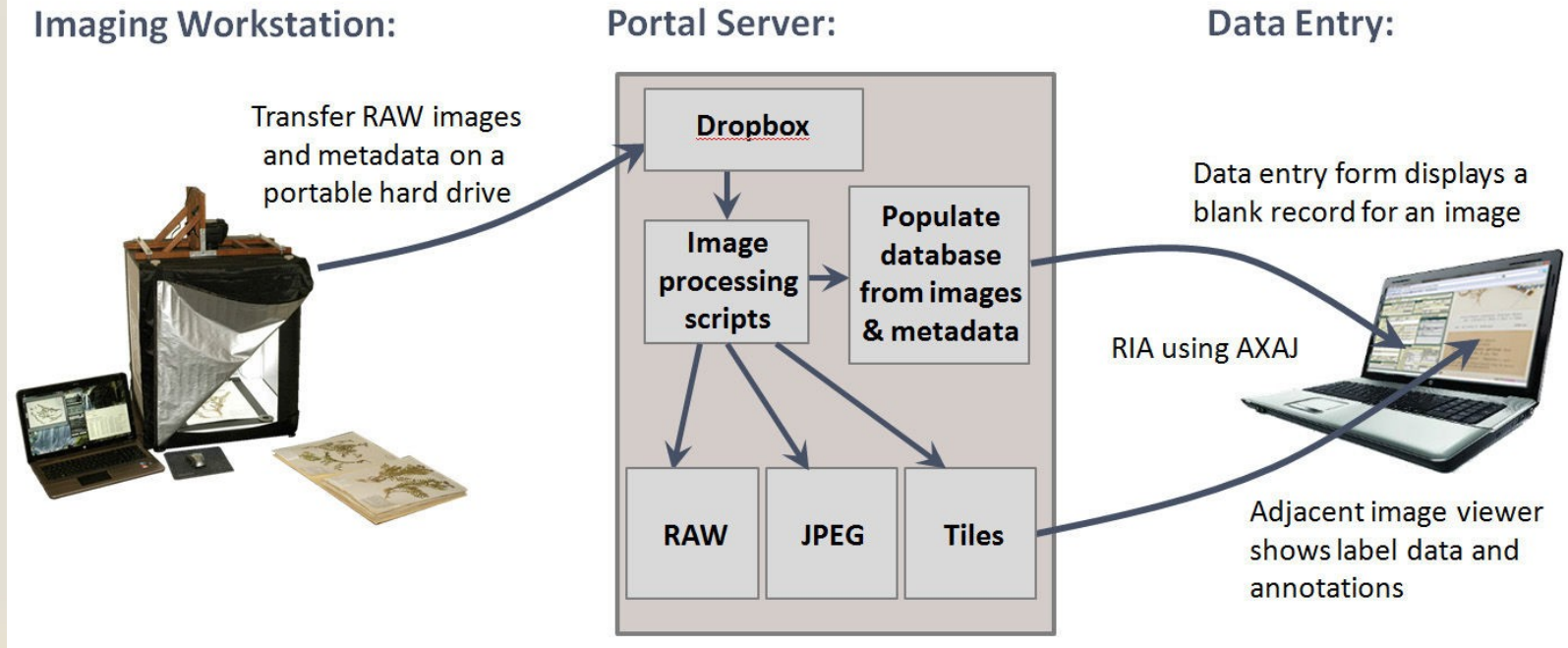


# Image Capture and Processing



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



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# Imaging Hardware and Software



- Ortery Light Box
  - \$1,800
  - [http://ortery.com/support/where to buy.php](http://ortery.com/support/where%20to%20buy.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
- Barcode scanner  
\$60.00
- Barcodes  
50,000/\$500.00
- 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

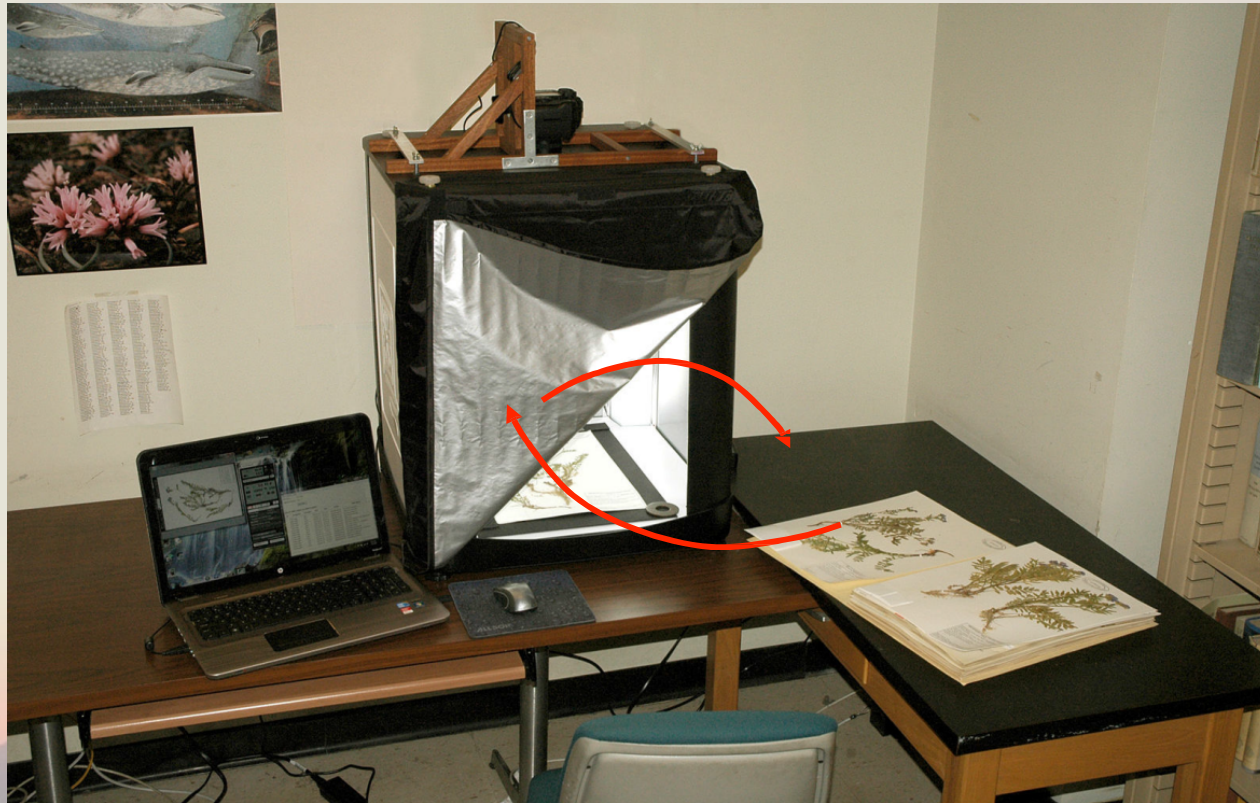
**Total Cost: approximately \$5,500**

# 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

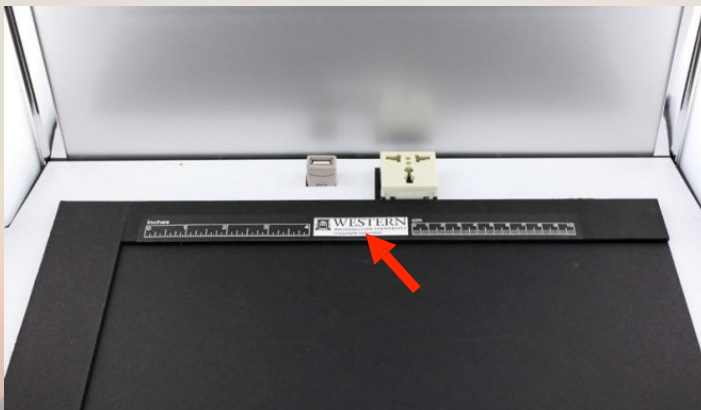
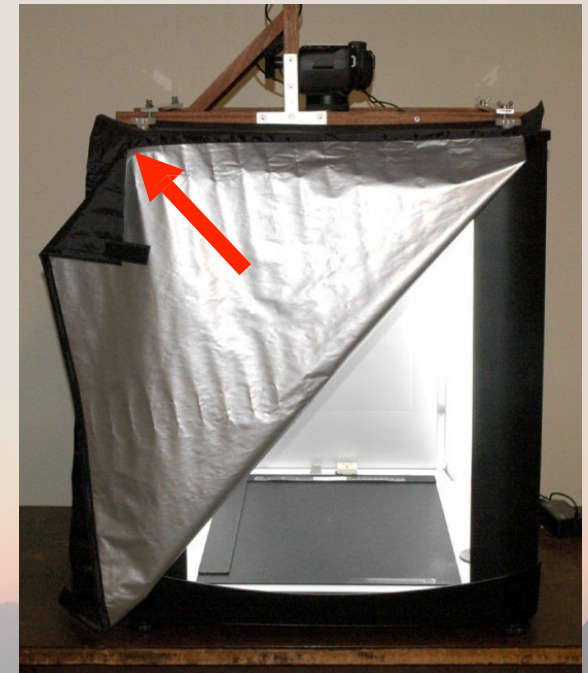


## Imaging Equipment: Light Box

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

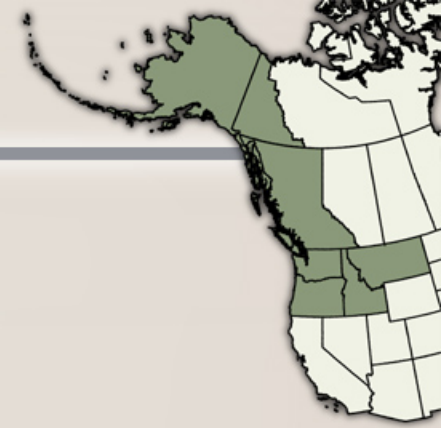


Fabric door on front of Light Box, with Velcro tabs added to allow a corner to be easily held out of the way.



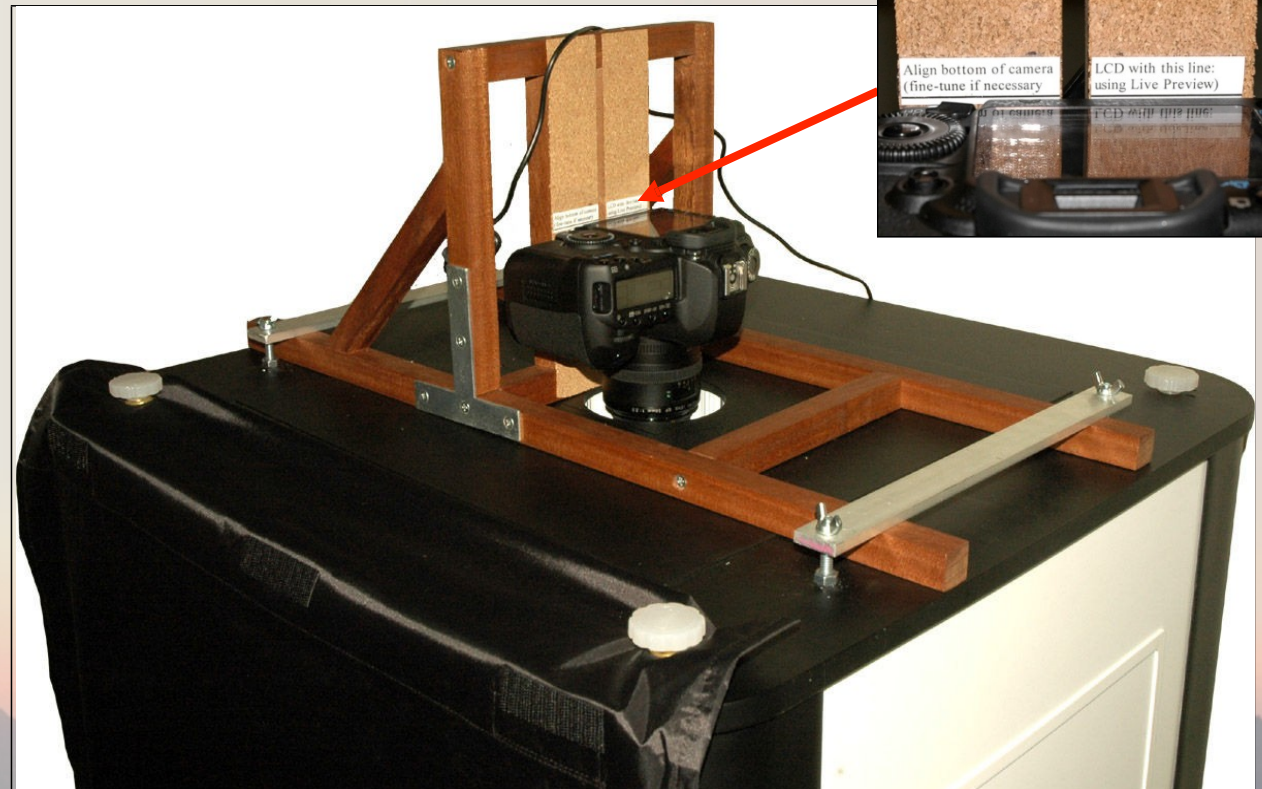
Proper position of specimen holder.

# 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



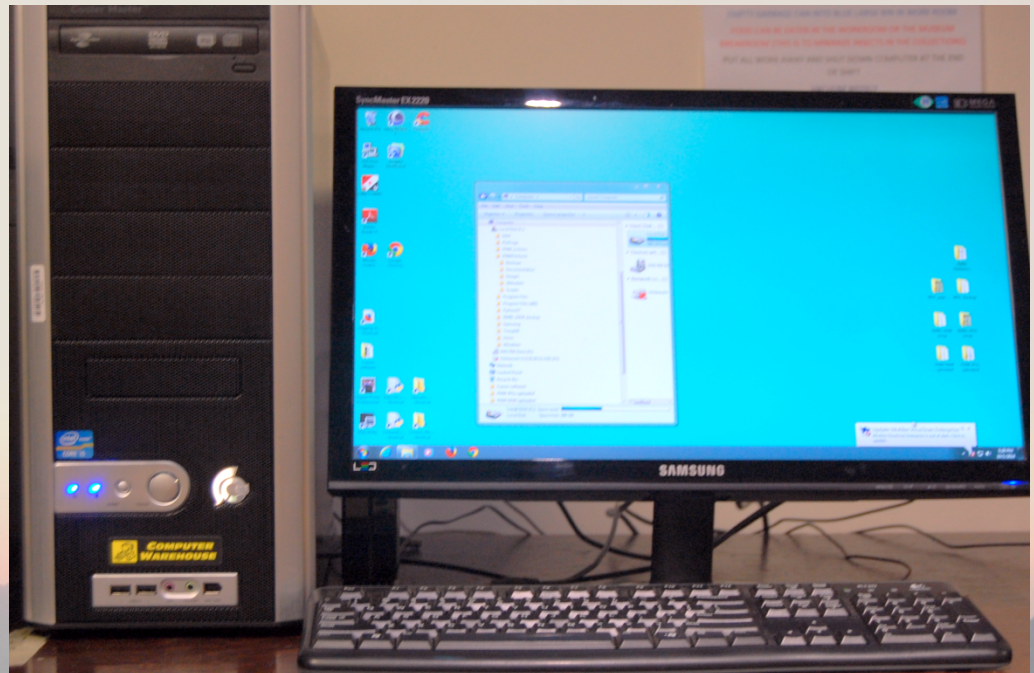
# Imaging and Databasing



## Imaging Equipment: Computer and Monitor



- Computer Intel Core i5
- Monitor Samsung 22" screen



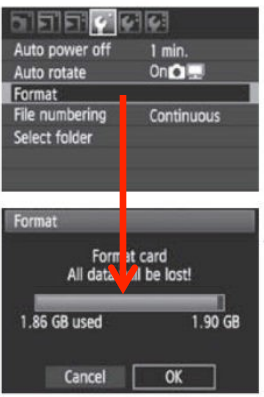
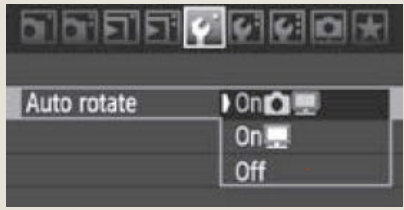
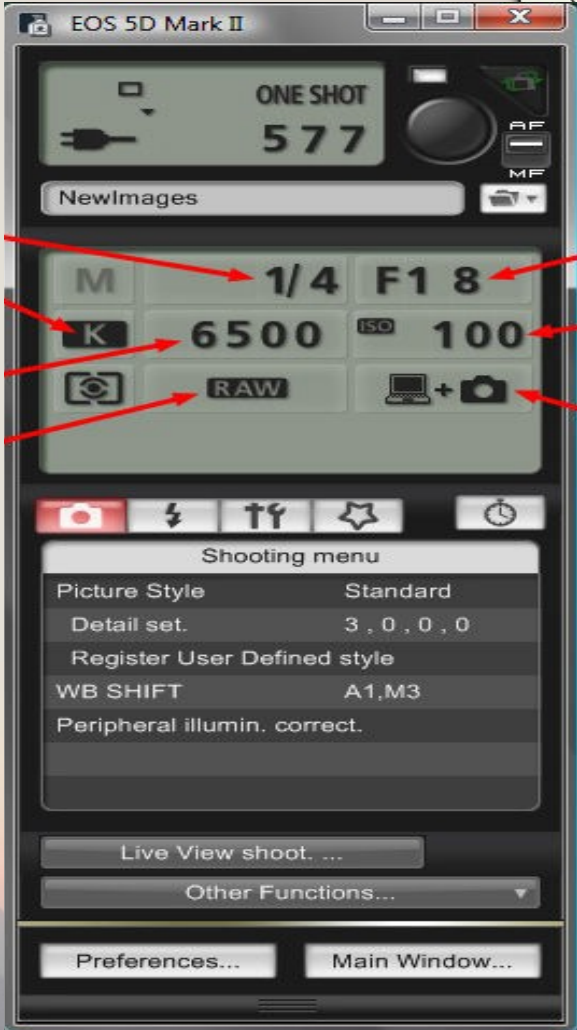
# 1. Imaging Workflow: Preparing for Imaging



- 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 [P] 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



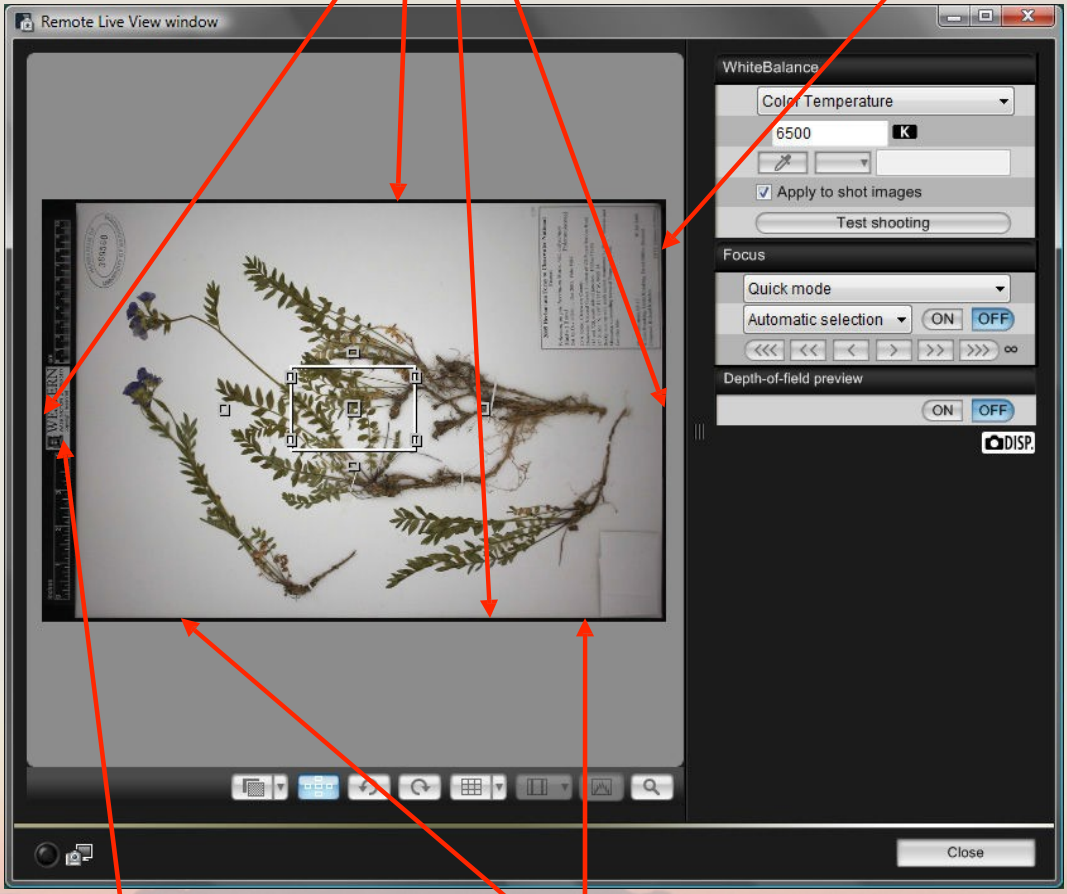
# 1. Imaging Workflow: Preparing for Imaging



## 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.



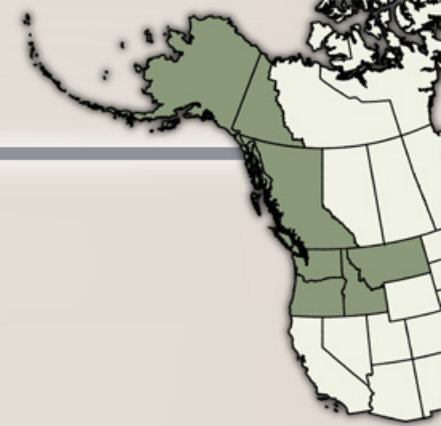
# 1. Imaging Workflow: Preparing for Imaging



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:

Collection Acronym:

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

**Add Folder Name**

Name Code:  Scientific Name:  Family:

Folder Code:

Senecio triangularis  
Senecio triangularis var. angustifolius  
Senecio tridenticulatus

Save Cancel

INSTRUCTIONS: Use the Name Code to enter a code consisting of the first 3 letters of the genus, the first 3 letters of the species, and optionally the first 3 letters of the subspecies or variety (e.g.: pinconcon for Pinus contorta var. contorta). You can also enter only the first 3 letters of a genus, or the first 3 letters of a family. Then, use the Scientific Name drop-down list to select the folder name. If the name you want doesn't appear, you can manually type it in. If the family name does not auto-fill, then enter it manually.

Image Metadata, PNW Herbaria

File Admin Help

Your name:

Collection Acronym:

Add Folder

**List of folders, in order imaged:**

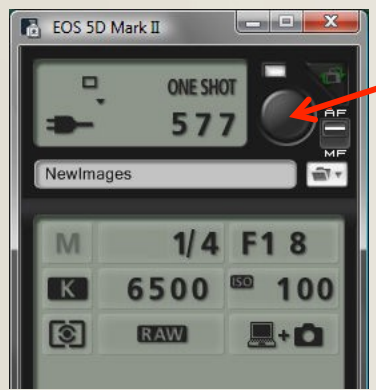
	Imaged By	Acronym	Date	Time	Family	Scientific Name	Folder Code
1	Harriet Hughes	ID	2010-10-08	10:57:01	Araceae	Arisaema	non-Idaho (cream)
2	Harriet Hughes	ID	2010-10-08	11:11:16	Araceae	Calla	non-Idaho (cream)
3	Harriet Hughes	ID	2010-10-08	11:15:46	Lemnaceae	Lemna	non-Idaho (cream)
4	Harriet Hughes	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)



# 2. Imaging Workflow: Metadata and Image Capture

## 2.2 Image capture for each folder

Proper placement of specimen sheet.



Shutter release button on the EOS utility window.

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

**Rename Image, PNW Herbaria**

Old name: IMG\_9772.CR2  
New Name:   
(don't include file extension)

INSTRUCTIONS:  
1) Double-check that the cursor is in the New Name field.  
2) Then use the barcode reader to scan the barcode.  
3) If you need to add a suffix, use the keyboard to manually edit the new name.  
4) Then click the Rename button to rename the image and close this window.

**Ray J Davis Herbarium**  
IDS0063909

**Image Metadata, PNW Herbaria**

Your name: Cole Morrison  
Collection Acronym: IDS

**List of folders, in order imaged:**

	Imaged By	Acronym	Date	Time	Family	Scientific Name	Folder Code
1	Cole Morrison	IDS	2014-10-01	12:06:43	Betulaceae	Alnus sinuata	(cream) Idaho
2	Cole Morrison	IDS	2014-10-01	12:14:18	Betulaceae	Alnus rhombifolia	(cream) Idaho
3	Cole Morrison	IDS	2014-10-01	12:15:23	Aceraceae	Acer glabrum	(cream) Idaho
4	Cole Morrison	IDS	2014-10-01	12:16:32	Betulaceae	Betula glandulosa	(cream) Idaho
5	Cole Morrison	IDS	2014-10-01	12:18:11	Salicaceae	Populus tremuloides	(cream) Idaho
6	Cole Morrison	IDS	2014-10-01	12:19:27	Brassicaceae	Boechera	(cream) Idaho
7	Cole Morrison	IDS	2014-10-01	12:20:11	Brassicaceae	Boechera retrofracta	(cream) Idaho
8	Cole Morrison	IDS	2014-10-01	12:21:26	Brassicaceae	Turritis glabra	(cream) Idaho
9	Cole Morrison	IDS	2014-10-01	12:22:05	Brassicaceae	Descurainia incana	(cream) Idaho
10	Cole Morrison	IDS	2014-10-01	12:24:34	Brassicaceae	Noccaea fendleri	(cream) Idaho
11	Cole Morrison	IDS	2014-10-01	12:25:18	Brassicaceae	Lepidium virginicum	(cream) Idaho
12	Cole Morrison	IDS	2014-10-01	12:28:14	Malvaceae	Sphaeralcea grossularifolia	(cream) Idaho
13	Cole Morrison	IDS	2014-10-01	12:28:49	Haloragaceae	Myriophyllum spicatum	(cream) Idaho
14	Cole Morrison	IDS	2014-10-01	12:29:22	Nyctaginaceae	Abronia mellifera	(cream) Idaho
15	Cole Morrison	IDS	2014-10-01	12:29:58	Onagraceae	Gayophytum decipiens	Type

**EOS 5D Mark II**

MANUAL 988  
NewImages  
M 1/5 F1 8  
K 6500 ISO 100  
RAW  
Shooting menu  
Picture Style Standard  
Detail set 3, 0, 0, 0  
Register User Defined style  
WB SHIFT A1.M3  
Peripheral illumin. correct.  
Live View shoot...  
Other Functions...  
Preferences... Main Window...

**File Explorer**

Local Disk (C:) > PNWHerbaria > Images > NewImages

Name Date modified  
IMG\_9772 10/3/2014 12:15 PM

1 item

12:15 PM 10/3/2014

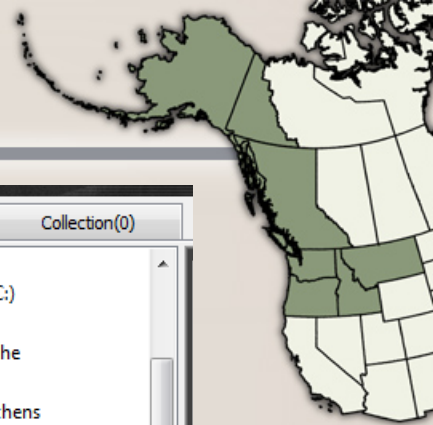
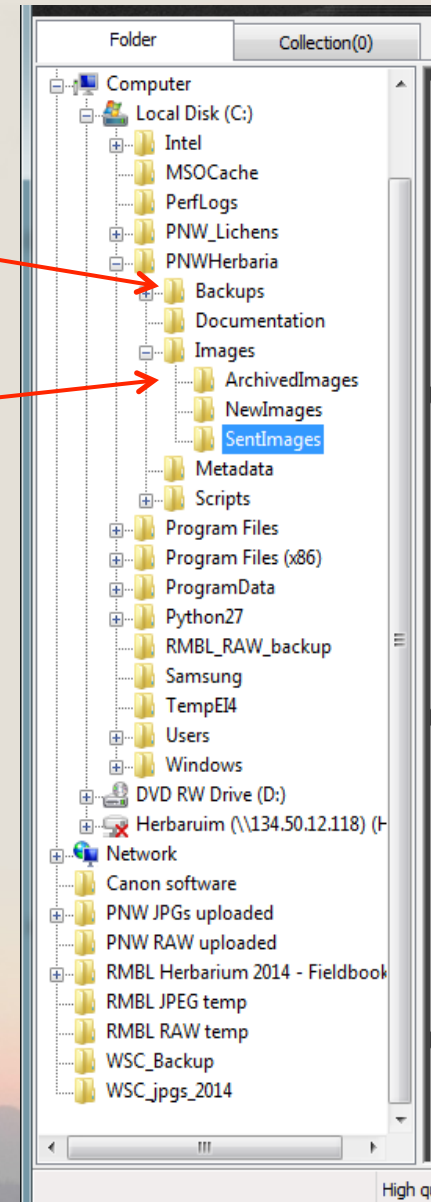
# 3. Imaging Workflow: Finishing Image Capture and Shutting Down the Imaging Workstation

## 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:

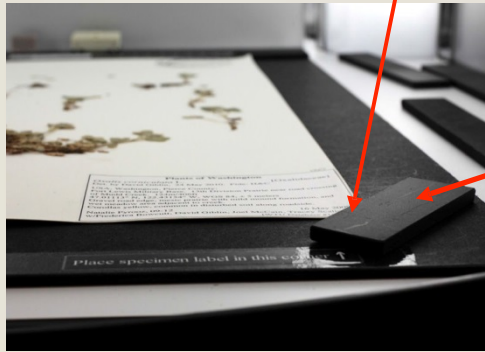
- Close metadata entry form. No need to save anything.
- Close EOS Utility window
- Turn off camera/replace lens cap
- Shut down computer



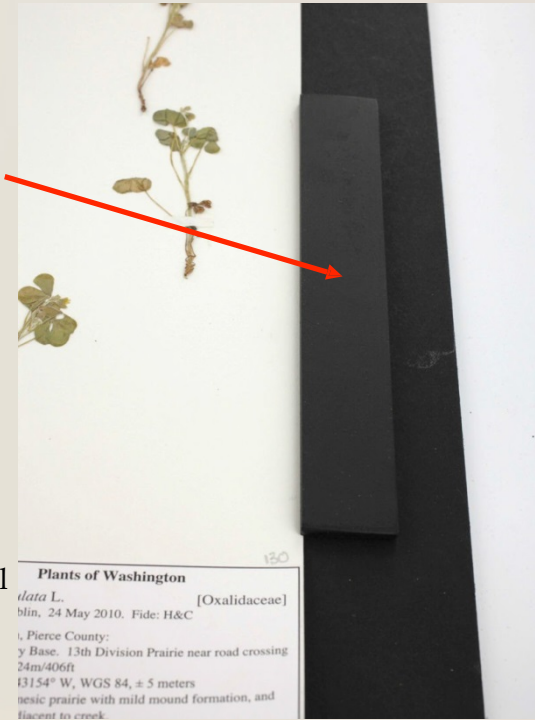
# 4. Imaging Workflow: Dealing with Problems During Image Capture



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



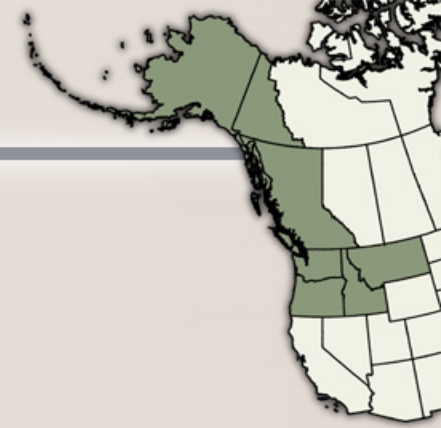
Black weight to hold down side of sheet



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



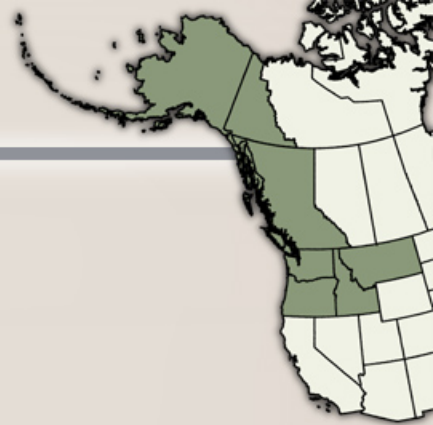
## 4.2 Specimen sheet contains a packet with plant material inside:

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



FLORA OF WASHINGTON  
COLL. BY T. R. SHREVE  
2733 THAUPOPOIN PARVIFLORUS L.  
THURSTON CO. ROADSIDE PARALLELING  
HAYWARD TRUSS 2 MILES SOUTH OF RAHIER.  
PALE PURPLE LINDLETS. 16 JUNE 1951

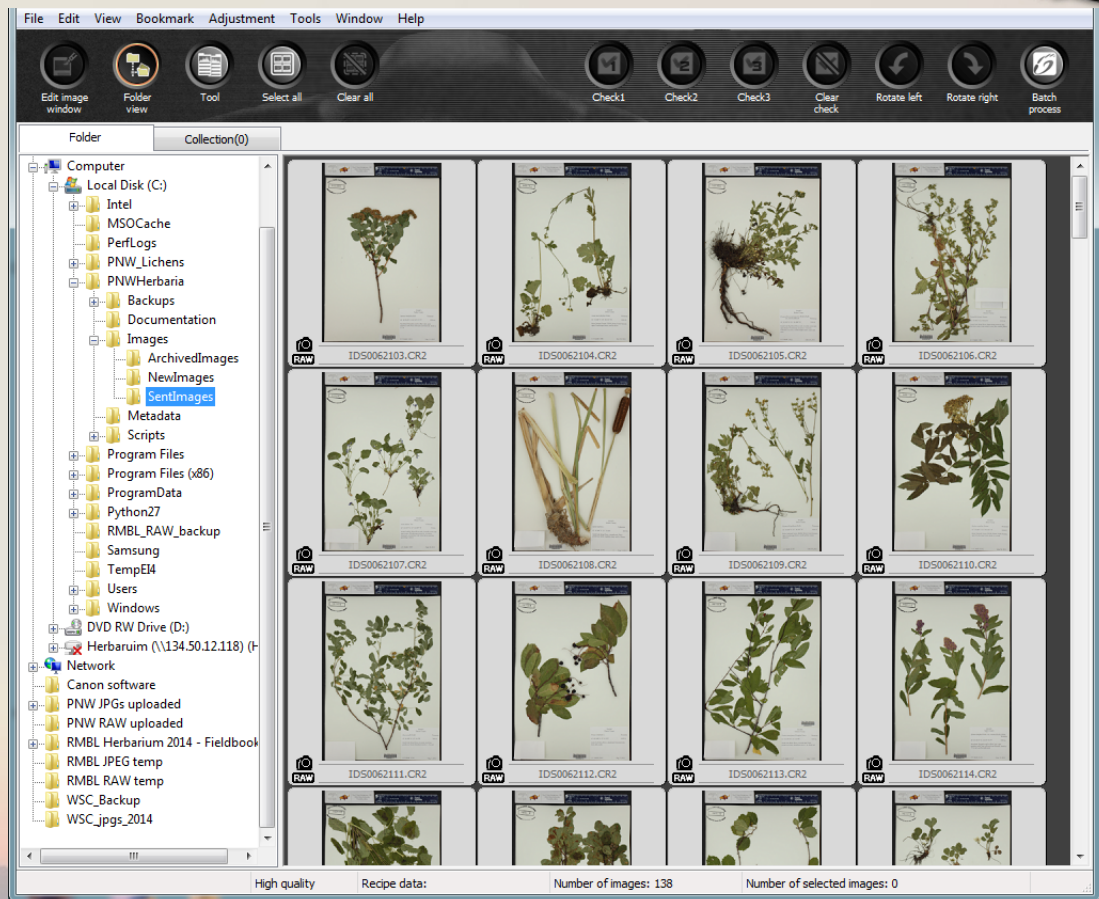
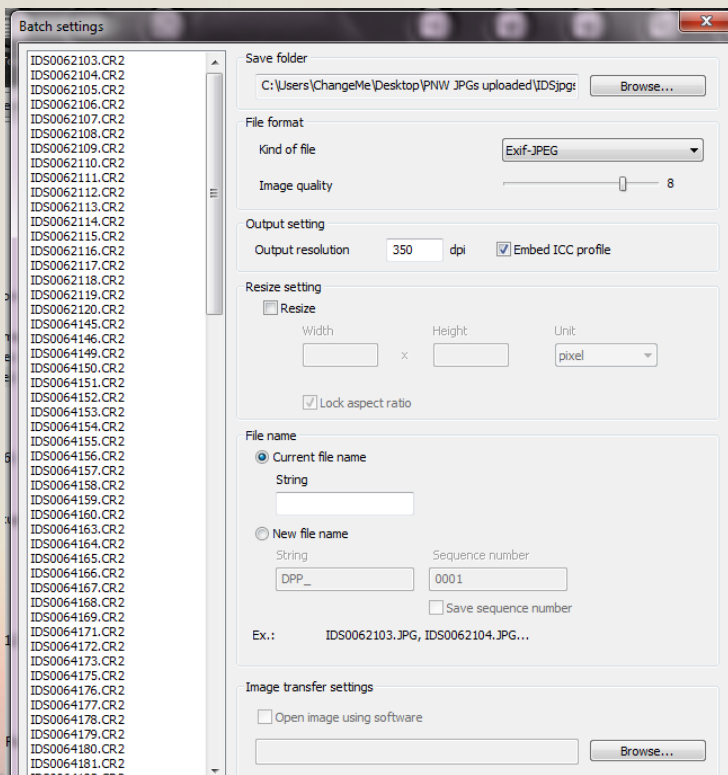




# 5. Uploading Images and Metadata to Host Portal

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)

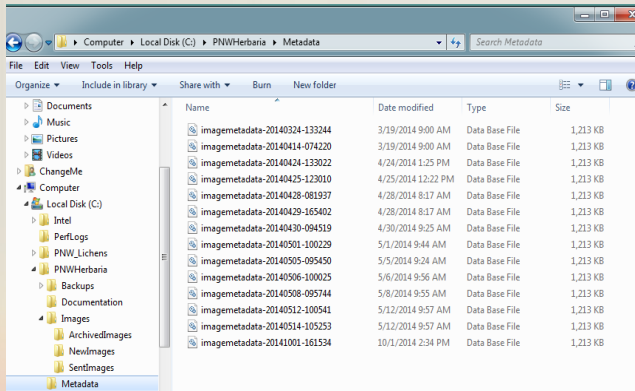
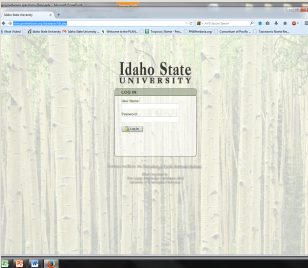




# 5. Uploading Images and Metadata to Host Portal

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

Under manage images tab:  
Link metadata and jpegs



The screenshot shows the 'Manage Images' interface of the PNW Herbaria database. The browser address bar shows [www.pnwherbaria.org/databases/ids.php](http://www.pnwherbaria.org/databases/ids.php). The page has a navigation menu with 'Data Entry', 'Labels & Reports', 'Tables', 'Queries', 'Reference Data', and 'Manage'. The 'Manage Images' section is active, showing 'Browse | Upload | Link' tabs. Below the tabs, there are instructions for uploading image files and metadata, and a grid of 8 image thumbnails. Each thumbnail has an 'Edit' and 'Delete' button. The thumbnails are labeled with IDs: 1) IDS0000001, 2) IDS0000002, 3) IDS0000003, 4) IDS0000004, 5) IDS0000005, 6) IDS0000006, 7) IDS0000007, and 8) IDS0000008. The thumbnails show various botanical specimens, including leaves and flowers.

**Idaho State University**  
Data Entry | Labels & Reports | Tables | Queries | Reference Data | Manage

**Manage Images**  
Browse | Upload | Link

**Upload Image Files and Metadata:**  
Please read the [instructions](#) first!

**Step 1. Select metadata file:**  
 No file selected.  
The metadata file is optional but recommended. It should be one of the following:  
1) A tab-delimited text file containing one row per image file, with field names in the first row.  
2) A folder metadata file (.db or .sqlite) generated from the PNW Herbaria image metadata form.

**Step 2. Link images to specimens by:**  
 Matching image name to Herbarium + Accession  
 Matching image name to Herbarium + Catalog  
 Matching image name to Barcode  
 (do not link images to specimens)

**Step 3. Assign images to Collection:**  
vascular Plants  
The Collection selected here will apply only if Collection is not defined in the metadata file.

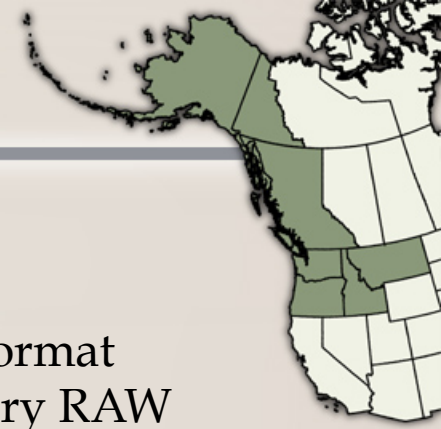
**Step 4. Upload Image Files:**  
  
Only JPEG images can be uploaded through this interface. RAW images must first be batch-converted to JPEG.

1 of 63931 | Form View | New | Duplicate | Delete | Find | Sort | Replace | Export

Viewing images 1 - 50 of 63931

1) IDS0000001 | 2) IDS0000002 | 3) IDS0000003 | 4) IDS0000004  
5) IDS0000005 | 6) IDS0000006 | 7) IDS0000007 | 8) IDS0000008

# 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	(For comparison, an 8-bit TIFF with LZW compression is larger than the DNG, JPEG, and tiles combined)
JPEG	2.2 Terabytes	
Tiles	1.1 Terabytes	
<b>TOTAL</b>	<b>10.1 Terabytes</b>	

(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.

**Idaho State UNIVERSITY** | Data Entry | Labels & Reports | Tables | Queries | Reference Data | Manage

Log out | Help | Janet Bala (administrator)

Specimen Data Entry | 1 of 1579 | New | New From Image | Duplicate | Delete | Print | Find | Sort | Replace | Import | Export | Refresh | View SQL

Record ID: 5746 | Status: verified | Databasing Project: C.F. Williams Catalog | Tags: | # of Duplicates: 10

Herbarium: DS | Collection: Vascular Plants | Label Header: Ray J. Davis Herbarium, Pocatello (IDS)

Accession: 2012.005 | Catalog: | Barcode: DS0024774 | Label Footer: | Other #s: | Dups: | Add/Edit Annotations

Family: Liliaceae | Accepted Name: Erythronium grandiflorum

Code: | Name: | Name Qualifier & Position: | Add Name

Identified As: erygra | Erythronium grandiflorum | Edit Name

Last Name: | Full Name: | Collector: Williams = Charles F. Williams | Coll. #: 2010-0001 | Day: 13 | Month: May | Year: 2010 | Verbatim Date: 5/13/2010

Coll. With: Janet Bala

Site #: | Site Lookup... | Find Matching Sites | Dupl. from Skeletal

Country: | State or Province: | County: | Political: U.S.A. | Idaho | Bannock

Locality: Inkom, 5 mi. S on Marsh Creek Rd. to Walker Creek Road, then 4 mi. W to Walker Creek trailhead, Caribou National Forest. Approx. 1/2 mi. SW on trail from trailhead and up ridgeline N of trail.

Elevation: Min. 6060 | Max. | Unit: ft. | USGS | UTM | Zone: | Easting: | Northing: | TRS/PLSS: T8S R35E S14 SE 1/4 SE 1/4

Latitude: 42.718575 | Longitude: 112.323217 | Degrees: | Minutes: | Seconds: | Additional Lat/Lng: | Site Description or Habitat: Moist, rocky, east facing slope. Douglas Fir/Aspen Forest at base of slope; sparse Aspen stand above. Glacier Lily, Spring Beauty, Waterleaf in bloom.

Specimen Notes: Some large multi-flowered stalks. Population is polymorphic for yellow and red pollen (anthers) Population in full bloom. Very common.

Phenology: | Origin: | Flowers: | Cultivated: | Type Specimen: | Add/Edit Types

Latitude: | Longitude: | Uncertainty: | Datum: | Sources: | Georef. By: | Georef. On: | Site Georef: 42.718575 | -112.323217 | 30 | m. | WGS 84 | Garmin eTrex Vista

Specimen Georef: | Remarks: | Copy Georef. to Matching Sites

Created By: Charles F. Williams | On: 2012-12-24 07:59:00 | Allow record online | Use Field Notes mode for data entry

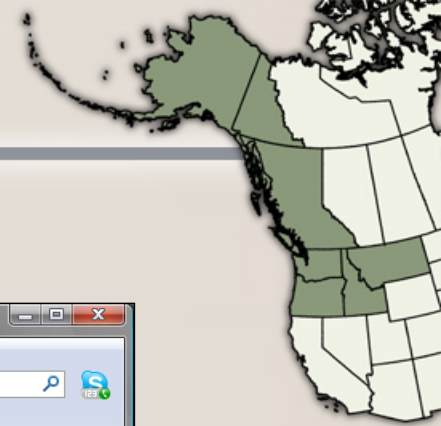
Modified By: Charles F. Williams | On: 2013-12-04 14:04:16 | Allow locality online

Images | Documents | Map | Browse | Show Thumbnails | Hide Image Viewer | Upload Images | 1 image attached

Ray J. Davis Herbarium, Pocatello (IDS)  
IDaho, U.S.A.  
*Erythronium grandiflorum* Pursh  
Bannock County  
Inkom, 5 mi. S on Marsh Creek Rd. to Walker Creek Road, then 4 mi. W to Walker Creek trailhead, Caribou National Forest. Approx. 1/2 mi. SW on trail from trailhead and up ridgeline N of trail.  
Elevation: 6060 - 112.323217  
Date: 13 May 2010  
Collector: Williams, Charles F.  
Coll. #: 2010-0001  
Barcode: DS0024774  
13 MAY 2010  
Janet Bala

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# Imaging and Databasing



## Specimen Image Viewer

WTU000223 - Consortium of Pacific Northwest Herbaria - Mozilla Firefox

File Edit View History Bookmarks Tools Help



http://localhost/pnwherbaria/portal/gmapviewer.php?Image=WTU000223

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WTU000223:



HERBARIUM  
86571  
University of Washington

*Chrysothamnus nauseosus* (Pall.) Britton,  
var. *alticola* (Gray) Hall & Clun.

Det. by Loran C. Anderson 1980-81

PLANTS OF OREGON  
Judson Clifton  
1269. *Chrysothamnus aureus* Nutt.  
Trask Arb. Publ. No. T-212. 1926  
A. A. Heller collector September 2, 1978  
North slope of Mt. Hood, 10,000 feet, along the highway  
near the north peak of Mt. Hood, 10,000 feet.

POWERED BY Google

DATABASED

WTU Herbarium Terms of Use

Done

# Consortium of Pacific Northwest Herbaria

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

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Member Herbaria

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Documentation

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## Herbarium specimens from the Pacific Northwest

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

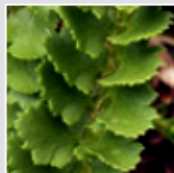
<http://www.pnwherbaria.org/>

Alaska  
British Columbia  
Idaho  
Montana  
Oregon  
Washington  
Yukon Territory



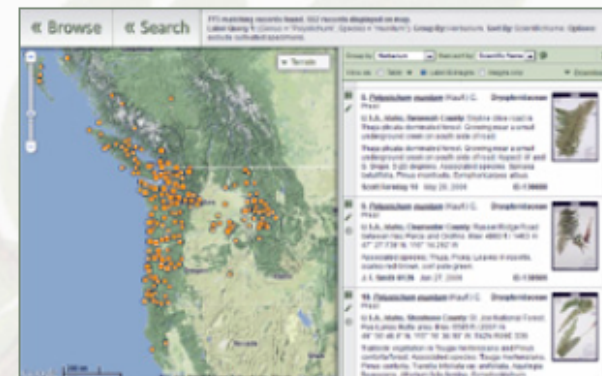
## About Us

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 irreplaceable storehouse of information for research and public education. [More](#)



*Polystichum kruckebergii*

## 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.

A screenshot of a table displaying specimen records. The table has multiple columns, including specimen ID, date, location, and collector information. The data is organized in a grid format.

### Data for Download

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

Code	Provider	# Specimens Hosted
BARF	B. A. Bennett Herbarium, Nelson Government	7,720
HALEF	H.L. Auldman Experimental Forest	1,313
MSUT	Montana State University	54,450
OSU	Oregon State University	127,610
PLU	Pacific Lutheran University	8,303
NEED	NEED College	6,420
V	Royal British Columbia Botanic	90,130
NY	The New York Botanical Garden	83,330
UAF	University of Alaska, Fairbanks - Research of the North	121,820

### Data Providers

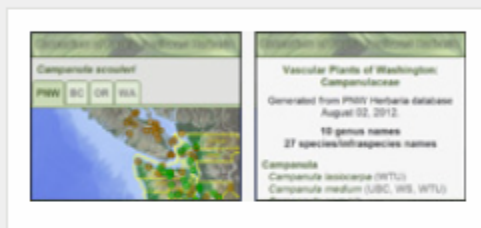
See which herbaria provide specimen data

## Compiled Resources:



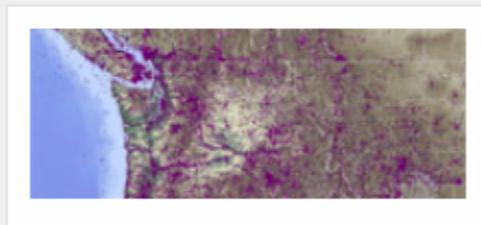
### Species Checklists by County

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.

