

A VEGETATION STUDY OF CAPITOL REEF NATIONAL PARK

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Objectives

Capitol Reef National Park lies in a relatively unexplored region of southcentral Utah. The diversity in geology and the elevation gradient (3,500-9,000 feet) allows for diverse vegetation including endemic and rare taxa (Welsh and Chatterley 1985). Previous floristic studies have been conducted in San Rafael Swell (Harris 1980) and the Henry Mountains (Neese 1981); however, aside from classification of coniferous habitat types (Youngblood and Mauk 1985), no community studies have been done in this region.

This was the 3rd year of a 3-year investigation of the plant communities, flora, threatened, endangered/sensitive taxa distribution and the effects of grazing in Capitol Reef National Park. Our specific objectives for the project are:

1. To complete an annotated list of vascular plant species in Capitol Reef National Park, identifying origin, form, duration special status, flower color(s), general location, abundance, flowering dates, habitat, geology, special use information, elevation, effects of grazing, synonymy and comments.

The investigators have completed objective one. The annotated list of vascular plants is stored in the VAX computer at San Juan College and will be sent to Capitol Reef National Park in January. The responsible person is Kenneth Heil.

2. To collect, press, mount and label a few remaining vascular plant species known from the Park but not yet incorporated into the park herbarium.

The investigators have completed objective two; however, some mounted plants need to be taken to the Capitol Reef National Park Herbarium. These plants will be delivered sometime in January. The total number of plants added to the Capitol Reef Herbarium numbers approximately 350. The responsible person is Kenneth Heil.

3. To identify and map locations (SAGIS & 7.5 Minute Quadrangles) for all threatened, endangered, sensitive (rare) species.

We have identified and located on topographic maps all threatened, endangered, sensitive (rare) species. We plan to enter this information into SAGIS by the spring of 1989. The locations of threatened, endangered, sensitive (rare) species on topographic maps will be given to Capitol Reef National Park in March. The responsible person is J. M. Porter.

4. To identify all immediate and potential threats to threatened, endangered, and sensitive species.

Objective number four is 75% completed and will be described in the following format: species name, family, common name, description, general distribution, distribution within the park, general habitat, associated community, similar species, threats and remarks. The responsible person is J. M. Porter.

5. To further test and improve the plant community classification currently being constructed by use of multivariate analysis.

We developed a revised community classification in April 1988 and field tested it in the summer of 1988. Following this field testing and sampling of 45 additional stands, we revised the classification again in November 1988. We plan to further test and possibly revise this classification to produce the final classification by spring 1989. Vegetative data are stored on the VAX computer at Fort Lewis College. The responsible person is Bill Romme.

6. To map the distribution of all plant community types in the Park by use of aerial photos, field notes, and the analytical capability of SAGIS.

The vegetative map will be developed using SAGIS in the spring of 1989, as soon as we have completed the classification and Capitol Reef National Park has acquired all of the necessary data bases that will be used to facilitate the vegetation map (geologic substrate, elevation, etc.). The responsible person is Bill Romme.

7. To identify the potential climax stage for each type of plant community and to make recommendations for maintaining that climax vegetation (or appropriate seral stages, if those are necessary for maintaining populations of certain rare plants, or if they have other special values).

The objective will be completed in the course of completing objectives 5 and 6. The responsible person is Bill Romme.

8. To photograph all threatened-endangered plants and community types.

Ken Heil has color slides of all threatened, endangered, sensitive (rare) species and Bill Romme has color slides of all the community types. From these, 5 x 7 prints will be made of the threatened/endangered species and all photographs will be delivered to Capitol Reef National Park this spring.

9. To evaluate grazing impact on the vegetation of waterpockets using Cottonwood, Willow and Miayahan Tanks as examples.

We have sampled the vegetation at several of the water pockets in the Cottonwood, Willow, and Miayahan Tank areas. We have also worked with Norm Henderson to develop a more thorough investigation of the effects of grazing on the tanks to be carried out by park personnel next summer. We will include a preliminary assessment of grazing impact in our discussion of community types to be completed in the spring of 1989. Responsible person is Bill Romme.

This study will provide baseline ecological data for Capitol Reef National Park. Benefits from this project will include maps of the community types and distributions for rare taxa, additional plants for the herbarium, annotated plant list and some information on the effects of grazing. We also want to incorporate our floristic and vegetational sets into the SAGIS geographical information system (GIS) that is now being installed in Capitol Reef National Park. This is an additional piece of work that was not specifically included in our original proposal, but it will make the results of our research immediately accessible to park managers and will integrate our data with other existing data bases of the Park.

Methodology

The 3rd field season followed a mild winter and much of the field season was spent collecting plants and running vegetation plots. The vegetational patterns also have proven to be more complex than originally expected. We collected releve data in 312 stands (ca 0.3 ha each) representing the range of variation in elevation, geologic substrate, and aspect within the Park. The stands were then classified using TWINSPAN, a plythetic divisive method of cluster analysis. We used the results of TWINSPAN plus field observations to identify 21 tentative community-types.

The classification scheme that is currently being developed is designed to use for management purposes. It will (1) provide a general description of major natural associations of plant species in the area and (2) describe the kinds of habitats and communities within which rare plant species are most likely to be found.

We performed an ordination of the 312 stands using detrended correspondence analysis (DECORANA). Results revealed two major gradients controlling the distribution of species and communities. The

first axis in the ordination reflected a soil moisture gradient as influenced by geologic substrate. the second axis reflected an elevational gradient, with effects on both temperature and moisture.

Following field checking and final revision of the community classification, the vegetation of the Park will be mapped using the SAGIS geographic information system.

Results

After the first year's field season, we were determining and mapping a preliminary community classification. Threatened and endangered plants were also being mapped. An annotated list of all of the plants found in the park was being compiled. Voucher specimens of plants have been identified, mounted, labeled and will be given to Capitol Reef National Park Herbarium. Dr. Stan Welsh has assisted in taxonomic evaluation of specimens. Nomenclature has followed Cronquist, et. al. (1972, 1977, 1984) when possible. Other texts used include Welsh (1986); McDougal (1973). Generic revisions have been used when applicable.

During the 1986-88 field seasons we located 20 sensitive plant taxa in the park, four of which have federal protection (Table 1). The investigators have found 300 previously unrecorded taxa in the park bringing the total to approximately 850 plant species in Capitol Reef National Park.

Based on a complete data set, we will develop our final classification, maps, and report during the spring of 1989. The tentative communities are as follows:

A. Wetland and Perennial Riparian Communities

1. Dogwood-Spruce Riparian Woodland
2. Cottonwood-Willow Riparian Woodland
3. Waterpockets
4. Hanging Gardens

B. Upland Forest and Woodland Communities

5. Aspen Woodlands
6. Pine-Douglas-Fir Woodlands
7. Pine-Manzanita Woodlands
8. Bristlecone Pine-Cushion Plant Community
9. Pinyon-Juniper-Tall Shrub Community
10. Pinyon-Juniper-Grass Community
11. Pinyon-Juniper-Low Shrub Community
12. Cottonwood-Rabbitbrush Woodland
13. Hornbeam-Hackberry Deciduous Woodland
14. Cultivated Orchards and Settlements

Table 1. Threatened, endangered or candidate species found in Capitol Reef National Park.

Threatened-Endangered-Rare Plants

1. Sclerocactus wrightiae (Endangered) The Wright's fish-hook cactus
 2. Cycladenia humilis var. jonesii (Threatened) The Jones Cycladenia
 3. Townsendia aprica (Threatened) The Last Chance Townsendia
 4. Erigeron maguirei (Endangered) The Maguire daisy
 5. Schoenocrambe barnebyi (Candidate)
 6. Gilia caespitosa (Candidate) The Rabbit gilia
 7. Cymopterus beckii (Candidate)
 8. Astragalus harrisonii (Candidate)
 9. Pediocactus winkleri (Candidate) The Winkler pediocactus
 10. Spiranthes diluvialis (Candidate)
 11. Astragalus barnebyi (3C)
 12. Astragalus malacoides (3C)
 13. Asclepias ruthiae (3C)
 14. Astragalus consobrinus (3C) The Bicknell milkvetch
 15. Lomatium junceum (3C)
 16. Lygodesmia entrada (3C)
 17. Astragalus pardalinus (3C)
 18. Eriogonum corymbosum var. revelianum (3C)
 19. Eriogonum cronguistiii (3C)
 20. Cryptantha johnstonii (3C)
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- (3C) Dropped from candidate list

C. Shrub Communities and Grasslands

15. Riparian Shrublands
16. Sand Sagebrush Shrubland
17. Sagebrush Parks
18. Blackbrush Shrubland
19. Shadscale Grasslands
20. Aeolian Grasslands
21. Badlands Community

Conclusions

No conclusions are possible at this time.

Trips, Field and Lab Time

The field season at Capitol Reef National Park began in late April 1988 with Rich Fleming backpacking into the Halls Narrows. In mid-May, Ken Heil and Bill Romme gave a presentation to the Utah Native Plant Society about the Capitol Reef project at Bullfrog, Utah. In late May K. Heil, J. M. Porter and B. Romme did field work at Sulphur Creek, Fremont River, Miners Mountain, the Hartnet, Upper Deep Creek and the Purple Hills. In early June, R. Fleming, K. Heil and W. Mietty did field work at Paradise Flats, Upper Deep Creek, Fruita, and Pleasant Creek. R. Fleming spent a few more days in the Upper Deep Creek region. R. Fleming spent another week in July at the Park and K. Heil and W. Mietty did field work from 7/19 to 7/24. By September approximately 120 man days were spent in the field. Twenty man days have been spent in the San Juan College herbarium lab identifying and preparing herbarium voucher specimens. Another 15 days were spent entering information on the vascular plants of Capitol Reef into the VAX computer at San Juan College.

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