Digitizing and Imaging Local Herbaria to Improve Accessibility

Erin Lonergan[1] and Tom Engstrom[2]

[1] Klamath National Forest, 1711 South Main Street, Yreka, California, 96097

[2] Sierra Pacific Industries, 19794 Riverside Avenue, Anderson, CA 96007

INTRODUCTION

There are numerous local herbaria scattered throughout northern California. Generally, these collections are relatively small, lack duplicate accessions that can be distributed to larger institutions, and are infrequently maintained. With the advent of digital information storage and the internet, it is now possible to unlock the botanical information in these collections. Klamath National Forest and Sierra Pacific Industries botanists are leading an effort to digitally image plant specimens, transcribe label information into a database, and upload the information via the North American Network of Small Herbaria, nansh.org. Users will be able to view quality images of plants, zoom in to see morphological details, better understand species ranges, and determine localized flowering times.

MATERIALS

- Kaiser RSX copy stand
- Kaiser RTX arm
- Nikon D610 DSLR
- Nikon AF-S Micro Nikkor 60mm lens
- Kaiser RB 5000 daylight copy lights with 5400K fluorescent tubes
- Camera Control Pro 2 software
- Capture NX2 software
- Code 39 barcodes printed on acid free paper
- Unitech scanner
- Color check
- Scale bar

METHODS

PREPARATION

Prior to imaging and digitization, herbaria are registered with Index Herbariorum. Specimens are annotated and barcodes are applied. Images are named using the barcode ID which provides a unique identifier linked to label information.

EQUIPMENT SETUP

Images are captured using a Nikon D610 DSLR camera with a Nikon AF-S Micro Nikkor 60mm lens attached to a Kaiser RTX arm on a Kaiser RSX copy stand. Two Kaiser RB 5000 daylight copy lights with 5400K fluorescent tubes illuminate the images.

IMAGE CAPTURE

Images are taken remotely using Camera Control Pro 2 software. Photo quality was found to be the highest using an aperture of 60 and f-stop 10. Camera settings and focusing are done remotely using the software.
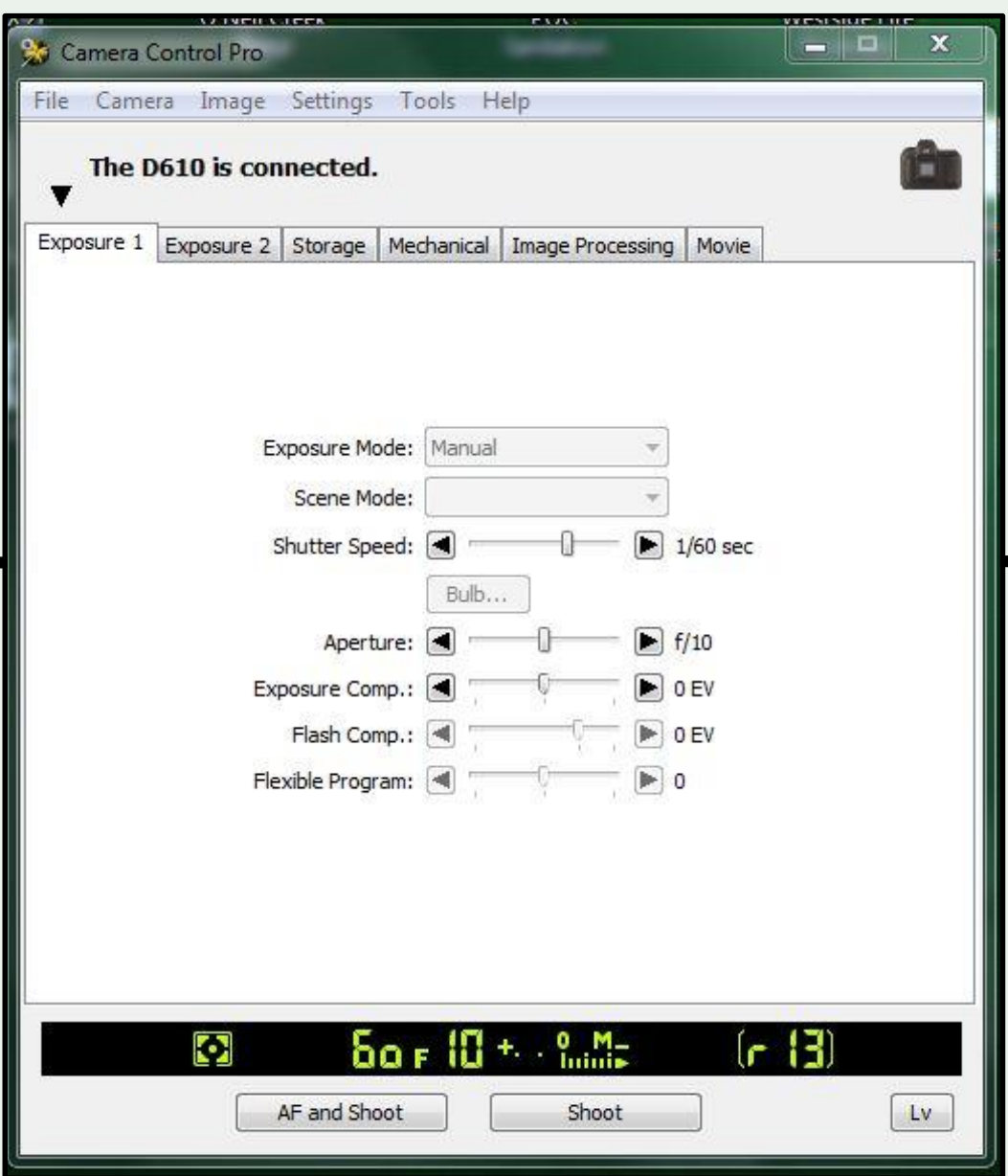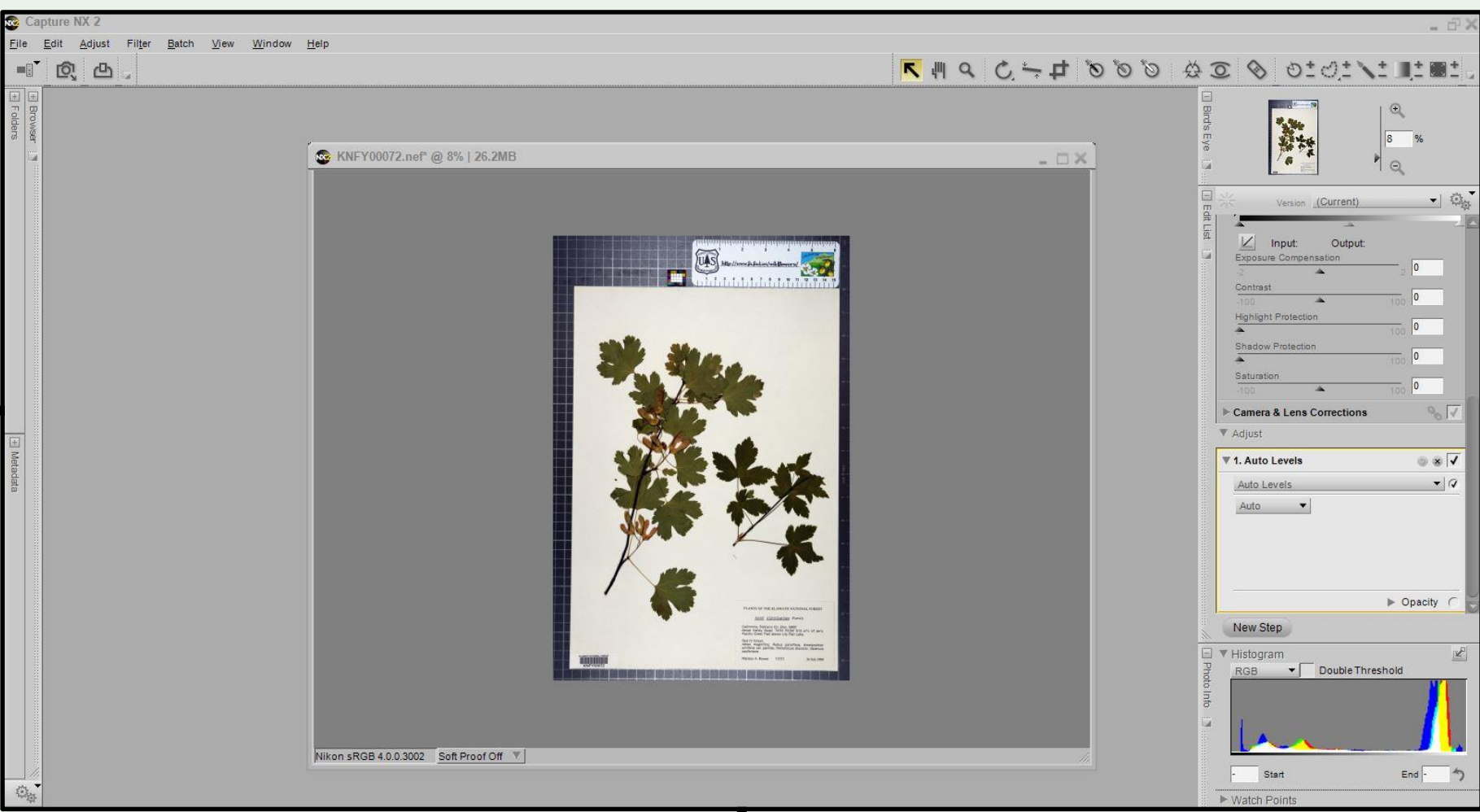
IMAGE EDITING

Lighting conditions affect the color of captured objects. Capture NX2 software is used to adjust the white balance by removing unrealistic color casts and taking into account the "color temperature" of the light source. This software is also used to compress and convert the image into a JPEG from a raw NEF file.
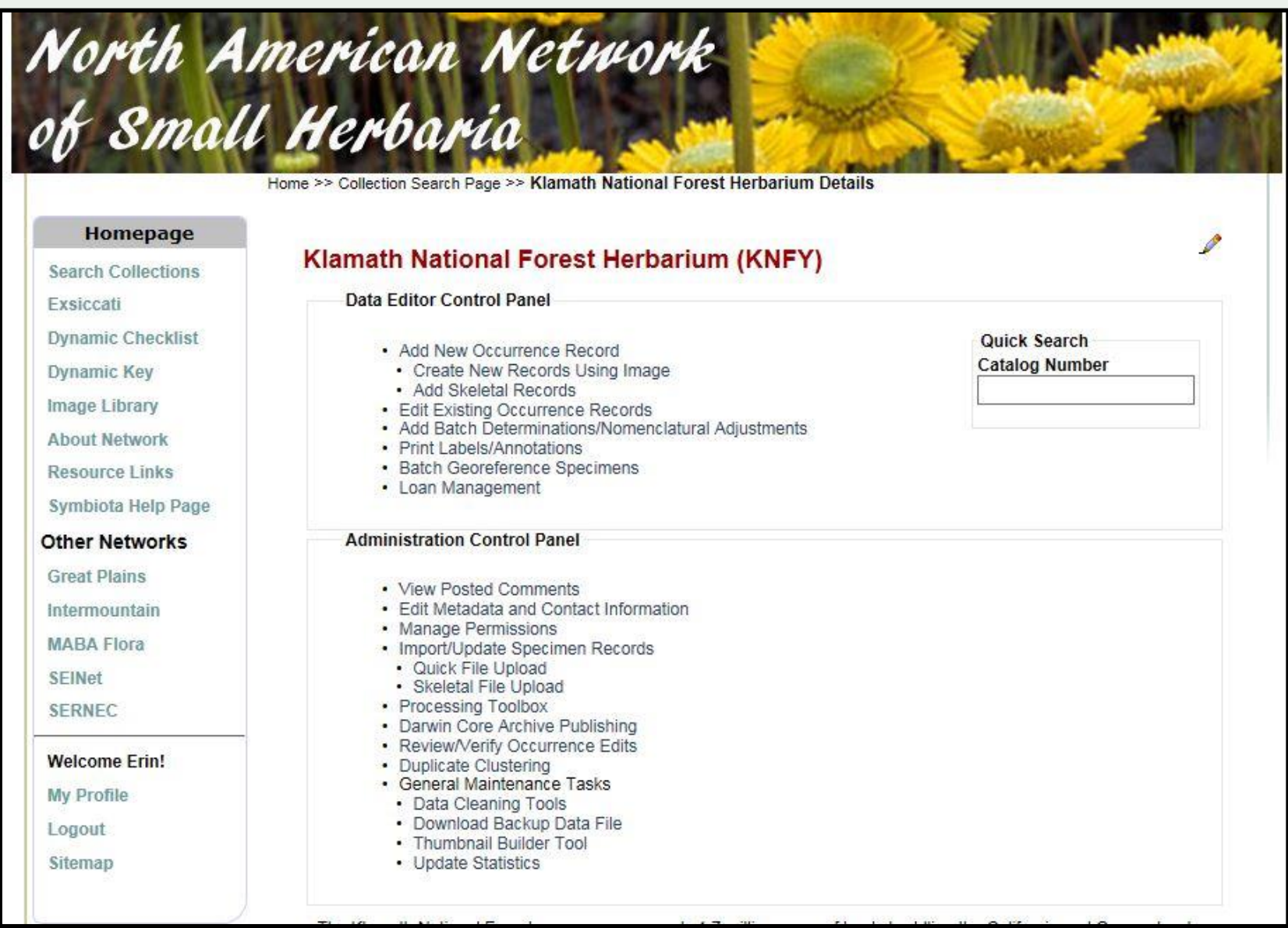
DIGITZATION

Images are uploaded into the North American Network of Small Herbaria portal either individually or in batch using a media ingestion tool. Label information can be entered directly from the image label or linked to images using the barcode ID. The SYMBIOTA portal has built in quality checks to ensure data is correctly entered. A map server function also allows for images to be geo-tagged.
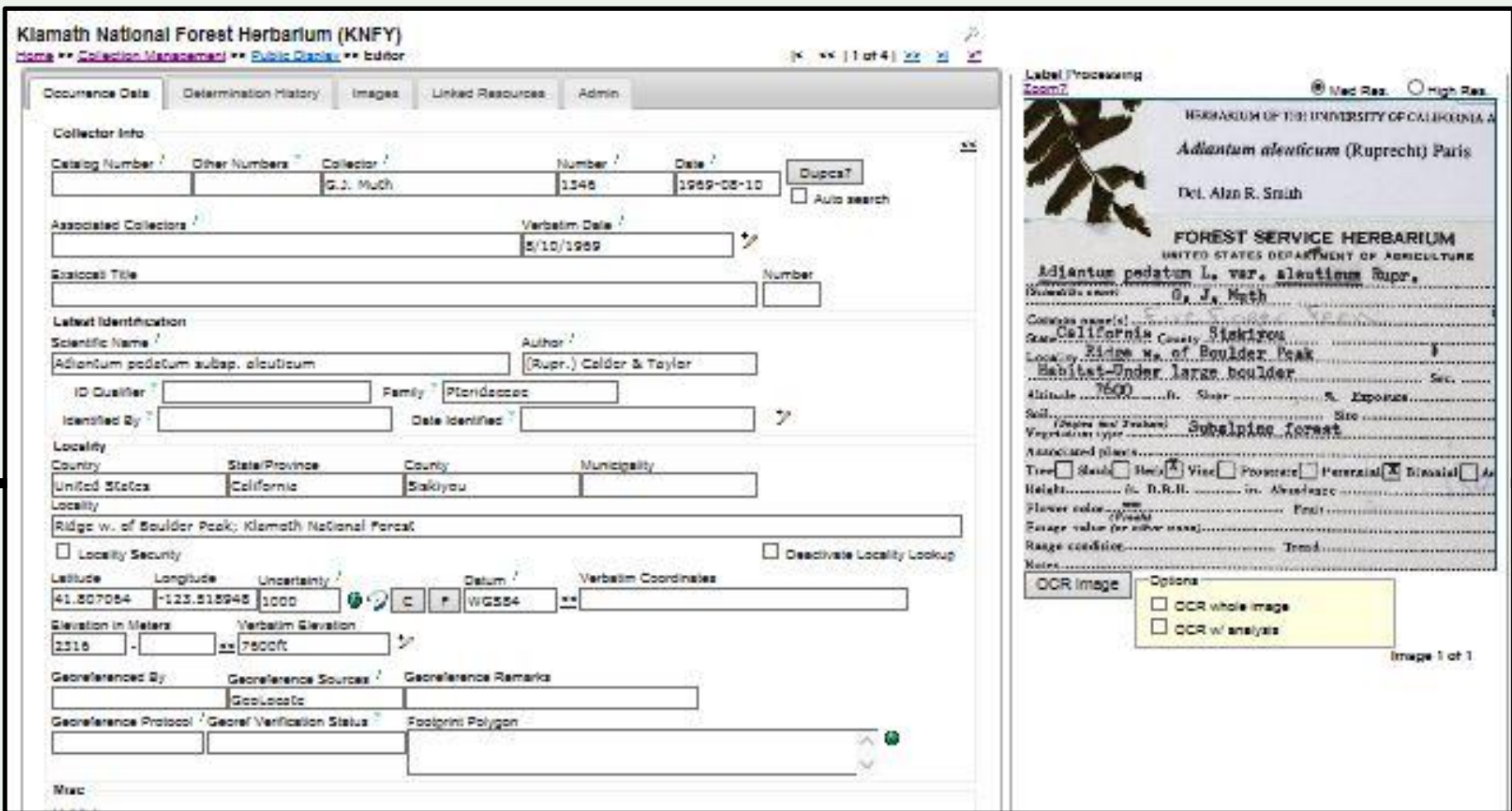
COLLECTION MANAGEMENT

Digital collections are managed in the North American Network of Small Herbaria (NANSH) portal using the SYMBIOTA Virtual Biota software package. NANSH is a unifying portal for smaller herbaria with various regional concentrations.

RESULTS

Approximately 3500 herbarium specimens will be imaged and digitized on the Klamath National Forest before equipment is passed to Sierra Pacific Industries for imaging and digitization of their 1800 specimens. We expect to circulate the imaging equipment to participating herbaria and occasionally cycle back to each cooperator to ensure collections are kept up to date. All data will be published to Integrated Digitized Bio Collections, a national resource for digitized information of vouchered natural history collections. California-based collections will also be published to the California Consortium of Herbaria. All data will be available through numerous herbarium search engines to facilitate broad accessibility.

Epilobium siskiyouense (Munz) Hoch & P.H. Raven   *Astragalus whitneyi* A. Gray var. *siskiyouensis* (RYDB.) Barneby   *Cypripedium fasciculatum* Kellogg ex S. Watson   *Lewisia cotyledon* (S. Watson) B.L. Rob. Var. *howellii* (S. Watson) Jeps.   *Fritillaria lanceolata* Pursh

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