
Briefing Paper¹

Survey and Analysis of Relict Plant Communities
within National Park Service Units of the Colorado Plateau

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April 28, 1990

The points presented below are placed under one of three headings.

The first of these contains statements about the Colorado Plateau's uniqueness and the advantages its parks, monuments, and national recreation areas ("units") offer for investigations that are synoptic, long-term, and largely or entirely free of confoundment from land use effects, past and present.

The second category concerns the survey ("the project"), insofar as it reveals, describes, and compares relict communities ("sites") that could comprise a protected network for predominately nonmanipulative investigations.

The third heading describes potential project extensions and applications, particularly from the perspective of Western and Southwestern Region science directorates, principal investigators requiring study sites, or interregional NPS coordinators seeking to make the best case possible for using the Colorado Plateau parks as a large-scale research arena.

My thesis is that the Plateau may offer extraordinary value for research into and modeling of the suspected or predicted effects of elevated carbon dioxide and other "greenhouse gases" on terrestrial ecosystems. A corollary is that the Park Service, as the preeminent steward of protected lands of international caliber on the Plateau, is especially well positioned to host a coordinated research program here in response to national mandate. Furthermore, a thorough inventory of prospective study sites, especially those free of modern human influences, is now timely, if not imperative if the Colorado Plateau is selected among many competing regions under NPS jurisdiction.

¹This brief was composed in response to requests from two Park resource managers. It does not substitute for a voluntary project proposal amendment, a mandatory annual report (due in June) or any other deliverables called for by the governing Cooperative Agreement. Any statements herein may be freely used and modified by Park Service personnel, without credit.

The Uniqueness and Advantages of the Colorado Plateau to Research

- *Literally dozens of free-standing buttes and mesas exist whose tops have never sustained livestock grazing, other land uses, or repeated human visitation. Many of these can only be reached by helicopter. These tops support a great variety of desert, semidesert, and woodland plant communities and, depending on size and isolation, unusually attenuated to essentially complete faunas.
- *Such entirely impregnable sites are free of hysteretic ('system memory') effects that might be apparent under stress in communities that, while seemingly undisturbed, sustained past impacts which we cannot now retroduce.
- *Relict sites are probably extensive and varied enough that they could sustain small-scale manipulative experiments or destructive sampling without public or NPS objections.
- *Thanks to past investigators' diligence and dedication to the region, floral and faunal inventories are very complete, especially for the dozens of endemic plants here. These workers could be mobilized again, given the funding, for more thorough surveys, updates of past collections, and individual-organism based studies, such as plant demography.
- *The Nature Conservancy has (as one part of the project) synthesized a vegetation classification for the entire Plateau. These operational taxonomic units are an essential prelude to ecosystem and landscape ecology studies.
- *NPS units are well-distributed over the Plateau -- high to low east to west, north to south. Sites within them would thus comprise a fairly balanced study network, and would contain species and communities presumably sensitive to large-scale trends or perturbations.
- *The already-rich study resources of NPS units can be complemented by protected areas under US Forest Service and Bureau of Land Management administration. Examples (all described and protected with The Nature Conservancy's help) are: Red Canyon Research Natural Area (RNA); Indian/Water Canyon Area of Critical Environmental Concern (ACEC); Timbered Cinder Cone RNA; Gilbert Badlands RNA/ACEC; Mount Peale RNA; and Lavender Mesa ACEC.
- *The Plateau is rich in proxy evidence of past climates and environments and their relation to human occupancy, especially in tree rings and rodent middens. This provides a rich datum for future climate and ecosystem dynamics.

The 1988-90 Relict Area Survey Project

- *The forerunner was a like survey (finished in 1988) of Glen Canyon National Recreation Area. Nearly twenty superb relict sites were described, botanized, and photographed in detail with the aid of a helicopter. Some of these sites probably had never been visited by humans before, even though they are dozens or hundreds of hectares in extent.
- *The most pertinent major objectives of the current Plateau-wide survey are to:
 - (3) "develop a listing of known and potential relict areas within National Park Service units in the Colorado Plateau,
 - (4) "conduct field inventories to assess the qualifications of as many of the potential sites as possible, and
 - (5) "prepare reports that evaluate the significance of each of the potential sites".
- *The goal toward which these objectives contribute is a [multi-agency] system of protected areas on the Plateau. The Conservancy has been building this system, primarily with reference to Utah, since 1982. The project will enable a quantum advance toward completion, especially since other states are involved or can become so.
- *About 40 qualifying sites (in addition to those within Glen Canyon NRA) have been located and verified via aerial reconnaissance, reliable secondary sources, and field inspection. More places may turn up. Work through 1990 has had to be confined to the northern Plateau, which is essentially the same as Utah and Nevada and the Rocky Mountain Region's share of the physiographic Plateau.
- *The sites include pristine occurrences of communities and populations that may register climatic changes most rapidly and unambiguously. Other sites have examples of communities that, elsewhere, support appreciable grazing, wildlife production, and woodland forestry and may be severely affected by global change.
- *The methodological "flagship" of the project is the very rigorous photodocumentation of current (1990; beginning of the last decade of the century) landscapes within the relict areas. Photo stations are permanently marked, to enable exact photo retakes for comparisons in the decades ahead. This degree of exactitude and coverage (over 700 images will be available) is unprecedented in the National Park System, and will be invaluable to posterity.

Project Implications and Extensions

- *The final report is due December 31, 1990, and preparations are on schedule. It will be a richly illustrated compendium, by unit, of all the relict areas, including ones for which information was available but costs and logistics prevented a first-hand look. In tandem with the Glen Canyon report, this document will be highly useful to principal investigators and NPS research coordinators. Thus oriented, they can select observational and experimental locales with economy and assurance.
- *The next challenge, once the report is tendered and an open-literature manuscript is begun, is to sell the project to the Western and Southwestern Regions, so that Arizona and New Mexico units may be surveyed. Success may require a Washington-level directive and the appointment of an interregional Colorado Plateau coordinator. However, a solid final report from the "Phase II" just described is needed first.
- *Another potential extension would be inferential sampling and even full enumerations of communities and populations within some of the surveyed areas, as the next step before "ecosystem ecology" work. Park specialists and technicians could perform much of this, before "big science" arrives. The data thus obtained would also be valuable for more parochial (that is, unit-level) concerns, such as grazing administration or assessment of visitor impacts.
- *Because progress on Research Natural Area designations has been substantial on other federal ownerships, the Park Service should consider accelerating RNA establishment and appropriate unit zoning. The Nature Conservancy and the Colorado Natural Areas Program are ready to assist, especially if the designated areas do become active and valuable research sites.
- *National, regional (Rocky Mountain) and state (Utah and Colorado) Conservancy decisionmakers are considering a bioreserve encompassing Plateau lands in eastern Utah and adjacent Colorado. If this site nomination is confirmed, the resulting funding and protection could strongly complement the Park Service's selection of the Plateau as a Biosphere Reserve or for major science initiatives.

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