

-- A Proposal --
[DRAFT]

INVENTORY OF RELICT VEGETATION COMMUNITIES IN
NATIONAL PARKS AND MONUMENTS ON THE COLORADO PLATEAU

from

The Nature Conservancy
Great Basin Field Office
and
Western Regional Office

to

USDI National Park Service
Rocky Mountain Region

prepared by

Joel S. Tuhy
Utah Public Lands Coordinator
The Nature Conservancy
Wellsville, Utah

December 23, 1986

Table of Contents

	<u>Page</u>
Introduction	1
Progress to Date	1
Identification.	2
Protection.	2
Future Needs	3
National Park Service Role	9
Summary of Major Points.	12
Proposal	13
References	15

List of Tables

1. Status of vegetation elements in relict areas on the Colorado Plateau	4
2. Vegetation types that are beginning to have good representation in relict areas on the Colorado Plateau.	7
3. Vegetation types that lack adequate representation in relict areas on the Colorado Plateau	8
4. Proposed funding levels for the original plan and reduced first-year alternative	14

Introduction

The Nature Conservancy is a non-profit conservation organization dedicated to the maintenance of natural biological diversity. This means that we identify and seek protection for examples of the full array of ecosystems and species in the natural world. We focus our resources on those parts or "elements" of the natural world that are the most scarce: rare species, rare communities, and undisturbed examples of more common communities.

This proposal deals with the latter two categories. The Conservancy is working to create systems of protected relict areas that are based on community elements, i.e. that include the range of vegetation types, both common and rare, on a regional basis. In this case, we are seeking to create a system of natural areas on the Colorado Plateau.

The recognition and protection of relict areas is important for at least four reasons:

1. Relict areas are locations where natural biological and physical processes occur unhindered by direct human influence. They are baselines or standards that serve to gauge the effects of human intervention in other parts of the natural environment. In this sense, relict areas represent the concept of "controls" in natural-science hypothesis testing.
2. Relict areas have value for the applied sciences of resource management. Their unaltered ecosystems can help define productive potentials of the land. In this sense, relict areas can be used to determine carrying capacities of similar lands being managed for resource production. Further, relict areas can be used to guide the reclamation of previously altered lands.
3. Relict areas are sanctuaries for individual species and communities. A system of relict areas functions to preserve genetic reservoirs of native flora and fauna, both typical and rare, in a region such as the Colorado Plateau.
4. Relict areas are outdoor laboratories useful for education and research of environmental structure and function.

The creation of a relict-area system provides benefits for a variety of interests. Benefits accrue to land managers, resource specialists, research scientists, educators and, ultimately, to society as a whole. Several other references discuss the importance of recognizing and protecting relict areas. These include Allen (1986), FCER (1977), Laycock (1975), USDA Forest Service (1985-86), and Van Pelt (1982).

Progress to Date

A number of relict areas have received recognition and protection via special administrative designation on federal lands in the past sixty years.

Most of these have been in the Pacific Northwest. Several natural areas have received special designation in the Colorado Plateau region, though probably without much thought to how these sites would contribute to a system of such reserves.

In 1981 The Nature Conservancy began working to build a system of natural areas in Utah. Virtually all of these efforts have involved cooperation with federal land management agencies, as about two-thirds of Utah's land, and an even greater portion of the remaining "wildland", are administered by the federal government. We have since initiated similar federal natural-area programs in the other states that contain portions of the Colorado Plateau.

The progress to date has involved two separate processes: 1) Identification and 2) Protection. This progress is detailed in the following two sections.

Identification

The first step was to determine the needs for statewide community-based systems of natural areas. For Utah, this was done at a February 1982 workshop in Salt Lake City, co-sponsored by the Conservancy and the Forest Service. The seventy scientists and land managers who attended undertook three tasks:

1. List the vegetation types of Utah (and Nevada), insofar as existing classifications allow.
2. Decide which of those types are adequately represented in existing designated natural areas.
3. Suggest locations of additional relict areas to include those vegetation types that are not adequately represented.

The resulting report, Research Natural Area Needs in Nevada and Utah: A First Estimate (Van Pelt 1982), identified quite a few locations, with various ownerships, that would fill unmet needs in these states' natural-area systems. This list of areas has served as the agenda for subsequent protection efforts in Utah over the last four years. Similar identification work has been done by state-based Heritage Programs in Colorado, Arizona and New Mexico.

Protection

Most of the work to date has involved cooperation with the Forest Service and Bureau of Land Management, to recognize and protect certain areas via administrative special designation. Methods that have been used can be summarized as a three-step process:

1. Initial field inspection is done to assess qualifications of potential relict areas. This assessment focuses on criteria of 1) naturalness, or lack of past/present disturbance (Laycock 1975; p. 7); 2) presence

- of features not represented in established areas; and 3) manageability, including types of conflict with other resource uses.
2. A report is prepared proposing special status for areas that appear to be good additions to the natural area system. Areas judged to be unsuitable are dropped from further consideration; not every area that is visited is subsequently proposed.
3. Follow-up work with the appropriate land management agency is done as needed for formal administrative designation.

Results to date are encouraging. In Utah, more than forty potential relict areas have been inspected and found to be suitable additions to natural-area systems in the past four years. Almost thirty of these sites are on the Colorado Plateau. Formal protective designation proceeds more slowly, but many of these locations should receive special status in the next few years.

Future Needs

It is reasonable to assume that many of the relict areas proposed for special designation in the past four years will receive formal protection fairly soon. As a result, certain vegetation type needs in the system are starting to be met, and the 1982 needs list will soon be out of date.

The Conservancy has plans to revise the needs list using the same procedure as in 1982: 1) refine the classification, 2) determine which needs are met and which are not, and 3) suggest locations to include unrepresented vegetation types in protected natural areas. Although the revision will not be done until mid 1987, it is still possible to outline the general vegetation-type needs for relict areas on Colorado Plateau. This assessment is shown in Table 1.

A quick glance at Table 1 seems to indicate that many of the vegetation types have at least some representation in relict areas. The situation is not quite that simple, for two primary reasons:

1. Most of the entries under "Relict-Area Representation" are in the Probable and Potential columns. All of the Potential sites must go through agency designation processes before they are formally protected; such protective designation is by no means certain at present. The Probable sites are close to the end of their respective designation processes, but positive results still cannot be assumed in every case. Not many needs are met in considering only the Existing column.
2. The vegetation elements listed for the Colorado Plateau are mostly broad cover types. Representation shown in Table 1 probably does not encompass the variation in many of these broad types, as characterized by different understories and correlated with soil and environmental differences.

Table 1. Status of vegetation elements in relict areas on the Colorado Plateau.

Elements	Relict-Area Representation		
	Existing	Probable	Potential
<u>ALPINE</u>			
(No specific classification)	---	BUN,UPK, MOE	---
<u>AQUATIC/RIPARIAN</u>			
Montane Streams (Utah High Plateaus)	---	BUN,UPK	---
Lowland Streams (<u>Populus-Salix-Typha-Juncus-Equisetum</u>)	BEN	WAN	CON,RIN, WIK
Hanging gardens	---	WAN	CON,ICN, RIN
<u>FORESTS</u>			
Engelmann spruce	---	UPK	---
Bristlecone pine	AMR	LAN,TAF	---
Subalpine fir	AMR	BUN,UPK, MOE,TAF, TIEA	---
White fir	---	NEN,UPK, WAW	---
Douglas-fir	---	LAN,RENA, UPK,WAN	CAE,LENB
Blue spruce	---	---	---
Ponderosa pine	AMR,BIN, KOS,WEY	TAF	WAW,RENB, TIEB
Limber pine	---	---	---
Aspen	---	---	TIEB
<u>GRASSLANDS</u>			
Ricegrass-Needlegrass-Galleta (-Ephedra)	---	VIK	GRH
Salina Wildrye	---	LAN	ELA,LENB
Thurber Fescue	---	---	---

Table 1 (Continued). Status of vegetation elements in relict areas on the Colorado Plateau.

Elements	Relict-Area Representation		
	Existing	Probable	Potential
<u>WOODLANDS AND SHRUBLANDS</u>			
Piñon - juniper	BIN	BRA,LAA, LAN,NOA, RENA	LENB,THK
Mountain mahogany (<u>Cercocarpus</u>)			
- Curlleaf (<u>C. ledifolius</u>)	---	NEN	TIEB,WAW
- Alderleaf (<u>C. montanus</u>)	---	LAN	CAE,LENB, RENB
- Dwarf (<u>C. intricatus</u>)	CAS,KOS	CLE	---
Gambel Oak	BOEA,WEY	CLE,WAN	---
Sagebrush (<u>Artemisia</u>)			
- Big (<u>A. tridentata</u>)	BOEA	BRA,LAA, LAN,NEN, NOA	CAE,COH, THK
- Black (<u>A. nova</u>)	---	NEN,RENA	CAE,COH
Salt Desert Shrub			
- Greasewood	BEN	---	---
- Shadscale	---	---	ELA,KEY
- Mat saltbush	---	GIS	---
- Winterfat	---	BRA	THK
Chaparral (<u>Quercus-Garrya-Arctostaphylos</u>)	---	---	LENA
"Sand shrub" (<u>Quercus undulata</u> , <u>Artemisia filifolia</u> , <u>Ephedra cutleri</u>)	---	---	---
Blackbrush	AND	---	BOEB,ROA
Torrey Ephedra-Shadscale/Ricegrass-Galleta	CAS	---	HEN,KEY, NOP

Table 1 (Continued). Status of vegetation elements in relict areas on the Colorado Plateau: Key to Areas.

Symbol (status)*	Area Name - Administering Unit
AMR (ex)	Amphitheater - Cedar Breaks NM
AND (ex)	Antelope Island - Glen Canyon NRA
BEN (ex)	Beaver Wash Canyon - Richfield BLM
BIN (ex)	Bighorn - Zion NP
BOEA (ex)	Bookcliffs Mountain Browse - Vernal BLM
BOEB (po)	Bowknot Bend Butte - Moab BLM
BRA (pr)	Bridger Jack Mesa - Moab BLM
BUN (pr)	Bullion Canyon - Fishlake NF
CAE (po)	Castle Cove - Vernal BLM
CAS (ex)	Caineville Mesas - Richfield BLM
CLE (pr)	Cliff Dwellers Pasture - Manti-LaSal NF
COH (po)	Cowboy Bench - Vernal BLM
CON (po)	Cow Canyon - Glen Canyon NRA
ELA (po)	Elliott Mesa - Moab BLM
GIS (pr)	Gilbert Badlands - Richfield BLM
GRH (po)	Grand Bench - Glen Canyon NRA
HEN (po)	Hebes Mountain - Moab BLM
ICN (po)	Iceberg Canyon - Glen Canyon NRA
KEY (po)	Keesle Country - Moab BLM
KOS (ex)	Kolob Mesas - Zion NP
LAA (pr)	Lavender Mesa - Moab BLM
LAN (pr)	Lance Canyon - Ashley NF
LENA (po)	Leeds Canyon - Dixie NF
LENB (po)	Leers Canyon - Vernal BLM
MOE (pr)	Mount Peale - Manti-LaSal NF
NEN (pr)	Nelson Mountain - Manti-LaSal NF
NOA (pr)	No Mans Mesa - Cedar City BLM
NOP (po)	North Big Flat Top - Moab BLM
RENA (pr)	Red Canyon - Dixie NF
RENB (po)	Red Mountain - Vernal BLM
RIN (po)	Ribbon Canyon - Glen Canyon NRA
ROA (po)	Romana Mesa - Glen Canyon NRA
TAF (pr)	Table Cliff - Dixie NF
THK (po)	The Block - Richfield BLM/Glen Canyon NRA
TIEA (pr)	Timbered Cinder Cone - Dixie NF
TIEB (po)	Timber-Cow Ridge - Ashley NF
UPK (pr)	Upper Fish Creek - Fishlake NF
VIK (pr)	Virginia Park - Canyonlands NP
WAN (pr)	Water Canyon/South Fork Indian Canyon - Cedar City BLM
WAW (po)	Water Hollow - Fishlake NF
WEY (ex)	West Rim/Phantom Valley - Zion NP
WIK (po)	Wilson Creek - Glen Canyon NRA

* ex = existing, pr = probable, po = potential

Despite these factors, some Colorado-Plateau vegetation types are beginning to get adequate representation in relict areas. For the most part these are types shown to have Existing and Probable representation in Table 1. These types are listed in Table 2.

Table 2. Vegetation types that are beginning to have good representation in relict areas on the Colorado Plateau.

<u>Vegetation Type</u>	<u>Representation</u>
Alpine communities	Probable Research Natural Areas (RNA's) in the LaSal and Tushar Mountains. There is little alpine habitat on the Colorado Plateau.
Bristlecone pine	Cedar Breaks NM and Table Cliff proposed RNA.
Subalpine fir	Cedar Breaks NM and several probable RNA's on National Forests.
Some piñon-juniper subtypes	One existing and five probable RNA's.
Curlleaf mountain mahogany	One probable RNA (Nelson Mountain).
Dwarf mountain mahogany	One probable and two existing RNA's (the latter are not well known).
Gambel oak (-bigtooth maple)	Two existing and two probable RNA's.
Some big sagebrush subtypes	One existing and five probable RNA's.
Some black sagebrush subtypes	Two probable RNA's.
Mat saltbush	One probable RNA (Gilbert Badlands).
Blackbrush	One existing and one potential RNA, both on the Glen Canyon NRA.

If newly-identified relict areas are found to contain cover types shown in Table 2, then such sites should not necessarily be rejected as redundant. It would be profitable to investigate them further, either in-person or through file searches, for two reasons:

1. Site characteristics and total species composition may indicate that the newly-identified area is substantially different from known relict areas containing the same broad cover types.
2. Newly-identified sites may be nearly identical to known relict areas, but may be much better candidates for addition to the relict-area system. The new areas may be in better condition or be more manageable as natural

areas. This means that potential or even formally proposed areas may be rejected in favor of newly-discovered candidates. The Colorado Plateau is too large to develop a vegetation map detailed enough to know where every example of every type is located, in order that the best of each may be selected for protection. For now (and maybe forever) it is best to protect the best known examples of types, even though one cannot be certain that there is not a better example "out there" somewhere.

A number of Colorado-Plateau vegetation types still lack adequate representation in relict areas. These types are shown in Table 3.

Table 3. Vegetation types that lack adequate representation in relict areas on the Colorado Plateau.

Vegetation Type	Comments
Riparian/wetland	Especially those of lower elevations. There are very few of these in truly relict condition.
Ponderosa pine (?)	Ponderosa pine occurs in one probable RNA on National Forest land, and in four existing RNA's on National Park Service land. The latter areas are not well known. The main need is for Ponderosa pine that is typical of stands under commercial timber management; the question is whether or not the five areas meet this criterion.
White fir, Douglas-fir, Blue spruce, Limber pine	Found mainly on the Utah High Plateaus.
Aspen	Either "climax" or seral. There are large stands at appropriate elevations in certain parts of the Colorado Plateau, such as the LaSal Mountains and the Utah High Plateaus.
All types of grasslands	
All types of salt desert shrub	[Possible exception of mat saltbush.]
"Sand shrub" (<u>Quercus undulata</u> , <u>Artemisia filifolia</u> , etc.)	West (1983) maintains that these are degraded situations of grasslands.
Ephedra-shadscale/ ricegrass-galleta	There are several good potential areas whose long-term integrity is still not assured.

The unmet needs shown in Table 3 will be the primary emphases for future growth of the relict-area system on the Colorado Plateau.

genetic resources
applied research
management areas
where can research
what might
actions do for
other sites

National Park Service Role

To date most of the effort toward protecting relict vegetation communities on the Colorado Plateau has been done cooperatively with the Forest Service and Bureau of Land Management.

The National Park Service can make significant contributions to a system of relict areas on the Colorado Plateau. Park Service cooperation would be very valuable to the growth of this system for several reasons:

1. Many of the unmet vegetation-type needs in the Colorado Plateau province (see Table 3) occur in middle- and lower-elevation habitats, where the density of National Parks and Monuments is fairly high (versus higher elevations covered by National Forests).
2. In some cases, the best remnant examples of certain Colorado Plateau vegetation communities are in National Parks or Monuments.
3. Perhaps most importantly, the National Park Service is not subject to the multiple-use concept that results in competition between various uses, in which relict-area protection/recognition has low priority. This situation has two ramifications:
 - a. The Park Service can contribute good additions to a natural-areas system without detracting from the commodity resource base on public lands. There are certain exceptions, such as grazing in Glen Canyon NRA.
 - b. Protection would probably be more secure in National Parks and Monuments, at least "on paper" if not on the ground.

This latter fact is probably why the National Park Service appears to give relict area protection a low priority at both the Regional level and on individual Parks and Monuments. Low priority seems to arise from a general attitude that an extra layer of protection is unnecessary for relict areas because Parks and Monuments are already protected. This thinking is not necessarily valid, for two primary reasons:

1. This attitude does not consider that special attention should be given to relict areas as a registry or recognition of their natural and scientific values, that otherwise would be masked within a Park or Monument as a whole. It is quite appropriate to label areas within Parks and Monuments as specific locations for basic or applied research in undisturbed baseline ecosystems.
2. Park Service administration does not automatically give protection to all lands within. For example, the Glen Canyon NRA has definite resource conflicts with grazing and, in some places, minerals. Although the NRA is a special case, potential adverse impacts to relict areas can occur in "mainline" Parks and Monuments on the Colorado Plateau. Chief among such impacts is visitor use. Despite good intentions, such use has undoubtedly concentrated and dispersed impacts that detract from pre-settlement

naturalness. It may be necessary to give special protection to these relict areas by restricting, channeling or excluding visitation. Perhaps the most striking example of this situation is Virginia Park in Canyonlands National Park.

The above two points indicate that it is appropriate, and even necessary, for the Park Service to give higher priority to relict areas, both at the Regional level and within individual Parks and Monuments. It is not necessary for relict areas to receive top priority. There are certainly more pressing concerns in many Parks. But relict areas should receive sufficient priority so that resources can be committed to a joint program that aims to expand the system of relict areas on the Colorado Plateau. The Conservancy hopes that the Park Service is willing to do so, because the Park Service is definitely able to make valuable contributions.

National Park Service participation in building a relict-area system would involve two general considerations: 1) separate identity of relict areas within Parks/Monuments, and 2) consistency within the overall system.

It is important to give relict remnants an identity that is separate from that of the Park or Monument as a whole. A separate identity for protected relict areas is in line with the concept of zoning, where certain portions of Parks or Monuments have certain uses. Naturalness and/or scientific use can and should take precedence over other Park uses in specific locations. Absence of special identity would be appropriate only if extreme sensitivity or fragility of an area dictate that publicity be kept to a minimum.

In building a system of protected relict areas on the Colorado Plateau based on "contributions" from various federal agencies, with the National Park Service being one participant, it is best to maintain an internal consistency that ties the individual sites together regardless of administering agency.

The concepts of separate identity and consistency influence the means by which recognition and protection are accomplished. Perhaps the best way of registering and protecting worthy relict areas on National Parks and Monuments is through administrative special designation.

The Research Natural Area (RNA) is probably the most preferable type of special designation. It can be used by all federal land-administering agencies, including the Park Service. Thus the RNA title provides a measure of consistency within a system of relict areas that are under different administrations. The RNA title also emphasizes the practical use of relict areas for education and basic and applied research.

Other possible titles such as Protected Natural Area and Natural Environmental Area be applied. The Conservancy is not familiar with all of the possibilities available to Park Service. Unless exceptional circumstances dictate otherwise, it seems best to use only one title. The RNA title seems to be the best choice; it gives recognition and protection to relict sites on National Parks and Monuments by bestowing a specific identity in a manner

consistent with that of other federal land-management agencies.

It is not advisable to designate whole Parks/Monuments, or very large tracts (10,000's of acres), as RNA's. A good size range is from about 300 acres up to several thousand acres. This range is consistent with RNA's under different administration (Forest Service, BLM). Some specific reasons for maintaining this consistent RNA size range, regardless of administering agency, are as follows:

1. RNA's need only be large enough to include self-sustaining examples of their constituent vegetation types. This may involve complicated conservation biology issues that cannot be addressed here. It is sufficient to say that a particular RNA does not need to encompass unnecessary redundancy.
2. The larger the area, especially if a whole Park or Monument, the more likely it is to contain non-relict (often seriously degraded) conditions. The best additions to the RNA system are sites that contain a minimum of human-related disturbance throughout. Very large areas such as whole Parks or Monuments usually contain substantial land that has been altered from relict condition by past (and present) use. Mingling of these altered areas with the smaller, truly relict fragments would dilute the RNA system as a whole.
3. The altered, non-relict portions of large areas, such as whole Parks, may be recovering from past disturbance. There is a need to designate specific relict remnants that serve as baselines to gauge the rate and determine the endpoints of recovery.
4. RNA's need to be known. Generation of fairly detailed vegetation maps, plant and animal species lists, geology/soils, and other resource information is best accomplished in relatively small areas.
5. RNA's need to be manageable, protectable, and capable of having impacts monitored. This is better accomplished in relatively small areas, even though authorized use may be more concentrated. In theory this use can be controlled.
6. The Conservancy has been wary of proposing RNA's larger than 5000 acres on National Forest and BLM land, so as to minimize confusion with the totally separate issue of Wilderness. This consideration is perhaps less important in National Parks and Monuments, given that they are not constrained by multiple-use requirements.

It is also important to consider what will happen in relict areas after RNA designation, regardless of administering agency. Management is required to preserve the specific relict vegetation communities for which the areas were designated. This can be active management to maintain certain conditions, or it can be a "hands-off" approach. Two types of monitoring are also necessary:

1. Resource Management monitoring, involving the establishment of permanent study plots to measure quantitative vegetation parameters over time.
2. Patrol monitoring to ensure compliance with management directives needed to maintain the relict integrity of the sites.

Finally, the Park Service does not seem to have a coherent policy for recognition/protection of relict areas, via RNA or similar designation, at Regional or National levels. Two good models for defining and refining such a policy may be found in the Forest Service Manual (Section 4063), and in the Federal Committee on Ecological Reserves directory of RNA's (FCER 1977).

Summary of Major Points

Eight major points presented so far are summarized below:

1. A system of relict areas on the Colorado Plateau, that includes the range of vegetation types in this region, provides benefits for a variety of groups. These include land managers, resource specialists, research scientists, educators and, ultimately, society as a whole.
2. Good progress has been made toward building such systems in the west. To date this has involved cooperation mainly between The Nature Conservancy and the Forest Service and Bureau of Land Management.
3. The National Park Service can make major, valuable contributions to the growing system of relict areas on the Colorado Plateau because 1) relict examples of unfilled vegetation-type needs occur in Parks/Monuments, and 2) the Park Service is not subject to multiple-use requirements, so that relict-area protection need not detract from the commodity resource base.
4. Special Park Service attention to relict areas is justified in terms of 1) recognition of natural and scientific values, and 2) protection from adverse human impacts that do occur in Parks and Monuments, mostly involving visitation.
5. Special attention is not only justified, but should be of sufficient priority at Regional and Park/Monument levels to result in action.
6. Active Park Service participation in building a Colorado Plateau relict-area system should consider 1) separate identity for relict sites within individual Parks/Monuments, and 2) consistency among various agencies contributing to the system. These two considerations are best realized by designating small- to moderate-sized Research Natural Areas within Parks and Monuments.
7. It is important to consider what happens in RNA's after designation: Management and Monitoring.
8. Good models exist upon which to pattern the development of a national or regional relict-area/RNA policy within the National Park Service.

Proposal

The Nature Conservancy seeks RNA designations on federal lands in order to register and protect examples of biotic communities that we consider to be important. The National Park Service can designate RNA's to register and protect the natural, scientific and educational values of relict areas. In these respects, the goals of the Conservancy and the Park Service are quite similar. Working together would be mutually beneficial.

The Conservancy proposes a cost-sharing Cooperative Agreement with the National Park Service that has the following four objectives:

1. Generate a more-detailed list of vegetation types that are in need of representation in relict areas on the Colorado Plateau.
2. Develop a list of known and potential relict areas in National Parks and Monuments that can fill as many of these unmet needs as possible.
3. Conduct field inventories to assess the qualifications of as many of the suggested sites as possible. Three criteria for this assessment are:
1) relict character, 2) need for the area in a regional-system context, and 3) manageability.
4. Prepare reports that propose special designation for qualified areas.

This would be a three-year project involving all National Parks and Monuments on the Colorado Plateau. The Conservancy has the capability to apply a regional approach. The majority of work would be done by our Public Lands Coordinator in Utah; there would also be contributions from staff of state-based Heritage Programs in Colorado, New Mexico and Arizona.

The proposed level of funding is based on a comparison with the relict-area contract work now being performed by Utah State University in the Glen Canyon NRA. Under terms of this contract, the National Park Service is providing about \$27,500 for the two years of work. Utah State University and The Nature Conservancy are providing about \$10,000 more in matching funds for the two years. In all, about \$37,500 is being committed to this two-year project in the 1,250,000-acre NRA. There are two ratios of note in this arrangement:

1. The overall expenditure is three dollars per 100 acres of total land area for the two-year project in the NRA.
2. The Park Service is providing funds on almost a 3:1 matching basis with the contractors.

The funding proposal for the Cooperative Agreement outlined here is extrapolated from the Glen Canyon work. The total area of Parks and Monuments on the Colorado Plateau, excluding Glen Canyon NRA, is about 2,650,000 acres. Based on the first ratio above, a total of \$79,500 would be needed over the three-year life of the project, or \$26,500 per year.

The Conservancy proposes a NPS:TNC matching fund ratio of 2:1, more favorable to the Park Service than that of the Glen Canyon work (second ratio above). Total annual contributions would therefore be \$17,700 from the Park Service and \$8,800 from The Nature Conservancy.

It could be difficult to achieve full funding intensity in 1987. Park Service budgets for 1987 have already been planned, and time is short for the Conservancy to coordinate operations among the four states involved. Therefore it may be more realistic to consider a reduced level of work for 1987.

One reduced alternative for the first year would limit work to the five National Parks in Utah. This combined area is about 835,000 acres, requiring \$8,350 for 1987, with Park Service contribution of \$5,600 and Conservancy contribution of \$2,750. Funding needs would be as outlined above for 1988 and 1989, with the portion not done in 1987 being added on to one of those years.

Proposed funding for the original plan and for the reduced first-year alternative are summarized in Table 4.

Table 4. Proposed funding levels for the original plan and reduced first-year alternative.

Premise: Funding levels are extrapolated from the current Glen Canyon NRA relict-area contract, which has a total cost of three dollars per 100 acres aggregate land area for the two-year life of the project.

Three features are relevant to the proposed Cooperative Agreement:

1. Total area of Parks and Monuments under consideration is about 2,650,000 acres (this does not include Glen Canyon NRA).
2. A proposed three-year time span.
3. A proposed NPS:TNC matching fund ratio of 2:1.

Proposed funding levels are as follows:

	<u>ORIGINAL PLAN</u>			
	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Total</u>
National Park Service	\$ 17,700	\$ 17,700	\$ 17,700	\$ 53,100
The Nature Conservancy	<u>8,800</u>	<u>8,800</u>	<u>8,800</u>	<u>26,400</u>
TOTAL	\$ 26,500	\$ 26,500	\$ 26,500	\$ 79,500

Table 4 (Continued). Proposed funding levels for the original plan and reduced first-year alternative.

<u>REDUCED 1987 ALTERNATIVE</u>				
	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>Total</u>
National Park Service	\$ 5,600	\$ 17,700	\$ 29,800	\$ 53,100
Nature Conservancy	<u>2,750</u>	<u>8,800</u>	<u>14,850</u>	<u>26,400</u>
TOTAL	\$ 8,350	\$ 26,500	\$ 44,650	\$ 79,500

Finally, all aspects of this proposal -- scope, methods, time span, funding -- are negotiable. The Nature Conservancy is willing to work with National Park Service to plan a course of action best suited toward identifying and maintaining a system of relict areas on the Colorado Plateau. Welcome all comments and suggestions with regard to this proposal.

References

Allen, B.H. 1986. Remember rangeland reference areas? *Rangelands* 8(4): 180-182.

Federal Committee on Ecological Reserves (FCER). 1977. A directory of research natural areas on federal lands of the United States of America. USDA Forest Service. 280 p.

Lock, W.A. 1975. Rangeland reference areas. Society for Range Management Range Science Series No. 3. 66 p.

USDA Forest Service. 1985-86. Forest Service Manual, Section 4063: Research Natural Areas. 19 p.

Pelt, N.S. 1982. Research natural area needs in Nevada and Utah: A first estimate. Western Regional Office, The Nature Conservancy, San Francisco, CA. 153 p.

Odum, H.T., ed. 1983. Temperate deserts and semi-deserts. Volume 5, Ecosystems of the World. Elsevier Scientific Publishing Company, Amsterdam. 22 p.