Image Capture and Shutting Down the Imaging Workstation

3.1 Back up the metadata and images:

- Create a backup copy of the metadata list.
  - Save file in folder "PNWHerbaria\backups\"
  - Copy all images from "\NewImages\" to folder "ArchivedImages"
- This process tracks images backed up which have been sent to WTU.

3.2 Shut down the imaging workstation:

Close metadata entry form. No need to save anything.
Close EOS Utility window
Turn off camera/replace lens cap
Shut down computer

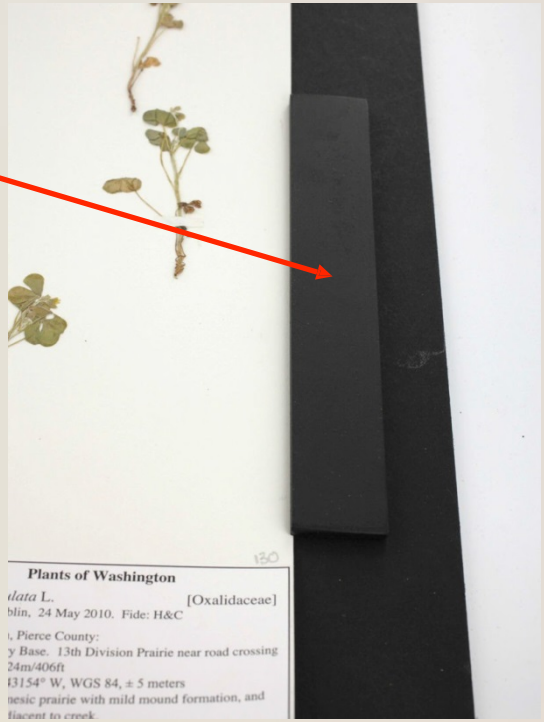


4. Imaging Workflow: Dealing with Problems During Image Capture

4.1 Specimen sheet does not lie flat (due to curves or bends in the sheet)

Black weight to hold down side of sheet

Black weight to hold down label corner



Using the black weights to hold down curved edges of a specimen sheet. Shown here is a curved label corner held down by barely overlapping the weight with the corner of the sheet, and the side of a sheet held down with a longer black weight.

4. Imaging Workflow: Dealing with Problems During Image Capture

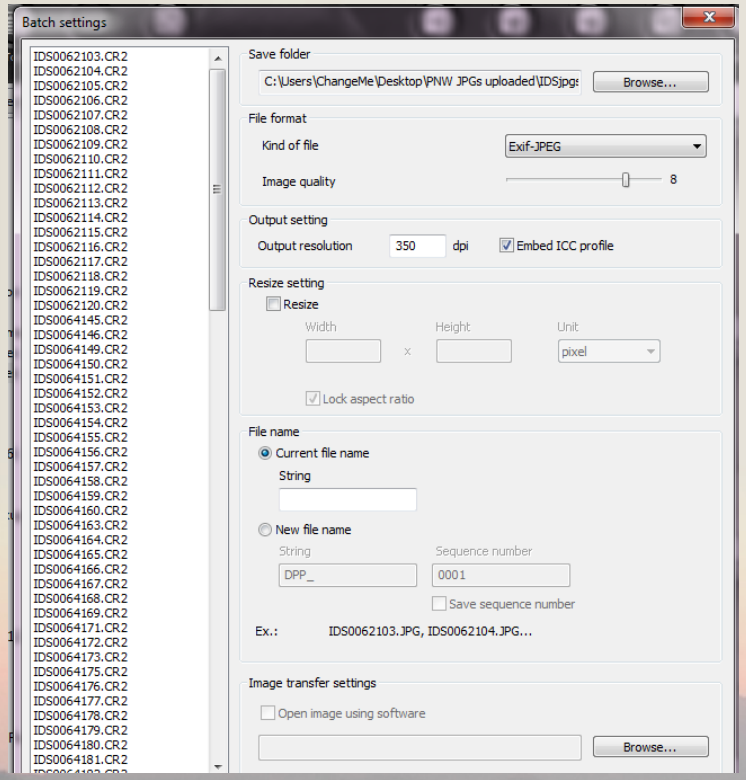
4.2 Specimen sheet contains a packet with plant material inside:

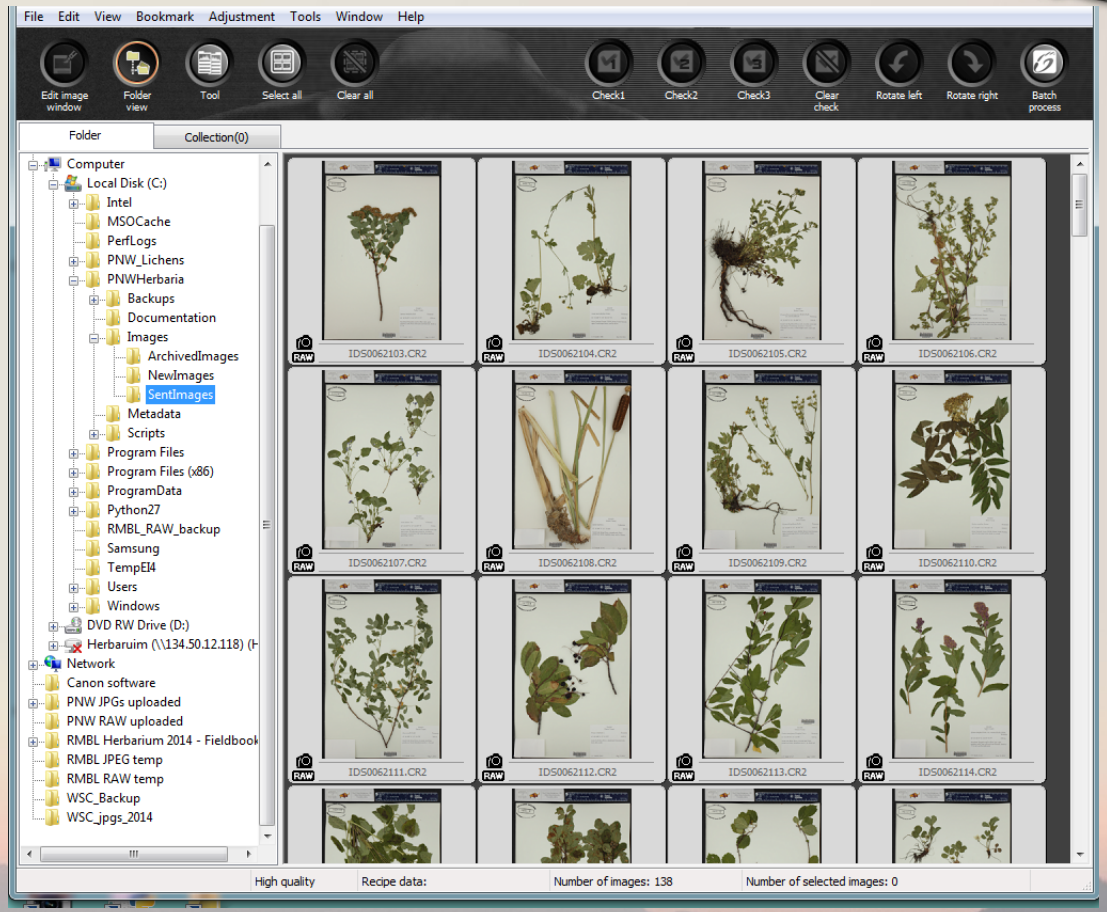
- Open pack and image with weights holding envelope flaps
- Take two images, one with envelope closed, one with envelope opened

5. Uploading Images and Metadata to Host Portal

Open Digital Photo Professional:

- Check correct orientation
- Batch process
- Current file name is the barcode
- Jpeg with compression of 8, dpi 350
- Execute (10-15 seconds/image)

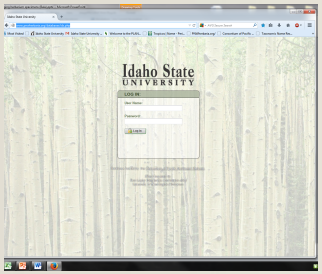


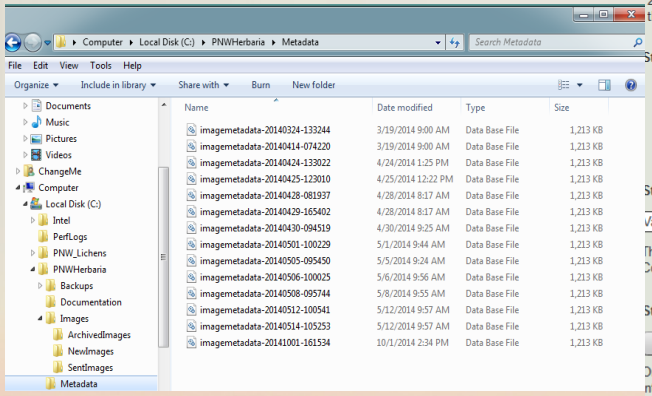


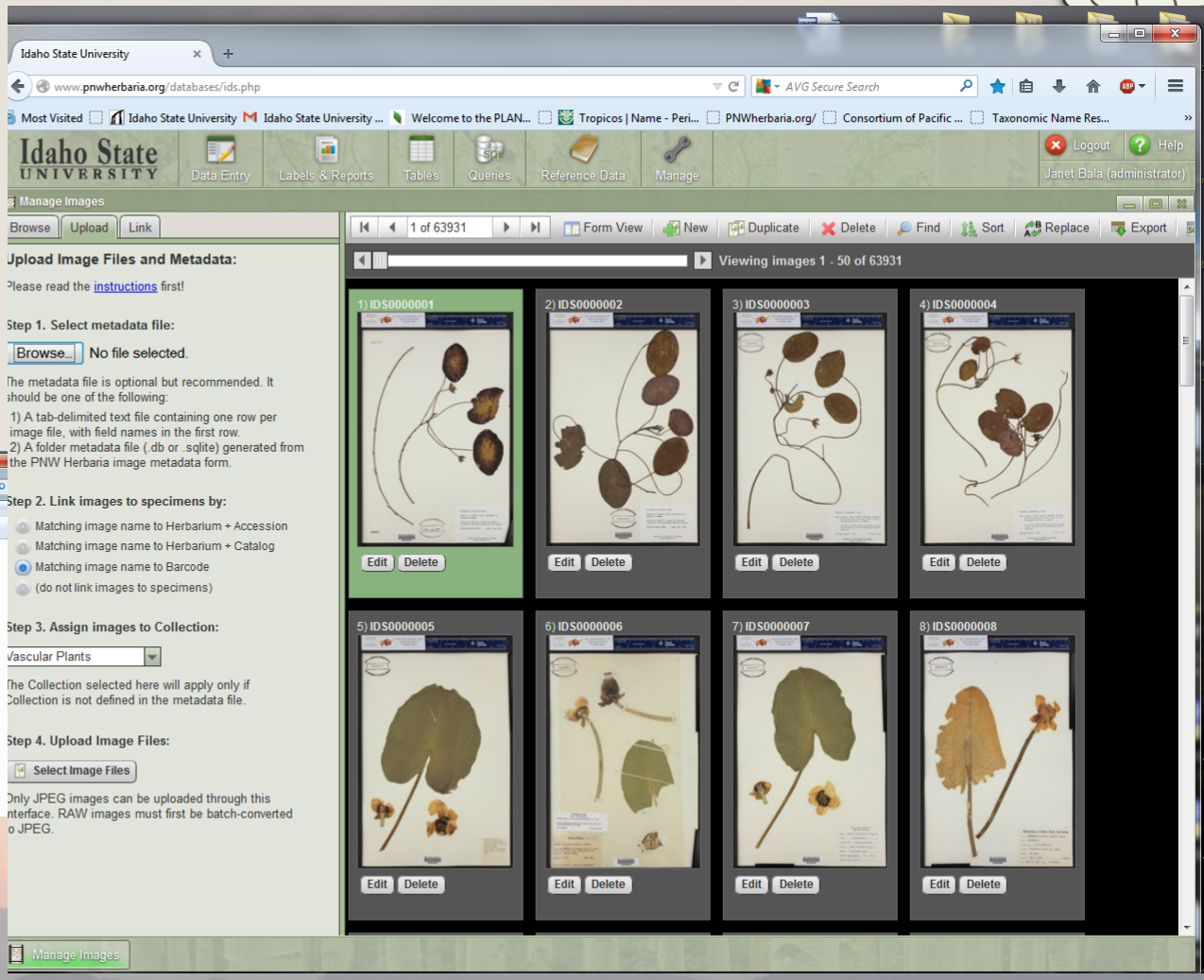
5. Uploading Images and Metadata to Host Portal

Open database: http://www.pnwherbaria.org/databases/ids.php

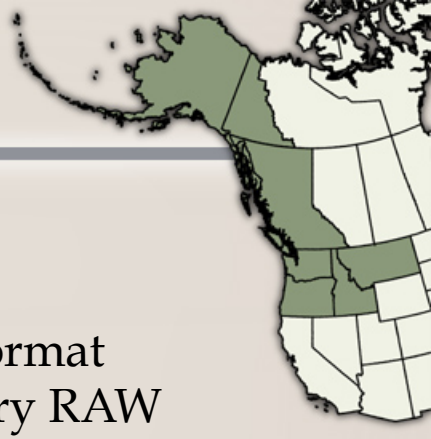
Under manage images tab:
Link metadata and jpegs







Imaging and Databasing



Images are stored in several formats:

- **Digital Negative (.DNG):** This is a publicly documented RAW format developed by Adobe as an alternative to the numerous proprietary RAW formats from each camera manufacturer. 22 MB per image.
- **JPEG:** Conversion from RAW formats to TIFF or JPEG is a hassle, so we will store high-quality JPEG copies for immediate access. 7 MB per image.
- **Tiled images:** These are used by the online specimen image viewer. They function in the same way as map tiles in Google Maps. 3.5 MB per image.

Storage requirements for 327,000 specimen images:

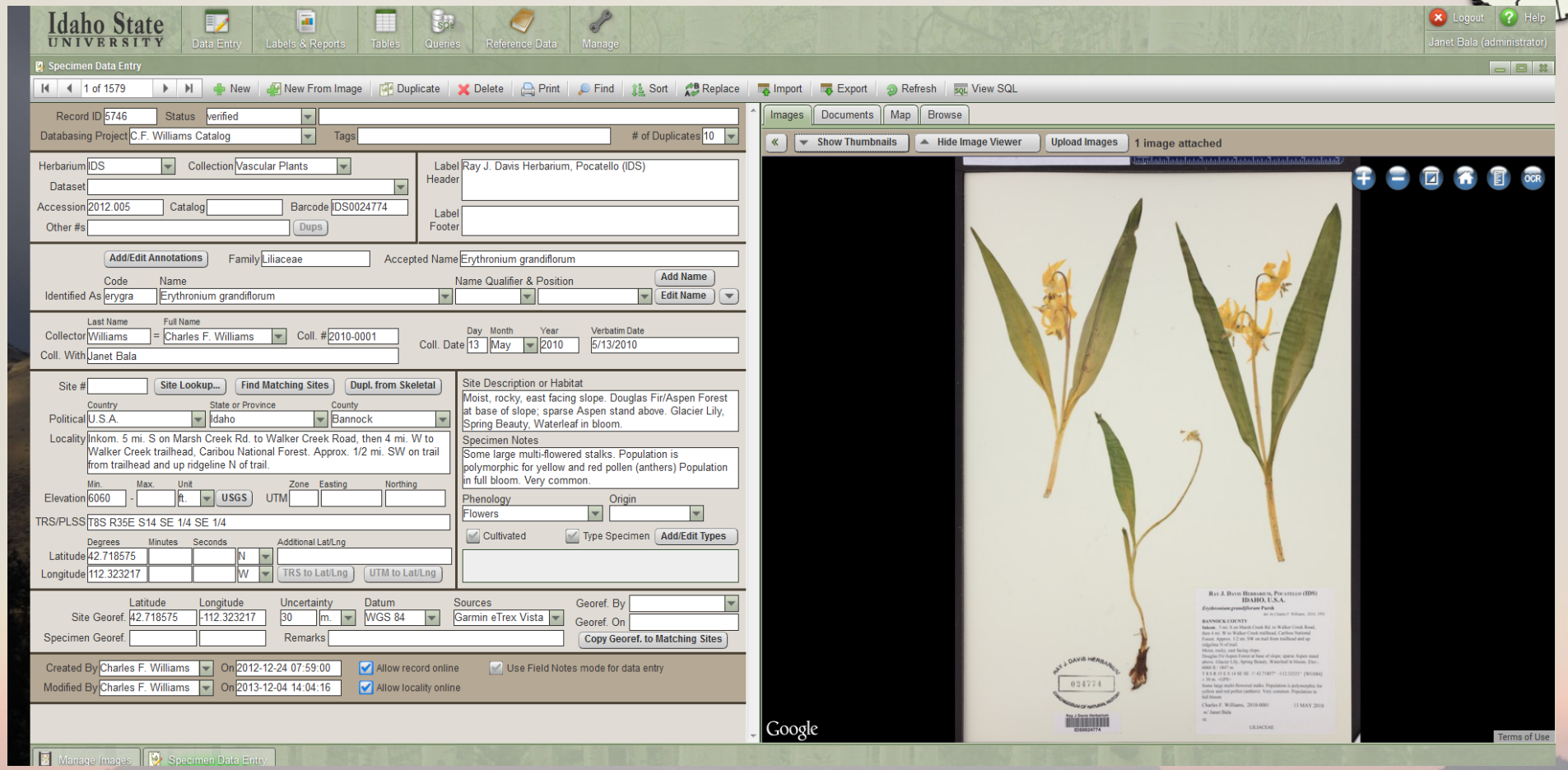
DNG	6.8 Terabytes
JPEG	2.2 Terabytes
Tiles	1.1 Terabytes
TOTAL	**10.1 Terabytes**

(For comparison, an 8-bit TIFF with LZW compression is larger than the DNG, JPEG, and tiles combined)

(We'll have 13.5 Terabytes available and can purchase more if needed)

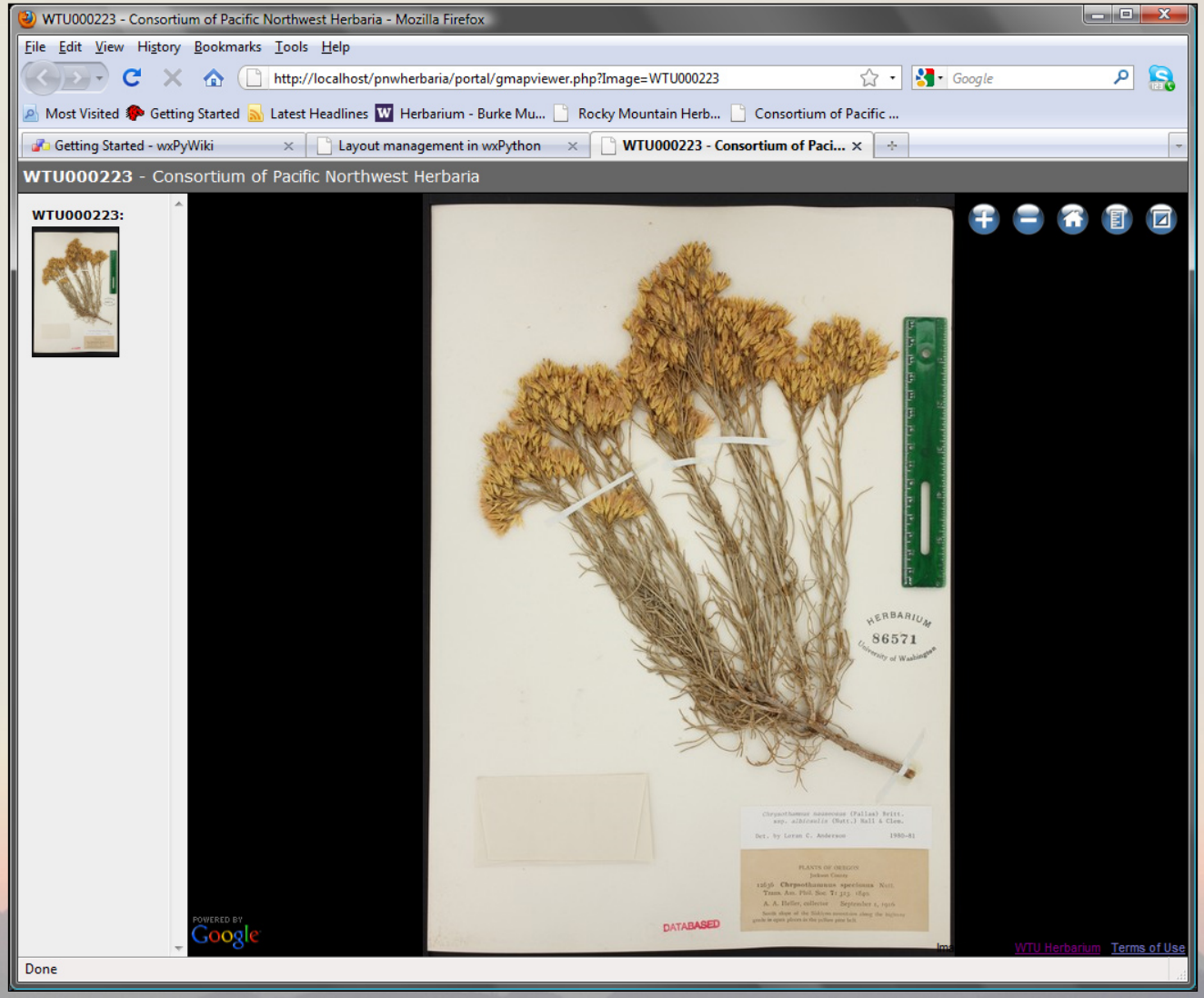
Imaging and Databasing

Data entry personnel simply click a button to pull up a blank record, database from the image, and repeat. I may add OCR-assist to the data entry interface.



Imaging and Databasing

Specimen Image Viewer



Consortium of Pacific Northwest Herbaria

Providing access to specimen data and digital resources from herbaria throughout Pacific Northwest North America

Log In

- Home
- Specimen Data
- Online Resources
- Member Herbaria
- External Links
- Documentation
- About
- Contact Us

Polystichum kruckebergii

Herbarium specimens from the Pacific Northwest

2,392,637 specimen records and 823,180 images from 33 herbaria.

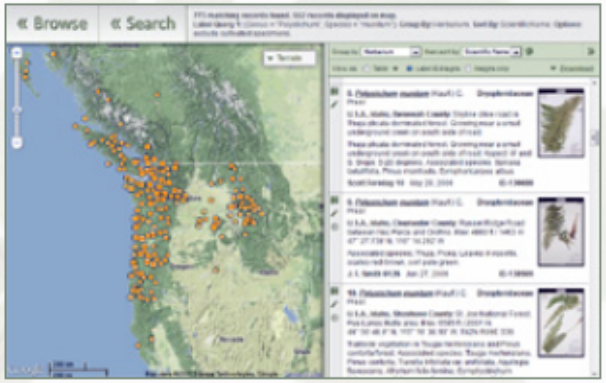
http://www.pnwherbaria.org/

Alaska
British Columbia
Idaho
Montana
Oregon
Washington
Yukon Territory

About Us

The Consortium of Pacific Northwest Herbaria was created in 2007 to bring together regional herbaria and provide an online portal to the wealth of existing and emerging information about the flora of Pacific Northwest North America. Over 3.6 million specimen records and numerous online electronic resources are managed by the region's 57 herbaria, representing an irreplacable storehouse of information for research and public education. **More**

Search the database:



Specimen Data:

Specimen Database

Search for herbarium specimens by label data or geographic location. Results show full label data, images of specimens sheets, and a distribution map. Results can also be downloaded or distilled into a species checklist.

Data for Download

Download text files containing the label data for all specimen records in the Consortium database, or for individual herbaria.

Data Providers

See which herbaria provide specimen data

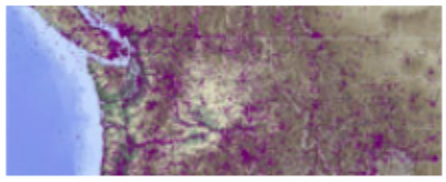
Compiled Resources:

Species Checklists by County

Create species lists for any counties in Washington, Oregon, Idaho, or Montana. Lists can include vascular plants, bryophytes, lichens, algae, and/or fungi.

Datasets for Mobile Devices

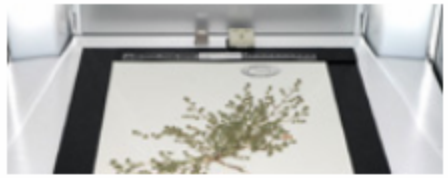
View or download pre-packaged datasets intended for use on mobile devices without an internet connection. Includes county checklists, distribution maps, and specimen label data.



Collections Coverage Maps

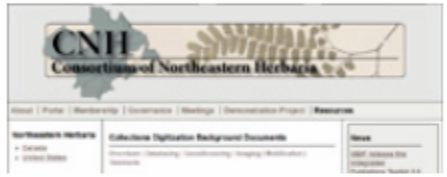
Collection dot maps for the region, and

Documentation & Links:



Specimen Imaging Documentation

Learn how CPNWH images herbarium specimens. Included are detailed descriptions of our equipment and workflows. Software scripts are available for download.



Collections Digitization Documents

A comprehensive list of documents and links relevant to digitizing biological collections, particularly herbarium specimens. Maintained by the Consortium of Northeast Herbaria.