Capitol Reef

Using Geologic Maps for Habitat Prediction

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Example 1

Defining the Problem

Congress established **Capitol Reef National Park** (Fig. 1) to protect the geological feature known as the Waterpocket Fold, which contains unique microhabitats that support more than 40 rare and endemic plant species. The Park Service needs baseline information on the distribution and occurrence of these rare plants (Fig. 2) to determine whether visitor activities, especially in heavily used areas, are damaging them.

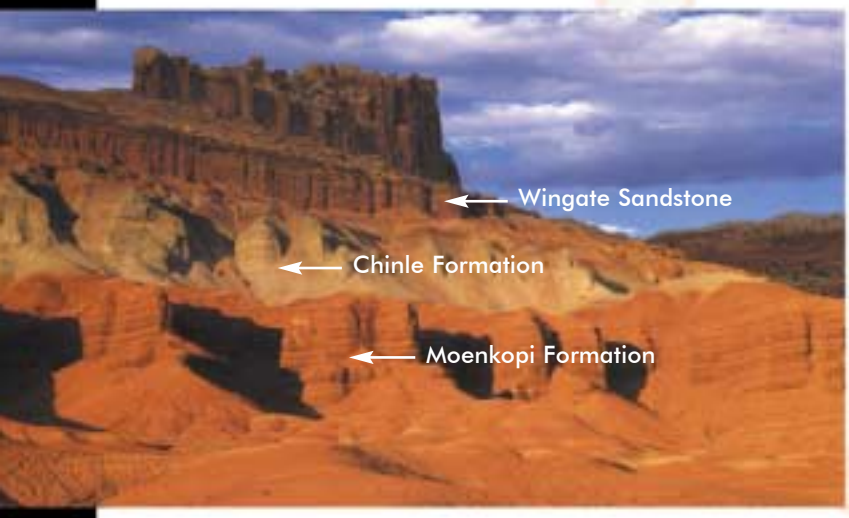
The Geologic Map

The blue, green, yellow, and brown patterns on the geologic map (Fig. 3) show the distribution of the ancient sedimentary rocks that predominate at Capitol Reef. These rocks were formed in a variety of geologic environments including open marine, near shore, river, lake, and desert over the last 275 million years. Digital versions of geologic maps of the Capitol Reef area were prepared for use in a Geographic Information System (GIS). The geologic data may be used in GIS analyses and integrated with other datasets to define spatial relationships between physical and biological resources. Here, the Mesozoic sedimentary formations found in the Waterpocket Fold can be used to **predict** which areas are most likely to include fragile habitats.

Fig. 1. The Castle and Fluted Wall is one of the most recognizable features in Capitol Reef National Park.

Applying the Geologic Map

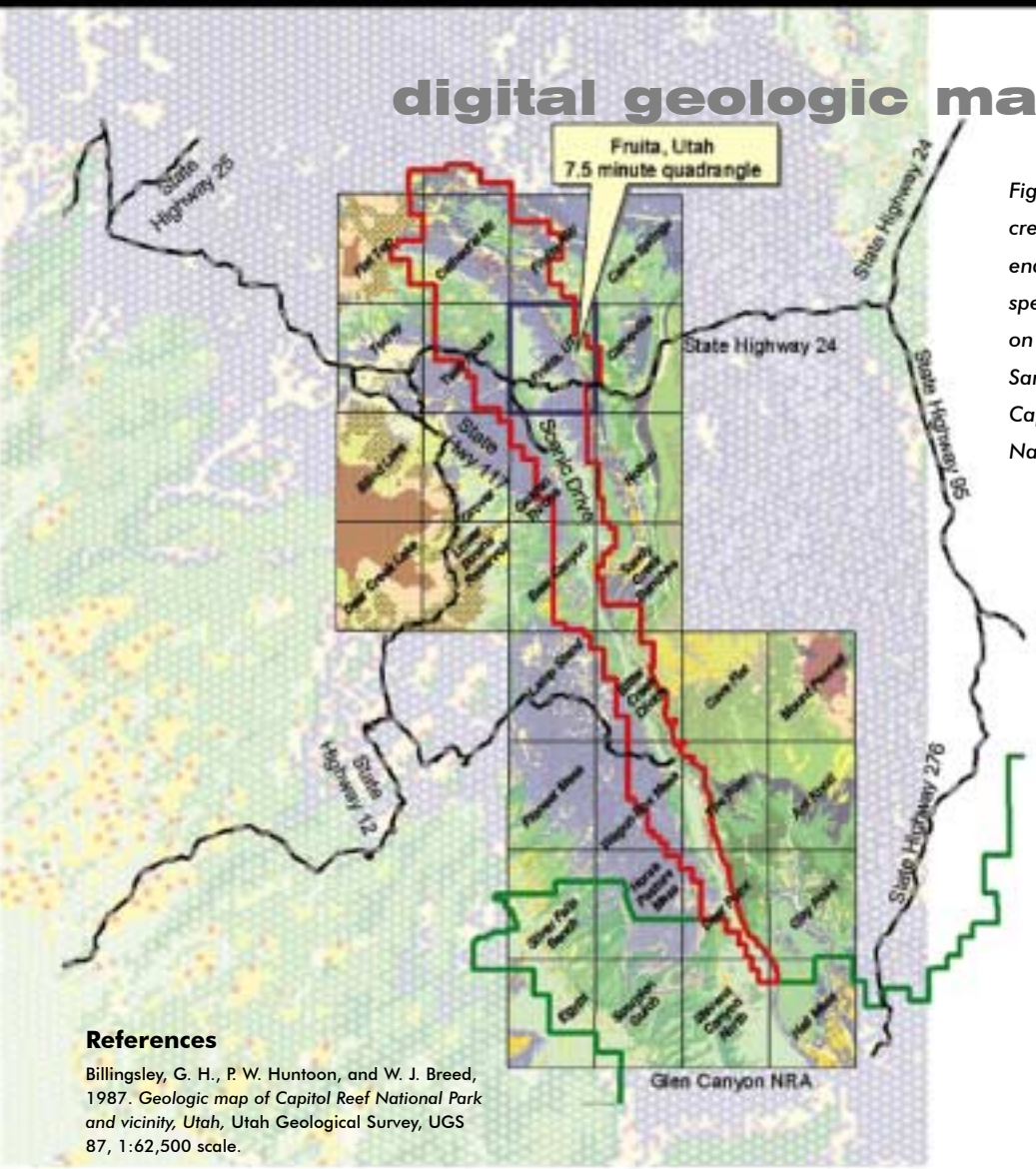
Direct connections between geologic substrate and **habitat** exist for a number of species (Fig. 4). For example, Barneby reed-mustard is confined to north facing, cliff exposures in the Triassic Moenkopi Formation. Jones cycladenia is found only in the Owl Creek Member of the Triassic Chinle Formation. Beck's Spring Parsley seems to occur only in north facing narrow canyons within the Jurassic Navajo Sandstone. Harrison's milkvetch, Maguire's daisy, and Rabbit Valley gilia are spatially correlated with the Navajo Sandstone. Winkler's cactus is confined to geologic exposures of the Salt Wash Member of the Jurassic Morrison Formation.



Conclusion

By using digital geologic map data, along with soil, slope, and other parameters, better predictive models can be developed to locate habitat for known threatened and endangered species. When combined with visitor-use data, this information helps pinpoint areas for which it would be beneficial to monitor effects of human impacts and develop resource protection measures to mitigate further impacts. Maps predicting potential habitat can be used for land management purposes.

digital geologic map



Rabbit Valley gilia

Fig. 2. Field crews inventory endemic plant species growing on the Navajo Sandstone in Capitol Reef National Park.

Fig. 3. On this geologic map the Capitol Reef National Park boundary is red, the boundaries of the "heavy use" quadrangles are blue, and the boundary of the Glen Canyon National Recreation Area adjoining the Park on the south is green.

References

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geo-ecological habitat map

Fig. 4. This map, based on information derived from geologic maps and known ties to geologic formations, shows potential habitat in the Fruita quadrangle for a few threatened and endangered plant species.

LEGEND

- Morrison Formation: Salt Wash Member — *potential habitat for Winkler cactus*
- Navajo Formation — *potential habitat for Beck's spring parsley, Maguire's daisy, Rabbit Valley gilia, and Harrison's milkvetch*
- Chinle Formation: Owl Creek Member — *potential habitat for Jones cycladia*
- Moenkopi Formation — *potential habitat for Barneby reed mustard*
- Capitol Reef NP boundary