Using Field Station Natural History Collections for Research and Education

Rick Williams
Rocky Mountain Biological Laboratory, and
Idaho Museum of Natural History
Collections at RMBL

- Plants – ca. 13000 Vascular Plants
  - 6000 at RMBL plus 7000 at WSCU
  - Few lichens and bryophytes
- Insects – ca. 5000
  - Including bees, leps, aquatics
- Mammals – ca. 500 skins and skulls
- Birds – ca. 50 skins
- Algae/Diatoms – slides, stream sampling
- Pollen – reference collection slides
- Field Notes, Catalogs, Data Archives, Photos
History of RMBL Collections

• Laboratory Founded in 1928
  – High altitude research and education mission
• Herbarium started 1929
  – Harriet and B.D. Barclay – University of Tulsa
• Mammal and Insect Collections from 1940s
• Physical collections used for teaching/reference
• Herbarium digitized 2005-2006
• Herbarium Database integrated with SEINet 2011
• Herbarium Imaged 2012 with annual updates
• RMBL bees/host plants digitized in ca. 2012
  – hosted by AMNH/Discover Life
• Added WSC (Gunnison) Herbarium data/images in 2015
How are RMBL Collections Used?

- Teaching and Reference – Physical and Digital
- Document Diversity and Distribution – Checklists
- Identify Potential Field Sites - Mapping
- Characterize Change over Time - Resurvey
  - Bee elevational distributions/community composition
  - Bees and host plants
  - Appearance of “invasive” species - *Didymosphenia geminata*
  - Isotopic analysis of fossil and extant mammal diets
  - Plant phenology and community changes
Jean Langenheim – Stephanie Zorio
Changes in Plant Communities 1949-2014
Long-term shifts in the phenology of rare and endemic Rocky Mountain plants

Seth M. Munson and Anna A. Sher

May 30th, 1921

April 28th, 1981

Figure 1: Herbarium specimens of Rocky Mountain flora showing that more recent flowering dates occur earlier in the year compared to historical flowering dates. Photo credit: Scott Dressel-Martin, Denver Botanic Gardens.

May 22, 1892

April 15, 2004

Graph: Flowering date (Day of year) vs. Year

Sagebrush Regression

Barren River Regression

Alpine

Sagebrush

Barren River
Advantages of Collection Digitization

1. Digital Curation

- Online Data Transcription from image
- Online IDs and Annotation
- Links to images and other resources

Upload to Regional Database/Website – www.intermountainbiota.org
2. Searches, Dynamic Lists and Maps

Searches by taxon, locality, elevation, date, collector, etc.

Search data from single collection, or aggregate data from many collections.
Create Distribution Maps and Associated Specimen Data

Enter Search Parameters

Fill in one or more of the following query criteria and click “Search” to view your results.

**Taxonomic Criteria:**
- Include Synonyms from Taxonomic Treasures
- Family or Scientific Name: *Polemonium viscosum*

**Locality Criteria:**
- Country:
- State/Province: Colorado
- County: Gunnison
- Locality: Gunnison
- Elevation: to

Intermountain Region Herbarium Network
Create taxon lists for any geographic radius or polygon

Get species descriptions for any taxon on list
3. Digital Field Guides and Keys

Create Static or Dynamic Checklists for a Region
3. Digital Field Guides and Keys

Display taxa as a list or as images
3. Digital Field Guides and Keys

Click on Image for Species Page

Create Key for Listed Taxa
3. Digital Field Guides and Keys

Filter List by Taxon

- Adoxaceae
  - Adoxa noschellina
  - Sambucus racemosa
- Amaranthaceae
  - Blitum virgatum
  - Chenopodium album
  - Chenopodium atrorubens
  - Chenopodium berlandieri
  - Chenopodium capitatum
  - Chenopodium fremontii
  - Monolepis nuttalliana
- Amaryllidaceae
  - Allium brandegeei
  - Allium cernuum
  - Allium geyeri
- Apiaceae
  - Angelica ampha
  - Angelica grayi
  - Carum carvi
  - Conioselinum scopulorum
  - Conium maculatum
  - Heracleum maximum
  - Heracleum ophryoides
  - Ligusticum porteri
  - Ligusticum tenuifolium
  - Lomatium bicolor
  - Lomatium dissectum
  - Lomatium simplex
  - Creois alpina
### 3. Digital Field Guides and Keys

#### Intermountain Region

Herbarium Network

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**CIRH Homepage**

- Search Collections
- Image Library
- Plant Games
- Links

**Flora Projects**

- Regional Floras
- Colorado Floras
- Utah Floras
- Colorado Plateau
- Teaching Checklists

**Dynamic Tools**

- Dynamic Checklist
- Dynamic Key

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**Taxon:**

- All Species
  - Select a Taxonomic Group: All Species

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**Rocky Mountain Biological Lab**

- Rick Williams
- Species Count: 777

**Aceraceae**

- Adoxa moscheata
- Sambucus racemosa

**Amaranthaceae**

- Blium virgatum
- Chenopodium album
- Chenopodium stenophyllum
- Chenopodium berlandieri
- Chenopodium capitatum
- Chenopodium fremontii
- Monolepis nuttiliana

**Amaryllidaceae**

- Allium bradleyi
- Allium cernuum
- Allium geyeri

**Apiaceae**

- Angelica amara
- Angelica grayi
- Carum carvi
- Conioselinum scopulorum
- Conium maculatum
- Heracleum maximum
- Heracleum sphondylium
- Ligusticum porteri
- Ligusticum tenufolium
- Lomatium bicolor
- Lomatium dissectum
- Lomatium simplex
- Oreoxys alpina

**Leaves**

- **Type**
  - simple
  - pinnatifid-pinnatisect
- **Compound arrangement**
  - alternate
  - opposite
  - whorled
  - basal
  - fascicled-clustered along stem
Idaho Wildflowers App

The Idaho Wildflowers, a plant identification app for smartphones and tablets, provides images, species descriptions, range maps, bloom period, and technical descriptions for more than 805 common wildflowers, shrubs, and vines that occur in Idaho and adjacent areas of Montana, Washington, Utah, and Oregon. Costs $7.99

Designed for both budding wildflower enthusiasts and experienced experts, Idaho Wildflowers will appeal to individuals who travel to wildflower areas and are interested in knowing the names and natural history of the plants that they encounter. Idaho and its adjacent areas are home to diverse landscapes containing a wealth of wildflowers, shrubs, and vines. Idaho Wildflowers is also a great educational tool for learning more about plant communities, botanical terms, and how to identify plants in general.

Sample Images

A collaboration of the University of Washington Herbarium at the Burke Museum has partnered with the University of Idaho’s Stillinger Herbarium, Idaho Museum of Natural History’s Ray J. Davis Herbarium at Idaho State University, Mark Turner, and High Country Apps.

Visit www.highcountryapps.com or scan the QR code.
4. Citizen Science and Data Collection

Photo-voucherized General Observations
4. Citizen Science and Data Collection

[Image: A screenshot of an online portal for citizen science data collection, showing a specimen observation page with details about an Epicobitis gigantea plant, including its taxon, family, collector, date, locality, habitat, associated species, description, phenotype, and notes.]

[Image: The Specimens & Observations section of the portal, showing various collection names and options.]
4. Citizen Science and Data Collection
Herbarium specimens from the Pacific Northwest
1,871,131 specimen records and 290,407 images from 20 herbaria.

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

www.PNWHerbaria.org
Collect Georeferenced and Photo-vouchered Occurrence Data on Phones or Pads

PHENOLOGY DATA OVERVIEW

Phenology data are already supporting science and helping natural resource managers and public officials make decisions about how to prepare for and cope with the rapid changes occurring across the nation.

YOU CAN...
- Get a snapshot of the data in our National Phenology Database.
- Explore the data collected via Nature’s Notebook with our interactive visualization tool.
- Download the data collected via Nature’s Notebook.
- Search for other phenology data sets.
- Share existing data.