

INVENTORY OF PLANT SPECIES OF SPECIAL CONCERN
AND THE GENERAL FLORA OF DINOSAUR NATIONAL MONUMENT

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Field surveys during the third year (1989) of a botanical inventory of Dinosaur National Monument (DINO) concentrated in Lodore Canyon and selected areas in the Utah portion of the monument. Inventory efforts focused on areas not represented in historical collection records and in habitats known or suspected of supporting populations of rare and/or endemic plant taxa. The museum research component of the study was continued for a second year.

Objectives

Four objectives of the research project will assist park managers in management and protection of rare plants in Dinosaur National Monument.

1. Complete a systematic botanical inventory of the Monument to document threatened, endangered, and special concern plant species.
2. Prepare a checklist of the flora of the Monument, compiled from field work, published literature, and museum sources.
3. Provide DINO with a relatively complete set of verified plant specimens for inclusion in the Monument's herbarium.
4. Provide baseline data and management recommendations for use in plant resource and natural area conservation, management, and research in the Monument and within the region.

Dinosaur National Monument represents a unique conservation and management opportunity within the Uinta Basin. It can be viewed regionally as an island surrounded by areas with similar bio-ecological characteristics, but different uses.

Methods

The 1989 field inventory was conducted at planned intervals to maximize representation of plant species with differing phenologies and to complement inventory work conducted in previous years:

- June 1-6 Lodore Canyon and selected tributaries of the Green River below the confluence
- June 26-30 Split Mountain and Quarry areas.
- August 21-30 Split Mountain and Quarry areas; selected areas near Round Top and in Yampa Canyon.
- November 16-20 Museum research, Brigham Young University, Provo, Utah.
- November 27- Museum research, University of Colorado,
December 1 Boulder, Colorado.

Field surveys in 1989 were conducted by one botanist working independently, or occasionally accompanied by technicians. Areas surveyed in 1988 and 1989 presented greater logistical challenges than areas surveyed in 1987 due to remoteness, topography, and/or transportation constraints. Potential habitat was reviewed prior to establishing daily transect routes using aerial photographs, geologic maps, topographic maps, and a list of expected taxa. Unusual geologic exposures, topographic conditions, soils, hydrologic regimes, and vegetation having the greatest potential for associated rare taxa were examined carefully. Transects were designed to maximize coverage of diverse geologic substrates and vegetation types. Areas examined were delineated on USGS 7.5 minute topographic maps. A base map (1:62,500) was prepared showing daily transects, rare plant locations, and high-quality vegetation sites.

Approximately 57 rare plant species are known or expected in Dinosaur National Monument. Most of these were identified prior to initiation of field work from published literature, museum records, and consultation with knowledgeable botanists. Habitat profiles were developed based on existing data to assist in locating the plants in the field. Search images were modified as the plants were encountered during field surveys. Twenty-nine plant taxa considered rare by the states of Colorado and/or Utah had been documented in Dinosaur National Monument prior to the 1987 field season. Nine additional rare

taxa were added in 1987, one in 1988, and two in 1989. Sixteen taxa known from adjacent areas within the Uinta Basin were not found in DINO during the 3-year survey.

Standard plant collecting techniques were used. Data acquired during the first two years of the study were used to concentrate collection efforts on taxa unrepresented or under-represented in regional herbaria. A complete set of specimens will be deposited at Dinosaur National Monument. Duplicates were selectively collected in the second and third field seasons for disposition to the University of Colorado, Colorado State University, and Rocky Mountain Herbarium. Specimens were verified and processed at the Colorado State University herbarium. Nomenclature follows Goodrich and Neese (1986).

A dBASE III+ database file was developed to accommodate new collection records generated by the present study as well as historical museum records. Research trips to herbaria at Brigham Young University, Utah State University, and the University of Colorado were made to examine historical collections from the Monument. Data from museum collections were added to the computer file. A copy of the database will be made available to the monument for curation and resource management purposes.

Results

Seventy-five collections representing approximately 71 taxa and 192 specimens were made during the 1989 field season. Significance of these collections will be determined when analyses of 1989 collections and historical herbarium records are complete. Water year 1989 (October 1988 - September 1989) was apparently a record low precipitation year with 15 cm recorded in DINO. The 25-year average is 29.5 cm, with a previous record low of 15.5 cm recorded in 1977 (Steve Petersburg, personal communication). The drought had a visible effect on plant growth and reproduction and the 1989 growing season. Many plants failed to produce flowers and some appeared dormant. Inventory and collection efforts were hampered by drought effects in that many species were not in suitable condition for collection and preparation as museum specimens.

Approximately 1350 mounted plant specimens were deposited in the Dinosaur National Monument herbarium in 1987 and 1988. Seventy-five additional specimens collected in 1989 will be deposited when processing is complete. These specimens

represent a substantial addition to the monument herbarium and will serve as a valuable reference tool for park managers and interpreters.

Regional herbarium research trips conducted in 1988-1989 yielded approximately 875 historical collections from Dinosaur National Monument or within 3.2 km of its borders. Approximately 600 of these are housed at Brigham Young University, 100 at Utah State University, and 175 at the University of Colorado. Relative size of the historical DINO collection housed at each institution is reflected approximately by these numbers. Brigham Young University herbarium has the largest historical collection of Dinosaur National Monument plant specimens in the world. The Carnegie Museum is probably second, with approximately 350 specimens collected by Earl Douglass and O.A. Peterson in 1912 and by E.H. Graham in the early 1930's (Graham 1937). The specimens documented during the present study do not represent an exhaustive research effort, but reflect the number of specimens that could be found and documented in the available time.

Collection records from the present study and from museum and published sources have been compiled in a database which contains approximately 2600 entries. This database represents the most complete historical record of the flora of Dinosaur National Monument and will serve as the basis for a checklist of the flora of the monument.

Six sensitive plant species were collected in 1989. Five of these are of special concern to the state of Colorado and three are of special concern to the state of Utah. Three of the six sensitive plant species are rare throughout their range or have an extremely limited distribution. Two are peripheral or disjunct in Colorado, and one appears to be rare in Colorado, but conclusive data are lacking. Twenty-four rare plant localities were mapped during the 1989 field season. The discovery of a population of Spiranthes diluvialis (lady's tresses orchid) in Hog Canyon (southern flank of Split Mountain) was especially significant. Spiranthes diluvialis is a federal category 2 species which will likely be listed as threatened or endangered within the year.

The Quarry District of Dinosaur National Monument was identified as a significant concentration area for rare and endemic plant species. Exposure of numerous geologic formations in the Quarry District largely accounts for the high concentration of unusual plant species, many of which are extremely substrate-specific. Designation of the Quarry

District as a special botanical interest area is recommended.

Several areas in Dinosaur National Monument were identified during the 3-year study as potential Research Natural Areas (RNAs). The Johnson Canyon-Bull Canyon complex contains high-quality riparian vegetation and significant rare plant habitat. Warm Springs Cedars contains an excellent example of mature pinyon-juniper woodland with native understory and undamaged cryptogam communities. Curl-leaf mountain mahogany (Cercocarpus montanus) woodlands on Zenobia Peak will be evaluated in 1990 for RNA values.

Conclusions

Management recommendations will be made based on the completed analysis of data collected in 1989. Most of the rare plants in Dinosaur National Monument require little or no active management at present. The database and maps produced will assist the park in facilities placement planning and ensure the survival of Dinosaur National Monument's rare plant resources. Identification of significant natural areas in the monument will provide managers with baseline areas for use in comparative evaluations of conservation, active management, and restoration projects within the park.

Literature Cited

- Goodrich, S. and E. Neese. 1986. Uinta Basin Flora. USDA Forest Service, Intermountain Region. 320 pp.
- Graham, E.H. 1937. Botanical studies in the Uinta Basin of Utah and Colorado. Annals of the Carnegie Museum 26:1-432.