

Rocky Mountain Herbarium

Jan 2015

Summary

Ronald L. Hartman
Curator, Professor of Botany
B. Ernie Nelson
Collections Manager

The Rocky Mountain Herbarium (RM, 1893) with the integrated National Herbarium of the U.S. Forest Service (USFS, 1911) and the associated Wilhelm G. Solheim Mycological Herbarium (RMS; 1929) contains the world's largest assemblage of plants and fungi from the greater Rocky Mountain region. It contains more than 1,260,000 plant specimens and ranks 15th in the nation of 641 herbaria.

The staff of the RM have developed a philosophy to aggressively inventory the flora of the Rocky Mountains and adjacent plains and basins. This region was vastly under-collected and many roadless areas had not been botanized. Such areas are remote and often requiring hikes of 10 to 25+ miles, although many others are easily reached by vehicle yet remain unexplored. The result has been a relatively “fine grain” sampling in order to capture, based on voucher specimens, species distributions as a whole. In addition, genotypic/phenotypic variation and ecological differentiation are documented. Impressive, yet not excessive, numbers of collections per unit area (~5 specimens/mi²) have been obtained. The development of new tools through the decades that place broad-scale floristics into an interdisciplinary framework with biogeography, ecology, and land management is fortuitous. These include computer hardware and software advances, informatics, the Internet, website development, GIS applications, and molecular systematics.

In 1978, the RM initiated this major floristic inventory of the greater Rocky Mountain region. The inventory now is the largest program of its kind in the annals of North American botany and, arguably, temperate Northern Hemisphere. More than 63 (50 by MS students) major floristic studies have been completed and 640,000 new collections have been obtained for the Flora of the Rocky Mountains project (13 states; Figs. 1, 2).

The projects completed during the 1990s in Colorado, Idaho, Utah, Washington, and Wyoming resulted in the inventory of 79,391 mi². Most importantly, **414 different species of conservation concern were documented at 1,459 sites**, most of these sites of occurrence were new. Additionally, projects completed during the first decade of the 2000s in Arizona, Colorado, Idaho, Kansas, Montana, Nebraska, New Mexico, Oregon, South Dakota, Washington, and Wyoming resulted in the inventory of 89,363 mi² of mostly state and federal lands. During this period, **430 different plant species of conservation concern were documented at 1,678 sites**. As many of the taxa collected during the 1990s had been removed from Natural Heritage lists prior to 2000, this is even more remarkable.

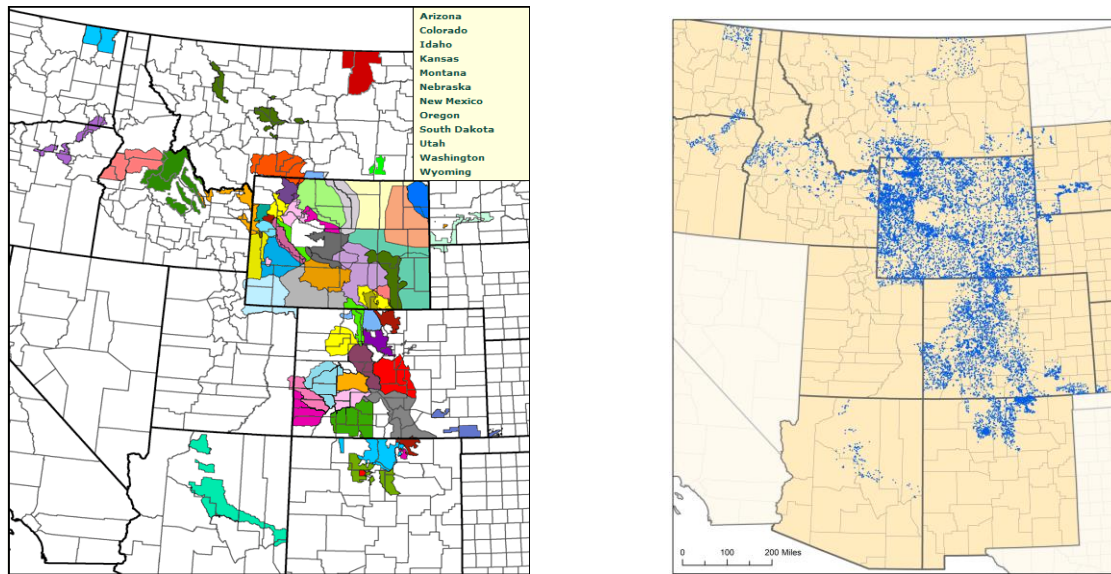
In 1991, the RM Plant Specimen Database was initiated. Currently it serves over 850,000 specimen records, 140,000 specimen images, and over 4,000 vouchered field photographs (www.rmh.uwyo.edu). Recently, the database has been rebuilt using MySQL. The new web interface is among the best in the field. We have a memorandum of understanding with UW Library (Imaging Lab, Digital Collections, and Systems Department) for housing and maintaining the website and database.

Since 2000, the RM has received six NSF grants in collaboration with regional and national herbaria for databasing projects (including mosses and micro-/macrofungi). Thus, since 1997, more than \$1,670,000 (little or no overhead) from 84 cost-share agreements with the USFS, BLM, NPS, NRCS, and USFWS have been acquired for inventory, specimen processing, databasing, imaging, and curation. Several of the recent ones are in collaboration with Larry Schmidt, UW Library.

- Databasing/georeferencing of ~30,000 specimens of vascular plant species from Arizona and New Mexico at RM. This complements data acquisition on ~45,000 recent collections from north central New Mexico (five projects funded separately by USFS, BLM, and Ted Turner Ranch) and 6,500 collections from selected areas in Arizona (USFS).
- The databasing of 18,000 specimens from BLM lands in Wyoming.

- The imaging/databasing of the 6,500 specimens in the Grand Teton National Park herbarium (funded by UW/NPS; www-lib.uwyo.edu/digitalherbaria/public). Likewise the processing/imaging of 8,002 collections obtained recently in the Park. We have completed the imaging of herbaria at Bandelier National Monument and the Black Hills cluster: Devils Tower, Jewel Cave, Wind Cave, Mount Rushmore. The latter group of herbaria were databased by Mark Gable, Black Hills State University. We are imaging NPS herbaria in the Northern Great Plains Inventory and Monitoring Network.
- The processing/imaging of 55,924 specimens from recent inventories on Shoshone NF.
- The databasing of RM specimens from the Missouri Plateau (eight of 23 counties in Wyoming and major portions of Montana, the Dakotas, and northern Nebraska) funded by NSF through Black Hills State).
- Imaging/databasing ~5,900 nomenclatural type specimens at RM, funded by Andrew W. Mellon Foundation. [A type specimen is one on which the description of a species new to science is based; they are critical to understanding the circumscription of a species.]
- Imaging the herbaria of Yellowstone NP (~10,000 specimens), Bighorn Canyon National Recreation Area, Teton Science School, Casper College, NRCS, USFS, and BLM offices in Pinedale, and Fort Laramie Historic Site.

Additionally, two collaborative NSF proposals have been submitted, one for databasing and imaging of specimens from the Southern Rockies, and one for a national archive for specimen images.



Left figure – Map of study areas where intensive inventories have been conducted by students and staff of the RM. The number of collections range from 8,000 to 20,000 per project. Additionally, Phillips County to the west of Valley County (red), northeastern Montana, was included in the study. Projects not shown include two in western Colorado (W Central Colorado and White River National Forest), Beaverhead NF, Montana, Selway-Bitterroot Wilderness, Idaho, and Clearwater NF, Idaho.

Right figure – This is a detailed map of all collecting sites associated with the botanical inventory conducted between 1978 and 2010. In most cases, a dot represents 50-150+ collections.