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Tampa, Florida
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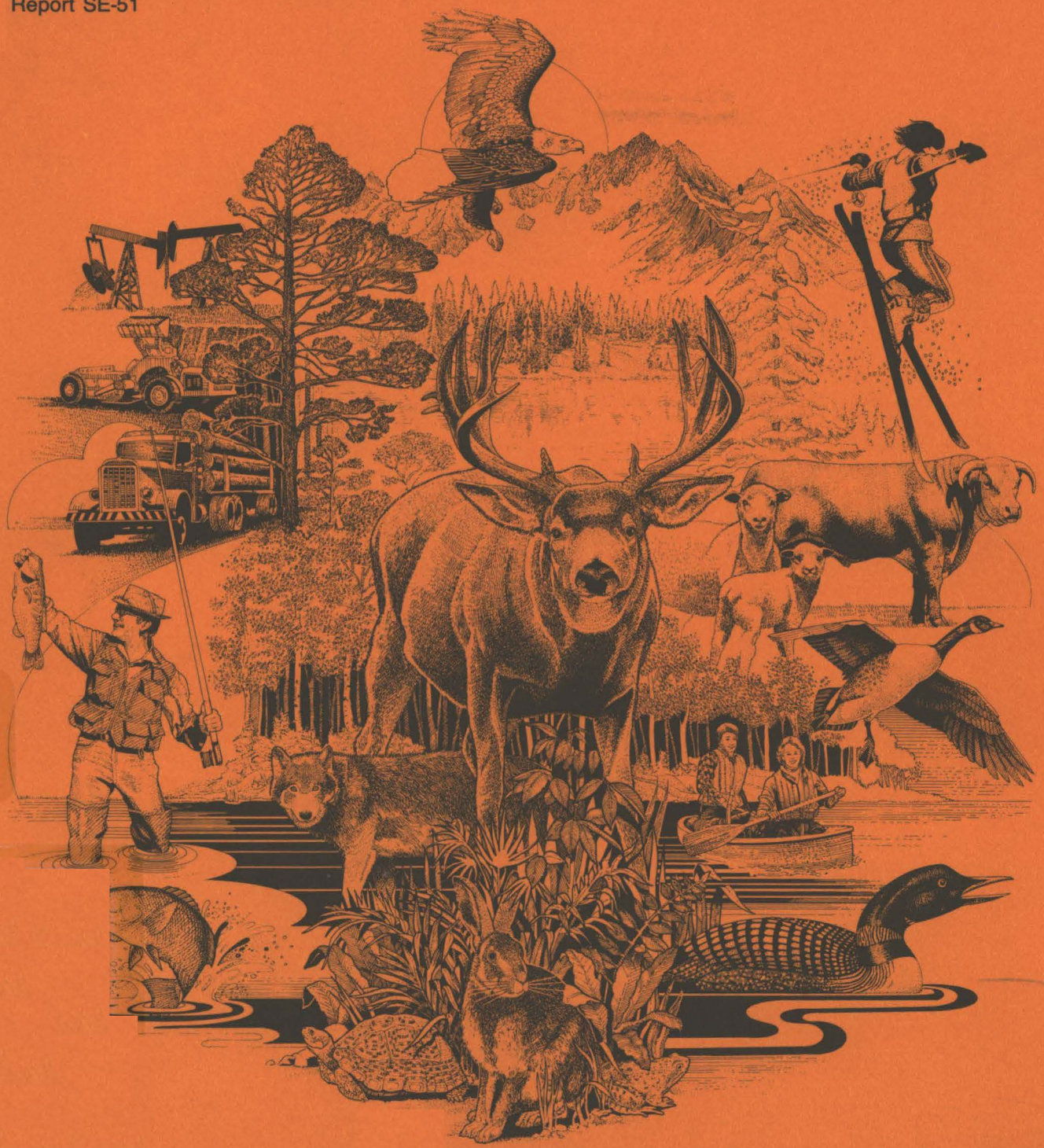

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January 1989
Southeastern Forest Experiment Station
P.O. Box 2680
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Wilderness Benchmark 1988:

proceedings of the

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Tampa, Florida, January 13-14, 1988

Compiler:

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Southeastern Forest Experiment Station, U.S. Department of Agriculture, Forest Service

FOREWORD

The USDA Forest Service is required by the Renewable Resources Planning Act (RPA) of 1974 to prepare an Assessment every ten years. This document includes assessments of all resources of the National Forests and other public lands, including wildlife, range, water, timber, minerals, outdoor recreation, and wilderness.

In January 1988, the Forest Service sponsored Benchmark 1988, a national conference held in Tampa, Florida. The Conference was divided into two parts: the National Wilderness Colloquium and the National Outdoor Recreation and Wilderness Forum. Presentations and discussions at this conference were a source of information for the Forest Service's 1989 Assessment of Outdoor Recreation and Wilderness.

The Proceedings are being published in two separate volumes. This volume includes over twenty papers addressing the wilderness resource and its (non-recreational) values and benefits to the American people. The second volume reports current research in outdoor recreation, including additional descriptions of the wilderness resource with emphasis on recreational use.

The Colloquium

Forty persons from throughout the United States participated in the presentations and group discussions of the 1988 National Wilderness Colloquium. Invited participants came from the National Park Service, USDA Forest Service, Bureau of Land Management, universities, private research groups and environmental organizations. "Nonrecreational uses and values of wilderness" were the colloquium's themes, reflecting the need to describe and quantify all uses of wilderness.

The 1964 Wilderness Act specifically authorizes a number of uses of wilderness. Section 4b of the Act states that "wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use" (78 Stat 894). Notwithstanding, research into the extent and value of nonrecreational uses lags considerably behind those of recreational uses and values.

This volume begins with an overview of the National Wilderness Preservation System - what it is now and what it could be in the future. The overview papers are followed by thirteen papers addressing specific non-recreational uses and values of wilderness. Authors were asked to include descriptions of 1) legislative guidelines influencing the use; 2) inventory of use; 3) value of use; 4) trend in use; and 5) issues and recommendations.

A short summary of discussions at the colloquium and the results of a national telephone survey are included in the Appendix. Many of the ideas expressed in the discussion groups were used in the preparation of the RPA Assessment and are valuable reading for wilderness mangers and planners. A number of authors in these proceedings referenced the telephone survey in their papers. A short description of the procedure and the results of the survey are included here.

Numerous individuals contributed to the planning and organization of the colloquium and the publication of the Proceedings. Pat Reed of Colorado State University was the principle organizer and worked closely with the Outdoor Recreation and Wilderness Assessment Group of the USDA Forest Service in Athens, Georgia in selecting participants and soliciting papers. Reviewers of colloquium papers included: Evan DeBloois, Ken Cordell, Sarah Greene, David Cole, Bev Driver, Gary Davis, Tom King, Steve McCool, Perry Brown, David Porter, Roger Clark, Robert Greenway, Alan Ewert, Greg Alward, Jim Absher, Pat Long, Terry Hartig, Ted McConnell, Susan Bratton, William McLaughlin Walter Cook, Doug Welhnan, Ross Gorte, Sally Ranney, Robert Lucas, Joe Roggenbuck, Jim Omemick, Larry Phillips, and Larry Hartmann.

We hope these proceedings will spark the interest of researchers, planners, and managers and they will be encouraged to add to the information base presented here. More information is necessary if we expect all mandated uses and values of wilderness to be considered equally in land management decisions.

Helen R. Freilich, compiler

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INTRODUCTORY REMARKS

H. Ken Cordell*

The Renewable Resources Planning Act (RPA) Assessment covers the various uses of natural resources such as timber, wildlife, range, recreation, wilderness, minerals, and water. Its purpose is to communicate the importance of those resources and their condition. This requires a series of analytical steps to describe the resource, how it is managed, the cost of managing it, the societal and economic demands placed on the resources, and the improvements needed to meet those demands through better resource management. All of this is aimed at identifying what the future could be and what role the Federal government should play in that future.

To my knowledge, this is the first time that we have had the opportunity as a group to look at wilderness from the perspective that it is much more than a recreational resource. In the past, recreational uses of wilderness has seemed to be a primary focus. This Colloquium recognizes the many different uses and values of wilderness and acknowledges that we know very little about those uses which we might call "nonrecreational". We need improved understanding of the nonrecreational uses and values of wilderness for the upcoming RPA Assessment.

You are the experts. You have an understanding of both the questions and the answers concerning nonrecreational uses and values and can greatly help us to better evaluate the wilderness resource as an RPA Assessment focus. Where there are no answers, you can help us better formulate the questions and pose them as a research agenda. Such a research agenda will help guide future RPA Assessments. We are most anxious to hear what you have to say.

For this Colloquium, each of you have been asked to examine a particular aspect of wilderness. The information you provide will be used for natural resources planning through the Administration and in the RPA Assessment report to the Congress. With your help we will be better able to communicate the importance of wilderness relative to some of the other uses of natural resources. We will also recommend a research program to improve knowledge of wilderness uses and values in the future.

We hope to see a repeat of this meeting at the appropriate time in the future. At this meeting we will reexamine what we said here about the non-recreational uses and values of wilderness. When we reconvene let us ask, "Are there still holes in our knowledge about this vast and vital wilderness resource and its uses?" The goal is to improve the management of wilderness, to create a better base of information, and to effectively communicate this information to those who are making decisions.

Project Leader, Outdoor Recreation and Wilderness Assessment Group, Southeastern Forest Experiment Station, USDA Forest Service, Athens, GA.

THE NATIONAL WILDERNESS PRESERVATION SYSTEM: THE FIRST 23 YEARS AND BEYOND

Patrick C. Reed*

ABSTRACT

Following nearly 10 years of congressional debate, the National Wilderness Preservation System was created in 1964. Since then the System has grown in size and geographic distribution and now totals nearly 89 million acres in 44 different States. The System has been shaped by existing patterns of Federal land ownership and is concentrated in Alaska and the 11 Western States. Considerably more acreage may be eligible for wilderness status; but, as the System matures, attention will begin to shift away from designation of new wilderness to the management of existing wilderness. This paper briefly describes the past and present size and distribution of the System, as well as some of the issues associated with its future composition and management.

INTRODUCTION

Just over 23 years ago, and after nine long years of effort, the U.S. Congress passed the Wilderness Act (PL 88-577) in 1964 in order to "establish a National Wilderness Preservation System for the permanent good of the whole people" (78 Stat 890). The first system of its kind in the world, the National Wilderness Preservation System (NWPS) provides for the protection and preservation of congressionally designated wilderness areas, or "areas where the earth and its community of life are untrammeled by man" and which retain their "primeval character and influence" (16 USC 1131). Wilderness has outstanding opportunities for solitude and a primitive form of recreation, but may also contain any of a number of non-recreational amenities such as "ecological, geological, or other features of scientific, educational, scenic, and historical value" (16 USC 1131).

Initially, the NWPS was homogeneous in several senses. With the passage of the Wilderness Act 1964, the nine million acres of the NWPS were all located within the National Forest system. With the exception of the Boundary Waters Canoe Area in Minnesota and some 25,000 acres in New Hampshire and North Carolina, it was also all located within the 11 Western states.

Over the past 23 years, the NWPS has become more diverse both in size and geographic range. With more than 460 units located in all but six States, the NWPS now totals almost 89 million acres, or about 4 percent of the total land area of the United States. Its units are now managed by four different Federal agencies: the Forest Service, National Park Service, Fish and Wildlife Service, and Bureau of Land Management. The next 10 years are likely to hold both opportunity and more challenges to the development of the NWPS. Decisions about future wilderness additions may need to be made jointly by the four agencies if the NWPS is to obtain the richest diversity of natural and cultural environments. Increased attention will be given to management in order to insure that the areas already within the NWPS permanently retain their wilderness character. The value of the many non-recreational uses of wilderness will gain more recognition.

A LOOK BACK

The road to a national system for the protection of wilderness lands was rocky and long. Both popular and political appreciation

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of wilderness built slowly throughout the early history of America and well into the middle of this century (Allin 1985, Hendee and others 1978, Nash 1982). However, the road to Federal support for wilderness preservation in 1964 was not entirely uncharted.

A Federal Track Record

Several Federal agencies now managing designated wilderness did have some prior experience in managing de facto wilderness (or lands exhibiting wilderness-like characteristics but not officially designated by Congress). The National Park Service Act of 1916 created and charged the new agency with, among other things, keeping park scenery and wildlife 'unimpaired for the enjoyment of future generations" (39 Stat 535). Although early backcountry preservation was largely ignored in favor of recreational use (Foresta 1984), the intent of subsequent park legislation for the Grand Tetons in the late 1920's and the Everglades in the early 1930's became much clearer in its effort to preserve wilderness values in the parks (Hendee and others 1978).

Like the National Park Service, the Forest Service in its early years was also reluctant to stand in the way of "progress" (Robinson 1975). However, largely through the efforts of people like Aldo Leopold and Arthur Carhart, the Forest Service began to set aside lands for wilderness recreation beginning with the 574,000 acre Gila Wilderness Preserve (the forerunner of current wilderness areas) in New Mexico in 1924. By 1929, the Forest Service had adopted an internal policy (the L-20 Regulation) to manage and protect a system of "primitive areas." In 1939, the U-l, 2, and 3 Regulations further developed the formal practice of protection and management of wilderness, wild lands, and roadless areas.

The other Federal agencies that now manage wilderness in the NWPS, the Fish and Wildlife Service (then known as the Bureau of Sport Fisheries and Wildlife) and the Bureau of Land Management, essentially had no formal lands to manage prior to the 1950's because they had no "organic" acts. Any protection of diverse wilderness values (as later described in the Wilderness Act) in national wildlife refuges or public domain lands was probably fortuitous since the enhancement of habitat and range were major management policies of the respective agencies (Hendee and others 1978, Reed and Drabelle 1984).

Not withstanding the policies of the federal agencies, Congress had acknowledged the idea and value of a national network to protect "strict wilderness reserves" as early as 1940 in a joint Pan-American agreement (56 Stat 1354). Still, if the way to a national wilderness system was no longer uncharted, it was not necessarily to be smooth. Regardless of their earlier flirtations with backcountry and wildland preservation, both the National Park Service and the Forest Service were initially opposed to Senator Hubert Humphrey's early attempts to introduce and pass the first national wilderness bill beginning in 1956. It was contrary to the National Park Service's then new 'Mission 66" program which encouraged more recreation-related development in the parks (Foresta 1984). For its part, the Forest Service was concerned with a number of issues, including water and timber rights in the proposed wilderness lands, and was also opposed to such legislation (Allin 1982).

An Idea Comes of Age

Real help for a national system of wilderness came with the recommendations of the 1962 Outdoor Recreation Resources Review Commission. The Commission identified more than 28 million acres of Federal, State, and private lands with wilderness qualities (ORRRC 1962). Table 1 lists the Commission's inventory of potential wilderness by Federal agency.

As shown in table 2, most of the ORRRC acreage recommendations were located in two Western Regions' (eleven Western States), but none in Alaska.

Finally, after almost yearly attempts and failures on 65 different wilderness bills, Congress reached a compromise and passed the Wilderness Act on September 3, 1964. The newly created NWPS would become an "overlay" on the existing National Forest, Park, and Wildlife Refuge systems (Hendee and others 1978). The purposes for which the wilderness areas were designated was to be

Table 1. -- A comparison of the 1962 Outdoor Recreation Resources Review Commission inventory of potential wilderness and the National Wilderness Preservation System as of December 31, 1987 (by Federal agency)

	1962 ORRRC potential acreage[1]	1987 NWPS acreage[2]
Forest Service	18,967,590	32,411,297
National Park Service	7276,000	36,756,382
Fish and Wildlife Service[3]	694,540	19,330,335
Bureau of Land Management	220,740	470,779
Bureau of Indian Affairs	560,650	0
State	291,240	0
Private	193,630	0
United States	28,204,390	88,968,793

[1] Source: Outdoor Recreation Resources Review Commission 1962.
[2] Source: U.S. Department of Interior 1987a.
[3] The Fish and Wildlife, Service replaced the Bureau of Sport Fisheries and Wildlife.

Table 2. -- A comparison of the 1962 Outdoor Recreation Resources Review Commission inventory of potential wilderness and the National Wilderness Preservation System as of December 31, 1987 (by RPA Region)

RPA Region[1]	1962 ORRRC potential wilderness acreage[2]	1987 NWPS acreage[3]
Pacific Coast	7,944,800	67,176,085
Rocky Mountains-Great Plains	17,512,730	17,807,232
North	705,680	1,456,855
south	2,041,180	2,528,621
United States (excluding AK)	28,204,390	32,484,117
United States (including AK)	28,204,390	88,968,793

[1] See Appendix for listing of States within each RPA Region.
[2] Source: Outdoor Recreation Resources Review Commission 1962.
[3] Source: U.S. Department of Interior 1987a.

Figure 1. -- Composition of the RPA Regions (by State) used in this paper

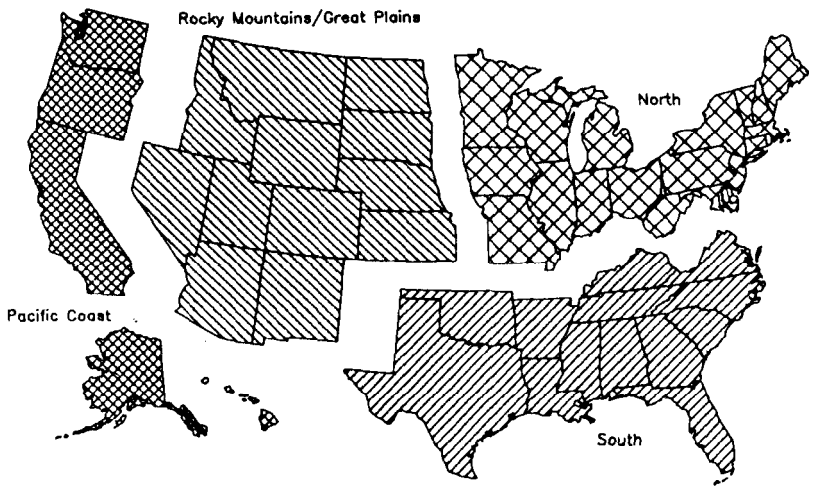
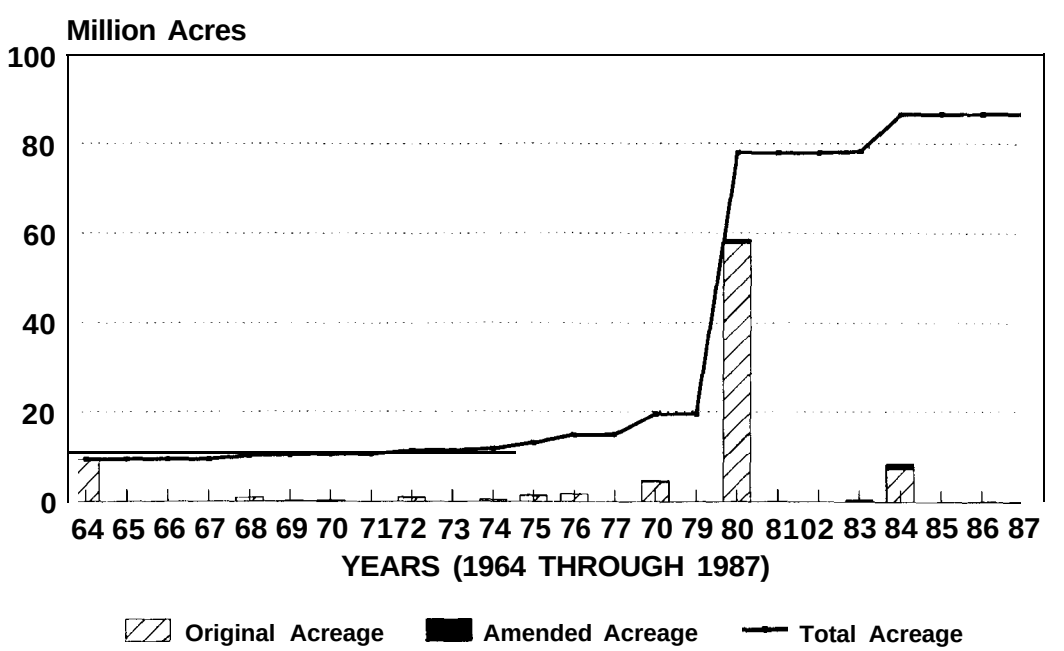


Figure 2. -- Yearly additions and total acreage for the National Wilderness Preservation System (1964-1987)



"within and supplemental" to the purposes for which the [National Forest, Park, and Wildlife Refuge systems are established and administered" (16 USC 1133). Regardless of what the purposes of the other systems might be, it is clear that the NWPS provides a number of different benefits to the American people (Driver and others 1987). These benefits are both "personal" in nature (such as self-actualization, mental and physical well-being, and spiritual) and "social" (including commodity uses, economic, and cultural).

The Wilderness Act created 54 "instant" wilderness units in the NWPS, totalling more than 8.9 million acres. All of this acreage was administered by the Forest Service and much was former wilderness, wild, or roadless areas under the U-Regulations. The act also empowered the Fish and Wildlife Service and National Park Service to manage wilderness. The fiit wilderness within a National Wildlife Refuge (the Great Swamp in New Jersey) was designated in 1968 and the first two units within National Parks (the Craters of the Moon in Idaho and the Petrified Forest in Arizona) were designated in 1970.

A System Takes **Shape**

As illustrated in fig. 2, over the next 23 years wilderness units were slowly added to the NWPS through numerous public laws. In addition, a number of existing wilderness units had their acreages adjusted upwards in subsequent acts. Most notable among the post-Wilderness Act legislation are the "Eastern Wilderness Act", the Federal Land Policy Management Act (FLPMA), and the Alaska National Interest Lands Conservation Act (ANILCA).

Nearly all of the units originally created by the Wilderness Act were located in the Western United States. In 1973, Public Law 93-622, often referred to as the Eastern Wilderness Act (Hendee and others 1978, Wilderness Society 1984), designated 16 new units in the Eastern United States. More importantly, the act set a precedent for including wilderness that had been previously modified by human activity.

The authority for the Bureau of Land Management to manage wilderness came with the passage of the FLPMA (PL 94-579) in 1976. It required the agency to review all of its 400 million-plus acres for suitable wilderness. The first Bureau of Land Management wilderness (the Bear Trap Canyon Unit of the Lee Metcalf Wilderness in Montana) was designated 7 years later in 1983.

Second only to the original Wilderness Act in number of units added to the NWPS was the 1980 ANILCA (PL 96-487). Signed by President Jimmy Carter in the final days of his administration, the 56 million acres of new wilderness created in the National Forests, Parks, and Wildlife Refuges of Alaska more than doubled the total size of the NWPS with the stroke of a pen.

In 1964, the Wilderness Act gave the Forest Service, National Park Service, and Fish and Wildlife Service 10 years to complete studies of their respective lands for potential wilderness. However, as the result of extensions to this deadline, notably for the Forest Service's controversial Roadless Area Review and Evaluations (RARE I and II), the largest number of units (nearly 200) were added in several State-specific acts in 1984. Since then, there has been little additional legislation designating more wilderness.

ALOOKAROUND

Today, the NWPS consists of 464 units administered by four Federal agencies, totaling 88,968,793 acres[2] (U.S. Department of Interior 1987a) [see Appendix]. It is a more diverse system now, often with unusual contrasts. For example, the largest unit, the 8.7-million-acre Wrangell-St. Elias Wilderness in the National Park of the same name in Alaska, is inland. Less than one-millionth of that size is the smallest wilderness, the 6-acre Pelican Island Wilderness managed by the Fish and Wildlife Service off the Florida coast. Two wilderness areas lie within 35 miles of New York City's Yankee Stadium, but none within 300 miles of Des Moines, Iowa. And the Bandalier Wilderness in New Mexico, once the home of the ancient Anasazi people, is less than 10 miles from the birthplace of the hydrogen bomb in Los Alamos.

Because wilderness units are supplemental to the purposes for which agency systems were established, there are some differences in the way that they are administered (Allin 1985; Edwards 1986). The contrasts among the principal charges of the four agencies are somewhat perpetuated in the management of their respective wilderness areas, particularly in terms of their recreational use. Because the recreational use of national parks is a paramount objective of the National Park Service, there are fewer distinctions between wilderness and non-wilderness lands. Recreational use in the national wildlife refuge system wilderness is permitted only when it does not conflict with the principal charge for that system, which is the propagation of wildlife habitat. Forest Service and Bureau of Land Management wilderness use reflects the historical multiple-use perspectives of these agencies.

Subsequent legislation has also generated anomalies within the wilderness of any given agency, especially in mining activities and motorized access. Permitted uses in any Alaskan wilderness may vary markedly from those of the lower 48 States due to special provisions of the ANILCA.

A review of some key statistics helps to put the size and distribution of the NWPS into better focus. Because almost two-thirds of all NWPS acreage is located in Alaska, the NWPS is often described as having two different components. Any such review of the size and distribution of the NWPS needs to distinguish wilderness in Alaska and in the other 49 States.

Federal Agency Wilderness Acreage

In terms of total wilderness acreage managed, the National Park Service leads the other agencies with more than 40 percent of the total NWPS acreage (U.S. Department of Interior 1987a) [table 3]. This is primarily due to their vast Alaskan holdings. For the same reason, the Fish and Wildlife Service is second with about 24 percent of the NWPS acreage, followed by the Forest Service with 20 percent. The Bureau of Land Management, which manages almost twice as much total land acreage as the Forest Service, National Park Service, and Fish and Wildlife Service combined, manages less than 1 percent of the NWPS's total acreage.

As graphically illustrated in fig. 3, the picture changes radically if Alaskan wilderness acreage is excluded. In the lower 48 States and Hawaii the Forest Service is the largest manager of wilderness by a rather large margin. With more than 26 million acres, it has about five times as much wilderness as the National Park Service, Fish and Wildlife Service, and Bureau of Land Management combined.

In terms of agency land in wilderness status, the National Park Service again leads the other agencies with 50 percent. The Forest Service follows closely with 36 percent of its total acreage in wilderness and the Fish and Wildlife Service with about 2 percent. The Bureau of Land Management again is last with less than one-half percent. All together, the 88.8 million acres in wilderness status account for about 14 percent of the total land administered by these four Federal agencies.

Not surprisingly, the Forest Service manages the largest number of wilderness units in the NWPS units (more than three-fourths), even including those located in Alaska [table 4]. On a regional basis, the Pacific Coast and Rocky Mountains-Great Plains Regions together account for about three-fourths of all individual NWPS units.

Regional Wilderness Acreage

Because wilderness lands are an "overlay" on Federal agency lands, their location necessarily mirrors the existing distribution of those lands. Primarily because 88 percent of Alaska is federally owned, the bulk of the NWPS acreage--over 75 percent--is located in the Pacific Coast Region (U.S. Department of Interior 1987a) [table 5]. Another 20 percent is located in the Rocky Mountains-Great Plains Region. The other two Regions (with 37 States) share the remaining 4 percent of the NWPS's total acreage. Figure 4 illustrates well the differences in wilderness acreage among the four Regions as well as how Alaska influences the Pacific Coast Region acreage.

Table 3. -- A summary of Forest Service, National Park Service, Fish and Wildlife Service, and Bureau of Land Management acreage and the National Wilderness Preservation System acreage as of December 3 1, 1987 (by agency)

Agency	Total agency acreage	1987 NWPS acreage	Percent agency in wilderness	Agency percent of NWPS
Forest Service	161,038,854	32,411,297	20.1	36.4
National Park Service	68,898,258	36,756,382	53.3	41.4
Fish and Wildlife Service	81,007,068	19,330,335	23.9	21.8
Bureau of Land Management	334,029,039	470,779	0.1	0.4
United States	644,973,219	88,968,793	13.8	100.0

Source: U.S. Department of Interior 1987a.

Figure 3. -- National Wilderness Preservation System acreage by Federal agency as of December 31, 1987

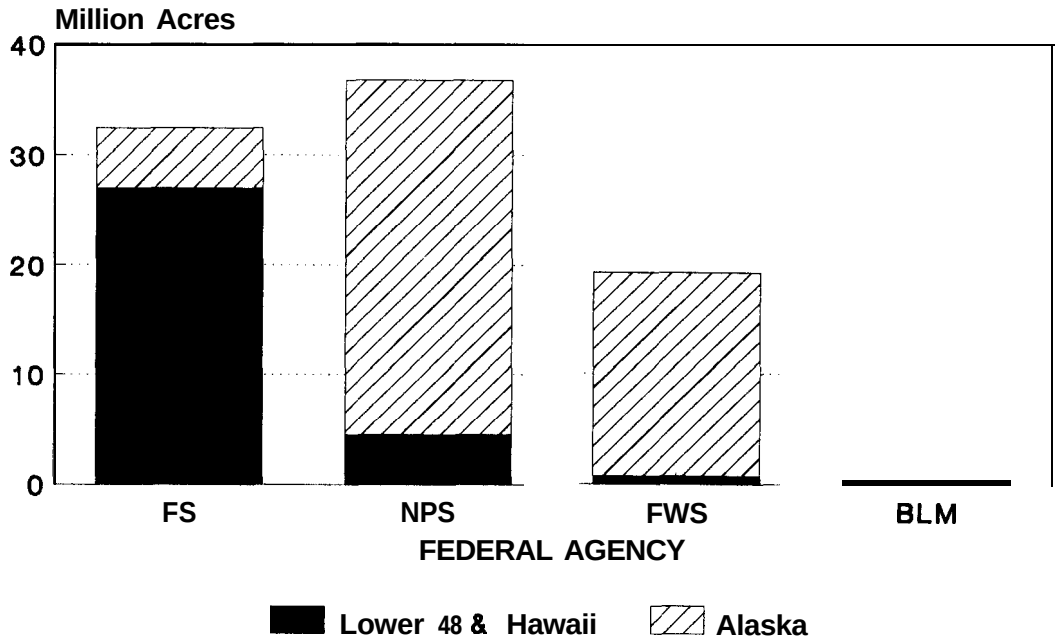


Table 4. -- A summary of National Wilderness Preservation System units as of December 31, 1987 (by agency and RPA Region)

RPA Region'	Forest Service	National Park Service	Fish & Wildlife Service	Bureau of Land Management	All Federal Agencies
Pacific Coast	119	17	26	10	172
Rocky Mountains-Great Plains	125	12	8	17	162
North	41	2	13	0	46
south	75	6	18	0	99
United States	360	37	65	27	489[2]

Source: U.S. Department of Interior 1987a.
[1] See Appendix for listing of States within each RPA Region.
[2] Total reflects several units located in more than one State and/or agency.

Table 5. -- A summary of total regional acreage and National Wilderness Preservation System acreage as of December 3 1, 1987 (by RPA Region)

RPA Region'	Total regional acreage[2]	1987 NWPS acreage'	Percent Region in wilderness	Region percent of NWPS
Pacific Coast	589,692,000	67,176,085	12.4	75.7
Rocky Mountains-Great Plains	749,449,000	17,807,232	0.3	19.9
North	446,176,000	1,456,855	[illegible]	1.5
south	37 1,990,000	2528,621	0.7	2.8
United States (excluding AK)	1,937,726,000	32,484,117	1.7	36.4
United States (including AK)	2,315,969,000	88,968,793	3.8	100.0

[1] See Appendix for listing of States within each RPA Region.
[2] Source: U.S. Department of Commerce 1987.
[3] Source: U.S. Department of Interior 1987a.

In terms of the proportion of total regional acreage in wilderness status, the Pacific Coast again leads with more than 11 percent. A distant second is the Rocky Mountains-Great Plains Region with 2 1/2 percent. In the North and South Regions, less than 1 percent of all regional acreage is in wilderness status. Taken together, NWPS acreage represent less than 4 percent of the total land area of the United States. Six States, including Connecticut, Delaware, Iowa, Kansas, Maryland, and Rhode Island, have no designated wilderness.

Wilderness Unit Size

One of every two wilderness units in the NWPS is between 5,000 and 50,000 acres (U.S. Department of Interior 1987a). About 4 percent of the NWPS is in units larger than 1 million acres, led by the Pacific Coast Region with 14 one-million-plus wilderness units (all in Alaska).

While not an absolute requirement, the Wilderness Act recommends that a wilderness unit be "at least 5,000 acres, or of a size sufficient as to make practicable its preservation and use in an unimpaired condition" (16 USC 113 1). Nearly one of every eight NWPS units is less than the 5,000 recommended acres, with most belonging to the Fish and Wildlife Service and Bureau of Land Management and occurring in the North and South Regions.

For purposes of this paper only the wilderness units have been arbitrarily divided into seven different size classes: 0 to 4,999 acres (class 1); 5,000 to 49,999 acres (class 2); 50,000 to 99,999 acres (class 3); 100,000 to 499,000 acres (class 4); 500,000 to 999,000 acres (class 5); 1,000,000 to 4,999,000 acres (class 6); and greater than 5,000,000 acres (class 7). The relative distribution of these size classes among the Regions is shown in table 6.

Land-Surface Form and Ecoregion Diversity

As shown in table 7, hill and mountain land-surface forms (Hammond 1970; U.S. Department of Interior 1982a) account for almost three-fourths of the NWPS primarily due to the influence of the Pacific Coast and Rocky Mountains-Great Plains Regions. This type of land-surface form includes lands with less than 20 percent of the area gently sloping, with local relief ranging from 300 to 5,000 feet. The next most common form is open hill and mountain (19 percent), characterized by 20 to 50 percent of area gently sloping, with local relief ranging from 100 to 5,000 feet. Plains and tablelands, characterized by 50 percent or more of the area gently sloping, total less than 5 percent of the NWPS.

Because of the Alaskan wilderness, tundra and subarctic ecoregions (Bailey 1980; U.S. Department of Interior 1982a) dominate the acreage of the NWPS with more than 44 percent of the total [table 8]. Marine ecoregions account for some 23 percent and steppe ecoregions another 14 percent. Especially underrepresented in the NWPS are the prairie (0.02 percent), rainforest (0.16 percent), and subtropical (0.8 percent) ecoregions.

Wilderness versus Urban Acreage

Nationwide, there is a little less than twice as much wilderness as there is urban built-up land (U.S. Department of Interior 1987a; U.S. Department of Commerce 1987) [table 9]. However, if Alaska is excluded, urban built-up acreage exceeds wilderness acreage by about 3 to 2.

Alaska surely possesses the greatest ratio of wilderness acreage to urban built-up land acreage (although accurate data on Alaska's urban acreage is unavailable). Consequently, the Pacific Coast Region has the highest wilderness to urban built-up acreage ratio: nearly 14 to 1. The Rocky Mountains-Great Plains Region follows with about 4 acres of wilderness for each urban built-up acre. The North and South Regions have the lowest ratios--as little as 0.07 acre of wilderness per urban built-up acre.

Per Capita Wilderness Acreage

Nationwide, including Alaska, there is about 0.4 acre of wilderness for every American citizen (U.S. Department of Interior 1987a;

Figure 4. -- National Wilderness Preservation System Acreage by RPA Region as of December 31, 1987

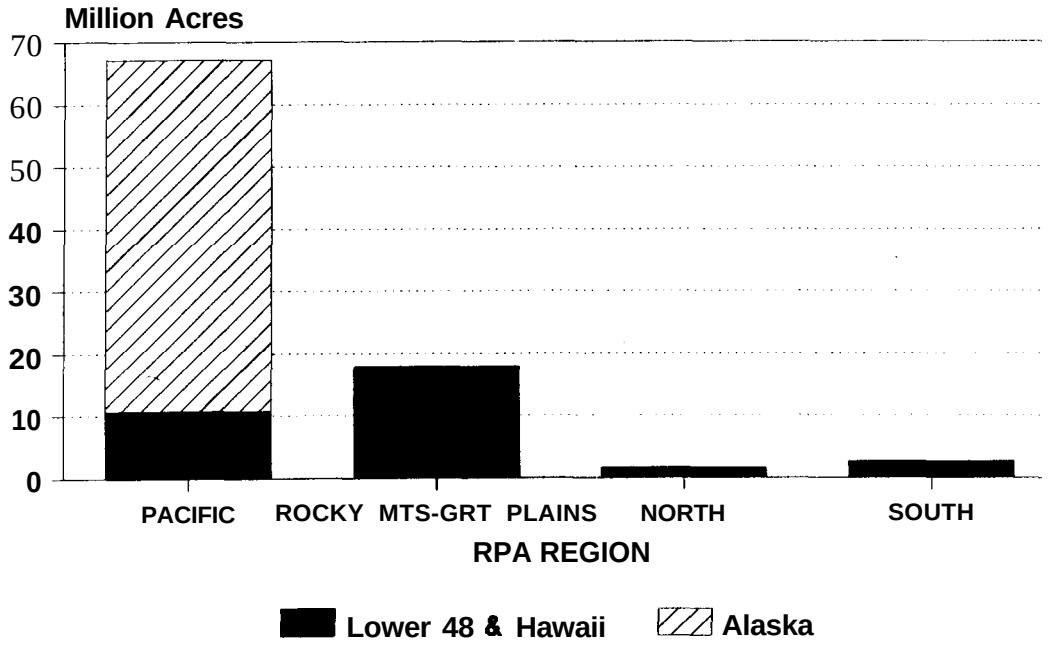


Table 6. -- Percent of National Wilderness Preservation System units as of December 31, 1987 by size class (by RPA Region')

Size Class (acres)	Pacific coast	Rocky Mtns-Great Plains	North	South	All RPA Regions
1 (0 - 4,999)	12.2	3.8	32.1	35.4	16.4
2 (5,ooo - 49,999)	43.0	57.5	64.3	61.6	54.0
3 (50,000 - 99,999)	9.9	15.0	0.0	1.0	8.6
4 (100,000 - 499,999)	21.5	19.4	1.8	1.0	14.4
	5.8		0.0		2.9
6 (1,000,000-4,999,999)	2.3	2.9	0.0	0.0	2.9
7 (5,000,000 and above)	[illegible]	0.0	[illegible]	0.0	0.8
TOTAL,	100.0	100.0	100.0	100.0	100.0

Source: U.S. Department of Interior 1987a.
[1] See Appendix for listing of States within each RPA Region.

Table 7. – Percent of National Wilderness Preservation System acreage as of December 31, 1987 by dominant land-surface form (by RPA Region[1])

Land-surface Form[2]	Pacific Coast	Rocky Mtns-Great Plains	North	South	All RPA Regions
Plains	2.50	0.4	9.8	76.6	4.1
Open hills & mountains	21.60	11.0	20.4	9.0	18.9
Hills & mountains	75.10	78.9	11.7	13.9	73.2
Tablelands	0.04	2.7	0.0	0.0	0.5
Plains with hills & mountains	0.80	6.9	58.2	0.5	2.9
TOTAL	100.00	100.0	100.0	100.0	100.0

[1] See Appendix for listing of States within each RPA Region.
[2] Source: U.S. Department of Interior 1982a.

Table 8. – Percent of National Wilderness Preservation System acreage as of December 31, 1987 by dominant ecoregion (by RPA Region[1])

Ecoregion[2]	Pacific Coast	Rocky Mtns-Great Plains	North	South	All RPA Regions
Tundra	35.4	0.0	0.0	0.0	26.7
Subarctic	23.5	0.0	0.0	0.0	17.7
Warm continental	0.1	31.3	87.4	0.0	7.7
Hot continental	0.0	0.0	11.9	18.3	0.7
Subtropical	0.0	0.0	0.5	28.0	0.8
Marine	31.3	0.0	0.0	0.0	23.7
Prairie	0.0	0.03	0.3	0.3	0.02
Mediterranean	7.4	0.0	0.0	0.0	5.6
Steppe	1.6	65.3	0.0	0.0	14.1
Desert	0.6	3.4	0.0	1.9	1.1
Tropical savanna	0.0	0.0	0.0	51.5	1.5
Rainforest	0.2	0.0	0.0	0.0	0.2
TOTAL	100.0	100.0	100.0	100.0	100.0

[1] See Appendix for listing of States within each RPA Region.
[2] Source: U.S. Department of Interior 1982a.

Table 9. – A comparison of urban built-up acreage and National Wilderness Preservation System acreage as of December 31, 1987 (by RPA region)

RPA Region[1]	1987 NWPS acreage[2]	Total urban acreage[3]	Wilderness acres per urban acre
Pacific Coast	67,176,085	4,907,000	13.6[4]
Rocky Mountains-Great Plains	17,807,232	4,222,000	4.2
North	1,456,855	20,017,000	0.07
South	2,528,621	17,268,000	0.1
United States (excluding AK)	32,484,117	46,416,000	0.7
United States (including AK)	88,968,793	---	---

[1] See Appendix for listing of states within each RPA region.
[2] Source: US Department of Commerce 1987.
[3] Source: US Department of Interior 1987a.
[4] Does not include Alaska (data unavailable).

U.S. Department of Commerce 1987) [table 10]. Excluding Alaska, that figure drops to less than one-sixth of an acre per person. Alaska residents enjoy the highest per capita acreage of wilderness, more than 100 acres for each person (much of that total, however, is relatively inaccessible). Consequently, as a Region, the Pacific Coast offers the highest per capita acreage of wilderness, about 2 acres for each resident. The next highest per capita wilderness acreage is found in the Rocky Mountains-Great Plains Region, with 1 acre per person. Again, residents of the North and South Regions have the least wilderness, although it is generally much more accessible. In these two Regions there is only about 0.01 acre of wilderness, or less, for every resident.

Given the expected national population growth rate (U.S. Department of Commerce 1987), 6 million acres of additional wilderness would be required to maintain the current national ratio through the year 2000.

A LOOK AHEAD

What is to determine the ultimate nature and composition of the NWPS--its size, geographic distribution, natural resources and environments, and management direction? Will--and should--the same factors that shaped it to date continue to control its future?

The pattern for the size and diversity of the NWPS has already been effectively outlined, albeit indirectly, in the language of the Wilderness Act itself. For the act states that the NWPS shah "be composed only of federally owned lands designated by Congress" (16 USC 1131). There are several important consequences of this language. First, it obviously eliminates the possibility of non-Federal lands from the NWPS. Therefore, State and private wild lands are excluded from consideration no matter how well they meet all other qualifications or characteristics. Second, it further limits the distribution of wilderness to only four Federal agencies. Regardless of their merit, the lands of other Federal agencies, such as those of the Bureau of Indian Affairs and various Department of Defense agencies, are excluded from wilderness review. Third, by virtue of the fact that wilderness is an "overlay" on the National Forest, Park, and Wildlife Refuge systems and public domain lands, it can only repeat the same pattern of geographic distribution exhibited by the parent systems. This means that the present pattern of unequal wilderness distribution in Alaska and the two Western Regions will continue for most new wilderness acreage. If significant changes are to occur in this pattern, some of the limitations inherent in the Wilderness Act may need to be re-evaluated.

Wilderness Recommendations and Study Acreages

Despite these apparent limitations, considerable additional acreage has already been recommended to Congress for inclusion in the NWPS and even more is under study for its suitability as wilderness. Although this new acreage could effectively double the size of the NWPS, there are no guarantees how much will eventually be added. Nor would the new acreage necessarily insure regional equality or representative diversity. To the contrary, it may perpetuate most of the existing patterns.

The original lo-year inventory period specified in the Wilderness Act has long passed for the Forest Service, National Park Service, and Fish and Wildlife Service. The Bureau of Land Management has another 4 years to complete its inventory of suitable wilderness areas and make its recommendations. As of 1987, some 14.6 million acres of land have already been recommended by the agencies for wilderness designation. More than half of this total (8.7 million acres) would come from the National Park System (U.S. Department of Agriculture 1986) [table 11]. The remainder is divided among the Forest Service, with 2.4 millions acres (U.S. House of Representatives 1984), and the Fish and Wildlife Service, with 3.4 million acres (U.S. Department of the Interior 1987b). None of the recommended acreage would come from the Bureau of Land Management's public domain lands.

The recommended wilderness acreage is concentrated in the Rocky Mountains-Great Plains Region. The 9.8 million acres there represent about two-thirds of the national total of recommended acreage [table 12]. (The four Great Plains States of North Dakota, South

Table 10. -- Per capita National Wilderness Preservation System acreage and required acreage for maintenance of existing per capita rate in year 2000 (by RPA Region)

RPA Region[1]	1985 estimated population[2]	1987 NWPS acreage[3]	1987 per capita acreage	Estimated population growth--2000[2]	Additional acreage required to maintain 1987 ratio
Pacific Coast	35,036,000	67,176,085	1.9	20.1%	5,707,508
Rocky Mountains-Great Plains	18,238,000	17,807,232	1.0	-7.4%	0
North	114,908,000	1,456,855	0.01	1.8%	24,576
South	70,557,000	2,528,621	0.04	29.2%	303,435
United States (excluding AK)	238,219,000	32,484,117	0.1	---	2,476,984
United States (including AK)	238,740,000	88,968,793	0.4	---	6,035,519

[1] See Appendix for listing of States within each Region.
[2] Source: U.S. Department of Commerce 1987.
[3] Source: U.S. Department of Interior 1987a.

Table 11. -- A summary of acreage recommended to Congress and in study for inclusion in the National Wilderness Preservation System (by agency)

Agency	1987 NWPS acreage[1]	Recommended wilderness acreage	Under study wilderness acreage
Forest Service	32,411,297	2,413,370	4,054,913
National Park Service	36,756,382	8,776,405	31,618,115
Fish and Wildlife Service	19,330,355	3,436,224[2]	57,748,868[2]
Bureau of Land Management	470,779[3]	0	23,386,714[3]
United States (excluding AK)	32,484,117	14,626,754	31,346,491
Unites States (including AK)	88,968,793	14,626,754	116,808,610

[1] Source: U.S. Department of Interior 1987a.
[2] Source: U.S. House of Representatives 1984.
[3] Source: U.S. Department of the Interior 1987b.

Table 12. -- A summary of acreage recommended to Congress and in study for inclusion in the National Wilderness Preservation System (by RPA agency)

RPA Region[1]	1987 NWPS acreage[2]	Recommended wilderness acreage[3]	Studied wilderness acreage[3]
Pacific Coast	67,176,085	3,698,089	95,804,989
Rocky Mountains-Great Plains	17,807,232	9,846,730	19,659,852
North	1,456,855	75,667	295,633
South	2,528,621	1,006,268	1,048,136
United States (excluding AK)	32,484,117	14,626,754	31,346,491
United States (including AK)	88,968,793	14,626,754	116,808,610

[1] See Appendix for listing of states within each RPA region.
[2] Source: US Department of Interior 1987a.
[3] Source: US Department of Interior 1987b, US House of Representatives 1984.

Dakota, Nebraska, and Kansas share less than 50,000 of those acres, however.) Another 3.7 million is located in the Pacific Coast Region, none of which is located in Alaska. Particularly deficient (in terms of recommended wilderness) is the North Region.

In addition to the recommended acreage, another 116.8 million acres of land within the respective systems of the four agencies are being, or have been, studied by the agencies for possible recommendation to Congress. Nearly one-half of this, about 57.7 million acres, belongs to the Fish and Wildlife Service. Within the National Park System there are 31.6 million acres of wilderness under study. The Bureau of Land Management is studying 23.3 million acres and the Forest Service another 4 million acres.

Primarily due to Alaska, the Pacific Coast leads all Regions in terms of wilderness under study. Almost three-fourths of all remaining wilderness under study, about 95.8 million acres, is located there. The Rocky Mountains-Great Plains Region is second with about 19.6 million acres. A little more than 1 million acres is being studied in both the North and South Regions. Again under-represented are the Great Plains and Northeast States, where no further potential wilderness is being studied for suitability.

Some Strategic Considerations

The prognosis for the inclusion of the recommended and/or study areas in the NWPS in not entirely clear. It may be politically unrealistic to expect that all recommended and/or study areas will eventually enter the NWPS (Crandell 1987). This may be primarily due to the potential for competing interests in the energy resources, timber, water, strategic minerals, and other commercially or strategically important national resources within these areas. It has been a long standing and common perception that such resources are "locked up" once they enter the NWPS (Irland 1979).

When the first wilderness units entered the System directly through the Wilderness Act in 1964, they only needed to meet the basic requirements stipulated in the act, such as Federal ownership, roadless character, and size (see 16 USC 1131). For the next half decade, most National Park Service and Fish and Wildlife Service wilderness additions to the NWPS were also added largely if they met the basic criteria in the act. However, in 1971 the Forest Service undertook the RARE I procedure. RARE I added additional objectives not necessarily spelled out in the Wilderness Act to the selection process, including optimization of resource and wilderness value trade-offs, preservation of representative ecosystems, and proximity to densely populated areas. Despite the innovations of RARE I, it also had some methodological shortcomings and was roundly criticized (Allin 1982). A second wilderness inventory and evaluation process, dubbed RARE II, was begun in 1977 and was to experience its own criticisms. Regardless of the problems of RARE I and II, they laid the groundwork for consideration of objectives beyond the general goal and criteria specified in the Wilderness Act.

An integrated, interagency plan for the future development of the NWPS may soon be needed. Based on agreed-upon objectives for the NWPS, such a plan might prioritize all potential wilderness--irrespective of Federal agency ownership--on strategic considerations such as the following: (1) integrity and fragility of wilderness character; (2) threats to the wilderness character; (3) size and completeness of ecosystems; (4) representativeness of different natural ecosystems and cultural heritage; (5) productivity in terms of renewable resources such as water and wildlife; (6) proximity to population and transportation; and/or (7) scientific and educational opportunities and needs. Such a plan might address the "rehabilitation" of existing Federal lands that have been impacted by allowing them slowly to regain wilderness qualities. Finally, the plan might consider the outright fee purchase (or even purchase of use easements) of private lands with wilderness qualities and significant opportunities to fill "holes" in the strategic plan.

As mentioned earlier, the NWPS doesn't appear to have a wide-open range of options to meet different strategic considerations. The Great Plains ecosystems, for example, will never be proportionally represented because

there is little Federal acreage in those States to begin with. Likewise, the Northeastern urban centers will never have a large amount of nearby wilderness acreage. If the available land base is to provide more opportunities--and meet rising expectations for non-recreational wilderness uses--then some new options should be explored, even including the possible amendment of the Wilderness Act itself. Ideas that have been suggested in the past include (1) stronger language regarding non-recreational value and uses of wilderness; (2) the creation of a separate wilderness administration agency; or (3) incorporating State or privately owned lands into the NWPS. Many are loathe to consider amending the Wilderness Act because it could also open the door to changes that might adversely affect the existing supply and management of wilderness. But, much like other environmental legislation in the past, there may be good reason to review the goals and performance of the Wilderness Act on its 25th anniversary in light of nearly a quarter of a century's experience and changing expectations.

The Next Challenges

The preservation of wilderness involves more than just its initial protection through congressional designation however. Equally important is the subsequent agency management after designation. The next challenge ahead then will be insuring that the wilderness already in the NWPS is administered "in such a manner as will leave them unimpaired for future use and enjoyment as wilderness" (16 USC 1131). Making basic wilderness management tenets and objectives operational, however, is yet to evolve fully and is often the subject of intense debate. As the process of fiig out the NWPS eventually slows, more attention and energy must be focused on the management practices of the Federal agencies (Bolle 1985).

Part of this challenge will be to expand and refine management practices for the many non-recreation& uses of wilderness. A quick review of the wilderness-specific sections within the administrative manuals of the four agencies shows that more attention has traditionally been focused on recreation rather than the other non-recreational uses, with the possible exception of commercial uses (U.S. Department of Agriculture 1973; U.S. Department of Interior 1978, 1981, 1982b). If the non-recreational values of wilderness are to be more fully appreciated and protected, additional management attention must be paid to them--including better training for managers, increased budget, and more coherent management policies.

Still another challenge will be to develop the sensitivity and methods to assign non_commodity, if not non-economic, values to wilderness planning and administrative considerations--and the courage to equate those values with the traditional economic values that are more easily, though not necessarily any more correctly, measured (Rolston 1986).

The last domestic challenge for the future of the NWPS will be to stretch further our recognition of still human-oriented "anthropocentric" (Hendee and others 1978) non-recreational wilderness values to include the nonhuman "inherent/intrinsic" values of wilderness (Driver and others 1987). Such latter values assert that the wilderness has a right to exist quite apart from any human benefits. As noted by Driver and others (1987), "wilderness preservation, as a form of restraint, helps temper the tendency of aggressive humankind to conquer and subdue the entire Earth."

A Worldly Epilogue

If the NWPS protects in perpetuity a piece of this Nation's natural heritage it will be a tremendous achievement indeed. But, if it serves, as with our National parks earlier, to inspire other nations likewise to preserve unique wildlands in a similar if not identical way, then it may become a legacy for the world as well. Perhaps the final challenge in the long evolution of wilderness preservation in this nation--as well as the world--is the wholesale eradication of war, poverty, and ignorance among humankind. For these are the real threats to a planetary wilderness preservation system.

REFERENCES

Allin, Craig W. 1985. "Hidden agendas in wilderness management." In Parks and Recreation. Volume 20, Number 5 (May).

Allin, Craig W. 1982. The Politics of Wilderness Preservation. Greenwood Press: Westport, CN.

Bailey, Robert G. 1980. Bcoregions of the United States. USDA Porest Service Miscellaneous Publication No. 1391.

Bolle, Arnold W. 1985. "Public groups turn to management issues." In Frome, Michael C., ed. Issues in Wilderness Management. Westview Press:-Boulder, CO.

Crandell, Harry. 1987. "Congressional perspectives on the origin of the Wilderness Act and its meaning today." In Proceedings-National Wilderness Research Conference: Issues, State-of-Knowledge, Future Directions. US Department of Agriculture. USDA Forest Service Technical Report INT 220.

Driver, B. L., Roderick Nash, and Glenn Haas. 1987. "Wilderness benefits: a state-of-knowledge review." In Proceedings-National Wilderness Research Conference: Issues, State-of Knowledge, Future Directions. US Department of Agriculture. USDA Forest Service General Technical Report INT 220.

Edwards, Gregory W. 1986. "Keeping wilderness areas wild." In Virginia Journal of Natural Resources Law. Volume 6, Number 1 (Fall).

Foresta, Ronald A. 1984. America's National Parks and Their Keepers. Resources For The Future: Washington, DC.

Hammond, Edwin H. 1970. "Classes of land-surface form." US National Atlas Sheet Nos. 1 and 2.

Hendee, John C., George H. Stankey, and Robert C. Lucas. 1978. Wilderness Management Handbook. USDA Forest Service Miscellaneous Publication No. 1365.

Irland, Lloyd C. 1979. Wilderness Economics and Policy. DC Heath: Lexington, MA.

Nash, Roderick. 1982. Wilderness and the American Mind. 3rd ed. Yale University Press: New Haven, CN.

Outdoor Recreation Resources Review Commission. 1962. Wilderness and Recreation - A Report on Resources, Values, and Problems. ORRRC Study Report 3. The Wildland Research Center: Washington, DC.

Reed, Nathaniel P. and Dennis Drabelle. 1984. The United States Fish and Wildlife Service. Westview Press: Boulder, CO.

Robinson, Glen 0. 1975. The Forest Service. Resources For The Future: Washington, DC.

Rolston, Holmes, III. 1986. Philosophy Gone Wild. Prometheus Books: Buffalo, NY.

Sierra Club. 1985. National Wilderness Preservation System.

University of Montana. 1985. National Wilderness Preservation System. Wilderness Institute: Missoula, MT.

U.S. Code Annotated. 1985. Title 16-Conservation. Sections 761-1150. West Publishing: St. Paul, MN.

US. Department of Agriculture. 1986. Twenty-second Annual Wilderness Report on the status of the National Wilderness Preservation System for the calendar year 1985. USDA Forest Service.

U.S. Department of Agriculture. 1973. Forest Service Manual. Chapter 2320: Wilderness, primitive areas, and wilderness study areas, USDA Forest Service. Washington, DC.

U.S. Department of Commerce. 1987. Statistical Abstract of the United States. Bureau of the Census.

U.S. Department of the Interior. 1987a. National Wilderness Preservation System. U.S. Geological Survey.

U.S. Department of the Interior. 1987b. Wilderness Opportunity Areas. U.S. Fish and Wildlife Service.

U.S. Department of the Interior. 1982a. Ecoregions and Land-Surface Forms of the United States. US. Fish and Wildlife Service.

U.S. Department of the Interior. 1982b. National Wildlife Refuge Manual. Part 6, Section 8: Wilderness area management. US. Fish and Wildlife Service. Washington,-DC.

US. Department of the Interior. 1981. Wilderness Management Policy. Bureau of Land Management. Washington, DC.

U.S. Department of the Interior. 1978. National Park Service Management Policies. Chapter 6: Wilderness preservation and management. U.S. National Park Service. Washington, DC.

US. House of Representatives. 1984. House Subcommittee on Public Lands and National Parks. Forest Service and BLM Wilderness Statistics as of December 1, 1984.

Wilderness Society. 1987. National Wilderness Preservation System (Summary Data). Washington, DC.

Wilderness Society. 1984. The Wilderness Act Handbook. Washington, DC.

APPENDIX: Summary of National Wilderness Preservation System acreage by Federal agency and RPA Region as of December 3 1, 1987.

RPA Region State	Forest Service	National Park Service	Fish & Wildlife Service	Bureau of Land Management	All Federal Agencies
Pacific Coast:					
Alaska	5453,366	32,355,000	18,676,310	0	56,484,676
California	3,920,050	1,990,034	141	15,216	5,925,441
Hawaii	0	142,370	0	0	142,370
Oregon	2,077,087	0	495	16,543	2,094,125
Washington	2,521,495	0	838	7,140	2,529,473
(SUBTOTAL)	13,971,998	34,487,404	18,677,784	38,899	67,176,085
Rocky Mountains-Great Plains:					
Arizona	1,315,657	443,700	0	272,520	2,03 1,877
Colorado	2,585,802	52,730	0	0	2,638,532
Idaho	3,957,438	43,243	0	720	4,001,401
Montana	3,371,513	0	64,535	6,000	3442,048
Nebraska	8,100	0	4,635	0	12,735
Nevada	64,677	0	0	0	64,677
New Mexico	1,388,735	56,392	39,898	130,040	1,615,065
North Dakota	0	29,920	9,732	0	39,652
South Dakota	9,824	64,250	0	0	74,074
Utah	779,638	0	0	22,600	802,238
Wyoming	3,084,933	0	0	0	3,084,933
(SUBTOTAL)	16,566,317	690,235	118,800	43 1,880	17,807,232
North:					
Illinois	0	0	4,050	0	4,050
Indiana	12,935	0	0	0	12,935
Maine	0	0	7,392	0	7,392
Massachusetts	0	0	2,420	0	2,420
Michigan	91,535	131,880	25,309	0	248,724
Minnesota	798,309	0	6,180	0	804,489
Missouri	63,130	0	7,730	0	70,860
New Hampshire	102,932	0	0	0	102,932
New Jersey	0	0	10,341	0	10,341
New York	0	1,363	0	0	1,363
Ohio	0	0	77	0	77
Pennsylvania	9,705	0	0	0	9,705
Vermont	59,448	0	0	0	59,448
West Virginia	78,131	0	0	0	78,131
Wisconsin	43,959	0	29	0	43,988
(SUBTOTAL)	1,260,084	133,243	65,528	0	1445,500

APPENDIX **(cont'd):** Summary of National Wilderness Preservation System acreage by Federal agency and RPA Region as of December 31, 1987.

RPA Region State	Forest Service	National Park Service	Fish & Wildlife Service	Bureau of Land Management	All Federal Agencies
South:					
Alabama	19,426	0	0	0	19,426
Arkansas	115,805	10,529	2,144	0	128,478
Florida	72,582	1,296,500	51,271	0	1,420,353
Georgia	89,268	8.840	362,107	0	460,215
Kentucky	18,056	0	0	0	18,056
Louisiana	8,700	0	8,346	0	17,046
Mississippi	5,500	3,202	0	0	8,702
North Carolina	100.218	0	8,785	0	109,003
Oklahoma	0	0	8,570	0	8,570
South Carolina --	16,529	0	29,000	0	45,529
Tennessee	66,714	0	0	0	66,714
Texas	35,413	46,850	0	0	82,263
Virginia	64,687	79,579	0	0	144,266
(SUBTOTAL)	612,898	1,445,500	470,223	0	2,528,621
United States:					
Total (excluding AK)	26,957,931	4,401,382	656,581	470,779	32,484,117
Total (including AK)	32,411,297	36,756,382	19,330,335	470,779	88,968,793

Source: U.S. Department of Interior 1987a.

ENDNOTES

1. *The four Regions used in this paper are the same as those to be used in the Forest Service's 1989 RPA Assessment. These Regions do not correspond to the standard Forest Service Regions. Fig. 1 above depicts the composition of these Regions (Alaska and Hawaii are not shown but are part of the Pacific Coast). A list of States within each Region may be found in the Appendix.*

2. This total is according to the U.S. Department of Interior (1987a). It should be noted that authoritative sources often differ on several important statistical characteristics of the NWPS, including the number of units, their acreage, and who manages them (see, for example, U.S. Department of Agriculture 1986, U.S. Code Annotated 1985, University of Montana 1985, Sierra Club 1985, and Wilderness Society 1987). Discrepancies result from several factors, such as units in one or more States or agencies, changes in land acquisition, boundary adjustments, refinement in measurements, and completion of official mapping, as well as whether gross (including water and private inholding) or net acreage is reported. Actually, failure of agreement on the acreage of units is probably insignificant in assessing the true size of the NWPS since nearly two dozen Alaskan wilderness units have only been reported to the nearest 100,000 acres!

THREATS TO THE NATIONAL WILDERNESS PRESERVATION SYSTEM

John Peine, John Burde, and William **Hammitt***

ABSTRACT

***Influences by man on natural ecosystems are escalating at an alarming rate, with profound global effects on natural resources. Resources of the National Wilderness System are not immune to those threats. A review of four surveys of wilderness unit managers conducted over the last seven years reveals the wide variety of internal and external threats to wilderness, the lack of understanding of the ramification of those threats on the resource base or wilderness experience, and the trend toward an increase** in the number and intensity of threats over time. The perception that wilderness is forever may be a pipe dream. Managers are a long way from understanding the ramifications of anthropogenic influences on the natural ecosystem process which constitute the essence of wilderness values they are charged to protect.*

INTRODUCTION

The concept of threats is difficult to define. As J. S. Burgess and E. Woolmington (1981) note, the *term* "**threat**" is highly anthropocentric: it is a social metaphor applied to biological systems. It suggests human concern that certain valued characteristics of nature are in danger of degradation or destruction. Ecologically, threats can be considered suspected stresses, and "thus threat can be said to roughly equal perceived (and sometimes imagined) stress, often with additional connotations relating to the interests of the perceive?' (Burgess and Woolmington 1981).

For the purpose of this discussion, the term "threat" will be limited to those activities by man which degrade valued characteristics of nature. Unfortunately, "threat" is a loaded term and means different things to different people but is generally accepted to convey the topic at hand.

From Rachel Carson in "Silent Spring" to the Apollo mission astronauts who were the first to see the earth as a finite planet, man has gradually become aware of the ramifications of his actions on the planet **Earth.**

Our understanding of the health of the planet lags far behind our understanding of the health of the human body. Our present awareness of global health may be equivalent, in the evolution of medical science, to a period somewhere between the bubonic plague and the discovery of the polio vaccine, It is definitely at some point prior to the modem era of extensive cancer research and treatment technology.

Global health encompasses all terrestrial and aquatic ecosystems. Threats to global health most assuredly affect our wilderness system. Man's global population escalates at an ever-increasing rate, and his adverse impact on the natural environment escalates exponentially. We **are** just beginning to take the carbon cycling issue and resultant global warming phenomenon seriously. Ozone depletion in the stratosphere and artificial formation in the atmosphere have recently come to our attention. Massive global deforestation is under way. Intercontinental species introduction threatens native species populations on every continent. As a result of all this, scientists are predicting rises in sea

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level anywhere from 6 inches to 3 feet; major shifts in climate, creating deserts in regions with normally plentiful rainfall; and possible loss of species critical to many other forms of life. For example, Asian bee mites have invaded Florida and threaten the future existence of honey bees in North America. This is not too important unless you want to eat.

Assessment of anthropogenic threats related to natural ecosystems has been focused primarily on parks as opposed to wilderness areas. Most studies of threats to parks have been limited to specific parks or discussion of geographically homogeneous parks. Much of the research has been qualitative. A few systematic studies of threats to parks have been conducted, mostly in the United States. None of them incorporate any of the issues of global health previously mentioned in a broad context, such as sea level size or climatic change.

Long-term ecological research sites have varying histories in the type and length of studies concerning ecosystem level processes and species community dynamics. These programs are laying groundwork for detecting ecosystem response to environmental change and anthropogenic influences. These programs tend to be site-specific, and their relevance to the landscape scale is not well understood. Syntheses of research conducted at these sites are not usually couched in terms of threats as the concept is presented here.

The assessment of threats to wilderness in this discussion will be based on a synthesis of four studies. First, the National Park Service 1980 Report to Congress on the State of the Parks will be utilized (NPS 1980). This represents the only attempt made to assess internal and external threats to 320 park units of the National Park System The term "threats" as used in the NPS report refers to those pollutants, visitor activities, exotic species, industrial development projects, and so on, which have the potential to cause significant damage to park resources or seriously to degrade important park values or park experiences. The report had significant impact in Congress, but the term "threat" has since been dropped by NPS in order to avoid the perception of sensationalizing the issues.

In 1983 Randel Washburne and David Cole published results of a survey of wilderness managers (Washbume and Cole 1983). The section of that report directed toward impacts from recreational use on wilderness values was utilized. This study was limited to internal influences on wilderness. The data were collected in 1980.

The third study utilized is an assessment of the state of the world's parks conducted by Gary Machlis and David Tichnell (Machlis and Tichnell 1985). Questionnaires were analyzed from 100 parks in 49 countries.

The fourth data set was collected for this paper, consisting of a telephone survey of managers of 50 designated U.S. wilderness areas. Data were collected by Mark Young, a graduate student of Dr. William Hammitt of the University of Tennessee, and Denise Ervin, a graduate student of Dr. John Burde of the Southern Illinois University. Data for this study consisted of replication of a section of Washbume and Cole's questionnaire in order to establish trends in recreation impacts and a section devoted to external influences on wilderness values in which managers indicated on a scale the level of significance of the threat.

All four of these studies utilized qualitative, judgmental variables to assess threats. All essentially were attempting to establish a consensus of management opinion concerning a broad range of issues. A case study of wilderness management for the Great Smoky Mountains National Park (GSMNP) is also included in order to provide specific examples of issues raised by the general surveys.

OVERVIEW OF THREATS

All four studies conclude that a wide variety of threats exists concerning parks and wilderness areas. Seventy-three different kinds of threats were identified in the 1980 NPS assessment. A total of 1,611 threats were identified by park managers in the global park assessment. Only 3 out of 100 global park managers reported no threats to their parks. These instances were due to extreme isolation from areas of human activity. Washbume and

Cole found wilderness unit managers shared common problems of resource degradation and loss of solitude due to recreational use. None of the 50 wilderness unit managers contacted in the 1987 survey indicated an absence of threats in their areas. At GSMNP; 41 threats were listed.

Documentation as to the degree and nature of impact from the threats is considered inadequate. In the 1980 NPS assessment of parks, 75 percent of all 3879 reported threats identified by the 310 respondents to the questionnaire were in need of research to document adequately. As depicted in figure 1 from the 1980 NPS Report to Congress, none of the categories of threats beyond esthetic degradation had more than 70 percent of their threats adequately documented. Responses to the global park assessment portrayed in table 1 indicate that, on an average, over 40 percent of the threats are not documented.

Despite 12 years of an established in-house research program at GSMNP, most of the recognized threats are not well understood. For instance, the makeup of air pollutants and their adverse effects on plants, animals, and soils is just beginning to be understood. Of approximately 300 exotic plant species occurring in the park, only one, kudzu (Pueraria lobata), has been thoroughly mapped and populations treated. Long-term effects of those treatments are not adequately monitored. Eradication treatment for many species, such as Microstegium, a Japanese grass that is taking over the forest floor in disturbed areas, is just now being studied, with no promising treatment yet discovered. The illegal taking of plants and animals is another activity that is known to occur in the park, but the extent of it is unknown.

RECREATION-CAUSED IMPACTS

Only 13 of the 252 area managers included in the Washbume and Cole survey indicated no recreation problems in their management units. Perceptions of recreation-caused impacts by the 1987 sample of wilderness unit managers is portrayed in table 2. Response summaries displayed are only for those instances where managers considered the impacts to be a problem in many places.

On an average, human-caused adverse impact from recreational activity frequently occurs in one out of four wilderness units. Vegetation damage around campsites was most frequently cited. It is considered to be a problem at a few areas by 46.7 percent of the respondents, and a problem at many areas by 36.7 percent of the respondents. The 7-year trend indicates an increase in damage for 12 percent of the areas and a decline in damage in 10 percent of the areas.

At GSMNP from 1980 to 1985, a 50 percent decline occurred in backcountry overnight use, from approximately 100,000 to 50,000 overnight stays. During that period, an extensive mapping of bare ground at backcountry campsites was conducted and revealed significant recovery at a majority of the sites. However, the trend in the Smokies is not universal. The problem of crowding occurred in 16 percent of the areas. The problem of litter, of similar magnitude to crowding, may show slight improvement. Over 85 percent of the managers indicated litter was a problem in at least some places in their areas. A few more indicated an improvement (14 percent) than a decline (10 percent) in this impact.

Comparisons of recreation-caused impacts by Region size and agency are displayed in table 3. Human-caused impacts on vegetation are greater in the West than the East. This is undoubtedly due in part to the fact that Eastern areas are more likely to be mesic and have greater species diversity so they may be more resilient to human activity and recover more quickly from it. Interestingly, large wilderness areas are much mom frequently cited than small areas (under 50,000 acres) as having diverse impact from human activity. Sixty percent of the managers of large areas cited vegetation trampling at campgrounds as a problem in many places. Soil compaction was cited almost as frequently. Litter was cited as a serious problem three times as often by managers of large versus small areas.

Table 1. -- Status of reported threats in the Global Park Assessment

Subsystem	Suspected N	Suspected %	Documented N	Documented %
Total	645	40	966	60
Water	56	36	99	64
Air	19	45	23	55
Soil	78	48	83	52
Vegetation	100	31	227	69
Animal life	212	46	249	54
Management	111	35	208	65
Other	69	47	77	53

Source: Machlis and Tichnell 1985

Table 2. -- Trends in recreation-caused impacts for a 50-unit sample of the National Wilderness Preservation System

Impacts	% of units having "a problem in many places" in 1987	% Change from 1980 Worse	% Change from 1980 Better
Human-caused vegetation impacts			
Trails	22.4	14	4
Campsites	36.7	12	10
Waterbodies	28.6	16	8
Human-caused soil impacts			
Trails	26.5	2	8
Campsites	28.6	10	10
Waterbodies	8.2	14	8
Packstock-caused vegetation impact			
Trails	15.9	8	0
Campsites	11.4	6	0
Waterbodies	2.3	10	2
Packstock-caused soil impact			
Trails	18.2	10	0
Campsites	11.6	10	2
Waterbodies	2.3	10	2
Other recreation-caused impacts			
On wildlife	8.2	10	8
Water pollution	4.1	18	4
Litter	16.3	10	14
Human waste	10.2	12	4
Crowding	18.4	16	6
Conflicts between users	4.1	18	4
Trailhead vandalism	12.2	22	2
Theft within area	14.3	8	6
Boundary-related problems	28.6	22	22

Source: 1988 National Wilderness System assessment

Table 3. -- Comparison of recreation-caused impacts among subsets of the National Wilderness Preservation System

Impacts	East vs. West[1]		Large[2] vs. Small		NPS vs. USDAFS	
	n=17	n=33	n=25	n=25	n=18	n=26
Human-caused vegetation impacts						
Trails	5.9	31.3	28.0	16.7	29.4	23.1
Campsites	29.4	40.6	60.0	12.5	47.1	34.6
Waterbodies	17.6	34.4	32.0	25.0	35.3	30.8
Human-caused soil impacts						
Trails	23.5	28.1	32.0	20.8	35.3	26.9
Campsites	29.4	28.1	52.0	4.2	41.2	26.9
Waterbodies	41.2	12.5	12.0	4.2	11.8	7.7
Packstock-caused vegetation impacts						
Trails	13.3	17.2	21.7	9.5	21.4	16.7
Campsites	13.3	10.3	14.4	4.8	7.1	16.7
Waterbodies	13.3	3.4	0	4.8	35.7	4.2
Packstock-caused soil impacts						
Trails	13.3	20.7	26.1	9.5	21.4	20.8
Campsites	6.7	14.3	17.4	5.0	57.1	21.7
Waterbodies	13.3	3.4	0	4.8	21.4	4.2
Other recreation-caused impacts						
On wildlife	5.9	9.4	12.0	4.2	17.6	3.8
Water pollution	5.9	3.1	8.0	37.5	5.9	3.8
Litter	11.8	18.8	24.0	8.3	29.4	11.5
Humanwaste	11.8	9.4	16.0	4.2	11.8	11.5
Crowding	11.8	21.9	20.0	16.7	11.8	26.9
Conflicts between users	5.9	3.1	4.0	4.2	5.9	3.8
Trailhead vandalism	5.9	15.6	12.0	12.5	5.9	15.4
Theft within area	11.8	--	20.0	8.3	0	7.7
Boundary related problems	23.5	31.3	28.0	29.2	35.3	19.2

[1]West = West of Great Plains
[2]Large = greater than 50,000 acres

Source: 1988 National Wilderness System assessment

National Park Service managers were more likely to cite recreation caused impacts than were USDA Forest Service managers. One exception to this is in citation of crowding, where more than twice as many Forest Service managers as Park Service managers cited it as a widespread problem.

EXTERNAL THREATS

Cumulative rank order responses for the significance of external threats are displayed in table 4. Military operations, namely overflights, was ranked first among all threats listed. The all-pervasive airborne pollution ranked a close second. As shown in table 5, air pollution was the least often mentioned as an insignificant threat. Fires set by man was the next most frequently mentioned threat of the slightly (2 level) and somewhat significant (3 level) categories. Exotic plant species was the most frequently mentioned threat in the very significant (4 level) category, and military operations was most often mentioned in the extremely significant category. (The military operations

Table 4. -- Rank order of external threats to the National Wilderness Preservation System (n = 50)

External threat category	Rank Order
Military operations (overflights)	1
Air pollution	2
Exotic plant species	3
Fires set by man	4
Tourist	5
Poaching	6
Exotic wildlife species	7
Water pollution	7
Mining/prospecting for minerals	9
Industrial development	10
Livestock grazing	11
Logging activity	12
Exotic pathogens	13
Exotic insect pests	14
Overpopulation of native species	15
Oil and gas mining	15
Incompatible use of inholding properties	17
Thermal mining	17

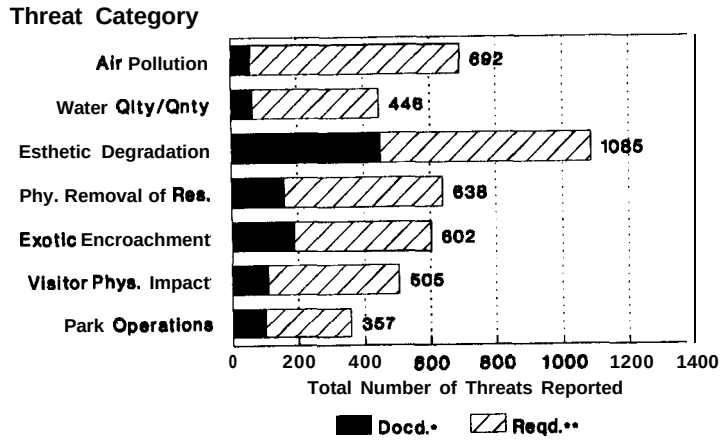
Source: 1988 National Wilderness System assessment

Table 5. -- The degree of significance of external threats to the National Wilderness Preservation System (n = 50)

	Significance Level				
External Threat Category	1 (Not)	2	3	4	5 (Extremely)
Poaching	50	22	20	8	0
Incompatible use of inholding properties	69	16		4	2
Fires set by man	44	28	21	4	2
Exotic plant species	42	28	12	16	2
Exotic wildlife species	68	14	8	6	4
Exotic insect pests	80	20	2	2	4
Exotic pathogens	78	12	4	4	2
Overpopulation of native species	82	8	6	2	2
Livestock grazing	55	20	14	8	2
Military operations (overflights)	42	22	18	12	6
Logging activities	78	8	10	2	2
Air pollution	40	26	18	12	4
Water pollution	52	34	12	2	0
Tourism	48	24	20	8	0
Oil and gas mining	84	6	6	0	4
Mining/prospecting of minerals	72	16	4	4	4
Thermal mining	92	4	0	2	2
Industrial development	76	8	6	10	0

Source: 1988 National Wilderness System assessment

Figure 1. -- Number of known and suspected threats to National Parks (by threat category) which require research to adequately document, as compared with threats which are adequately documented by research



* Adequately Documented by Research
** Known or Suspected Threats which Require Research to Adequately Document
Source: National Park Service, 1980 Report to Congress on the State of the Parks

Table 6. -- Comparisons of external threats among subsets of the National Wilderness Preservation System (n = 50)

	% of unit managers considering threat not significant					
	East/West[1]		Large/Small[2]		NPS/USFS	
External threats	n=17/	n=33	n=25/	n=25	n=18/	n=26
Poaching	71	61	40	60	28	69
Inholders	41	69	64	75	61	76
Fires by man		45	36	48	17	38
Exotic plants	41	42	60	76	33	61
		67	80			84
Exotic wildlife	71	85			67	88
Exotic pathogens	82	76	68	88	72	77
Overpopulation	82	82	84	80	83	85
Livestock	100	31	56	54	50	52
Military (overflights)	53	36	32	52	28	46
Logging	82	33	72	84	11	85
Air pollution	9	48	56	52	39	46
Water pollution	47		32	48		58
Tourism		48		64	33	58
oil & gas	82	85			72	92
			88	88	67	73
Mining	88	94	72	80	78	100
Industrial development	76	76		80	61	81

[1] West = West of great plains
[2] Large = greater than 50,000 acres
Source: 1988 National Wilderness System assessment

Table 7. -- Ten most reported threats of the Global Park Assessment (n=98)

Subsystem	Threat	N	%
Animal life	Illegal removal of animal life	74	76
Management	Lack of personnel	72	73
Vegetation	Removal of vegetation	60	61
Soil	Erosion	57	58
Management	Local attitudes	42	53
Management	Conflicting demands	52	53
Vegetation	Fire	50	51
Animal life	Human harassment	49	50
Animal life	Loss of habitat	47	48
Vegetation	Trampling	46	47

Source: Machlis and Tichnell 1985

Table 8. -- Ranking of threats cited by 1980 State of Parks report

Threat Category	Number of citations
Noise - motor vehicles and aircraft	153
Land development	120
Exotic plants	116
Utility access	110
Overcrowding and vandalism	107
Roads and railroads	106
Trampling	104
Smoke	102
Soil erosion	100
Urban encroachment	193

Source: National Park Service, 1980 Report to Congress on the State of the Parks

category is somewhat misleading in that it refers primarily to overflight, and some respondents may have included commercial or private air traffic within the category.)

Comparisons of responses to the external threats question for various subsets of the sample population of unit managers are displayed in table 6. External threats were more likely to be cited in the Western than Eastern units, in large rather than small units, and in those units managed by the Park Service rather than the Forest Service. Disparity between agencies was most extreme for the threat categories of poaching, exotic plants, exotic wildlife, air pollution, and tourism. This dichotomy for these categories held true for large versus small units as well Agency differences probably reflect differences in core agency missions as well as the fact that the Forest Service units tended more to the West, where they are more likely to be surrounded by large buffer zones of Federally owned land. Six of the 17 Eastern wilderness units were managed by the Forest Service.

Machlis and Tichnell did not differentiate between internal versus external or recreation versus other internal activity, but their list of most reported threats, as displayed in table 7, is quite similar to that displayed in table 4. Many on the list are human behavior problems.

Table 8 is a list of threats to parks from the 1980 NPS study. Again, many recurring themes occur

At GSMNP, the number one threat to the park is the external threat of air pollution. The extent of the adverse effect is yet to be determined, but scientific study to date has clearly indicated a significant decline in visibility and a high degree of pollutants loading in the high elevation forests. Ozone damage to plant foliage is widely documented. The high-elevation red spruce trees are in a severe state of decline in vigor. Other external threats of key importance are tourism-related development adjacent to the park; poaching of plants and animals; fires set by man; and exotic pathogens, insects, and plants. The next wave of extreme stress will be from the exotic gypsy moth.

CONCLUSIONS

The concept of wilderness in perpetuity might be overly optimistic. Global climatic change could drastically change biological elements of our National Wilderness Preservation System. The threats to the system are numerous and not well documented. Those that are most likely to receive aggressive management action are associated with recreational use, The National Park Service is more likely to place restrictions on public use of wilderness and more frequently cited threats associated with exotic species and poaching. The USDA Forest Service was more concerned with crowding than the National Park Service. There may be a problem with a lack of recognition of threats in some circles. The external threats are particularly troublesome since the means to deal with them tend to be beyond the authority of the unit manager.

The following recommendations are suggested:

1. Establishment of a long-term, ecologically based monitoring program for the wilderness system to evaluate nature's response to anthropogenic influences.

2. More uniformity of wilderness management policy among agencies.

3. A standard data base on wilderness.

4. A means of liaison between the site manager and the perpetrators of the external threats.

REFERENCES

Burgess, J. S., and E. Woolmington. 1981. Threat and stress in the Clarence River Estuary of Northern South Wales. Human Ecology 9(4) (419-43 1).

Machlis, G. E., and D. L. Tichnell. 1985. The state of the world's parks. Westview Press, Boulder and London.

National Park Service. 1980. State of the parks, 1980. A Report to the Congress. Office of Science and Technology, National Park Service, U.S. Department of the Interior, Washington, DC.

Washbume, R. F., and D. N. Cole. 1983. Problems and practices in wilderness management: a survey of managers. Res. Paper INT-304, USDA Forest Service, Intermountain Forest and Range Experiment Station, Ogden, UT.

DE FACTO WILDERNESS:

LANDS COMPLEMENTARY TO THE NATIONAL WILDERNESS SYSTEM

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ABSTRACT

The Wilderness Act defines wilderness in part as land retaining its primeval character and influence, which is protected and managed to preserve its natural conditions, is of sufficient size to make practicable its preservation and may contain ecological, geological, and other features of scientific, educational, scenic or historic value. In the United States there are Federal, State, and private systems of land that are of similar character and serve to complement the National Wilderness System. The principal, but not exclusive, purpose of these non-wilderness land systems is to ensure the long-term preservation and maintenance of the Nation's elements of natural diversity. With this objective, these lands primarily serve non-recreational purposes, although, like National Wilderness Systems lands, man usually is allowed to come as a visitor. There are natural preserve designations at all levels of government, as well as other recreational, wildlife, open space, and scenic land systems that, to a greater or lesser degree, complement the National Wilderness System. This paper will attempt to treat public and private nature preserves fairly comprehensively because it is these lands that most closely replicate and contribute to the non-recreational aspects of wilderness.

MAJOR FEDERAL AGENCIES WITH NATURAL AREA PROGRAMS

Five major Federal agencies are responsible for managing more than 723 million acres (BLM 1983). Together, these agencies make up the bulk of the Federal estate as well as the bulk of both established and de facto wilderness Nationwide.

National Park Service

The National Park Service administers 339 National Park System units encompassing 79 million acres (National Park Service 1986). Lands are managed for recreation and preservation under a variety of names, including National Parks, National Monuments, National Historic Sites, National Historical Parks, National Recreation Areas, National Seashores, and National Lakeshores.

It is difficult to ascertain precisely what portion of the National Park System is managed for natural diversity because the agency generally has avoided using special designations to indicate which lands serve which purpose. Their current approach is to recognize that lands may have several attributes and to manage all lands as "jewels in a crown of jewels" (National Park Service 1964). However, in the 1960's and 1970's the Park Service categorized their lands as natural, recreational, and historic. In 1975, 83 percent of Park Service land was in the natural category. If the same ratio holds true today, and it should because the major additions have been in Alaska, there would be 66 million acres of natural lands. Some 36.8 million acres of these lands are currently wilderness (Wilderness Society 1987).

Within each park, regardless of the management category or the natural or historic theme it portrays, the Park Service classifies all

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lands for management purposes on a land classification system designed to recognize the inherent qualities of park land, the visitor uses they may serve, and the special uses allowed by law or administrative regulations.

The National Park Service natural zones are subdivided into wilderness/wilderness study, environmental protection, outstanding natural features, and natural environment subzones. There also are historic development and special use zones. The National Park Service has also participated in the interagency Research Natural Area Program (table 2). Based on the premise that the National Park Service manages its natural lands for their inherent qualities, the 29.2 million acres of non-wilderness natural-lands can be described as contributing significantly towards non-recreational wilderness objectives.

United States Fish and Wildlife Service

The US Fish and Wildlife Service administers the 90-million acre National Wildlife Refuge System (U.S. Fish and Wildlife Service 1985). The refuge system includes National wildlife refuges, game ranges, wildlife management areas, waterfowl production areas, and areas for the protection and conservation of fish and wildlife that are threatened with extinction, The Service administers and manages these lands for purposes that range from strict protection of a specific species or native habitat to major habitat manipulation and change. Therefore, it is difficult to say what percent of the total non-wilderness portion of the refuge system is maintained in a natural condition, It is, no doubt, significant acreage.

In addition to the 19.4 million acres of wilderness that the Fish and Wildlife Service manages, they have an internal Public Use Natural Areas Program and participate in the interagency Research Natural Area Program. A "Public Natural Area," a Fish and Wildlife Service administratively created designation, is defined as "... a relatively undisturbed ecosystem or sub-ecosystem that can be enjoyed by the public under certain restrictions without destroying it" (US Fish and Wildlife Service 1972). Along with Research Natural Areas, Public Use Natural Areas serve to preserve for the future valuable environments that are essentially unmodified to man.

There are currently 37 Public Use Natural Areas covering 210,673 acres and 186 Research Natural Areas covering 1,850,685 acres (table 1).

Table 1. -- Established Research Natural Areas by Agency'

Agency	RNAs	Acres
USDA Forest Service	160	181,041
USDI Fish & Wildlife Service	186	1,850,685
USDI National Park Service	6 6	2,000,000
Bureau of Land Mgt.	100	190,138
Department of Defense	5	?
Totals	517	4,221,864+

[1] Data from personal communication between authors and agency personnel.

The Fish and Wildlife Service also administers the Federal Endangered Species Act of 1973 as amended. This act requires all Federal agencies to utilize their authority to carry out programs for the conservation of officially listed endangered and threatened species. To facilitate this process, "critical habitat" may be designated during the listing process for each species; this constitutes the geographical areas occupied by that species that are essential to its conservation. There are now a total of 101 species that have been listed with designated critical habitat (U.S. Fish and Wildlife Service 1988).

Bureau of Land Management

The BLM owns and manages some 341 million acres of the Federal estate, almost entirely in the Western half of the country (BLM 1983). These lands are managed under

a multiple use policy as outlined and specified in the Classification and Multiple Use Act of 1965 and the Federal Land Policy and Management Act of 1976 (FLPMA), Among the expressed land use categories for BLM property are wilderness and a host of other designations that have non-recreational wilderness values. To date, the BLM has established 23 wilderness areas totalling 370,000 acres (Wilderness Society 1987). Several State BLM offices are in the process of analyzing a number of wilderness study areas for potential Congressional designation.

Along with other Federal agencies, the BLM has participated in the National Research Natural Areas system (table 2). This agency has also used many other special designations but brings them all together in its Areas of Critical Environmental Concern (ACEC) program. Mandated by the FLPMA legislation, these areas are designated when special management attention is needed to protect important historic, cultural, scenic, and/or natural values. Those identified for natural values best represent non-recreational wilderness values. There are a total of 281 established ACECs covering 5.1 million acres (BLM 1987). A majority of these have substantial natural area values.

USDA Forest Service

The USDA Forest Service owns and manages over 191 million acres (USDA Forest Service 1986). As with the BLM, these lands are managed under a multiple use concept. Guidance has been provided by the National Forest Management Act of 1976, which called for the generation of individual National Forest plans to allocate specific land uses. To date, the Forest Service has 338 units of established wilderness totaling 32.4 million acres (USDA Forest Service 1987). Other protective designations used internally by the agency which have significant natural diversity values include Research Natural Areas and Special Interest Areas.

The Forest Service has traditionally been the lead agency in the Federal Research Natural Area program (see RNA section). Much of the substance and direction for the system has developed within the Forest Service beginning in 1925 with the first official designation, There are now 160 established Forest Service RNAs totaling 181,041 acres with over 500 new areas proposed in forest plans and pending designation (tables 1 and 2). Special Interest Areas are designated administratively under the recreation branch of the Forest Service with their objective being to protect and manage special recreation areas with scenic, geological, botanical, zoological, paleontological, archeological, or other special characteristics (USDA Forest Service 1986). Of these categories, only the botanical, zoological, and geological themes contribute substantial non-recreational wilderness values. There are currently 45 such areas in the National Forest system, with more likely as forest plans are finalized (USDA Forest Service 1987).

Department of Defense

The defense agencies (Army, Air Force, Navy, Marines, and Army Corps of Engineers) together own and manage over 22 million acres of the Federal estate (BLM 1983). The Department of Defense recognizes natural resource management for environmental quality, which can include the selection of lands as natural areas (Department of Defense 1965). The individual defense agencies have participated in various Federal land protection programs in a limited fashion by designating a handful of Research Natural Areas, National Wildlife Refuges, and National Monuments on their lands (tables 1 and 3). Although the Department of Defense has relatively few established natural areas, their lands contain substantial biological diversity and hold great potential for adding to the National system of de facto wilderness.

Research Natural Areas Program

The one Federal program that probably best represents non-recreational wilderness values is the Research Natural Areas system. This designation is used by all the major Federal land managing agencies and carries with it a connotation of relatively strict management practices for the preservation of natural diversity. There are now 517 established Federal RNAs with more pending (tables 2 and 3).

Table 2. -- Established and Proposed USDA FS RNAs by Region[1]

FS Region	Established	Proposed	Total
1 (Northern)	20	75	95
2 (Rocky Mountain)	13	12	25
3 (Southwest)	14	29	43
4 (Intermountain)	19	89	118
5 (Pacific Southwest)	15	84	99
6 (Pacific Northwest)	39	80	119
8 (Southern)	22	17	39
9 (Eastern)	12	140	152
10 (Alaska)	4	23	29
Totals	160	549	709

[1] Data from Mr. Russell Bums, USDA FS, Washington, DC.

Table 3. -- Major Federal De Facto Wilderness Designation Types

Designations[1]	Agencies[2] USFWS	NPS	USFS	BLM	DOD	Congress
Research Natural Areas	D,M	D,M	D,M	D,M	D,M	--
National Parks and Monuments	--	M	M	--	M	D
National Wildlife Refuges	D,M	--	--	--	M	D
Critical Habitat	D,M	M	M	M	M	--
Wild and Scenic Rivers	M	M	M	M	--	D
Areas of Critical Env. Concern	--	--	--	D,M	--	--
Special Interest Areas	--	--	D,M	--	--	--

[1] USFWS = US Fish and Wildlife Service; NPS = National Park Service; USFS = US Forest Service; BLM = Bureau of Land Management; DOD = Department of Defense.
[2] D = Designation Authority; M = Management and/or Ownership Authority.

Guidelines for the identification, establishment, and management of RNAs were originally developed by the Forest Service. Each agency that uses the RNA designation has its own internal procedures for establishment, but the Forest Service manual provides a good overview. Objectives for the RNA system therein include preserving a wide spectrum of pristine representative ecosystems, preserving and maintaining genetic diversity, and serving as reference baseline areas for studying succession, and monitoring the effects of resource management practices. Management standards are designed to protect RNAs against activities that directly or indirectly modify ecological processes (USDA Forest Service 1985).

Wild and Scenic Rivers

In 1968, Congress enacted the Wild and Scenic Rivers Act. The purpose of this act is to preserve selected rivers or sections thereof in their free-flowing condition to protect water quality of such rivers and to fulfill other vital National conservation purposes. Three levels of designation/protection are defined in the act: Wild, Scenic, and Recreation. Of these, only the Wild designation contains specific management provisions which qualify it for inclusion as *de facto* wilderness. A total of 7,363 river miles of 72 individual rivers have been designated Nationally as Wild and Scenic Rivers to date. Of this total, 4,293 river miles are designated as Wild (National Park Service 1986b). Ownership of these river miles includes Park Service, Forest Service, BLM, and Fish and Wildlife Service, among others (table 1).

State Activities

Every State has some form of *de facto* wilderness system within one or more of its land managing departments. The entities of State government involved range from Departments of Transportation to Divisions of Water Resources but most typically include some forms of designation administered by State Parks, Game and Fish, and/or Natural Resource agencies.

Many States have established nature preserve programs which are established and managed exclusively for the preservation of natural diversity. Some nine States have their own internal wilderness systems similar to the Federal system, set up via State law or administrative regulation. These programs, among all other State natural area activities, contribute the most in terms of National non-recreational wilderness values. Some State nature preserve programs receive significant State government funding and actively acquire and manage new lands via purchase, while others identify and designate the most appropriate existing State-owned lands for preservation. The nine States with wilderness systems have established at least 50 areas totaling more than 1.7 million acres (Natural Areas Journal 1984).

Natural Heritage Inventories and databases exist in 48 States. Developed originally by The Nature Conservancy in the 1970's. these programs contain detailed manual and computerized data on rare and endangered species and native ecosystems. In most States, Natural Heritage Programs are now partially or wholly operated by State government. They are used extensively by the private and public sectors as a tool to help determine conservation priorities of specific sites and to track the status of species of concern.

Private Preserves and Related Systems

Systems of privately held preserves that contribute to the protection of natural areas fall into two categories: (1) National nonprofit organizations and (2) local or regional land trusts. Relatively few of the National organizations are set up to acquire and manage parcels of land. The Nature Conservancy and the Audubon Society are the two most significant ones.

The Nature Conservancy has established the largest system of privately held reserves in the world. Their preserves are identified, established, and managed strictly for the purpose of protecting natural diversity. To date, the Conservancy has protected 2,866 preserves totaling 2.68 million acres through various mechanisms including easements and

leases as well as outright ownership (The Nature Conservancy 1987).

The Audubon Society operates a National system of wildlife sanctuaries. The primary objective of these sanctuaries is the long-term protection of plants and animals, especially threatened and endangered species. There are a total of 68 Audubon sanctuaries Nationwide totaling 133,332 acres (Audubon Society 1987).

Land trusts include local or regional private conservation organizations working in the direct protection of lands with open space, recreation, or natural resource values. There are 535 land trusts operating in 45 States which own or have under conservation easement 737,000 acres (Stone 1985). It is not known what percentage of these lands could be considered de facto wilderness.

CONCLUSIONS AND RECOMMENDATIONS

There is a developed system of non-wilderness lands that contribute to the preservation and maintenance of the Nation's natural diversity and that can be considered de facto wilderness. The mechanisms for identifying and offkially protecting the most significant sites have been developed, and a number of areas have become established under the various existing programs. The important goals of these programs, however, are far from being met. Biological diversity in the United States is declining at an alarming rate. Native habitats are being altered on a large scale, and unless conservation efforts are increased substantially over the next 10 to 15 years, many will be lost permanently. The Federal land managing agencies need to place more emphasis on their various natural area systems and increase their level of participation in certain geographical regions. Some Forest Service Regions are lagging behind in proposing and establishing RNAs, and the identification and designation of biological Special Interest Areas needs attention in most regions. The BLM's ACEC program is inconsistent with a few States having virtually no program at all. Management guidance and practices on established ACECs also need proper development if these important areas are to be a valuable contributor to the National system of protected areas. The Department of Defense needs to develop its own formal natural areas system or participate fully in the existing RNA system.

States without nature preserve programs designed specifically to protect natural diversity need to develop them. State funding for the acquisition of important sites should be a part of each of these programs. Innovative mechanisms for dedicating such funding have been developed in several States and could be utilized elsewhere.

private efforts aimed at preserving key parcels of land must be redoubled. Many important natural areas can only be safeguarded through the expensive acquisition of privately owned property. The Nature Conservancy must continue to expand its protection efforts and reach or exceed its goal, set in 1986, to raise $300 million in private funds by 1990 in support of those efforts. Beyond 1990, they will need to set and reach higher goals. Other National conservation organizations and local land trusts will also need to increase their land protection activities.

Finally, cooperation and teamwork between the various non-wilderness land protection programs should increase. More Statewide or regional natural area committees, with interagency and private organization participation, should become active. Such communication will help set important priorities for each entity in the huge task ahead.

REFERENCES

Audubon Society 1987. National Audubon Society Properties.

Classification and Multiple Use Act. 1965.

Endangered Species Act. 1973. as amended.

Federal Land Policy Management Act. 1976.

National Forest Management Act. 1976.

Natural Areas Programs State Reports. 1987. Fourteenth Annual Natural Areas Conference. Illinois Department of Conservation, Division of Natural Heritage.

Natural Areas Journal. 1984. Wilderness, wildlands. Natural Areas Journal 4(4).

Nature Conservancy. 1982. Preserving our natural heritage, Volume III - private, academic, and local government activities. U.S. Department of the Interior, Government Pnntmg Office, Washington, DC.

Nature Conservancy. 1976. Preserving our natural heritage, Volume II - state activities. U.S. Department of the Interior, Government Printmg Office, Washington, DC.

Nature Conservancy. 1975b. Preserving our natural heritage, Volume I - Federal activities. U.S. Department of the Interior, Government Printing Office, Washington, DC.

Nature Conservancy. 1975a. The preservation of natural diversity: A survey and recommendations. U.S. Department of the Interior, Government Printing Office, Washington, DC.

Nature Conservancy. 1987. Preserve and tract data bases. Stewardship Department.

Stone, P. K. 1985. 1985-86 National Directory of Local and Regional Land Conservation Organizations. Land Trust Exchange, Bar Harbor, ME.

U.S. Department of Defense. 1965. Natural resources - conservation and management. Directive 5500.5. Washington, DC.

U.S. Department of Agriculture, USDA Forest Service. 1986b. Land areas of the National Forest System. Report #383.

U.S. Department of Agriculture, USDA Forest Service. 1986a. Title 2300 - Recreation, Wilderness, and Related Resource Management. Chapter 2370 - Special Recreation Designations. Forest Service Manual.

U.S. Department of Agriculture, USDA Forest Service. 1985. Series 4000 - Research. Section 4063 - Research Natural Areas. Forest Service Manual.

U.S. Department of Interior, Bureau of Land Management. 1987. Areas of critical environmental concern and other special designations on public lands, fiscal year 1988. From: BLM (WO-760).

U.S. Department of Interior, U.S. Fish and Wildlife Service. 1985. Lands under control of the U.S. Fish and Wildlife Service. Annual Report.

U.S. Department of Interior, Bureau of Land Management. 1983. Public Lands Statistics.

U.S. Department of Interior, U.S. Fish and Wildlife Service. 1972. Wildlife Refuge Handbook.

U.S. Department of Interior, U.S. Fish and Wildlife Service. 1988. Listing and recovery data bases. Washington, DC. Personal communication with authors.

U.S. Department of Interior, National Park Service. 1986b. Status of the wild and scenic rivers program. National Park Service Summary.

U.S. Department of Interior, Bureau of Land Management. Undated. Managing special areas on the public lands. A summary report on special area policy and procedure.

U.S. Department of Interior, National Park Service. 1986a. Park designations and how the sites are managed.

U.S. Department of Agriculture, USDA Forest Service. 1987. Discover your national parks.

U.S. Department of Interior, National Park Service. 1964. Administrative policies - natural area category. revised 1970. Appendix A-3, Memorandum from Secretary of the Interior Stewart Udall to George Hartzog, Director of National Park Service.

Wild and Scenic Rivers Act. 1968, as amended.

Wilderness Society. 1987. Wilderness units and acreage of Federal agencies. Personal communication with authors.

Wilderness Act. 1964.

UNDERSTANDING THE DEMAND FOR MORE WILDERNESS

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ABSTRACT

The topic posed for me -- "What If We Do Nothing?" i.e., "what if the National Wilderness Preservation System stays the same in terms of size, location, diversity, and management?" -- must be intended to provoke inquiry into the case for more wilderness, particularly in terms of the non-recreational values of wilderness. Under the hypothesis posed, the question must be: what would happen if the public is frustrated by the failure of Government to respond to its demands for more wilderness?

Rather than try to cope with what I regard as a totally unlikely hypothesis, I will interpret the question as a way of getting at understanding the nature of public demand for more wilderness in all its aspects.

INTRODUCTION

In the 1960's, recreational use of wilderness achieved a central place in the case of more wilderness. With the "baby boom" generation growing up and changing attitudes, wilderness use skyrocketed, increasing 10-25 percent per year (Hendee and Stankey 1973). Now with an aging population, less leisure time, and reduced mobility, wilderness use is leveling off. However, the data presented by the President's Commission on Americans Outdoors suggest that almost 20 million Americans backpack, which is mainly done in wilderness-type areas (President's Commission 1987). Thus, the recreational constituency for wilderness is substantial, even if it is no longer growing explosively.

However, what is continuing to grow explosively is the demand for quality in the areas used, even though the frequency of use may be less. A survey done for the President's Commission on American Outdoors by the National Geographic Society found that "when people go to parks their most important criteria are the natural beauty of the area and whether it is crowded or uncrowded" (Shabecoff 1986). In that same survey, 68 percent of the public said they "enjoy being in nature." These responses express a desire for quality in outdoor experiences, and wilderness epitomizes that desire.

The greatest change over the past 20 years in terms of the policy debate over questions of wilderness and public lands is toward the quality of the experience as opposed to the quantity of users. To a certain extent, this shift mirrors the changes wrought by environmentalism. Questions of ecology, biological diversity, and the maintenance of geophysical systems' integrity have displaced discussion of recreational use patterns. The gross number of users is no longer a paramount concern, particularly with the National Park Service demonstrating techniques to limit and control numbers of users of wilderness. In the context of wilderness, accordingly the more relevant considerations today are the non-recreational bases for valuing wilderness: its ability to maintain natural diversity, in situ germ plasm, ecosystem integrity, nongame wildlife habitat; and its contributions to geophysical system health and watershed function. Various offsite uses, including vicarious use and what some call "existence and bequest" valuations, are another consideration.

In some ways, the dialogue has shifted toward what some might call a more "biocentric" concept (Hendee and Stankey 1973) of wilderness valuation and away from an "anthropocentric" concept. When John Hendee suggested these terms 15 years ago, they reflected the debate over "purism," but they ring truer today in terms of the valuations just described. In short, the constituency for wilderness wants it to be there regardless of

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the fluctuations in recreational use of specific areas. Many would say "we need wilderness even if no one goes there."

The constituency for wilderness expresses its demands through pressures upon Congress to add more units to the National Wilderness Preservation System. To a limited extent, the demand exerts itself on land management agencies too, but because final and binding decisions are made by Congress, the pressures are directed primarily there. This may make it seem that the subject can only be discussed in the terminology of political debate, and clearly management agencies yearn for a more objective and even a scientific vocabulary for discussion. But, if the discussion is to be useful in the real world in which the decisions are in fact made, there must be no flight from reality into a vocabulary which is self-deceptive, albeit comfortable.

The relevant discipline for analyzing decisions made by the national legislative body is political science. Underlying theory can be analyzed, trends in public opinion can be charted, the nature of the interests at stake can be examined and their relative strength assessed, and the behavior of the Congress in dealing with wilderness questions can be studied. Inquiries of this sort will shed light on what is really going on and can at least provide a realistic context for management agencies to understand what is happening when wilderness questions are decided. In this paper, I will provide an introduction to this mode of analysis, with some flavor provided. More work would be needed to flesh out the analysis.

An alternative discipline which purports to offer an objective framework for discussing this subject is economics. Economists are devising techniques for assigning dollar values to such concepts as "option demands" and similar ones (Chichetti and Smith 1973). All of these efforts involve guessing at how much the public would pay for various values of wilderness if a real market existed for buying and selling wilderness. Some of these efforts also assume that wilderness is really owned by private commodity interests and that the public is buying back the opportunity to have these areas. Of course, the reverse is the case: the public owns wilderness on public lands, and private commodity interests are trying to buy rights to take away wilderness values--to take various natural resources for private gain Rolston 1985). In any event, all of these efforts--some of which are interesting--strain at imagining what a market would look like in wilderness values. The fundamental point to remember is that all of these efforts are imaginary; they do not describe anything real.

The real marketplace that exists is the political one--the system by which Congress makes decisions. If one wants reality, that is the system to study, not systems of elaborate imagination. Imagining what people would pay to have wilderness under hypothesized market systems says very little about what Congress will in fact do in response to the public demand that it sees. Congress' decisions reflect the actual value that the body politic places on having wilderness.

Underlying Theory

Today wilderness advocates place less emphasis on the recreational case for wilderness than they did in the decade-long struggle for the Wilderness Act.

In 1966, I summed up the case which had been made for wilderness in an article published in the Oregon Law Review entitled "The Wilderness Act of 1964: Its Background and Meaning" (McCloskey 1966). Eleven bases for valuing wilderness were set forth, five early and six contemporary, which I would summarize as follows:

Early Valuations

(1) As a place of challenge and self-discovery of one's capacity;

(2) As a setting for a religious experience (e.g., "temple of nature");

(3) As a setting for political reform (e.g., "return to nature");

(4) As a place of refuge (e.g., simple life of Walden Pond);

(5) As the center of conflicts over threatened nature;

Contemporary Valuations

(6) As a cultural heritage (e.g., as an historic or esthetic experience or source of inspiration);

(7) As a setting of scientific value (e.g., benchmarks, in situ gene banks, discovery of new species of economic value, center of further evolutionary development);

(8) As an expression of ethical obligations to nature (e.g., of an "ecological conscience");

(9) As a setting for an educational experience (e.g., nature study);

(10) As a place for therapy (e.g., to overcome the stresses of modern urban life);

(11) As a recreational setting (e.g., for backpacking and what is now called "adventure travel").

Even during the campaign for the Wilderness Act, recreation was of less importance as the case was articulated; probably less than half of the valuations listed above can be immediately experienced by the recreational user. In looking over some more recent attempts to summarize the values of wilderness, the non-recreational values stand out even more, and a number of additional valuations are proffered. Some are new, and some are further variations on older themes. They are:

(1) The value of wilderness in maintaining life-support systems (i.e., geophysical systems, such as watershed function and reduced CO, production)(Rolston 1985);

(2) Wilderness as a key component of a system of "regions of biotic freedom" where natural processes have a right to continue; here the change is from man's duty to nature to nature's rights (McCabe 1971);

(3) Wilderness as a hedge against future imponderables in the need to protect the biosphere (the concerns that we cannot afford to lose any more and that "they are not making any more");

(4) Wilderness as a place of scientific study; it is now identified as the uniquely qualified place to study evolution to determine how important competition between species may be (Rolston 1985);

(5) Wilderness as a place to build character, especially with youth, as in Outward Bound programs;

(6) Esthetics benefits, now getting more emphasis, even among recreational users, than the rewards from sports such as mountaineering and river-running.

From this review of the reasons wilderness is valued, the recreational experience can be viewed more as the occasion for reinforcing all of the intellectual reasons for valuing wilderness (e.g., historical, cultural, ethical, religious, political, literary, scientific, educational, and esthetics). The term "recreation" does not begin to capture the richness of the intellectual valuations. As nature is hard pressed on more and more of the land on this continent, and indeed on the planet (McCloskey 1987); the sense of desperation which many feel about the need to maintain a balance between development and nature becomes focused on the effort to protect more wilderness. Wilderness has come to embody the culture of more and more educated professionals in our society and is the object on which they project their hopes for a better outcome in the struggles over the environment. It is the one place, they believe, "we haven't spoiled ... where we can start over."

Thus, the demand for more wilderness to be preserved has very little to do with trends in recreational use of wilderness areas. As long as there is a sense that the condition of the environment is getting worse rather than better, the pressures for more wilderness will continue. Wilderness is an expression of a dominant cultural imperative among many well-educated, urban professionals. This culture is not likely to change soon.

The members of Congress who represent these people will continue to press for the protection of more wilderness. Even their constituents who do not care about wilderness have no opposing interests and thus do not shape the outcome. With the population now largely urban, there is no prospect that rural legislators will ever dominate the process again (though they may have temporary successes in blocking the addition of certain units to the system).

Public Opinion

Empirical evidence for the demand for wilderness protection can be found in public opinion surveys. Feelings underlying the demand for more wilderness can be seen in the results of surveys that measure public concern over stresses affecting nature and the

environment. The responses to three questions asked in recent years are particularly revealing. Because some other queries of a more general nature show incredibly high levels of public concern, these questions posed tougher tradeoffs or called for more discriminating responses.

In a question asked annually from 1976 through 1986, the public was asked to choose between two contrasting propositions: (1) We must be prepared to sacrifice environmental quality for economic growth, and (2) we must sacrifice economic growth in order to preserve and protect the environment. In 1976, 38 percent of the public called for sacrificing economic growth; by 1987, that figure had climbed to 66 percent -- a 28-point increase. In contrast, only 19 percent called for sacrificing environmental quality in 1987, while the figure in 1976 was 21 percent (Dunlap 1987) By a nearly 3 to 1 margin, the public --and now a majority of it--favors sacrificing economic growth over the environment if forced to make a choice.

In the 1980's, another question forced even harder choices. Those polled were asked whether or not they agreed with the following proposition: Protecting the environment is so important that requirements and standards cannot be too high, and continuing environmental improvements must be made regardless of the cost. In 1981, 45 percent agreed, while 42 percent disagreed; by 1986 the margin had shifted so that 66 percent agreed, while only 27 percent disagreed. Now there was more than a 2 to 1 margin for an extremely strong proposition (Dunlap 1987).

That these results were not a fluke can be seen in another survey which asked if respondents "think there is too much, too little, or about the right amount of governmental regulation and involvement in the area of environmental protection." In 1982, 35 percent said there was too little; by 1986 those believing there was too little had grown to 59 percent. Those responding "too much" shrunk from 41 percent in 1982 to 26 percent in 1986 --again a 2 to 1 margin for the environmental position (Dunlap 1987).

Through the years, fewer questions have been asked directly about attitudes toward wilderness at the national level. However, one study was done for the Western Regional Council in 1978 by the fii of Yankelovich, Skelly, and White. It found that 82 percent of those surveyed "feel the government has a responsibility to protect large areas of land for wilderness and related environmental values" (Yankelovitch 1978)).

The preceding year the American Forest Institute commissioned a special survey to help guide its public affairs strategy. It posed a question relevant to the tradeoff between having commercial timber available for logging versus wilderness. Those surveyed were asked to choose between two alternatives: "... increase the yield and sales of timber from National Forests, or ... preserve these trees in their natural state." Sixty-two percent of the public called for preservation, while only 28 percent called for an increase in timber sales. Again, the public made the environmental choice by a 2 to 1 margin. In that same survey, other questions asked revealed that only 7 percent of the public felt there was "too much" wilderness. Those making the survey for the Institute concluded by saying: "It is obvious that opposing wilderness or other set asides on the basis of lost timber growing potential has no appeal to the public" (American Forest Institute 1977).

It is usually assumed that those residing in the localities near wilderness oppose its protection. However, a recent study by Gundars Rudzitis contradicts this view. Finding that the 227 counties containing wilderness in the United States are experiencing more rapid growth than other areas, he interviewed a cross-section of residents in four typical counties of this sort. He found that among those who had moved there in the past decade, "environmental quality, pace of life, amenity, and the recreational factors are most often cited as reasons why they moved to these counties. The presence of wilderness is an important reason why they moved ... and both migrants and residents feel strongly about protecting wilderness areas from any development" (Rudzitis 1987).

Competing Forces

The decisions that Congress makes on wilderness reflect not only public opinion but the relative strength of the forces which lobby for and against wilderness reservations. Over the past decade, environmental groups have been growing in size and strength. Both the Sierra Club and The Wilderness Society have doubled in size,. and other environmental groups that participate in wilderness lobbying have been growing too (Dunlap 1987). Moreover, public confidence in environmentalists is high. One survey showed them near the top of groups commanding respect in American society. Oil companies were near the bottom of the list. The survey found that environmentalists were "seven times as popular as the major oil companies" (Democratic National Committee 1982).

In the past few years, almost all industries devoted to development of natural resources have fallen on hard times. With the drop in oil prices, the oil industry is in a depression, with drilling activity down by 75 percent (Famey 1987). Even if it revives somewhat, its focus is likely to be primarily on private lands since 88 percent of the producible oil and gas is thought likely to be found there. In any event, over 100 million acres of Federal land have already been leased for oil and gas development (Wilderness Society 1982). The uranium industry is near collapse, being unable to compete with higher grade foreign ores (Famey 1987). The Western coal industry also is facing bleak times as demand has not grown as was forecast and prices are half of what they were a decade ago (Famey 1987). The domestic hardrock mining industry is also fading away, with the U.S. copper industry's market share only half of what it was in 1970 Farney 1987). Only gold mining is showing much strength.

The timber industry is still recovering from its depression of 1982, and is absorbing the lesson of having to give back sales on which it overbid. The market could not support the prices it paid in the late 1970's. The shakeout in this industry has reduced its budget for government affairs and the number of lobbyists it fields. In the meantime, many National Forest managers are trying to reduce allowable cuts in light of environmental factors (including wilderness needs) as forest planning struggles forward. Ultimately, all involved will be mindful of the fact that 80 percent of the commercial forest land in the country is in private hands. Wilderness-type areas on public lands are generally the least promising areas on which to grow timber.

The grazing industry has also experienced declining fortunes. Sheep numbers today are less than one-third of what they were in 1960. Cattle numbers have declined too, and again deciders of public policy will recognize that 86 percent of the livestock production comes from private lands (Wyant 1982).

Finally, one should note what has happened under provisions of the Wilderness Act that made concessions to commodity interests. These provisions reflected concern at the time that the claims of commodity interests might have had more merit than was initially apparent. Twenty more years was allowed to file mining claims in wilderness. This period came and went with no major discoveries announced, and there was no successful effort to extend the dispensation. The U.S. Geological Survey was asked to study potential wilderness areas to identify important mineral potential; it found such potential in only 8 percent of the areas it studied. The President was granted authority to permit water projects to be developed in wilderness if he found an overriding national need. He never has. Pre-existing grazing permittees were allowed to continue, but the number of such permittees has declined.

The Record

In response to public opinion and the interplay of forces, the Congress has in fact increased the size of the Wilderness System from about 9 million acres in 1964 to nearly 90 million acres today (a tenfold increase). Reserved areas are found in 44 States and 9 States have their own systems (President's Commission 1987). It is not difficult to foresee the system growing to include as many as 150 million acres (about 8 percent of the nation's land, including Alaska) and some suggest it should grow to include nearly 300 million acres (Flamm 1988).

Table 1. -- Wilderness Legislation and USDA Positions'

Year	FS recommendation	Congress's increase	% increase
1981	no action		
1982	10,010 acres	2,943 acres	+29.0%
1983	340,068 acres	25,506 acres	+7.0%
1984	4503,045 acres	2,006,936 acres	+44.0%
1985	3,260 acres	0 acres	0
Average increases:			+41.8%

[1] USDA Forest Service

The demand is certainly there, and the Congress has shown a general willingness to add more to the system than administering agencies recommend. They are more conservative than the Congress in judging what is politically viable and good public policy. I recall that one study of the 1970's found that Congress on the average increased the size of units added to the system by 25 percent above what the agencies recommended. Data from the first half of the 1980's show that the margin for the National Forests has jumped to nearly 42 percent (table 1) (USDA Forest Service).

Research is needed to put the whole record since 1964 together by agencies. Figures should be obtained on the original agency recommendation for each unit, showing the acreage put in the system by Congress and the relative increase or decrease. The figures should be organized by the years in which Congressional decisions were made. This information could be organized by States and Regions also to show trends in handling wilderness questions. It would be interesting also to examine trends in the number of units added to the system enjoying local Congressional sponsorship. This information could shed light on the changing popularity of wilderness in the districts hosting the units. This area of research could play an important part in helping the Forest Service develop an accurate appraisal of the political viability of proposing larger areas for wilderness in the Federal electoral jurisdiction closest to its operations.

CONCLUSIONS

This paper suggests a series of inquiries which could be pursued in greater depth to assist agencies administering wilderness, such as the USDA Forest Service, to develop strategies to guide the process of making recommendations on wilderness reservations in the future.

While the inquiries pursued here are limited, they clearly suggest continuing public demand for wilderness as a reflection of cultural and social preferences, and that Congress is likely to ratify those preferences by continuing to add acreage to the National Wilderness Preservation System.

Each decision that Congress makes is evidence of the value that American society places on having such areas preserved. The fact that none of these decisions has been reversed later or even revisited suggests a high degree of social consensus about the values of adding areas to the wilderness system. The strong demand and absence of any backlash suggests that the process of enlarging the system will continue and that arbitrarily halting this process is not a social option.

RE FERENCES

American Forest Institute. 1977. Public participation in outdoor activities and attitudes toward wilderness.Research Recap 10.

Chichetti, Charles J.; Smith, Kerry V. 1973. Congestion, quality eterioration and optimal use. Social Science Research 2 (1)

Democratic National Committee. 1982. Memorandum re: national survey on environmental issues; February 24, 1982. p.8.

Dunlap, Riley E. 1987. Public opinion on the environment&r the Reagan era. Environment 29: 11, 32, 33, 35.

Farney, Dennis. 1987. Western gloom: resources-rich basin finds its treasures don't bring prosperity. Wall Street Journal, October 28, 1987.

Flamm, Barry. 1988. The future wilderness system. In: Proceeedings of the 1988 National Wilderness Colloquium; 1988 January; Tampa, Florida.

Hendee, John; Stankey, George. 1973. Biocentricity in wilderness management. Bioscience(September): 535.

President's Commission on American's Outdoors. 1987. Americans outdoors, the legacy, the challenge. Washington: Island Press. 420 p.

USDA Forest Service, Legislative Affairs. Wilderness legislation and USDA positions (undated mimeographed chart).

McCabe, John M. 197 1. A wilderness primer. Montana Law Review 32:43.

McCloskey, Michael. 1966. The wilderness act of 1964: its background and meaning. Oregon Law Review 45: 288-321.

McCloskey, Michael. 1987. The world wilderness inventory. In:Proceedings of the Fourth World Wilderness Congress; 1987 September.

Rolston, Holmes III.1985. Valuing wildlands. Environmental Ethics. (7):31-38.

Rudzitis, Gundar. 1987. How important is wilderness: attitudes of migrants and residents in wilderness counties. Unpublished research paper, University of Idaho, September.

Schabecoff, Philip. 1986. Survey finds outdoor U.S. that wants nature areas kept. New York Times, April 23, 1986.

Wilderness Society. 1982. Potentially producible petroleum and natural gas in the U.S. and western overthrust belt.February (revised in January 1983).

Wyant, William K. 1982. Westward in eden, Berkely:University of California Press. Chapter 12.

Yankelovich, Skelly, White. 1978. Memorandum to the Western Regional Council dated September 27, 1978, p. 52.

COMPATIBLE AND INCOMPATIBLE INTERACTIONS BETWEEN RECREATIONAL AND NON-RECREATIONAL USE OF WILDERNESS

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ABSTRACT

The non-recreational aspects of wilderness are an element central to the very concept of wildness, but one that is all too often overlooked and ignored.

INTRODUCTION

Federal lands managed by the Forest Service, National Park Service, Bureau of Land Management (BLM), and Fish & Wildlife Service provide the widest possible opportunities for dispersed recreation. Nowhere is this more true than in wilderness areas, which are oriented to primitive recreation and the virtues of solitude. Because these areas provide recreation that allows the user a high degree of freedom of choice, the potential for impact or incompatible interaction is high.

Can the recreationist and nature coexist harmoniously in the wilderness? Yes. To do so means first articulating the values (recreational and non-recreational) for which the area was set aside and then defining recreation use in the context of protecting those values. Without the first step, compatibility determinations become extremely haphazard, if they occur at all.

That in essence is the focus of my presentation. To assess how recreation and non-recreation values were managed in wilderness, 1 randomly selected six wilderness areas based on geographic diversity and high recreation use: four are USDA Forest Service areas: Dolly Sods, W. Va., Monongahela National Forest; Sandia, NM, Cibola National Forest; Boundary Waters Canoe Area, MN, Superior National Forest; Yellowstone Ecosystem, WY and MT. (includes Bridger, Teton, Absaroka National Forests; two are BLM areas: Table Rock, OR: Paria-Vermillion Cliffs, AZ.

To determine what the wilderness values were and what management actions were proposed and implemented to preserve the wilderness character, I looked at the legislation establishing the area as wilderness, the testimony and background documentation in support of designation (values), and finally, the management plan for the area. What I found wasn't encouraging. Most wilderness management plans are so generic as to be virtually useless.

It is a rare to find any recognition of the wilderness areas' special values. Without this information, I maintain the compatibility question cannot truly be answered.

Before discussing my "findings" for each of these wilderness areas, let me set the stage by briefing addressing the meaning of wilderness, the tendency to overemphasize recreation values in wilderness, and the importance of the, wilderness management plan in defining the values of an area.

SETTING THE STAGE - THE MEANING OF WILDERNESS

Let's back up a moment and examine the meaning of wilderness and how recreation fits. As one colleague of mine in the Forest Service stated: "Wilderness is clearly a place where a recreational experience can be found, but wilderness is not a recreational area."

Wilderness has always been intended to be more than a place for recreation. In Aldo

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Leopold's land ethic, wilderness was "a model of ecological perfection. Unmodified, wild country assumed significance as 'a base-datum of normality, a picture of how healthy land maintains itself as an organism'"(Nash 1967). He stated that recreation was not the only or even the principal utility of wilderness (Nash 1967). Bob Marshall stressed the psychological and esthetic importance of wilderness. Sigurd Olson wrote of the scenic beauty and the wildlife associated with the great silences of land lying Northwest of Lake Superior (Olson 1982). The Wilderness Society was formed in 1935 "for the purpose of fighting off the invasion of the wilderness and of stimulating...an appreciation of its multiform emotional, intellectual, and scientific values (Nash 1967).

It is clear from the Wilderness Act' itself that recreation is but one value in the wilderness setting. Wilderness implies an absence of civilization. Man is but "a visitor". "Wilderness values are so fragile that even appropriate kinds of recreational use detract from, and in sufficient quantity, destroy wilderness." Using the area for recreation must be done on wilderness' terms (Nash 1967). If we are to define what constitutes compatible and incompatible interactions between the nature and our recreational use of it, we must first describe the values (or character) of the wilderness area. If we are to maintain the wilderness character (where man is but a visitor). then there is greater need for specificity in the definition of uses and the management prescription than may be the case for other dispersed outdoor recreation uses on public lands. Until the character and important values of the area have been defined with their locations, I maintain, you cannot determine whether coexistence is possible.

THE RECREATION "TRAP"

We are finally beginning to realize that wilderness provides a unique opportunity to protect communities of species, total food chains and ecosystems, in addition to geologic, esthetic, historic and psychological values. Yet we continue to place a singular value on recreational use of wilderness. In most forest plans any specificity accorded the wilderness area will generally be stated in terms of recreation visitor days only. It is a rare plan that will contain a discrete listing of the wilderness values with appropriate locations.

Why is it that we have placed so much value on recreational use of wilderness, or what I call the recreation "trap"? First, it's more difficult to define non-recreation values. The concepts, as well as the inventory methods, are in still in the developmental phase. Second, existing recreation use patterns by and large dictate the nature of management, to the extent the wilderness is managed at all. It's simply much easier to use recreation (a definable use) to justify management action which is basically responsive to an existing use. Third, training programs which focus on developing understanding and awareness of non-recreational values for wilderness managers have been minimal at best. Hence managers attitudes will most likely be attune to the status quo and past practices - recreational use. Fourth, much of the use of a wilderness area is for its recreational values - the enjoyment of solitude, physical and spiritual renewal.

The recreation "trap" has always been there. Nash states that in 1918 new ideas about the nonmaterial values of the National Forests were beginning to challenge the traditional utilitarian objectives of foresters. The National Park Service was attracting considerable attention to parks as recreation meccas for the newly motorized public, The Forest Service, fearful of losing land, countered by giving unprecedented publicity to scenery and outdoor recreation as major "products" and commissioned a study of the forests' recreational potential (Nash 1967). In 1938 Leopold expressed concern about the recreation development focus in wilderness areas. We have yet to commission a study of non-recreation values or even require individual forests to do so.

I shudder to hear Mike McCloskey define wilderness for purposes of the international inventory as an area through which you can hike for two weeks without ever crossing your tracks (McCloskey 1989). It's a definition focused purely and simply on a primitive recreational experience and accounts for none of the other values which a wilderness area holds. It restates Leopold's early definition but loses sight of Leopold's own evolution toward a broader ecological perspective of wilderness. Let us not deviate

from the definition in the Wilderness Act. It is a more than satisfactory definition and continues to serve us well.

The manager's attitude is also a critical factor, not to be overlooked. The perception of incompatible recreation impacts is influenced by the manager's possessive interest in the land he manages, his resource management training and experiences, the historic role of protection responsibilities, and the mandate to provide a wide spectrum of recreation opportunities (Bauscher 1981). In the case of the Forest Service the timber management experience influences what will be viewed as an impact or an incompatible use. In the case of BLM, it will be grazing, minerals and land adjustment experience.

Bob Lucas reminds us: "The tension between recreation and regulation is intensified in wilderness management. The Act defines wilderness as an area that provides 'outstanding opportunities for solitude or a primitive and unconfined type of recreation'. The Act also requires managers to protect and manage wilderness 'so as to preserve its natural conditions'- an almost impossible mandate if uncontrolled recreational use is allowed" (Lucas 1983). Yet how often do agencies attempt to control recreation use?

The results of a recent telephone survey (Reed and others 1989) reveal startling information, if our goal is to preserve wilderness values. Only 39 per cent of those interviewed had a completed and approved wilderness management plan. Only 39 per cent were conducting any environmental research studies (determining baseline data). The remainder were not, and had not done so for the past three years, Only 14 percent were doing studies on use. Further, 70 percent did not have standards below which changes would be unacceptable.

Based on general correspondence in the wilderness files that I reviewed plus the survey results above, I maintain that incompatible interactions between recreational and non-recreational values occur all too often with little remedial action or mitigation, Why? Because the wilderness values or the acceptable limits of change for the area have never been determined. They are, in fact, generally ignored. Without an examination of the relationship between the wilderness area's values and the objectives of current management, it will be extremely difficult to define appropriate mitigation measures, educational programs and management techniques. So the standard for managing recreational use is to ' it until there is some destruction of the resource, then apply a band-aid.

I am not suggesting that we ignore the recreation as a value. In fact recreation may rank high in the list of values for which the area was added to the wilderness system. My concern is that the majority of the wilderness management plans, to the extent they exist, focus exclusively on existing patterns of recreation use and fail to account for and manage for all the values for which the area was established.

How well are the Forest Service and BLM doing in terms of ensuring compatible interactions to the maximum extent possible? The clue to how agencies view wilderness values in the areas under their jurisdiction can be found in policy statements, forest plans, the management implementation schedules or management plans, and in the attitude of the local manager.

THE WILDERNESS MANAGEMENT PLAN

In the new forest planning process with a consolidated forest plan, that document alone may contain the only management plan for the wilderness area. There may not be any additional prescriptions; if there are, they are at the discretion of the manager.

In the Forest Service wilderness management handbook, approved September 1986, the 6th wilderness principle states: "Management should be guided by objectives established in Forest Plans." There is no requirement to prepare a specific management plan for the area, nor to inventory or ask for public input if a separate management document is prepared, The handbook recognizes that the basic purpose of a wilderness management plan is to give a clear picture of what the wilderness should look like

in the future, what management actions are necessary to achieve this, and how the wilderness management strategy deals with the relationship between all wilderness resources/values. The handbook does not focus too much on developing isolated management strategies for individual uses and resources. The key elements in the handbook include recreation (2/3 of the text), range, fish and wildlife, vegetation, and minerals.

The BLM Wilderness Management Policy, issued in 1984, requires completion of a management plan within two years following designation of an area as wilderness. I believe that requirement is a critical element in the protection and preservation of wilderness values. The plan-itself, based on the old Forest Service MBO model (which the Forest Service no longer uses), requires a statement of objectives, a description of the current situation, and specific management actions with a schedule. This is accompanied by an environmental assessment with a "no action", a resource protection alternative, and a recreation development and use alternative.

Let's turn to the six wilderness areas to see how the policy guidance is interpreted.

1. Dolly Sods, West Virginia, a wilderness area of 10,215 acres, was established by P.L. 93-622, commonly referred to as the Eastern Wilderness Act, in 1975. It is a high, wind-swept plain offering unique vegetation, climate and animal life comparable to what might be found in parts of Canada with outstanding opportunities for nature study. The 1975 Wilderness Act Statement of Findings addressed the need for areas in the East that are managed to promote and perpetuate the wilderness character of the land and its specific values of solitude, physical and mental challenge, scientific study, inspiration and primitive recreation. While Dolly Sods shares all these values, because of its unusual ecosystem, it has particularly high scientific values.

The Monongahela National Forest Plan was disappointing in its coverage of the wilderness area, but not unique. First, as a member of the public and one familiar with bureaucratic documents, I had some difficulty locating the section dealing with Dolly Sods wilderness. With the exception of the RVD (Recreation Visitor Day) numbers listed for each of the 5 wilderness areas within Monongahela, the management prescription was so generic that it would be applicable to most wilderness areas around the country. There was no mention of the unique natural values which both Cranberry and Dolly Sods share and which need to be protected. The plan simply says "Allow recreation use consistent with protection of the wilderness attributes."

Materials developed in 1969 by an Ad Hoc Committee on Dolly Sods, recommending the area's designation as wilderness, highlight the scenic and ecological values of the area and the need to protect and enhance these values. The 1969 public comment discussed the need to preserve wildlife habitat and maintain low interaction among users, the need for an expanded trail system, better signing and more recreation information. None of these were addressed in the forest plan.

In discussions with the staff on the Monongahela Forest, 1 found that no inventory of natural values exists. Fortunately, the existing recreational use pattern lies outside what is considered the unique tundra-like ecosystem area. But this is accidental and not planned, the result of existing use patterns.

The Forest anticipates initiating a LAC (Limits of Acceptable Change) framework study in 1988 which should provide better definition of the important values of the area and hence help define what may constitute incompatible use. As a result of a monitoring study completed this year, the Forest intends to conduct an assessment of what the recreational user expects. The LAC framework study is not mandated. The potential for incompatibility is high until the LAC is completed and appropriate management actions are in place.

2. BWCA (Boundary Waters Canoe Wilderness Area), Minnesota, in Superior National Forest was established as a full wilderness by P.L. 95-495 in 1978. The BWCA, an area with which I am personally familiar, has been studied more intensively in terms of visitor use/carrying capacity than any other wilderness area. The wilderness values cited in the Congressional Record include: the only lakeland canoe wilderness, a historic

portaging area, a remnant forest of "old Northwoods", wildlife (wolves are found in the BWCA) and intact ecosystems. A 1981 Forest Service briefing paper on the designated wilderness gives priority to the non-recreational values, stating that "management emphasis is on the protection and perpetuation of the wilderness resource while allowing use and enjoyment by the people."

Because of intensive use (it is the most heavily used wilderness), the need for a management plan manifested itself well before the consolidated forest plan process was adopted. The 1974 plan, which superseded an earlier version, has an updated 1981 supplement. Thus, the BWCA benefits from a fairly detailed management action plan identifying the critical values that need protection and how they will be addressed. It is a precursor of the format used by BLM.

The management plan identifies various elements: soil quality, water quality, vegetation, fish, wildlife, wilderness, sensory, recreational experiences. For each element there is a description of the existing situation, a statement of assumptions, management direction, and policies. The level of detail is still general enough to allow the manager sufficient flexibility in implementation. Most important, there is sufficient knowledge of the resources values to enable prescriptions to protect those values and to reduce the likelihood of incompatible interactions.

In the House Committee hearings on the BWCA, Congressman Sebelius, Kansas, recommended to the Forest Service that it "strengthen its commitment to make stronger application of this (refers to all research on use, attitudes, impacts) work to the management of the area and to other wilderness areas across the Nation. Of absolutely critical importance is the development and implementation of wilderness carrying capacity thresholds and controls. It is one thing to initially designate a wilderness, but safeguarding its integrity in perpetuity does not stop there. It is essential that appropriate user limitations are recognized and adhered to so that the wilderness qualities for which the area was established are perpetuated indefinitely for the sake of many generations of users to come." Sadly, that advice has gone begging in all but a few areas, such as the BWCA.

By managing entry via each portal, the Forest Service has made a serious effort to maintain solitude and other wilderness opportunities while limiting the sense of regulation in the BWCA. There are wilderness purists who would argue that such regulation, trail construction and maintenance, fireplace grates, and primitive privies are incompatible with the wilderness resource values. I disagree with that argument and maintain that these facilities are necessary to protect the resource and reduce incompatible interactions. The mitigation plan for the BWCA provides solid statements for why these "regulations and facilities" are necessary. In my opinion the management of the BWCA is unmatched anywhere in the system. It is a model which should be widely emulated.

The recreation mitigation plan calls for designating campsites and controlling users in order to safeguard water quality and soil and to keep campsites away from known raptor and loon nesting sites. The water component of the management plan assumes that "water sensitivity to nutrient inputs will be a primary factor in developing recreation use capacity guides." The related policy calls for locating and constructing needed sanitary facilities so as to minimize pollution and contamination of surface and ground water, and monitoring and testing water quality on lakes and streams to detect changes caused by recreation use; this helps to determine visitor carrying capacity. While this is hardly overly detailed or constraining to the manager, it is sufficient to indicate how the area will be managed to protect the resource, as well as the user.

In summary, this is a management plan which should serve as a model for other Forest Service wilderness areas. The only other Forest Service area I reviewed with a comparable management plan was Sandia, in New Mexico's Cibola National Forest. It is a new plan, effective 1987.

3. Sandia was designated as wilderness by P.L. 95-237, the Endangered American Wilderness Act of 1978. Its inclusion in the wilderness system was in large part due to a concern that the Forest Service might allow

logging in the area. In testimony supporting designation, the values cited included the importance of the area as a scenic backdrop to Albuquerque, recreational values for a major metropolitan area, and watershed. Recreational use ranked high as a value. Each year the La Luz Run, an annual competitive event that predates the wilderness designation, takes place in the Sandia Wilderness. The La Luz Run is clearly a recreational experience, but most likely not a wilderness experience. In fact, it may well be an incompatible recreation use.

Section 1 of P.L. 95-237, states: "These and other undeveloped national forest lands exhibiting wilderness values are immediately threatened by pressures of a growing and more mobile population, large-scale industrial and economic growth and development and uses inconsistent with protection, maintenance, restoration and enhancement of their wilderness characteristics." Hence there is an acknowledgment of the strong potential for incompatible and conflicting uses in these areas so close to urban centers,

The House committee report provides a further clue to the values of this particular wilderness. That report states that the Committee expects the Forest Service to maximize efforts to construct, maintain, and improve trails and the trail system so as to facilitate access and recreational use, as well as to increase opportunities for high quality wilderness experience for the visiting public. The Committee report goes on to state that Sandia is an important addition to the wilderness system because it is readily accessible to residents and visitors of a large metropolitan area, and because recreation use is on the increase. Urban sights and sounds heighten the public's awareness and appreciation of areas with outstanding wilderness values.

Without delving further in the legislative history, one could reasonably argue that the La Luz Run is a compatible use of the Sandia wilderness given the strong emphasis on recreation values for the Albuquerque public in the legislative history.

4. The Yellowstone ecosystem includes Yellowstone National Park and a number of nearby wilderness areas including Teton, Absaroka, Washakie, and Lee Metcalf; these were early designations to the wilderness system. The values cited in the original wilderness designation files include big game and other wildlife, unique geologic features, spectacular mountain vistas, varied topography, and historic fur trails.

The Yellowstone ecosystem area is one of the largest assemblages of wilderness acreage in the lower 48 States. Is it managed in a unified way to enhance those values, which were identified well before there was a Wilderness Act? No! Only belatedly have areas been closed to recreational use to protect the grizzly - the consummate incompatible recreation/non-recreation interaction. Even so, the grizzly usually loses in a confrontation with man. Management of this system is dictated largely by existing recreation use patterns and by the outfitter and guide industry. A comprehensive wilderness management plan does not exist for the area.

In a first step toward meaningful management coordination, the involved Federal agencies have recently completed an Assessment of the Ecosystem. With respect to management of the wilderness, the Assessment points out only that the primitive character of the area will be maintained, but this is nowhere defined. It states that the opportunities for managers am: (1) to provide for quality wilderness experience for an increasing number of users; (2) to ensure visitor use does not adversely affect the wilderness resource (undefined); (3) to ensure rules for visitors are reasonably consistent from one area to another.

The Assessment is, according to one of its architects, simply an aggregation of information, a snapshot of what's there. There is no analysis, no determination of what is compatible and what is in conflict. Setting the values has not been done. At this juncture there has been no determination of what the ecosystem should look like and what uses, and where, are compatible with that vision. We should applaud the desire and intent to move to that stage of analysis; but we must also lament our failure in waiting so long.

That is not to say that no baseline data exists. Yellowstone Park benefits from the

efforts of some 150 independent researchers each year. The Grizzly Bear Cumulative Effects Analysis for the Greater Yellowstone area is now 90 percent operational. Information on other "heroic wildlife" species also exists. The Grizzly Analysis has brought requests from the public for similar information on other species. The information data base is, however, highly variable and developed as a reaction to recreation overuse and misuse and the needs of independent researchers.

According to one of the key Federal managers in this area, when baseline data exists, it is much easier to dictate a proactive agenda that protects the wilderness resource values, rather than waiting to develop a reactive agenda in response to a crisis. Hopefully, the Federal agencies responsible for managing the Yellowstone ecosystem will quickly move beyond the Assessment and develop the proactive agenda. There is, unfortunately, no timetable that requires them to do that.

Let us turn now to BLM, currently the only land-managing agency offering specific guidance on how to develop a management plan for wilderness and requiring that it be done. For those unfamiliar with BLM, the agency is truly in its infancy with respect to the wilderness designation and management process. Hence, only a few examples of wilderness management plans exist. The Table Rock Wilderness Management Plan may be considered the best example of a BLM wilderness management plan at this time because it covers all the values of the area, contains considerable public input, and sets specific objectives and management actions.

5. **Table Rock, Oregon,** wilderness was established by P.L. 98-328, the Oregon Wilderness Act, in 1984. The Act cites the outstanding natural characteristics of the area. The Senate Committee report comments that Table Rock represents an ecologically intact island with rare and endangered plants and wildlife.

LAC standards were to be established for each element by September 1986. Annual monitoring of water, soil, vegetation, fish and wildlife elements, as well as recreation, is done to "detect changes before unacceptable conditions requiring remedial work are reached." The LAC standard setting is in process, but not completed.

6. **The Arizona Wilderness bill,** P.L. 98-406, added Paria Canyon -Vermillion Cliffs Wilderness to the system. Values cited for Paria in the legislative history include the unique red slickrock canyon, opportunities for hiking and other primitive recreation; and for Vermillion, scenic, wildlife, and archeological values were noted. Both areas have special geologic and plant community values.

A management plan was completed for Paria-Vermillion that has been criticized by the Wilderness Society for: (1) failing to specify what LAC field studies will be initiated for which resources and when, and (2) developing isolated, rather than integrated, management strategies. This is an example of a plan which may have met the requirements of the BLM policy but where management commitment at the upper levels was missing to ensure implementation. This comment is made based on my personal knowledge as Director of the BLM wilderness effort for 4 years. The commitment exists at the field working level, it is not supported by management.

CONCLUSION

In summary, of the six plans, only two Forest Service wilderness areas, BWCA and Sandia, had detailed wilderness management plans which provided a baseline against which one could determine compatibility of values. Both BLM areas had detailed wilderness area plans, but in one the commitment may be missing to implement it effectively. The Dolly Sods qualified as having a management plan under the rubric of the Forest Plan, but it was so generic as to be virtually useless. The same applies to the wilderness areas of the Yellowstone ecosystem.

A policy statement supporting the development of a wilderness management plan is a critical first step. However, without a specific mandated deadline for completion of the plan the policy is all too often ignored following designation of an area. Existing use patterns often dictate management to the extent it exists at all. The requirement to complete a

wilderness management plan within a specified timeframe, however, forces the manager to identify and articulate the values for which the area was included in the system, and to manage for those values. There should be provision for monitoring to ensure management is successful. The plan provides a tool for the public to use to ensure the manager is carrying out his wilderness management mandate responsibly.

The key to a successful plan are the identification of wilderness values (including those unique to that area), integration of the elements into the action plan, and an implementation schedule. As noted earlier, Bob Lucas has pointed out that the tension between recreation and regulation is intensified in wilderness management. Thus, it is critical to control recreation use with as little regulation and as much education as possible if one is to enhance the wilderness experience, preserve wilderness values and ensure harmonious coexistence. This also means that personnel must be available to implement the plan and do requited monitoring. Otherwise, incompatibility and conflict are inevitable.

According to Dave Porter, BLM's Wilderness Management expert, all BLM wilderness management plans to date recognize there are other reasons for managing wilderness besides recreation use. This results from the wilderness specialists, involved public and some managers recognizing that most BLM wilderness areas are not just "recreation play areas". The plans recognize this, but only time will tell if actual management practices also reflect this insight. Because BLM has lands "where people are not", the agency has an opportunity to demonstrate excellent management of the non-recreational wilderness resources. Hopefully, it will rise to that challenge.

Comprehensive wilderness management plans, and proper implementation, updating and monitoring of them will begin to assure the compatibility of all uses and ensure that recreational activity does not degrade the wilderness character of the area. This requires inventorying the area for its values and setting up a schedule of actions to protect them The absence of a plan increases the likelihood of single use (recreation) management dictated by existing use patterns. Until wilderness managers become more attune to wilderness values and the need to ensure their protection, the plan serves as the only tool the public has to force managers to protect these values.

Once values are defied, the compatibility question becomes clearer but no less challenging to deal with. We are now faced with the carrying capacity question, and the problem of defining the limits of acceptable change (LAC). The carrying capacity concept, which was never fully utilized throughout the Forest Service, has been replaced by LAC, with its emphasis on the conditions desired in the area rather than on how much use the area can tolerate.

Completing the LAC framework for each wilderness area is unfortunately not a requirement for the Forest Service. It should be. The guidelines are there, examples of well defined management plans exist, but the concern for managing the wilderness resource is still far from being of paramount importance.

Until we begin to recognize a wilderness area's special values, we will be hard pressed to answer the compatibility question. The BLM requirement to do management planning for each area is commendable. The Forest Service should follow suit with a requirement to complete a LAC framework for each wilderness area. The BWCA management plan provides an excellent model. To permit a National Forest to pass muster with a generic statement "to encourage good things and discourage bad things", such as exists for Dolly Sods, is unfortunate.

Those ardent framers of the Wilderness System eloquently argued for protection and preservation of the wilderness resource. The wilderness resources' very existence depends on such protection and preservation; the public needs it; and future generations deserve it. A plan defines what needs to be preserved and how. We can afford to do no less. We will then be on the way to developing an environmental ethic that respects all the values of the wilderness while permitting us to enjoy its benefits.

REFERENCES

Buscher, Richard F. 1981. Wildland Recreational Impact from the U.S. Forest Service Land Manager's perspective. Recreation Resource Bulletin. Fall 1981:11-12.

Lucas, Robert C. 1983. The role of regulations in recreation management. Western Wildlands. (9)2:6.

McCloskey, Michael. 1989. Understanding the demand for more wilderness. In: Proceedings of the 1988 National Wilderness Colloquium; 1988 January; Tampa, Florida.

Nash, Roderick. 1967. Wilderness and the American Mind. New Haven: Yale University Press.

Olson, Sigurd F. 1982. The Singing Wilderness. New York: Knopf. p. 5

Reed, Patrick; Haas, Glen; Beum, Frank, Sherrick, Lois.1989. Non-recreational uses of the National Wilderness Preservation System: A 1988 Telephone Survey. In: Proceedings of the 1988 National Wilderness Colloquium; 1988 January; Tampa, FL.

ENDNOTES

1. *Section 4(b) of the Wilderness Act (P.L. 88-577) states:" Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character. Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use.*

THE FUTURE WILDERNESS SYSTEM

Barry R. Flamm*

It would promise us a more serene and confident future if at the start of our sixth century of residence in America, we began to listen to the land and hear what it says, and know what it can and cannot do.
Wallace Stegner (1981)

INTRODUCTION

Since the end of the 19th century, various efforts by States and the Federal Government have led to land designations providing various degrees of protection to wild resources. The establishment of Yellowstone and Yosemite National Parks and New York State's Adirondack Park, as well as administrative primitive and wilderness designations by the Forest Service, serve as notable examples.

It was not until after the mid-20th century, however, that the United States pronounced an official national policy on wilderness. Congress enacted legislation--the Wilderness Act of 1964 (P.L. 88-577)--that created the National Wilderness Preservation System.

The Wilderness Act immediately designated 9.1 million acres of National Forest land in 54 areas. Previously, these lands were classified as wilderness, wild, and canoe areas.

The Wilderness Act also directed a review of 34 National Forest primitive areas, totaling 5.4 million acres, and roadless lands in National Parks, monuments, National wildlife refuges, and game ranges to determine the suitability of each area for preservation as wilderness. In 1976, Congress required a like review--under the Federal Land Policy and Management Act--on lands administered by the Bureau of Land Management.

State and local Governments also have the opportunity to set aside areas of land to be preserved in their natural state and managed as wilderness. Nine States have established wilderness systems within their boundaries totaling more than 1.7 million acres and at least five areas (National Areas Journal, 1984). California, with two areas totaling 97,000 acres, and New York, with 16 areas totaling approximately one million acres, are the only States that incorporated the Federal standards for wilderness. Eighteen other States have passed wilderness legislation or already contained designated areas that do not meet the Federal standards but do preserve lands in a natural condition (RARE II EIS 1979). Soper and Humke have further described de facto wilderness systems owned and managed by States and by private nonprofit organizations and land trusts. (Soper and Humke, 1988).

At present, the Wilderness Preservation System includes 88.8 million acres. Nearly two-thirds of these lands are found in the great expanses of Alaska; 32.2 million acres are located in the contiguous 48 States and Hawaii. Yet despite this commendable commitment to land preservation for future generations, the finite wilderness resource on all land ownerships has decreased in quantity and quality. During the last 25 years, millions of acres of wildlands were lost to development in this country. The quality of wilderness decreased through pollutants such as acid deposition and under the impacts of grazing, mining, and visitation. In addition, profound ecological changes and perhaps direct effects on our biota are occurring as tropical forests around the world are destroyed. Predicted global climatic changes in the next century--a direct result of tropical forest liquidation and air pollution--may be the biggest threat of all.

Americans currently enjoy the benefits of de facto wilderness from wildlands not yet roaded and developed. These lands provide

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enormous ecological services, such as watershed and airshed protection, and serve to enlarge the effective size of protected areas such as designated wilderness, National Parks, and wildlife refuges. But these lands will not long survive in an undeveloped state without affirmative action. Opportunities for preserving wilderness values in the United States are limited. Only an estimated 7 percent of the Nation's land outside Alaska remains undeveloped, increasing to 16 percent when Alaska is included.

I argue that the most effective means of preserving pristine lands is congressional designation of wilderness. While wilderness areas are frequently portrayed by friend and foe alike as simply primitive recreation areas, others have long recognized the wide array of values that wilderness offers. Indeed, the Wilderness Act acknowledges that wilderness "may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value."

Therefore, I am pleased to present this paper on the additions that are essential if the Wilderness Preservation System is to fulfill the entire range of non-recreational needs in the future. I congratulate the Forest Service and the organizers of the colloquium for their recognition of the broad importance of wilderness and for this first-time effort to collect information on the non-recreational values of wilderness for the upcoming Resource Planning Act Program assessment.

NON-RECREATIONAL VALUES OF WILDERNESS

In wildness is the preservation of the world.

Henry David Thoreau (1862)

The preservation of wildness is an essential form of land stewardship, providing tremendously important societal benefits beyond recreation. Among those are biological diversity, geological and watershed protection, scientific opportunities, and other values as discussed below.

Biological Diversity

The estimated 30 million-plus species on Earth constitute a genetic resource that is the most valuable and irreplaceable resource we have. Once lost, it is gone forever. Yet humans are wasting and degrading this genetic reservoir that provides food, clothes, clean water, energy, building material, medicines, psychological well-being, and many other benefits. Simply put, unless we dramatically alter current practices, the Earth will certainly lose a large share of its species during our lifetime. Biological diversity is also being seriously affected through the loss of diversity within species (genetic loss) and the destruction of ecosystems.

Before solutions to the loss of biological diversity can be achieved, we must have a more complete and widespread understanding of what biological diversity is. In basic terms, biological diversity is the diversity of life. It encompasses these related levels of diversity. First, ecosystem diversity, defined as different physical settings containing distinctive but interacting communities of species. Second, species diversity or species richness--the most commonly used form of the term biological diversity. It refers to the number of different species that share the planet. Third, genetic diversity which is the genetic variability that exists among individuals of a species. Genetic variation affects the ability of that species to adapt to environmental changes.

Wildlands are necessary to the conservation of biological diversity. Experience has shown time and again that human manipulation of the environment fails to ensure diversity at its three basic levels. In fact, preserving intact representatives of each native ecosystem to allow for natural ecological functions should be a primary objective of the National Wilderness Preservation System. It is estimated that 157 of the 261 ecosystem types in the United States are currently included in the wilderness system (Davis 1987), but they may not be sufficiently represented or large enough to sustain all species populations.

A second important objective should be the preservation of species that are dependent on wildlands for all or part of their lives.

Such species exhibit great differences in their abilities to tolerate human disturbance. Some disturbance-sensitive species, such as the ivory-billed woodpecker, require vast expanses of undisturbed forest. The Northern spotted owl is equally particular, requiring large areas of old-growth forests--primarily Douglas-fir--to survive. Restoring grizzly bear, mountain lion, and wolf populations to parts of their former range requires large undeveloped areas. Practically speaking, the National Wilderness Preservation System is not now--and may never be--of sufficient magnitude for the long-term survival of these species. Therefore, wildland areas must be combined with other lands on which activities have been designed or restricted so as to meet those species' needs.

Finally, wildlands preservation plays a critical role in genetic conservation. Although gene banks, gardens, and zoos are a limited means in genetic conservation, in situ methods provide the only reasonable, cost effective solution on the broader scale. Plant and animal species existing in their natural habitats have been vital to the development of drugs to fight heart disease, of antibiotics, anti-cancer agents, hormones, and anticoagulants. More than 40 percent of modem pharmaceuticals are derived from natural substances; yet, only one percent of known plant species has been studied thoroughly for human benefits. The genetic reservoir is critical for future food and fiber supplies, not only for new crops but to "revitalize" existing commercial species.

To paraphrase Aldo Leopold, wilderness serves a crucial role by allowing us to save some of the ecological pieces as we tinker wholesale with our natural environments. As private lands are developed and modified and as unprotected Federal lands are progressively roaded, logged, and mined, the need for permanently protected wilderness increases.

Geological Features

"Geologic and land form features are evidence of the historical forces that shaped the evolution of living organisms and can provide insight into past environments . . . ." (Juday 1987).

Outstanding and representative natural geologic features should be preserved as an important part of our National heritage. Of course, geologic features are closely related to biological diversity. Wilderness designation provides protection for these features.

Watershed Protection

The value of wildlands for watershed protection is undisputed. In the Western United States, for example, the majority of all flowing water used by industry, municipalities, farmers, and ranchers originates on public lands--most often on wildlands.

Foresters and other resource managers many times argue that they can manage a watershed better than nature. However, a considerable body of research and experience demonstrates the values of undisturbed forests in providing high-quality water with the added benefits of low cost and naturally regulated and modulated flows.

There is little doubt that resource extraction activities can disturb natural waterways in such a manner as to cause disastrous effects on water quality and aquatic habitats. A classic case involves the South Fork Salmon River on the Payette National Forest in central Idaho. Once one of the most important spawning areas for summer chinook salmon in the Pacific Northwest, the South Fork contributed 55 percent of the entire Columbia River basin summer chinook population. The river produced approximately 50,000 adult chinook annually, of which 10,000 later returned from the Pacific Ocean to spawn. During the early 1960's, more than 30 percent of Idaho's chinook salmon angling occurred on the South Fork.

This river has been severely impacted by timber management practices. The South Fork drainage is located atop the Idaho Batholith, a highly unstable and erosive granite formation that underlies much of central Idaho and extends into Montana. In the mid-1960's, heavy rains fell on the winter snowpack, causing a massive washout of Forest Service logging roads and clearcut areas. The washout dumped tons of sediment into the South Fork, smothering fish spawning and rearing gravels

and devastating the fishery. This disaster caused population numbers of anadromous fish to decline drastically. The South Fork drainage was closed to further logging for a decade during which time the river slowly began to cleanse itself of the sediment. In 1978, the Forest Service resumed logging on a limited basis, These logging activities were again halted after monitoring revealed increasing levels of sediment in the river.

Today the South Fork, a fishery once valued at $100 million, has a fraction of its former capacity to produce fish. Only about 7,000 summer chinook smolts are now produced annually, with as few as 300 adults returning from the Pacific Ocean to spawn. Federal officials have considered nominating the South Fork's salmon and steelhead populations for listing under provisions of the Endangered Species Act.

The Forest Service has recognized that wilderness management provides the greatest opportunity to protect and improve fish habitat in the South Fork. In its draft management plan for the Payette National Forest, the agency explained:

> A major opportunity exists to improve anadromous fish habitat in the South Fork Salmon River. Near natural habitat potential could be achieved by decreasing existing erosion and sedimentation and protection of habitat by wilderness designation and Wild and Scenic River designations. Fish habitat is maximized within naturally functioning ecosystems, in which fish evolved or were created. The adaptation process, which has occurred over millennia, cannot be improved upon by relatively short-term human strategies. Therefore, wilderness designation or Wild and Scenic River designations, which protect the integrity of naturally functioning ecosystems to the greatest extent possible, have the indirect benefit of being optimal from a fish habitat management standpoint. (USDA Forest Service, 198%).

Unfortunately the final forest plan for the Payette does not reflect this policy.

In addition, research in the Pacific Northwest has demonstrated that undisturbed old-growth forests produce the highest quality water for human consumption and that streams free of sediment are prime anadromous fiih spawning areas. (Maser and Trappe 1984; Mastrantonio 1987). From mountain tarns to ovefflow river bottoms and from bubbling glacier-fed brooks to braided river deltas, the diverse nature of and benefits to humans from untainted, free-flowing, and healthy watersheds cannot be overstated. Protection for reasonable portions of these systems relieves humans from the onus of attempting to artificially duplicate literally hundreds of within-system functions, Cleansing water, supporting complex wildlife systems, trapping and modifying chemical concentrations, recharging underground systems, regulating annual water regimes, recreation for man, and esthetics are all natural contributions of watersheds. Clearly the dilemmas of Southern Florida and the everglades system indicate that nature is far better and more cost effective at operating watershed functions.

One of two original purposes in establishing the National Forests was the protection of watersheds. In the East, one of the central aims of the acquisition of the National Forests under the 1911 Weeks Act was to protect watersheds. Through a series of improvements in clean water and other related legislation, the American public has demonstrated its commitment to quality water for human consumption, wildlife, and recreation use. Wilderness designation continues to offer the surest long-term protection of watersheds at the lowest cost. Most of the National Forest roadless lands could be justified for addition to the wilderness system based solely on their importance to the protection and maintenance of high quality waters.

Science

A most obvious non-recreational benefit of wilderness is its ability to provide benchmarks for scientific research, applied forestry, and agriculture. In this sense,

wilderness is like a trust fund for the future, holding answers to questions we have not yet learned to ask. As examples, the study of any species in its natural, undisturbed habitat contributes to a more intelligent management regime for the species elsewhere. This is particularly important for forestry and wildlife management. Wilderness watersheds, in addition to the benefits I noted above, also establish a benchmark against which to judge the impacts of development activities elsewhere. Wilderness waters are being used to conduct important studies on acid deposition. Because these waters are largely free of disturbances caused by human activity, they can provide vitally needed base-line data about the effects of atmospheric pollution.

Wilderness-offers a tremendous opportunity for the study of patterns of disturbance and recovery. As a USDA Forest Service scientist has noted, "Wilderness ecosystems are unique in their scale and in their degree of naturalness, which provide people with unique opportunities to learn." (Franklin 1987)

Heritage, Educational, Cultural, Psychological, and Spiritual Values

Wilderness has been a major force in the development of the United States. It has been a source of important cultural differences, and even today is viewed differently by individuals and cultural groups. Native Americans traditionally and now see the natural world unlike European settlers and their descendants see it. Chief Standing Bear of the Ogalala Sioux made this clear in reference to contacts with white civilization: "We did not think of the great open plains, the beautiful rolling hills and the winding streams with tangled growth as wild. Only to the white man was nature a wilderness and . . . the land infested with wild animals and savage people" (Nash 1982). The "wildness" shaped those who colonized North America and helped form the National character. Rod Nash describes this history and has concluded it is a source of our democracy. Remaining wildlands have enormous importance for the preservation of Native American cultural and spiritual values and for saving a microcosm of what shaped the heritage of the United States. Today's wilderness continues to shape our National development and is widely heralded and sometime used to develop leadership, personal confidence, and social skills and to instill a sense of pride and respect for our natural resources.

In addition, wilderness is believed by some professionals and lay people alike to be important for mental health and well being. Just the mere presence and availability of wilderness may have psychological benefits. Wilderness experiences increasingly are used for therapeutic reasons and to help correct social disorders.

Esthetics

Natural, undisturbed landscapes have a special beauty and inspire awe in ways that cannot be duplicated by the works of humans. The National Wilderness Preservation System contains many examples of such landscapes and should encompass even more of the Nation's scenic wonders. But a landscape does not have to be spectacular to be esthetically pleasing. Wilderness should protect both the grand and the simple natural land forms of the country.

Moral

All the wilderness values discussed to this point have a decidedly anthropogenic approach or bias. However, there are those who believe that nonhuman life and wild ecosystems simply have a right to exist. The basic intuition is that all organisms and entities are equal in intrinsic worth (Devall and Sessions 1985). No conventional economic or biological analysis will encompass this concern. It is more a religious belief or an article of faith such as is found in the thinking and writing of the "deep ecologists."

THE FUTURE WILDERNESS SYSTEM

Preserving wilderness to protect the values and insure the benefits described above is a considerable challenge. Indeed, there are some who would claim that we have already "locked up" enough lands in the United States.

My own experience and research leads me to a different conclusion.

A quick review of the present wilderness system makes it clear that additional wildland protection is necessary to meet the challenge I have defined. First, only 4 percent--88.8 million acres in 463 areas--of the U.S. landbase is included in the National Wilderness Preservation System.' Four Federal agencies--the National Park Service, USDA Forest Service, U.S. Fish and Wildlife Service, and Bureau of Land Management--oversee the lands in the system.

Approximately 16 percent of the Nation remains in a relatively natural, roadless condition. However, these wildlands are not distributed on an even basis in the geographical sense. Most are located in Alaska and in the 11 Western States.

Table 1 and figures 1 and 2 show the amount of Federal designated wilderness by Federal land system and give estimates of acreage with the potential for inclusion in the wilderness system.[2] Acreage figures tell us little, though, about the quality and types of lands preserved as wilderness today. Ideally, a full range of functioning, intact ecosystems should be protected. But, as George Davis reports in using a refinement of the Bailey-Kuchler ecosystem approach, only 157 of the country's 261 ecosystems are now represented in the National Wilderness Preservation System. I believe that many of these ecosystems are under-represented with respect to both their size and quantity.

In other words, simply saving "representative" ecosystems is not sufficient. Indeed, size may be the most important factor in conserving biological diversity. Island biogeographic theory and site specific studies provide tools to estimate the relationship between species and areas. The rough rule is that a tenfold decrease in area corresponds to a halving of the equilibrium number of species present (May 1981 p. 231). This estimate indicates we can eventually expect a significant loss of species dependent on wildlands in the United States, considering that only 7 percent of the landbase on the contiguous 48 States is wild.

As to quantity, redundancy of representation is essential insurance for the future. One cannot assume that all species within an ecosystem are randomly and uniformly distributed. We could miss entire species or certainly key genetic variants if we preserve only one of several like ecosystems or fail to establish a properly designed macroreserve. Replications of similarly functioning ecosystems would provide a safety net for little known invertebrate animals and nonvascular plants, some of which could be seriously endangered (Wilcove and Flamm 1986).

In addition, greater consideration must be given to the problem of habitat fragmentation. When continuous habitats are fragmented, some habitat islands will be unable to support viable populations of certain species. This is often the case for animals requiring large areas for survival such as the grizzly bear. A single grizzly in the Yellowstone ecosystem might range over an area up to 3,000 square kilometers. Species with large area requirements can be very difficult to conserve; yet they are often the ones most in need of protection (Norse and others 1986).

One solution is to ensure that each eco-region (as defined by Bailey) contains at least one "macro-wilderness" as a haven for those species requiring large areas. Properly managed, these large areas will provide a protective umbrella for many species. To achieve macro-wilderness, existing wilderness areas could be enlarged by adding adjacent roadless areas. In some cases, two or more wilderness areas could be joined by restoring roaded lands that link wilderness areas. The effective size of these macro-wildernesses could be further increased by restricting land use activities in areas adjacent to the protected areas. It is clear that such a solution to the problems caused by habitat fragmentation will require a high level of coordination between private and public land managers, including foreign Governments.

The Wilderness Society has proposed a macro-reserve management approach for the Greater Yellowstone Ecosystem (Wilderness Society 1986). This region consists of all or portions of the Gallatin, Custer, Shoshone, Bridger-Teton, Caribou, Targhee, and

Table 1. -- Designated wilderness and potential wilderness by federal land system (millions of acres)

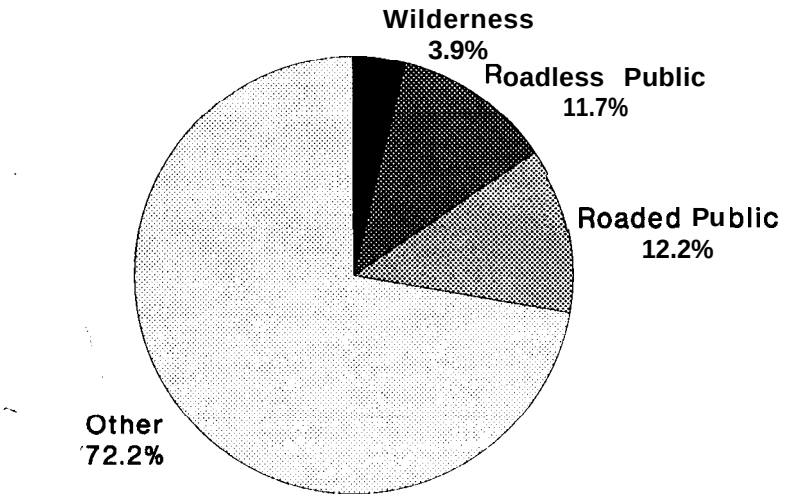
Federal Land System	Alaska			Other 49 States (Excluding Alaska)			Total United States		
	Poten-tial	Desig-nated (NWPS)	Total	Poten-tial	Desig-nated (NWPS)	Total	Poten-tial	Desig-nated (NWPS)	Total
National Forest System	12.0	5.5	17.5	41.0	26.8	67.8	53.0	32.3	85.3
National Park System	19.0	32.4	51.4	6.0	4.4	10.4	25.0	36.8	61.8
National Wildlife Refuge System	58.0	18.7	76.7	5.0	0.6	5.6	63.0	19.3	82.3
Public Lands (BLM)	75.0	00.0	75.0	50.0	0.4	50.4	125.0	0.4	125.4
Total Four System'	164.0	56.6	220.6	102.0	32.2	134.2	266.0	88.8	354.8
State System Equivalent to National System						1.1			1.1
Total Acreage			379.1			1902.0			2281.1

[1] Figures may not add to total due to rounding.

Table 2. -- A proposed future national wilderness preservation system (millions of acres)

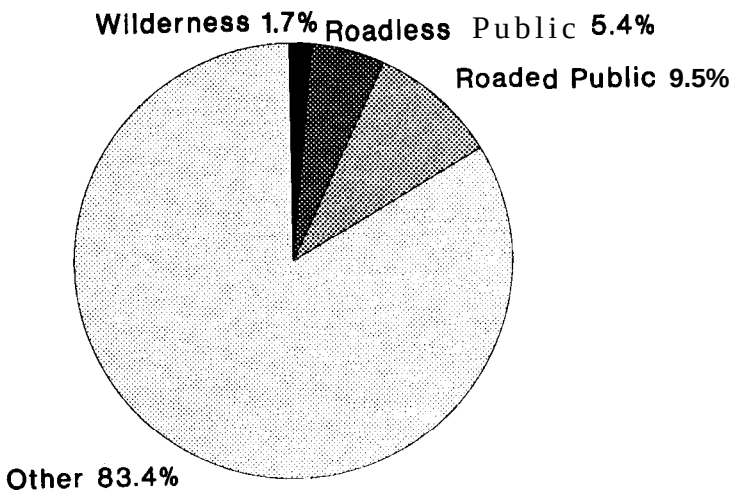
Federal Land System	Alaska	Other 49 States, Puerto Rico, and Territories	Total
National Forest System	15.0	50.0	65.0
National Park System	51.4	10.4	61.8
National Wildlife Refuge System	76.7	5.7	82.4
Public Lands (BLM)	50.0	25.0	75.0
New Areas	0.0	9:o	9.0
Total (rounded off)	193.0	100.0	293.0

Figure l.--Wilderness Today (Total United States)



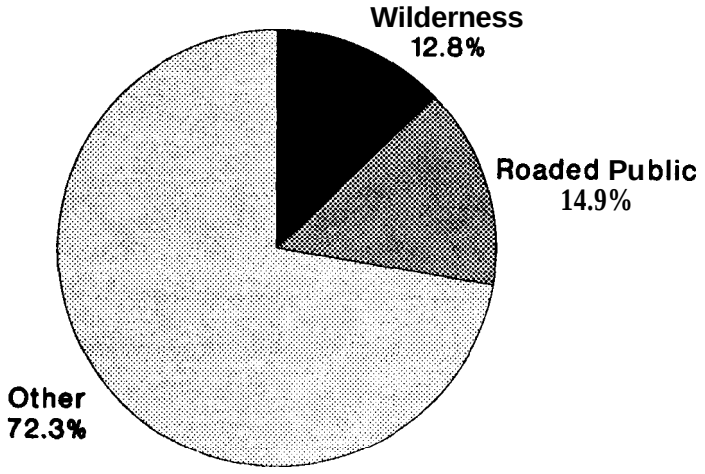
Source: The Wilderness Society

Figure 2.--Wilderness Today (Excluding Alaska)



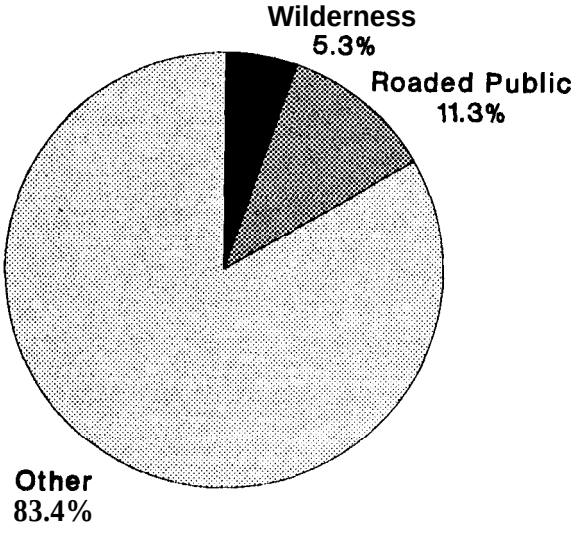
Source: The Wilderness Society

Figure 3.--Future Wildemess (Total United States)



Source: The Wilderness Society

Figure 4.--Future Wilderness (Excluding Alaska)



Source: The Wilderness Society

Beaverhead National Forests; Grand Teton and Yellowstone National Parks; the National Elk Refuge; and Red Rock Lake and Gray's Lake National Wildlife Refuges. In the Greater Yellowstone Ecosystem, the opportunity exists to link together critical Federal wildlands, creating a macro-reserve that may well be essential to the long-term health of the ecosystem and the creatures it harbors.

Examples of other candidate macroreserves are:

1. Appalachian Mountains - encompassing the Chattahoochee, Cherokee, and Nantahala-Pisgah National Forests to the South; the Great Smoky Mountain National Park; and the Jefferson, George Washington, and Monongahela National Forests and Shenandoah National Park to the North.

2. Northern Great Lakes - comprised of Voyageurs National Park; the Superior, Chequamegon, Ottawa, Nicolet, and Hiawatha National Forests; the Seney National Wildlife Refuge; and Quantico Park in Canada.

3. Northern Continental Divide - including the Flathead and Lewis & Clark National Forests, Glacier-Water-ton National Park, Swan River National Wildlife Refuge, and adjacent lands.

4. Pacific Forests - from Northern California through British Columbia to Southeast Alaska (requiring several macroreserves).

5. Arctic Region - preserving the Brooks Range, the South slope tiaga forests and portions of the coastal plain, Arctic National Wildlife Refuge, and Canada's Northern Yukon National Park.

6. Colorado Plateau - encompassing the physiographic province located in Utah, Colorado, New Mexico, and Arizona (bordered to the North by the Uinta Mountains, to the East by the Southern Rocky Mountains, to the South by the Mogollon Rim, and to the West by the Hurricane and Wasatch faults).

Despite the rapid pace at which wild areas are disappearing in the United States, I believe there are sufficient wildlands available in Alaska and the Western States to meet most ecosystem protection needs and to preserve areas of sufficient size to conserve most species. The Great Plains and much of the East present different conservation challenges. Cooperatively managed protective systems will be necessary and new acquisitions for units such as the Tallgrass Prairie National Park and for linkage areas will be required.

Inclusion of the remaining ecosystems not found on Federal lands would require a large land acquisition program and commitment by States for protection of the lands under their jurisdiction. A report to The Nature Conservancy nearly a decade ago stated that "as of April 1, 1978, 69 ecosystem types appeared to have no definite Federal protection. The top 11 States in terms of the number of Federally unprotected major ecosystems which they contain were as follows: Texas (14); Oklahoma (10), California (9); Minnesota (6); and Florida, Illinois, Iowa, Michigan, Missouri, Nebraska and Wisconsin (5 each)." (Crumpacker 1979) Further study should be made of the opportunity and legislation requirements to complement the National Wilderness Preservation System with State wilderness systems.

SUMMARY CONCLUSIONS

Alaska.--Alaska is one of the few places remaining in the world where all of the values associated with wilderness still exist and where we have an opportunity to protect large and complete ecosystems for the future. Because of the fragility of the Alaskan environment, any development must be done with extreme care. The biological needs of the large Alaskan mammals and other migratory species require large undeveloped areas. Alaska has very diverse geology and some very dynamic environments that also require protection.

For these reasons, I recommend that approximately one-half of Alaskan lands remain forever wild.

Contiguous United States--Designated and de facto wilderness in the contiguous 48 States falls short of the aggregate needed to insure biological diversity in the long term and to meet other needs. In addition, the wilderness

resource is inadequately distributed, concentrated in the Western United States. An estimated 104 ecosystems are not represented in the National Wilderness Preservation System. Some of these "missing ecosystems" may occur on State or other Federal lands. These ecosystems should either be transferred for inclusion in the system or provided with comparable long-term protection under other authorities. Many of the missing ecosystems will require acquisition and subsequent restoration.

Islands, Aquatic and Underground Ecosystems. --Most islands under United States sovereignty have been greatly modified. Yet each has unique and important ecosystems, I believe that all of the remaining undeveloped lands on these islands should be protected. Representative aquatic and under-ground ecosystems should also be protected and included in the National Wilderness Preservation System.

Ecoregion and Ecosystem Representation.-- Ideally each ecoregion (Bailey) should include at least one macro-wilderness within a larger macro-reserve complex. The system should include three to five representatives of each of the ecosystems (Davis 1987). Ecosystem redundancy is needed for geographic and genetic representation, as insurance against catastrophes, and for inclusion of all narrowly confined insular species. Ecosystem representation should also ensure representation of many of the Nation's geologic features. However, it will not completely capture the geologic component of our natural heritage. A geologic classification system should be used to identify features that may have been missed by the ecological approach. Such a classification system was developed in 1978 by a panel of professional geologists. The system is process-oriented to provide a means of classifying all geologic features of possible National, State or local significance. The classification system can be used in connection with the ecological systems (Spicer 1987).

A National Wilderness Preservation System that adequately protects natural diversity can be expected to satisfy most of the other non-recreational needs wilderness provides. Lands that were excluded from the above approach should be included on a case-by-case basis.

It is my belief that these wilderness values warrant protecting forever in a wild State at least 5 percent of the lands of the coterminous United States and 13 percent of United States lands overall, (as shown in table 2, figures 3 and 4, a Future Wilderness System).

REFERENCES

Bailey, Robert G. and Charles T. Cushwa. 1981. Bcoregions of North America. Washington, DC.; U.S. Geological Survey.

Crumpacker, David W. 1979. Acquisition priorities for major natural ecosystems in the United States, Report to the Nature Conservancy.

Davis, George D. 1987. Ecosystem representation as criterion for World Wilderness Designation, prepared for the Wild Wings Foundation and presented at the Fourth World Wilderness Congress. September 1987.

Devall, Bill; Sessions George. 1985. Deep ecology.

Franklin, Jerry F. 1987. In: Lucas, Robert C. compiler, Proceedings, National wilderness research conference; July 23-26, 1985; Fort Collins, CO. Gen. Tech. Rept. INT-220, Ogden, UT.

Juday, Glenn P. 1987. Selecting natural areas for geological features: A rationale and examples from Alaska. Natural Areas Journal 7(4): 137.

Maser, Chris; Trappe, J. M. 1984. The seen and unseen world of the fallen tree. Pacific Northwest Forest & Range Exp. Station, Gen. Tech. Rep. PNW 164.

Mastrantonio, J. L. 1987. Old growth forests teach many lessons, Oregonian: July 30. Portland, OR.

May, Robert. 1981. Theoretical ecology: Principles and applications. 23 1.

Nash, Roderick. 1982. Wilderness and the anierican mind. xiii. Natural Areas Journal. 1984.. Wilderness wildlands. 4(4).

Norse, Elliott, et al. 1586. Conserving biological diversity in our National Forests. The Wilderness Society.

Soper, C.; Humke, J. W. 1988. De Facto Wilderness: Lands' complementary to the National Wilderness System prepared for the National Wilderness Colloquium.

Spicer, Richard C. 1987. Preserving the geological component of, our natural heritage. Natural Areas Journal. 7(4):135-136.

Stegner, Wallace. 1981. American Places.

Thoreau, Henry David. 1862. Walking.

U.S. Department of Agriculture. Forest Service. 1979. Roadless area review and evaluation (RARE 2). Final Environmental Statement; Washington, D.C.

U.S. Department of Agriculture. Forest Service. 1985. Draft management plan. Payette National Forest; McCall, ID.

Wilcove, David, and Barry R. Flamm. 1984. Conserving biological diversity: A challenge for National Forest management. Paper presented at the IV InterNational Congress of Ecology; Syracuse, NY; August 15, 1986.

Wilderness Society [The]. 1986. Management directions for the greater Yellowstone ecosystem; Washington, D.C.

ENDNOTES

1. ***These figures do not reflect privately protected lands such as those owned by The Nature Conservancy.***

2. ***Potential lands are based on the following: (1) National Forest estimates from Roadless Area Review and Evaluation process (RARE II), including roadless lands released by legislation; (2) National Park acreage based on agency wilderness proposals; (3) USFWS acreage based on agency wilderness proposals; and (4) BLM acreage based on agency review as required by FLPMA, adjusted upward 25 million acres to compensate for faults--namely excessively stringent standards--in the review process.***

THE NON-RECREATIONAL USE OF WILDERNESS IN THE INTERNATIONAL CONTEXT

George N. Wallace and Harold K. Eidsvik *

ABSTRACT

It is in the developing countries that the non-recreational uses and benefits of wilderness have added significance. It is these benefits that provide the most convincing arguments for wildland protection and management. This is especially true in countries where basic human needs are still at the top of the agenda and where the recreational use of wilderness is, for the most part, a new or a foreign idea. This paper begins with a general discussion of the concept of "wilderness" as it relates to the world beyond our borders; goes on to examine the extent of the world's wildlands, including an estimate of which might be said to have "wilderness quality"; then describes why the non-recreational benefits are so important for countries that are trying to protect and manage their wildlands.

THE INTERNATIONAL UNDERSTANDING OF WILDERNESS

Not long ago the concept of wilderness was, in the words of Roderick Nash, a "full stomach phenomena" (Nash, 1978). It was the invention of a few developed countries that were blessed with abundant natural resources and who had attained a high standard of living. These countries, it was thought, were the ones who could afford to set aside such areas.

This attitude has begun to change and the concept of wilderness is now frequently discussed in international circles in a serious and considered way. Even in developing countries that lack organized environmental or recreational constituencies, there is a growing awareness among decision makers about the importance of wilderness protection. This awareness is usually linked to concerns about things like watershed management, biological and genetic diversity, and the protection of endangered species, which are now topics that are difficult to escape if one is involved in a country's development. This understanding has been fostered by those agencies (AID, CIDA, GTZ etc.) offering development assistance, the efforts of organizations like The International Union for the Conservation of Nature (IUCN), programs like The United Nations Man and the Biosphere (MAB) and the World Wilderness Congress -- among others.

While wilderness protection is an objective of wildland managers worldwide, few countries have chosen to designate wilderness through a legal process. As of this writing, Canada, Australia, New Zealand and South Africa ate the only countries besides the United States to have wilderness legislation and some of that is at the provincial or state level. Protected areas with limited resource utilization, however, exist in 125 of the world's 160 countries (IUCN 1985). "Wilderness", in the international context, more often than not, refers to the wildlands within these protected areas that have "wilderness characteristics".

Even though the term "wilderness" is used more frequently among members of the world conservation community, it is still infrequently used elsewhere. There are problems with the translation of the word "wilderness" into languages like Spanish and French (Dourjeanni, 1984), and words like "wildland" or "wild area" ("area silvestre", "aire sauvage") are more understandable and used more often.

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The World Wilderness Congress has given wilderness a formalized international platform. It has dealt with the concept, the reality, the difficulties and the need for wilderness. In spite of many cultural differences, each of the four World Wilderness Congresses has worked on a definition of wilderness that is acceptable to the world community. The most recent Congress adopted the following revision of previous definitions:

> "Wilderness is an enduring natural resource which provides opportunities to obtain those pristine elements which comprise the spiritual and physical wilderness experience.
>
> It is protected as an ecological preserve of natural diverse processes and genetic resources, it is primarily affected by nature, with human impact substantially unnoticed, and where people are visitors, without mechanical transport or installation.
>
> It must enjoy the highest legislative protection. It should be of sufficient size to realize its essential nature. It should be managed so as to retain its wilderness qualities." (Estes Park -Colorado, 1987)

Subsequently, the Resolutions Committee requested that IUCN further revise the above definition in a way that accommodates indigenous peoples who live within wilderness. The following has been proposed:

> "Wilderness is an enduring natural area, legislatively protected and of sufficient size to protect the pristine natural elements, which may serve physical and spiritual well being. It is an area where little or no persistent evidence of human intrusion is permitted, so that natural processes may continue to evolve (Eidsvik, 1988).

There is then, a marked difference between this evolving definition and the US. Wilderness Act . . . ."where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain' (U.S. Wilderness Act, 1964). Nearly all wildland areas in developing countries, if not occupied by indigenous people, are occupied by or under pressure from nearby non-traditional subsistence peoples who engage in shifting cultivation, grazing, hunting or gathering. This is an important distinction which we shall discuss later in the paper.

The Wilderness Congress also continues to address the criteria for the size of wilderness areas. Some feel that an area size standard as small as the 5000 acres or more prescribed by the U.S. Wilderness Act would make it difficult to achieve the objectives of large size, remoteness, and the protection pristine natural elements. (Eidsvik, 1985; Mosley, 1986). Others feel that area criteria may be unnecessary and point out that an isolated mountain valley or an island, which otherwise meet wilderness criteria, might be excluded from designation if size standards were not flexible.

HOW MUCH WILDERNESS/WILDLAND IS THERE IN THE WORLD?

The Sierra Club recently completed a worldwide inventory using jet navigation charts to see how many blocks of roadless and relatively uninhabited land larger than 400,000 ha. could be found. They identified five billion hectares or roughly one third of the worlds land area that fit this description. Much of this "de-facto" wilderness (> 60%). however, is tundra, desert or unoccupied because of it's inhospitable nature (McClosky 1987). The Sierra Club survey gives a preliminary overview of how much of the world remains relatively undeveloped. Much of this could be considered "wildland" but is not "wilderness" under currently accepted definitions which require some degree of legal protection.

Another measure of the worlds wilderness areas comes from the data kept by IUCN's Protected Areas Data Unit (PADU) which was initiated in 1959 at the request of the United Nations. This data which is kept at the Conservation Monitoring Center registers the legally designated or privately owned protected areas found in 125 of the worlds 160 countries. As of 1985 PADU describes the worlds protected areas as presented in table 1.

Table 1. -- Protected Areas of the World

IUCN category		units	land area
I	Scientific, Nature Reserves	526	38,106,074 ha.
II	National Parks, or Equivalent	1,050	256,029,904 ha.
III	National Monuments	70	6556,943 ha.
IV	Managed Nature Reserves and Wildlife Sanctuaries	1,488	103,504,852 ha.
V	Protected Land or Seascapes	380	19,586,625 ha.
TOTAL			423,774,398 ha.

Source: IUCN 1985

Of this total, about half, or more than 200 million hectares (772,200 square miles), are of wilderness quality using U.S. standards (Eidsvik 1987). Further observation indicates that 100 million ha are North of 60 degrees in the Northern Hemisphere.

This 200 million ha. of "wildland" having wilderness quality includes about 39 million ha. in the U.S. Wilderness Preservation System and approximately 71 million ha. are in the wilderness systems of Canada, Australia, New Zealand and South Africa. "Wilderness areas" in most countries are wildland zones within legally protected areas found in IUCN categories I-IV. The "core areas" of the worlds Biosphere Reserves are good examples of this type of zoning. The 50 countries in Table 2 incorporate more than 90% of the worlds' protected areas (Eidsvik 1984).

North of 60 degrees there are 44 protected areas over 50,000 in size which could be considered as de facto wilderness areas. These are dramatic numbers which include 25% of the world's largest park, the 70,000,000 ha Greenland National Park. There are few permanent residents in any of the circumpolar defacto wilderness areas.

One of the world's greatest wildlands is Antarctica, which is 99% ice, 1% soil and has a negative heat supply for all but two months of the year. It does, of course have unique flora and fauna. The international treaties that govern the area do include special conservation and scientific interest sites, access to which is prohibited except by permit. Members of the Scientific Committee for Antarctic Research (SCAR) feel that such areas will continue to be protected by their climate and isolation (IUCN/SCAR 1986).

The wilderness/wildland areas that are the focus of the remainder of this paper are those lying below or above circumpolar regions and within developing countries (Table 2) that are struggling to protect their wildlands. It is here we find the tropical and neotropical rainforests, the snow leopard, the great game herds of the African Savanna, the cloud forests, volcanos, waterfalls, coral reefs, condors, mangrove swamps and thousands of other examples of (known and unknown) flora, fauna, land and seascape that the world is beginning to treasure - and worry over. It seems appropriate that we focus on these areas and their rich diversity of biomes principally because most are under tremendous pressure from inappropriate economic development as well as from nearby human activity and encroachment. These developments include the over-exploitation of tropical forests, poorly planned hydroelectric projects and the conversion of forest lands to agricultural land uses that are often not sustainable.

THE RELATIONSHIP BETWEEN INTERNATIONAL DEVELOPMENT, PEACE AND STABILITY AND WILDLAND PROTECTION

There is consensus among all involved--expressed at the Fourth World Wilderness Congress--that the protection of wildlands can only succeed if it is part of an overall strategy for peace and development that will raise the standard of living for the world's poor and make it less likely that individual nations will sacrifice their natural resources in order to pay their foreign debt or to win a war (Brundtland

Table 2. -- The world coverage of protected areas', countries protecting more than 1,000,000 ha

Country	Number of Areas	Hectares
Argentina	29	1517,700
Australia Angola	581	2,594,351
		35,413,712
Bolivia	12	4,707,690
Botswana	8	11,644,000
Brazil	50	11894.302
Cameroon	15	2,228,200
Canada	78	22,949,135
Central African Republic	7	3,904,000
Chile	64	12,737,360
China	62	2,273,606
Colombia	30	3,958,750
Congo	10	1,353,100
Czechoslovakia	28	1,157,022
Greenland	2	71,050,000
Ecuador	12	2,627,365
Ethiopia	10	3,027,500
France	37	1,654,878
Gabon	5	1,673,000
Ghana	8	1,175,075
India	239	11,149,261
Indonesia	140	13,755,239
Iran	24	3,055,696
Ivory coast	10	1,865,000
Japan	50	2,195,600
Kenya	28	3,105,307
Malawi	9	1,081,485
Malaysia	34	1,558,882
Mauritania	2	1,483,000
Mongolia	4	4,672,580
Mozambique	6	1,815,000
New Zealand	147	2,787,392
Norway	61	4,716,628
Pakistan	52	6,537,3 11
P aragua y	9	1,120,538
P eru	11	2,407,642
Senegal	9	2,176,700
South African	149	5,689,179
South West Africa	9	6,563,570
Spain	56	1,700,659
Sudan	3	1,915,670
Sweden	67	1,463,146
Tanzania	15	10,601,775
Thailand	45	2,720,533
Uganda	18	1,332,029
USSR	122	14,497,025
United Kingdom	57	1,552,567
United States of America	251	64,946,135
Venequela	34	7,388,912
Zaire	9	8,827,000
Zambia	19	6,664,400
Zimbabwe	17	2,757,709

[1] Adapted from IUCN, 1985. Thus about 50 countries incorporate more than 90% of the world protected areas (Eidsvik 1987).

1987). Without an integrated approach to rural development in particular, wildlands in the third world will remain under pressure from people who need their resources to survive.

In much of the tropical and neotropical realm, for example, there is no frost and resident subsistence or near-subsistence agriculture is possible year round - even on lands that would never be farmed in temperate or developed countries. Steep hillsides, rocky or densely forested areas do not deter people who have few other economic options and who can survive by using the simple tools of fire, machete, ax, grazing livestock, rifle or snare to provide for themselves or their families. In some of the poorer countries 60 to 75 percent of the population still earn their living from agriculture. It is convenient for politicians and government officials to look the other way. In many countries, search for wildlands are pressure relief valves that temporarily absorb hundreds of thousands of people who might otherwise be in the streets demanding jobs, housing and food.

Given the basic need for food and shelter the encroachment of wildland protected areas is continual even without the surges of new settlement that are provoked by warfare, economic downturns or the construction of a new roads. This is explained not only by increases in population but also by the fact that many of the remaining wildlands and nearby settlements occur on marginal lands. On such lands the nutrients are frequently tied up in the vegetative cover where decomposing plant material is quickly recycled and where the soil is protected from sun or wind and rain by the native vegetation. The subsistence agricultural cycle often entails clearing the land for it's timber or fuelwood, which enables the cultivation of subsistence crops for a few years until nutrients are depleted. This is often followed by a few more years of grazing and the felling of more forest for new cropland as the cycle continues.

With only a limited ability to govern their own destiny and an increasing international debt, many of the lesser developed countries are unable to sustain their economies or provide effective rural development or resource management programs. This exacerbates conditions with the rural poor. With few cash crops or the inputs necessary to intensify and stabilize subsistence production, rural people become increasingly dependent on limited natural resources and find it difficult to sustain themselves without encroaching on "protected areas". These areas in effect are their external support system providing wild meat, firewood and agricultural opportunity.

There are numerous instances where wildlands have been located on or near productive lands where people with money and power have taken advantage of the government's reluctance to remove squatters from protected areas in order to establish their own farms and ranches. In most cases, however, the encroachment of wildland protected areas located on marginal lands can rarely be said to be the fault of the person wielding ax, torch or herding a few head of livestock. Such people are typically landless, have few other options for earning a living, and little idea of the long term implications of their actions or the extent of world resources.

It is also necessary to point out that there are long time indigenous occupants of wild areas who's hunting, gathering and farming is extensive (as opposed to intensive) enough that it allows the land to recover with little long term damage. In some cases Indian tribes might be said to be living in harmony with their ecosystem and guardians of valuable knowledge (Gomez and Pompa 1987). Where traditional cultures do use sustained yield practices, indigenous people and protected area managers can be appropriate allies but this requires considerable mutual understanding (IUCN/UNEP, 1986).

Subsistence pressure on wildlands has been intensified by warfare and the resulting numbers of refugees in places like Central America, Africa and South East Asia. Refugees entering neighboring countries who do not have the means to care for them are often allowed to settle in protected wildland areas as a last resort. Guerrillas hide in wild areas and use them intensively for their needs. The government in power builds roads into protected areas to facilitate the entry of counterinsurgency forces and to "pacify" the area. Combat zones experience considerable damage from the fighting itself. War and underdevelopment are usually related and have

many indirect repercussions for wilderness. An example of indirect impact is provided in Nicaragua. Their national treasury depleted by years of strife the government has, in desperate effort to pay for imported energy, recently agreed to allow both Honduran and Costa Rican companies to enter previously protected wildland areas inside Nicaragua in order to harvest timber.

The massive disruption of protected areas by military and civil disturbance is overshadowed by the human misery, desperation and desolation caused by these activities. From a long term conservation perspective, however, one cannot ignore the destruction of the protected area systems, for example, of Angola, Mozambique, Uganda, Ethiopia, Afghanistan, Iran, Cambodia, Nicaragua and El Salvador.

THE IMPORTANCE OF FOCUSING ON THE NON-RECREATIONAL BENEFITS PROVIDED BY WILDERNESS IN ORDER TO FACILITATE PROTECTION

In developing countries that have large numbers of rural and urban poor it goes without saying that most people have neither the time, money or the cultural predisposition for outdoor recreation that is found in the developed world. In situations where a large percentage of the population is still involved in small scale farming it is less likely that those who work physically in the outdoors will opt to spend available free time in a wilderness setting. Environmental groups that support the protection of wildlands are beginning to appear in the larger cities of many developing countries. Few of these constituencies however, have members that defend, or like their counterparts elsewhere, demand wilderness as a result of their coming to know and love such areas via personal recreational experiences (Barborak, Morales, 1987). On the contrary, protected areas in developing countries often lack the staff or budget to provide access, facilities or information for local people even though there may be outfitters present who cater to foreigners who come for recreation or nature tourism (Ingram and Durst, 1987).

The in-country support that does exist for protecting wildlands in most third world countries has been achieved with difficulty and has more often than not arisen out of a growing awareness about the importance of the following kinds of non-recreational benefits, most of which are essential for sustaining regional or local development:

1. Maintaining the environmental stability of the surrounding region. This entails stabilizing the water regimen or the intensity of floods and dry periods, decreasing the rates of soil and wind erosion and ameliorating local microclimatic conditions such as protected areas in India and Nepal like Manas NP.

2. Protecting the public's investment in infrastructure such as hydroelectric or irrigation projects which are huge investments for any developing country. The loss of reservoir and power generating capacity as a result of sedimentation and dramatic fluctuations in water regimen have become serious problems for many countries in recent years (Quesada and Wallace 1985). As a result, watershed protection is starting to be included as part of the anticipated costs of most hydroelectric or irrigation projects funded by the World Bank or sponsored by USAID and other development organizations. Examples include: Canaima NP in Venezuela, Sinhara River in Sri Lanka, and Dumoga-Bone NP in Indonesia.

3. The protection of quantity and quality of domestic water supplies. The procurement and treatment of water is a costly process. These costs are frequently minimized by the presence of protected watersheds and forest reserves that are close to urban areas. Such areas have the potential to serve as wildlands that provide many benefits to the local population and it is in such areas that there is perhaps the highest level of interest in wildland management (Wallace, 1985). La Tigra National Park near Tegucigalpa, Honduras comprises a minor portion of the watershed land area but provides the city with a disproportionate amount of it's water supply the quality of which requires considerably less treatment than the water from the rest of the watershed area. Among many other examples are the Rio Macho/Tapanti Wildlife and Watershed Protection Area in Costa Rica and the Mome Trois Pitons NP in Dominica.

4. Maintaining the productive capacity of ecosystems. Wildland protected areas serve as sources of wild breeding stock for a variety of plant and animal products that are important renewable, harvestable resources for the local economy. Protected areas serve as indispensable nesting, calving, spawning areas for species upon which local people depend for bushmeat, wildlife products such as hides and venom, or plants and animals reared from wildstock for export such as curare, periwinkle crocodiles, ornamental fish or butterflies (IUCN,UNEP, 1.984).

5. Genetic and Species Conservation. Increasingly, national leaders, government officials and environmental groups, even in the poorest countries; are being exposed to the worldwide concern about the importance of protecting a wide range of biomes and species communities. The international scientific community together with non-governmental organizations like the IUCN, World Wildlife Federation, Worldwatch, The Nature Conservancy and programs like The United Nations Man and the Biosphere Program, The World Conservation Strategy, and others have made an attempt to reach national leaders and to move ahead with their own wildland protection projects. In some cases this awareness is, again, a result of stipulations placed on money being loaned for development projects by international lending and donor organizations. Such external development assistance now frequently requires the analysis of a projects impacts on species and genetic diversity and may require mitigation which includes the designation of protected areas and interagency coordination to ensure their viability.

6. Research. The benefits to all mankind from wildland research in the areas of medical pharmacology, plant breeding, environmental tnodification etc, - both basic and applied have been described adequately elsewhere in these proceedings. It is important to note that the interest in conducting research and the presence of more research activity in developing countries has helped to make decision makers aware of the economic and social benefits derived from research. It has also stimulated "scientific tourism" and helped to point out the uniqueness and importance of previously unrecognized wildland values and resources (Laarman and Perdue, 1987).

7. Tourism that brings visible benefits to the local economy. There is some resentment about preserving third world wildlands (that might otherwise be exploited for their consumable resources) for the benefit of first world tourists and scientists. In countries like Kenya, Costa Rica or Nepal, however, the benefits from wildland tourism have been noticeable enough that both decision makers and the general public have come to recognize the value of protected wildlands to the local. economy. In these countries it has become more acceptable to enforce the boundaries and regulations of protected areas. Costa Rica recently used their civil guard to remove several hundred illegal subsistence gold miners from remote and roadless areas of Corcovado National Park. What would have been seer, as a bold and risky move in many countries went smoothly and was accepted by the public. Costa Ricans have come to recognize the value of their wildland resources and the fact that many tourists and scientists visit and return to Costa Rica specifically to experience pristine backcountry in a tropical setting (Laarman and Perdue, 1987).

This list of non-recreational benefits is not as exhaustive as those brought forth during this symposium, but it does serve to highlight some of the more significant reasons that wildland/wilderness areas are being protected in most of the world. Poverty and underdevelopment have meant that the protection of wilderness cannot yet be based on a “love for wilderness” of the sort held by a significant number of people in the United States and a few other developed countries. It is a difficult and perilous business for government officials to tell thousands of rural poor that they cannot consume wildland resources or to tell already established groups that they must leave wildland protected areas. ‘I’here rnust be convincing reasons. As an awareness about the long term benefits provided by wildlands increases, especially among the educated and urban public, it will become more feasible to actually enforce the regulations and wildland boundaries that often only exist on paper in many of the countries that are listed in Table ’ (Shores and Houseal, 1988).

Simultaneous with increasing the general public's awareness about the importance of wildlands, perhaps the greatest challenges facing officials and managers and others who are concerned about wildlands am:

(a) being able to integrate the protection of wildlands into regional land-use and development planning, and

(b) improving the lot of and winning the support of those who live immediately adjacent to or within protected areas and who are immediately affected by restrictions on their use of the area.

It is a reality that the future of wilderness in much of the world in a sense depends on the future of development. If basic human needs are not met we can only agonize at the slow but continual loss of wild tissue. Conventional politics, economics and government processes tend to overlook the values inherent in wilderness even when not pressured by short term survival needs. It is therefore important that these values be carefully articulated and then brought forth - as they have been at this conference - and whenever possible put in the international context.

THE ROLE OF U.S. AGENCIES

There now exists a considerable body of knowledge that contribute to our understanding about the relationship between world's undisturbed wildlands and their importance as gene pools, for scientific research, (medical, agricultural, industrial), and their long term role in enabling sustainable national development, hence peace and prosperity between nations. Thoreau's claim that, "In Wilderness lies the preservation of the world" has now been substantiated scientifically. That the U.S. has a stake in the protection of the world's wildlands goes without saying. Precedents for U.S. public land management agency assistance to other counties have been set and such assistance is likely to continue to expand into the area of wilderness management.

The interdependence that many species of wildlife found in the United States have with wildlands in other parts of the Americas has long been known and is reflected in legislation like the Migratory Bird Treaty Act involving Canada, Mexico and the US. Likewise, endangered plant and animal species worldwide depend on agreements like those developed by the Convention on International Trade of Endangered Species (CITES) which has led to the creation of the Office of Scientific Authority by the U.S. Fish and Wildlife Service. The National Park Service, the Forest Service and the USFWS have established international assistance units.

The interdependence of protected areas is further underlined by the Convention for the Protection of the World"s Cultural and Natural Heritage. The World Heritage Convention provides technical advice and financial assistance to the most outstanding protected areas in the world - known as World Heritage Sites. The funds available, as with most protected areas in the world, barely scratch the surface of the needs.

The National Park systems that exist in many countries are frequently patterned after U.S. and Canadian parks and the Park Service has a long history of technical assistance in this area. Wilderness management is a relatively new field within the USFS, NPS, USFS and BLM (Wilderness Research Center 1985). The Forest Service has developed perhaps the most extensive knowledge about wilderness management. Many agency people have themselves been trained in the field via in-service training since University natural resource management curriculums are just beginning to incorporate wilderness management courses. In spite of wilderness management's being a relatively new field in the this country, Agencies like the Forest Service should anticipate the need to assign time, budget and personnel to international programs that have already requested and will continue to seek assistance in the areas of wildland management, research, training and other support necessary for the future designation of wilderness areas per se and to make effective wilderness and wildland management a reality in more than just a handful of countries which is now the case. Such assistance can be an important part of the overall international development effort that must take place for many years to come.

REFERENCES

Barborak, J. and Morales, R., 1987, unpublished papers, Wildlands Program, CATIE, (Centro Agromomico Tropical de Investigacion y Ensenanza), Turrialba, Costa Rica.

Dourjeanni, M. (personal communication with author) June 1984, Gland Switzerland.

Eidsvik, Harold K. 1987. Wilderness Policy - An International Prospective. pp.54-68, In: Lucas, Robert C. Proceedings - National Wilderness Research Conference: Issues, State-of-knowledge, Future Directions. 1985. July 23-26; Fort Collins, CO. Gen. Tech. Rep. INT-220. Ogden, Utah: U.S. Department of Agriculture, Forest Service, Intermountain Research Station,

Eidsvik, Harold K. 1988. "Wilderness Sanctuaries", forthcoming paper done for the IUCN Commission on National Parks and Protected Areas.

Eidsvik, Harold K. 1987. "The Status Of Wilderness: An International Overview", unpublished paper prepared for: The Natural Resources Journal, University of New Mexico Law School, Albuquerque.

Eidsvik, Harold K. 1985. Proceedings - National Wilderness Research Conference, Ft. Collins, Colorado, July 1985.

Estes Park Colorado, 1987, Proceedings - Fourth World Wilderness Congress"

Gomez Pompa and Andrea Kaus, 1987, "The Conservation of Resources by Traditional Cultures in the Tropics", presented at the 4th World Wilderness Congress, Estes Park, Colorado, 1987.

IUCN/UNEP, 1986, Managing Protected Areas in the Tropics, MacKinnon,J and K., Child and Thorsell, editors, IUCN Conservation Monitoring Center, Cambridge, UK.

IUCN/SCAR, 1986, "Conservation in the Antarctic", report of the Working Group on Long Term Conservation in the Antarctic, Gland, Switzerland.

Ingram, C. and Denise and Patrick Durst, 1987. "Nature Oriented Tourism by U.S. Based Tour Operators", FPEI (Forestry Private Enterprise Initiative) Working Paper No. 28

IUCN, 1985, United Nations List of National Parks and Protected Areas, IUCN Gland and Cambridge, 1985.

Laarman J. G. and Richard R. Perdue 1987. "A Survey of Return Visits to Costa Rica by OTS Participants and Associates", FPEI Working Paper No. 6

McClosky,Michael J., and Heather Spalding, 1987, " A Reconnaissance-Level Inventory Of The Wilderness Remaining In The World", Sierra Club, Washington DC.

Mosley, G. "Our Last Great Wilderness, Australian Conservation Foundation, Melbourne, 1986.

Nash, Roderick, 1976, "Nature in World Development", Bellagio Lectures, Rockerfeller Brothers, 197 8

Shores, J.and Brian Houseal, 1988, "Of Partners and Paper Parks", IN The Nature Conservancy Magazine, Vol 38, number 1, Jan.- Feb.

Quesada, C., and Wallace, G., 1985, "El Manejo de Las Cuencas Hidrographicas" (Watershed Management), audio- visual with booklet, CATIE, Turrialba, Costa Rica.

United States Wilderness Act, Public Law 88-577, 88th Congress, S.4 Sept. 3 1964.

Wallace, George, 1985, "Cuanto Vale El Agua" (How Much Is Water Worth), audio-visual with booklet, produced for CATIE and Acueductos y Alcantarillados (A y A, the National Water Utility), San Jose, Costa Rica.

Wilderness Research Center, 1985, "Wilderness Management - A Five Year Action Plan", University of Idaho, Moscow.

World Commission on Environment and Development, 1987, Our Common Future, Gro Harlem Brundtland, chairperson, Oxford University Press, New York.

PRESERVATION OF NATURAL DIVERSITY: THE ROLE OF ECOSYSTEM REPRESENTATION WITHIN WILDERNESS

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ABSTRACT

The value of preserving the natural diversity of the United States' 261 major terrestrial ecosystems is defined and preservation efforts on public lands in the National Wilderness Preservation System (NWPS) are reviewed. One hundred and four major ecosystems not protected in the NWPS are identified and some opportunities to include such systems with the NWPS are discussed. Inclusion within the NWPS of representative samples of all 261 major terrestrial ecosystems of the United States is advocated.

INTRODUCTION

Scientists have long extolled the importance of preserving the widest possible spectrum of life forms. It is only in recent years, however, that lay conservationists and political leaders have understood that the preservation of natural diversity may very well be vital to the survival of the human race. The quality of life of future generations will benefit significantly if this generation takes steps to ensure the preservation of portions of all the major ecosystems represented on this planet.

By definition, natural diversity must include both biological diversity and a diversity of physical environments. Biological diversity includes both species diversity and genetic diversity within species. Natural diversity incorporates the physical environment within which species interact with biological diversity. Natural diversity is, therefore, synonymous with ecosystem diversity. The preservation of the widest range of natural diversity, in a practical sense, depends on the preservation of a full range of functioning ecosystems.

The benefits, material and esthetic, of maximum diversity are well documented, so I will not reiterate in detail the myriad values to be derived from ecosystem preservation. The literature clearly documents both the anthropocentric and the biocentric values of such preservation (Norton 1985; Norse and others 1986; Randall 1985).

Advocates of wilderness should never forget, for all the heated debate, that wilderness preservation is a mechanism for granting future generations optimal enjoyment of an array of natural landscapes and ecosystems. We must recognize, however, that wilderness protection is but one mechanism for protecting selected portions of our natural landscape. National parks, nature preserves, and similar legal reservations also play important roles in determining what this generation will pass on to the next.

Legal Basis

The National Forest Management Act (16 U.S.C. 1600) speaks to the importance of natural diversity, and throughout the Act a regard for future generations is clearly evident. Preserving natural diversity for future generations is only possible by understanding political feasibility, recognizing resource management limitations, and respecting scientific integrity. Natural diversity is provided by two methods: manipulative management and preservation management. Both are necessary to provide a true cross section of diversity. In this paper I will limit myself to preservation management and, more specifically, to the inclusion of representative

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samples of our naturally occurring ecosystems in the National Wilderness Preservation System.

Preservation management insures diversity through the process of unrestrained ecological processes. In forested areas it can provide for old growth, in a dynamic steady state condition, which recent studies (Schoen and others 1981) have shown to be among the most complex, diverse, and productive of all forest age classes.

Preservation management can and should be pursued at various scales. The biosphere reserve program of UNESCO is intended to eventually contain an international network of protected areas representing the major natural regions of the world (UNESCO 1984). This initiative was undertaken by 'the International Union for Conservation of Nature and Natural Resources (Dasmann 1972) and adopted for UNESCO's biosphere reserve program (Udvardy 1975). A research natural area program has been administratively operative on Federal lands in the United States since 1927 (The Nature Conservancy 1977). The biosphere reserve program generally seeks to preserve large areas of the world's major ecoregions whereas the research natural area program incorporates areas at a more detailed scale for specific ecological baseline purposes. Both programs exist primarily for scientific purposes.

Wilderness at the national level and in the legal sense can only be created by Congress. Furthermore, the 1964 Wilderness Act (16 U.S.C. 1131-1136), which created the National Wilderness Preservation System, specifies that whereas scientific value may be a part of the basis for wilderness classification, it is not mandatory and, at least by inference, not preeminent. Still, it would be difficult to overstate the scientific and educational values of wilderness.

Although all of the preservation methods we have are important, I intend in this paper to dwell on the potential role of wilderness as a method for preserving ecological diversity for future generations.

Defining Ecosystem - A Matter of Scale

Tansley (1935) is credited with coining the term "ecosystem". He used the word to describe a "biotic community interacting with its physical environment" (Dasmann 1972). Thus, in the sense Tansley used the term, an ecosystem could be readily mapped by delineating the boundaries of any particular community. The scientific definition of ecosystem has since become more complex, incorporating energy flow, soils, and physiography. Still, the basic concept as expressed by Tansley is of immense value to lay persons, generalists in the natural resource field, public policy-makers, and government officials.

The Tansley concept allows us to view the earth as a series of ecosystems whose components are dependent upon one another. Yet these ecosystems also interact. As Bailey has pointed out, "The boundaries of ecosystems, however, are never closed or impermeable; they are open to transfer of energy and materials to or from other ecosystems" (Bailey 1982). It is possible to develop a defined hierarchy of ecological units of different sizes that reflects a continuum of ecosystems. The largest is formed by the planet Earth; examples of small ecosystems include a narrowly limited, homogeneous stand of vegetation or a small pond. Since ecosystems are spatial systems, they will be consistently inserted, or nested, into each other (Bailey 1982).

As an aside, it is useful to note that in choosing an appropriate definition of ecosystem and an appropriate hierarchical classification system, the purpose to which the definition and resultant classification system is to be put must be considered. When the purpose behind the choice of an ecosystem classification scheme is to preserve representative samples of ecosystems, the plant and animal components of such systems determine the minimum critical size for reserves. Larger reserves tend to reduce or prevent the loss of individual species and communities (Diamond 1975; Torborgh 1975). Recent studies by Newmark (1987) confii this insofar as mammalian extinctions in Western North American parks are concerned.

Early efforts at mapping ecosystems centered around the vegetative element. For example, Clements (Weaver and Clements 1938) described and mapped major climax plant communities. A year later Clements worked with animal ecologist Victor Shelford to develop the concept of the biome, an area defined by climax vegetation and its associated animal life (Clements and Shelford 1939). The biome concept is particularly useful because it is based on readily visible species. Since it relies on the climax vegetative type, it is most useful in areas where human disturbance has been minimal--areas where a wilderness classification has not yet been forgone.

THE SECOND NATIONAL FOREST ROADLESS AREA REVIEW AND EVALUATION (RARE II)

In 1977 the Forest Service, an agency of the U.S. Department of Agriculture, undertook a review of 62 million acres (24,800,000 hectares) of roadless and undeveloped lands under its jurisdiction to determine which of these lands should be incorporated into the National Wilderness Preservation System (NWPS). Early in the process the Forest Service decided that preference would be given in allocating roadless areas to wilderness if the addition of the areas would increase the diversity of the NWPS (USDA 1978a).

In its RARE II program, the Forest Service merged two widely accepted national ecological classifications: Bailey's ecoregion concept (Bailey 1976) and potential natural vegetation (Kuchler 1966; Ewel and Whitmore 1973). This produced a particularly strong system emphasizing both factors from the physical environment such as climate and soil, and factors of the biological environment such as vegetation. (Vegetation generally defines the animal life in an area.) Using this system, the Forest Service mapped 242 distinct ecosystems in the United States and Puerto Rico (USDA 1978a). Refinement by Bailey (1980) and Davis (1980, 1984, 1987) brought the actual number to 261. While other classification systems could be designed to describe the vast natural diversity found on lands administered by the Forest Service in perhaps as few as 50 or as many as 500 basic ecosystems, the one chosen for use by the Forest Service provides enough detail to be biologically significant yet broad enough to be easily understood by lay persons.

The Bailey-Kuchler system, as it became known, readily lends itself to further refinement; e.g., it places little emphasis on aquatic ecosystems. Furthermore, the small scale (1:7,500,000) obviously omits much on-the-ground heterogeneity. Federal Research Natural Area programs, the Experimental Ecological Reserve program (Institute of Ecology 1977). and the individual States were encouraged to refine this system to help ensure that representative samples of the United States' natural heritage would be set aside for posterity.

In evaluating diversity in the National Wilderness Preservation System, the Forest Service defined adequate representation of each Bailey-Kuchler ecosystem as two or more distinct examples of at least 400 hectares apiece. This definition left a margin of error for mistaken or atypical classifications. In addition, if preservation of a nation's basic ecosystems is a legitimate objective, it was recognized that the areas selected as representative must epitomize that particular ecosystem. In reality, of course, optimum spatial requirements would vary with ecosystems; 400 hectares was determined to be only a reasonable minimum.

The Impact of RARE II on Ecosystem Preservation in the United States

As a result of the RARE II program and the political process of formally designating wilderness areas, 157 of the United States' 261 basic ecosystems are now represented in the NWPS (Davis 1987) compared to 131 prior to RARE II (USDA 1978b). At least 11 more unrepresented ecosystems are in national parks and wildlife refuges that have been recommended for wilderness designation but are still awaiting Congressional action. Thirteen others are represented in national parks not recommended for the NWPS.

Since the Bureau of Land Management (BLM) of the U.S. Department of the Interior has also agreed to use the Bailey-Kuchler concept of ecosystem representation as a

criterion in its current wilderness studies, it is expected that diversity within the NWPS will be considerably increased. Because of the Forest Service and BLM decisions to adopt diversification of the NWPS in the United Sates as a criterion for wilderness designation, I estimate that the number of ecosystems represented in the NWPS will have been increased by 50 percent, from 131 to an estimated 200, between 1978 and the end of the century--if our public land managing agencies do not lose their commitment to this criterion,

It is anticipated that most, but not all, of the forest and desert ecosystems in the United States will be represented in the NWPS by the year 2000. Unfortunately, few of the fertile native grassland ecosystems are likely to be represented since most of these lands are in private ownership and lack the scenic splendor that spurs the citizenry to seek wilderness designations. The scientific community must play a more active political role if truly diverse areas are to be preserved as wilderness.

More remains to be done, but an impressive step forward to ensure the preservation of ecosystem diversity has been taken in the United States.

THE NEXT STEP

Whereas the Forest Service pioneered the concept of using ecosystem representation a decade ago, its leadership role has since been eclipsed. First, the Bureau of Land Management embraced the concept and included it as a key criterion in its ongoing roadless area review. Then, during an international assemblage of government officials and scientists at the Fourth World Wilderness Congress in September 1987, a major initiative was advanced. Representatives of 62 nations voted unanimously for a resolution calling for the preservation of "representative samples of all major ecosystems of the world to ensure the preservation of the full range of wilderness and biological divenity". [1] This resolution went on to request that the International Union for Conservation of Nature and Natural Resources (IUCN) "appoint a task force to prepare a status report to be presented at the Fifth and future World Wilderness Congresses. This report should include recommendations for the designation of additional wilderness or similar protected areas to expand the representation of ecosystems and therefore preserve a wider array of biological diversity."

Meanwhile the Forest Service's commitment in the 1977-1979 RARE II period seems to have waned. Anticipated wilderness recommendations for the Mexican Highlands-Grama Tobosa and Palouse-Wheatgrass Bluegrass ecosystems did not materialize. Forest Service support for wilderness recommendations in the Shortgrass Prairie-Grama Buffalo Grass, Shortgrass Prairie-Juniper Pinyon, and Upper Gila Mountains-Grama Galleta Steppe ecosystems was withdrawn. Precious few national forest management plans developed in the last decade use ecosystem representation as a criterion for determining wilderness recommendation. Forest Service testimony before Congress on proposed wilderness legislation has been generally silent about the desirability of increasing the diversity within the NWPS. This silence has resulted in lost opportunities for preserving the last known undeveloped remnants of at least two, and likely more, major ecosystems. Although such areas often lack the dramatic, high country appeal that has come to be associated with wilderness, professional resource managers should emphasize the importance of preserving samples of all resources.

One question in particular needs to be asked: Why has the Forest Service lost interest in preserving samples of the major ecosystems it manages while other agencies and nations are increasingly recognizing the great importance of doing so? The 1989 Resources Planning Act (RPA) assessment offers an excellent opportunity for the agency to reassert its commitment both to the preservation of natural diversity and to the diversification of the NWPS.

Appendix A (available from the author upon request) lists all units of the NWPS, as well as equivalent State wilderness systems and national parks, by the Bailey-Kuchler ecosystem(s) they include. In addition, this table identifies the 80 major ecosystems within the United States that are not yet represented

in any preservation-oriented system, i.e., NWPS, national park, State wilderness, The 1989 RPA assessment might recognize these "missing links" and encourage all public land managing agencies to review their undeveloped lands for opportunities to fill these gaps in the preservation system.

OUR LEGACY, THEIR HERITAGE

What prouder natural resource legacy could we leave future generations and what richer natural resource heritage could they enjoy than a wilderness system that includes representation of all of this nation's major ecosystems?

Ecosystem-representation should be adopted as a fundamental criterion for wilderness designation. Such action would show that our generation cares deeply for our heritage and for the legacy we leave for future generations. A fundamental charge to this generation should be to help ensure that our children and grandchildren may know and cherish the wonders of all our natural systems,

SPECIFIC RECOMMENDATIONS

1. Congress should be encouraged to act on those wilderness recommendations pending before it, particularly those of the National Park Service and Fish and Wildlife Service that have been awaiting action for more than a decade.

2. The Bureau of Land Management should be commended for using ecosystem representation as a criterion in its wilderness studies; such representation should be a leading criterion when ecosystems not presently represented in the NWPS are considered.

3. The Forest Service should reassert its commitment both to the preservation of natural diversity and to the diversification of the NWPS in the 1989 RPA assessment.

4. National Forest Management plans should be required to include a review of all roadless areas and to recommend wilderness designation for those that would fill an ecosystem gap in the NWPS.

5. After a national survey to determine which ecosystems can only be preserved by State action, the Federal government should encourage, support, and, as appropriate, subsidize effective State wilderness preservation systems that protect ecosystems not available for preservation in the NWPS.

6. The Forest Service should use its international influence to promote the worldwide preservation of representative ecosystems either through expansion and refinement of the UNESCO biosphere reserve program or other, more detailed, programs.

7. The Federal government and academic institutions should continue to investigate and refine ecosystem classifications and define adequate spatial requirements for their preservation as functioning units.

REFERENCES

Bailey, Robert G. 1976. Ecoregions of the United States. USDA Forest Service, Intermountain Region, Ogden, Utah. Map.

Bailey, Robert G. 1980. Description of the Ecoregions of the United States. USDA Forest Service, Misc. Pub. 1391, Washington, D.C. 77 pp.

Bailey, Robert G. 1982. Classification Systems for Habitat and Ecosystems. In: Research on Fish and Wildlife Habitat. U.S. Environmental Protection Agency EPA 600/8-82-022: 16-26. Washington, D.C. 248 pp.

Clements, F.E. and V.E. Shelford. 1939. Bioecology. John Wiley, New York.

Crumpacker, David W. 1986. Status/Trends of US. Natural Ecosystems. Office of Technology Assessment, U.S. Congress, Washington, D.C. 71 pp.

Dasmann, Raymond F. 1972. Towards a System for Classifying Natural Regions of the World and Their Representation by National Parks and Reserves. In: Biological Conservation 4(4): 247-255.

Davis, George D. 1980. The Case for Wilderness Diversity. American Forests 86(8): 24-27, 60-63.

Davis, George D. 1984. Natural Diversity for Future Generations: The Role of Wilderness. Pp. 141-154 In: Natural Diversity in Forest Ecosystems, Proceedings of the Workshop, (Eds. J.L. Cooley and J. H. Cooley) Institute of Ecology, University of Georgia, Athens, Georgia. 290 pp.

Davis, George D. 1987. Ecosystem Representation as a Criterion for World Wilderness Designation. Wild Wings Foundation, c/o DAVIS ASSOCIATES, Chevre Hill Farm, Wadhams, NY 12990. 86 pp.

Diamond, J. M. 1975. The Island Dilemma: Lessons of Modem Biogeographical Studies for the Design of Nature Reserves. In: Biological Conservation (7): pp. 129-146.

Ewel, J.J. and J.L. Whitmore. 1973. The Ecological Life Zones of Puerto Rico and the U.S. Virgin Islands. USDA Forest Service, Research Paper ITF-18, Rio Piedras, Puerto Rico. 72 pp.

Hendee, John C., George H. Stankey and Robert C. Lucas; 1978; Wilderness Management; USDA Forest Service Misc. Publ. 1365.

Institute of Ecology. 1977. Experimental Ecological Reserves: A Proposed National Network. U.S. Government Printing Office 038-000-00321-6, Washington, D.C. 40 pp.

Kuchler, A.W. 1966. Potential Natural Vegetation (Map). National Atlas of the United States: pp. 89-92. USDI, Geological Survey, Washington, DC.

The Nature Conservancy; 1977; Preserving Our Natural Heritage, Vol. 1, Federal Activities; USGPO.

Newmark, William D. 1987. A Land-Bridge Island Perspective on Mammalian Extinctions in Western North American Parks. In: Nature 325 (29): pp. 430-432.

Norse, Elliott A., K.L. Rosenbaum, D.S. Wilcove, B.A. Wilcox, W.H. Romme, D.W. Johnson and M.L. Stout for The Ecological Society of America. 1986. Conserving Biological Diversity in Our National Forests. The Wilderness Society, Washington, D.C. 116 pp.

Norton, Bryan G. 1985. Values and Biological Diversity. Contract Paper No. 2, Office of Technology Assessment, U.S. Congress. Washington, D.C. 38pp.

Randall, Alan. 1985. An Economic Perspective of the Valuation of Biological Diversity. Contract Paper No. 1, Office of Technology Assessment, U.S. Congress, Washington, D.C. 40 pp.

Schoen, John W., O.C. Wallmo and Matthew D. Kirchhoff; 1981; Wildlife - Forest Relationships: Is A Reevaluation of Old-growth Necessary?; Transactions, 46: 531-544. 46th North American Wildlife and Natural Resources Conference.

Tansley, A.G. 1935. The Use and Abuse of Vegetational Concepts and Terms. In: Ecology (16): 284-307.

Terborgh, J. 1975. Fauna1 Equilibria and the Design of Wildlife Preserves. pp.369-380 in: Tropical Ecological Systems: Trends in Terrestrial and Aquatic Research (F. Golley and E. Medina, editors). Springer-Verlag, New York, NY.

Udvardy, M.D.F. 1975. A Classification of the Biogeographical Provinces of the World. IUCN Occasional Papaer No. 18, Morges, Switzerland. 49 pp.

United National Educational Scientific and Cultural Organization (UNESCO). 1984. Action Plan for Biosphere Reserves. In: Nature and Resources (XX) 4.

U.S. Department of Agriculture, Forest Service. 1978a. Roadless Area Review and Evaluation (RARE II) Draft Environmental Statement 78-04. USDA

Forest Service, Washington, D.C. 112 pp. and 2 maps.

U.S. Department of Agriculture, Forest Service. 1978b. RARE II National Analysis. Updated mimeo. USDA Forest Service, Washington, D.C.

Weaver, J.E. and F.E. Clements. 1938. Plant Ecology, 2nd ed. McGraw-Hill, New York. 601 pp.

ENDNOTES

1. ***From Resolution 25 adopted by the Fourth World Wilderness Congress*** at ***Denver and Estes Park, CO, September 12-18, 1987.***

WILDERNESS AND THE PROTECTION OF GENETIC DIVERSITY

Christine Schonewald-Cox and Thomas J. Stohlgren*

ABSTRACT

Merely "designating" areas or establishing laws does not guarantee the protection of biological and genetic diversity. Similarly, it does not guarantee the preservation of naturally functioning ecosystems. To achieve protection we must reassess the goals, objectives and unique contributions of wilderness in preserving biological and genetic diversity. We must study social and economic impacts on protection of wilderness areas. We must evaluate the relationships between wilderness areas and adjacent habitats/land uses, including critical habitats not yet protected. We need also to establish firmly the advantages of designating wilderness areas.

> "Each species is a storehouse of irreplaceable genetic material whose loss we cannot afford."
>
> - Dasmann 1978

We would like to begin by discussing protection, the value of our specific types of genetic diversity, and our concept of the importance of wilderness to the protection of genetic and biological diversity. In response to the editors' request, we will emphasize threatened and endangered species and genetic diversity of species yet undiscovered but of potential value to humankind.

Maybe it was foresight that when Yellowstone National Park was dedicated in 1872, its purpose was as a "reservation of its territory from private occupancy so that it may remain in unrestricted freedom." Though it may be common knowledge to most field managers, the conservation research community is only now beginning to appreciate that humans pose a significant if not the greatest threat to the survival of most species. This includes the encroachment of rapidly growing human populations that are placing increased pressures on their habitats (Dahlberg and others 1985, Diamond 1987).

The National Wilderness Preservation System (NWPS) has undoubtedly provided a structural framework for preventing rapid human encroachment and habitat destruction within the boundaries of wilderness areas (Reed 1988). Along with the designation of wilderness areas, however, comes the challenge to successfully develop a management framework. This framework should (1) protect naturally functioning ecosystems and (2) actively protect biological and genetic diversity within wilderness areas (Hendee and others 1978, Freeman 1986).

Definitions of terms used throughout the text follow. Unlike "biological diversity" that includes all the diversity comprising life, "genetic diversity" is a specialized term referring to the genetic variation existing at or below the species level, within and between populations.

The Endangered Species Act defines an endangered species as one that is close to extinction throughout all or a significant part of its range. A threatened species is one likely to become endangered in the future. In preserving genetic diversity, we must also be concerned with "rare" species. Norris (1987) defines a numerically rare species as one with a few individuals, and a geographically rare species as one that are abundant in a local area but not found away from that small geographic area. The latter may possess unique physical and/or behavioral characteristics worthy of preservation despite the lack of preservation status given threatened and endangered species.

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PROTECTION OF BIOLOGICAL AND GENETIC DIVERSITY

While some species are rare for reasons such as low density or restriction to one locality, and some species face natural extinction, most of contemporary extinction is at least anthropogenic. Space limitations, pollution, and acid rain may be indirect causes of decline, whereas. direct anthropogenic effects such as poaching are more obvious contributors to numerical declines. If we wish to slow and halt the loss of species, to what values can we appeal to insure dedication of land and funds for their protection? Myers (1987) and others (Oldfield 1984, Prescott-Allen and Prescott-Allen 1986) have attempted to itemize the values of nature to humankind. We feel it preferable not to have to do this. Esthetics and cultural values are not generally shared, however. Fortunately, within our culture we are seeing some large-scale changes. A 1985 Harris poll, for example, showed the concept of "value" in the U.S. has changed with 63 percent of Americans placing a greater priority on "environmental cleanup" than on economic growth (Harris 1985). Although the issue of values is not resolved, we can appeal to values at the economic and cultural (recreational and esthetic, at least) levels.

Objective of Protection

What is the objective of threatened and endangered species protection? At the very least it is only to avert an inevitable extinction. At the most, it is to maintain or increase species numbers to viability in the face of current ecological and evolutionary changes. While major efforts are concentrated on the subject of viability, there is no single formula that works generically across species. Requirements for viability are variable between localities and within and between species. (For a recent treatment of the subject see Soule 1987.) Instead, it is the demographic estimates, ranges of desired growth, and estimated genetic variability that can be provided to synthesize estimates of viability requirements. Some progress is being made in this area for spotted owl and grizzly bear (Bolger and others 1986). Restoring viability of populations and species should be the objective of protection of genetic diversity. This would imply the ability to restore resilience of a population to withstand ecological pressures, natural selection and random (unpredictable) fluctuations in local survival. (See Shaffer 1981, Schonewald-Cox and others 1983, and Harris 1986 for treatments of these subjects.)

Accomplishing Protection

Protection can be accomplished for the present by a variety of methods in-habitat and out-of-habitat (used for in situ and ex situ, respectively). In-habitat we have the opportunity of setting aside sufficient acreage of suitable land, preferably optimal habitat, that is well protected. Enforcement and management should be sufficiently strong to restore the population (species) to short-term stability, at least. Successive efforts towards protection of genetic diversity, such as protection by law with the Endangered Species Act, Migratory Bird Act and a potential biodiversity act, can increase the long-term survival probability for focal populations and peripheral fragments. These laws act together with land management, modification of behavior, and species management to achieve protection.

Out-of-habitat protection can work to insulate a gene pool from loss of habitat and exploitation. Reproduction can be controlled as can environment and competition or predation. However, limited space, food and medical care affect the evolution of the species. Under such evolving conditions, expanded measures of germplasm storage and concurrent in-habitat protection can counteract the inadvertent changes in genetic diversity. They are also high-tech and comparatively expensive management techniques, such as embryo storage and transfer. These out-of-habitat techniques can also act favorably to increase the effective population size, shorten generation time, and counteract stochastic events at the demographic and catastrophic levels, and are therefore essential to protection in general.

HOW WILDERNESS CAN PROTECT DIVERSITY

Wilderness designation may help protect biological and genetic diversity. Wilderness areas are usually greater than 5000 acres (Reed 1988). Large size wilderness confers protection at an in-habitat scale and permits species to express behavioral and other phenotypic variation not otherwise possible. It may buffer against boundary intrusion by impacts, and facilitate natural forces to act on large scales. Conversely, it is likely to soften conflicts posing threats to surrounding land ownership.

There are costs resulting from this preference for large+5000 acre) size. Administrative decisions regarding protection may be difficult to influence or enforce. For example, day-today support for monitoring species may not be available; complacence can exist undetected; sampling may be forcibly localized in planning and management and may, therefore, miss some genetic diversity (including ecotypes) existing in non-sampled parcels.

Preference for large size can cause us to miss inclusion in the wilderness system of important habitats, such as in riparian zones, natural islands, urban parks and corridors and nodes in agricultural areas. Some areas are not necessarily best protected in single, large reserves (Quinn and Robinson, 1987).

Human Value of Genetic Diversity

We may assume that most endangered species have been identified and their listing lobbied for because someone knew of their rarity and proposed a listing based partially on (1) esthetics, (2) function of the species in the ecosystem, (3) recreation, (4) curiosity and (5) the notion that to value the species was seen as a reflection of broader values. Regardless of the motivating initiative for proposed listing, those involved certainly sensed responsibility (whether to the species, to themselves, to human kind in general or all of these). They likely sensed the irreversibility of the loss if it were to occur, and likely felt a desire to awaken others regarding the potential loss.

We have perhaps the greatest species diversity in the humid tropics. But, we have no guarantee that the impact of discovery is greatest just from tropical species. The variability we seek may be different major phenotypes rather than taxa. Different phenotypes within species respond differently to "polarized" natural selection extremes across a species' range.

Economic Value of Genetic Diversity

In 1979, Arthur found that public support for maintaining species diversity was based largely on ecological and existence values. Driver and others (1987) maintain that few published articles on wilderness preservation have contributed to the appraisal of economic benefits of diversity. They note that while only a small percentage of species are found in designated wilderness, and their numbers are comparatively small, even their future benefits are unknown.

Questioned about the value of genetic diversity, what have others said? The range of uses, often including travel, pharmacy, toothpaste, or bread made from stoneground grain, reflects our dependence on diversity (Myers 1987). The value of genetic diversity, directly related to the quality of life, is more than an inference. The replacement costs for some species (including genes), were they to disappear, would go beyond our affordable monetary ranges. The fact is the value of a species is more than just quantitative. This is hard for some to reconcile, unfortunately, with the concept of value.

Affixing Potential Value to Diversity

How does one defend the value of species of yet undiscovered cultural or economic value? As mentioned earlier, we have not yet come across any means to assess the broad array of values. If there were an easy answer, our methods of proactive conservation would be farther ahead, better received and more soundly supported. There is yet no failsafe path for making such assessments. (Discovery does not necessarily occur where the greatest investments have been made.) Consider wheat, barley, oats, alfalfa, and rice.

Just these five species represent the majority of the world's nutritious consumption. It would have been hard to predict that these few weedy species could be so vital to human survival in both temperate and tropical regions. These do not represent great species diversity. They do, however, represent enormous genetic manipulation, investment, and learning. They represent contrasting values related to profit, trade, treaties, and good will that, taken as a category of species, represent a keystone to human survival.

Genetic diversity may increase in value at an entirely different level, such as in photography for commercials and magazines, film making, and television tourism. In these, the diversity and its value is contained in the ambience, the poetic;, daring, affectionate, and generally esthetic components of nature. The diversity contributed by genes to this use is too complex for us to dissect here. In contrast, when something is awry and significant components of diversity are lost, the value judgement changes. Who could have guessed one or two hundred years ago that someone would lose sleep over condors, dusky seaside sparrows, or African "killer" bees? It works in both directions. How many are anxious today to find whether something can be done with the especially potent antibiotics secreted naturally by an obscure toad? In the case of the bees, the quality or value of genetic and biological diversity can be undermined by inadvertent changes in the constitution of gene pools and the natural selection and ecological processes that follow.

THE CONTEXT IN WHICH WILDERNESS EXISTS

When we are faced with evaluating wilderness, how much of it exists is only part of the assessment. Several other factors are appropriate. These have to do with locality, biome, geographic context, regulations, uses, and adjacent area interface (purpose of this volume).

The wilderness area occurs in a geographic/landscape context. It may have one of many possible shapes, most likely defined by things other than the limits of the ecosystem (Schonewald-Cox 1988). While the wilderness area cannot contain roads, it may be bordered by them. Adjacent land use may involve a policy of fire suppression in contrast to regulated burning in a wilderness area, as with Sequoia and Kings Canyon National Parks (Bancroft and Partin 1979). Moreover, the landscape may include nearby rural or urban development. In the case of rural development, mining, industry, agriculture, and rural towns may be close to the border; in the case of the urban development, the nearest major city and associated industries may be spreading rapidly to the borders of the wilderness (as is the case with Saguaro National Monument and the city of Phoenix).

Internal Control Over Wilderness

From the internal perspective, the wilderness area is managed and regulations are enforced to achieve protection. Enforcement may take on many aspects depending upon the regulations, what is and is not permitted within the geographic limits of the wilderness area (Schonewald-Cox 1988). It may be that numerous visitors come, and regulations are set down to limit the number of people that can enter the wilderness at any one time. Wilderness permits may assist in regulating the numbers. Perhaps enforcement may entail use of backcountry rangers or superintendents who check for incorrect uses of camp sites, illegal hunting, or illegal specimen collections.

Management may entail manipulation of certain biological features to preserve a series of natural features that would otherwise disappear for lack of space or other resources (such as fire or succession). Management may just involve picking up after visitors to the area, and monitoring the changes in species and physical environment.

A National Park Service Example

Present NPS policy (USDI National Park Service Management Policies 1978) states that "the ecosystem will constitute the unit for resources management purposes in natural areas of the National Park Service" and that generally this is confined to one community type. The NPS, however, recognizes the "key to successful management will be found in

identifying man's adverse influences, correcting them, and properly regulating his future activities."

It is easy to assume that by "maintaining and restoring natural processes" we are also maintaining primeval genetic and biological diversity. The term "restoring" is loosely interpreted. Whether or not contemporary peoples of North America had interfered with natural processes, there would still be evolutionary shifts in both biological and genetic diversity. Also, since we did interfere in most cases (in some causing irreversible impacts) (Freeman 1986), we cannot assume restorations are at all similar to the effects of that same process at an earlier time. For example, 60 years of fire suppression in a naturally high fire frequency area (i.e., every 20 years) may have resulted in the loss of viability in fire ephemeral herbs such as lotus. Restoring the "process" of fire cannot restore the viability of seeds, and lower genetic diversity and perhaps lower species diversity will result. Therefore, movements to recreate the past can be easily misguided. Adapting to modem and future selection with existing diversity might be considered the priority challenge. Restoring diversity lost to the system may mean restoring genotypes no longer capable of surviving current local selection.

IMPACTS

Each wilderness area may suffer impacts from inside or outside regardless of a responsible agency and appropriate policies. These impacts include tourism, acid rain, air pollution, water pollution, and the propagation of alien species. Those listed are among the most widespread impacts likely to affect most regions of the country.

Internal Uses

Tourism, the byproduct of development and beauty, brings additional people to the adjacent habitat where they rest, and subsequently into the wilderness area to participate in the wilderness experience. The latter may be innocent in intent but may also create pressures on a small area within a short period, if only by trampling and crowding out wildlife.

By contrast, use by visitors is likely to communicate the existence, value, and purpose of the area to others who travel there and to those who live near the wilderness. These values are likely to be passed on further. To this extent, the wilderness area serves as a communication beacon pointing out the values of such natural areas. Their shared use brings communal value to an area. To communicate a sense of value and to pass on this to others still is very important to the survival of wilderness and its constituent parts. This is. as with species preservation mentioned earlier, in the realm of esthetics; it is increasingly important to this country.

Uses of Adjacent Habitat

Adjacent lands can contribute to protection, recreation, residences, and economic growth. In contributing to economic growth, the areas adjacent to wilderness are likely to be used for industry (as for mines, dams and electricity, forestry and factories), urban development and recreation, and for living areas; these may be compact as with developments of houses and apartments, or may be low density housing. They may serve for urban development, becoming crowded and expensive. The lands may be used for agriculture, including crop dusting or irrigation systems. This may transfigure the land, as may urbanization. as in Phoenix, Miami, and Los Angeles.

Impacts and Genetic Diversity

Genes are immediately responsive to pollution and other stresses. Whether population and species flourish or become extinct will be determined by their ability to cope with the stresses. If some individuals carry the genetic tolerance for new changes, these will likely increase in frequency, while others less fortunate may become dormant or die out. Stress-induced changes may demonstrate characters or bring to light species or genotypes of particular commercial or esthetic interest. One can predict with certainty that diversity that is lost is not likely to be of any use regardless of its previous

potential. Therefore, land use in and adjacent to wilderness areas needs to be planned and monitored, and additional support is needed for cooperation and long-term inter-institutional planning and monitoring.

While the focus of preservation may be at the geographic level (i.e., to protect and maintain representative habitats or ecosystems) and will automatically include much diversity, this is not all inclusive. Benefits can be derived from protection at the species or population level; such as has been done for threatened and endangered species. Keystone species and ecotypes are still overlooked as justification for establishment of protection despite their dominating roles in ecological processes.

In establishing our goals, we should assess continually the viability of all focal species in our care. This should include evaluations of population trends both within and in areas adjacent to wilderness areas. Proposed changes in land use and external threats such as pollution, alien species, invasions, etc. need consistent and thorough evaluations. We should recognize and follow through with the support to both research and resources management.

Problems of Protecting Genetic Diversity in Wilderness

Too little attention is given to how wilderness areas are designed (recognizing that in most instances there is little leeway for choice). How will protection expectations be matched to the size, complexity, and protection investment? How will the management fit the objectives of the agency, and of wilderness systems in general? Are management and research support sufficient to achieve objectives? What will be done to ensure cooperation, maintenance, and public development of respect and appreciation for the wilderness area? How can predispose our network of wilderness areas to protect genetic and biological diversity while, at the same time, furthering international contributions towards the protection of biodiversity and the biosphere in general?

As for protection of species of yet undetected value, or protecting diversity for future generations, we do not know what future generations will cherish. We can take only our present values and carry these forward. So it is especially clear that we need to identify them, bearing in mind their implications for protection and human development.

Unique Features of Wilderness

The title "wilderness area" is consistent throughout the United States within and between agencies. While the specific mandates of agencies vary considerably, there are some commonalities that are apparent in designated wilderness. One of the interesting characteristics of wilderness areas is that they assimilate the collective benefits of their agencies. They represent different scopes of protection. They have different administrations protecting them and therefore experience different management techniques. This provides the inter-agency wilderness system with an insurance against overdevelopment and exposure promoted by a single agency. There is an associated spreading of risks. The interagency network provides a supra-structure of management that will ensure that some form of wilderness protection persists into the future.

Besides offering us an opportunity to learn different long-term effects of adjacent land uses and management, the effort to protect wilderness offers the opportunity to create cooperative linkage between agencies. This could strengthen the quality of wilderness management and of cooperation between agencies for other protection activities.

Unique Contributions of Wilderness

Wilderness gives us several intrinsically variable strategies for putting land aside at an intermediate scale.

The unique contributions of wilderness to protecting genetic diversity, whether this constitutes threatened and endangered species or genes, is the geographic core. Wilderness is likely to be the least disturbed of a network of public and private lands set aside for protection. Wilderness areas have the potential

to function like core areas of biosphere reserves that serve as bench marks of environmental change, as reservoirs of diversity, and as focal points for protection. Additional protected lands surrounding the wilderness core areas can, by serving multiple purposes, be directly responsive to local human needs without compromising the buffer properties they confer to the core area or wilderness. The Biosphere Reserve model of protection is respected globally. Following this model enhances the value of Wilderness designation.

There is a disproportionate shortage of wilderness representing North central grasslands and Northeastern forest. As Reed (1988) points out, it may not be the additions as much as the modifications of management of wilderness areas that we may witness in the coming years. How do we direct this protection and management to increase or at least project the current value of wilderness areas into the future? It is easy to see from the U.S. Geological Survey map that wilderness areas increase in size inversely to the colonization sequence of the United States. Land cannot be requisitioned from dense landscapes, but small wilderness areas will have to be managed cooperatively in networks of nodes and corridors up and down the Eastern and in the agrarian States. Where wilderness areas are small, we may have to settle for more humble objectives of protecting species and communities at a level appropriate to the size of the system offered (Schonewald-Cox 1983, Salwasser and others 1987). While it may not change our expectations for herbaceous species, it may change them for large or medium sized vertebrates.

RECOMMENDATIONS

1. Wilderness areas require funds specifically designated for repeated inventories and monitoring of biological diversity. Genetic diversity should be routinely examined for selected species in the course of monitoring activity. Selected species should include keystone, threatened/endangered, environmental indicator and popular species and their ecotypes.

2. Funded research programs need to be dedicated to the ecology, demographics, behavior, genetic variability, and viability of focal species. These programs require increased inter-institutional cooperation and collaboration.

3. Specific proportions of annual funding and long-term funding of wilderness areas should be dedicated to the synthesis of information regarding wilderness areas and biodiversity/genetic diversity.

4. Continued attention must be given to external threats (i.e., anthropogenic air pollution, global warming, CO, increase, alien species invasion, etc.). Management practices such as use of prescribed fire, handling of visitors, habitat rehabilitation, etc. in wilderness areas and adjacent lands must also be scrutinized.

5. Increased information is needed on the relation of human behavior to protection of biological and genetic diversity. Wilderness areas provide an excellent focus, and should be asked to contribute to our knowledge in this subject.

6. Scientists in the conservation-related fields should be encouraged to provide sustained guidance to wilderness administrators and field managers of adjacent lands on the protection of biological and genetic diversity.

7. Wilderness areas should not be viewed as single protected isolates. They should function cooperatively both nationally and internationally in habitat protection.

REFERENCES

Arthur, L.M. 1979. The esthetic value of wildlife: perceptions of the American public and sportsmen. In: Daniels, Terry C.; Zube, Ervin H.; Driver, B.L., tech. coords. Assessing amenity resource values. General Technical Report RM-68. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station; 1979:32-34.

Bancroft, W.L. and W.A. Partin. 1979. Fire Management Plan, Sequoi and Kings Canyon National Parks. National Park Service. Three Rivers, CA.

Bolger, D.T., C.C. Biehl, M. Sorice, and M. Gilpin. 1986. Estimation population size for the Yellowstone grizzly bear population: effects of non-poisson family size distribution and breeding sex ratio. Pp 3-16. In: Proceedings of the Conference on Science in the National Parks. Fort Collins, CO. July 13-16, 1986.

Dahlberg, K.A., M.S. Soroos, A.T. Feraru, J.E. Harf and B.T. Trout. 1985. Environment and the Global Arena: Actors, Values, Policies and Futures. Duke University Press, Durham, N.C., p. 95.

Dasmann, R. 1978. "Wildlife and Ecosystems." p. 18-27. In Brokaw, H.P., ed. Wildlife and America. U.S. Government Printing Office, Washington, D.C.

Diamond, J.M., K.D. Bishop, and S.V. Balen. 1987. Bird survival in an isolated Javan woodland: island or mirror? Cons. Biol. 1(2):132-142.

Driver, B.L., R. Nash and G. Haas. 1987. Wilderness benefits: a state of the knowledge review. Pp. 294-319, In: Proceedings National Wilderness Conference: Issues, State of Knowledge, Future Decisions. R.C. Lucas (Compiler) USDA Gen. Tech. Rep. INT-220.

Freeman, J. 1986. The parks as genetic islands. National Parks 60(l-2): 12-17.

Harris, L. 1985. Current public perceptions, attitudes and desires on natural resources management. Transactions of the 50th North American Wildlife and Natural Resource Conference. Washington DC: Wildlife Management Institute.

Harris, CD. 1986. The fragmented forest: island biogeography theory and the preservation of biological diversity, Univ. of Chicago Press, Chicago, IL.

Hendee, John C., George H. Stankey, and Robert C. Lucas. 1978. Wilderness Management Handbook, U.S. Forest Service Miscellaneous Publication No. 1365.

Myers, N. 1987. Not Far Afield: U.S. Interests and the Global Environment. World Resources Institute Report No. S786. Washington, D.C.

Norris, L.L. 1987. Uniform Appearance? Yes. Uniform terms? Not yet. Park Science 8(1):6.

Oldfield, M.L. 1984. The value of conserving genetic resources. USDI, National Park Service, Washington DC.

Prescott-Allen, C. and Prescott-Allen R. 1986. The first resource: wild species in the North American economy. Yale University Press, New Haven, CT.

Quinn, J.F., and G.R. Robinson. 1987. The effects of experimental subdivision on flowering plant species diversity in a California annual grassland. J. Ecol. 75:837-856.

Reed, Patrick C. 1989. The National Wilderness Preservation System: The First 23 Years and Beyond (this volume).

Salwasser, H., C.M. Schonewald-Cox, and R.J. Baker. 1987. The role of interagency cooperation in managing for viable populations. In: M.E. Soule (ed.) Viable populations. Cambridge Univ. Press, Cambridge, U.K.

Schonewald-Cox, C.M. 1988. Boundaries in the protection of nature reserves; translating multi-disciplinary knowledge into practical conservation. Bioscience (In Press).

Schonewald-Cox, C.M., S.M. Chambers, B. MacBryde and L. Thomas. (eds.) 1983. Genetics and conservation. Benjamin Cumming, Menlo Park, CA.

Shaffer, M.L. 1981. Minimum population sixes for species conservation. Bioscience 31:131-134.

Soule, M.E. 1987. Viable populations. Cambridge Univ. Press, Cambridge, U.K. (In Press).

USDI, National Park Service. 1978. Management Policies Handbook. Part 2. pp. 7-8. National Park Service, Washington, D.C.

CULTURAL RESOURCES AND WILDERNESS

Loretta Neuman and Kathleen M. Reinburg*

ABSTRACT

This paper discusses issues of wilderness management and cultural resource protection on Federal lands, based on the directions and authorities contained in federal preservation laws, the Wilderness Act, and agency authorities and regulations. The capabilities, opportunities and constraints of wilderness for the appreciation and preservation of historical and prehistorical sites and artifacts are examined. Although conflicts may sometimes occur, we believe that the goals of natural and cultural resource management in wilderness areas are compatible and can be mutually beneficial. Proper planning and policies for dealing with cultural resources in wilderness areas may need legislation to be effectuated.

INTRODUCTION

All Federal land managing agencies, regardless of their specific missions or mandates, are required to protect the cultural resources on their lands--archaeological sites as well as historic structures and artifacts. This duty has become increasingly recognized since the mid 1960's, with enactment of major environmental and preservation legislation.

In particular, two landmark laws were enacted that had a profound impact on the way that agencies in the Departments of Interior and Agriculture manage their natural and cultural resources. The Wilderness Act, signed into law September 3, 1964, established the National Wilderness Preservation System. It provided a process to identify, designate and protect areas of undeveloped Federal land which retain their "primeval character and influence, without permanent improvements or human habitation" and which are "protected and managed so as to preserve (their) natural conditions."

Two years later, the National Historic Preservation Act was enacted on October 11, 1966. It created the National Register of Historic Places maintained by the Secretary of the Interior and established the Advisory Council on Historic Preservation. Section 106 of the Act requires Federal agencies to take into account the effects of undertakings on historic properties and to give the Advisory Council an opportunity to comment. Section 110 of the NHPA (added by Congress in 1980) directs federal agencies to take responsibility for preserving historic properties they own or control; to locate, inventory, and nominate to the Secretary of the Interior properties that appear to qualify for the National Register; and to carry out their programs and projects in accordance with the purposes of the NHPA.

All of these requirements are in addition to those contained in the National Environmental Policy Act, which requires agencies, among other things, to prepare an environmental impact statement on any major actions that significantly affect the human environment. In 1979 a separate Act was established to specifically help protect cultural resources on federal lands--the Archaeological Resources Protection Act (ARPA). The Act provides for a system of permits to excavate or remove archaeological resources, prohibits nonpermitted activities and contains civil and criminal penalties for violations.

While these Acts were well intended as a means of protecting important resources, their interpretation by Federal agencies have often created conflicts with regard to the management of cultural resources in proposed and designated wilderness areas.

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Some agencies initially took a very "purist" approach. They attempted to eliminate from consideration areas which contained manmade resources, even historic ones, as incompatible with "primeval" wilderness, despite the fact that the standards of the Wilderness Act provide for a more generous interpretation. A later issue was whether the full range of historic preservation activities--inventory, evaluation and excavation--were allowed by the Wilderness Act and, if so, the extent to which limited agency resources should be spent on such activities.

This paper will examine these and other issues relating to wilderness management and cultural resource protection on Federal lands managed by the Forest Service in the U.S. Department of Agriculture. The Forest Service has the longest track record relating to these issues and manages the largest number of wilderness units of any Federal agency. It is second only to the National Park Service in wilderness acreage.' The issues relating to the management of cultural resources in national forest wilderness areas are similar to those of other Federal agencies and many of the recommendations relating to them are applicable to other agencies, such as the Bureau of Land Management and Fish and Wildlife Service and even to the National Park Service.

CONFLICTS BETWEEN WILDERNESS AND CULTURAL RESOURCES

For several decades, federal mangers have been grappling with the question of how to best integrate cultural resource management into wilderness settings. Among the major issues are the following:

* Whether the language referring to the absence of evidence of man in section 2(c) of the Wilderness Act includes historic properties and archaeological sites and to what extent this language is modified by the acknowledgement of "historical value" in the definition of wilderness under the same section and in the uses of wilderness under Section 4(b).

* Whether historic and prehistoric structures should be allowed to remain in wilderness if they have no administrative function;

* Whether designation of a wilderness area constitutes an adverse effect on cultural resources and requires compliance with Section 106 procedures, especially if restoration or maintenance of historic sites were not allowed and they were thereby subject to deterioration or removal.

* And, the age-old question of whether cultural resources (and attendant management activities) add to, conflict with or detract from wilderness.

In examining these and related issues, it is significant to point out that the Wilderness Act does more than merely mention "historical value" as contributing to wilderness. Section 2(c) of the Act defines wilderness as an area that "generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable" (emphasis added). The Act does not state that the area must be pristine with no evidence of human activity (Wilderness Society 1984).

In terms of on-the-ground cultural resource management, however, the Wilderness Act is less specific. Section 4(b) directs agencies to administer a designated wilderness area "for such other purposes for which it may have been established as also to preserve its wilderness character." Section 4(c) simply states that activities which could have negative impacts on wilderness (such as temporary roads, motor vehicles, and motorized equipment) may be undertaken only "as necessary to meet minimum requirements for the administration of the area for the purposes of this Act..." No mention is made of the types of activities that would otherwise be carried out for cultural resource management purposes on non-wilderness lands nor is any direction provided as to whether these activities are allowed or precluded in wilderness.

Most of the guiding legislation for federal agency implementation of the Wilderness Act fails to acknowledge this issue. For example, the Forest Service's National Forest Management Act, is silent on the

matter.[2] Nor is any mention of wilderness included in the relevant preservation legislation (NHPA, ARPA etc.) As a result, most agencies have been ambiguous and often inconsistent on how to deal with cultural resources in wilderness areas.

Some forest managers have taken a hands-off attitude or, at best, have assumed that the mere inclusion of an historic property in wilderness (especially an archaeological site which is underground and generally not visible) will be enough to protect the site. Some have concluded that cultural resources in wilderness can be managed in much the same way as they are in other areas. Exceptions include non-motorized methods of treatment and a focus on the natural processes (allowing deterioration of non-significant properties, for example).

Clearly, many professional wilderness managers and cultural resource professionals believe that wilderness designation does not mean that human activities and the remains of these activities will not occur in these areas (Peters 1987). In Minnesota at the Superior National Forest, for example, some of the best examples of turn of the century logging camps are in designated wilderness areas.

Furthermore, wilderness does not mean that the area is in its original, unaltered state. Many of these areas have undergone significant alterations. "Wilderness," as used in this context, is a legal term defined by an Act of Congress. It is not merely an esthetic description of a state of nature. Any close reading of the Wilderness Act and related legislation shows that Congress did intend for cultural resources to be included in designated wilderness areas. The challenge, therefore, is to determine how best these resources can be managed in ways that are compatible with preserving wilderness values.

FOREST SERVICE GUIDELINES

All federal land managing agencies have agency regulations or manuals which deal at least in part with cultural resource management on their lands. The wilderness chapter of the Forest Service Manual is quite specific regarding the protection of historic and prehistoric cultural resources. The legal authorities governing protection and management of cultural resources in wilderness include the Acts discussed above, implementing regulations in 36 CFR 800, Executive Order 11593, and individual forest and management plans.

The manual states that the Forest Service policy is that cultural resources in wilderness are available for scientific study to the extent that the study is consistent with the concept of wilderness, the intent of the Wilderness Act, and cultural resource management objectives. Cultural resources are also available for recreational, scenic, scientific, education, conservation, and historic uses, consistent with management as wilderness.

The policy also directs that analysis will be on a case-by-case basis and will ensure that actions are compatible with wilderness and cultural resources objectives as stated in the forest plan. As a general rule, cabins, shelters, or other structures approaching 50 years of age should be examined for their cultural resource value. Those sites or structures that do not qualify for the National Register should be removed or allowed to deteriorate naturally unless they are deemed necessary to support public purposes of wilderness[3] or serve administrative purposes[4].

Within the Forest Service, management direction for cultural resources eligible for the National Register is subject to compliance with Section 106 of the NHPA and the regulations contained in 36 CFR 800. A decision to remove, maintain, or allow a historic or prehistoric structure to deteriorate naturally is considered a Federal undertaking that will affect the resources. Interpretation of cultural resources located in wilderness shall generally be done outside the wilderness area; verbal interpretive services by qualified wilderness rangers, volunteers, or permitted guides is acceptable.

VALUE OF USE

One difficulty in dealing with cultural resources in wilderness in a multiple-use agency such as the Forest Service is the difficulty of quantifying the values of these

resources or, for that matter, of the wilderness itself. There is, indeed, no systematic method to assess the value and method of treatment of cultural resources within wilderness.

One way to deal with this is to include specific provisions in the authorizing legislation for a wilderness area at the time it is designated, such as was provided for the River of No Return Wilderness in the Central Idaho Wilderness Act. That Act states that resource management within the wilderness area will have protection and interpretation of archaeological sites as one of its purposes.

In addition, part of the comprehensive management plan should encourage scientific research, protect significant cultural resources, provide public interpretation and report on the location, significance, condition and recommendations on any sites or structures. [5]

Although there are many social and educational values for maintaining cultural resources, these are hard to quantify or measure. Human beings have an intellectual curiosity about themselves and their past, and cultural resources help answer their questions. Knowledge gained from prehistoric and historic sites and from archaeological excavation and historical interpretation can enable scientists to address modem problems. Cultural resource preservation provides important information on environment, geology, plant and animal domestication, human health, and development of society to name a few. The long term effects of irrigation on soil formation, safe land management practices, reintroduction of plants thought to be extinct, environmental changes and natural disasters can be examined through the archaeological record.

Less tangible, but nevertheless real, is the value that a great many people place on preservation of a cultural resource for its own sake. This is not mere rhetoric or well-wishing; it is part of our national public policy. In Section 1, the preamble of the National Historic Preservation Act, the Congress itself found and declared that, among other things, "the spirit and direction of the Nation are founded upon and reflected in its historic heritage" and this heritage should be "preserved as a living part of our community life and development in order to give a sense of orientation to the American people."

Each archaeological site and historic structure offers unique information about the past. Thus each should be evaluated on its own merits, and not judged merely on whether or not it occurs in a wilderness area. This was stated very lucidly by Rupert Cutler, former Assistant Secretary of the Department of Agriculture, who participated in 1980 in the Society for American Archaeology's annual meeting. He noted lessons that can be learned from prehistoric agricultural and conservation practices; knowledge of long-term climatic patterns based on archaeologically derived information; understanding of ancient Indian religious and cultural practices so that present land management activities do not interfere with their modem observance; and ways that historic structures can be reused for modem purposes. (Cutler 1980).

CURRENT PROBLEMS GIVE FUTURE DIRECTIONS

One of the major problems with the Federal agency cultural resource management in wilderness is the very lack of any affirmative management program and the subsequent lack of an expanding information base. This is in direct contrast to non-wilderness land, where, prior to an undertaking, all agencies are required to conduct a cultural resources inventory. It is not uncommon for inventories to end with archaeological site avoidance rather than excavation or mitigation, which usually results in a list of sites which need further evaluation and research. The list, if evaluated properly, can aid land managers in making other decisions relating to sites, such as which ones should be preserved in situ and which need additional research to add to the historical and archaeological record.

Law enforcement and resource protection are also major problems. Vandalism, looting and pot hunting are destroying sites rapidly. Although this occurs more frequently in roaded areas, wilderness designation does not of itself assume site protection. Since federal agencies, for the most part, have not developed a complete site inventory, except in response to specific projects, many sites that are not

already identified are being damaged or destroyed. The tragedy is that there is little control over the situation and often no concept of the extent of site loss. This is especially true for wilderness areas in which cultural resource surveys are rarely done. Yet archaeological sites are non-renewable resources; once destroyed they are gone forever.

According to the newly released General Accounting Office report (1987) on cultural resource protection, the federal land managing agencies in Arizona, New Mexico, Utah and Colorado (the Four Comers) "... manage about 104 million acres of land in the Four Comers states, yet the agencies had surveyed less than 6 million acres, or less than 6 percent of these lands, to identify archaeological sites... estimate that there are nearly 2 million archaeological sites in the four states, of which only 7 percent (about 136,000) have been recorded. Further, most of the archaeological surveys performed in recent years have been done to obtain clearances for development projects and, therefore, are not necessarily directed at those areas having the greatest archaeological resource potential." (General Accounting Office 1987).

This points to another major problem -- lack of sufficient, trained personnel. According to one Forest Service archaeologist, for example, the five state Rocky Mountain Region of the Forest Service has approximately 26.5 million acres of multiple use national forests and grasslands but only 8 archaeologists to provide protection and professional judgement. How closely can 8 people monitor 26.5 million acres?

In the West, it is a particularly challenging task. Forests with several million acres can contain several hundred thousand archaeological sites. Even to survey 10% of the sites which are primary looting targets would mean surveying approximately 20,000-30,000 sites. Public involvement has been stressed as one way to help monitor large expanses of land, but efforts thus far have been merely exhortative and largely ineffective.

While federal land managing agencies respond reasonably well to their Section 106 responsibilities on non-wilderness lands, there have been problems meeting obligations for site stabilization, interpretation and enhancement of cultural resources for the public, This has been documented by Dr. Leslie Wildesen, Colorado state archaeologist. As former regional archaeologist for the Forest Service's Pacific Northwest Region, Dr. Wildesen worked with wilderness managers from 19 national forests in an effort to coordinate wilderness management and cultural resource protection.

In a landmark article, Wildesen noted that the complex relationship between cultural resources and wilderness values is complex and said that "it is often difficult to strike a balance between preservation of cultural resources in wilderness areas and preservation of pristine wilderness." She stressed that both the National Historic Preservation Act and the Wilderness Act have similar focus, to preserve important resources for public enjoyment and enlightenment and for scholarly use. She added, however, that wilderness designation, "traditionally has been the death knell for affirmative cultural resource management on millions of acres of federal lands. Conversely, the presence of historical and archaeological resources has been cited as a reason to prevent an area from being included in the Wilderness Preservation System" (Wildesen 1985).

Other problems occur when land managers discourage archaeological research in wilderness by limiting access to it or when they assume that sites are protected merely because no development will occur that might damage the resource. Managers may fail to take into account the value of cultural resources during wilderness planning. Too often, historical resources have been deliberately destroyed because of a perceived conflict with the purposes of wilderness -- despite the fact that no such destruction is called for or condoned by the Wilderness Act.

Unfortunately, cultural resource advocates have themselves sometimes contributed to the conflict. Failure to identify the cultural resource base in potential wilderness areas and not being persuasive in securing specific language in wilderness legislation are some of the reasons there are problems (Wildesen 1985).

Cultural resource professionals have felt the need to work for specific statutory language, as in the Central Idaho Wilderness Act. That language was included as a result of the efforts of Dr. Ruthann Knudson who proposed the specific provision requiring "affirmative management" of the historical and archaeological resources within the wilderness boundaries and requiring preparation of a cultural resource management plan during the wilderness management planning process.

There is, moreover, an ethical issue that is raised by the manipulation of wilderness for scientific ends, including the taking of artifacts, the very action of which may destroy some wilderness values. In a recent article on this issue, it was noted that

> . . . the apparent conflict with allowing freely functioning natural conditions and basic ecological process to proceed in wilderness with minimal human-induced interference and disturbance. Can we indeed retain wilderness value and character while at the same time physically removing finite, non-renewable components? . . . Thus, the dilemma, does the wilderness manager allow destruction of potentially significant scientific data in order to preserve wilderness values? Or does the manager allow the removal of fossil and cultural materials to facilitate the preservation of scientific knowledge at the expense of wilderness values? (Berger et al. 1987).

However, to manage effectively a land based resource, one must know where and what it is. Inventory and evaluation are key to this, but in wilderness areas are rarely done. For example, the 3.5 million acre Superior National Forest has approximately 80,000-100,000 acres surveyed annually. Of this, only 300 to 500 acres are in wilderness, yet the wilderness contains 1.2 million acres, or over one third of the entire forest (Peters 1987).

At this rate, and despite efforts by archaeologists and cultural resource specialists, a complete survey may, never be completed. Since the majority of federal land managing agencies are project based agencies, most of the work is project related. Funds for cultural resource surveys come from each specific project budget such as timber, minerals, grazing, or recreation. Systematic surveys of existing wilderness areas are a low priority for Federal agencies due to lack of funding for non-impacting program work, a heavy emphasis on areas where impacts are occurring, and misguided beliefs on the part of wilderness managers, cultural resources specialists and the public that wilderness designation protects cultural properties.

Furthermore, the emphasis on compliance with federal regulations concerning the identification, evaluation, and nomination of historic and prehistoric resources can often result in little time available to devote to the development of long-term planning and management strategies for cultural resources. Considerable quantities of data have been accumulated with little effort being spent in developing techniques that would enable the prediction of the location and densities of cultural properties. This is especially true of non-wilderness lands and is perhaps a major reason why less attention and support is given to cultural resource management in wilderness. "We have been attempting to keep one step ahead of the chainsaw and bulldozer with little time to look at where we are going or should be going." (Cordell 1984).

SPECIFIC RECOMMENDATIONS

Progress has occurred since the promulgation of many cultural resource regulations. The Forest Service for example states: "In reaching a decision, the long-term needs of society and the irreversible nature of an action must be considered. The Department must act to preserve future options; loss of important cultural resources must be avoided, except in the face of overriding national interest where there are no reasonable alternatives."[6]

The biggest stumbling block is to overcome the traditional tendency to view responsibilities for cultural resource management as a stepchild to important

activities or as a constraint on the management of other resources. Rather, it should be seen as an opportunity for broader service. One way to do this is by better integrating cultural resources into the full spectrum of multipleresource management. In this regard, there are a number of recommendations for addressing specific needs. These include the following:

* Develop cultural resource inventory strategies which are more workable in wilderness areas; refine sampling techniques and improve accuracy while reducing the time and cost;

* Improve the use of remote sensing and other nondestructive technological methods to identify and protect cultural resource sites;

* Develop better methods of data collection, including dating techniques to establish the importance and value of archaeological sites and better means of managing and exchanging data and other information;

* Improve methods for assessing and predicting potential impacts on cultural resources, and for understanding what motivates cultural resource vandalism and theft;

* Develop better means for cultural resource interpretation to make cultural resource programs relevant (Cutler 1980).

Another recommendation is use of consistent cultural resource protection language in all future wilderness legislation. It is unfortunate but true that without language which carries a specific inventory responsibility, as in the case with the River of No Return Wilderness, cultural resources will remain largely unknown in these areas. Wildesen provided the framework and rationale for this in her article when she called for

> . . . a program of future research, public interpretation, and historic preservation to be carried out as part of ongoing management of the wilderness. The very concept of "wilderness" implies that cultural resources found in these places are not routine, run-of-the-mill properties. Rather, they represent adaptation - or attempted adaptations - to environments that today we find too difficult, rugged, or isolated to try to "civilize." It follows that these resources may be the most informative of all about the history of human success and failure in these environments over the past 10,000 years and that we should therefore be vigorous in our attempts to preserve them (Wildesen 1985).

Until Federal land managing agencies take more affirmative action for managing cultural resources in wilderness under existing authorities, the need remains to incorporate, in certain instances, explicit legislative language to protect historic and archaeological resources in many new and existing wilderness areas. A specific requirement could be included to inventory, evaluate, and provide affiiative management for significant resources. Conflicts could therefore be resolved during the early planning stages of wilderness management.

CONCLUSION

The national direction is in place. Federal law -- carried out through the agency manuals and regulations -- mandates cultural resource management and protection. The long-term nature of management planning allows sufficient time to build cultural resources survey and protection into wilderness management. Individual land managing units, such as national forests, have unit management plans. Most do not, however, prepare plans for the management of individual wilderness areas generally or cultural resources specifically. This is an area which begs for further attention.

Federal agencies should have no difficulty integrating wilderness and cultural resources into the context of multiple use management, especially considering that they have done so with other resources and other multiple use tasks. Wilderness and cultural resources may be separate, but they ate not unalike. In the end, after all, their goals are the same --to save a part of our heritage for present as well as future generations to learn from and enjoy.

RE FERENCES

Berger, A.W., W.L. Overbaugh, G.H. Stankey. 1987. Extraction of Non-Renewable Resources from Wilderness: A Dilemma of Scientific Use.

Cordell, Linda S. and Dee F. Green, editors. 1984. Stage I Site Locational Modeling in the Southwestern Region. Cultural Resources Management Report 5, US Forest Service Southwestern Region.

Cutler, M. Rupert. 1980. Cultural Resource Programs in the Department of Agriculture. Paper given at the Society for American Archaeology Annual Meeting, May 2,~1980. Philadelphia, PA.

DeBloois, Evan I. 1984. Measuring Cultural Resource Management Accomplishments. Professional Development Program for Outdoor Recreation Management, Forest Service.

DeBloois, Evan I. 1987. Personal Communication.

Peters, Gordon. 1987. Personal Communication.

Society for American Archaeology. 1987. Oversight Hearing on Forest Management Activities. Testimony before the House Agriculture Committee Subcommittee on Forest, Family Farms and Energy, June 17, 1987.

U.S. Department of Agriculture. Forest Service. 1987. Discover Your National Forests - An Information Guide for All Interested in America's Outdoors.

U.S. Department of Agriculture. Forest Service. 1986. Title 2300 - Recreation, Wilderness and Related Resource Management, Chapter 2320 Wilderness Management.

U.S. General Accounting Office. 1987. Cultural Resources: Problems Protecting and Preserving Federal Archeological Resources.

Wilderness' Society. 1984. The Wilderness Act Handbook. The Wilderness Society.

Wildesen, Leslie E. 1985. Dilemma: Should Wilderness Areas Preserve Historic and Archaeological Cultural Resources7 Colorado Heritage News, 5,7. Colorado Historical Society, Denver, CO.

Wildesen, Leslie E. 1986. Model Cultural Resource Language for Special Areas Designation.

APPENDIX ONE

Central Idaho Wilderness Language

Sec. 8 (a)(l) In furtherance of the purposes of the Wilderness Act, the Wild and Scenic Rivers Act, section 6 of the National Forest Management Act, the Archaeological Resources Protection Act, and the Historic Preservation Act, the Secretary shall cooperate with the Secretary of the Interior and with agencies and institutions of the State of Idaho, in conducting a cultural resource management program with the River of No Return Wilderness and within the Salmon River component of the National Wild and Scenic Rivers System as designated in section 9 of this Act.

(2) Such program shall have as its purposes the protection of archaeological sites and interpretation of such sites for the public benefit and knowledge insofar as these activities are compatible with the preservation of the values for which the wilderness and wild and scenic river were designated to protect.

(3) To carry out the cultural resource management program required by paragraph (1) of this section, the Secretary shall, as part of the comprehensive management plan required under subsection S(a) of this Act, develop a cultural resources management plan for the wilderness and the river. Such plan shall -

(A) encourage scientific research into man's past use of the River of No Return Wilderness and the Salmon River corridor,

(B) provide an outline for the protection of significant cultural resources, including protection from vandalism and looting as well as destruction from natural deterioration;

(C) be based on adequate inventory data, supplemented by test excavation data where appropriate;

(D) include a public interpretation program; and

(E) comply with all Federal and State historic and cultural preservation statutes, regulations, guidelines, and standards.

(b)(l) Within two years from the date of enactment of this Act, the Secretary shall cooperate with the Secretary of the Interior and with agencies and institutions of the State of Idaho in conducting an inventory of the ranch, homestead, trapper and other cabins, and structures within the River of No Return Wilderness and within the Salmon River component of the National Wild and Scenic Rivers System designated by Section 9 of this Act and submit to the Committee on Energy and Natural Resources of the United States Senate and the Committee on Interior and Insular Affairs of the United States House of Representatives a report on-

(A) the location of these structures;
(B) their historic significance, if any;
(C) their present condition;
(D) recommendations as to which of these structures should be:
(i) stabilized;
(ii) restored;
(iii) maintained; or
(iv) removed;
(E) the estimated cost of such stabilization, restoration, maintenance, or removal; and
(F) the suitability of any of these structures for inclusion in the National Register of Historic Places.

(2) Until such time as the study under this subsection is completed and the required report submitted to the Committees, the Secretary shall not knowingly permit the destruction of significant alteration of any historic cabin or other structure on national forest land within the River of No Return Wilderness or the Salmon River component of the National Wild and Scenic Rivers System designated in section 9 of this Act.

APPENDIX TWO

Model Cultural Resource Language for Wilderness as Proposed by Wildesen

In order to protect the unique archaeological, historic, cultural, and other (e.g. scenic, wilderness, recreation, geologic, wildlife, ecologic, scientific) resources of the , there is hereby established the (Wilderness; National Park; National Monument; Wild, Scenic, or Recreational River; National Wildlife Refuge; etc.).

ADMINISTRATION

General

The Secretary shall manage the name of area in a manner that will protect the archaeological, historic, cultural and other (listed as appropriate) resources and values of the (type of area) and to provide for public education about those resources and values.

Specific

The Secretary shall permit the full use of the (name of area) for scientific research and scholarly study, subject to such restrictions as may be necessary to prevent degradation of the (list of resources) resources of the area.

Management Plan

Within (time period) after the date of enactment of this Act, the Secretary shall complete a management plan for the (name of area) in accordance with the requirements contained in (name of authorizing legislation - FLPMA, NFMA, etc.).

Such plan shall include but not be limited to each of the following items:

(1) Specific measures for the preservation of the known and potential archaeological, historic, and cultural resources of the (name of area);

(2) A schedule for the prompt completion of a detailed archaeological, historical and cultural resources management plan, which shall meet each of the following requirements;

(a) The plan shall be based on adequate inventory data and shall include a schedule for timely implementation of intensive field inventory (if needed). Inventory data shall be supplemented by archival research, oral history, and archaeological test excavation data as appropriate to enable evaluation of all inventoried resources for the National Register of Historic Places.

(b) The plan shall include a public interpretation program, and shall take into account the opinions of the public, including appropriate agencies and scholars in the fields of archaeology, history, anthropology, historic preservation, and landscape architecture.

(c) The plan shall provide for the protection of significant cultural resources, including protection from vandalism and looting as well as destruction from natural deterioration or environmental degradation.

(d) The plan shall provide for long-term scholarly use of archaeological resources, and for continued use or adaptive reuse of historic structures and buildings, insofar as possible consistent with (name of managing agency) policy and the National Historic Preservation Act.

(e) The plan shall develop data on the past and present use(s) of the (name of area) by Indian [or other Native American, Eskimo, Aleut, etc.] people sufficient to ensure their nonexclusive access for traditional cultural and religious purposes in accordance with the American Indian Religious Freedom Act. Such data shall be developed in consultation with appropriate Indian tribes [or others--Eskimo, etc.].

(f) The plan shall comply with all federal historic and cultural preservation statutes, regulations, guidelines, and standards, including but not limited to the National Historic Preservation Act and the Archaeological Resources Protection Act.

(g) The plan shall, to the extent possible, take into account the appropriate Statewide Comprehensive Historic Preservation Plan(s) for the State(s) of (name), in which the (name of area) is located.

(3) Such other resource-specific topics as may be necessary to comply with (name of authorizing legislation).

ENDNOTES

1. *The National Forest System has 339 wilderness units with a total of 32 444,737 acres compared to 37 units with 36,754,980 acres at the National Park Service 20 units of 368,739 acres under the jurisdiction Bureau of Land Management and 70 units containing 19,332,891 acres at the Fish and Wildlife. Service.*

2. *The National Forest Management Act, (16 U.S.C. 1600 et seq.) proposes to manage the use of, demand for and supply of renewable resources through a comprehensive assessment of present and anticipated uses, including analysis of environmental economic impacts and promotion of a sound technical and ecological base foreffective management,* use *and protection.*

3. *As set forth in section 4(b) of the Wilderness Act (16 U.S.C. 1121 et seq.).*

4. *Section 4(c) of the Wilderness Act.*

5. *The Central Idaho Wilderness Act (Public Law 96-312 July 23, 1980).*

6. *US Forest Service Manual, Title 2300 - Recreation, Wilderness and Related Resource Management, Chapter 2320 Wilderness Management.*

ENVIRONMENTAL MONITORING IN WILDERNESS

Susan P. **Bratton***

ABSTRACT

Wilderness legislation may interfere with field execution of many types of monitoring studies, and confusion about management of scientific projects in wilderness has discouraged many monitoring projects from utilizing wilderness. Despite the inhibition of monitoring, wilderness areas represent an important long-term investment in maintaining ecosystems with low levels of human disturbance. The present paucity of monitoring projects in wilderness may be allowing site integrity problems to develop undocumented. Policy revision and clarification are needed to encourage monitoring for preservation of site integrity as well as for the purposes of the scientific community at large. All agencies responsible for wilderness should consider scientific research and monitoring an important product of a well-organized wilderness management program.

INTRODUCTION

Since World War II, human impacts on natural ecosystems have increased at an alarming rate. Not only is direct human use, such as clearing for agriculture, mining, and logging, disturbing an ever-increasing percentage of the Earth's surface, but remote human impacts, such as acid rain, pesticide contamination, nuclear fallout, ozone depletion, and global climate change, are affecting very isolated regions with little continuing human presence. Environmental monitoring, once rare outside of urban and industrial zones, is now under way in the Antarctic and the Arctic, in the open oceans, in very arid deserts, and on high mountain ridges. The purpose of this paper is to discuss the present state and future prospects of environmental monitoring in the National Wilderness Preservation System of the United States. The paper will then attempt to determine if wilderness legislation has in any way benefited monitoring efforts, and if present policies concerning monitoring in wilderness can be improved.

THE STRUCTURE OF ENVIRONMENTAL MONITORING PROGRAMS

Environmental monitoring projects vary in their complexity, managerial goals, and scientific purposes. Environmental monitoring may be undertaken in a wilderness area because:

(1) The integrity of the site itself is at stake. The purpose of the monitoring is thus to verify rates of change in ecosystem structure and processes, or to verify the extent and impact of undesirable anthropogenic influences, such as human trampling or acid rain.

(2) The site is in a desirable geographic location or contains species or ecosystems of interest for a specific project. A wilderness area might be used for environmental monitoring because it incorporates the highest elevations in a mountain range, for example, or because it contains old-growth forest.

(3) The site is relatively pristine or free from human disturbances, and thus may serve as a control site in an impact study. Also, it may act as a baseline for comparison with other areas with greater human disturbance or may provide information on background levels of pollutants or other compounds.

The Wilderness Act incorporates lands that appear "to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable" and that "contain ecological, geological, or other features of scientific, educational, scenic or historical value." The wilderness system has thus purposefully incorporated properties that

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have high value for scientific research and are relatively undisturbed. The Wilderness Act, however, has only general provisions for scientific use. The act states "... wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use ...." and does not in any specific way provide for establishment of scientific monitoring or other types of scientific research. It should be noted that the Wilderness Act does exclude certain uses, some of which are common elements of scientific monitoring projects. These include the "use of motor vehicles, motorized equipment, or motorboats, ... landing of aircraft, ... other form[s] of mechanical transport ..." and "structure[s] and installation[s]." The Wilderness Act has no provisions for monitoring to maintain site integrity, much less for participation in other types of monitoring programs, and essentially leaves the scientific management of the site at the discretion of the Federal agency responsible for the area.

PRESENT DISTRIBUTION OF MONITORING PROGRAM

Many wilderness areas are covered by other legislation or participate in national or international scientific or conservation programs. Great Smoky Mountains, for example, has National Park enabling legislation, and is also a Biosphere Reserve under a program sponsored by UNESCO. In reviewing the distribution of environmental monitoring programs now in wilderness, we must first look at the overall pattern of legislation and other mandates and determine which portions of present monitoring programs are forwarded by wilderness status and which are being promoted by other designations.

According to a study by Butler and Roberts (1986). between 1970 and 1980 one-half of the research projects in Forest Service wilderness areas were on recreational topics (50 percent), whereas a majority of the projects in National Park Service wilderness areas were on biological topics (62 percent). For the 53 Forest Service areas included in the study there was an average of 0.13 zoology projects per site. For the 22 NPS areas included there was an average of 10.3 zoology projects per site. Thus nearly 80 times more zoology projects were conducted per site in NPS areas. There were 13 times as many botany projects per site, and 15 times the general ecology projects in NPS sites, while the Forest Service areas had 3 times more recreation projects per site than the NPS. If recreational projects are counted, the NPS had 7 times as many scientific projects per wilderness area as the Forest Service. If recreational projects are deleted, the NPS had 14 times as many per area.

The present status of environmental monitoring reflects the overall research use of wilderness areas as described by Butler and Roberts (1986). Comparing wilderness areas in the Southeastern United States, the most diverse monitoring programs are on National Park Service properties. The two best developed efforts are in the Great Smoky Mountains and Everglades National Parks, but there are also developing programs in smaller areas, such as Cumberland Island and Gulf Islands National Seashores. The NPS is still in the process of expanding monitoring in the Southeast, and several additions to present efforts are already planned for fiscal years 1988 and 1989.

Within the NPS sites, those with Biosphere Reserve status often have the largest programs or are better integrated with the activities of other institutions and agencies. The Man and the Biosphere program has tended to foster information exchange and interaction between reserves, and has also drawn non-Park Service scientists into the parks.

The trends apparent in the Southeastern United States would seem to apply, with a few exceptions, nationwide. For instance, in the "Proceedings--National Wilderness Research Conference: Current Research" (meeting held in Fort Collins, CO, July 23-26, 1985), a majority of the environmental monitoring papers (not those discussing recreational impacts) concerned NPS sites. Forest Service scientific participation in the Biopshere Reserve program has usually centered on the experimental forests rather than on the wilderness areas. Most of the larger, older Forest Service wilderness areas do not have long-term monitoring programs developed to evaluate site integrity concerns, whereas most

of the larger, older National Parks (with or without wilderness) have at least a small effort under way.

The reasons for these differences between agencies are complex, but several factors are probably operating nationwide. First, The NPS began as an agency with a mission in preservation, whereas the Forest Service began with a mission in conservation, The NPS has a very high concern for maintaining ecosystems in a "natural" or even pre-Columbian state. Second, most parks had long histories of supporting environmental research before they fell under wilderness legislation. This is not true of many Forest Service wilderness areas. Third, most park legislation includes mandates to protect "the native flora and fauna" or the "scientific values" of the areas. Fourth, the NPS sponsors extensive interpretive programs with onsite staff and has been doing this for decades. Although a majority of these programs are aimed at "front country" visitors, they tend to foster descriptive natural history studies and the maintenance of park museums. Through the years this has helped to expand scientific knowledge of the parks. Forest Service wilderness areas rarely have these programs and facilities. Fifth, the NPS has slowly expanded the number of field laboratories for research use. Although small, very basic, and outside the legislated wilderness, these work spaces greatly facilitate access to wilderness. Sixth, most of the larger parks were traversed by major roads prior to wilderness legislation. All parks (outside of Alaska) with high mountain ranges, have roads leading to the upper elevations. This facilitates establishing monitoring stations along elevations and other environmental gradients. Seventh, as a matter of national policy, the NPS has greatly expanded its air and water quality monitoring. Eighth, the Park Service has had several programs to evaluate site integrity of both cultural and natural resources for all parks and for all types of areas, wilderness and non-wilderness. One of these efforts, the "Threats to Parks" program which began in 1980, generated dozens of monitoring projects directed at defining anthropogenic changes.

The Forest Service, in contrast, has been much more oriented to the various user constituencies. Since the service operates in a conservation and production mode, the product of wilderness areas has become recreation. In the Forest Service, scientific research is often viewed as a means of either increasing or maintaining the productivity of timber producing sites. The Service has, of course, participated in hundreds of research projects evaluating human impacts on forested and grassland ecosystems. Much of this work was economically motivated or aimed at providing better services to the public. Research aimed solely at native ecosystem preservation is less common in the Forest Service than in the NPS. Although the legislation indicates science is a potentially important product of wilderness, Forest Service managers have not tried to increase scientific use of most wilderness areas. This may be an artifact of long-term research administrative policies of the agency where the research centers on the products of the systems - in this case recreation - and ignores other concerns. (It should be noted that many NPS managers are antagonistic towards university based, and even Park Service based, research and in some cases will try to limit research programs to projects addressing the immediate managerial concerns of the park.)

From this comparison we can infer that wilderness legislation has done little to encourage environmental monitoring. The sites which have extensive monitoring programs have them because of other legislation, or because of management histories which have little to do with the Wilderness Act. We therefore need to ask three new questions. First, if wilderness is not encouraging environmental monitoring, is it inhibiting it in any way? Second, does wilderness legislation have any potential benefits for environmental monitoring which are not being realized because of agency policies? And third, since monitoring is often used to evaluate site integrity, are the present monitoring programs adequate for future wilderness management needs?

WILDERNESS AND FIELD EXECUTION OF MONITORING

There can be little doubt that wilderness legislation restricts many types of monitoring activities. Lack of roads makes access to study sites difficult, and prohibitions on the use of

motorized transportation slow trips into the center of wilderness areas. For most types of monitoring projects, these problems can be overcome by adding increased person power or person time to compensate the time lost reaching study areas. Use of wilderness may therefore add substantially to a project budget. In some cases, the difficulties of wilderness access may double or triple sample collection effort and this is proportionately reflected in personnel costs.

Looking at well-developed park monitoring programs, we fiid much of the monitoring is not actually done in wilderness or is conducted a very short distance over the wilderness boundary. Weather and pollution monitoring stations are placed along roads to allow easy vehicle access. Some types of hydrologic and water-quality sampling are conducted where motorized boats are permitted, often at the periphery of a terrestrial wilderness area. In Southeastern wilderness, a majority of the scientific monitoring actually under way in the center of wilderness zones (away from roads) consists of permanent vegetation plots which only need to be resampled on an extended cycle, i.e., annually, or every 5 or 10 years, or wildlife population monitoring undertaken once annually, or conducted from the air. As a general rule, the shorter the sampling rotation, and the greater the distance to the study sites, the more difficult it is to use wilderness for monitoring.

Another major problem area for environmental monitoring is the question of structures (Franklin 1987). Many types of pollution monitoring stations require protective fences and power sources. Scientific equipment may be visually intrusive, and even a solar-powered station may stand out as 20th century technology in a "virgin" forest stand. Site markers, bench marks, and fences vary greatly in size and conspicuousness. In some cases, a small "house" may be necessary, in others, equipment may be left exposed. Some sampling equipment looks very space-aged, while other items can appear quite rustic. Grazing enclosures for large ungulates may require fences 10 feet high, while a vegetation monitoring plot may require little more than an aluminum tree tag. Since there is no national policy on establishing scientific monitoring facilities in wilderness, site managers usually try to interpret the spirit of the Wilderness Act for themselves. This leads to variability in what is allowed (enclosures permitted in one park, but not in another for example), and in some cases has terminated monitoring programs completely, at least within the wilderness boundary.

This author, for example, has been personally involved in negotiations between researchers and wilderness site managers over:

(1) Construction of grazing enclosures.

(2) Placement of pollution monitoring stations in wilderness.

(3) Construction of protective fences for pollution monitoring stations.

(4) Power sources for pollution monitoring stations.

(5) Use of all-terrain vehicles to survey nesting sea turtles (at the edge of wilderness).

(6) Use of large bench marks.

(7) Establishment of vegetation plots with numerous trees tagged or marked for relocation.

(8) Use of gasoline-powered motors on electro-shocking equipment for fisheries surveys.

(9) Use of boats rather than trucks to access coastal sites.

(10) Construction of weirs for water quality monitoring.

(11) Low elevation aerial survey.

(12) Delivery by helicopter of monitoring hardware.

(13) Use of sleds rather than wagons as horse drawn conveyances to move enclosure materials.

(14) Establishment of research base camps in wilderness.

(15) Use of steel drums or boxes to protect scientific supplies from bears.

Some types of destructive or experimental large-scale scientific research are certainly not in keeping with the intent of the Wilderness Act. Since the act itself commends the sites for scientific use, however, it would seem that most types of nondestructive environmental monitoring would be appropriate. There is presently a large "grey area", where one site manager or one agency may decide against a certain type of project and another may decide in favor of it. Lack of consistent policy discourages scientists from using wilderness for monitoring as does the history of argument between the Federal agencies supervising the sites and the scientific research community.

Over all, wilderness legislation may be doing more to inhibit environmental monitoring than to encourage it at the present time. Working in wilderness often adds to project expenses. In some cases, site managers may prohibit monitoring projects entirely. It should be recognized, however, that these trends may be more a result of general agency management patterns and of how wilderness legislation has been interpreted than of the Wilderness Act itself.

FUTURE WILDERNESS BENEFITS FOR MONITORING

Although wilderness presently may inhibit monitoring to some extent, wilderness legislation is a very good long-term investment in site protection. At designation, many Forest Service wilderness areas were little different from the surrounding region, except that they were more remote or contained less disturbed systems. As the decades pass, and the areas around wilderness are repeatedly logged or developed, wilderness will become even more unique and may offer relatively disturbance-free systems in regions where they have disappeared elsewhere. Even within National Parks, which have enabling legislation prohibiting many forms of human exploitation, wilderness restricts the construction of new roads, thus preserving watersheds and preventing fragmentation of natural ecosystems. Well-managed wilderness is "money in the bank" as far as scientific monitoring is concerned, and its value will increase greatly through time. We should therefore be concerned about the low level of baseline information gathering in many wilderness areas today. Future monitoring projects will need background information, and, in some cases, an established monitoring data base.

MONITORING AND SITE INTEGRITY

In general, there are several types of monitoring and several levels of monitoring effort. A program may only concern the wilderness area, or it may concern several related areas; it may be part of a national network, or it may be part of an international network. Although the value of a monitoring project to the national welfare isn't directly correlated to scale, the national level programs are generally of high importance. In terms of monitoring human impacts, projects in wilderness may concern primarily the effect of wilderness recreationists. This may include campsite and trail erosion surveys, creel census, data from hunter check-in stations, and some types of water quality evaluation. Researchers may also evaluate the impact of esthetic intrusions on wilderness users, This includes such items as noise monitoring from aerial overflights. The monitoring of human impacts may expand to evaluate the spread of exotic species, the decline of a large carnivore, or the population status of a fish endangered by hydroelectric projects outside the wilderness. In a well-developed program, monitoring for variables of global environmental concern may be implemented, including evaluation of such phenomena as acid rain, climatic warming, and sea level rise.

Environmental monitoring does not have to address human impacts, and some programs may be initiated just to analyze natural ecosystem processes. Although these projects are often the least favored by site managers because they are of no immediate managerial use, the "pure science" projects are often among the best long-term investments, because they are usually very sophisticated in design and describe how ecosystems function in a natural state. These theoretical studies provide a foundation for determining what constitutes undesirable change in wilderness.

At the present time, wilderness status tends to forward visitor impact and esthetic intrusion monitoring. Trampling, vandalism, and wildlife harvest are of course very threatening to site integrity, and efforts to contain them are necessary to the long-term preservation of wilderness. Many of these types of studies deal with very local areas, however, and do not tackle the larger scale threats. Most types of visitor impact monitoring do not require long-term placement of sampling equipment or construction of small housings. Nor do most of these types of studies encounter serious access problems, as they are oriented towards main visitor routes and do not require heavy equipment. In some cases, such as monitoring bacteria in lakes and streams near campsites, getting the samples to the laboratory quickly enough may be a problem, but this is often resolved by use of small coolers or holding media.

The introduction of monitoring aimed at broader scale processes or developed as part of a national network is less frequent in wilderness and often adds more complications. A pollution monitoring station, for example, may have to meet nationally established specifications, or may be part of a network with a protocol developed for non-wilderness sites. Most types of air and water quality monitoring have a short sampling rotation, which means even automated stations need to be checked frequently. The more sophisticated and the more nationally oriented the program, the more likely wilderness status is to be a problem.

The irony of the present situation is that the broader scale human impacts are the ones most likely to damage seriously large areas of wilderness through time and to cause serious loss of site integrity. In the Great Smoky Mountains, for example, trail and campsite erosion has displaced rare plant species and caused some sedimentation in streams. Campsites in old-growth stands may damage valuable botanical resources. These localized direct human impacts cannot compare, however, to the disturbances caused by non-native species, including the European wild boar, the balsam woolly adelgid, and the rainbow trout over the last 30 to 40 years, The park is also suffering from red spruce dieback and may soon lose thousands of large hardwoods to gypsy moths. Acid rain and elevated ozone levels have probably had numerous subtle impacts on park ecosystems. Dispersed anthropogenic disturbances to the Great Smokies have tended to increase through time, and legal protection, by itself, has not been effective in preventing unnatural disintegration of native ecosystems (White and Bratton 1980).

The impacts of wilderness recreationists are also less of a concern on Cumberland Island National Seashore than a variety of broader scale human-initiated impacts. Hikers confined to designated campsites may disturb shore birds, wading birds, and occasionally sea turtles, but they do not compare to wild hogs, feral horses and a very large white-tailed deer population in terms of total disruption to inter-dune meadows, live oak forests and cordgrass marshes. U.S. Department of Defense dredging activities at the park boundary will probably accelerate erosion of both beaches and marshes, and are changing water quality within park estuaries.

Despite the potential for loss of species and perhaps entire biotic communities, wilderness status tends to encourage monitoring of more localized concerns. In areas like Great Smokies and Cumberland Island, wilderness status has precipitated trail and campsite and visitor use and perception studies, but it is a very minor component in exotic species or dredging concerns.

At the very least, there is a national need for basic environmental monitoring in wilderness, to establish baseline information banks for attacking site integrity questions. This effort needs to encourage basic ecological research, including all types of biological surveys and descriptive studies. The attitudes of the managing agencies toward science are falling short of the needs of the scientific community and of the wilderness areas themselves.

THE FUTURE

Both the value of wilderness for monitoring and the disturbance potential of broad-scale impacts will probably increase

through time. Concurrently, agency funding for wilderness monitoring projects is likely to decrease on a per site basis. Recent additions of large and relatively pristine areas in Alaska alone will strain the capabilities of present agency science budgets. The structure of field research staffs is also liable to change. A number of Park Service monitoring projects in wilderness have relied heavily on volunteers to assist with sampling or moving equipment. Due to economic and demographic factors, volunteers have become increasingly difficult to recruit, thus the lack of "walking" field help is further inhibiting research. Not just national but international economic conditions are likely to have a major impact on wilderness monitoring, as will the availability of college students and recent graduates who are willing to work in remote areas.

Several conceptual changes in wilderness science management would be very beneficial:

(1) Science and education need to be considered as legitimate products of wilderness sites. Not all wilderness areas are equally useful for these purposes, so not all wilderness needs to support large numbers of projects. Some wilderness is extremely valuable, however, and agency management policies for these locations should foster scientific use. Policies concerning environmental monitoring should be redrafted to require local site managers to facilitate non-destructive research. The agencies managing wilderness should ask the scientific community which sites have special value for research and adjust their local management plans accordingly.

(2) The problems with placement of structures, fences, and other developments need review and more careful analysis. Scientists need to know what to expect before planning projects. Guidance in "grey areas" should be provided for local managers who may wish to avoid conflict, and who may be afraid to authorize projects with unusual equipment or site needs.

Standards for scientific work should not be drafted to form a single national model but should incorporate methods for dealing with specific pending problems affecting certain types of sites. Sea level rise on the coast along with storm overwash makes lightweight bench marking systems relatively useless, for example. Dieback of high elevation forests in several regions may warrant extensive pollution monitoring facilities. Special provisions should be made for cases where there are extreme threats to site integrity.

Because of the interest in recreation as a product and the relative lack of disinterest in science, many wilderness areas have a double standard for allowable damage. (This is true in both the Forest Service and the NPS areas.) Recreation often requires extensive trail and campsite systems which disturb hundreds of hectares and crisscross watersheds. In building trails, for example, it is common practice to remove surface soil and to cut through tree root systems. Should a researcher suggest doing this to establish a weir, the plan would be rejected by many wilderness managers - despite the fact that the total disturbance to the watershed is a small fraction of that caused by a typical long-distance hiking trail. This author believes that many wilderness areas allow more damage than they should from recreational users and their facilities. The restrictions on environmental monitoring, however, are often too strict. The decisions should be based on long-term impacts, as well as immediate visual intrusion problems. If there are 100 campsites in a wilderness area and 3 monitoring stations, and all are causing the same amount of site disturbance, it would seem the monitoring stations are very reasonable additions. New policies for environmental monitoring would help to decrease discrepancies in recreational and scientific management. (3) All interested parties should open dialogue on appropriate scientific uses of wilderness. The managing agencies should prompt discussion between scientific and recreational users over problems of concern to both. Issues might include establishment of monitoring stations which are visually intrusive, tagging and bench marking systems, aerial overflights for research purposes, establishment of grazing enclosures, the use of small generating stations to power sampling equipment, and reasonable action in the case of serious threats to site integrity.

This dialogue might also open the issue of when recreational users are willing to accept scientific intrusion into their wilderness experience; it might consider site closure

because of serious threats to site integrity by disturbances which originate with the users. In the case of dieback of high elevation coniferous forest, for example, would backpackers consider it acceptable to erect visually intrusive pollution monitoring towers? What if there were no dieback evident but pollution levels were thought to be increasing?

(4) Standards should be set for all wilderness in tern-6 of monitoring site integrity. All agencies should identify major existing or pending problems, on all scales. Even though the NPS has taken the lead in this area, it should be noted that many of their properties have had major unnatural disturbances which have gone undocumented for decades. Both the European wild boar and the balsam woolly adelgid were in the Great Smokies for 20 years before any serious research on their impacts was undertaken. Many Park Service wilderness areas still do not have vegetation monitoring systems or reliable census data for endangered species. Although many parks have made great strides in pollution monitoring, most are ill prepared to deal with climate change, and on the coast, with sea level rise. In "State of the Parks 1980: A Report to Congress" (NPS 1980) the Biosphere Reserve parks, which certainly have some of the best scientific data bases available, reported only 30 percent documentation of exotic species threats, 7 percent documentation of air pollution threats, and 15 percent documentation of water quality threats (see also Mack and others 1983).

Similar efforts need to be made to determine the extent of threats to the ecological integrity of wilderness, and then to expand scientific research programs accordingly.

(5) The agencies should consider expanding base operating facilities for scientists desiring to work in wilderness. This might be the addition of simple base camps or covered shelters outside the wilderness, but with good access to main trail systems or to valuable study areas (lakes, undisturbed stream valleys, high elevations, old-growth forest). Scientists need places to keep supplies. Refrigeration, electrical power, and running water are also helpful for processing samples. These facilities certainly do not need to be in wilderness, but they need to be close by since working in wilderness increases sample collection and transportation time so greatly. In some cases, universities or colleges may be willing to cooperate in facilities maintenance.

With restricted agency budgets and the problems of getting in and out of wilderness, further cooperation between groups would be highly desirable. University-based researchers may be willing to find funding for wilderness projects themselves and some wilderness areas could be used for nondestructive class projects. Private research foundations and conservation organizations such as Earthwatch and the Sierra Club may be willing to assist in integrity monitoring. As the nation tackles federal budget deficits, the agencies' funding may be too limited to carry the monitoring burden on their own.

As of this writing, the U.S. National Park Service was in the process of redrafting its wilderness management policies, and was adjusting and standardizing policies on wilderness monitoring ("Wilderness preservation and management," U.S. National Park Service, 1988). These proposed new policies will shortly be available for public review:

(1) Clearly encourage non-destructive research within the management objectives of the wilderness;

(2) Allow hydrologic, hydrometeorologic, seismographic, and other research and monitoring devices to be placed in wilderness, if the desired information is essential and the proposed device is the minimum tool necessary to accomplish the objective;

(3) Directly instruct the parks to begin wilderness monitoring programs for anthropogenic impacts and physical and biological change.

These policies will tend to solve some of the difficulties surrounding the use of structures and markers for permanent monitoring, and should encourage a more uniform program of site integrity monitoring. Although many parks are already undertaking wilderness monitoring, the new policies should expand these activities.

The proposed policies may tend to discourage certain types of basic research, however, because they require that:

(1) A research project address a need identified in a park's resources management plan;

(2) The project address a stated wilderness management objective;

(3) There be no alternative to its being conducted in the wilderness.

This author feels that wilderness status places enough restrictions on most projects to discourage casual efforts, and that forcing science into a management framework tends to inhibit many descriptive and ecosystem oriented efforts. Wilderness managers should in some cases try to attract projects that could be done elsewhere so they obtain basic data on the wilderness site. Wilderness managers should consider the potential long-term benefits of gathering scientific information, even if it does not appear to be immediately useful; we are, after all, frequently short-sighted about what will be ecologically useful in two or three decades. Further, the Wilderness Act itself gives no indication that scientific research should be restricted only to that which must be conducted on the site, no more than recreation should be restricted only to those activities which have to be undertaken in wilderness. Criteria concerning possible adverse research caused impacts to wilderness are more appropriate. Admittedly, in some parks with a great deal of research use, a "carrying capacity" might need to be established for basic research projects, because multiple projects may cause excessive disturbance of sensitive ecosystems. It should be noted that the proposed NPS policies do not consider research an important component of wilderness, nor is there a formal statement of service to the scientific community. This author suggests that limiting research to present management concerns and to projects that "must" be done onsite could discourage many desirable research efforts.

As a final note on conceptual problems, it is important to recognize that present wilderness legislation reflects a late 19th and early 20th century view of what threatens site integrity and how science is conducted in isolated regions. The legislation assumes that direct human impacts will be of the highest concern, and if activities such as logging are stopped, the site will return to natural condition. Site management then has to concentrate on the potential impacts of recreationists. Today, roblems originating across a continent may damage distant wilderness.

The legislation also seems to assume (there is no direct mention of this) that science will be conducted in a natural history mode. Simply excluding roads and human exploitation will make the site attractive. Today, many types of research necessary for protecting the wilderness areas themselves require sophisticated equipment and laboratory analysis. Wildlife census, bird observation, and plant collecting are still very valuable, but we may also need high towers to trap pollutants, and special power sources to run sequential samplers. If we cannot adjust our wilderness management to meet today's environmental threats and today's scientific methods, we will not only inhibit scientific progress, but we will ultimately lose the wilderness.

REFERENCES

Butler, Lisa M. and Rebecca S. Roberts, 1986. Use of wilderness areas for research. Proceedings - National Wilderness Research Conference: Current Research, Fort Collins, CO, July 23-26, 1985. U.S. Forest Service, Intermountain Research Station, Ogden UT, Gen. Tech. Rep. INT-212, pp. 398-405.

Franklin, Jerry F., 1987. Scientific use of wilderness. Proceedings - National Wilderness Research Conference: Issues, State-of-Knowledge, Future Directions, Fort Collins, CO, July 23-26, 1985. U.S. Forest Service, Intermountain Research Station, Ogden UT, Gen. Tech. Rep. INT-220, pp. 42-46.

Mack, Alison, William, P. Gregg, Susan P. Bratton, and Peter S. White, 1983. A survey of ecological inventory, monitoring, and research in U.S.

National Park Service Biopshere Reserves. Biol. Conserv. 26: 33-45.

U.S. National Park Service, 1980. State of the Parks, 1980: A Report to Congress. Office of Science and Technology and U.S. National Park Service, Washington, D.C.

U.S. National Park Service, 1988. Wilderness preservation and management. Draft policies statement , mimeo. U.S. National Park Service, Washington, D.C.

White, Peter S. and Susan P. Bratton, 1980. After preservation< Philosophical and practical problems of change. Biol. Conserv. 18: 241-55.

THE STATE OF ECOLOGICAL RESEARCH IN FOREST SERVICE WILDERNESS

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ABSTRACT

Research on natural processes within Forest Service wilderness areas is defined and discussed. Current wilderness research, other than recreation-oriented, is looked at in the context of ecosystem research on natural processes. Research needs are presented. The apparent lack of ecosystem research on natural processes is a result of regulations, attitude, logistics, and funding. Recommendations for dealing with these problems are made.

INTRODUCTION

The study of the natural processes of an unaltered environment has become increasingly important as humankind's effects are becoming more pervasive and apparent. Studies in laboratories and on degraded ecosystems have value, but ecological studies that collect baseline data on and improve knowledge of how natural ecosystems function is essential to appraising and mitigating adverse effects on the environment. Large natural areas, such as are provided by wilderness areas, National Parks, and research natural areas, are needed to provide the laboratories or settings for the study of truly natural processes.

Our definition of the study of natural processes emphasizes research on how ecosystems function, on the relationship of natural biological processes to the abiotic environment, and to the collection of baseline data to describe the "natural" state. This information is generally gathered in a nondestructive and non-manipulative way. What we learn is how nature functions in the absence of human interference.

Many wilderness areas provide excellent laboratories for this kind of scientific research because they contain whole drainages where land and water interactions can be studied on a range of scales; they often contain animal populations whose entire range and habitat needs are met within the wilderness; they are large enough to include a mosaic of vegetation types and ages on comparable sites; and they frequently provide excellent areas to study the natural background levels of environmental pollutants (Franklin 198 1).

Forest Service wilderness areas should be playing an important role in providing these natural laboratories but, unfortunately, they are not. Research as a valid use of wilderness has not been accepted and applied. Basic ecological studies have generally not been encouraged or supported in wilderness. In this paper we examine the present and potential scientific use of Forest Service wilderness areas as it relates to understanding ecological systems and determining trends in environmental conditions. We also make some recommendations on changes in present wilderness policy.

TYPES OF WILDERNESS RESEARCH

The goals and objectives of the Forest Service Manual (2320.2, 2324.4) concerning scientific research in wilderness are aimed at protecting naturalness and diversity. This can involve two kinds of research--basic research in wilderness and applied management research on wilderness. Basic research in wilderness has broad societal applications, in this case the generation of knowledge. The knowledge may have no direct benefit to wilderness but uses wilderness as a control point. This kind of research, which includes providing adequate

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baseline data, is frequently long-term in nature and expensive.

The second type of research, applied management research on wilderness, is designed to help maintain and manage wilderness. This most often involves an assessment of effects, usually related to recreational use of one kind or another, and leads to recommendations for mitigation measures. Because baseline information on natural processes is needed to assess adequately effects on natural systems, basic research is badly needed.

PRESENT RESEARCH USE

Basic ecological research on natural processes and their response to environmental change has been limited in Forest Service wilderness. Butler and Roberts (1986) made a fairly exhaustive tabulation of research in this wilderness and found at least 50 percent of it was recreation-related; earth science accounted for 26 percent (mostly U.S. Geological Survey reports on geology of wilderness areas); botany and zoology accounted for 14 percent, other research for 5 percent, and general ecology for 4 percent. The category of general ecology relates most closely to our concern for research on natural processes and their response to environmental change.

The senior author spoke to personnel in every Forest Service Region and many National Forests in the country to ascertain (1) what research, other than recreation-oriented, has taken place or is ongoing in wilderness areas; (2) whether this research is ecosystem-oriented; and (3) what perceived research needs, other than recreation-oriented, exist. Most of the reported research can be categorized into six major topics: wildlife, fii, vegetation, geomorphology, riparian/aquatic, and atmospheric deposition.

Most wildlife research is species-specific, with studies of habitat and patterns of movement most common. Studies include research on the gray wolf (Canis lupus) in Region 9 (Eastern Region); transplants of California bighorn sheep (Ovis canadensis); movements of deer (Odocoileus spp.) and elk (Cervus spp.) herds; feeding habits of elk, autecology of the gray-crowned rosy finch (Leucosticte arctoa), mountain lion (Felis concolor), and wolverine (Gulo luscus).

Studies relating to fii history, fire effects, fire-return intervals, etc., have been done in numerous wilderness areas (Regions 1, 2, 3, 5, 8 [Northern, Rocky Mountain, Southwestern, Pacific Southwest, and Southern], and 9) with the purpose of trying to reintroduce fire into an ecosystem(s) where historically it has been suppressed. In the early 1970's an extensive fire history study was begun in the Gila Wilderness in Region 3. Fire-return intervals in ponderosa pine (Pinus ponderosa) communities were determined and the relationship of fire to succession and wildlife was studied. Fire studies are being used in the fire management plan for a particular wilderness, but many questions concerning air quality monitoring, such as defining airsheds, still need answers. Other fire studies in wilderness include the fire history of the Boundary Waters Canoe Area in Region 9, fire ecology of Coulter pine (Pinus coulteri), fire ecology of chaparral, and the relationship of burning to several rare and endangered plants.

Vegetation studies in wilderness areas have been surprisingly limited. Very little general classification of vegetation types has been done within individual wilderness areas. Region 6 (Pacific Northwest), which has a strong vegetation classification program, has discouraged its ecologists from sampling in wilderness. Permanent plots designed to follow growth and structural changes in a chronosequence of forest stands have been established in several wilderness areas in Region 6, but most of these studies were initially started in research natural areas that were eventually included in wilderness. One extensive vegetation study was done in the Three Sisters Wilderness with support from the Man and Biosphere Program. Cole (1982) classified vegetation in two drainages in the Eagle Cap Wilderness, Oregon, and discussed the value of doing it. Several California wilderness areas have been subjects of broad vegetation classifications. Studies on vegetation change in mountain meadows have taken place in Regions 5 and 6, but these have generally been in response to human damage.

Some of the most extensive research in wilderness areas is geologic, including studies of vulcanism, glaciation, and geomorphic processes. Much of this work is legislatively mandated assessments of mineral potential conducted by the U.S. Geological Survey. Some studies on erosion and large landslides have been done in Region 5.

Aquatic and riparian studies have been mostly associated with fish rehabilitation projects or fish introductions. Little work has been done in the way of classification or productivity. A National Science Foundation study, which looked at changes in aquatic community composition, production, and energy flow, was conducted on the River-of-No-Return Wilderness in Idaho.

The final category, atmospheric deposition, has recently received much attention. The U.S. Environmental Protection Agency's survey of lakes included many lakes administered by Forest Service Wilderness. Regions 2, 4 (Intermountain), and 9 have studies in wilderness on air pollution and its effect on lichens, and very general air quality studies have been begun in Regions 1, 2, 4, and 9. Some of these studies are only monitoring visual quality and have little baseline data to precede them.

Most of the research being done tends to be short-term and lacks a holistic emphasis. Although every study contributes to our overall understanding of ecological processes, baseline information on a wider range of natural processes is needed. Such studies need to be carefully designed to identify trends and improve our understanding of natural processes. A repeated series of measurements on permanent sample plots with certainty of funding is badly needed to identify trends.

Most of the support for research in wilderness is coming from non-Forest Service sources. The U.S. Geological Survey supported all the mineral classification work. The Environmental Protection Agency, the Department of Energy, and the National Science Foundation have supported much of the atmospheric deposition research. Funds for most of the research work reported in California wilderness areas have been provided by State universities.

In contrast, the National Park Service has been more accommodating in opening its wilderness areas to gathering baseline ecological data and studying natural processes. As an example, an ecosystem study on the South Fork Hoh River in Olympic National Park has provided useful information for managed landscapes outside the park as well as for park management. One of the research results on the South Fork demonstrated the importance of off-channel habitats to fish production (Starkey and others 1982). This has led to changes in attitude outside the park where anadromous fisheries and timber harvesting occur together. Two large elk enclosures erected in 1978-79 have provided dramatic evidence of the effects of elk on vegetation composition and structure, Additional ecosystem research has been added to the Hoh drainage as part of the National Acid Precipitation Assessment Program, including quantitative studies of nutrient cycling.

Specific research needs were repeatedly mentioned by Forest Service personnel. Everyone agreed that basic inventories of plant and animal populations are needed. The most commonly mentioned topic was fire and its role in natural ecosystem processes. This topic has many aspects: vegetative structure and composition, successional processes, nutrient dynamics, and air quality. Most people seemed to agree that we need to know more about succession to understand the effects of grazing and fire suppression. Several people expressed interest in studies of other natural perturbations such as insect epidemics. Diversity was another topic that was often mentioned. Although the term was not usually defined, the primary concern was lack of knowledge about the effects of management activities on diversity. Finally, air quality and atmospheric deposition were stated as major research needs. This topic is quite involved and ranges from the complexities of acid rain studies to merely defining the ah-shed for a particular wilderness. Overall, the discussion with Forest Service personnel indicated consensus on the need to understand natural processes occurring in wilderness and a concurrent need to integrate this information into wilderness management.

TRENDS IN RESEARCH USE

Scientific use of Forest Service wilderness is minimal, especially as it relates to the natural functioning of ecosystems. Because there is no system to record what is taking place, trends in research use are extremely hard to discern. There does not appear, however, to be any great increase in research use since the first wilderness areas were established. As discussed above, most research tends to come about in reaction to an adverse effect on the environment. The wilderness areas most commonly used for research are: (1) in California, especially the heavily used areas near Southern California; (2) areas close to universities; and (3) wilderness areas in Region 1 where most wilderness researchers in the Forest Service reside.

Butler and Roberts (1986) found that larger areas received greater research attention, and that use increases from dry to wetland areas. They also state that wilderness management concerns tend to dictate the dominant research topics. Because the Forest Service has managed its wilderness primarily for recreation, research has been primarily directed toward recreation although recreation yields no direct benefit to wilderness. Finally, people in Regions 1 and 5 feel that inaccessibility of wilderness is a major deterrent to researchers.

PROBLEMS AND RECOMMENDATIONS

There are serious long-term implications to society and to wilderness management because of the low level of ecosystem-based research. Though the wilderness system is large and represents an impressive commitment, society is not accumulating the knowledge necessary to understand the basic processes operating in natural ecosystems and how these processes are affected by environmental changes. This has several consequences for wilderness preservation. First, management is not getting the kind of information it needs to identify threats to wilderness and to develop management practices consistent with the wilderness concept. Second, scientific values as a justification for maintaining and expanding the wilderness system will be hard to substantiate.

Why, then, isn't more wilderness research being done on Forest Service land? First, we must look at the formal limits imposed by Forest Service regulations and then at other limits.

Regulations and Non-Conforming Uses

Justification for the scientific use of wilderness is documented in numerous Federal statutes and has been discussed at length in articles and at symposia (Lucas 1986, 1987). The 1964 Wilderness Act, the 1969 National Environmental Policy Act, the 1974 Resources Planning Act, and the 1976 National Forest Management Act all endorse the use of wilderness for scientific research, either in the context of an expressed use or for evaluation of management practices. The Forest Service manual direction is more specific than the legislative acts, and this specificity can be restrictive in nature. The research must be shown to be compatible with the preservation of the wilderness environment; research proposals should be reviewed to ensure that areas outside the wilderness could not provide similar research opportunities; and exceptions to the equipment restrictions are to be made only if the research is essential to meeting the minimum requirements for administering the wilderness. These restrictions pertain to any kind of research.

Wilderness legislation has allowed for too many conflicting or non-conforming uses that have created problems for wilderness research. In some instances domestic livestock grazing has compromised the naturalness of meadows and riparian zones to the point where the "natural" community no longer exists. Hunting and trapping may detract from the potential scientific value of studying natural populations of game animals, and may have subtle effects on the populations of nongame animals. Fish stocking of previously barren lakes has affected the trophic structure of many lakes. Human traffic has sometimes caused the introduction of exotic species (Franklin 1987).

Regulations relating specifically to scientific use are also a problem. Marking of

permanent sample plots with stakes or re-bar, essential for future relocation, has generally been discouraged. Electronic equipment that is necessary for many types of research but requires a power source is prohibited. Shelters for meteorological equipment or temporary gauging stations are generally discouraged. The inaccessibility and ruggedness of many wilderness areas can make sampling much more difficult. Often heavy equipment use and the need to expedite transportation of samples is prevented or inhibited by distance and prohibition of any kind of motorized equipment. However, in some instances the use of motorized equipment, for instance helicopters, may have the least impact on the wilderness resource. In essence the very best equipment and methods of research on natural processes often cannot be, currently used within wilderness boundaries under present policies.

Other Problems

Three additional problems concerning the lack of scientific use of wilderness are attitude, logistics, and funding. Attitude is, perhaps, the most serious problem and the hardest to deal with, To begin with, scientific research on natural ecosystem processes has not been highly valued as a part of management planning. Managers have traditionally only supported research to solve their immediate problems. Such studies tend to be short-term and lack a holistic perspective. Long-term data that do not serve their immediate needs are viewed as too costly and too vague in objectives and likely results. Scientists, on the other hand, have traditionally been unappreciative of management's problems or concerns, have viewed managers as only interested in short-term studies, and are often ignorant of wilderness regulations. This mutual misunderstanding has done little to further scientific knowledge and has certainly done a disservice to wilderness management and preservation. What is lacking is a strong advocate for scientific research on natural systems and its relation to wilderness management problems.

In justifying ecosystem-based research in wilderness, one is often forced to define whether this is applied management research on wilderness or basic research in wilderness. The latter category is usually thought to have no direct benefit to wilderness, unlike a study on user effects. Wilderness as a control site, as a baseline ecosystem that can tell us something about the world around us, is currently not what wilderness is perceived as providing, if the level of support is any indication.

Logistics is complicated in wilderness areas because of inaccessibility and ruggedness of the terrain. Butler and Roberts (1986) found that the larger wilderness areas received the most research use, but our telephone survey indicated that large size can also be a deterrent. Many wilderness areas are in terrain that is physically very difficult to get around in, especially if you have to carry more than your own personal gear.

Funding is a perennial problem that severely restrains research programs. Substantial research money is often spent on logistics, out of concern for maintaining the "wilderness character," which then decreases the amount available for actual research. With less money available for sampling, the scope of the research is reduced and the level of uncertainty about one's data often increases. Managers and scientists might have differences of opinion on what level of uncertainty is acceptable. Who decides the balance? Equitability is also an issue. East coast wilderness managers believe that the vast majority of money that is available for research in wilderness goes to Western wilderness areas. When funding is limited, resources are generally allocated to immediate, critical (a perception) problems.

Recommendations

How, then, can these issues be dealt with? Changing attitudes is the major challenge. What is needed is a strong sense of advocacy, at national and regional as well as individual forest levels, for scientific research on natural ecosystems that includes wilderness management problems as part of an integrated package. Mechanisms need to be developed to bring managers, at all three levels, together with scientists to determine research needs and options, and to formulate long-term plans. Managers need to communicate to scientists

their needs and concerns, while attempting to be more flexible in their regulations and time frames. Scientists need to educate managers to the potential benefits of long-term ecological research, while showing interest and concern for managers' immediate needs. Users need to provide feedback and support to both groups. They need to make it clear that they care about the naturalness and integrity of the wilderness ecosystems, and they need to understand that they are also part of the problem. A possible mode of advocacy has appeared in Region 1. A wilderness ecosystem committee has been formed that includes managers and scientists from the Forest Service, National Park Service, Fish and Wildlife Service, State Parks, State Game Departments, Intermountain Forest and Range Experiment Station, and the University of Montana.

A fresh look at wilderness regulations is in order. Grazing, hunting, trapping, and fish stocking of lakes needs to be reevaluated in the context of the need for monitoring of long-term baseline data and research on natural processes. The use of shelters, permanent sample plot stakes, and occasional motorized equipment should be permitted after considering the potential benefits of the research. A case in point involves a large study done by the Rocky Mountain Forest and Range Experiment Station. The study involved developing guidelines to assess current conditions of wilderness ecosystems as part of a larger program to protect air quality as mandated in the Clean Air Act of 1977. The research was ultimately sited outside wilderness because of the resistance to power-driven instrumentation, instrument shelters, etc. In commenting on the problem of acquiring exemptions from the regulations, the scientists state "In all likelihood, then, a request for an exemption is likely to be refused unless it can be demonstrated unequivocally (emphasis added) that the data to be gathered under the exemption are absolutely necessary, and all possible alternatives to the exemption have been considered, and the data cannot be gathered in any other manner" (Fox and others 1987). Yet their research was supposed to yield information on current conditions within wilderness ecosystems. Inflexibility in regulations should be weighed against the potential scientific information made available to managers. At the same time, scientists need to adopt new techniques for data gathering.

Perhaps specific areas within wilderness might be designated for ecosystem research. In the West, research natural areas have been identified in wilderness with this specific purpose in mind. Designated use does not run counter to wilderness direction; wilderness areas have many kinds of designated uses--camping areas, grazing areas, stock-use areas, stocked lakes for fishing, etc. Wilderness management zoning is not a new idea (Haas and others 1987).

Regarding the last issue, no one will be surprised to hear that more money is essential. Scientists and managers need to educate decision makers about critical long-term problems. Much can be learned from the National Park Service which has a much better record of research with an emphasis on understanding natural processes. The NPS often has proportionately more research staff and money dedicated to this pursuit. For instance, Glacier National Park has 10 scientists on its staff concentrating on wilderness- ecosystem process research. Most ecosystem research occurring in Forest Service wilderness has relied on outside support such as the National Science Foundation. The Service itself needs to provide more support for research of this kind. Service support also needs to include more than just money. Ways of expediting National Science Foundation, university, and other Federally funded research should be pursued, including changes in attitude as well as more flexible regulations.

CONCLUSIONS

The Forest Service Manual (2320.2) lists five objectives for wilderness management. Number 4 states "Protect and perpetuate wilderness character and public values including, but not limited to, opportunities for scientific study, ...", and number 5 states "Gather information and carry out research ... to increase understanding of wilderness ecology, ..." Both statements stress scientific study of ecological processes is both valid and necessary. Such research involves measurement of long-term processes, whether it is changes in environmental conditions, ecosystem succession, or population dynamics

ecosystem succession, or population dynamics of various organisms. Carefully planned and integrated, it can provide a holistic view of wilderness ecosystems and improve management for wilderness attributes. Very little of such work is being done. Quite simply, Forest Service wilderness areas are under-utilized for ecosystem research, considering the diversity of ecosystems and the vast acreage that is rarely used by recreationists.

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REFERENCES

Butler, Lisa Mathis, and Rebecca S. Roberts. 1986. Use of wilderness areas for research. IN Robert C. Lucas. 1986. Proceedings, National Wilderness Research Conference: Current Research. Fort Collins, CO. Intermountain Research Station, Ogden, UT. GTR INT-212. p. 398-405.

Cole, David N. 1982. Vegetation of two drainages in the Eagle Cap Wilderness, Wallowa Mountains, Oregon. Intermountain Forest and Range Experiment Station, Missoula, MT, Research Paper INT-288. 42 pp.

Fox, Douglas D., J. Christopher Bernabo, and Betsy Hood. 1987. Guidelines for establishing current physical, chemical, and biological conditions of remote alpine and subalpine ecosystems. Rocky Mountain Forest and Range Experiment Station, Fort Collins, CO. GTR-RM 146. 148 p.

Franklin, Jerry F. 198 1. Wilderness for baseline ecosystem studies. IN Proceedings of XVII IUFRO World Congress. p. 37-48.

Franklin, Jerry F. 1987. Scientific use of wilderness. IN Proceedings, National Wilderness Conference: Issues, State-of-Knowledge, Future Decisions. Fort Collins, CO. Intermountain Forest and Range Experiment Station, Ogden, UT. GTR-INT 220. p. 42-46.

Haas, Glenn E. , B. L. Driver, Perry J. Brown, and Robert G. Lucas. 1987. Wilderness management zoning. Journal of Forestry. 58(12):17-21.

Lucas, Robert C., compiler. 1986. Proceedings, National Wilderness Research Conference: Current Research. Intermountain Forest and Range Experiment Station, Ogden, UT. GTR-INT 212. .553 p.

Lucas, Robert C., compiler. 1987. Proceedings, National Wilderness Research Conference: Issues, State-of-Knowledge, Future Decisions. Intermountain Forest and Range Experiment Station, Ogden, UT. GTR-INT 220. 369p.

Starkey, Edward E., Jerry F. Franklin, and Jean W. Matthews. 1982. Ecological Research in National Parks of the Pacific Northwest. National Park Service Cooperative Park Studies Unit, Oregon State University Forest Research Laboratory, Corvallis, OR. 142 p.4.

SOCIAL RESEARCH IN WILDERNESS: MAN IN NATURE

Robert E. Manning*

ABSTRACT

Wilderness has special value as a social science laboratory for understanding man's relationship to nature. This paper reviews human use of wilderness with the purpose of understanding this relationship better and illustrating the value of wilderness for social research.

INTRODUCTION

Like other authors in this colloquium, I was assigned a topic. My topic was social research in wilderness. The colloquium organizers went on to describe my task as addressing research on human use of wilderness. But this is a big topic; social research is broad and diverse and invites many interpretations. After puzzling over my assignment, I concluded that the greatest value of wilderness for social research is as a laboratory to study man's relationship to nature. After all, wilderness represents the natural environment in its most pure and unmodified form. What better way to study man and his relationship to the natural world than to study man in the wilderness?

But this is still a broad topic. How could it be operationalized for the purposes of this paper? I decided to focus on what I believe is the key phrase in my assignment: "human use of wilderness". What does research tell us about how we use and value wilderness? A review of the literature on this topic should provide important insights on man's relationship to nature while at the same time illustrating the usefulness of wilderness to social research.

HUMAN USE OF WILDERNESS

Human use of wilderness has been the subject of considerable study. From this study it is apparent that wilderness can have many uses. The Wilderness Act itself is suggestive where it states that "wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical use" (Wilderness Act 1964). The following is a brief survey of the multiple uses of wilderness in contemporary American society.

Wilderness Recreation

Perhaps the most obvious or readily apparent value of wilderness is for recreation. People use wilderness directly as the focus of and setting for outdoor recreation activity. In absolute terms the statistics are impressive. It is estimated that designated wilderness areas within the National Forests accommodated 12 million visitor-days of recreation in 1985. Backcountry areas within the National Parks accommodated approximately 1.7 million overnight stays the same year (Stankey and Lucas 1986). Relative statistics, however, present a somewhat different picture. Wilderness recreation accounted for only 5.3 percent of all outdoor recreation within the National Forests in 1985 (Stankey and Lucas 1986). Moreover, it is estimated that only 6 to 15 percent of the U.S. population has ever visited a designated wilderness area (Opinion Research Corporation 1977; Wallwork 1984; Young 1980).

But the value of wilderness for recreation cannot be measured solely on the basis of the number of people who visit. Much of its value lies as an anchor of the primitive end of a spectrum of recreation opportunities. Recreation research has revealed that there are many tastes in outdoor recreation and that there needs to be a corresponding

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diversity of opportunities to ensure a high quality outdoor recreation system (Manning 1986). This concept has recently been operationalized formally as the Recreation Opportunity Spectrum (ROS) (Brown and others 1978; Brown and others 1979; Clark and Stankey 1979; Driver and Brown 1978). Wilderness recreation is one specialized type of recreation opportunity emphasizing naturalness, solitude, and freedom.. As one type of recreation opportunity it is inherently no more nor less valuable than any other type that may be found within ROS. Its value lies in its distinct contribution to a greater system of recreation opportunities.

However, wilderness does hold special recreation value to some people. Psychological research indicates that, like most other human activity, outdoor recreation is goal directed: people participate in outdoor recreation to satisfy certain motives. Driver and associates have conducted extensive tests of recreation motives using Recreation Experience Preference scales (Driver 1976; Driver and Cooksey 1977; Driver and Knopf 1976; Haas and others 1980). A number of the motives found important to selected samples of recreationists are closely associated with wilderness (see, for example, Brown and Haas 1980; Driver and others 1987; Knopf and Lime 1984; Schreyer and Roggenbuck 1978). Examples of such motives include enjoying nature, physical fitness, reduction of tensions, escaping noise/crowds, outdoor learning, independence, introspection, achievement, and risk taking. Without wilderness recreation opportunities, people seeking to satisfy these motives may be unfulfilled.

Wilderness also holds special value for more "pure" or highly developed forms of recreation. Sax (1980), in reflecting on a recreation policy for National Parks, references the philosophical writings of Frederick Law Olmsted who emphasizes the need for opportunities for "reflective" recreation. Some forms of recreation evolve to exercise the "contemplative faculty" of participants where the emphasis is placed on technique and setting without the distractions of technology or other societal intrusions. The philosophical literature of fishing (Waltin and Catlin 1925), hunting (Gasset 1972). and mountain climbing (Rowell 1977) is suggestive of the need for natural, undisturbed environments to practice the highest forms of these recreation pursuits. Some writers refer to these forms of recreation as "wilderness-dependent" (Hendee and others 1977). There is some limited empirical evidence of this phenomenon. Evolution of recreation activity from novice to more specialized forms has been documented for samples of fishermen (Bryan 1977), white-water rafters (Munley and Smith 1976). and campers (Burch and Wenger 1967). In each case, preferences evolve toward more natural settings which provide greater challenge for enhanced skills and experience.

Spiritual Values in Wilderness

Nature is such an imposing, powerful and all-embracing element of our world that its relationship to things spiritual or even religious is inevitable. Symbolic of this relationship is the fact that the word "wilderness" appears nearly 300 times in the Old and New Testaments (Nash 1982). However, wilderness has been subject to conflicting spiritual interpretations. The Puritans of colonial America, for example, viewed wilderness as the antithesis of God. Within conservative religious doctrine, wilderness was generally interpreted as the physical and spiritual opposite of the Garden of Eden (Nash 1982). Perhaps nowhere is this more evident than in the Book of Joel which, in recounting the story of Adam and Eve, states that "The land is like the garden of Eden before them, but after them a desolate wilderness" (Joel 2:3).

Following the early colonial experience, American religious interpretations of nature became somewhat more benign, though their outcome was no more favorable. Following the teachings of Genesis, man was instructed to "be fruitful, and multiply, and replenish the earth, and subdue it: and have dominion over the fish of the sea, and over the fowl of the air, and over every living thing that moveth upon the earth" (Genesis 1:28). Wilderness was seen simply as a storehouse of raw materials for man's earthly use, Nature was exploited accordingly and wilderness diminished.

More recently, nature, and its ultimate expression as wilderness, has been subject to

more favorable spiritual treatment. Beginning in the 19th century, the Concord intellectuals, led by Ralph Waldo Emerson and Henry David Thoreau, formulated their complex philosophy of transcendentalism. Postulating a series of higher spiritual truths, transcendentalism suggested nature as a setting or even metaphor for such truths. "Nature is the symbol of the spirit" wrote Emerson (Emerson 1883). Thoreau went further, suggesting that nature was God's purest creation and that the best way to know God and divine revelation was to get as close as possible to nature. The wilder and purer was nature, the better. In fact, nature may even be the physical manifestation of God. "Is not nature, rightly read, that of which she is commonly taken to be the symbol merely?" asked Thoreau (Thoreau 1893a).

The transcendentalist interpretation of nature has been eagerly accepted by many wilderness enthusiasts. Notable among them is John Muir who viewed nature as "a window opening into heaven, a mirror reflecting the Creator" (Muir 1911). Defending the Hetch Hetchy valley within Yosemite National Park from a proposed dam, Muir railed "Dam Hetch Hetchy! As well dam for water tanks the people's cathedrals and churches, for no holier temple has ever been consecrated by the heart of man" (Muir 1912).

Today the transcendentalist tradition continues. Environmental degradation is often described as "desecration," a term with obvious religious overtones. John Denver celebrates the "cathedral mountains" of the Rockies. Spiritual values and personal introspection are often cited as important motives for people who visit wilderness areas (Driver and others 1987). A recent book by Graber has even suggested that wilderness preservation might be justified on the constitutional basis of maintaining religious freedom (Graber 1976).

Wilderness and Culture

In the minds of many, wilderness has contributed to the distinctiveness of American culture. Nash, for example, notes that colonial America, like most fledgling nations, was defensive about its lack of established culture (Nash 1982). Americans had no grand history, art, or architecture which might compete with that of their European ancestors. Rather, one of the qualities which made America distinctive was the grandness and wildness of its nature. Many of America's first contributions to world culture celebrated its wilderness heritage. William Cullen Bryant was one of America's first great poets to gain international recognition and his subject was the romantic American forests. James Fennimore Cooper enjoyed a wide international following for his novels about adventure in the American wilderness. Thomas Cole, Frederick Church, Albert Bierstadt, Thomas Moran, and other American painters redefined the practice of landscape art with their emphasis on the power and sublimity of the American wilderness landscape. The image of America became closely associated with its wilderness condition.

Some suggest that wilderness shaped not only America's physical and mental image, but its personality as well. The most definitive treatment of this view is Frederick Jackson Turner's "frontier thesis" (Turner 1920). Turner believed that the pioneers' experience in the wilderness of the American frontier marked them with a sense of independence, rugged individualism, and self-worth which defines a distinctive American personality. Moreover, these characteristics developed out of the wilderness experience have been directly translated into our distinctive form of democratic government with its emphasis on maintaining personal freedom. "Out of his wilderness experience," Turner wrote, "out of the freedom of his opportunities, he fashioned a formula for social regeneration--the freedom of the individual to seek his own" (Turner 1920).

More recently, Wallace Stegner has given contemporary meaning to wilderness as a museum of our cultural heritage. The wilderness of America presented an opportunity for a new beginning, a place to build a better society. Preserving wilderness now and into the future celebrates our success and symbolizes our continued potential. As such, wilderness is "a part of the geography of hope" (Stegner 1969).

Wilderness as Therapy

Wilderness has long been thought to have therapeutic value in both a physical and mental sense. Robert Marshall was one of the fiit to write about these qualities in a serious way. A prodigious hiker, Marshall's own adventures in the wilderness in the early 1900's convinced him of the physical benefits of wilderness use. "Toting a fifty-pound pack over an abominable trail, snowshoeing across a blizzard-swept plateau or scaling some jagged pinnacle which juts far above timber," he wrote, "all develop a body distinguished by soundness, stamina and elan unknown amid normal surroundings" (Marshall 1930). But the fact is that most people don't visit wilderness often enough to develop or maintain a true physical conditioning effect, Marshall also claimed that wilderness had psychological benefits. Marshall's thinking was influenced by Sigmund Freud and the developing science of psychology which suggested that mental dysfunctions were often caused by repressed desires forced upon us by the constraints of society (Nash 1982). Wilderness, argued Marshall, provided an opportunity to release those constraints and play out emotion and instincts (Marshall 1930).

Therapeutic values of wilderness have received considerable attention of late. A substantial industry has grown up around these potential values, led by Outward Bound and the National Outdoor Leadership School. It is estimated that there are now over 300 such programs (Burton 1981). A large number of studies have evolved at the same time which attempt to explore and document the therapeutic values of wilderness use' Burton (1981), for example, reviewed 72 studies of Outward Bound-type programs. Most focused on participant reports or tests of self-concept or self-perception and most found a positive or beneficial effect. Driver and associates have conducted extensive tests of more general wilderness recreationists using the Recreation Experience Preference scales described earlier. Self-concept-related preference items, such as gaining a sense of self-confidence, are consistently found to be important to a large number of wilderness visitors (Driver and others 1987). Though many of the wilderness therapy studies have methodological shortcomings, there is a growing body of evidence to suggest that various therapeutic benefits from wilderness are real and forthcoming.

Esthetics of Wilderness

Esthetics is another area in which wilderness has been subject to considerable revision and reinterpretation. Mountains, for example, were once generally considered as "warts, pimples, blisters and other ugly deformities on the Earth's surface" (Nash 1982). The scientific advances of the Enlightenment first suggested that the wilder regions of the planet had some logic or order to them. These places, in fact, must have been created and shaped by God's own hand. This led to a more sympathetic and appreciative view of nature which flowered in the Romantic movement of the 17th and 18th centuries. Edmund Burke formally expressed this new esthetic of nature in his book "Philosophical Enquiry into the Origin of Our Ideas of the Sublime and Beautiful" published in 1757. Wild nature, or wilderness, was still steeped with horror and terror, but was beautiful at the same time due to the awe and power it signified within us. Wilderness was sublime. It was this sublimity in nature that was first captured and illustrated by the American landscape painters described earlier (Nash 1982).

Robert Marshall developed additional sophistication of wilderness esthetics. Marshall recognized that nature possesses unique esthetic characteristics: it is detached from all temporal relationships in that it is not rooted in any one period of human history; it has an encompassing physical ambience in that we can be literally surrounded by its beauty; it has a dynamic beauty as it is always changing; it has the potential to gratify all of the senses in that it can be seen, heard, smelled, tasted, and felt; and it provides the best opportunity for pure or perfectly objective esthetic enjoyment in that it is not created or affected by man (Marshall 1930). Based on this philosophy of esthetics, Marshall emphasized the special contribution wilderness might make to the quality of life. Asked how many wilderness areas we need, Marshall replied "How many Brahms symphonies do we need?" (Flint 1939). Wilderness contributes to the quality of life

and we should have as many wilderness areas as we can afford.

There is considerable evidence of the esthetic value of wilderness today. The photographs taken by millions of visitors to the national parks and similar areas are symbolic as are the calendars and coffee-table books published by environmental groups and others. The Recreation Experience Preference scales of Driver and associates are again instructive. The scale item "scenery" ranks as one of the most important motives of wilderness visitors (Driver and others 1987).

Ecology and Wilderness

Ecology is a relatively new science. The very word "ecology" was not coined until the 1860's by German evolutionist Ernest Haeckel and means the study of living things and their interrelation with their environment (Odum 1959). Ecology is a complex and emerging science.

Rudimentary observations about ecological relationships--and the meaning they might have for wilderness preservation--were made in the United States in the early 19th century. It was during this time that George Perkins Marsh witnessed the large-scale clearing of Vermont hillsides for agriculture (Curtis and others 1982; Lowenthal 1958). Simultaneously he observed changes in streamflow patterns--more flooding with snowmelt and spring rains, and streams tended to run dry more often in late summer. Marsh theorized that it was the roots of trees which helped bond the soil together and allow water to percolate down slowly through the soil and eventually filter into streams. This mechanism provided a relatively constant source of stream flow. Without trees and their roots, water ran off the hillsides quickly, often washing the soil away with it. Marsh published his observations in 1864 in his important book Man and Nature. Man's tendency to disrupt the interrelationships in nature, Marsh proposed keeping a large portion of "American soil ... as far as possible, in its primitive condition" (Marsh 1864). His arguments were influential in convincing the citizens of New York to set aside the Adirondack region to protect the quantity and quality of water which flowed to downstate residents (Nash 1982). This was one of the first actions of large-scale wilderness preservation.

The environmental movement of today is based largely on concern for ecological relationships. Our current technological ability to modify ecological relationships on a massive scale may threaten our long term existence by disrupting vital components of our environment such as clean air and water, fertile soil, and a stable climate. Setting aside large areas of our natural environment as wilderness is viewed as one way to protect our future well-being.

Wilderness serves another ecological value in conserving biological and genetic diversity. The number of species on earth is unknown but generally estimated to exceed 10 million (Myers 1979). Although extinction of species is a natural phenomenon, the rate of extinction is believed to have increased sharply in recent years due to human modification of the environment (Ehrlich and Ehrlich 1981; Myers 1979; Myers 1983). The loss of biological and genetic diversity is of grave concern because of its current and potential usefulness to society. Plants and animals provide many benefits to society through their use in medicine, industry, and agriculture, Since most species are still unidentified or unstudied, their extinction poses a great potential loss to society. Wilderness helps preserve habitat, thus protecting endangered species as well as providing for continued evolution and speciation.

Wilderness and Science

It was noted above that the science of ecology is relatively young. This means, among other things, that there is much more to be learned. Only about 3 percent of the United States is designated wilderness. If certain types of scientific knowledge can be obtained only from natural ecosystems, then wilderness holds special value for developing scientific theory and knowledge. Wilderness provides the only place, for example, to study effectively large-scale ecological processes such as forest succession and watershed function, and to study wildlife such as grizzly bears and wolves which have large home ranges. Some suggest that we don't yet fully appreciate the

knowledge that may be forthcoming from wilderness. In the words of one environmental writer, wilderness "holds answers to questions man has not yet learned how to ask" (Nash 1982).

Evidence suggests that wilderness areas are indeed used extensively as natural laboratories. A recent study of only a sample of officially designated wilderness areas within the National Forest and National Park systems found over 800 scientific publications focused on these areas (Butler and Roberts 1986). Scientific disciplines covered included ecology, botany, zoology, and geology.

Wilderness can also serve the interests of science as an environmental control or baseline. In living out our,day-to-day lives we must alter the environment around us. But what long-term effects are we having on that environment? Only through comparison to environmental control areas--the natural environments we preserve in wilderness--can we be certain. Aldo Leopold was the first to suggest this use of wilderness when he wrote that wilderness is "a base-datum of normality, a picture of how healthy land maintains itself as an organism" (Leopold 1941).

Wilderness and Intellectual Freedom

Nash (1982) makes an interesting case that wilderness is the ultimate source of intellectual freedom or creativity. Piecing together the writings of a number of natural philosophers, Nash suggests that wilderness provides the purest form of objectivity from which original thoughts might be derived. Unfettered by human influence, wilderness inspires intellectual creativity and diversity. Thoreau, for example, saw wilderness as the "raw material of life" (Thoreau 1893b) while Leopold viewed the history of human thought as "successive excursions from a single starting-point" which was the "raw wilderness" (Leopold 1966). The contemporary words "pathfinding," "trailblazing," and "pioneering" associate creative thought and scholarship with a wilderness context (Nash 1982).

Intellectual freedom inspired through wilderness has been found in several disciplines of human endeavor, including religion and the arts. The Puritans came to the wilderness of the New World to find spiritual freedom just as the Mormons went to the deserts of Utah. Similarly Thomas Cole and his followers found artistic inspiration in the wilderness. More recently, wilderness has even been suggested as a source of political freedom. Abbey, for example, writes that wilderness may someday be needed "not only as a refuge from excessive industrialism but also as a refuge from authoritarian government, from political oppression" (Abbey 1968). Nash also notes that George Orwell's police state society of 1984 abolished wilderness because it "supported freedom of thought and action" (Nash 1982).

Wilderness as Moral and Ethical Obligation

Most of the wilderness values discussed thus far focus on human use of wilderness and how we might benefit from such use. An emerging notion suggests that wilderness and its component parts may have intrinsic value that we have a moral and ethical obligation to support, This notion stems from several sources.

Aldo Leopold was the first to suggest a "land ethic." As a scientist Leopold recognized that man was part of a larger ecological community. Just as we express moral and ethical rights to other members of our human communities, so should we extend such rights to members of our ecological community. "All ethics so far evolved," wrote Leopold, "rest upon a single premise: that the individual is a member of a community of interdependent parts. The land ethic simply enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land" (Leopold 1966).

Extension of moral and ethical considerations to the natural world is also supported by contemporary reinterpretation of Judeo-Christian teachings. Given that we have seriously depleted many of our natural resources, White (1967) suggests that the scripture contained in Genesis, as described earlier in this paper, may suggest something different than it has traditionally. Man's dominion over other life forms may be more appropriately interpreted as expressing a

stewardship responsibility rather than indiscriminate or unlimited use.

The "rights" of natural objects have even been tested in the court system. In the landmark case of the Mineral King Valley, California, Supreme Court Justice Douglas wrote that a wilderness had a right to legal standing in the court (Stone 1974). His, however, was a minority opinion.

Intrinsic rights of nature is a new and evolving concept in the environmental community. A Journal of Environmental Ethics has been established and some of the most thoughtful writing of contemporary environmental philosophers is focused on this subject (Elliot and Gare 1983; Regan 1983; Rolston 1986; Rolston 1988; Stone 1987; Wilson 1984). Some suggest that the environmental movement is evolving from its "shallow" anthropocentric traditions to a new "deep" biocentric philosophy (Devall 1980; Devall and Sessions 1985; Naess 1973). To all those who believe in the intrinsic rights of nature, preservation of wilderness is an expression of man's moral and ethical obligation to the environment.

Economics of Wilderness

Though it may seem paradoxical at first, wilderness is seen by some as having substantial economic value. Indeed, this paper has discussed many uses, values, or benefits that wilderness might have to society and it seems reasonable to assume that such values might be measurable, at least theoretically, in traditional economic terms. As it turns out, some values are more readily measurable than others. In any case, a substantial body of economic literature has been developed that focuses on various aspects of wilderness valuation.

Some economic values of wilderness are relatively straightforward. Wilderness recreationists, for example, incur certain costs for travel and equipment and these costs constitute a minimum economic value of wilderness for recreation (Clawson and Knetsch 1966). Actual costs are considered a minimum measure of value because recreationists may be willing to pay more than required and this additional increment, or consumer surplus, is a more accurate measure of actual value. Sorg and Loomis (1984) reviewed a number of willingness-to-pay studies of wilderness recreationists and found that most values ranged from $13 to $20 per activity day, adjusted to 1982 dollars. Additional economic value of wilderness recreation includes the contribution of this activity to national, local, and regional economies which provide related goods and services to wilderness recreationists (Alward 1986; Walsh and Loomis 1986).

Some wilderness values are highly tangible. The high-quality water that flows off protected watersheds is used for drinking and irrigation. Compromises made in passing the Wilderness Act allow some wilderness areas to be used for commercial grazing and mineral production. Certainly the biotic and genetic diversity preserved in wilderness is increasingly used in a wide variety of commercial and medical applications. Little work has been done, however, to quantify these values in economic terms (Irland 1979).

Other wilderness values are less tangible. How do we value, for example, the vital ecological "services" provided by nature such as clean air and climatic stability? (Westman 1977) Due to uncertainty, how can we value the future usefulness of biotic and genetic diversity? (Bishop 1978) The therapeutic, cultural, intellectual, esthetic, and spiritual values of wilderness may all benefit society through increased health and productivity, sense of pride and self-worth, innovation, and pure enjoyment. But these values are difficult to quantify in dollar terms.

Finally, it has been suggested that wilderness may have unique values involving the preservation of natural environments. Decisions to develop natural environments are often irreversible. By preserving such areas as wilderness we may be creating and capturing option, existence, and bequest values (Krutilla 1967). By avoiding the irreversible decision of development, wilderness remains available as an option for those who do not now use wilderness but may wish to do so in the future. Alternatively, some people may have no expectation of using wilderness directly, but value the knowledge that such areas exist. Finally, some people may be imbued with a

sense of social altmism and derive satisfaction and value in knowing that future generations have been endowed with or bequeathed wilderness. Empirical tests suggest that option, existence, and bequest values can be substantial, even outweighing more tangible wilderness benefits. A recent study of public support for wilderness preservation in Colorado, for example, found that the average family would be willing to pay $14 per year to preserve the State's wilderness areas as recreation reserves. These same families, however, would be willing to pay even more--an additional $19 per year--to be comforted in knowing that such areas exist and are being protected for future generations (Walsh and others 1984).

WILDERNESS AS A LABORATORY FOR SOCIAL RESEARCH

Earlier in this paper it was noted that the Wilderness Act suggests that wilderness might serve a number of values in contemporary society. The survey of wilderness uses outlined in this paper confirms and even expands this expectation. Wilderness advocates, philosophers, and researchers have identified numerous and diverse ways in which preservation of wilderness can serve the needs of society now and in the future.

Some wilderness uses are more direct or tangible than others. Wilderness recreation, for example, would seem to require one's direct physical presence in wilderness. However, maintenance of vital ecological services, such as air and water purification, requires no direct human use and, in fact, may be more efficiently carried out under such conditions. It seems clear that although only a minority of the population uses wilderness in the direct and narrow sense of the term, society can still find great value in wilderness.

In preparing this summary of human use of wilderness it became obvious that research in this broad area of study is highly uneven. Some wilderness uses, for example, are poorly documented in the scientific sense, relying instead on classical philosophical writings or anecdotal evidence. There is a considerable body of literature, for example, regarding spiritual values of wilderness and, by extension, man's spiritual relationship to nature, but there is a near total lack of empiricism. In contrast, research on economic values of wilderness has tended to be highly quantitative, but lacks both breadth and depth.

It seems equally clear that research on human use of wilderness can be of considerable value in determining appropriate wilderness policy and management. Recent reviews of recreation research, for example, present an impressive body of knowledge which can be brought to bear on wilderness management (Brown and others 1987; Cole 1987; Driver and others 1987; Hammitt and Cole 1987; Manning 1986; Roggenbuck and Lucas 1987; Stankey and Schreyer 1987). We have developed profiles of wilderness visitors, for example, including their psychological motives for wilderness recreation and attitudes toward management alternatives. We understand that crowding in wilderness settings is a normative concept and can be affected not only by the number of interparty encounters but by the type and behavior of groups and the situation in which encounters occur. We know that recreation use causes environmental impacts and that these impacts tend to occur quickly even under relatively light levels of use. From research we have developed a number of management concepts, such as carrying capacity, Recreation Opportunity Spectrum and Limits of Acceptable Change, which assist in the effort to manage wilderness for both its recreational and ecological values.

From this brief survey of wilderness use, it is apparent that wilderness can be an important laboratory for social research. But its importance lies more in its potential than in results now achieved. Not enough social science research is occurring in wilderness. Perhaps this is best illustrated in the preliminary results of the Non-recreational Wilderness Use Telephone Survey conducted in preparation for this colloquium (Reed and Haas 1987). Only 14 percent of the wilderness areas studied supported any social research studies in 1987.

Finally, it should be noted that human use of wilderness is clearly evolving. Throughout this paper there is an historical theme suggesting that wilderness values are growing in type and intensity. Only through

social research will we be able to document and understand man's changing relationship to nature.

REFERENCES

Abbey, E. 1968. Desert solitaire: A season in the wilderness. New York: Ballantine Books.

Alward, G. 1986. Local and regional economic impacts of outdoor recreation development. A Literature Review: President's Commission on Americans Outdoors. Washington, D.C.! U.S. Government Printing Office, pp. V47-V58.

Barcus, C. and R. Bergenson. 1982. Survival training and mental health: A review. Therapeutic Recreation Journal 6(1):3-7

Bishop, R. 1978. Endangered species and uncertainty: The economics of a safe minimum standard. American Journal of Agricultural Economics 60(1):10-18.

Brown, P., B. Driver, D. Bums, and C. McConnell. 1979. The outdoor recreation opportunity spectrum in wildland recreation planning: Development and application, pp. 1-12 in First Annual National Conference on Recreation Planning and Development: Proceedings of the Specialty Conference (Vol. 2). Washington, D.C.: Society of Civil Engineers.

Brown, P., B. Driver, and C. McConnell. 1978. The opportunity spectrum concept in outdoor recreation supply inventories: Background and application, pp. 73-84 in Proceedings of the Integrated Renewable Resource Inventories Workshop. USDA Forest Service General Technical Report RM-55.

Brown, P. and G. Haas. 1980. Wilderness recreation experiences: The Rawah case. Journal of Leisure Research 12(3):229-241.

Brown, P., S. McCool, and M. Manfredo. 1987. Evolving concepts and tools for recreation user management in wilderness: A state-of-knowledge review. Proceedings - National Wilderness Research Conference: Issues, State-of-Knowledge, Future Directions. USDA Forest Service General Technical Report INT-200, pp. 320-346.

Bryan, H. 1977. Leisure value systems and recreational specialization: The case of trout fishermen. Journal of Leisure Research 9(3): 174-187.

Burch, W. and W. Wenger. 1967. The social characteristics of participants in three styles of family camping. U.S. Department of Agriculture, Forest Service Research Paper PNW-48.

Burton, L. 1981. A critical analysis of the research on outward bound and related programs. Ph.D. Dissertation. Rutgers University, Brunswick, N. J.

Butler, L. and R. Roberts. 1986. Use of wilderness areas for research. proceedings - National Wilderness Research Conference: Current Research. U.S. Department of Agriculture, Forest Service General Technical Report INT-212, pp. 398-405.

Clark, R and G. Stankey. 1979. The recreation opportunity spectrum: A framework for planning, management and research. U.S. Department of Agriculture, Forest Service Research Paper PNW-98.

Clawson, M. and J. Knetsch. 1966. Economics of outdoor recreation. Baltimore, Maryland: The Johns Hopkins Press.

Cole, D. 1987. Research on soil and vegetation in wilderness: A state-of-knowledge review. Proceedings - National Wilderness Research Conference: Issues, State-of-Knowledge, Future Directions. USDA Forest Service General Technical Report INT-200, pp. 135-177

Curtis, J., W. Curtis and F. Lieberman. 1982. The world of George Perkins Marsh. Woodstock, Vt.: The Countryman Press.

Devall, W. 1980. The deep ecology movement. Natural Resources Journal 20:299-322.

Devall, W. and G. Sessions. 1985. Deep ecology: Living as if nature mattered. Salt Lake City, Utah: Peregrine Smith Books.

Driver, B. 1976. Quantification of outdoor recreationists' preferences. research: Camping and environmental education. Pennsylvania State University HPER Series No. 11, University Park, PA, pp. 165-187

Driver, B. and P. Brown. 1978. The opportunity spectrum, concept in outdoor recreation supply inventories: A rationale, pp. 24-31 in Proceedings of the Integrated Renewable Resource Inventories Workshop. U.S. Department of Agriculture, Forest Service General Technical Report RM-55

Driver, B. and R. Cooksey. 1977. Preferred psychological outcomes of recreational fishing. Catch and release fishing as a management tool: A national sport fishing symposium. Humbolt State University, Arcada, CA, pp. 27-49

Driver, B. and R. Knopf. 1976. Temporary escape: One product of sport fisheries management. Fisheries 1:21-29.

Driver, B., R. Nash and G. Haas. 1987. Wilderness benefits: A state-of-knowledge review in proceedings - National Wilderness Research Conference: Issues, state-of-knowledge, future directions. U. S. Department of Agriculture, Forest Service General Technical Report INT-220, pp. 294-319.

Ehrlich, P. and A. Ehrlich. 1981. Extinction: The causes and consequences of the disappearance of species. New York: Random House

Elliot, R. and A. Gare (eds.). 1983. Environmental philosophy. State College: Pennsylvania State University Press.

Emerson, R.W. 1883. Nature in nature, addresses and lectures, The Works of Ralph Waldo Emerson, Standard Library Edition (14 vols. Boston) I, 31,38; as cited in Roderick Nash. 1982. Wilderness and the American Mind (3rd ed.). New, Haven: Yale University Press. p, 85.

Ewert, A. 1983. Outdoor adventure and self-concept: A research analysis. University of Oregon, College of Human Development and Performance, Eugene, OK!.

Flint, E. 1939 "Robert Marshall, the man and his aims", Sunday Montana] Misoulian, Nov. 19; as cited in Roderick Nash. 1982. Wilderness and the american mind (3rd ed.). New Haven: Yale University Press. p. 203.

Gasset, J. 1972. Meditations on hunting. New York: Charles Scribner's Sons.

Genesis 1:28

Gibson, P. 1979. Therapeutic aspects of wilderness programs: A comprehensive literature review. Therapeutic Recreation Journal 13(2):21-33.

Graber, L. 1976. Wilderness as sacred space. Washington, D.C.: The Association of American Geographers.

Haas, G., B. Driver, and P. Brown. 1980. Measuring wilderness recreation experience preferences. In: Proceedings of the Wilderness Psychology Group Annual Conference, University of New Hampshire, Durham, N.H., pp. 20-40.

Hammitt. W. and D. Cole. 1987. Wildland recreation: Ecology and management. New York: John Wiley and Sons.

Hendee, J., G. Stankey and R. Lucas. 1977. Wilderness management. U. S. Department of A&culture, Forest Service Miscellaneous Publication 1365.

Irland, L. 1979. Wilderness economics and policy. Lexington, Massachusetts: Lexington Books.

Joel 2:3

Knopf, R. and D. Lime. 1984. A recreation managers guide to understanding river use and users. U.S. Department of Agriculture, Forest Service General Technical Report WO-38.

Krutilla, J. 1967. Conservation reconsidered. American Economic Review 57:777-786.

Leopold, A. 1941. Wilderness as a land laboratory. Living wilderness 6:3; as cited in Roderick Nash. 1982. Wilderness and the American Mind (3rd ed.). New Haven: Yale University Press. p. 198.

Leopold, A. 1966. A sand county almanac with essays on conservation from Round River. New York: Ballantine Books, p. 239.

Levitt, L. 1982. How effective is wilderness therapy? in Proceedings of the Third Annual Conference of the Wilderness Psychology Group, West Virginia University, Morgantown, W.V., pp. 81-93

Lowenthal, D. 1958. George Perkins Marsh: Versatile Vermonter. New York

Manning, R. 1986. Studies in outdoor recreation: Search and research for satisfaction. Corvallis: Oregon State University Press.

Marsh, G. 1864. Man and nature; or, physical geography as modified by human action. New York. p.228; as cited in Roderick Nash. 1982. Wilderness and the American Mind (3rd ed.). New Haven:' Yale University Press. p. 105.

Marshall, R. 1930. The problem of the wilderness. Scientific Monthly, 30, p. 142.

Muir, J. 1911. My first summer in the Sierra. (Boston), p. 211; as cited by Roderick Nash. 1982. Wilderness and the American Mind (3rd ed.). New Haven: Yale University Press. p. 125.

Muir, J. 1912. The Yosemite (New York), pp. 261-262; as cited by Roderick Nash. 1982. Wilderness and the American Mind (3rd ed.). New Haven: Yale University Press. p. 168.

Munley, V. and V. Smith. 1976. Learning-by-doing and experience: The case of whitewater recreation. Land Economics 52(4):545-553.

Myers, N. 1979. The sinking ark: A new look at the problem of disappearing species. Oxford, England: Pergamon Press.

Myers, N.. 1983. A wealth of wild species: Storehouse for human welfare. Boulder, Colorado: Westview Press.

Naess, A. 1973. The shallow and the deep, long-range ecology movement. Inquiry 16:95-100

Nash, R.. 1982. Wilderness and the american mind (3rd ed.). New Haven: Yale University Press.

Odum, E. 1959. Fundamentals of ecology (2nd ed.) Philadelphia, Penn: W.B. Saunders.

Opinion Research Corporation. 1977. The public's participation in outdoor activities and attitudes toward national wilderness areas. Princeton, N.J.: Report prepared for the American Forest Institute.

Reed, P. and G. Haas. 1987. Preliminary results to the non-recreational wilderness use. Telephone Survey. Unpublished manuscript dated December 14, 1987.

Regan, T. 1983. The case for animal rights. Berkeley: University of California Press.

Roggenbuck, J. and R. Lucas. 1987. Wilderness use and user characteristics: A state-of-knowledge review. Proceedings - National Wilderness Research Conference: Issues, State-of-Knowledge, Future Directions. USDA

Forest Service General Technical Report INT-200, pp. 204-245.

Rolston, H. III. 1986. Philosophy gone wild: Essays in environmental ethics. Buffalo, N.Y.: Prometheus Books.

Rolston, H. III. 1988. Environmental ethics: Duties to and Values in the Natural World. Philadelphia: Temple University Press.

Rowell, G. 1977. In the throne room of the mountain gods. San Francisco: Sierra Club.

Sax, J. 1980. Mountains without handrails: Reflections on the National Parks. Ann Arbor: University of Michigan Press.

Schreyer, R. and J. Roggenbuck. 1978. The influence of experience expectations on crowding perceptions and social-psychological carrying capacities. Leisure Sciences 1(4):373-394

Sorg, C. and J. Loomis. 1984. Empirical estimates of amenity forest values: A comparative review. USDA Forest Service General Technical Report RM-107.

Stankey, G. and R. Lucas. 1986. Shifting trends in backcountry and wilderness use. Paper presented at the First National Symposium on Social Science and Resource Management, Oregon State University, Corvallis, Ore.

Stankey, G. and R. Schreyer. 1987. Attitudes toward wilderness and factors affecting visitor behavior: A state-of-knowledge review. Proceedings - National Wilderness Research Conference: Issues, State-of-Knowledge, Future Directions. USDA Forest Service General Technical Report INT-200, pp. 246-293.

Stegner, W.. 1969. The sound of mountain water. Garden City, N.Y., p. 153; as cited in Roderick Nash. 1982. Wilderness and the American Mind (3rd ed.). New Haven: Yale University Press. p. 262.

Stone, C. 1974. Should trees have standing? Toward legal rights for natural objects. Los Altos, California: William Kaufman, Inc.

Stone, C. 1987. Earth and other ethics. New York: Harper and Row.

Thoreau, H.D. 1893a. A week on the Concord and Merrimack Rivers in the writings of Henry David Thoreau. Riverside Edition. (11 vols. Boston) I, 504; as cited in Roderick Nash. 1982. Wilderness and the American Mind (3rd ed.). New Haven: Yale University Press. p. 85.

Thoreau, H.D. 1893b. "Walking" in The Writings of Henry David Thoreau, Riverside Edition (11 vols., Boston) 9, 277; as cited in Roderick Nash. 1982. Wilderness and the American Mind (3rd ed.). New Haven: Yale University Press. p. 88.

Turner, F.J.. 1920. The frontier in American history. New York.

Wallwork, S. 1984. Montanans and selected wilderness issues. Montana Business Research Quarterly 22(4):15-18.

Walsh, R. and J. Loomis. 1986. Contribution of recreation to national economic development. A Literature Review: The President's Commission on Americans Outdoors. Washington, D.C.: U.S. Government Printing Office pp. V35-V46.

Walsh, R., J. Loomis, and R. Gillman. 1984. Valuing option, existence and bequest demands for wilderness. Land Economics 60(1): 14-29.

Walton, I. and C. Catlin. 1925. The compleat angler. London: Navarre Society.

Westman, W. 1977. How much are nature's services worth? Science 197:960-964.

White, L. Jr. 1967. The historical roots of our ecologic crisis. Science 155(3767):1203-1207.

Wilderness Act, 1964. Public Law 88-577.

Wilson, E. 1984. Biophilia. Cambridge, Massachusetts: Harvard University Press.

Young, R. 1980. The relationship between information levels and environmental approval of the wilderness issue. Journal of Environmental Education 11(3):25-30.

ENDNOTES

1. *Reviews of these studies can be found in Barcus and Bergenson 1982; Burton 1981; Driver and others 1987; Ewert 1983; Gibson 1979; Levitt 1982.*

THE WILDERNESS ENVIRONMENT: TRAINING WILDERNESS MANAGERS

Richard H. Spray and Paul D. Weingart*

ABSTRACT

A case is made that wilderness provides the most appropriate place to train land and resource managers for the benefit of the Wilderness Resource. Training in Wilderness for the benefit of the individual participants can be accommodated but is of secondary importance. Wilderness as a training ground for managers is further justified as the best location for the development of sensitivity, skills and basic philosophy that will lead to better Wilderness management decisions. The interagency training aspect will lead also to more consistency in understanding and management of the Wilderness Resource, across agency boundaries.

INTRODUCTION

From October 4-6, 1983, 300 managers and other people interested in wilderness management met in Moscow, Idaho, at the First National Wilderness Management Workshop. After meeting in general sessions and small groups for three days, this group of 300 left the task of finishing an action plan to a small task force. They had done their work by arriving at five major action items that were seen as essential to the survival of the Wilderness System. Those five action items fell into the categories of:

1. Educating the public.

2. Education and training of managers.

3. Capacity and concentrated use.

4. Interagency coordination and consistency.

5. Wilderness management practices.

The second of these major action categories is of importance to us here today. There were several subtopics under the category of "Education and training of managers." They are:

-- Institute and revitalize comprehensive in-service wilderness management training, focused on the value of the wilderness resource, wilderness ethics, and low-impact camping, utilizing expertise.

-- Conduct workshops and other programs, nationally, regionally, and locally, as cooperative ventures of agencies, educational institutions, and interest groups in order to share ideas, concerns, and techniques relating to wilderness management.

-- Include wilderness management as a course in university natural resource curricula. Establish a basic course on wilderness as a resource, including management of visitors. Encourage accrediting groups (such as the Society of American Foresters) to include it in their curricula requirements.

-- Each agency should systematically identify management personnel who would benefit from additional training in wilderness management.

This is our charge for educating and training wilderness managers. It comes almost 20 years after the passage of the Wilderness Act. It is surprising that coordinated and systematic effort of this kind took this long. Let's look at some of the past history that led to this action in 1983.

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HISTORY OF WILDERNESS AS A "RESOURCE"

In the late 1950's, the various versions of proposed wilderness legislation were being debated. At the same time the Forest Service was nursing another bill through the legislative process, the Multiple-Use Sustained-Yield Act of 1960. This act is significant to our discussion here because it is the first legislative validation of wilderness as a resource. In the latter part of Section 2 of the act it states: "In the administration of the National Forest due consideration shall be given to the relative values of the various resources in particular areas. The establishment and maintenance of areas of wilderness are consistent with the purposes and provisions of the Act." This validation of wilderness as a resource is important to our consideration of education and training of managers for the management of wilderness because in our world of management, it is "resources" which require special skills.

Let's look at this in a little more depth. In 1964 the Wilderness Act came into being. It is here that the definition of wilderness as a resource is unmistakably strong and the charge for management of wilderness as a resource is given. In Section 2. (a) of the act it states: "... It is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring RESOURCE of wilderness ..." (Emphasis added.) This is no mere implication. It is an unambiguous statement that wilderness, by definition of Congress, is a resource.

Further along in the Wilderness Act in Section 2. (b) it states, "... the area shall continue to be MANAGED by the Department and agency having jurisdiction ..." (Emphasis added.) In Section 4. (b) it says, "... each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and shall so administer such area for other purposes for which it may have been established as also to preserve its wilderness character ..." There are several other references in the Wilderness Act which substantiate that wilderness is a resource which is intended to be managed by the agency with jurisdiction.

Immediately after the passage of the Wilderness Act, the Forest Service had 54 areas totalling 9.1 million acres to manage and was the only Federal agency with wilderness. Today the National Wilderness Preservation System contains 465 wilderness areas totaling 89 million acres which are managed by four Federal agencies. The need for trained wilderness managers is evident.

In the Southwestern Region an Arizona State University professor in the Department of Leisure Studies, Dr. Rachel Robertson, conducted a study of Southwestern National Forest wilderness managers in 1984. Among the six recommendations contained in Dr. Robertson's 1986 report is one which states: "Wilderness schools, workshops, and training conferences should continue to be a primary means of technology transfer. "This followed findings in the report that wilderness managers' experience and training was, on the average, quite low, and that most managers' background before coming to the wilderness responsibility was either timber or range management, both resources which require a good deal of manipulation in their management. Turnover rate in the wilderness management job was also quite high.

HISTORY OF WILDERNESS EDUCATION

Education "In" Wilderness

The purposeful use of a wilderness environment to help educate is not new. Indians have used a wilderness environment in one way or another for this purpose for as long as documentation is available. One of the best described instances is the Indian vision quest. This was a male passage to adulthood which used a wilderness solo to gain knowledge about nature on which the Indians depended for their living. J. Donald Hughes describes the process thus:

> The vision quest took place for several days alone in a special place chosen carefully for its natural setting, with fasting, thirsting, and

> offering of the person's own flesh cut in small pieces from the body. At some time during the retreat, the animal who was to be the Indian's guardian spirit would appear and speak, giving a significant message, teaching a song, and designating a special object or design to be used on a shield, a tepee, or painted on the body, that should always be kept as a talisman of the 'vision and the guardian spirit itself, so that the power could continue to be present with him .... Black Elk said, "Lamenting (the vision quest) helps us to realize our oneness with all things, to know that till things are our relatives."

In our culture Henry, David Thoreau was one of the first to use a natural or wilderness environment for educational purposes. His approach was straightforward. Thoreau, even in 1840, thought many people had lost touch with their roots in nature, so he took young people who were under his care for their education into the woods and showed them around. Other educators after Thoreau also followed his lead. Thus summer camps have been established, and such youth groups as the Boy Scouts and CampFire Girls came into existence leading to a well-established outdoor education philosophy in American education today.

This movement may have reached its peak in 1962 when Outward Bound was founded in Colorado. Up to this time outdoor education nibbled around the edges of really using a full blown wilderness environment to its fullest degree for educational purposes. Outward Bound changed that. This program uses wilderness environments of the most pristine kind to educate participants in mind, body, and spirit much in the manner of the Indian vision quest. Outward Bound is carefully and deliberately programmed to obtain specific desired results, but the wilderness environment is a critical and indispensable part of the educational process.

Outward Bound also represents perhaps the culmination of what is called education "in" the wilderness where the primary objectives are benefits for the individual participants.

Education "For" Wilderness

In 1965 a former Outward Bound instructor, Paul Petzoldt, saw a deficiency in the Outward Bound program and founded an alternative program called the National Outdoor Leadership School (NOLS). This new program resembled Outward Bound, but a different major objective was not only to educate "in" the wilderness but to educate "for" the wilderness. Thus education to perpetuate the wilderness resource was begun and has since been emulated by many other university and private wilderness programs.

Coincidentally, at about the same time the Wilderness Act passed and Paul Petzoldt founded NOLS, the Pacific Northwest Region of the Forest Service began educating managers in the wilderness "for" the wilderness. In 1964, 1965, and 1966. wilderness workshops were conducted in the Eagle Cap Wilderness, the Mt. Jefferson Primitive Area, and the Glacier Peak Wilderness, respectively. These workshops were intended to bring managers up to speed regarding implementation of the new Wilderness Act. Each was attended by about 25 assorted Regional staff, Forest Supervisors, District Rangers, Forest staff, District staff and a few researchers. Camp locations were away from travel routes in the wilderness and were contracted with local outfitters and guides who furnished the camp, meals, and transported most of the personal gear. Participants were restricted to foot transportation in order to reduce the numbers of stock.

The program format of these workshops was work in small groups in a specific, small area within each wilderness (typically a small lake basin). Groups were to identify and propose solutions to management problems using the new Wilderness Act and draft regulations and manual guidelines, and then to compare and discuss the consistencies and inconsistencies between the results of the several groups.

These workshops were true education "for" the wilderness and were very popular and

well attended. Many graduates of these early Forest Service wilderness workshops conducted in the wilderness are still around today and include Dr. John Hendee, then a young researcher in Seattle and now Dean of the School of Forestry, University of Idaho; and Jim Overbay, then a District Ranger in Southern Oregon and now Regional Forester of the Northern Region. Regardless of the success of the workshops, they were discontinued because of a perception that they were too expensive, and an underlying feeling that the participants were having too much fun.

To my knowledge, the end of the Pacific Northwest Region wilderness management workshops led to a long period of inactivity in the use of wilderness environments to facilitate the education of-wilderness managers. Many wilderness workshops,, seminars, and symposiums were held throughout the 1970's, but the record indicates that they were all conducted in the style of the Holiday Inn meeting room.

In 1983 the Southwestern Region conducted a wilderness workshop within a wilderness once again. Appropriately, it was held in the first wilderness, the Gila Wilderness in Southwestern New Mexico. The intent of this workshop or school was to begin a continuing education 'effort for a small number of wilderness managers each year. The focus of the school was on integrated management of the wilderness resource by including topics and instructors dealing with the several resources which together make up the wilderness resource. It also aimed to give the participants new wilderness skills and an appreciation of some of the more subtle values of wilderness. The school has been conducted every year since 1983 and has rotated between the Gila, Superstition, and Pecos Wildernesses to change environments, impact, and job load.

In contrast to the Pacific Northwest Region's, workshops which relied on contracted services with outfitter/guides, the Southwestern Region's schools have used in-house and participant support (the Pecos school was an exception). Horse and mule packing capabilities are greater in the Southwest and local Ranger District pride is such that the care and feeding of the participants has been kept in-house. Each of the three wilderness areas have had slightly different modes of operation due to differences between the Ranger District/Forest personnel and the physical location of the school.

The Gila school has evolved into a central, packed-in camp setup operated in a manner to demonstrate an ideal USDA Forest Service, outfitter/guide, or permittee stock-supported camp. Participants travel by foot on day trips from the central camp.

The Superstition school utilizes a camp on the edge of the wilderness in order to minimize impact. This camp is a special use, permittee-developed site and is organized and operated by the local Ranger District personnel. Participants travel by foot on several day trips to areas of heavy recreation impact.

The Pecos school has been conducted only once (but it is scheduled again for 1988), and the camp and packing for that school was contracted on the model of the Pacific Northwest Region workshops. The camp was located in the wilderness in a location away from travel routes. The success of this mode of operation is difficult to assess because this one example occurred in a very large storm that would have caused hardships regardless of who was the host.

The program for all of the Southwestern Region schools has been similar. Participants have been restricted to about 20 with five or more instructors. Generally,if school's total enrollment threatens to exceed 25, instructors are rotated in and out so the total attending will remain at that figure. The group has not been broken into smaller groups, operating as one large group for the most part. This has been necessary because most of the instructors are extremely skilled individuals whose knowledge could benefit the entire group. This difference also explains the language difference in the titles: The small group works best in a "workshop" format while the large group works best when the format is a "school".

The Southwestern Region plans to continue their Wilderness School indefinitely in the future. The next is scheduled for the Pecos Wilderness in September 1988.

TYPES OF WORKSHOPS AND SCHOOLS

Here we will discuss advantages and disadvantages of two basic types of wilderness management workshops and schools and comment on a third type that is different enough to warrant special mention.

Classrooms or **Conference Rooms**

The most common format for almost all agency-conducted workshops is the classroom or conference room setup, usually in a hotel/motel but sometimes in an office conference room. The primary advantage of such arrangements is that they are easy to set up on short notice with little staff involvement. The hotel/motel industry has made it very convenient to call their sales staff and have all the physical arrangements made. This is no small matter for agency personnel who are pressed for time and simply must turn such details over to someone else.

This kind of arrangement is also convenient for participants. Our agency cultures are oriented toward air travel to major urban areas, adopting the businessman's lifestyle of motel living and conference room existence. We can virtually pack a bag in our sleep with the necessary accouterments for a week at any hotel, and a mole-like existence in some windowless conference room. It may not be particularly pleasant, but it doesn't take much preparation.

Whether the meeting is going to be a series of lectures/papers, or a truer form of workshop with small groups actually engaging in problem solving, the conference setup makes it relatively easy to construct an agenda and format a program. This "advantage" is also a disadvantage in certain respects. It is easy to format because the classroom or workshop nature only engages participants in a one-dimensional way. From a wilderness education point of view, classrooms can address only the intellectual learning part of wilderness.

The Wilderness Environment

This leads to the most important advantage of conducting wilderness management education and training in the wilderness. Perhaps the intellectual phase of learning can not be programed in wilderness as easily as in a classroom. Certainly distractions are greater--a hawk in the sky or the work of a squirrel--while an instructor is dealing with the complexities of Limits of Acceptable Change. On the other hand, these same complex concepts take on real meaning in the wilderness, and while the numbers and details may not come across completely, they are usually forgotten anyway. The concepts, basic philosophy, and the workings of processes will be remembered if learned in the wilderness; the manager will understand wilderness as a resource far better.

Another aspect of wilderness training that is usually not addressed in classroom training, is inadequately treated, is the physical aspect of a wilderness manager's growth. Wilderness is "wilderness." It is untamed wild land, and it is the wilderness managers' job to keep it that way. This requires basic physical strength, flexibility, and skills to be able to travel and live comfortably in wilderness. As human beings, our usual response to wilderness when we encounter uncomfortable conditions is to change the wilderness. Thus it is extremely important that wilderness managers know their strengths, correct their weaknesses, and have the skills to be confident and comfortable in a wilderness environment. These are things that cannot be taught in a classroom very well, and conversely can be taught extremely well in a wilderness. A week in a wilderness, afoot and sleeping on the ground, is not something many agency managers are exposed to often, if at all. This is a time individuals can assess their bodies relative to the stresses of wilderness living. The usual result is gaining confidence in something that was already there but untested, but it can also result in a commitment to correcting problems which come to light.

These are individual, internal matters for participants of training conducted in a wilderness environment. There are also some physical, external aspects of training that are programed right into the agenda. This is skills training. Natural resource managers are not automatically knowledgeable about the skills of wilderness travel and living. Nowhere in the curricula of forestry, range, or soil science

colleges are these subjects taught. Natural inclination may have stimulated some natural resource managers to learn some skills on their own, but even then, they are seldom knowledgeable in all needed aspects managers. Travel skills include orienteering, stock packing, horsemanship, general hiking, basic mountaineering, and even some skills in winter travel such as snowshoeing and ski mountaineering., Living skills include the basics of shelter, cooking, and most importantly, low impact techniques both of travel and living.

The third dimension of wilderness training or education can hardly be addressed in a conference room environment. This is the emotional or spiritual aspect of wilderness education that a manager needs to know his wilderness customers 'and the resource properly. There are many values of wilderness. Many are specified in the Wilderness Act, and others are addressed in the intellectual phases of wilderness training whether, in the classroom or in the wilderness. There are still other values extremely important to wilderness -- the reasons why American society has decided to set aside 89 million acres of real estate. Nash in 1976 identified ten values of wilderness, many of which fit the spiritual category. They are: (1) Wilderness is a reservoir of normal ecological processes; (2) Wilderness is a nourisher of American culture; (3) Wilderness is a sustainer of American character; (4) Wilderness is a historical document; (5) Wilderness is an ego trip; (6) Wilderness is a setting for fear and pain; (7) Wilderness is a sustainer of human dignity and diversity; (8) Wilderness is a church; (9) Wilderness is a guardian of mental health; and (10) Wilderness is an aid to developing environmental responsibility . These concepts are not easily taught in the classroom, but are more easily taught in a wilderness environment. A participant in a workshop conducted in a wilderness first needs to be made aware of these things. Then through introspection during the session, the importance of these values will become clear or lead to further investigation. In brief, these values make up the heart of what is described as a "wilderness experience." Participants of a wilderness school realize fully the importance of the factors contributing to that experience. To sum up, we need to develop a basic philosophy for managers as a starting point in making management decisions concerning wilderness. "Start the decision process from viewing through Aldo Leopold's eyes."

A final factor which should be discussed is cost. Field wilderness schools are frequently targeted for elimination because they are considered too costly. A little thought about this, however, reveals that a field-based school has a huge advantage over a conference room school. There is no dollar cost to using the wilderness environment as there is to renting rooms in a hotel. The cost is all in physical effort and caring, which most attendees at a field school are happy to contribute. In other words, the cost of per diem and/or sustenance in a wilderness is much less than in a hotel/motel.

Several years ago we began to finance our wilderness management school by charging tuition. To some that may sound strange, but we found ourselves in the position of not being able to keep sufficient funds in our Regional Staff account to pay for things. By charging a tuition of $150 per student we are able to pay for instructional materials plus the travel and expenses of a couple of out-of-Region guest instructors. No one has objected to this so far.

School in Wilderness, Living Outside

This is a type of wilderness training environment that embodies a little of both of the above formats. Participants live outside the wilderness, either in a non-wilderness camp or in more substantial housing, and day hike into wilderness for the actual wilderness training. We use this format for the wilderness school in the Superstition Wilderness. This has some advantages and some disadvantages. It is easier to prepare, as in the conference room format, but lacks many of the physical and spiritual education advantages of the field-based school. This third format costs more than the field-based school only if hotel/motel housing is used instead of a camp. It may cost less if stock and packing are not needed. Although it has advantages, a big loss is the full impact of the physical and spiritual education which may be the most critical aspect of a wilderness manager's training.

PROGRAMMING THE FIELD-BASED SCHOOL

A program or agenda must be created for a wilderness workshop or school. This is not an easy job, and our Southwestern Wilderness School is still developing. The three elements referred to earlier need to be included in the program, but in different ways. We will discuss the special characteristics of each element.

Resource Training

This is the easiest of the three to deal with and to present here. It is a more or less traditional curriculum dealing with each of the resources commonly found in wilderness and with the wilderness resource itself. Help can be found in agendas of other wilderness workshops held around the country. Typically, subjects dealing with range management, soil and water management (engineering of trails), air management, fiie management, wildlife management, recreation management, and the wilderness resource as a whole need to be addressed by resource experts in those subjects, relating each to the Wilderness Act and the overall support of the wilderness resource. We have utilized specialists from the Regional Office, Forest staff, District staff, and specialists from outside the Region for this job. Since our school is conducted every year, the lesson plans have the benefit of continuity and growth. It has become a practice to pass the instructor job around, usually to the host Forest, along with the lesson plan. In this way, many more people get the benefit of instructing and contributing to the growth of the lesson plan.

Skills Training

Much can be done in advance to prepare for this element. Physical conditioning is an individual's responsibility, but an impending foot trip to a wilderness is a powerful incentive for action. Preparatory materials should contain information on conditioning as well as information on equipment needed and should give references for additional study. We include outfitter mail order catalogs with our preparatory materials to aid participants in equipping themselves.

Skills training can be integrated into virtually every aspect of a field-based school. The trip into camp can include some basics on orienteering, foot care, hydration, acclimatization, day hiking, etc. Care should be taken that all of the skills training information is presented in a way that is interesting and acceptable to participants of varying skills. Enlist the more experienced participants to help out. We have even found ourselves with National Outdoor Leadership School graduates in some of our schools. Use every opportunity to encourage low-impact traveling and camping. The base camp itself must be a model of low impact. This should not be optional, but a requirement. Use contests and games wherever possible. We have had a crosscut saw contest and a mule-packing contest as part of our after-hours events. Utilize participants as helpers or leaders whenever possible for packing, camp chores, and in leading groups for various purposes. We haven't done it yet, but it may be a good idea to do a skills survey of participants before the school begins.

At an appropriate time in the agenda, formal sessions on backpacking, stock packing, or whatever the particular wilderness lends itself to can be intermixed with less formal material to provide a break in intensity and to take advantage of on-site opportunities.

Value Sensitivity

This is a topic often left to each individual to cope with on his/her own. Many believe mere exposure to wilderness will accomplish value sensitivity. This is partially true; probably most of us developed this kind of sensitivity or spiritual attachment over a period of years and many wilderness trips. However, much can be done in the program to facilitate this element of wilderness training. While we have much to learn and no doubt could learn faster with expert help, we have deliberately chosen not to because we wish to grow slowly. We feel participants can easily feel "pushed" in this area and will push back, so probably it is best to go slowly here.

As a way of preparation we furnish reading references from some of the great wilderness pioneers and philosophers such as Aldo Leopold, Bob Marshall, and Dick Costley. During the session we always try to include a person from outside the USDA Forest Service who is a current philosopher on wilderness such as Mike Frome or a local wilderness advocate. We had the opportunity to have a South African wilderness manager with us for an entire school. Everyone learned a lot from this association. We must remember wilderness is a world-wide resource as evidenced by the broad participation in the 4th World Wilderness Congress held in Colorado in September 1987. We try to make sure the person we invite is a good speaker and able to adjust his advocacy to our circumstances. We also allow and encourage time for introspection. This may be the most important thing that we do to encourage a spiritual feel for wilderness values.

PHYSICAL ARRANGEMENTS

To prepare for each school, a preliminary trip is made several months in advance of the scheduled school by the school director, usually the person in the Regional Office with wilderness management responsibility, the Forest Staff, District Ranger, and District Staff. Others may be involved depending on how the Forest and Ranger District operate. During this trip all aspects of the physical needs of the school are studied including a trip over the actual routes that will be traveled. Program matters are also discussed since physical arrangements and programming are closely intertwined. Probably the most important outcome of this meeting is agreement over individual responsibilities.

Typically, the Ranger District is responsible for all the physical arrangements, and it is left to the District Ranger to decide if he will take on the actual work of packing, camp making, and meal preparation or contract out all or part of that job. Due to the cooperative nature of the preliminary meeting, the Ranger usually can expect a lot of cooperation from the Forest, and the Regional Office, and helpful students, so s/he decides to take on the job. During one school the Forest R&L Staff decided to make the model base camp his personal contribution to the school and did an outstanding job.

Contracting should be approached with caution. Outfitter/guides usually have the experience and the equipment to do an excellent job. However, sometimes the motivation or the money isn't there. You must know your outfitters and understand the consequences of the "low bid" before tying the success of your school to the fortunes and skills of someone else. I would recommend starting with something that is a strength of your outfitters but not critical to the school, such as packing. If that proves successful, you can include furnishing the camp another year. The last thing you might consider contracting are the meals. We had a slight hitch in our Pecos Wilderness School due to the meals -- not enough quantity. It may have been poor estimating, but we think it was due to the extremely poor financial condition of the outfitter coupled with a low bid. This is also one of the jobs that students typically will jump in and do, and do well.

We have a strict rule about travel in the wilderness -- no horses. All travel, even by dyed-in-the-wool horse-oriented wilderness managers, is by foot. There are several reasons. Lots of people would rather ride than walk. We have to draw a line, so we exclude horse transportation entirely (maybe an exception for the host District Ranger!). We keep travel distances short for travel into camp and for the day hikes. Even though everyone must walk, we don't want to cause so much pain they can't absorb the messages being given. This limits camp selection opportunities, but so far has not caused insurmountable problems.

Camp selection is important. The campsite must be kept away from travel routes both for privacy and so as not to disturb other wilderness visitors. Camp is also selected to access as many examples of resources and conditions as possible. Because it is close to the wilderness boundary and usually close to heavily used areas, this has usually been no problem. The campsite itself must be selected to withstand the impact of the school for a week and rapidly recover thereafter. In one unfortunate instance many years ago, camp selection was left to an outfitter, and when the

school arrived at the already setup campsite, they found it in a wet meadow on a lakeshore -- another reason for being careful when contracting. In our dry Southwestern climate, we need to be prepared to pack all camp water. However, even in more watered parts of the country it would be a good idea to consider packing water to camp. This will open up camp selection opportunities tremendously and may be the key to selecting a camp that meets all the criteria.

PARTICIPANTS

Interagency

Our schools are interagency. When we started we always reserved slots for Bureau of Land Management and National Park Service participants; we've always filled them. We have also extended invitations and hosted State Park employees. The school has been so successful that we are now reserving 50% of the slots for BLM employees. In the very near future we hope to rotate the location of the school to BLM wildernesses. So far the Park Service has not participated to such an extent, but I suspect that they will when they see how the BLM/FS cooperation is working out. The goal of interagency involvement in the schools is consistency in management of wilderness regardless of management agency.

Numbers of Participants

School slots are limited to 20 each session. Our candidates are selected from nominees sent in by District Rangers through Forest Supervisors. Since the school is almost always over-subscribed, decisions are made by the Regional Office staff based on training needs in current assignment. Instructors are chosen in much the same way except that we usually are aware of good instructors and will promote their availability. Many times students can also instruct in their specialty. You need to keep in mind the multiple resources in wilderness and not form a recreation bias in choosing students or instructors.

The annual nature of our wilderness school prevents us from oversubscribing the available. Supervisors who are unsuccessful getting a candidate to a school one year are assured that they have future opportunities. The research indicates that wilderness manager training will be needed continuously in the future due to turnover in the ranks.

Instructors

Instructors should be knowledgeable about their resource area as well as supportive of the wilderness resource concept. We initially used resource instructors from the Regional office in order to convey to the representatives from Forests and Ranger Districts that wilderness management but an interdisciplinary approach was critical to the best Wilderness management goals. We now have instructors from all managerial levels.

REFERENCES

Bloedel, Ed, "Managing Wilderness as a Resource", World Wilderness Congress, 1987.

Hendee, John C., George H. Stankey, and Robert C. Lucas, "Wilderness Management", U.S.D.A. Misc. Pub., No. 1365, October 1978.

Miles, John C., "Wilderness As A Learning Place", Journal of Environmental Education.

Nash, Roderick, "Wilderness: To Be Or Not To Be?", Yale University Bulletin # 90, 1976.

Robertson, Rachel D., "Wilderness Management in the Southwest", January, 1986.

Simer, Peter and John Sullivan, "National Outdoor Leadership School's Wilderness Guide", Simon & Schuster, Inc., 1983.

Simer, Peter and John Sullivan, "Wilderness Management--A Five-Year Action Program", BLM, F&WS, FS, NPS, The University of Idaho Wilderness Research Center.

WILDERNESS AND SUBSISTENCE-USE OPPORTUNITIES: BENEFITS AND LIMITATIONS

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ABSTRACT

The term "subsistence" is used to denote the customary use of wild, renewable natural resources by rural sub-populations dependent on fish, wildlife, and plant species for physical survival, economic and social well being, or for the maintenance of traditional culture. Resource management agencies and mainstream social scientists commonly believe that subsistence hunting, fishing, and gathering have all but disappeared in modern industrial societies. Court suits over Native treaty rights and an emerging social science literature, however, suggest the existence of resource use activities that are motivated by non-recreational considerations more appropriately referred to as subsistence objectives. Both de facto and legally-designated wilderness, by' maintaining conditions in which resource populations can be naturally sustained, have the potential to serve as a repository of many traditional subsistence values, activities, and lifestyles, as well as to preserve cultural diversity within modern societies. At the same time, however, legally-classified wilderness presents limitations to subsistence use as well.

INTRODUCTION

For thousands of years, human beings sustained themselves through such activities as hunting, fishing, and other resource-gathering. To this day, rural peoples in many areas of the world continue to provide for themselves through the subsistence harvest and use of natural resources for food, fuel, shelter, clothing, medicine, and barter. With the advent of modem society, and its reliance on the market economy, high levels of industrial development, and other technological advances, it is often mistakenly believed that subsistence activities have all but disappeared in the United States outside of Alaska. Most hunting and fishing regulations in the United States, for example, are designed to manage recreational and commercial uses of fish and wildlife, rather than to provide for users more appropriately characterized by a subsistence orientation. This view has been subscribed to and incorporated into the operating assumptions of resource management agencies; interest groups such as conservation organizations, sportsmen's groups, and commercial associations; and social scientists within the mainstream of resource economics, cultural anthropology, and rural sociology.

Studies of hunters, fishermen, and other recreationists who participate in consumptive uses of natural resources indicate that, in addition to the opportunity to harvest fish and game, they are often primarily motivated by factors such as communing with nature, observing wildlife, and interacting with close friends. On the other hand, earning a livelihood is usually the paramount objective for engaging in commercial enterprises involving fish and wildlife resources, although lifestyle considerations are often important to people involved in these activities--commercial fishing or guiding, for example. Nevertheless, it is often quite difficult to differentiate between recreational, commercial, and subsistence users on an operational basis because often the same equipment is used to harvest the same species in the same locations. Nonetheless, it is our view that significant human sub-populations exist in many rural areas of industrialized North America whose resource utilization strategies can most accurately be characterized as subsistence, although their harvesting activities are managed

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under policy umbrellas governing recreational use, commercial use, or Native rights (Muth and others 1987). For many of these people, the primary benefits of fishing, hunting, and gathering are supplementing income through fur trading, obtaining food and fuel, and the manufacture and sale of handicrafts. In short, although some overlap exists, subsistence practitioners ascribe a different array of social meanings to renewable natural resources than do recreational and commercial users. Furthermore, one of the important, but poorly understood, functions of both de facto as well as legally-designated wilderness is to serve as a geographic base capable of providing naturally-occurring sustained-yield levels of resource populations for use by subsistence-based households.

It should be emphasized that there are limited data on subsistence activities for the United States outside of Alaska. At the same time, there are significant socioeconomic similarities between rural residents of Alaska and sub-populations in rural areas of the rest of the country. In both cases, community economies represent mixed systems with market, public, and subsistence sectors that vary in importance by degree only. In fact, studies have indicated that some Alaskan communities have higher median household incomes than the U.S. average (e.g., Glass, 1987). Through exploring the relationship between wilderness and subsistence use, it is the intent of this paper to stimulate discussion and provide a basis for future research to elucidate the complexities of renewable resource use and management in the United States.

What do we mean by "subsistence"? There are a variety of different legal, cultural, popular, and social scientific definitions and interpretations of subsistence. While none of these offers a precise or functional definition of the term (Albrecht, 1972; Schneider, 1982), it is commonly used in the absence of an alternative terminology that captures the meanings and behaviors characterizing particular resource user groups with specific resource dependencies. In the social science literature, subsistence generally refers to "... the absolute minimum standard of physical and mental survival and productive efficiency" (Sharif, 1986). Subsistence lifestyles are generally associated with small, self-sufficient, dispersed societies that have limited impacts on their environments. Traditional subsistence activities are usually self-contained within a kinship, tribal, or community group, or within a geographic region (Ellen, 1982).

Subsistence describes a loosely defined pattern of social and economic activities that may include some forms of hunting, fishing, gathering, herding, cultivating, trading, tool-making, crafting, fuel production, trapping, and food processing and storage. Although most subsistence-based households existing within industrial societies today are undoubtedly involved in the market economy and benefit from publicly financed activities, subsistence activities most often provide for near-term consumption and are governed by personal use, in-kind barter, or minimal cash transactions, rather than a profit orientation or large-scale commercial exchanges.

We do not mean to suggest that subsistence-based households are necessarily primitive, socially isolated enclaves. Embedded as they are within modem society, they have made many economic, social, and technological adaptations. For example, chainsaws, gillnets, steel traps, fiberglass boats, snowmachines, highpowered rifles, and monofilament fishing line have replaced bows and arrows, babiche snares, hand-held harpoons, and dugout canoes as principal harvest mechanisms. Under the forces of modernization, subsistence has evolved from the sole source of support for traditional communities to an income-supplementing activity in a mixed economic system. In addition to customary subsistence resource use, for example, wage labor, government transfer payments as well as other programs, and investment income are playing an increasing role in traditional subsistence communities. But modem adaptations notwithstanding, relative to other social strata, subsistence-based households consume most of what they produce, sell little in the cash economy, rely primarily on family labor, employ labor-intensive practices, maintain a limited economic standard of living, and often must consider individual, family, and group survival in decision-making (Glass 1987; Muth and others 1987).

Finally, it is clear that subsistence, at least as defined herein, is not culturally dependent; rather, it transcends cultural and ethnic groups. Many cultures within the United States depend on natural resources for ceremonial, religious, or other social functions. Tlingit Indians in the community of Angoon, Alaska, for example, continue to distribute deer meat and salmon at community potlatches. As such, subsistence resources continue to play vital roles in many cultures existing within the dominant industrial society. However, just as the distribution of deer meat at a Native potlatch may be one example of subsistence distribution, so too is the deer harvest of a marginally employed logger in rural Idaho or the fifth-generation farmer in Appalachia. The families of both of those 'workers may depend on deer meat as the major source of protein due to income limitations and the prohibitive cost of substitutes available through the market economy. Here, too, subsistence distribution may occur beyond the immediate family.

ADMINISTRATIVE GUIDELINES

The political context of resource allocation in Alaska has resulted in legal definitions of subsistence considerably different than the traditional image of small, self-reliant villages providing for their own survival. During passage of both State and Federal law, political realities dictated that legislatively designated subsistence rights be conveyed to all rural Alaskans, both Native and non-Native alike, irrespective of income. Thus, subsistence uses on public lands in Alaska are viewed by Congress and the State of Alaska as customary and traditional activities differentiated only by rural versus non-rural residency, rather than by ethnicity , economic status, or length of residence. This has resulted in rather anomalous situations in which extremely wealthy rural residents (both Native and non-Native) possess subsistence rights, while at the same time, urban residents--regardless of their material or cultural needs--have been denied subsistence rights.

Nevertheless, Alaska has been in the policy forefront with respect to recognition and protection of subsistence-use opportunities through State and Federal statutes. Consequently, the administrative guidelines designed to implement statutory requirements regarding subsistence are relevant only to Alaska. Although application of these guidelines is not germane to the public lands in States other than Alaska, a brief summary of legislative requirements and agency implementing regulations will illustrate Congressional intent regarding subsistence as a non-recreational use of public lands including wilderness in Alaska.

The Alaska National Interest Lands Conservation Act (ANILCA) of 1980 is the principal law governing subsistence management and use on public Federal lands, including Congressionally-designated wilderness, in Alaska. In Title VIII of ANILCA, subsistence uses are defined, subsistence rights are conveyed, and subsistence management direction is provided. As used in ANILCA, the term subsistence

> means the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade (U.S. Congress 1980).

In addition to defining subsistence uses, ANILCA recognizes the importance of providing continuing opportunities for subsistence on public lands in Alaska. To provide for the continuation of subsistence opportunities, Congress mandated that ". . . the utilization of the public lands in Alaska is to cause the least adverse impact possible on rural residents who depend upon subsistence uses of the resources of such lands ...." (U.S. Congress 1980) Finally, in a visionary attempt to ensure that subsistence opportunities are maintained in perpetuity, Congress mandated that ". . . the taking on public lands of fish and wildlife for non-wasteful subsistence uses shall be accorded priority over the taking on such

lands of fish and wildlife for other purposes." (U.S. Congress 1980) This section of ANILCA has been interpreted to mean that subsistence users have priority access to fish and wildlife resources over recreational and commercial users during those times when it is necessary to restrict hunting and fishing in order to protect the continued viability of resource populations.

In an attempt to' ensure consistent implementation of the subsistence provisions of ANILCA, the Alaska Land Use Council (composed of representatives from selected Native regional corporations and various State and Federal resource management agencies) developed guidelines for incorporating subsistence considerations into Federal land-use decision-making processes in Alaska. These guidelines have been integrated into the land-use planning processes and on-going land management programs of Federal agencies in Alaska, such as the National Park Service, the Fish and Wildlife Service, the Bureau of Land Management, and the Forest Service. Although the various Federal agencies having authority for wilderness management in Alaska have developed regulations implementing the provisions of ANILCA into their management programs, we will restrict our focus here to administrative guidelines developed by the Forest Service.

In addition to the provisions of ANILCA, the Code of Federal Regulations, and guidelines of the Alaska Land Use Council, key Forest Service directives concerning subsistence uses are contained in internal manuals and handbooks governing agency planning processes and management activities. Consistent with ANILCA, subsistence policies apply to all lands managed by the Forest Service in Alaska, including wilderness. In the management of wilderness lands designated by Congress, it is Forest Service policy that the provisions of the Wilderness Act of 1964 apply in providing direction for wilderness management unless specific exceptions are provided by ANILCA.

In 1980, ANILCA created approximately 5,453,366 (net) acres of wilderness on Forest Service-managed lands in Southeast Alaska. Procedural guidance for incorporating subsistence considerations into land use planning and decision-making is contained in the Forest Service (Alaska Region) handbook 2609.25 (Subsistence Management and Use). Other guidance for managing subsistence uses is provided in Alaska Region Supplement 34 to Forest Service Manual (FSM), chapter 2320, Wilderness, Primitive Areas, and Wilderness Study Areas. FSM 2320 defines subsistence uses, reiterates the policy of causing the least adverse impact possible upon rural residents who depend upon subsistence uses, and reaffirms the priority of subsistence uses over other uses of fish and wildlife when it is necessary to restrict harvest in order to assure viability of fish or wildlife populations.

In addition, FSM 2320 (p. 3) draws on other provisions of ANILCA in order to ensure that continued access to subsistence resources is available in wilderness:

e. Rural residents engaged in subsistence uses shall have reasonable access to subsistence resources. This is not tied to historic use areas but to availability of resources. Hence, the areas used for subsistence may shift as the fish and wildlife populations or abundance shifts.

f. Snowmobiles, motorboats and other means of surface transportation shall be permitted for subsistence purposes, subject to reasonable regulation to protect other resource values. This does not foreclose the use of new, as yet unidentified, means of surface transportation, so long as such means are subject to reasonable regulation necessary to prevent waste or damage to fish, wildlife, or terrain (USDA Forest Service 1983).

In summary, subsistence uses have been formally recognized by law in the State of Alaska. Key Federal statutory and regulatory guidance for managing subsistence uses on both wilderness and non-wilderness public lands is contained in the Alaska National Interest Lands Conservation Act, guidelines developed by the Alaska Land Use Council, and agency procedures implementing ANILCA. Within the Forest Service, principal policies for managing subsistence in wilderness are contained in FSM 2320.

INVENTORY OF USE

Outside of Alaska, subsistence has received limited attention. Nonetheless, there is an increasing body of research suggesting that rural sub-populations, both Native and non-Native, continue to rely on renewable natural resources for subsistence in technologically-developed regions of North America (Barsh 1982; Lichens 1977; Rattner 1984; Victor and Burrell Research and Consulting and others 1981). A study of North Florida farm families by Gladwin and Butler (1982), for example, found that "... 76% of the farmers surveyed raise their own meat and/or hunt and/or fish, providing the average farm family with 55% of the meat and fish consumed." Other studies indicate that obtaining food is a key motivational force in hunting and fishing by many rural residents.

In preparing for the National Wilderness Colloquium held in 1988, the Colloquium Executor, Patrick Reed, conducted an informal telephone survey of wilderness managers in the United States regarding a variety of wilderness management issues. Of those managers surveyed, it was perceived that 13 percent of all wilderness areas are utilized by Native Americans for subsistence. Discussion indicated that subsistence included such things as the customary use of herbs and plants for medicinal and religious purposes in Yellowstone National Park, access to traditional hunting grounds by the Ute Indians in the High Uintas Wilderness, and gathering of cactus fruits in the Organ Pipe Cactus National Monument (Reed 1987). Systematic inventory will be necessary to verify and extend these findings.

While the records of State resource management agencies indicate that a large variety of fish, wildlife, and plant species are harvested, little data are available on personal consumption, sharing (distribution and exchange), barter, or involvement in the market economy. We know, for example, that people hunt big game, small game, waterfowl, upland game birds, reptiles, and marine mammals. They harvest all manner of shellfish and fiifish. They gather ginseng, wild vegetables, firewood, seaweed, mushrooms, berries, rosehips, and nuts. They collect bark, conks, burls, driftwood, ceremonial and medicinal herbs, seed cones, mistletoe, insects, honey, snails, and tree boughs. They trap lynx, beaver, fox, muskrats, minx, and other furbearers. What isn't known however, is the extent to which these activities are motivated by economic, social, or cultural objectives more appropriately characterized as subsistence, rather than by commercial or recreational values. These distinctions remain unclear even in Alaska, where considerable effort has been undertaken to understand them. Additionally, we understand very little about the role of wilderness in providing for these uses.

Subsistence Resource Use in Southeast Alaska

In Alaska, contrary to other rural areas of the United States, a substantial body of research has emerged that illustrates the importance of renewable natural resources to rural communities. Since Alaska contains relatively few miles of road in an area one-fifth the size of the lower 48 States, a significant proportion of subsistence use occurs either in de facto wilderness or in Congressionally-designated Wilderness Areas.

Data from recent studies throughout Alaska confirm the continuing participation in fishing, hunting, and gathering activities by rural households. Data from recent research in Southeast Alaska illustrate these patterns. In 1979, State and Federal agencies cooperated in conducting a research study referred to as the Alaska Public Survey. This survey, administered to a random sample of over 1,200 people in nearly all the communities in Southeast Alaska, asked questions about food-producing activities. Results indicate that local fish and wildlife resources were used extensively by Southeast Alaskan residents. As reported by Alves (1980), approximately 80 percent of the adult population in Southeast Alaska participated in hunting, fishing, and gathering activities. By means of these activities, people directly procured for themselves a sizable portion of their own food budgets: "Our data indicate that about 80 percent of the households surveyed provided some of their own food; on the average, households in the region directly supplied 30 to 40 percent of the meat, fish, and fowl consumed." (Alves 1980)

In addition to resource harvest, resource sharing contributed to household food budgets as well. Again, according to Alves (1980), through a combination of harvest and sharing, ". . . benefits of local food resources touch 90 percent of all households . . ." in the region.

More recently, community case studies cooperatively funded by the Alaska Department of Fish and Game and the Forest Service in 1984 and 1985 provide detailed, resource-specific information on subsistence uses (Muth forthcoming). A random sample of 148 households was surveyed in four remote Southeast Alaskan villages--Tenakee Springs, Angoon, Yakutat, and Klawock--regarding their household harvest and sharing activities. The total population of the four communities during the study period was 1,771.

The study validated the continuing reliance of rural households on a wide variety of renewable natural resources including seaweed, berries, herring eggs, and marine mammals. Use data provided by respondents indicate that, in terms of total weight harvested, deer and salmon--the two principal subsistence species in Southeast Alaska--continue to make substantial contributions to household food budgets in the study communities (table 1).

Table 1. -- Estimated annual usable weight (lbs.) per household of selected resources harvested in four Southeast Alaskan communities (148 sample households), 1984-1985

Species	Mean Weight (Lbs.) Per Household
All Edible Resources	889.4
All Salmon (5 Species Total)	295.4
Sitka Black-tailed Deer	118.4

Data on participation in harvest activities indicate that three fourths (75.4 percent) of the Native households in the study communities harvested salmon for personal use, while two-thirds (67.8 percent) of non-Native households harvested at least one of the five species of salmon present in Southeast Alaska. Resource-sharing patterns also appear to have retained their vitality. Slightly over one-third (36.1 percent) of the Native households gave salmon to households other than their own, while 43 percent of the non-Native households gave salmon to other households. In terms of receiving, 44.3 percent of Native households received salmon resources from other households, while 55.8 percent of non-Native households received salmon from harvesters outside their own households.

In terms of total weight harvested, Sitka black-tailed deer is the principal land mammal taken by hunters in Southeast Alaska. Native households had a mean harvest of about two deer, while non-Native households averaged slightly over one deer per household. The Alaska Department of Fish and Game has established a conversion formula that ascribes 80 pounds of usable meat, on the average, to each Sitka black-tailed deer. Using this conversion ratio, Native households harvested a mean of 162.4 pounds of deer meat, while non-Natives averaged 87.2 pounds of deer meat harvested per household.

Although the residents of the four study communities harvested fewer pounds of usable deer meat than pounds of salmon, they shared it with friends, family, co-workers, and others at rates approaching those for salmon. On the average, nearly one-third of all households (29.5 percent of Native and 32.2 percent of non-Native households) gave deer meat to other households. At the same time, 36.1 percent of Native and 35.6 percent of non-Native households received deer meat from households other than their own.

While not comprehensive, these data illustrate the importance of renewable natural resources to remote villages in Southeast Alaska. A considerable amount of harvesting activity is concentrated on the limited road systems near those communities that have them. Examination of subsistence maps detailing resource-harvest locations, however, indicates that subsistence users cover an extensive range that includes heavy use of undeveloped wilderness lands in Southeast

Alaska. This may be partly due to the fact that old growth forests in Southeast Alaska appear to provide more ideal habitat for key wildlife species than in other parts of the nation where earlier stages of vegetative succession usually associated with non-wilderness tend to support larger populations of desired wildlife species.

Benefits to Society

Data cited above, as well as information from other subsistence studies conducted in Southeast Alaska (e.g., Gmelch and Gmelch 1985; Mills 1982; Mills and others 1984; Newton and Moss 1984), confirm the continuing existence of resource harvest and sharing patterns in the contemporary lifestyles of Southeast Alaskan residents. Further, it is evident that subsistence utilization has retained its value for a number of psychological, social, cultural, and economic reasons.

Psychological.--Those resource managers and social scientists who acknowledge the existence of subsistence activities often mistakenly assume that subsistence resources are important only as a supplement to cash incomes. For many rural people, however, the opposite may be true: cash serves as a means by which to supplement subsistence lifestyles--lifestyles that may be preferential to full-scale participation in the market economy. From a psychological perspective, the opportunity to procure wild, renewable resources contributes to a sense of self-reliance, independence, and the ability to provide for one's self--values that social surveys indicate as reasons why many non-Native people migrate to or remain in Alaska (Alves 1980).

Social.--From a social perspective, subsistence harvest and sharing contribute to the cohesion of kinship groups, as well as to the solidarity of occupational and friendship networks. This cohesiveness is not unlike the bonding which takes place as reported by recreational sporthunters in numerous studies conducted in the lower 48 states. Additionally, subsistence distribution and exchange networks may contribute to the stability of resource-dependent communities as resource sharing extends to multiple households, some of which may contain the elderly, the widowed, or the infirm (Charnley 1983; Fall and others 1983; Muth forthcoming).

Cultural.--Harmon (1987) has convincingly argued that human cultural diversity is a desirable social objective, and that there is a definite relation between such diversity and protected lands in undeveloped status. He further contends that such lands can be sensitively managed to promote continued subsistence opportunities by local resident populations dependent on them for physical survival and socioeconomic wellbeing. Use of wild, renewable resources contributes to the maintenance of traditional cultural and sub-cultural systems within modem industrial society as well as in developing countries. Natural resources are used in traditional rituals and ceremonies, as well as to reinforce a variety of institutional aspects of social life including norms of obligation, wealth and status hierarchies, and respect. Continued access to subsistence resources by populations culturally dependent on them will help ensure the continued vitality of those cultural systems.

Economic.--Cash income and social welfare programs are playing increasingly important roles in traditional communities. By supplying a variety of household needs, however, subsistence harvest supplements income and adds to the standard of living regardless of the level of monetary income and the benefits of public programs, In addition, homemade handicrafts made from indigenous forest resources (e.g., spruce roots crafted into baskets, beaver-fur hats, etc.) are produced for barter, or for sale in the commercial market.

In addition to the obvious importance of sustenance and income derived from personal or household subsistence use, anthropological researchers (Drucker 1965; Oberg 1973) have established that an important social function of subsistence sharing among the aboriginal people of Southeast Alaska during the period prior to Euroamerican contact was as a form of "social insurance." Sharing of fish and game based on norms of mutual obligation and reciprocity served to provide security during periods of resource scarcity and uncertainty. As the subsistence-based system gradually gave way to economies containing a subsistence sector-private sector-public sector mix, however, the contributions of subsistence

resources might be especially important during downturns in the contemporary market economy (Glass and Muth 1986; Wolfe 1984). Muth (forthcoming) has suggested, for example, that one reason for the continued reliance on subsistence resources in Southeast Alaska may be due to their functional importance as social insurance in the seasonal and cyclical resource-extraction-based economy of Southeast Alaska.

In modernizing communities, subsistence has become integrated into mixed economic systems in which cash income provides the basis to procure more efficient subsistence factors of production, and in which public programs reduce the threat of disaster previously attributable to low resource harvest. As a result, subsistence has undergone a transition from an activity necessary for physical survival to one in which psychological, social, and cultural functions may be paramount. As the following section on Value of Use suggests, however, the potential economic benefits provided by subsistence harvest are still often considerable.

In summary, subsistence use of forest lands in Southeast Alaska has shown considerable persistence and adaptability. Subsistence harvest, distribution and exchange, and consumption serve a variety of psychological, social, cultural, and economic functions that include social group cohesion, cultural diversity, and economic wellbeing. Resource management, sensitive to subsistence as an institutional element of social life, is needed to help ensure that subsistence uses of renewable natural resources continue to serve these vital social functions.

VALUE OF USE

While it might be convenient to have all values expressed in terms of a common denominator such as money, the nature of valuation precludes conducting such an analysis. In fact, monetary values represent a mere subset within the framework of total valuation (Glass and Muth 1987a). Unfortunately, little information is available on the value (monetary or nonmonetary) of subsistence uses of natural resources. In a critical review of subsistence valuation studies, Usher (1976) concluded that "attempts to evaluate country produce in nonagricultural subsistence economies have been few, and although the literature in some respects has been consistent, most is without theoretical foundation." This is lamentable, since failure to assess the full economic value of subsistence resources has often led to serious underestimation of the contribution of traditional and customary resource gathering activities to the total regional economy.

Perhaps the most prevalent valuation approach used involves assigning monetary measures based on competitive market prices of substitutes in order to impute economic values to resources used for subsistence purposes. Although this technique has a variety of shortcomings (Glass and Muth 1987a; Glass and Muth 1987b; Usher 1976). it is often used to estimate the monetary value of natural resources harvested for personal use. It should be emphasized that such estimates are aimed at measuring the value of tangible outputs from specific subsistence activities in terms of additions to household income and do not attempt to measure the value of participation itself, which cannot be effectively expressed in monetary terms. Rather than undertake a comprehensive review of subsistence valuation efforts here, we will present two illustrative examples--one from a more traditional subsistence society, the Canadian Arctic, and one located more firmly within modern industrial society, New York State.

Methodological shortcomings notwithstanding, several attempts have been made to assess the monetary value of domestically-produced food, fuel, and handicraft resources. In an insightful study examining the valuation of subsistence food in the Canadian North, Usher (1976) found that on a protein-equivalent basis, the value of wild game such as caribou and moose approached $4 to $4.50 per pound, birds were valued at $2.50, and fish at $2. He states that:

> Given the monetary values suggested, it becomes easier to see why native people are so concerned about the continued availability of country food. A family primarily dependent on the

> land which obtained, for example, a dozen caribou, 60 geese and 500 pounds of fish in a year, would have obtained the equivalent of $6,200 worth of meat. The total estimated volume of the meat harvest of [five communities in] the Western Arctic ... would, on a substitution basis, probably be worth over a million dollars annually (Usher 1976).

In addition to the monetary value of subsistence foods, Usher (1976) also noted a number of non-quantifiable intangible values. "Country food has nutritional, social, and cultural values which cannot be replaced by any substitute andcannot be measured by market criteria or evaluated in cash. In short, food is an integral part of a way of life." Thus, in a total valuation framework, cash value may be only a small part of the overall social value of subsistence resources. In a study perhaps more applicable to the purposes of this paper, Rattner (1984) examined the economic value of household production activities in the community of Crown Point, New York. Crown Point is situated adjacent to Adirondack Park in upstate New York. The Adirondack Park is comprised of lands 60 percent privately-owned and 40 percent publicly-owned; State-owned lands being preserved in the forever-wild status by constitutional law. It is managed by the Adirondack Park Agency and the New York State Department of Environmental Conservation, whose management policies are directed toward economic development outside of forest preserve lands in the context of protecting the Park's environment.

In addition to raising gardens and domestic animals, resource-producing activities of Crown Point residents on private lands included the use of forest products such as firewood, fence posts, and maple syrup. Use of resources that may have been taken from either private or forest preserve lands included fish, wild meats, wild plant materials, and skins. In computing the economic value of household resource production based on retail values of similar commodities in local stores, Rattner found that

> . . . the average household in the study area generates about $1500 gross value a year of resource products. Low income non-farm households produce about $700 on average while the average value of non-low income household production is about $1800. In the aggregate, the gross value of annual household resource production for home consumption and local markets for all households in Crown Point was estimated to be $910,780. This makes household resource production the third largest source of community income after wages and Social Security transfer payments (Rattner 1984).

Unfortunately, data which might more directly relate to subsistence resource use of wilderness areas in the United States are unavailable. These examples from Northern Canada and New York State illustrate the monetary value of subsistence resources to selected local, rural populations. These data suggest that the use of natural resources for personal consumption or for sale at local markets represents a significant contribution to household incomes of rural residents. These additions to household income can be as critical to residents of economically depressed areas in the lower 48 states as they are in Alaska. That this would be true for elk harvested in the Bob Marshall Wilderness Area, salmon or trout caught in the Great Lakes, or berries and mushrooms harvested in the Glacier Peak Wilderness Area is perhaps self-evident.

ISSUES AND RECOMMENDATIONS

Although a considerable body of research literature has been developed regarding subsistence use of resources in Alaska and Canada, use of renewable natural resources for non-recreational subsistence purposes by rural populations in modem industrial societies is a poorly understood phenomenon. We know very little about the role of fish, wildlife, and plant species in the livelihoods and lifestyles of resource-dependent households. This is especially true of use that may occur in

wilderness areas. But an increasing body of research suggests the existence of a separate set of values--subsistence values--that are distinctly different from values associated with commercial or recreational activities. Given this situation, it will be important to identify the extent to which wilderness serves as a repository of subsistence use in an ever-developing world.

A Program of Scientific Research

Review of the current state of knowledge with respect to subsistence opportunities in wilderness indicates that critical information gaps exist. Establishment of a program of scientific studies will be necessary to identify the nature and extent of subsistence use on undeveloped public lands in the lower 48 States. The most basic need, perhaps, is to develop measures which differentiate between subsistence, recreational, and commercial users on a functional basis. In our view, this will involve identifying the array of social meanings that people ascribe to natural resource use. In this way, it will be possible to distinguish between groups whose values and attitudes concerning natural resource use are oriented more toward sustenance, rather than toward recreation, or solely as a commercial pursuit.

But a number of other research questions suggest themselves. What are the characteristics of resource users who define their resource-harvesting activities as subsistence? Which species are harvested and what are they used for? What is the extent to which both Congressionally-mandated and de facto wilderness provide opportunities for rural residents to engage in subsistence-related activities? Does wilderness, through its protection of naturally-occurring conditions and processes, provide for lifestyle options--either engaged in by necessity or adopted by choice--that would otherwise be precluded through other land-use designations? Or is wilderness, because of use limitations and maintenance of old-growth plant associations, actually an inferior biophysical environment for subsistence use?

From an economic perspective, it would be important to know the extent to which subsistence resources contribute to the socioeconomic wellbeing of resource-dependent rural populations. To what extent, for example, do subsistence activities (e.g., firewood gathering, hunting,) supplement incomes earned through the cash economy or through income-transfer programs? How can the overall benefits of subsistence be valuated in terms comparable with other resource uses? To what extent do the nonedible byproducts of fish, wildlife, and plants contribute to handicraft articles developed for sale in local markets? If participation itself is the key payoff, what fish and wildlife populations are necessary to satisfy subsistence needs if other economic sectors provide the necessities for physical survival? What is the magnitude of resource-related cottage industries, and what is the extent to which they contribute to the regional economies? Should current restrictions on motorized use and commercial activities in wilderness be relaxed to provide for barter opportunities and small-scale market transactions (such as horse-logging, for example)?

From a social perspective, what are the magnitude and importance of resource sharing? What are the patterns of resource distribution and exchange in local communities, and to what extent do those sharing networks contribute to physical survival, kinship cohesion, the solidarity of occupational and friendship groups, and community stability? Is resource sharing primarily expressive, or is there instrumental importance associated with resource distribution activities?

From a cultural perspective, to what extent does subsistence use of wilderness resources contribute to the perpetuation of cultural values and institutions (e.g., Indian potlatches in Southeast Alaska)? Are local, rural sub-cultures in danger of extinction? How should wilderness management be modified to provide human cultural diversity?

A research program directed toward subsistence use of renewable natural resources may ultimately identify relationships between wilderness and opportunities for subsistence-related activities. Answers to these and other research questions regarding subsistence use of renewable natural resources in the United States, particularly in wilderness,

will provide information specifically focused on resource users more accurately characterized by a subsistence orientation.

Management Sensitive to the Needs of Subsistence Users

As demands for intensive resource management of public lands continue to increase, potentially destructive effects on subsistence uses may occur. Intensive timber harvest, mineral extraction, recreation use, these and other development activities threaten both subsistence activities themselves as well as the resource species upon which subsistence users depend. Wilderness--with its undeveloped status protected by law--may serve as a repository for subsistence species, thereby providing continued opportunities for resource harvest by economically and culturally dependent user groups.

But a biophysical environment capable of providing subsistence species is only one necessary condition for subsistence use to take place. A second necessary condition is an institutional arrangement sensitive to the needs of subsistence users. In addition to the beneficial effects of wilderness designation on subsistence, wilderness status may present certain limitations to resource harvest as well. As Harmon (1987) has correctly perceived, protected areas (such as National Parks and wilderness) have the potential to present certain constraints for people who are dependent on natural resources for their subsistence. These limitations must be recognized, and, in so doing, it must be acknowledged that other protected-area designations may be more suitable in providing for subsistence use.

It is a common perception that Congressional designation of wilderness results in subsequent crowding and overuse. This "designation effect" is believed to stimulate increases in wilderness use through resource agency information programs, private marketing efforts, and word-of-mouth (McCool 1985). Although there is limited systematic research empirically verifying this hypothesis, in the event that wilderness classification actually results in substantial use increases, the impacts on subsistence users could be severe. Overcrowding, resource degradation from overuse, and competition for available resources often result when human use of an area increases dramatically. A possible effect would be to displace subsistence users out of an area into alternative, less productive, less desirable areas, perhaps foreclosing opportunities for subsistence use altogether.

Another institutional barrier to subsistence use of wilderness may be access restrictions. In desiring to provide areas essentially untrammeled by man, the Wilderness Act disallowed road construction, airplanes, snowmachines, powerboats, motorbikes, and other motorized uses in order to protect naturally-occurring wilderness conditions. At the same time that these access restrictions provide environmental protection, however, they limit access to the subsistence resources that may be available in wilderness. While it is true that subsistence users would continue to have the same access to wilderness as recreational and other users, subsistence activity is often characterized by optimal foraging strategies dependent on efficient means of harvest, processing, and transportation. Packing deer meat out in a backpack may contribute to a sporthunter's sense of self-reliance or communing with nature. For many subsistence users, however, it would represent an inefficient use of time and labor, which could be more productively employed elsewhere if only they could transport their deer home by jeep instead.

Finally, wilderness presents one additional limitation on subsistence use. One of the precepts behind the Wilderness Act was to preserve natural processes including, presumably, naturally-occurring cycles of fish and wildlife populations. In addition to adequate habitat, the provision of sustained-yield levels of fish and wildlife populations often depend on intensive management programs conducted by resource agencies. Consequently, many fish and wildlife management activities--such as creating desired species-age vegetative classes, creating openings, fish stocking, waterfowl nesting boxes, prescribed fire to enhance moose habitat, deer winter range improvements, predator control, etc.--are likely to be precluded in wilderness. Restrictions mandated by the Wilderness Act (or by implementing regulations developed by the various resource

agencies) often do not allow for the intensive management programs necessary to provide the levels of fish and wildlife populations sufficient to meet the needs of all user groups.

More complete and dependable information is needed in order to define the appropriate role of wilderness in providing subsistence opportunities. As previously discussed, many subsistence activities are fully compatible with wilderness, but there may be others that are in conflict with wilderness designation for various reasons. This raises difficult questions regarding whether wilderness policy should be modified in some way to accommodate subsistence use by local, rural populations.

CONCLUSIONS

One of the features frequently used to distinguish modern societies from developing countries is their respective orientations toward renewable natural resources. In primitive societies, household production strategies continue to involve direct procurement of renewable natural resources for subsistence. Use of natural resources in modem societies, on the other hand, is more commonly believed to involve only recreation or commercial exploitation. Within rural areas of modem societies, the existence of resource uses more appropriately defined as subsistence is rarely acknowledged by natural resource policymakers and managers. The result has been a situation in which subsistence users are being provided for only incidentally--under regulations designed to govern recreational and commercial uses--rather than through sound, pro-active policy formation. The existence of subsistence users as a distinct clientele sub-group possessing a separate set of meanings and values needs to be recognized. To do otherwise risks overlooking an important segment of the total set of values derived from public sector natural resources.

REFERENCES

Albrecht, H. 1972. The concept of subsistence. Zeitshrift fur Auslandische Landwirtschaft, 11:274-288.

Alves, William. 1980. Residents and resources: findings of the Alaska public survey on the importance of natural resources to the quality of life in southeast Alaska. University of Alaska, Institute for Social and Economic Research, Anchorage, AK.

Barsh, R.L. 1982. The economics of a traditional coastal Indian salmon fishery. Human Organization, 41: 170-176.

Charnley, S. 1983. Moose hunting in two central Kuskokwim communities: Chuathbaluk and Sleetmute. Technical paper No. 76, Alaska Department of Fish and Game, Division of Subsistence, Juneau, AK.

Ellen, Roy. 1982. Environment, Subsistence, and System. Cambridge University Press, Cambridge, England.

Drucker, Phillip. 1965. Cultures of the North Pacific Coast. Chandler Publishing Co., Scranton, PA.

Fall, James A., D.J. Foster, and Ronald T. Stanek. 1983. The use of moose and other wild resources in the Tyonek and upper Yentna areas: a background report. Technical Paper No. 74, Alaska Department of Fish and Game, Division of Subsistence, Juneau, AK.

Gladwin, C.H. and J. Butler. 1982. Gardening: a survival strategy for the small, part-time Florida farm. Proceedings, Florida State Horticultural Society, 95:264-268.

Glass, Ronald J. 1987. Subsistence as a component of the mixed economic base in a modernizing community. Paper presented at the annual conference of the American Association for the Advancement of Science, Arctic Division, Anchorage, AK, September 23-26, 1987.

Glass, Ronald J. and Robert M. Muth. 1987a. Pitfalls and limitations in the use of fisheries valuation techniques. Transactions of the American Fisheries Society, 116:381-389.

Glass, Ronald J. and Robert M. Muth. 1987b. Inadequate payoff evaluation as a deterrent to integrated resource management. Proceedings, 52nd North American Wildlife and Natural Resources Conference, pp. 101-111.

Glass, Ronald J. and Robert M. Muth. 1986. Natural resource allocation decision-making in Alaska: systematic evaluation of socioeconomic impacts on subsistence lifestyles. Paper presented at the First National Symposium on Social Science and Resource Management, Corvallis, OR, May, 12-16, 1986.

Gmelch, George and Sharon Bohn Gmelch. 1985. Resource use in a small Alaska city--Sitka. Technical Paper No. 90, Alaska Department of Fish and Game, Division of Subsistence, Juneau, AK.

Harmon, David. 1987. Cultural diversity, human subsistence, and the national park ideal. Environmental Ethics, 9(summer):147-158.

Lichens, A.B. 1977. A case study in fish management on the Deschutes River. In Schwiebert, E., editor, Columbia River Salmon and Steelhead. American Fisheries Society, Washington, DC, pp. 115-120

Mills, Dave. 1982. The procurement and use of abalone in Southeast Alaska. Technical Report No. 40, Alaska Department of Fish and Game, Division of Subsistence, Juneau, AK

Mills, Dave, Valerie Sumida, Gabe George, and Matt Kookesh. 1984. Salmon use by residents of the Chilkat and Chilkoot river drainages, 1983. Technical Report No. 95, Alaska Department of Fish and Game, Division of Subsistence, Juneau, AK.

Muth, Robert M. Forthcoming. Community stability as social structure: the role of subsistence uses of natural resources in Southeast Alaska. Accepted for publication in a forthcoming textbook entitled, Community and Forestry: Continuities and Natural Resources Sociology, edited by Robert G. Lee, William R. Burch, Jr., and Donald R. Field, to be published by Westview Press.

Muth, Robert M., David E. Ruppert, and Ronald J. Glass. 1987. Subsistence use of fisheries resources in Alaska: implications for Great Lakes fisheries management. Transactions of the American Fisheries Society, 116:510-518.

McCool, Stephen F. 1985. Does Wilderness designation lead to increased recreational use? Journal of Forestry, 83(1):39-41.

Newton, Richard and Madonna Moss. 1984. The subsistence lifeway of the Tlingit people: excerpts from oral interviews. U.S.D.A. Forest Service, Alaska Region, Juneau, AK.

Oberg, Kalervo. 1973. The Social Economy of the Tlingit Indians. University of Washington Press, Seattle, WA

Rattner, Shanna E. 1984. Diversified household survival strategies and natural resource use in the Adirondacks: a case study of Crown Point, New York, Masters Thesis, Cornell University, Ithaca, NY.

Reed, Patrick. 1987. Personal communication with the senior author.

Schneider, W. 1982. Subsistence in Alaska: a look at the issue over time. Pages 169-180 in P.G. Cornwall and G. McBeath, editors. Alaska's Rural Development. Westview Press, Boulder, co.

Sharif, M. 1986. The concept and measurement of subsistence: a survey of the literature. World Development, 14:555-577.

United States Congress. 1980. Alaska National Interest Lands Conservation Act. P.L. 96-487, 94 Stat., U.S. Government Printing Office, Washington, DC.

U.S.D.A. Forest Service. 1983. Forest Service Manual, Chapter 2320-Wilderness, Primitive Areas, and Wilderness Study Areas (draft). Region 10 Supplement No. 34, U.S.D.A. Forest Service, Alaska Region, Juneau, AK.

Usher, Peter J. 1976. Evaluating country food in the Northern Native economy. Arctic, 29(2):105-120.

Victor and Burrell Research and Consulting, J.E. Hanna Associates, Inc., and Hough, Stansbury, and Michalski, Limited. 198 1. Methods for assessing the socioeconomic impact! of acid rain on Canada's fisheries. Report prepared for Canada Department of Fisheries and Oceans, Toronto, Canada.

Wolfe, Robert J. 1984. Subsistence-based socioeconomic systems in Alaska: an introduction. Unpublished mimeo, Alaska Department of Fish and Game, Division of Subsistence, Juneau, AK.

THERAPEUTIC VALUE OF WILDERNESS

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ABSTRACT

During the past fifty years, there has been growing recognition of the therapeutic value of wilderness for individuals with psychological, social, and physiological disorders. Camping in wilderness or wilderness-like settings has resulted in personal, social, emotional, cognitive, and psychomotor benefits for participants. These individual benefits in turn may lead to societal and economic benefits. Issues and recommendations include: improved experimental research designs, program planning, expansion of and more government support for such programs, and networking among rehabilitative personnel and wilderness managers.

INTRODUCTION

Individuals with psychological, social and physiological disorders would be labeled 'exceptional" children and adults today. By definition, exceptional children are "those who require special educational and related services if they are to realize their fullest human potential" (Hallahan and Kauffman 1982). If this definition is extended to adults, such groups as the mentally retarded, emotionally disturbed, physically handicapped, hearing or vision impaired, learning disabled would be included. Since the literature on camping experiences for exceptional children and adults is so vast over 500 studies (Vinton and others 1978)-- this paper will focus primarily on those individuals with psychological and social disorders, i.e., emotionally disturbed children and adolescents and chronic mentally ill adults. However, many of the therapeutic benefits, issues, and recommendations discussed in this paper are similar to camping experiences for other groups of exceptional children and adults,

Moreover, since most camping programs for emotionally disturbed children and chronic mentally ill adults do not take place in backcountry wilderness, the term "therapeutic camping" will be used throughout this paper.'

Although camping programs for emotionally disturbed children and adolescents have existed for over 50 years, camping programs for chronic mentally ill adults have evolved more recently. The goals of therapeutic camping programs for emotionally disturbed children and adolescents and chronic mentally ill adults are similar. They are to foster normal behavior patterns, emotions, and attitudes by encouraging participants to interact socially in an acceptable manner, to participate in activities, to be independent, to show initiative, to acquire new skills, and to make individual and group decisions. (For other groups of exceptional children and adults such as the physically handicapped, enhanced perceptual and motor skills and increased physical stamina are also goals.)

When comparing therapeutic camping programs, there is great diversity in the duration of the camping period, type of outdoor setting, the patients/clients, the staff, and the camper/staff ratios. Although some camping programs are day camps (Bergan 1958; Lee 1983; Orbach 1966). most are short-term camping programs with overnight stays ranging from a few days to a few weeks (Baer and others 1975; Banaka and Young 1985; Herr 1975; Kaplan and Reneau 1965; Lowry 1974; McCreary-Juhasz and Jensen 1968; McFarland and others 1967; Reitman and Pokomy 1974; Remar and Lowry 1974; Rerek 1973; Shearer 1975; Smith 1959; Weisman and others 1966).

Only a few therapeutic camping programs took place in rugged, backcountry wilderness areas where participants camped in tents (Coffey and Ferree 1974; Collingwood

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1972; Hobbs and Shelton 1972; Kistler and others 1977; Kole and Busse 1969; Ohio Department of Mental Health and Mental Retardation 1979). Usually mountainous, forested regions of this country such as National Parks and Forests, State parks, or forest preserves are used (Ackerman and others 1959; Bergan 1958; Hobbs and Radka 1976; McDonald 1974; Neffiger and others 1984; Reitman and Pokomy 1974; Shearer 1975; Tuttle and others 1975). Typically camping sites with developed facilities such as cabins, a dining hall or recreational building are chosen (Ackerman and others 1959; Acuff 1961; Barker and Weisman 1966; Henke and Kuhlen 1943; Herr 1977; McFarland and others 1967; Middleman and Seever 1963; Morse 1947; Ramsey 1969; Reitman and Porkomy 1974; Rerek 1973; Rickard and others 1971; Smith 1959; Weisman and others 1966; Winter and Winter 1968).

Usually, small groups of less than 10 to midsize groups of up to 50 participants are taken camping (George and Gibson 1959; Hobbs and Shelton 1972; Kistler and others 1977; McCreary-Juhasz and Jensen 1968; Neffmger and others 1984; Orbach 1966; Rickard and others 1971; Stimpson and Pederson 1970; Tuttle and others 1975; Weisman and others 1966). Camper/staff ratios range from approximately l/l (Jerstad and Stelzer 1973; McDonald 1974) to 3/1 or 5/1 (Neffiger and others 1984; Peterson and Acuff 1955; Stoudenmire and Comola 1973).

Programs for emotionally disturbed children and adolescents are usually restricted to all males or all females with most programs being all-male. The children and adolescents are usually referred to the programs by service organizations, schools, community mental health centers, or state institutions. Programs for children and adolescents include individuals with a wide variety of disorders such as phobias, low school achievement, hostility, aggression, withdrawal, adjustment problems, delinquency, sociopathic behavior, etc. On the other hand, programs for chronic mentally ill adults are invariably mixed-sex groups of different ages although a few programs limit their populations to geriatric patients/clients (Lee 1983; Rerek 1973). The mentally ill adults usually come from state mental hospitals or institutions (e.g., Rerek 1973), but some come from community mental health programs or private hospitals (e.g., George and Gibson 1959; Orbach 1966). Camping programs for mentally ill adults usually include chronic schizophrenics or schizophrenics in combination with other diagnostic categories (Acuff 1961; Banaka and Young 1985; Bergan 1958; George and Gibson 1959; McFarland and others 1967; Peterson and Acuff 1955; Shearer 1975; Whittekin 1967).

Participants are usually volunteers selected for such programs by the staff involved (e.g., Lowry 1974; Orbach 1966; Ramsey 1969; Stich and Senior 19084). While criteria for selection/elimination are not always clearly stated, certain children and adolescents ate eliminated depending on the nature of the program. For example, one program eliminated delinquents with severe psychopathology and a history of violent or assaultive behavior (Kelly and Baer 1969). Chronic mentally ill adults, those patients not able to care for their personal needs, those with some physical and/or medical impairment, or those who could possibly be behavior problems such as paranoid patients, homicidal patients, or addicts in active withdrawal (Lee 1983; McNeil 1957; Ramsey 1969; Remar and Lowry 1974; Stich and Senior 1984; Weisman and others 1966) have been eliminated as well.

The staffs of therapeutic camping programs consist of a combination of professionals and non-professionals such as clinical psychologists, rehabilitation therapists, recreational therapists, medical physicians, volunteer college students, cooks, and professional guides. While the importance of staff selection has been noted (Smith 1959), the criteria for selection of the staff are usually not stated. The staff for certain programs were chosen because of their experience in working with young chronic patients, for their skills, backpacking experience, or interest and motivation to participate in such programs (e.g., Lowry 1974; Neffinger and others 1984; Ramsey 1969).

INVENTORY OF USE

1987 Wilderness Use

Information regarding the total acreage and location of the wilderness areas in use for therapeutic camping programs is not available. However, therapeutic camping programs for exceptional children and adults exist in almost all states in the United States. Although the Minnesota Outward Bound School for the Physically Disabled uses the Boundary Waters Canoe Area, most of the therapeutic camping programs do not use wilderness areas formally designated by Congress but utilize other natural environments such as State parks or national forests.

Societal Benefits

Because individuals with psychological, social, and physiological disorders derive benefits from participating in therapeutic camping programs (see Value of Use section), societal benefits should also accrue. Since results of some studies indicate that therapeutic camping can lead to discharge from mental hospitals/institutions, shorter hospital stays, and reduced recidivism rates, considerable financial savings to taxpayers should result. Taxpayers will no longer have to pay for long-term custodial care of these persons in institutions.

Moreover, if participants can be rehabilitated to the point where they can function competently in performing the activities of daily living and/or obtain full-time or part-time employment, they can lead active and productive lives. The communities in which they live and society in general benefit in terms of their economic productivity, their ability to pay taxes, and their increased purchasing power. Thus, they reduce welfare rolls and become less of a financial burden and drain on already taxed resources of the government (Federal, State, and local). By helping to rehabilitate these individuals, therapeutic camping programs may perhaps contribute to reducing the numbers of homeless mentally ill and the crime rate in our cities. Thus, the quality of life for all citizens is enhanced.

In addition, since prejudice and discrimination exist against stigmatized groups such as the mentally ill and physically handicapped exists in our society (Levitt and Viney 1973), having self-functioning citizens in the community may lessen prejudices against them because they may be viewed as more "normal." Vinton and others (1978) list several programs in which handicapped and non-handicapped children interacting at camp actually improved attitudes toward the handicapped.

Finally, through therapeutic camping programs, exceptional children and adults may come to appreciate the esthetic and spiritual qualities of wilderness and hence contribute toward wilderness conservation efforts in their community and/or nation.

VALUE OF USE

Experimental Design and Methodology

Research on the effects of therapeutic camping programs has been conducted by professionals in a wide variety of disciplines such as psychology, social work, criminal justice, nursing, recreational therapy, and education. When evaluating therapeutic camping programs, the majority of researchers have used either Campbell and Stanley's (1963) one-shot case study (Caplan 1967; George and Gibson 1959: Jerstad and Stelzer 1973; Kaplan and Reneau 1965; Kistler and others 1977; Remar and Lowry 1974) or the one group pretest-posttest design (Jensen and others 1968; Kelly and Baer 1968; McCreary-Juhasz and Jensen 1968; Orbach 1966; Stimpson and Pederson 1970; Stoudemire and Comola 1973; Tuttle and others 1975). In the one-shot case study, participants are taken to some type of natural environment and changes in their behavior are assessed. In the one group pretest-posttest design, measures are taken of the participants before and after the therapeutic camping program to assess any behavioral or physical changes resulting from the camping experience. Some researchers added control or comparison groups (e.g., Banaka and Young 1985; Kaplan and Reneau 1974; Kelly and Baer 1968, 1971; Ritter and Mock 1980; Shniderman 1974; Stich 1983).

The data are usually observational or anecdotal in nature (e.g., Byers 1978; Caplan 1967; Eells 1947; George and Gibson 1959; Goodrich 1947; Jerstad and Stelzer 1973; Landes and Winter 1966; Lowry 1974; McDonald 1974; Middleman and Seever 1963; Morse 1947; Neffinger and others 1984; Peterson and Acuff 1955; Smith 1959; Stich and Senior 1984). Some researchers have used instruments such as personality tests, attitude and rating scales, questionnaires, daily journals, file data, or the Modified Bales Interaction Matrix (Baer and others 1975; Banaka and Young 1985; Collingwood 1972; Katz and Kolb n.d.; Kelly and Baer 1968, 1969; Mondell and others 1981; Ritter and Mock 1980; Stich 1983; Stimpson and Pederson 1970; Tuttle and others 1975). In analyzing the data, only a few researchers used statistical tests of significance (Baer and others 1975; Banaka and Young 1985; Henke and Kuhlen 1943; Herr 1975; Hughes 1979; Kelly and Baer 1968; Mondell and others 198 1; Orbach 1966; Ritter and Mock 1980; Ryan and Johnson 1972; Shniderman 1974; Stimpson and Pederson 1970; Tuttle and others 1975). Also, very few researchers have conducted any follow-up studies (Baer and others 1975; Banaka and Young 1985; Barker and Weisman 1966; Jensen and others 1968; Kistler and others 1977; Ramsey 1969; Rickard and Dinoff 1967; Ritter and Mock 1980).

Personal, Social, Emotional, and Cognitive Benefits of Therapeutic Camping Programs

The results of the majority of studies indicate that therapeutic camping has beneficial effects for emotionally disturbed children and adolescents and mentally ill adults. The major personal, social, emotional, and cognitive benefits include the following:

(1) Improved physical health, fitness and increased appetites (Caplan 1967; Collingwood 1972; Reitman and Pokomy 1974).

(2) Enhanced self-concept, self-esteem, and self-confidence (Coffey and Ferree 1974; Collingwood 1972; Hobbs and Shelton 1972; Hughes and Dudley 1973; Kelly and Baer 1969; Kimsey and Frost 1971; McCreary-Juhasz and Jensen 1968; McDonald 1974; Muller 1971; Shank 1975; Stimpson and Pederson 1970; Weisman and others 1966; Winter and Winter 1968).

(3) Increased initiative (Weisman and others 1966).

(4) Increased patient enthusiasm and fun (Kistler and others 1977; Neffinger and others 1984; Reitman and Pokomy 1974; Whittekin 1967).

(5) Improved school attitudes and behaviors (Behar and Stephens 1978; Coffey and Ferree 1974; Rawson 1973; Rickard and Dinoff 1967; Shniderman 1974)).

(6) Discharge from hospitals, shorter hospital stays, and reduced recidivism rates (Acuff 1961; Baer and others 1975; Barker and Weisman 1966; Jerstad and Stelzer 1973; Kelly and Baer 1968, 1971; Lowry 1974, Peterson and Acuff 1955; Rerek 1973; Weisman and others 1966; Willman and Chun 1973).

(7) Changes in group problem solving (Rickard and others 1975; Rickard and others 1971)..

(8) Fewer emotional problems and pathological symptoms (Behar and Stephens 1978; Henke and Kuhlen 1943; Ritter and Mock 1980; Rosen 1959; Shearer 1975; Stoudenmire and Comola 1973: Whittekin 1967; Winter and Winter 1966).

(9) Development of new interests and improved skills (Banaka and Young 1985; McCreary-Juhasz and Jensen 1968; Reitrnan and Polcomy 1974).

(10) Establishment of friendships (Barker and Weisman 1966; Lee 1983; Remar and Lowry 1974).

(11) Increased quality and quantity of social interactions (Banaka and Young 1985; Herr 1977; Hobbes and Radka 1976; Hughes 1979; Kaplan and Reneau 1965; Kelly and Baer 1968; Lowry 1974; McCreary-Juhasz and Jensen 1968; Rawson 1973; Reitman and Pokomy 1974: Shearer 1975; Smith 1959; Tuttle and others 1975).

(12) Improved patient-staff relationships (George and Gibson 1959; Herr 1975; Kaplan

and Reneau 1965; McFarland and others 1967; Ramsey 1969; Reitman and Pokomy 1974; Rerek 1973; Smith 1959).

For other groups of exceptional children and adults, Shea (1977) reports that additional psychomotor, diagnostic, placement, and remedial benefits as well as benefits to family, teachers, counselors, volunteers and trainees result.

However, some studies indicate that therapeutic camping can have negative effects including passive aggressive behavior, regressive behavior, depression or suicide, or no effects on certain behaviors (Byers 1978; Henke and Kuhlen 1943; McDonald 1974; Muller 1971; Orbach 1966; Polenz and Rubitz 1977; Ritter and Mock 1980; Shniderman 1974). Redl (1974) even cautions against the psychopathic risks of camp life.

Economic Benefits

The economic benefits of therapeutic camping should be looked at in terms of the cost-effectiveness of these programs and the resulting economic savings to society. While these programs must demonstrate cost-effectiveness to influence policymakers, it is difficult to determine the cost-effectiveness of therapeutic camping programs. Heller and Monahan (1977) state that the three types of costs and economic benefits that must be taken into account when analyzing community programs include client costs (e.g., professional salaries, administration, insurance); other public costs and benefits (impact on public agencies or the environment), and client-related costs and benefits (e.g., nonfinancial benefits). In evaluating the costs of therapeutic camping programs, the client costs (e.g., professional salaries, camping supplies, transportation) would be relatively easy to compute. However, the other public and client-related costs and benefits would be more difficult to assess. For example, if one prevents a juvenile delinquent from entering a life of crime, should one figure the costs that society would have incurred in terms of crimes committed, costs for reformatories or prisons, etc. (Heller and Monahan 1977)? In addition to these problems, how does one measure the nonfinancial costs of a social program (Heller and Monahan 1977)? How does one put a dollar value on the behaviors and attitudes that change as a result of therapeutic camping? Can one place a dollar value on enhanced self-concept? Heller and Monahan caution the evaluation of social programs in purely financial terms and state that the human factors side must also be considered in the benefits.

Perhaps because of such difficulties or lack of funds and resources to conduct evaluations, to date most researchers have not reported anything about the cost-effectiveness of therapeutic camping programs. While some caution against the expense of such programs (Shea 1977), others claim that their programs are cost-effective. Banaka and Young (1985) claim that their camping program was cost-effective when one compares the cost of one month in a hospital with the costs of camp. Six months after camp, Banaka and Young state the control group had accumulated hospital costs at twice the rate of camping program participants. Stich (1983) stated that participants in the Outward Bound Mental Health Program had shorter hospital stays which represent substantial savings.

Since calculating the costs of psychiatric care is complex (Bloom 1984), it is difficult to estimate how much money taxpayers save if a patient is discharged from an institution, has shorter hospital stays or is readmitted less often. However, a nationwide study of the costs of institutional cam for the mentally retarded and the developmentally disabled in the United States between the Fiscal years 1977 and 1984 gives us some clue as to the costs (Braddock and others 1986). These authors state that for the first time the nationwide per diem exceeded $100 in 1984.[2] In another study, the cost of one hour of outpatient services at a community mental health and mental retardation center averaged $53.15 for adults and $52.32 for children (Gorin 1986).

While some individuals argue that services concerned with the rehabilitative process cost less outside the institution (Albrecht 1976). others claim they cost more (Bloom 1984; Kirk and Therrien 1975; Smith and Hart 1975). Bloom (1984) cautions that the extra costs for community care might be acceptable if the economic benefits of the care

(e.g., increased tax revenues, reduced welfare support) exceed the costs. In fact, results of one study show projected benefits of community care over a lo-year period for 52 mentally ill or retarded individuals would exceed the costs by $20,000 a patient (Murphy and Date1 1976). The cost of mental illness is rising and reached nearly $37 billion in the United States in 1974, with $14.5 billion of this expended for direct patient services (Levine and Willner 1976). In the austere fiscal climate now imposed by the Graham, Rudman, and Hollings Bill and with an increasing share of the costs of institutionalization paid by the Federal government (Braddock and others 1986), policymakers should consider funding for innovative programs.

TREND IN USE

Camping for exceptional children was fiit recorded in the United States in 1888 (Vinton and others 1978). Since the 1930's, camping programs for exceptional children and adults have grown tremendously. Today there are over 225 camps for persons with special health needs (National Easter Seal Society for Crippled Children and Adults 1973). These camps are located in all regions of the United States.

Today backpacking in developed and wilderness areas via organized or independent camping is also gaining in popularity among handicapped individuals (Vinton and others 1978). Groups such as Outward Bound conduct wilderness trips for exceptional children. The Minnesota Outward Bound School has experimented with Outward Bound schools for the handicapped, blind, hearing-impaired, and persons with a variety of physical disabilities (Godfrey 1980). Results of these pilot programs have indicated that people with severe disabilities are far more capable than previously supposed. Men without legs have climbed a rock face and portaged a canoe. The Federal and State parks have expanded services in recent years to include not only accessible outdoor facilities but also total environment programming for the handicapped (Vinton and others 1978).

Thus, the trend is toward exposing more and more groups of exceptional children and adults to camping therapy in some wilderness or wilderness-like setting. However, it has been estimated that only 10 percent of the estimated 10 million handicapped children and youth in the United States are now being served by camp programs for handicapped individuals (Vinton and others 1978).

ISSUES AND RECOMMENDATIONS

Environmental and Social Implications

With increasing groups of exceptional children and adults expected to use existing wilderness areas, parks, national forests, etc., further strain will be put on the already existing wilderness areas. Therefore, more wilderness areas need to be set aside to accommodate the increasing needs and interests of these groups. While designation of more wilderness areas will be a partial solution, in the future some difficult management decisions will have to be made as to which areas should provide necessary resources. Since results of a recent telephone survey of wilderness managers found that only 13 percent of wilderness managers stated that there were any organized programs for medical or therapeutic purposes (Reed and Haas 1987), it would seem that this is an area that certainly needs attention.

Needed Research

Experimental Design and Methodology

Although most research findings appear to support the contention that camping in wilderness or wilderness-like settings is indeed therapeutic for emotionally disturbed children and adolescents and chronic mentally ill adults, the validity of these findings needs to be questioned due to weaknesses in experimental design and methodology. Because most of the programs were evaluated without the use of control or comparison groups and subjects were not randomly assigned to treatment conditions, the internal and external validity of these designs is weak.

The internal validity of these designs is weak because the treatment, therapeutic

camping, may be confounded with other factors such as spontaneous remission, environmental change, increased perceived control, or other therapies used in conjunction with camping therapy (Apter 1977; Clark and Kempler 1973; Hobbs and Radka 1975; Hughes 1979).

Since most of the observations were participant observation by the staff involved and only a few researchers reported interrater reliability (Banaka and Young 1985; Orbach 1966), biases could have resulted. In addition, the instruments used generally lacked reliability and validity. Moreover, because statistical tests of significance were rarely used in analyzing the data, we do not know if the results of these studies are statistically significant. Also, because of the use of small, biased samples, it is unclear if the therapeutic camping benefits generalize to other populations. For example, do the benefits that male adolescents achieved from therapeutic camping apply to females? Since sex differences in response to therapeutic camping have already been found (Ryan and Johnson 1972), this issue becomes more salient.

Finally, it is crucial that short-term and long-term follow-up studies be conducted (Berube 1975; Hobbs and Radka 1976; Mondell and others 1981; Perlman 1947). Without follow-up studies we do not know if the beneficial effects of therapeutic camping programs generalize from wilderness to non-wilderness settings or how permanent the effects are. Already there is evidence that some benefits dissipate over time (Banaka and Young 1985).

Therefore, if future research is to be more acceptable to the scientific community and is to provide a stronger data base from which to argue for financial support of such programs, there must be improvements in experimental design and methodology. To accomplish this, improvements in all of the areas cited (e.g., use of control groups, reliable and valid measures, follow-up studies, statistical tests of significance) are needed.

Therapeutic aspects of camping

To date we still do not know what is therapeutic about camping in a wilderness or wilderness-like setting. Is it the flora and fauna of wilderness, the uniqueness of wilderness, the low level of stimulation of wilderness, the esthetic or spiritual value of wilderness, the isolation of wilderness from the stresses of the city, or the ability of wilderness to evoke coping behaviors that produce therapeutic gains? (Acuff 1961; Apter 1977; Bernstein 1972; Neffmger and others 1984; Thomas 1981) Or is it some other confounding factor (e.g., increased perceived control, environmental change) rather than wilderness that is the therapeutic agent?

Moreover, since the nature of camping therapies differ widely (e.g., duration of the camping period, the camp activities, the camper/staff ratios), it is unclear what aspects of these programs contribute to the therapeutic gains or if it is the interaction of the program with the environment that produces these gains. Finally, it is not known if the beneficial effects of therapeutic camping programs are dependent on the natural environment or if these same benefits could be achieved in other settings.

Program planning

Several questions need to be answered concerning the operation of therapeutic camping programs (Gibson 1979). We need information as to whether camping programs should be designed differently for children and/or adults with different diagnoses, ages, chronicity, etc. It has already been suggested that different type programs are needed for adolescents, chronic mentally ill adults, and less disturbed adults (Remar and Lowry 1974). Juvenile delinquents may need action-oriented, challenging programs with periods of high excitement and real danger and therefore may be particularly well-suited for programs that emphasize camping in rugged, backcountry, wilderness areas. However, certain qualities of Outward Bound may make it an inappropriate treatment for urban juvenile delinquents or for students with psychological fears and difficulties (Katz and Kolb n.d.). Programs for exceptional children should emphasize what they can do rather than cannot do, and must be flexible enough to meet the needs of each individual child (Vinton and others 1978). More information is also needed concerning programs in which patient and relatives, or

handicapped and non-handicapped individuals interact (Muller 1971; Rerek 1973; Vinton and others 1978).

Criteria for selection and elimination of participants are needed. Usually the criteria are based on diagnosis, but other criteria such as psychosocial dysfunction or length of hospitalization may be important (Ramsey 1969; Stich and Senior.1984). In selecting the staff for the more rugged programs such as Outward Bound, selection is geared to those with the functionally relevant skills needed to implement the program (Collingwood 1972). More information on camper/staff ratio for various types of participants is also needed as staff can foster independence or can hamper growth and development (Vinton and others 1978). A l/l ratio for adolescents and 3/1 or higher for chronic mentally ill adults has been recommended (Remar and Lowry 1974).

Since negative effects of therapeutic camping on patients and staff have been observed, research is needed on the nature of workshops and/or meetings for the participants and staff both before and after the camping experience. In particular, more information on the negative effects of camping programs on the staff is needed.

What should the duration of the camping period be? It has been suggested that one or two days may be too short to expect desired behavior changes necessary for normal functioning (Shea 1977; Turner 1976). Research on the effects of repetitive camping experiences is also needed.

Other aspects of therapeutic camping programs not ordinarily looked at, such as the esthetic and spiritual value of wilderness or changing attitudes and/or behaviors regarding nature and conservation, should be explored. Vinton and others (1978) state that camping experiences for children and youth stimulate lifelong interests in camping and outdoor recreation.

Finally, a cost-effectiveness analysis of each program needs to be conducted and disseminated to other professionals. Cost-effective programs are a prerequisite if therapeutic camping is to be integrated as a permanent element of either a preventive or rehabilitative program.

Additional Issues and Recommendations

Three further issues and recommendations need to be made regarding the use of wilderness as therapy. First, since groups such as the physically handicapped can ride horses, boat, canoe, kayak, ski, and participate in the Special Olympics and have an increased interest in backpacking, expansion of such programs into wilderness areas of this country should be made for exceptional children and adults (providing their personal limitations and problems of access to such areas can be overcome). For example, Belshaw (1979) cites a two-day expedition where individuals in wheelchairs used elbow crutches to get a taste of the remote upland terrain of the countryside. These individuals should be given the opportunity to experience wilderness firsthand, something their handicaps may have caused them to miss.

Second, more government financial support and resources should be allocated for the development of innovative programs that have possible economic and societal consequences as well. Elpers (1986) suggested an increase of at least 1 percent for research into the treatment of the mentally ill.

Third, some type of networking of rehabilitative personnel, wilderness managers, and personnel in the USDA Forest Service, Fish and Wildlife Service, and Bureau of Management is needed if programs like these are to succeed.

In conclusion, it is hoped that this paper exposes more individuals to the therapeutic value of wilderness or wilderness-like settings for individuals with psychological, social, and physiological disorders and that the issues and recommendations raised in this paper are addressed.

REFERENCES

Ackerman, 0. R., Mitsos, S. B., & Seymour, M. A. 1959. Patients go camping in Indiana. Mental Hospital, 10: 16-17.

Acuff, S. H. 1961. Camping: Transition between hospital and home for the adult mentally ill. Journal of Health, Physical Education and Recreation, 32: 24-25,62.

Albrecht, G. L. 1976. Social policy and the management of human resources. In G. L. Albrecht (Ed.) The Sociology of Physical Disability and Rehabilitation. Pa: University of Pittsburgh Press, pp. 257-289.

Apter, S. J. 1977. Therapeutic camping: An alternative strategy for troubled children. Journal of Clinical Child Psychology, Winter: 73-75.

Baer, D. J., Jacobs, P. J., & Carr, T.E. 1975. Instructors' ratings of delinquents after Outward Bound survival training and their subsequent recidivism. Psychological Reports, 36: 547-553.

Banaka, W. H., & Young, D. W. 1985. Community coping skills enhanced by an adventure camp for adult chronic psychiatric patients. Hospital and Community Psychiatry, 36(7): 746-748.

Barker, B., & Weisman, M. 1966. Residential camping: Imaginative program helps chronic mental patients. Journal of Rehabilitation, 32: 26-27.

Behar, L., & Stephens, D. 1978. Wilderness camping: An evaluation of a residential treatment program for emotionally disturbed children. American Journal of Orthopsychiatry, 48: 644-653.

Belshaw, P. 1979. Accent on adventure: an account of outdoor pursuits. In L. Groves (Ed.) Physical Education for Special Needs, London: Cambridge University Press, 81-98.

Bergan, J. F. 1958. Day camp in Connecticut. Mental Hospital, 9: 12-13.

Bernstein, A. 1972. Wilderness as a therapeutic behavior setting. Therapeutic Recreation Journal, 6: 160-161,185.

Berube, P. 1975. Survival camping: A therapeutic modality. Journal of Leisurability, 2:)4-20.

Bloom, B. L. 1984. Community mental health: A General introduction (2nd Ed.), California: Brooks/Cole Publishing Co.

Braddock, D., Hemp, R., and Howes, R. 1986. Direct costs of institutional care in the United States. Mental Retardation, 24(1): 9-17.

Byers, S. E. 1978. Counselor skill-training in a year-round therapeutic wilderness camp: Effect on camper and counselor behaviors during problem solving sessions, Dissertation Abstracts International, 39(3-B), 1469.

Campbell, D. T., & Stanley, J. C. 1963. Experimental and Quasi-experimental designs for research. Chicago: Rand McNally College Publishing Co.

Caplan, R. B. 1967. Tent treatment for the insane--An early form of milieu therapy. Hospital and Community Psychiatry. 18: 145-146.

Clark, J., & Kempler, H. L. 1973. Therapeutic family camping: A rationale. Family Coordinator, 22: 437-442.

Coffey, J. V., & Ferree, J. 1974. Buddies, backpack and blisters. School Counselor, 21: 230-232.

Collingwood, T. R. 1972. Survival camping with problem youth. Rehabilitation Record, 13: 22-25.

Eells, E. P. 1947. From the Sunset Camp Service League: Camp as a therapeutic community. The Nervous Child, 6: 225-231.

Elpers, J. R. 1986. Dividing the mental health dollar: The ethics of managing scarce resources. Hospital and Community Psychiatry, 37(7): 671-673.

George, G. R., & Gibson, R. W. 1959. Patient-staff relationships change with environment. Mental Hospital, 10: 18-19.

Gibson, P. M. 1979. Therapeutic aspects of wilderness programs: A comprehensive literature review. Therapeutic Recreation Journal, 13: 21-33.

Godfrey, R. 1980. Outward Bound Schools of the Possible, New York: Anchor Books.

Goodrich, L. 1947. How much decentralized camping can do for the child. The Nervous Child, 6: 202-210.

Gorin, S. S. 1986. Cost-outcome analysis and service planning in a CMHC. Hospital and Community Psychiatry, 37(7): 696-701.

Hallahan, D. P., & Kauffman, J. M. 1982. Exceptional children: Introduction to special education, N.J.: Prentice Hall.

Heller, K. & Monahan, J. 1977. Psychology and community change, Illinois: The Dorsey Press.

Henke, M. W., & Kuhlen, R. G. 1943. Changes in social adjustment in a summer camp: A preliminary report. Journal of Psychology, 15: 223-231.

Herr, D. E. 1975. Camp counseling with emotionally disturbed adolescents. Exceptional Children, 41(5): 331-332.

Herr, D. E. 1977. Institutionalized adolescents' perceptions of a summer camp program. Adolescence, 12(47): 421-431.

Hobbs, T. R., & Radka, J. E. 1975. A short-term therapeutic camping program for emotionally disturbed adolescent boys. Adolescence, 10: 447-455.

Hobbs, T. R., & Radka, J. E. 1976. Modification of verbal productivity in shy adolescents during a short-term camping program. Psychological Reports, 39: 735-739.

Hobbs, T. R., & Shelton, G. 1972. Therapeutic camping for emotionally disturbed adolescents. Hospital and Community Psychiatry, 23: 298-301.

Hughes, H. M. 1979. Behavior change in children at a therapeutic summer camp as a function of feedback and individual versus group contingencies. Journal of Abnormal Child Psychology, 7(2): 211-219.

Hughes, A. H., & Dudley, H. K. 1973. An old idea for a new problem: Camping as a treatment for the emotionally disturbed in our state hospitals. Adolescence, 8: 43-50.

Jensen, S. E., McCreary-Juhasz, A., Brown, J. S., & Hepinstall, E. M. 1968. Brief communications and clinical notes: Disturbed children in a camp milieu. Canadian Psychiatric Association Journal, 13: 371-373.

Jerstad, L., & Stelzer, J. 1973. Adventure experiences as treatment for residential mental patients. Therapeutic Recreation Journal, 7: 8-11.

Kaplan, H. K., & Reneau, R. F. 1965. Young patients enjoy therapeutic camping. 235-237.

Katz, R., & Kolb, D. Outward Bound and education for personal growth. Unpublished. Office of Juvenile Delinquency, HEW Grant No. 66013.

Katz, A. H., & Martin, K. 1982. A handbook of services for the handicapped, Conn.: Greenwood Press.

Kelly, F. J., Baer, D. J. 1969. Jesness Inventory and self-concept measures for delinquents before and after participation in Outward Bound. Psychological Reports, 25: 719-724.

Kelly, F. J., & Baer, D. J. 1968. Outward Bound Schools as an Alternative to Institutionalization for Adolescent Delinquent Boys, Boston, Mass: Fandel Press, Inc.

Kelly, F. J., & Baer, D. J. 1971. Physical challenge as a treatment for delinquency. Crime and Delinquency, 17: 437-445.

Kirk, S. A., & Therrien, M. E. 1975. Community mental health myths and the fate of former hospitalized patients, Psychiatry, 209-217.

Kimsey, L. R., & Frost, M. 1971. Long term camping for emotionally disturbed boys. Diseases of the Nervous System, 32: 35-40.

Kistler, K. S., Bryant, P. M., & Tucker, G. J. 1977. Outward Bound - providing a therapeutic experience for troubled adolescents.& Hospital and Community Psychiatry, 28(11): 807,812.

Kole, D. M., & Busse, H. 1969. Trail camping for delinquents. Hospital and Community Psychiatry, 20: 150-153.

Landes, J., & Winter, W. 1966. A new strategy for treating disintegrating families. Family Process, 5: l-20.

Lee, J. A. 1983. The group: A chance at human connection for the mentally impaired older person. Social Work with Groups, 5(2): 43-55.

Levine, d. S., & Willner, S. G. 1976. The cost of mental illness. NIMH Statistical Note 125. Wash., D. C.: U.S. Government Printing Office.

Levitt, L., & Viney, W. 1973. Inhibition of aggression against the physically disabled. Perceptual and Motor Skills, 36: 255-258.

Lowry, T. P. 1974. Camping as a short term private psychiatric hospital. In T.P. Lowry (Ed.) Camping Therapy: Its uses in psychiatry and rehabilitation. Illinois: Charles C. Thomas, pp.59-62.

McCreary-Juhasz, A., & Jensen, S. E. 1968. Benefits of a school camp experience to emotionally disturbed children in regular classrooms. Exceptional Children, 34: 353-354.

McDonald, M. C. 1974. Adventure camping at Oregon State Hospital. In T.P. Lowry (Ed.) Camping therapy: Its uses in psychiatry and Rehabilitation, Illinois: Charles C. Thomas, pp. 16-31.

McFarland, F. W., Martin, R. C., & Williams, T. A. 1967. Staff attitudes and patient behavior change on a camping trip. Hospital and Commumty Psychiatry, 18: 296-298.

McNeil, E. B. 1957. The background of therapeutic camping. Journal of Social Issues, 13: 3-14.

Middleman, R., & Seever, F. 1963. Short-term camping for boys with behavior problems. Social Work, 8: 88-95.

Mondell, S., Tyler, F. B., & Freeman, R. W. 1981. Evaluating a psychotherapeutic day camp with psychosocial competence and goal attainment measures. Journal of Clinical Child Psychology, 10(3):180-184.

Morse, W. C. 1947. From the University of Michigan Fresh Air Camp: Some problems of therapeutic camping. The Nervous Child, 6: 211-224.

Muller, D. J. 1971. Post-camping depression: A lethal possibility. American Journal of Psychiatry, 128(1): 141-143.

Murphy, J. G., & Datel, W. E. 1976. A cost-benefit analysis of community vs. institutional living. Hospital and Community Psychiatry, 27: 165-170.

National Easter Seal Society for Crippled Children and Adults. 1973. The Easter Seal Directory of resident camps for persons with special health needs (8th Ed). Chicago, Illinois: National Easter Seal Society for Crippled children and Adults.

Neffinger, J. W., Schiff, J. W., & Abrams, S. 1984. The wilderness challenge: An adjunctive treatment. In B. Pepper and H. Ryglewicz (Eds.) Advances in Treating the Young Chronic Patient. New Directions for Mental Health Services, no. 21, March, San Francisco: Jossey-Bass, pp. 99-102. 99-102.

Ohio Department of Mental Health and Retardation. 1979. Camping program therapy for youth. Mental Horizons. 7.

Orbach, C. E. 1966. Camping experiences for psychiatric patients from a day care hospital. Journal of Psychiatric Nursing, 4: 57 l-585.

Perlman, J. 1947. Camps for maladjusted children. The Nervous Child, 6: 155-160.

Peterson, B. F., & Acuff, S. H. 1955. An experiment in living. Mental Hospital, 6: 8-9.

Polenz, D., & Rubitz, F. 1977. Staff perceptions of the effect of therapeutic camping upon psychiatric patients' affect. Therapeutic Recreation Journal, 22: 70-73.

Ramsey, G. V. 1969. Sociotherapeutic camping for the mentally ill. In A.J. Bindman & A.D. Siegel (Eds.) Perspectives in Community Mental Health, Chicago: Aldine, pp 324-334.

Rawson, H. E. 1973. Residential short-term camping for children with behavior problems: A behavior modification approach. Child Welfare, 52(8): 51 1-520.

Redl, F. 1974. Psychopathologic risks of camp life. In T. P. Lowry (Ed.) Camping therapy: Its uses in psychiatry and rehabilitation. Illinois: Charles C. Thomas, pp. 76-88.

Reed, P., & Haas, G. 1987. Preliminary results to non-recreational wilderness use telephone survey. Department of Recreation Resources and Landscape Architecture, College of Forestry and Natural Resources, Colorado State University, Ft. Collins, Colorado.

Reitman, E. E. & Pokomy, A. D. 1974. Camping at a psychiatric day center. In T. P. Lowry (Ed.). Camping therapy: Its uses in psychiatry and rehabilitation, Illinois: Charles C. Thomas, pp. 63-67.

Remar, M. E. & Lowry, T. P. 1974. Camping therapy in the commonwealth of Massachusetts. In T.P. Lowry (Ed.) Camping therapy: Its uses in psychiatry and rehabilitation, Illinois: Charles C. Thomas, pp. 13-15.

Rerek, M. D. 1973. Senior citizen camping: An innovative program in community psychiatry. Journal of the Bronx State Hospital, 1: 85-87.

Rickard, H. C., & Dinoff, M. 1967. Behavior change in a therapeutic summer camp: A follow-up study. Journal of Genetic Psychology, 110: 181-183.

Rickard, H. C., Serum, C. S., & Forehand, R. 1975. Problem-solving attitudes of children in a recreation camp and in a therapeutic camp. Child Care Quarterly, 4(2): 101-107.

Rickard, H. C., Serum, C. S., & Wilson, W. 197 1. Developing problem solving attitudes in emotionally disturbed children. Adolescence, 6: 451-456.

Ritter, D. R., & Mock, T. J. 1980. Carryover effects of a summer therapeutic daycamp program on children's classroom behavior: A one-year follow-up. Journal of School Psychology, 18(4): 333-337.

Rosen, H. 1959. Camping for the emotionally disturbed. Children, 6(3): 86-91.

Ryan, J. L., & Johnson, D. T. 1972. Therapeutic camping: A comparative study. Therapeutic Recreation Journal, 6: 178-180.

Shank, J. 1975. Therapeutic recreation through contrived stress. Therapeutic Recreation Journal, 9: 21-25.

Shea, T. M. 1977. Camping for special children. St. Louis: The C. V. Mosby co.

Shearer, R. M. 1975. Camping as a therapeutic experience for depressed and schizophrenic patients. Hospital and Community Psychiatry, 26: 494,497.

Shniderman, C. M.. 1974. Impact of therapeutic camping. Social Work, 19: 354-357.

Smith, B. K. 1959. Patients go camping in Texas.

Smith, W. G., & Hart, D. W. 1975. Community mental health: A noble failure? Hospital and Community Psychiatry, 26: 581-583.

Stich, T. F. 1983. Experiential therapy. Journal of Experiential Education, Winter: 23-30.

Stich, T. F. & Senior, N. 1984. Adventure therapy: An innovative treatment for psychiatric patients. In B. Pepper & H. Ryglewicz (Eds.) Advances in Treating the Young Adult Chronic Patient, New Directions for Mental Health Services, no 21, March, San Francisco: Jossey-Bass, pp 103-108.

Stimpson, D. V., & Pederson, D. M. 1970. Effects of a survival training experience upon evaluation of self and others for underachieving high school students. Perceptual and Motor Skills, 31: 337-338.

Stoudenmire, J., & Comola, J. 1973. Evaluating Camp Climb-Up: A two week therapeutic camp. Exceptional Children, 39: 573-5

Thomas, J. C. 1981. Treed? Bushed? Stoned? Implications of cognitive psychology for wilderness therapy. Presented at the Second Annual Convention of the Wilderness Psychology Group, Missoula, Montana.

Tuttle, L. P., Terry, D., & Shinedling, M. M. 1975. Note on increase of social interaction of mental patients during a camp trip. Psychological Reports, 36: 77-78.

Turner, A. L. 1976. The therapeutic value of nature. Journal of Operational Psychiatry, 7: 64-74.

Vinton, D. A., Hawkins, D. E., Pantzer, B. D., & Farley, E. M. 1978. Camping and environmental education for handicapped children and youth, Wash., D. C.: Hawkins and Associates, Inc.

Weisman, M. N., Mann, L., & Barker, B. W. 1966. Camping: An approach to releasing human potential in chronic mental patients. American Journal of Psychiatry, 123(2): 166-172.

Whittekin, R. G. 1967. Imaginative themes enliven day camp. Hospital and Community Psychiatry, 8: 237-238.

Willman, H. C., & Chun, R. Y. F. 1973. Homeward Bound: An alternative to the institutionalization of adjudicated juvenile offenders. Federal Probation, 37: 52-58.

Winter, L. M., & Winter, W. D. 1966. Therapeutic camping: An experience in group-living. Corrective Psychiatry, 12: 449-459.

Winter, L. M., & Winter, W. D. 1968. Clinical experiences with therapeutic camping. Adolescence, 3: 203-216.

ENDNOTES

1. However, other terms such as wilderness therapy, camp, challenges (Banaka and Young 1985; Neffinger and others 1984; Thomas 1981), experiential therapeutic camping (Stich 1983; Stich and Senior 1984), sociotherapeutic camping (Ramsey 1969), camping therapy (Remar and Lowry 1974) and psychiatric camping therapy (Lowry 1974) have also been used.

2. Per diem in this study referred to the cost figure derived from dividing the total annual institutional expenditures in a given State by the number of average daily institutional residents in that State and then dividing by 365 (366 for leap years).

THE ROLE OF WILDERNESS IN HUMAN DEVELOPMENT

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ABSTRACT

Wilderness is a place where people may develop their sense of competence through meeting the challenges of nature, but it is also much more. The wilderness is a fundamental symbol of our national heritage, our biological and evolutionary heritage as, members of a natural ecosystem, and personal identities that may be affirmed by its mere existence, in addition to the challenges posed by facing it. In this paper, we characterize the human development functions of wilderness as the result of individuals actively seeking self-definition. Because the wilderness is a rich and potent source of personal, national cultural and biological identity information, it plays a significant and valuable role in self-definition on all three levels of human functioning.

INTRODUCTION

Wilderness is often thought of as a place where humans can confront nature on its own terms, as a place where humans might test themselves, and as a consequence, gain a greater sense of personal competence, develop leadership skills in helping others to meet these challenges, and to the extent that such activities are carried out in a group context, develop social interaction abilities. While these types of human development benefits have often been attributed to wilderness use, the focus of this conference is the non-recreational values of wilderness, and our charge to address human development benefits of wilderness within a non-recreational context. We have chosen to address the various developmental benefits - personal competence, leadership, and social interaction - under the broader aegis of self-concept, and the ways in which self-concept may be linked to wilderness use, products, and symbols. Opportunities to express and affirm one's self-identity through wilderness related behaviors and symbols may in the long run facilitate individual growth and development by giving the person a wider repertoire of competencies through which to anchor their day-to-day identity.

Though it is difficult to distinguish between human development values associated with the personal use of the wilderness (recreational, educational, or therapeutic) and the values of wilderness apart from actual visitation, we begin with an important distinction between **self-definition** and **self-esteem** The human development value of wilderness has typically been viewed in terms of narrowly defined benefits, such as enhanced self-esteem, and self-actualization resulting from personal contact with the natural environment, usually in a recreation context. Therapeutic uses of wilderness (Gibson 1979; Levitt **1988),** and benefits associated with structured programs designed to specifically enhance self-awareness and efficacy such as Outward Bound are examples of this school of thought.

At present, research has not examined the role wilderness may play in self-definition as opposed to self-esteem enhancement. This restricted perspective is unfortunate in terms of understanding the value of wilderness for human development because when people are given freedom to describe themselves, fewer than 10 percent of their thoughts actually deal with self-evaluation **(McGuire** and **Padawer-**Singer 1978) of the kind that might be associated with self-esteem Apparently, most thoughts about the self deal with descriptive information (what we **are** like) as opposed to evaluative information (how good we are). Self-definition is one of the most fundamental

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requirements for human development. It has implications for our interactions with other people, our success in adapting to the rigorous demands of modem society, as well as our sense of competence and worth. One of the first distinctions an infant learns to make is the distinction between "me" and "not me," and the process develops and continues throughout one's entire life-span.

Selfdefinition can take the form of clarification we seek for our own sake, when we are uncertain of who we are or what values we stand for. Self-definition can also take the form of defining, or interpreting ourselves to others, so that the people in our social environment have a clearer understanding of who we are. Both forms of self-definition require constant maintenance; affirming our identity is as important to growth and development as is enhancing our feelings of self-worth. We continuously strive to understand ourselves better, as well as to insure that those around us are interpreting our actions and words in ways that are consonant with our preferred identity. We derive self-definition in almost every activity we perform, every symbol of ourselves we present to the world, and a significant proportion of our private thoughts.

Wilderness environments serve identity functions through their ability to provide information and meaning to individuals about how they are situated with respect to other individuals, cultures, and species. The notion that physical objects and environments provide for self-definition is not new (Proshansky and others 1983). Knopf (1987; 1983) has made the same point with specific reference to the role of nature in self-identity. In the first half of the twentieth century, the sociologist George Herbert Mead (1938) suggested that people, animals, objects and environments can make us "self-conscious," or aware of who we are as individuals, and thus develop our sense of self or personality. More recent examples of physical environments providing self-definitional functions include Rivlin's (1982) evidence of this phenomenon on the level of an urban neighborhood, Appleyard's (1979) vivid example of a "city-wide" identity threatened by the "Manhattanization of San Francisco," and Nash's (1969) discussion of the significance of the wilderness and frontier to the development of American cultural identity.

Wilderness environments function to provide individuals with a sense of who they are through their use as symbols. In terms of self-definition, the wilderness acts as the physical object or environment that represents abstract human values, beliefs, and characteristics. During wilderness recreation, the opportunities for self-definition are virtually limitless. There are mountains to be climbed, rivers to be forded, cliffs over which to rappel, and climatic conditions to be dealt with, all of which provide the individual with a wealth of information about him or herself as being more or less rugged, self-sufficient, adventurous, hardy, appreciative of scenic beauty, and a virtually unlimited list of other attributes. The more pervasive use of the wilderness for self-definition, however, does not arise from interaction with the wilderness directly, but through its use as a symbol of personal and cultural values. The actual number of people who make pilgrimages to wilderness areas is minute compared to the number that use the wilderness for its symbolic content.

In the following sections, we examine the nature of the self-concept. We will then review some of the literature that exemplifies the use of the wilderness in the cultivation of our personal, cultural, and biological identities, and finally address some issues and implications pertinent to the assessment of wilderness values within the Resource Planning Act framework.

On the Nature of Self-Concept

Implicit in our formulation of the self-concept is that the self is multidimensional. Much of the clinical psychology and recreation and leisure literature focuses on a single dimension of the self, that of self-esteem, or the evaluative (good-bad) dimension. Current trends in the field of psychology view the self in terms of cognitive processes and information structures. From the cognitive perspective, the preoccupation with a unidimensional self-esteem seems overly simplistic. One of the founding fathers of psychology, William James (1890) wrote of the self as being comprised of a multiplicity of selves. Similarly, the current

orientation toward the self positions it as a rich and highly-organized network of beliefs about ourselves, including who we are, our likes and dislikes, and our goals and aspirations. We view the self as a complex phenomenon composed of self-esteem (the affective or evaluative dimension); an infinite number of self-images (such as self-as-mother, self-as-an-honest-person, and self-as-a-naturalist); and, in a broader context, aspects of the self that motivate us to actively seek out and create opportunities for self-affirmation. It is primarily through the self-images that a linkage is provided between the mere existence of a wilderness, its symbolic utility as a representation of an abstract human value, and the benefits derived in terms of self-definition. What the wilderness means to us -- symbolizes to us -- becomes incorporated into our self-definition through changes in relevant self-cognitions, or, self-beliefs.

The motivational aspect of self-affirmation is particularly important to understanding the non-recreational value of wilderness for human development. We act in ways that organize and activate beliefs about ourselves, that allow specific self-definitions to be derived from our everyday environment. Csikszentmihalyi and Rochberg-Halton (1981) observed that the motivational aspects of the self allow us to "cultivate" identities, as opposed to having our social and physical environments impose a given identity upon us. Researchers such as Swarm (1983) and Schlenker (1984) have proposed several specific mechanisms people use to maintain their self-images, such as displays of signs and symbols of the self, selection of tasks or hobbies that permit identities to be built and maintained, and interpersonal behaviors designed to elicit appropriate feedback from others. An individual who is motivated to maintain wilderness related self-images will do so by infusing their everyday environment with reminders of desired self-images using mechanisms such those Schlenker and Swann propose. These mechanisms may serve as a framework for research on the motivational aspects of the self in wilderness and other environments.

In summary, the self is a complex entity, consisting of an affect or esteem dimension, as well as practically infinite numbers of cognitive dimensions or self-images, many of which are human values, beliefs, and characteristics which may be symbolized by wilderness environments. There is also a motivational, or dynamic aspect of the self that actively searches for, and creates opportunities for self-definition. In the course of human development, we strive to understand ourselves, as well as to be understood more clearly by others. This motivational aspect is significant because it makes human development less of a reaction to one's environment and more of an active transaction with one's social and physical environments,

BENEFITS TO SELF-CONCEPT THROUGH WILDERNESS

What does this self-definition process mean for wilderness as a contributor to human development? What evidence exists that wilderness, either through its recreational use or mere preservation, provides these self-concept benefits? As we noted earlier, human growth and development occurs through cultivation of beliefs about one's self, and wilderness may be a potent facilitator of human development through this enhancement of our understanding of ourselves, and through an enhanced ability to communicate who we are to others.

Specifically, the self-defining potential of wilderness contributes to self-identity in terms of three types of beliefs. First, individual identities may be tied to wilderness such that the use of wilderness (actual, vicarious, or symbolic) affirms important beliefs about the personal self or who we are as an individual. We may exhibit certain behaviors related to wilderness that give us feedback that we are adventurous, self-reliant, independent, physically fit, and mote generally competent. Secondly, wilderness and national parks can, as many have suggested (Nash 1982; Wellman 1987). give us feedback of our cultural self or who we ate as Americans. In Nash's view wilderness is an important symbol of American society. Historically, wilderness has served to give Americans a cultural identity, when we have felt inferior to our European cousins who had a much richer cultural heritage. Finally, and more speculative and philosophical, is that wilderness provides identity feedback in terms

of our biological self or who we are as human beings. By this we are suggesting that wilderness may enhance a person's "human" development by allowing that person an opportunity to discover or affirm who he/she is as a member of the human species among the many natural creatures in the world. Each of these three aspects of wilderness and self-concept has been examined to some extent in the wilderness benefits literature. The personal level has been the focus of the empirical literature, the cultural level, the province of historical and policy analysis, and the biological the exclusive estate of philosophy.

Personal Identity

A potential developmental benefit of wilderness-is its capacity to help people to achieve self-definition through affirmation of specific identities. The major line of research is exemplified by a number of scientific and conceptual works (Ewert 1986; 1983; Gibson 1979; Kaplan and Talbot 1983) addressing participants of formal or structured wilderness challenge/adventure programs such as Outward Bound and their potential to improve self-concept (Burton 1981; Gibson 1979). This topic is examined under the aegis of "therapeutic" values within these proceedings (Levitt 1988). In addition, some research has examined developmental benefits of general wilderness participants (Young and Crandall 1984; 1986). In either case the results examining the potential to enhance self-concept are far from conclusive. Burton concludes from a review of 72 studies that structured programs do appear to report positive effects on self-concepts, but adds that the quality of these studies is poor and there is little tangible evidence that these perceptions have a lasting impact. Schreyer and others (1987) discussed a number of conceptual issues that plague this area of research. The most important issues are the degree to which these self-concept improvements are maintained over the long term, especially in the absence of recurring participation, and the extent to which benefits can be attributed to wilderness per se or the social interaction and formal process established by the program.

At present, little research has examined the role wilderness may play in self-definition as opposed to self-enhancement. Furthermore, understanding the value of wilderness in terms of self-definition is particularly relevant to the non-recreational use of wilderness. The non-recreational value of wilderness to self-identity may be observed in terms of the self-defining mechanism of displays of signs and symbols. Knopf (1987; 1983) has written extensively of the rich symbolic value of nature and its capacity to affirm self-identity. Thus, the symbolic values inherent in wilderness can become a major source of self-concept expression. Identification with wilderness through symbols such as those embodied in books, art work, membership in wilderness organizations, and perhaps most immediate and prominent, the types of clothing a person wears, make convenient vehicles for self-concept expression and affirmation.

Finally, persons may seek to structure the nature of social interaction to affirm conceptions of self. One of the ways this may be accomplished is through the evolution and adoption of norms of wilderness and recreation behavior in general. An entire lifestyle may be created around the norms and values expressed in the appreciation and manifestation of appropriate behavior in wilderness and about wilderness. This process of learning and displaying behavioral norms has been suggested to account for the process developing specialized styles of participation (Bryan 1977) and may account for the diffusion of formerly exclusive and elite activities to a wider constituency (West 1984). Continued interaction with others who share similar values and norms is the essence of what these authors are describing to account for participation dynamics and the increased sense of commitment and competency that goes with acquiring and displaying the norms and symbols of their sport and the development of social reference groups. From the perspective of self-definition, a social reference group functions to affirm an individuals self-definition by reflecting back to the that person the images he or she desires. Such reference group interaction, which probably occurs more frequently in everyday encounters than specifically within wilderness, becomes a powerful means of self-concept definition.

National/Cultural Identity

While the beliefs about one's self as an individual are defined largely through wilderness use and symbolic products linked to its use, beliefs about the cultural self are affirmed independent of use, through mere existence and preservation of wilderness. Appleyard (1979) observed that the environment in general functions to symbolize individual and group identity and suggested that environmental conflict is as much over symbols as substance. As he puts it, "environmental decisions are not only value-based, but identity-based." Wilderness and natural landscapes seem to be a particularly rich and powerful source of national identity symbols (Nash 1982). Indeed, the American character of freedom and democracy is symbolized by wilderness. As Driver and others (1987) observed, wilderness has always been a refuge of the religiously and politically oppressed from the Puritans and Mormon pioneers to the modem political "freedom fighters" in Central America and Afghanistan.

Wilderness has played a prominent political role in this country because of the way the American character is linked to it. As a result, protecting wilderness serves to protect America's identity. As Nash (1969) observed, "Our national ego is fed by both preserving and conquering wilderness." Nineteenth century Americans, out of a desire for cultural independence to accompany their new-found political independence, sought to identify something that was different and impressive about their country: "sustenance for their national ego" (Nash 1969). That something was the untamed wilderness and abundant natural resources. America lacked the refined cultural symbols of art, architecture, literature, history, and traditions that Europe possessed. In addition, the commercial exploitation of Niagara Falls, which drew. the greatest number of European visitors in the mid-1800's, was a national embarrassment. The development of our national ego demanded that America take steps to preserve the "crown jewels" (as they were described) in the form of national parks and wilderness. Natural wonders as cultural symbols coupled with the emergence of the romantic movement in literature and religion, endowed wilderness with spiritual and esthetic uniqueness. Setting aside as national parks the scenic wonders of the Western wilderness was an opportunity demonstrate our cultural identity to our European cousins.

At the same time, the vast and available natural resources to be developed were also a source of national identity (Wellman 1987). In contrast to Europe, the abundance of natural resources and the absence of a rigid social class structure made America a place where anyone could achieve identity and status, primarily through settlement and development of the wilderness (Wellman 1987).

Biological Identity

As with the cultural self, the biological self is not dependent on the use of wilderness, but its preservation. Wilderness serves to affirm beliefs about who we are as homo sapiens. We value wilderness in part because it reminds us of our biological and earthly heritage. "Wilderness ... may be the best place to learn that we are members, not masters of the life community sharing a common habitat" (Rolston 1986b). Paraphrasing Rolston (1986a), Driver and others (1987) suggest that preserving wilderness is a "gesture of planetary modesty" and an expression of humility, gratitude, and admiration for powers greater than our own. Wilderness symbolizes biological roots easily forgotten in the "high-tech" modem world. At this level the bio/ecological heritage we encounter in wilderness places our personal and social identity in the perspective of humanness. Expressions such as "becoming one with nature" reflect a kind of unity, a belief about how our self is connected to the whole of the earth or even the universe.

Rolston (1986b) describes this as natural history benefits. "Humans are relics of . . . [the natural] ... world, and that world, as a tangible relic in our midst, contributes to our sense of duration, antiquity, and identity." He goes on to say "Without an appreciation of this evolutionary past, Americans cannot understand who and where they are." There is ample evidence that the human species can adapt to a life largely without direct contact with nature (Knopf 1987; 1983), but at what cost? Without wilderness and the natural processes embodied within, we lose part of our self;

personally, culturally, and perhaps most significantly, biologically.

ASSESSMENT OF THE VALUE OF WILDERNESS FOR HUMAN GROWTH AND DEVELOPMENT

Issues in Measurement

In order to address the notion of value, some semantic clarification is in order. Value is presumed to be the worth, or willingness to pay or make resource trade-offs in order to obtain a benefit (Brown 1984). However, this presumes the benefit is in fact known and demonstrated to be a consequence of the behavior undertaken (e.g., wilderness participation or preservation). As we have seen the human development benefits of wilderness are not easily molded into cause/effect analysis especially benefits associated with cultural and biological heritage. To the extent to which we believe that developmental benefits are indeed forthcoming from wilderness, there is also the question of the magnitude of the benefits produced, in relation to their value (Driver and Peterson 1987). Are two units of self competence enhancement worth twice as much as one unit? Is such a relationship in magnitude difference even recognized and/or responded to in a market?

Little research has been carried out in assessing the value of wilderness benefits to individuals. The only indirect indicator would be the total expenditure by persons who buy wilderness programs of one sort or another. It would be difficult to use expenditures of persons visiting wilderness in general, as it is not known what proportion of those expenditures could be attributed to self-concept. Values for cultural and biological self-identification are even more difficult to tap. Sampson (1988), in his discussion of individualism, addresses the efficacy of individualism for fostering success in the global economy. Sampson argues that "when a person's sense of self is defined through relationships and connections," rather than the self-centered individualism which dominates American culture, core cultural values of freedom, responsibility, and achievement are more likely to be affirmed. One could make the case that a country with a strong national identity, built on a connected self-identity (like that which may exist in Japan) is better equipped to compete in the global market economy; thus suggesting national economic benefits of national identity. While little research has attempted to provide a value for such benefits, Walsh and others (1984) have done research to assess option, existence and bequest values for wilderness. They suggest, as we have suggested, that such values nationwide far exceed the recreation participation values of wilderness.

The nature of these benefits may be measured in a variety of ways (Schreyer and Driver 1988). They may be identified through expert panels, using "Delphi" techniques or people may be questioned concerning their own perceptions of benefits. However, such subjective inquiry may not be reliable, as people may not be aware of or able to articulate such benefits. As a result, indirect methods such as obtaining self-reports of reasons for engaging in wilderness activities have been used to imply the nature of wilderness benefits. This is where the largest body of empirical research currently exists. Another approach has been to administer standard psychological scales related to various dimensions of self-esteem, usually in a pre-test post-test format, and to assess the nature of differences resulting from participation, if any (Schreyer and Driver 1988; Schreyer and others 1987; Burton 1981; and Ewert 1983 discuss the limitations of these approaches). Finally, more objective behavioral data may be used. Benefits such as economic productivity as it is related to national identity are difficult link to wilderness and require time consuming and expensive studies, which is why little of this type of research has been carried out (Driver in press).

Indicators of Value

The extent of use of wilderness for self-concept benefits is hard to assess as no comprehensive effort at evaluation has ever been attempted. For structured programs, a considerable body of research exists, but there is little sense of how much benefit is provided, and to whom, let alone establishing the value

of that benefit. A potential indirect indicator is the number of programs that exist. Driver and others (1987) cite Burton's research (1981) as estimating over 300 such programs nationwide.

As mentioned above, unstructured visitation has been studied indirectly through time in studies of visitors' motivations for participation in wilderness. These studies examine visitors' reasons for wilderness visitation. Inferences may be made to the benefits which such persons are seeking as a part of that visitation. While this is not conclusive evidence, it provides information concerning visitors' self-pemeptions of potential benefits. A variety of such studies use standardized measures of such potential benefits, such as Driver's (1977) Recreation Experience Preference scales. This allows for comparison across studies. However, such research usually involves one-time studies of visitors. It is therefore impossible to ascertain whether such benefits are linked to ongoing participation, or to the single episodic event in which they were measured.

Interestingly, as noted above, many of these studies do not show a self-concept benefit as being a particularly major reason for participation. Across 12 studies, Driver and Brown (1987) found that experience preferences related to personal efficacy (introspection, achievement, and teach/lead others) ranked in the middle to lower half in importance among 16 scales compared. Of course, this could be due to the fact that the benefits to self-concept derive from being able to engage in such behaviors and to act out one's sense of self, whether the pursuit is conscious or not. Other reasons, such as the desire to experience nature, may thus be the rationale for acting out the nature of self in that particular place (Schreyer and others 1985).

Trends in Use

Use of wilderness for self-concept benefits may be assessed only indirectly through tracking participation rates for wilderness activities motivated by such purposes, or by the increase in attendance at formal programs such as NOLS or Outward Bound. Unfortunately, readily accessible data do not exist concerning such increases through time. Assessments that such uses are increasing are more subjective than empirical. Other indirect indicators exist, such as the increase in formal wilderness experience courses in colleges and universities (Greenway 1987). There are also no agency statistics concerning the magnitude of such use. However, we have noted an increasing tendency for Forest Service personnel with wilderness management authority to mention that "perhaps something should be done" to regulate or control the numbers of wilderness training programs, which again serves as an indirect indicator of the fact that such programs are growing in popularity. The notable lack of trend data in this area suggests that this is a major future research need.

DISCUSSION

Environmental/Social Implications

The value of wilderness for providing opportunities for self-concept maintenance through participation would be maintained by the current status quo. It is unclear the extent to which a growing demand for such types of opportunities may be frustrated if such opportunities are not increased. The principal concerns here surround the tendency for agencies to seek control over users' behaviors for fear of impact to the resource, and whether growth in wilderness opportunities might be met with increasing restriction on the part of administrators.

The capacity to engage in wilderness activities for reasons of personal competence and leadership can only be hindered by regulation. By definition, if such activities require the opportunity to demonstrate personal autonomy, then actions which curtail that autonomy will reduce the opportunity. The key issue concerns the value of the benefit to the individual. Any use causes impact, and human uses of wilderness are tolerated, even at the cost of that impact. There comes a point when the impact may be too great and human use must be curtailed. However, there are currently few empirical indicators of how much use is too much use in wilderness. Such indicators must be developed through

subjective human judgment using systematic processes such as the "Limits of Acceptable Change" method (Stankey and others 1985). When the resource is used for its symbolic content, even subtle changes in the resource, or the way it is perceived by other members of society, can have an impact on its utility for self-definition. The "Limits of Acceptable Change" method of public involvement, then, involves not only the limits of acceptable change in the resource, but the limits of acceptable change in one's self-definition, as well.

Another related concern is the extent to which wilderness is unique in providing these opportunities. Wilderness areas are seen as particularly fruitful areas for testing the self because of the prevalence of natural challenges. Of course, any reasonably natural setting, regardless of its wilderness status, may provide similar benefits. Further, nonnatural settings may also provide many opportunities for self-testing, such as playing the stock market, climbing up the World Trade Center, or driving on L.A. freeways. Because of human diversity, however, not all individuals are able to employ nonnatural settings as effectively as natural settings for competence testing. The unique symbolic content of the wilderness provides more compelling avenues for self-definition for these individuals. Furthermore, and perhaps more importantly, natural settings have associated with them a set of meanings that nonnatural settings lack. By altering the resource, we alter its symbolic value, and we alter the identities of those people who find self-definition through wilderness symbols. Through changing the wilderness, we risk changing the character of the American people.

The more abstract components of wilderness benefits, national identity and biological identity, have more indirect relationships to the wilderness resource. National identity is probably not as greatly impacted by current wilderness management policies, nor by the total size of the National Wilderness Preservation System as it is by American attitudes reflected in wilderness policy. It is likely that if the amount of acreage under wilderness designation were to be halved or doubled, it would not impact the identification value of wilderness. The fact that wilderness exists and is protected provides for national identification independent of size (within limits, of course -- 10 acres of wilderness in the nation would not provide much benefit in this regard).

The biological identification component is another matter. Such identification is instrumentally related to the maintenance of viable ecosystems reflecting natural processes, gene pools, and biological diversity. These are all related directly to the size of the wilderness resource and to its management. The greater the size of the wilderness system, the greater the likelihood that such processes are fostered and such identification values are enhanced.

There are also substantial indirect values related to size, as the symbolic significance of such biological identification is tied directly to the moderation of human activity. Such moderation represents a commitment to partnership in the global ecosystem rather than dominance. Moderation of human activity means making tradeoffs between such acts and commodity production. As we have no sense of the magnitude of such values, we have little to gauge the nature of such trade-offs, which is why they are invariably made in the political sector. It is also likely that the public has little direct knowledge of the nature of such tradeoffs, though it may value considerably the identification with nature and the environment. At any rate, such benefits are enhanced by greater wilderness designation; they also point to the need for greater articulation of such values.

Issues, Concerns and Recommendations

One of the greatest concerns related to this topic is the recognition of the value of wilderness for non-commodity uses. Few would argue that such outputs are likely to be derived from wilderness. However, that recognition has virtually no functional impact on decision making. The underlying implication is similar for most wilderness values -- they are important because people are willing to act politically to set wilderness aside, but compared to the demonstrated importance of commodity values of resources in the market sector, they do not appear to have tangible significance. The ultimate challenge of documenting these types of benefits is to

achieve a substantive change in the premises of resource management. This change will ultimately require the recognition that non-market, non-quantifiable values are substantive and important, and in fact should affect decisions about national resource policy. This does not reduce the significance of commodity resource production, so much as it underscores the need to broaden the perspective of resource management.

We appear to be at a point in our resource history in which such changes are becoming increasingly apparent, but in which we have neither the moral/philosophical nor the administrative rhetoric to accommodate the significance of such phenomena. If anything, such forces translated into the political arena have been denigrated by association with cult, fringe or extremist groups/philosophies. However, the legislation of the past twenty years exists as a testament to the power of those philosophies in affecting resource policy.

Our point is underscored by the guidelines for the desired structure of the papers for this conference. We were not only to cover the state of knowledge related to a given resource use (meaning an attempt to hammer such benefits into the commodity model -- X units of self-concept output per Y units of management input), but we were to break that down by standard Federal Regions, as if the sum total of human knowledge about personal growth and development could be reduced to regional units. The inappropriateness of this mandate is an indicator of the internal conflict which is occurring among resource professionals who have been trained to apply "rational" (i.e., objective unit production criteria) resource management techniques that are poorly suited to understanding complex processes such personal growth and self-definition.

These concerns are structural, in that they involve an organizational approach to resource management which has been institutionalized through 90 years of bureaucratic activity. People are trained in schools that emphasize these more "objective" (and, by implication, fair) means of allocating resources. But as with any bureaucracy, such dogmas are inherently resistant to change, and to the development of society. We assume that through the adoption of ever more sophisticated research and management techniques (computer models and the like) we can accommodate these changes. However, we want to do that within the same quantitative, objective models of management, losing sight of the fact that the system is changing aualitatively. These changes cannot be broken down by Region, or by unit of commodity production.

This is where the real challenge for the Forest Service lies in the future. It is not a matter of fitting changing societal values into formal planning frameworks. Rather, it is a matter of fitting agency decision making into the changing values of society. Of course, this will not occur without considerable resistance. We all want the world to remain the same forever, even though we know that, just as we grow, so does the world around us. That friction is inevitable, but so are the processes of change, and we must seek to understand how as professionals dedicated to the public welfare we can adapt and accommodate to that change.

One of the key concerns with respect to the topic of this paper is the need to be able to articulate more clearly and cogently the nature of the values of wilderness for human development. One reason why it is difficult to break that down by standard Region or by unit of output is the total lack of any systematic data on this type of resource use. There is a tremendous need to articulate the relevance of these types of benefits to our culture, as well as to generate reliable, useful, and systematic data on the actual benefits provided by wilderness for these purposes. We operate in a situation of primarily anecdotal information. Perhaps more significantly, there is little if any information that is framed in ways in which persons who are committed to resource decisions based solely on commodity production unit outcomes can understand. This is where future research and writing on the topic is most needed, as will be addressed in the following section.

Research **Needs**

We have an intuitive belief that human development values are a major benefit derived

from wilderness. Unfortunately, there is little information resulting from empirical studies, beyond structured training programs, which can document such a benefit. This underlies the content of our recommendations for future research:

(1) There needs to be a data base on the nature and extent of formal training programs in wilderness, oriented toward human development and identity needs, as well as information tracking the changes in the number and nature of those programs through time;

(2) There need to be investigations of the benefits of long term participation in wilderness in general, independent of formal training courses. What is it that people derive, how does this compare to other aspects of life, and how valuable is it to people? This underscores the need for more longitudinal studies, as opposed to single, time-dependent studies;

(3) There needs to be a more systematic consideration of the benefits of such participation. We have a vast body of indirect and/or anecdotal knowledge on the set of benefits for the use of wilderness. However, we have not been able effectively to capture the relative value of such benefits in systematic ways. In the past this has been tied to economic value, which has resulted in attempts to transfer these values into a standard metric. However, we have yet to develop means which adequately express these values in non-market terms which have substantive impact on policy making.

(4) There needs to be increasing scrutiny of the agencies that provide for public benefits through the management of these resources. There is a growing gap between the premises upon which people are trained in resource disciplines, based primarily upon models developed in another era, and contemporary societal needs to which those persons have to respond. We need to explore models of resource management and decision making that can accommodate the non-commodity, non-market values of resource uses. This adjustment will occur whether policymakers want to see it happen or not. The question is merely how much pain is encountered by the agency, and how much public strife is necessary to make the transition.

(5) Finally, there needs to be an increased emphasis on the psychological processes involved in achieving wilderness benefits, in addition to the nature of the benefits, themselves. It is possible that an understanding of the process through which natural environments are transformed into "improved conditions" or human development benefits will improve our ability to understand the value of natural environments for human development. Once it is understood how people use the wilderness to affirm their personal, national, and biological identities, we will be closer to understanding how certain management actions may enhance or degrade peoples' ability to derive identity benefits from the land.

REFERENCES

Appleyard, D. 1979. The environment as a social symbol: Within a theory of environmental action and perception. American Planning Association Journal. 45:143-153.

Brown, T.C. 1984. The concept of value in resource allocation. Land Economics. 60(3):231-246.

Bryan, H. 1977. Leisure value systems and recreational specialization: The case of trout fishermen.. Journal of Leisure Research. 9: 174-187.

Burton, L.M. 1981. A critical analysis and review of the research on Outward Bound and related programs. New Brunswick, NJ: Rutgers Univ. PhD dissertation.

Csikszentmihalyi, M. and E. Rochberg-Halton. 198 1. The meaning of things: Domestic symbols and the self. New York: Cambridge University Press.

Driver, B.L. 1977. Item pool for scales designed to quantify the psychological outcomes desired and expected from recreation participation. USDA Forest

Service Rocky Mountain Forest and Range Expt. Stn. Ft. Collins,CO. 31 p.

Driver, B.L. In press. Benefits of river and trail recreation: The limited state of knowledge and why it is limited. In S. Seguire, ed., Proceedings, First International Congress on Trail and River Recreation. Vancouver, B.C.: Outdoor Recr. Council of British Columbia.

Driver, B.L. and P.J. Brown, 1987. Probable personal benefits of outdoor recreation. In President's Commission on Americans Outdoors -- A Literature Review. Washington, D.C.: U.S. Govt. Printing Off., pp. 63-70.

Driver, B.L. and G. Peterson., 1987. Benefits of outdoor recreation --An integrating overview. In President's Commission on Americans Outdoors -- A Literature Review. Washington, D.C.: U.S. Govt. Printing off., pp. l-10.

Driver, B.L., R. Nash and G.E. Haas. 1987. Wilderness benefits: A state-of-knowledge review. In R. Lucas ed., Proceedings--National Wilderness Research Conference: Issues, State-of-knowledge, Future Directions. USDA Forest Service, Gen. Tech. Report INT-220, pp. 294-319. Ogden, UT: Intermountain Research Station.

Ewert, A. 1983. Outdoor adventure and self-concept: A research analysis. Eugene, OR: University of Oregon, College of Human Development and Performance.

Ewert, A. 1986. Values, benefits, and consequences in outdoor adventure recreation. In A Literature Review Appendix to the Report to the President's Commission on Americans Outdoors. Washington, DC: US Government Printing Office.

Gibson, P.M. 1979. Therapeutic aspects of wilderness programs: A comprehensive literature review. Therapeutic Recreation Journal. 13(2):21-33.

Greenway, R. 1987. A psychology of wilderness "program" at Sonoma State Univ. Paper presented at the Fourth World Wilderness Congress, Estes Park, co.

James, W. 1890. Principles of Psychology. New York: Hall.

Kaplan, S. and J.F. Talbot. 1983. Psychological benefits of a wilderness experience. In I. Altman & J. Wohlwill, eds., Behavior and the Natural Environment, pp. 163-203. New York: Plenum Press.

Knopf, R.C. 1983. Recreational needs and behavior in natural settings. In. I. Altman & J. Wohlwill, eds., Behavior and the Natural Environment, pp. 205-240. New York: Plenum Press.

Knopf, R.C. 1987. Human behavior, cognition, and affect in the natural environment. In D. Stokols and I. Altman, eds., Handbook of Environmental Psychology. New York: Wiley.

Levitt, Lynn 1989. Therapeutic value of wilderness (this volume).

McGuire, W.J. and A. Padawer-Singer. 1978. Trait salience in the spontaneous self-concept. Journal of Personality and Social Psychology. 33:743-754.

Mead G.H. (1938) The Philosophy of the Act. Chicago: Univ. of Chicago Press.

Nash, R. 1969. The cultural significance of the American wilderness. In M. McCloskey & J. Gilligan, eds., Wilderness and the Quality of Life, pp. 66-73. San Francisco: Sierra Club.

Nash R. 1982. Wilderness and the American Mind. Third Edition. New Haven, CT: Yale University Press.

Proshansky, H.M. 1978. The city as self-identity. Environment and Behavior. 10:147-189.

Rivlin, L.G. 1982. Group membership and place meanings in an urban

neighborhood. Journal of Social Issues. 38:75-93.

Rolston, H., III. 1986a. Philosophy Gone Wild. Buffalo, NY: Prometheus Books.

Rolston, H., III. 1986b. Beyond recreational value: The great outdoors preservation-related and environmental benefits. In A Literature Review Appendix to the Report to the President's Commission on Americans Outdoors. Washington, DC: US Government Printing Office.

Sampson, E.E. 1988. The debate on individualism. American Psychologist. 43:15-22.

Schlenker, B. 1984. Identities, identification and relationships. In V. Derlaga, ed., Communication, Intimacy and Close Relationships. New York: Academic Press.

Schreyer, R. and B.L. Driver. 1988. The benefits of outdoor recreation participation, Paper presented at Benchmark 1988: A National Outdoor Recreation and Wilderness Forum. Tampa, FL.

Schreyer, R., D.R. Williams and L.M. Haggard. 1987. Episodic vs. continued wilderness participation - Implications for self concept enhancement. Paper presented at the 4th World Wilderness Conference, Estes Park, CO.

Schreyer, R., R. Knopf and D.R. Williams, 1985. Reconceptualizing the motive/environment link in recreation choice behavior. In G.H. Stankey and S.F. McCool, eds., Proceedings - Symposium on Recreation Choice Behavior. USDA Forest Service Genl. Tech, Rpt. INT-184. Ogden, Utah: Intermtn. For. and Range Expt. Stn., pp. 9-18.

Stankey, G.H., D. Cole., R. Lucas, M. Peterson and S. Frissell. 1985. The Limits of Acceptable Change (LAC) System for Wilderness Planning. Ogden, Utah: USDA Forest Service Intermm For. and Range Expt. Sm. Genl. Tech. Rpt. INT-176. 37 p.

Swarm, W. 1983. Self-verification: Bringing social reality into harmony with the self. In J. Suls and A. Greenwald, eds., Psychological Perspectives on the Self. Vol. 2. Hillsdale, N.J.: Erlbaum, pp. 33-66.

Walsh, R.G., J.B. Loomis and R.A. Gillam. 1984. Valuing option, existence and bequest demands for wilderness. Land Economics, 60(1): 14-29.

Wellman, J.D. 1987. Wildland Recreation Policy. New York: Wiley.

West, P.C. 1984. Status differences and interpersonal influence in the adoption outdoor recreation activities. Journal of Leisure Research. 16:350-354.

Young, R. and R. Crandall. 1984. Wilderness use and self-actualization. Journal of Leisure Research. 16:149-160.

Young, R. and R. Crandall. 1986. Self-actualization and wilderness use: A panel study. In R. Lucas eds., Proceedings--National Wilderness Research Conference: Current Research USDA Forest Service, Gen. Tech. Report INT-212, pp. 385-388. Ogden, UT: Intermountain Research Station.

THE NON-TRADITIONAL PUBLIC VALUATION (OPTION, BEQUEST, EXISTENCE) OF WILDERNESS

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ABSTRACT

In the past, we tended to view wilderness as primarily a recreation resource. More recently, the contingent valuation method has been applied to the problem of estimating the demands for wilderness preservation by the general public. The results provide an empirical test and confirmation of the hypothesis that the general population is willing to pay for the preservation of unique natural environments, and that their option, existence, and bequest values should be added to the consumer surplus of recreation use to determine the total economic value of wilderness to society. It is proposed that the current benefit estimating procedures of Federal agencies be enlarged to include these non-traditional public values.

INTRODUCTION

The purpose of the Wilderness Act (P.L. 88-577 Section 2 a) is to secure "for the American people of present and future generations the benefits of an enduring resource of wilderness." In the past, two myths evolved relating to the act: first, these American people are solely recreationists who have the time and money to visit such areas; and second, the values or benefits derived from wilderness are solely recreation-related. Haas, and others (1986) discuss reasons for the myths as follows. A vast majority of the popular literature focused on the recreation use and enjoyment of wilderness. Federal land management agencies included wilderness administration within their recreation programs. Moreover, these agencies reported wilderness use as recreation visits or visitor-days. Finally, resource economists attempted to develop a dollar value for wilderness by studying the travel patterns or expressed willingness to pay of wilderness recreationists. [1]

While this paper also is concerned with the benefits of wilderness recreation, it differs from earlier work by introducing non-traditional public values to the analysis of wilderness designation. This is consistent with guidelines of the Federal government which recommend that agencies establish wilderness programs consistent with the benefits to users and the general public. To Max Peterson, former Chief of the Forest Service, this means that "first, we must establish the true value ... to the American people, and then recognize that value in our planning and our politics." Wilderness managers and the public need to have an understanding and appreciation of the specific values for protecting wilderness.

Haas, and others (1986) summarize the results of a household survey designed to show how values of people who visit wilderness areas differ from people who do not. The question asked was:

> Many reasons have been proposed for valuing existing or potential wilderness areas. For each of the possible reasons below, check the box which best describes how important it is to you.

The 13 reasons are based on provisions of the Wilderness Act. Each is rated on a 5-point scale of preference ranging from not important to extremely important.

Table 1 compares the mean scores of recreation users and the general public of nonusers. A t-test of mean scores for each of the 13 values indicates that the two groups are not significantly different. The three most important motivations relate to biophysical

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resources--protecting water quality, wildlife habitat, and air quality. The next two are the option values of possible future recreation use by current and future generations. Providing current recreation opportunities is next, ranking fii and sixth (including ties) in importance to recreation users and the general public, respectively. Providing income from the tourist industries is of least importance to both groups, although still considered moderately important. The provision of recreation opportunities is most relevant to the two myths previously mentioned. While providing recreation opportunities is important, it is not the most important reason users and the general public value wilderness.

TOWARD A DEFINITION OF TOTAL ECONOMIC VALUE

As early as the mid-1960s, economists began to recognize that on-site recreation values did not capture the full social benefits of protecting a natural area from irreversible loss. Weisbrod (1964) first discussed what has become known as option value: that people were likely to be willing to pay some premium over and above their expected recreation benefits to maintain the option of possibly visiting a natural area in the future. Arrow and Fisher (1974) demonstrated that there exists a quasi-option value to society for maintaining future options when considering an irreversible investment that would foreclose forever preservation of a natural area. Krutilla (1967) and Krutilla and Fisher (1985) discussed the likelihood that many persons who may never visit or intend to visit a unique natural area might still gain satisfaction from knowing that the area exists and is protected. Krutilla (1967) suggested that the current generation might be willing to pay something to bequest a unique natural area to future generations. As these concepts have evolved in the economics literature, they are now commonly though not universally referred to as option, existence, and bequest values.

Table 1. -- Comparison of the mean scores of wilderness users and the general public when asked to rate the importance of wilderness areas

Reasons for Wilderness	Users'	General public non-users	t-test (2-tail)
Protecting water quality	4.4	4.4	0.60
Protecting wildlife habitat	4.2	4.0	0.18
Protecting air quality	4.1	4.2	0.51
Knowing that future generations will have wilderness areas	4.1	3.9	0.46
Knowing that in the future you have the option to go there if you choose	4.0	3.8	0.19
Providing recreation opportunities	4.0	3.8	0.23
Providing scenic beauty	4:o	3.8	0.19
Preserving unique plant and animal ecosystems and genetic strains	3.9	3.6	0.06
Conserving natural areas for educational and scientific study	3.8	3.3	0.01
Knowing that wilderness areas exist	3.5	3.6	0.73
Providing spiritual inspiration	3.0	2.9	0.81
Providing income for tourist industry	2.6	2.8	0.41

[1] On-site wilderness users were those people who indicated that they had visited an existing or potential wilderness area in Colorado (N=156). Nonusers had never visited such areas (N=58). Mean scores were based on a five-point scale: (1) not important, (2) somewhat important, (3) moderately important, (4) very important, and (5) extremely important.

This and related literature has evolved into a concept of the total contribution of wilderness resources to national economic development. Included in the total value concept are the: (1) direct consumption benefits of on-site recreation; and (2) indirect consumption of (a) the flow of information about these activities and resources in books, periodicals, and videos consumed as indoor recreation, and (b) preservation benefits,[2] i.e., willingness of citizens to pay for the knowledge that wilderness resources are protected (option, existence, and bequest values). This knowledge may be experience-based or education-based. Individuals either have visited wilderness (direct use) or they have learned about it (indirect use). Based on this knowledge, individuals report a willingness to pay an amount roughly equal to the dollar value of that satisfaction rather than forego it.

AN EMPIRICAL STUDY OF PUBLIC VALUES

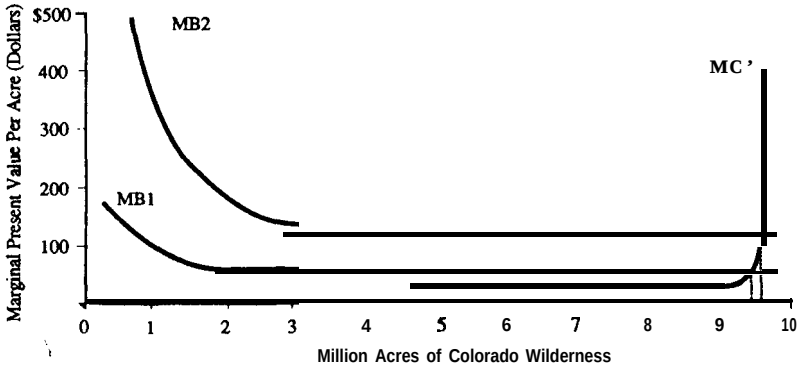
The preservation value of wilderness has been measured by the contingent valuation method (CVM) approved by federal agencies (U.S. Water Resources Council 1979, 1983; U.S. Department of Interior 1986) as providing an acceptable procedure for estimating the economic value of recreational and environmental resources. Interagency committees have established procedures for surveying a sample of the affected population about maximum willingness to pay contingent on changes in the availability of an environmental amenity such as wilderness.

Willingness-to-pay equations have been developed using dollar values derived from the CVM that allow decision-makers to determine how benefits change with a small increase or decrease in society's stock of wilderness protection. These incremental and site-specific issues are the ones that are relevant to management. While society as a whole values wilderness (according to information from opinion surveys), the US. Congress does not debate whether to have wilderness or not, but rather how many areas and where. The same is true of State managers of natural areas. The issue is not whether to have any natural areas or not, but what are the benefits of more or less. To make these types of resource allocation decisions, the manager needs to know how social benefits change when the level of a resource is increased or decreased from the current amount,

The question of how much wilderness to protect in a single Western State is illustrated in figure 1. It shows the marginal benefits of wilderness in the State of Colorado compared to the marginal costs of wilderness protection including management and opportunity costs. The marginal curves are simply the changes in total value resulting from changes in the amount of wilderness protected. They may be more familiar as demand and supply curves, with maximum benefits occurring where the two intersect, i.e., where supply equals demand.

Figure 1 shows the present value of marginal benefits and costs. Present value is estimated for a planning period of 50 years and a discount rate of 7-3/8 percent to conform with Federal procedures. The present value of the sum of consumer surplus from recreation use and public preservation benefits was compared to the present value of the sum of management and opportunity costs of wilderness designation. For example, the expected marginal benefit from adding 1 million acres to the present 2.6 million acres was estimated as $148 per acre, compared with marginal costs of $36 per acre. Without preservation values, marginal benefit from adding 1 million acres would be only $78 per acre, but still more than twice the marginal costs. Designating additional wilderness would be warranted on grounds of economic benefits to the people until marginal benefits with preservation values equal marginal costs of $100 per acre at approximately 9.6 million acres. These results are relatively insensitive to changes in the variables because of the extreme flatness of marginal cost over most of its range. Thus, even without preservation values, marginal benefits equal marginal costs of $67 per acre at nearly 9.5 million acres. Even if opportunity costs should double, the optimal amount of wilderness would equal 9.2 million acres with preservation values vs. 7.0 million acres without. The latter is nearly three times the 2.6 million acres currently designated. This relative insensitivity to changes in the variables may be unique to the study area, which has little or no commercial

Figure 1. Present Value of Marginal Benefits and Costs per Acre of Wilderness Designation, With and Without Nontraditional Values



MB1 - Marginal benefits without preservation values.

MB2 - Marginal values with preservation values.

MC'- Marginal costs.

[1] Costs included the net benefits of timber harvest, range improvements, mineral, energy, and motorized recreation foregone less the costs of managing for these uses, as reported in RARE II [U.S.D.A., 1978]. Also included were wilderness management costs of $1.75 per acre in 1977 based on Guldin [1980] and a survey of Colorado wilderness areas. Costs were updated to 1980, based on a 36.6 percent increase in the producer price index.

Table 2. -- Total Annual Consumer Surplus from Recreation Use and Preservation Value to Colorado Households from Increments in Wilderness Designation, Colorado, 1980

	Existing and Potential Wilderness Designation			
Value Categories	Wilderness Areas, 1980, 1.2 million acres	Wilderness Areas, 1981, 2.6 million acres	Double 1981 Wilderness Areas, 5 million acres	All Potential Wilderness Areas, 10 million acres
Recreation Use Value				
Per Visitor-Day	$14.00	$14.00	$14.00	$14.00
Total, Million	13.2	21.0	33.1	58.2
Preservation Value to Colorado Residents				
Per Household	13.92	18.75	25.30	31.83
Total, Million	15.3	20.6	27.8	35.0
Option Value				
Per Household	4.04	5.44	7.34	9.23
Total, Million	4.4	6.0	8.1	10.2
Existence Value				
Per Household	4.87	6.56	8.86	11.14
Total, Million	5.4	7.2	9.7	12.3
Bequest Value				
Per Household	5.01	6.75	9.10	11.46
Total, Million	5.5	7.4	10.0	12.5
Total Annual Recreation Use Value and Preservation Value to Colorado Households, Million	$28.5	$41.6	$60.9	$93.2

timber value in most roadless areas and excludes a number of sites with known mineral or energy development potential.

These results, reported in Walsh and others (1984), are based on a sample of 218 resident households that participated in a mail survey during the summer of 1980. Respondents were asked to make a series of four budget allocation decisions based on total annual benefits received from increments in wilderness designation, i.e., to report the maximum amount of money they would be willing to pay annually for protection of current wilderness, and for hypothetical increases in wilderness depicted on four maps. Once this budget allocation question was completed, respondents were asked to allocate the highest amount reported among the four categories of value: recreation use, option, existence, and bequest demands.

Table 2 shows that the non-traditional public (option, bequest, existence) values of wilderness increased from about $14 per household for 1.2 million acres to $19 for 2.6 million acres, $25 for 5 million acres and $32 for 10 million acres. These public preservation values represent a substantial part of the total value of wilderness, with onsite use value of $14 per recreation visitor day.

The total value estimates omit nonresidents of the State who are expected to have some positive values for Colorado wilderness designation, although much less than instate residents. It is indicative that residents of the State reported they were willing to pay an additional $21 per household annually to protect 125 million acres of wilderness in other States. Extrapolating this sample value to the general population of the United States results in a willingness-to-pay estimate of approximately $1.50 per household annually for protection of 10 million acres of wilderness in Colorado. Given the large number of households involved, even this low value would result in substantial aggregate nonresident values for wilderness.

Attempts to measure the proportion of the population that consumes preservation values of natural areas find a substantial majority of citizens throughout the United States report they do so. This is the case for unique wilderness resources such as the Grand Canyon (Cummings and others 1986) and Colorado wilderness areas (Walsh and others 1984). For less unique wilderness resources with regional rather than national significance, the proportion of the population that holds preservation values appears to be a declining function of the distance that they live from the resource (Barrick 1986; Pope and Jones 1987; Sutherland and Walsh 1985). In addition, there are important differences among the three types of preservation value. Option value appears to be positively related to income and the probability of direct use of recreation resources. It is negatively related to the availability of substitutes. Indications are that existence value is related to altruistic motivations of individuals to preserve natural scenery and ecosystems. Also, it is related to the knowledge gained from direct recreation use. Studies have shown that bequest values are higher for retired persons who, motivated by benevolence, receive satisfaction from the interpersonal transfer of natural areas to future generations. Apparently, all income groups value existence and bequest demands approximately equally.

VALIDATION OF PUBLIC VALUES

The values reported in the initial study should be considered a first approximation subject to improvement with further research. No approach can measure the actual benefits associated with environmental quality. All estimates are limited by assumptions and judgments affecting questionnaire design and data analysis. However, the reasonableness of the public value obtained in the initial study has been tested by replication. In 1983, 198 households representing a subsample of the population of the State were interviewed in their homes. The study design followed Randall and others (1981) in most respects, particularly the introduction of possible regional substitution among wilderness areas and between wilderness and other environmental resources. Group t-tests showed no significant difference at the 0.05 level between the average public values reported for designation of 10 million acres of wilderness in the two studies. This suggests that the method used in the initial study produced

results consistent with those of more advanced study design.

The Colorado studies also have been replicated in the adjacent Rocky Mountain States of Utah and Wyoming, and in the Eastern State of Virginia. Pope and Jones (1987) applied the CVM in a telephone survey of 280 resident households in Utah during the fall of 1986. The research method followed the initial Colorado study in most respects. Respondents were asked to make a series of four budget allocation decisions based on total annual benefits received from increments in wilderness designation. Table 3 summarizes the preliminary results of the study, where the total values include both consumer surplus of recreation use and non-traditional value (option, bequest, existence) of Utah households. These results are comparable to total values per household reported for Colorado (bottom line of Table 2), adjusted for 33 percent inflation and dividing by 1.1 million households in the State. For example, with an increase in wilderness to 2.7 million acres, the willingness to pay per million acres would be $19.53 per household in Utah compared to $18.84 in Colorado. Clearly, the value of wilderness to people living in Utah is not significantly different.

Barrick (1986) applied the CVM in mail surveys of on-site use values and non-traditional valuation (option, bequest, existence) for the Washakie Wilderness Area adjacent to Yellowstone National Park in Wyoming. He also sampled the population of the United States with mail surveys of urban residents in four cities and surrounding rural areas: Salt Lake City, Portland, Nashville, and Orlando. The cities are located 300 miles, 600 miles, 1,300 miles, and 1,900 miles, respectively, from the study site. He reported average annual non-traditional public values (option, bequest, existence) of $46 for onsite users compared to $9.70 for the urban residents and $8.40 for the rural residents of the four cities. Although public values tended to decline with distance, the mean values reported in the four cities were not significantly different. He concluded that the relevant population when estimating the benefits of wilderness designation is the entire United States.4

Prince (1988) applied the CVM in a mail survey of onsite users of Ramseys Draft Wilderness Area in George Washington National Forest, Virginia. It is reported to be the nearest wilderness area to Washington, D.C. Preliminary results indicate that consumer surplus of recreation users averaged $12 per day and that their willingness to pay for non-traditional values (option, bequest, existence) was equivalent to about the same amount. Although no information was obtained on the non-traditional values of the general population of nonusers, these findings suggest that consumer surplus estimates of direct use value understate the total value of users by half.

In a closely related study, Walsh, and others (1985) measured the non-traditional valuation (option, bequest, existence) of wild and scenic river protection in the State of Colorado. Most of the study rivers are located in existing or potential wilderness areas. A representative sample of 214 resident households participated in a mail survey in the spring of 1983. Sample size was satisfactory based on recommendations of the United States Water Resources Council (1983) for recreation and environmental quality studies. Response rate was 51 percent to three mailings. The characteristics of the sample were very similar to the population of the State, closely approximating income level and income distribution, age of household head, household size, occupations and education. A random subsample of 10 percent of the non-respondents were contacted by phone. A substantial majority favored river protection and were willing to pay for it. Thus, non-response cannot be equated to lack of interest or value from river protection.

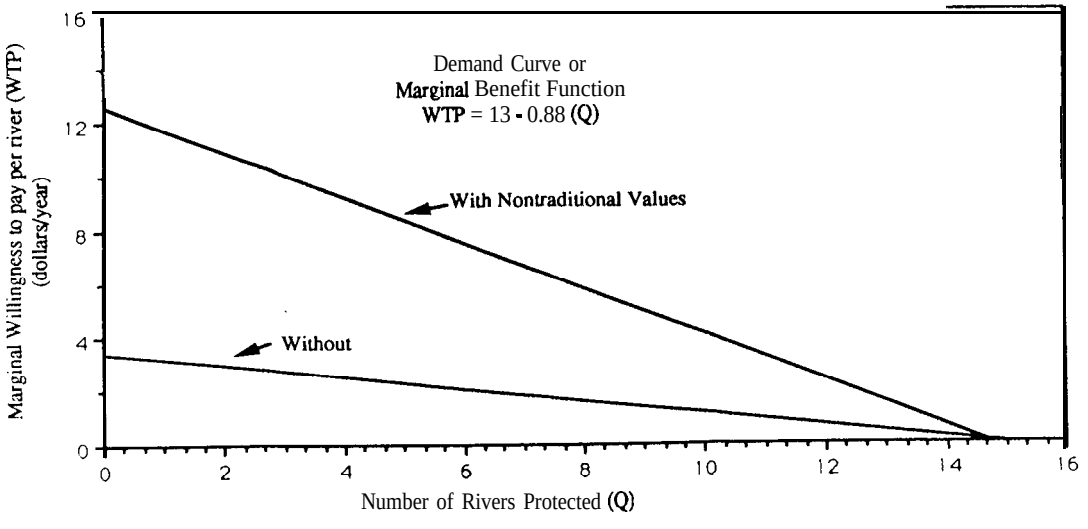
Figure 2 shows that for the first river, total household willingness to pay with non-traditional valuation (option, bequest, existence) is high because of scarcity value. With further increases in the number of rivers protected, the willingness to pay for each additional river decreases. As demand for river protection is fully satisfied, marginal benefits fall to zero at 15 rivers. Statewide, the Cache la Poudre is the most valuable river (designated in 1986), followed by the Elk, Colorado, Gunnison, Green, Yampa, etc., none of which have been designated. Without

Table 3. -- Total Annual Willingness to Pay for Wilderness Protection in Utah, 1986

Variables	Percent of the State 5%	10%	15%	30%
Acres of wilderness (million)	2.7	5.4	8.1	16.2
Willingness to pay per household (dollars)	$53	$64	$75	$92
Aggregate annual value (million dollars)'	$26.7	$32.5	$38.0	$46.7

[1] With 506,000 households

Figure 2. Annual Benefits per Household for Protection of Wild and Scenic Rivers, With and Without Non-traditional Values



information on non-traditional values, the demand for designation appears to be about one-fifth as much as with them (Figure 2). In the future, these rivers may be restudied for possible designation. Krutilla and Fisher (1985) have shown that future benefits from protection are expected to rise compared to benefits from alternative uses. This is due to the fixed supply of natural rivers and the effect of technological change which increases productivity and introduces substitutes for alternative uses.

Unfortunately, it is not possible to compare the CVM estimates of non-traditional public benefits to the travel cost method (TCM) or other behavior-based measures of value. However, the CVM estimates of the dollar value of public benefits can be compared to psychological preferences using standard procedures. In the 1983 replication in Colorado, Thurston's method of paired comparison is applied to half of the sample, with wilderness protection paired against each of six other environmental programs, and respondents indicate which they prefer to see improved. The fractionization method is applied to the remaining sample, with each respondent assigning 100 points to the most important program, and indicating the relative importance of other programs by assigning values from 0 to 100. The statistical correlation of the rank order of these psychological preference measures to dollar values is a highly significant 0.88. While there remains some difference between the psychological and economic measures of the importance of wilderness protection programs, there is a high degree of similarity. Apparently, the CVM can provide a close approximation of the social welfare effect of wilderness programs.

There are two additional points that should be made about this comparison. First, there may be psychological values associated with wilderness protection that exceed the economic measure of values reported here. The demand for protection, and therefore the economic benefit estimate, is constrained by limited consumer income, availability of leisure time, and other variables. However, psychological values may not be so constrained, i.e., satisfaction from preservation may be worth more than people are willing and able to pay. Second, there may be long-run ecological values of protecting wilderness resources that are not included here. It is difficult for biologists to predict what these might be, let alone measure and incorporate them into psychological and economic value. For this reason, it seems that economic values represent a conservative estimate of the total benefits to society from protecting wilderness resources. The inability of economics to place a dollar value on unknown ecological values should be recognized in making decisions about wilderness protection programs.

CONCLUSIONS

The study results provide an essential test and confirmation of the hypothesis that the general population may be willing to pay for the preservation of unique natural environments and that their option, existence, and bequest values should be added to the consumer surplus of recreation use to determine the total economic value of wilderness to society. The values reported should be considered first approximations subject to improvement with further research. No approach provides the actual benefits associated with wilderness protection. All empirical methods provide estimates limited by their respective assumptions. It is important to acknowledge that judgment affects the CVM approach in the questionnaire design, data analysis, and in the specification of a decision model. The findings of these studies could, however, be of use in the preparation of indicators of social net present value of alternative forest plans as mandated by the RPA program review, particularly if the results were replicated in larger, more detailed surveys using a sample more geographically representative of the U.S. population. The total value concept represents an important direction for future research.

During the 1985 and 1990 RPA program reviews, it was not possible to measure all of the benefits and costs of alternative forest plans, in particular the nontraditional (option, existence, bequest) values. Therefore, it was assumed that the partial measures would be satisfactory indicators of economic efficiency as long as the benefits and costs not included are either constant over alternative plans or vary in direct proportion to the values that are

measured. This assumption can be tested, in part, with the information available for non-traditional values. With respect to recreation use and environmental protection programs, the assumption appears to be reasonably accurate: Information is not available on the proportion of net economic benefits omitted from RPA estimates of the value of other output such as grazing and timber. However, it is likely to be much less than for wilderness owing to the nature of the supply of timber and livestock forage. Thus, it seems that the RPA assumption of constant or proportional omission of benefits and costs would not be correct.

The results of the Rocky Mountain studies are sufficient to demonstrate that measuring the non-traditional valuation (option, bequest, existence) of increments in wilderness designation would represent a substantial contribution to the present value of benefits estimated by the travel cost method. In the absence of information on the willingness to pay for preservation values, insufficient public land would be allocated to wilderness protection in States where future water, mineral, energy, and other development may irreversibly degrade natural environments. Thus, it is proposed that the benefit estimation procedures of Federal agencies be enlarged to consider preservation values. There is a need for State-specific studies in each of the Forest Regions. In the interim, estimates could be prepared for each State based on the Colorado equation. The value of variables such as acres, population, income, education, household size, etc. could be set at the appropriate level for a sample of States in each Region.

REFERENCES

Arrow, Kenneth, and Fisher, Anthony C. 1974. Environmental preservation, Uncertainty and irreversibility. Quarterly Journal of Economics 88:312-319.

Barrick, Kenneth A. 1986. Option value in relation to distance effects and selected user characteristics for the Washakie Wilderness, Northeast Wyoming. National Wilderness Research Conference: Current Research. General Technical Report INT-212, Intermountain Research Station, Forest Service, U.S. Dept. of Agriculture, Ogden, Utah. pp. 412-422.

Cicchetti, Charles, and Smith, V. Kerry. 1973. Congestion, quality deterioration, and optimal use: wilderness recreation in the Spanish Peaks Primitive Area. Social Science Research 2(Mar.):15-31.

Cicchetti, Charles, and Smith, V. Kerry. 1976. The cost of congestion. Ballinger Publishing Co., Cambridge, Mass.

Clawson, Marion, and Jack L. Knetsch. 1966. Economics of outdoor recreation. Johns Hopkins University Press, Baltimore.

Cummings, Robert G., David S. Brookshire, and William B. Schulze. 1986. Valuing public goods: An assessment of the contingent valuation method. Rowan & Allenheld, Totowa, New Jersey.

Deyak, Timothy A., and Smith, V. Kerry. 1978. Congestion and participation in outdoor recreation: a household production function approach. Journal of Environmental Economics and Management 5(Mar.):63-80.

Fisher, Anthony C., and Krutilla, John V. 1972. Determination of optimal capacity of resource-based recreation facilities. Natural Resources Journal 12(July):417-44.

Freeman, A. Myrick, III. 1979. The benefits of environmental improvement. The Johns Hopkins University Press, Baltimore.

Friedman, Milton. 1962. Capitalism and freedom. Chicago: University of Chicago Press, Chicago.

Guldin, Richard. 1980. Wilderness costs in New England. Journal of Forestry 78(Sept.):548-52.

Haas, Glen E., Hermann, Eric, and Walsh, Richard G. 1986. Wilderness values. Natural Areas Journal 6(2):37-43.

Kneese, Allen V., and Brown, F. Lee. 1981. The Southwest under stress: National resource development issues in a regional

setting. The Johns Hopkins University Press, Baltimore.

Krutilla, John V. 1967. Conservation reconsidered. American economic review 57(Sept.):777-86.

Krutilla, John V., and Fisher, Anthony C. 1985. The Economics of Natural Environments. Johns Hopkins University Press, Baltimore.

Leuschner, William A., Cook, Phillip S., Roggenbuck, Joseph W., and Oderwald, Richard G. 1987. A comparative analysis for wilderness user fee policy. Journal of leisure research 19(2):101-l 14.

Low, Christopher R. 1979. The option value for Alaskan wilderness. Ph.D. Dissertation, University of California, Los Angeles.

Menz, Frederic C., and Mullen, John K. 1981. Expected encounters and willingness-to-pay for outdoor recreation. Land economics 57(Feb.):33-40.

Milton, William J. 1975. National forest roadless and undeveloped areas: develop or preserve. Land economics 51(May):139-43.

Outdoor Recreation Resources Review Commission. 1962. Wilderness and Recreation: a report on resources, values and problems, study report 3. Washington, D.C.: U.S. Government Printing Office.

Pope, C. Arden III, and Jones, Jeffrey W. 1987. Value of wilderness designation in Utah. Unpublished paper. Department of Agricultural Economics, Brigham Young University, Provo.

Porter, Richard C. 1982. The new approach to wilderness preservation through benefit-cost analysis. Journal of Environmental Economics and Management 9(Mar.):59-80.

Prince, Raymond. 1988. Estimating recreation benefits under congestion, uncertainty, and disequilibrium. Unpublished paper, Department of Economics, James Madison University, Harrisonburg, Va.

Randall, Allan, Hoehn, John P., and Tolley, George S. 1981. The structure of contingent markets: some results of a recent experiment. Paper presented at the Annual Meeting of the American Economic Association, Washington, D.C. December.

Randall, Allan, and Stoll, John. 1983. Existence value in a total valuation framework. In Managing Air Quality and Scenic Resources at National Parks and Wilderness Areas (R. Rowe and L. Chestnut, eds.). Westview Press, Boulder, Colo.

Smith, V. Kerry, and Kopp, Raymond J. 1980. The spatial limits of the travel cost recreation demand model. Land Economics 56(Feb.):60-74.

Sutherland, Ronald J., and Walsh, Richard G. 1985. Effect of distance on the preservation value of water quality. Land Economics 61(Aug.):281-91.

Tyre, Gary L. 1975. Average costs of recreation on national forests in the South. Journal of Leisure Research 7(2):114-20.

U.S. Department of Agriculture. 1978. Colorado state supplement to roadless area. Review and Evaluation (RARE II). Forest Service, Washington, D.C.

U.S. Department of Agriculture. 1987. Resource pricing and valuation guidelines for the 1990 RPA Program. Report to the Chief's Technical Coordinating Committee on Resource Values for the 1990 RPA, Forest Service, Washington, DC.

U.S. Department of Interior. 1986. Natural resource damage assessments: final rule. Federal Register 51(148):27674-27753.

U.S. Water Resources Council. 1979. Procedures for evaluation of national economic development (NED) benefits and costs in water resources planning. Federal Register 44:242(Dec. 14):950-65.

U.S. Water Resources Council. 1983. Economic and environmental principles and guidelines for water and related land resources implementation studies. U.S. Government Printing Office, Washington, D.C.

Walsh, Richard G. 1986. Recreation economic decisions: Comparing benefits and costs. Venture Publishing, Inc., State College, Penn.

Walsh, Richard G., and Gilliam, Lynde 0. 1982. Benefits of wilderness expansion with excess demand for Indian Peaks. Western Journal of Agricultural Economics 7(July):1-12.

Walsh, Richard G., Loomis, John B., and Gillman, Richard S. 1984. Valuing option, existence and bequest demand for wilderness. Land Economics 60(Febr.):14-29.

Walsh, Richard G., Sanders, Larry D., and Loomis, John B. 1985. Wild and scenic river economics: Recreation use and preservation values. Department of Agricultural and Natural Resource Economics, Colorado State University, Fort Collins.

Weisbrod, Burton. 1964. Collective-consumption services of individual-consumption goods. Quarterly Journal of Economics 78(Aug.):471-77.

Wetzstein, Michael E., Green, Richard G., and Elsner, Gary H. 1982. Estimation of wilderness use functions for California: an analysis of covariance approach. Journal of Leisure Research 14(1):16-26.

ENDNOTES

1. *Several studies have estimated aspects of the demand for wilderness recreation (Leuschner and others 1987; Smith and Kopp 1980; Walsh and others 1984; Wetzstein and others 1982), particularly the effects of congestion on willingness to pay (Cicchetti and Smith 1973, 1976; Deyak and Smith 1978; Fisher and Krutilla 1972; Menz and Mullen 1981; Prince 1988; Walsh and Gilliam 1982).*

2. *The preservation value hypothesis appears to be related to an insight by Clawson and Knetsch (1966). They suggest that the total consumption of wilderness is more than the on-site recreation activity. The authors define the recreation experience to include five phases: anticipation, travel to the site, on-site recreation activity, return travel, and recollection. The anticipation phase would include the option value of possible future recreation use. The recollection phase would include both the existence value of knowing that the resource is protected and the bequest value of endowing future generations with the resource.*

3. *The USDA Forest Service also uses a 4 percent discount rate. To convert the 7-3/8 percent discount rate to 4 percent, multiply present value of benefits and costs by roughly 1.5.3.*

4. *Low (1979) employed. the contribution of time, money, and services by members of Alaskan conservation organizations in support of the Alaska Lands Bill to estimate willingness to pay for the wilderness option. Members were willing to pay an average of $218 to $846 per year, with the value of time in the lower estimate based on the wage value of services provided and the higher estimate based on income of the donor. It appears that members of special interest groups are willing to pay substantially more for preservation or option demand for wilderness, at least in support of a campaign of a few years' duration, than the general public would pay annually in the long run.*

5. Non-traditional values for resident Colorado households range from a high of 7.5 percent of total value for wilderness protection to a low of 60 percent for air quality protection programs. For maintenance of standard recreation facilities, non-traditional values are two-thirds of total value (Walsh 1986). Moreover, non-traditional values do not appear to vary appreciably with recreation output. For example, as the recreation use value *of wilderness increases, the proportion of total value attributed to non-traditional values does not change significantly.*

THE SPIRIT IN THE WILDERNESS: THE USE AND OPPORTUNITY OF WILDERNESS EXPERIENCE FOR SPIRITUAL GROWTH

Barbara McDonald, Richard Guldin, G. Richard Wetherhill*

ABSTRACT

Spiritual growth as a motivation for or value of wilderness has not been widely researched. A paradigm does not currently exist to examine the appropriateness of an area for such growth. We examine wilderness experience in four categories: sacred places and things, cultural heritage, organized groups, and individual experiences. The value of spiritual growth is presented in expanding spheres of community benefits, indicating personal and social value, and possibly biocentric value. Management challenges are presented. We conclude that while spiritual growth is subjective, there are indications that management guidelines could be developed to enhance the opportunity for spiritual growth.

INTRODUCTION

Spiritual growth as a motivation for, or value or benefit of wilderness has been largely unexplored by researchers, or recognized through the laws establishing public outdoor recreation or culturally significant lands. This dearth of attention results from a variety of reasons, of which two seem paramount. First, the connotation of spiritual growth suggests a religious association. The United States Constitution empowers separation of church and state. In practice this clause discourages government involvement in promoting religious practices and use of public resources for religious purposes. Second and more important to our thesis, a concise operational definition of spiritual growth has not been advanced in recreation research, therefore spiritual growth has not been measured or even adequately addressed in the literature. Our goal is to present a rationale for the importance of wilderness for spiritual values, to present some of the paradigms from related fields that might be applied to wilderness settings, and to suggest further awareness for additional research in this area.

Before discussing the use, capability, opportunity, and constraints of wilderness for spiritual reverence and growth, we first define the concept of spiritual growth for this paper.

Some have suggested that spiritual growth is the encounter between self and God. While helping to place the term into a context of meaning outside the day-today experiences of normal consciousness, this definition seems to require some agreement on the idea of God. Rather than move into a discussion of religious definitions and meanings, it may be more helpful to deiine spiritual broadly, and to allow each reader to further interpret the implications according to their own religious beliefs. This approach has its shortcomings, but will facilitate a discussion of wilderness-based spiritual opportunities without becoming mired in a discussion of wilderness-based spiritual opportunities without becoming mired in a discussion of religious definitions and meanings. Only very general definitions of "spirit" and "spiritual" are given in dictionaries, however. Spiritual is defined as relating to or consisting of spirit. Spirit is defined as the moral part of man, which is

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separated from the body at death. A second, more useful definition of spirit is: "animating, fundamental, or vital principle;" and "religious, mental, or emotional part of man's nature" (MacMillan 1979). These definitions are not operational, and therefore are not specifically useful to researchers. How might spiritual be more pragmatically defined?

To early Native Americans, spirituality was "pervasively present and was in complex interrelationships with all aspects of peoples' life-ways" (Brown 1982). Traditional Native American Indians live their religion; religion is part of their lifestyle (McDonald, Kimla 1987). Borrowing this concept and extending it outside the Native American community, a more useful sense of spirituality may be expressed in the idea of interrelationships. Taoism, one Chinese philosophy, is based largely on this concept of interrelatedness. Central to Taoism is "its notion of the relativity of all values" (Smith 1958). One definition of spiritual growth, therefore, may be the development of a mental or emotional awareness of fundamental or vital interrelationships, particularly between a universal force manifested in human and non-human life forms. This may occur suddenly (and be called a spiritual experience) or may develop over a period of time (and be called spiritual growth). The sudden awareness experience may be similar to the mystical experience, embracing such characteristics as ineffability, a feeling of knowledge, a short-lived experience, and a feeling of abeyance (James 1936). Spiritual growth, on the other hand, occurs over a period of time, but may include sudden experiences of insight and understanding. In the wilderness setting, spirituality may be defined as the sudden or gradual awareness of interrelationships among plants, animals, the landscape, and indeed all naturally- occurring things within a totally natural environment, one that is "untrammeled by man." The wilderness environment provides unique conditions which enhance an awareness of environmental and "self-other" interrelationships.

In support of a notion of the similarity between the natural environment and God, Norton (1987) suggests, "Medieval theologians who puzzled about how God could exist eternally and yet be creator of all things, concluded that He must have created Himself. God must be a self-moved mover. So biology mimics theology. The force of nature is in this respect Godlike; the earth's community of life is a self-moved mover." T.H. Watkins (1987) writes, "We humans are related in life to all the life around us...The species that produced the typewriter reaches adulthood through the same process by which the spider grows, shares in the same mysterious spark and dance of creation. Biologist E.O. Wilson has dubbed this relatedness biophilia- the brotherhood of life."

Spirituality is a human concept. The human species is therefore very much a part of the concept of spirituality. It has been suggested that spiritual growth should not be described in a personal or social context, but that spiritual growth is something well beyond healthy personal growth. While that may be true, it seems more useful to describe the wilderness experience as primarily a personal discovery, and second, a discovery of relationships. The deeper meanings and interpretations are a third part of this experience, but these meanings must be left to individual interpretation. Wilderness spirituality may be defined as the sudden or gradual awareness of self-other interrelationships. "Self" may be personal or it may represent the human species, and "other" may be the sacred, or God, or other systems that are "not-self." It is this "not-self" that some would define as God, necessarily having as a characteristic a universal energy of life. It is here that personal beliefs about God shape one's definition of spiritual. Buckminster Fuller, for example, defined God (for himself) as a verb, not a noun. It is the interaction of "self' and "other" within the wilderness context that defines (solely on a personal level) the true meaning of wilderness spirituality.

This interaction and awareness impact individuals to the degree that their view of their "life-world" is changed, reflecting the new awareness we labeled "spiritual growth". Spiritual growth, by definition, requires a change in awareness, which is rarely planned or calculated. Often it is only noticed after

the fact, and in fact, may never be recognized as such. Further, people may have a spiritual experience but find it difficult to verbalize what they have felt. Consequently, even if measurable, the occurrences of spiritual growth in or because of wilderness environments are not easily discernable. Thus, it remains largely a speculative and philosophical venture to discuss the spiritual uses of wilderness.

ADMINISTRATIVE GUIDELINES

The United States Code does not widely recognize the benefit of spiritual experience or growth on wilderness lands, or on any public lands. The code identifies the need for special management on public lands to protect, among other values, "historic, cultural, or scenic values" (43U.S.C.1702). The National Historic Preservation Act (16U.S.C.470) mentions specifically the enrichment and maintenance of "cultural, aesthetic, and inspirational benefits," and the Act establishing the Hells Canyon National Recreation Area adds the caveat,"...and other values contributing to the public benefits,"

The Forest Service Manual, section 2321, states, "The qualities of wilderness and wild areas are expansive solitude and unspoiled natural environment. These large areas in the national forest invite adventure, provide a refuge from civilization, give spiritual comfort, and preserve the flora and fauna for inspiration, enjoyment, and scientific study."

Specific documentation in the U.S. Code not withstanding, much of the activity surrounding the protection and preservation of wild lands has had its foundation in the spiritual and inspirational value afforded by those lands. In A Sand County Almanac, Leopold (1949) recommends the preservation of wilderness: "To the laborer in the sweat of his labor, the raw stuff on his anvil is an adversary to be conquered. So was wilderness an adversary to the pioneer. But to the laborer in repose, able for a moment to cast a philosophical eye on his world, that same raw stuff is something to be loved and cherished, because it gives definition and meaning to his life. This is a plea for the preservation of some tag-ends of wilderness..."

During Congressional hearings on the establishment of the National Wilderness Preservation System, much evidence for the spiritual value of wilderness was documented. Mrs. William F. Unsoeld testified, "The value to our nation of these expansive solitudes is impossible to measure in concrete terms. Statistical surveys of man-day usage simply fail to encompass the re-creative value to society of the primitive adventure or spiritual inspiration which natural solitude so strikingly stimulates" (Hearings before the Sub-committee on Public Lands, November 6, 1961).

Wilderness areas were set aside by Indo-Europeans as sacred groves or sanctuaries, in an implicit recognition of their intrinsic value (Vest 1987). In his discussion of wilderness solitude, Vest states, "Religion, then, is at the core of wilderness solitude." Even though the language creating the legal basis for American wilderness does not specifically discuss its religious roots, the cultural and historical background of the Wilderness Act suggests the important role it played. "Hence, the act is not a scientific statement of managerial technology, but a Congressional mandate reflecting a rich heritage of value." (Vest 1987).

MANAGEMENT GUIDELINES

Spiritual or inspirational growth is not subject to management regulations, although management philosophy and action may impact the opportunity of or likelihood for those types of experiences. The U.S. Code of Federal Regulations states that in carrying out such purposes, "National Forest Wilderness resources shall be managed to promote, perpetuate, and, where necessary restore the wilderness character of the land and its specific values of solitude, physical and mental challenge, scientific study, inspiration, and primitive recreation" (36 CFR 1986).

The cultural foundations of society may influence spiritual experience and growth through symbolic representation. For

example, the sight of a soaring Bald Eagle may be inspirational in part due to its association with the United States as a national symbol, or for others as a triumph over its endangered status. Managers may enhance Bald Eagle habitat and protection, thus enhancing the opportunity for an inspirational experience. But it remains for the individual to have that experience, interpret it, and recognize it as a benefit.

Regulations influencing the visual integrity of an area, its level of water pollution, air quality, and other standard setting regulations may undoubtedly influence the inspirational characteristics of the area. But inspiration and spiritual growth lie beyond the possibility of external or legal regulation. In the case of wilderness designation and management, it is perhaps the recognition and preservation of spiritual opportunity inherent in different ecosystems that is important.

Spiritual growth may occur in any setting, indoors or out, urban, rural, or primitive. Places of worship seem to mimic in some ways the characteristics of nature: large, cathedral-like open spaces with large, vertical dimensions, and a pleasing design among other characteristics. It appears likely that the more natural, unconfused, and peaceful the setting, the more likely it is that an individual may reflect on self-other interrelationships, and be influenced by them. Wilderness environments may provide outstanding opportunities for politicians, planners, and managers to promote the setting for inspirational outdoor experiences.

INVENTORY OF USE

The literature on inventory of use of wilderness areas for spiritual purposes is, in most cases, of the "fugitive" variety. Bits and pieces may be found among agency files, research monographs, oral histories, and the like. In large, specific documentation on selected sites is known to only a small cadre of persons whose work is related to the subject and tied to the location. Some work does surface, however. A software system for building and maintaining a data base of cultural resource survey data specifically relating to land exchanges is available from the Chippewa National Forest. The software is available to all U.S. Forest Service units, but the total extent of its use cannot be determined without contacting all of the more than 900 computer sites in the Forest Service. Another example from the U.S. Forest Service is the extensive Inventory of Native American Religious Use, Practices, Localities and Resources (Institute of Cooperation Research, 1981) conducted on the Mt. Baker-Snoqualmie National Forest in the state of Washington. This report divided its inventory of religious sites on the forest into five major categories: spirit sites, ceremonial flora sites, cedar sites, legendary sites and cemeteries and archaeological sites.

In general, however, a paradigm does not exist to measure the relative fitness of an area for spiritual growth. Therefore, it is not yet possible to make independent estimates of the "spiritual carrying capacity" of a particular tract--wilderness or not. The pragmatic approach is to observe use and use rates, and from them infer the relative fitness of an area for spiritual growth.

Use of wilderness for spiritual growth may be examined in four interrelated levels: 1) Sacred places and things, 2) Cultural heritage, 3) Organized group experience, and 4) Individual experiences (Figure 1).

1. Sacred Places and Things

Sacred places and things are sites or objects that hold special (and usually religious) significance to individuals, groups, cultures, or societies. Sacred space is described by Graber (1976): "Some parts of space are wholly different from others. When the sacred reveals itself in space, man gains a fixed point of orientation in the chaotic relativity of the profane world. Sacred space is the site of power, and makes itself known by the effects of power repeating themselves there, or by the effects of power being repeated in ritual by man." The United States has recognized some of these sites through preservation in the National Park System, National Recreation Areas, National Monuments, and the National Wilderness Preservation System, among other

types of recognition and preservation mechanisms. Native American societies, particularly before the invasion of Europeans, lived in "geopiety" (Graber 1976), a life centered around the natural world and oriented in physical space. These societies identified physical locations for certain purposes, many of which served religious or spiritual functions. Some of these sites are well known today, such as the Black Hills in South Dakota or the "sun daggers" and accompanying petroglyphs that dot the Four Comers area. A rough rule-of-thumb for identifying such sites is, "look to the high places". Unique physiographic elevations provided and still provide and Native Americans with ceremonial places, and as was the case of the Ninah Waiya mound along the Natchez Trace in Mississippi, they sometimes had to construct 'such high points themselves.

In a recent article, Kimla McDonald (1987) described the concept of geopiety: "Freedom of religion is for some people an environmental issue. Tribal religions are land-based theologies, and religious activity in specific places [is] inseparable from religious practice."

In 1986, the Lakota (Sioux) Tribe testified before the U.S. Senate Select Committee on Indian Affairs to reaffirm the boundaries of their reservation, and to secure additional Black Hills lands from the federal government. The testimony focused on the Black Hills as sacred in the traditional Lakota religion. Testimony of Lakota beliefs interpreted by Charlotte A. Black Elk included this statement, "Any segment of creation cannot be isolated from any other, however there are some parts of creation and the earth that have a special and unique character. The Black Hills is always presented as the part essential for existence of the Lakota" (Hearing before the Select Committee on Indian Affairs 1986). Places may hold special significance for cultures, even those not ascribing to a land-based religion. The Great Salt Lake and surrounding area holds special meaning for Mormons. Unique natural areas such as Yosemite and the Grand Canyon offer inspiration to visitors as well as serving as focal religious sites for Native Americans (Page 1982). Sub-cultural significance may also be assigned to areas such as battlefields, cemeteries, individual giant sequoia trees, and to sites like Walden Pond.

Another example of attention to the sacred is the reverence placed on ecologically or otherwise significant things, such as wildlife, plant species, and specific minerals. Thus, Native Americans ascribed special significance to totems, often animals such as the bear. Americans today may feel inspired by the sight of eagles, dramatic rock formations, or even less spectacular but still meaningful naturally occurring life forms or systems. A new focus by some groups on crystals ascribes that these minerals possess certain energies and powers, and some crystals may have special significance over others.

2. Cultural and Religious Heritage

Prior to the Industrial Revolution (1810-1840), American culture was based on the land and spiritual beliefs were related, in part, to a dependence on favorable physical conditions. Until the 1930s and the advent of mass communications media (radios, television) the cultural heritage of a society was still tied closely to geographic places and experiences. But in recent decades, cultural heritage was changed for many people, becoming much less dependent upon places. Material goods have become much more prominent in the culture of many people. Thus, the sacred places or things of an earlier society may change in their significance to later societies. An example of this change is an area currently identified as Indian Springs State Park in Georgia. The springs were considered sacred by early Native Americans. They visited the site annually to collect the sacred water. When white settlers moved close to the springs, the Native Americans moved away. Finally, the springs began to lose their sacred character for the natives (personal communication, Lucy Lawliss). Today, this site is preserved as a culturally important site in Georgia history, and may once again take on spiritually significant characteristics to visitors. A similar pattern of events can be found relating to the extraction and use of crystalline quartz in

Figure 1.---Levels for examining the use of wilderness for spiritual growth

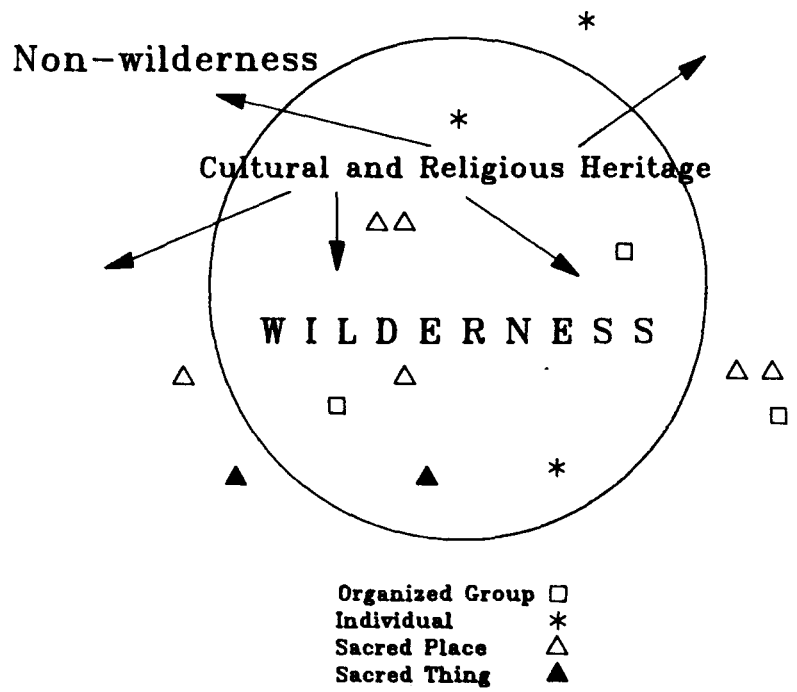
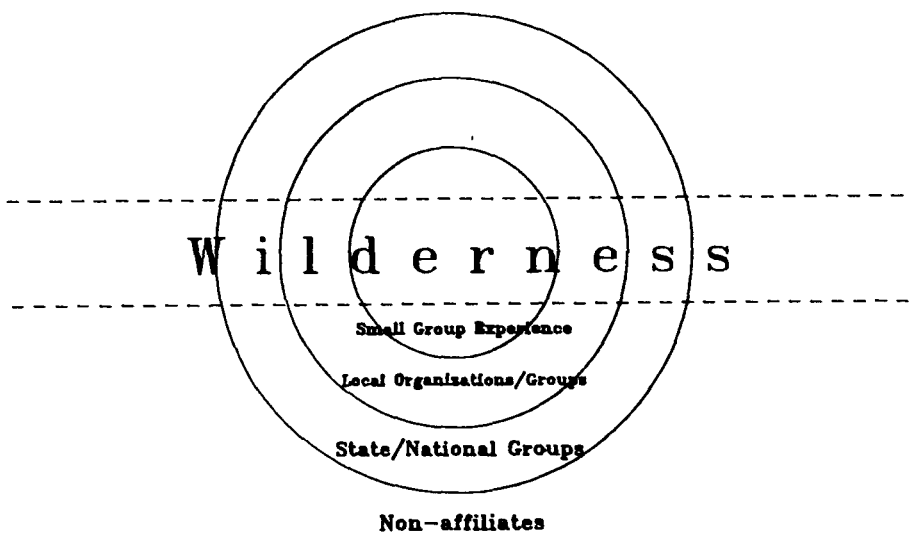


Figure 2.--Possible relationship of outdoor oriented groups to the wilderness experience.



West-Central Arkansas by the Caddo tribes, and by the preservation of numerous burial mounds in the Southeast U.S.

3. Group Process and Organizations

Figure 2 describes the placement of these groups in relation to wilderness experience.

Small group experiences may have a formal or informal organization. An informal group may be a family group or a group of friends. A more formal structure includes group outings such as church youth groups or the Boy Scouts. For these more formal groups, wilderness trips are usually structured to provide certain benefits. Outward Bound groups, for example, are structured to provide the opportunity for tangible and intangible benefits, such as skill development, outdoor knowledge, perseverance, and commitment. The Outward Bound Annual Report (1986), states: "Outward Bound has since evolved into a modern-day program for self-discovery and personal development." The Boy Scouts program hopes to develop "American citizens who are physically, mentally, emotionally, and spiritually fit" (Chaplain's Information, p. 2). Table 1 gives an example of some well-known organized outdoor groups, indication of whether spiritual benefits are implied in their mission or purpose, and estimates of 1986 membership.

Small group experiences are only one type of societal structure through which wilderness may be experienced. Most larger organizations are composed of smaller state, regional, and local membership groups, therefore, small group dynamics and experiences are important even in national organizations. As an example, the Sierra Club offered outdoor adventures to 3,794 individuals in the National Outings program (Annual Report 1985). It is estimated that over 400,000 additional individuals participated within one of the 58 local Sierra Club chapters across the US. in 1987 (personal communication, Jim Absher, November 10, 1987). Another example of how small groups can be structured for wilderness experiences is described in an abstract from a paper presented at the 4th World Wilderness Congress (Brown 1987): "This paper describes an outdoor retreat program the author has been conducting since 1976. [The paper] describes methods which can be employed to develop human resources such as imagination, intuition, inspiration, and insight; tap the transformative potential of, and facilitate the process of self-actualization on wilderness and back country trips."

As the size of organized groups gets larger, it is less likely that the spiritual value of wilderness for the aggregate group lies directly in the actual wilderness visit. There may be many who never set foot in a wilderness area, yet are committed to the values of wilderness. The concept of option, existence, and bequest value are relevant here. An organizational commitment to wilderness is similar to a cultural and community value, since many of the same values and symbols are shared by the members individually and the organization collectively. Graber (1976) states, "The striking uniformity of wilderness purists' beliefs, their memberships in conservation organizations, their sense of identity, and their degree of emotional commitment suggest the emergence of something like a sacred community". Therefore, the possibility of spiritual benefit of wilderness may exist even for those individuals and groups who infrequently or never experience the wilderness directly.

4. Individual Experiences

Individual spiritual experiences and growth may occur during solo wilderness visits, but solo experiences are probably not necessary for individual spiritual growth. It is difficult to identify and measure the individual spiritual uses of wilderness, due largely to difficulties with operational definition of both wilderness and spiritual value. Attributes closely related to personal spiritual growth in outdoor recreation have been explored in some studies. These studies provide some indication of the relative importance of the intangible benefits of outdoor experiences to the individual.

Market Opinion Research (MOR), in a report prepared for the President's Commission on Americans Outdoors

Table 1.--Selected Outdoor/Conservation Groups

Group	Spiritual or related benefits recognized in stated purpose?	Estimated 1986-87 Membership[1]
1. Boy Scouts	Yes	4,754,479
2. Girl Scouts	Yes	2,871,000
3. Sierra Club	Yes	349,797
4. Outward Bound	Yes	15,300 (students)
5. Camp Fire, Inc.	Yes	400,000
6. Audubon Society	No	550,000
7. Wilderness Society	Yes[2]	190,000
8. American Wilderness Alliance/Adventure	No	4,000

[1] Compiled from the Encyclopedia of Organizations, 1986-87.
[2] land ethic as a philosophy

Table 2.--Driver & Brown's seventeen recreation experience preference domains and scales

1. Enjoy Nature
   - A. Scenery
   - B. General Nature Experience
   - C. Undeveloped Natural Areas
2. Physical Fitness
3. Reduce Tension
   - A. Tension Release
   - B. Slow Down Mentally
   - C. Escape Role Overloads
   - D. Escape Noise
4. Escape Noise & Crowds
   - A. Tranquility, Solitude
   - B. Privacy
   - C. Escape Crowds
   - D. Escape Noise
   - E. Isolation
5. Outdoor Learning
   - A. General Learning
   - B. Exploration
   - C. Learn Geography of Area
   - D. Learn About Nature
6. Share Similar Values
   - A. Be With Friends
   - B. Be with People Having Similar Values
7. Independence
   - A. Independence
   - B. Autonomy
   - C. Being in Control
8. Family Kinship
9. Introspection
   - A. Spiritual
   - B. Personal Values
10. Be With Considerate People
11. Achievement/Stimulation
    - A. Reinforcing Self-Confidence/Self-Image
    - B. Social Recognition
    - C. Skill Development
    - D. Competence Testing
    - E. Seeking Excitement/Stimulation
    - F. Self Reliance
12. Physical Rest
13. Teach/Lead Others
    - A. Teaching/Leading Skills
    - B. Leading Other
14. Risk Taking
15. Risk Reduction
    - A. Risk Moderation
    - B. Risk Prevention
16. Meet New People
    - A. Meet New People
    - B. Observe New People
17. Nostalgia

classifies American adults as having five types of motivations for outdoor recreation:

1. fitness
2. social
3. excitement
4. experience self and nature
5. conformist/space cramped

Those individuals with the motivations to experience self and nature are probably the most receptive to an experience involving spiritual growth in the outdoors. The fact that this dimension even emerged in the MOR study is an indication of the importance this type of outdoor experience has as a motivator for Americans. The MOR report also depicts a clustering of individuals with like motivations, Figure 3.

"Getaway Actives" consider outdoor recreation as a chance to be alone and study nature, but they are not anti-social. They participate in all kinds of sports, but like quiet, in-the-woods-and-waters sport. They are not into competition. Their median age is 35, 50% male, 50% female (Market Opinion Research 1987). The "getaway actives" would seem to be the most likely group to visit wilderness areas for spiritual growth although probably only a small proportion would specifically admit to this as a primary reason for the visit. These data help us to broadly classify the motivations of possible wilderness users, and give some indication that spiritual growth (broadly defined) is a possible benefit for some users.

The 1982-83 National Recreation Survey conducted by the National Park Service asked respondents why they enjoyed their favorite outdoor activities. Several selected reasons am closely associated with spiritual growth, Figure 4.

Sixty-eight percent of the respondents said that they enjoy nature and the outdoors, and 47% mentioned the quiet and peaceful aspects of the site as reasons for enjoyment. These data give some idea of the spiritually related aspects of outdoor recreation benefits. However, the data give little explicit evidence of the presence or magnitude of spiritual benefit. Driver and Brown (1987). in a paper prepared for the President's Commission on Americans Outdoors, listed 17 recreation experience preference domains and related scales, Table 2.

Introspection (#9), as an experience preference domain, consists of scales identified as spiritual and personal values. Baaed on these domains, some indication of a more recent research concern with inspiration and personal growth is evident.

In a theoretical model of commitment and community awareness presented at the National Recreation and Park Association Annual Congress (McDonald 1987), spiritual growth was theorized to be a possible outcome of committed outdoor/skill challenge activities (Figure 5).

Spiritual growth was defined by McDonald as an increasing awareness of community or of the interrelationships among increasingly larger systems. If this model could be successfully applied to wilderness experience, then spiritual growth as a benefit could be considered a part of a process that includes such experlences as the sharing of similar values, physical fitness, escaping noise and crowds, enjoying nature, risk taking, and achievement, as well as introspection (these experiences are all included in Driver & Brown's list of recreation experience preference domains, and all would likely be part of a wilderness visit). In fact, it is difficult to describe spiritual growth as an independent variable. It may be better viewed as a dependent variable, having as its independent variables a variety of conditions or experiences, many of which are listed in the Driver and Brown Experience Preference Domains.

In the Driver-Brown paper, 16 of the 17 domains are ranked by mean scores for eight designated wilderness areas and four non-designated wilderness areas. The average ranks for the 16 domains across the 12 areas are shown in Table 3.

If the community model can be applied to wilderness experience, and the assumption of commitment to the experience (repeated performance) is fulfilled, then five out of the first eight domains, including the top two, may be viewed as part of a process leading

Figure 3.--Market opinion research classification of motivations of American adults, by percentage

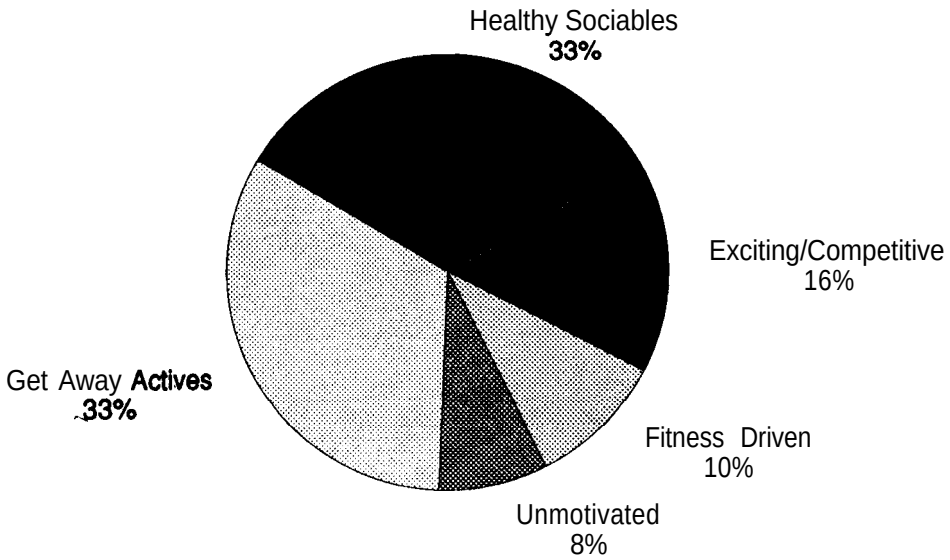


Figure 4.--Selected reasons why favorite outdoor recreation activities were enjoyed.

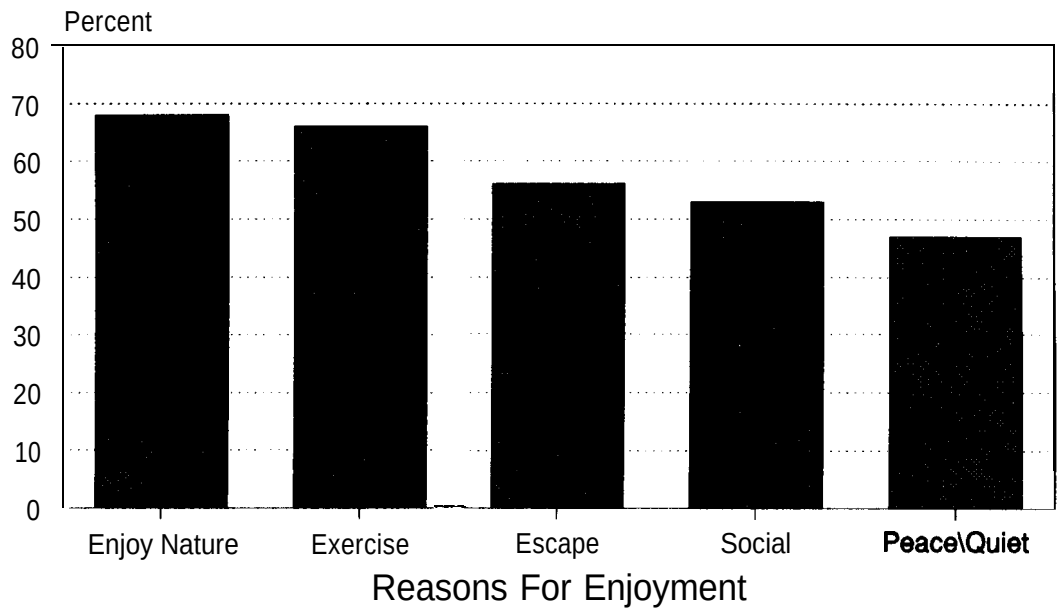


Figure S.--The corn-model (model of community)

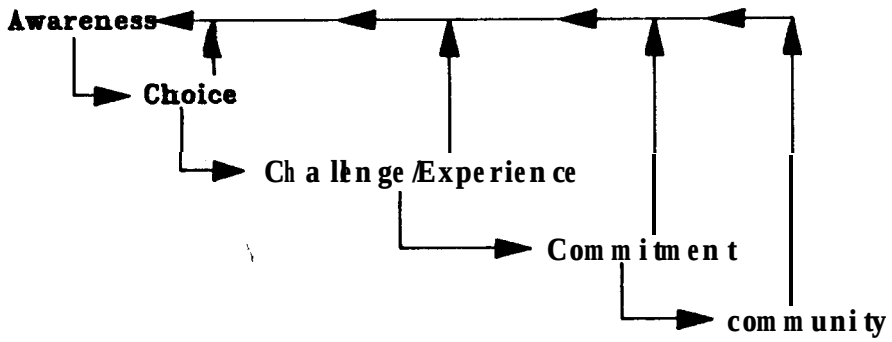


Table 3. -- Average Rank of Experience Domains Across 12 Wilderness Areas

Experience Preference	Average Rank
Enjoy Nature	1.0
Physical Fitness	2.4
Reduce Tensions	2.9
Escape Noise/Crowds	3.1
Outdoor Learning	3.3
Sharing Similar Values	5.7
Independence	6.4
Introspection	6.6
Family Kinship	7.0
Considerate People	7.1
Achievement/Stimulation	8.7
Physical Rest	8.3
Teach/Lead Others	9.8
Risk Taking	10.5
Risk Reduction	11.8
Meet New People	12.0

to greater community awareness and possibly to spiritual growth.

The implication of the community model process is that spiritual growth may be a multi-dimensional construct, and may be manifested without either anticipation nor immediate recognition in the course of other wilderness experiences.

A PARADIGM FOR CONSIDERING VALUE

The value of spiritual growth seems on the surface to be primarily a personal value, but the measurement of this value has not been widely explored in research methodology. Arlie Hochschild (1979) describes what she calls "feeling rules", social guidelines that tell us how we think we should feel. Examples of feeling rules are: a feeling of reverence in church, sadness at funerals, sympathy at misfortune, etc. Spiritual growth shares some characteristics with the notion of feeling rules. Outdoor recreation and wilderness experiences, like church-going experiences, may culturally and socially prime individuals and groups to feel spiritually uplifted. Hochschild reports that feeling rules do not apply to action but rather are a precursor to action. Spiritual growth on the other hand, is more likely the result of some action, whether it be activity or passive thought. For both concepts (feeling rules and spiritual growth), "they tend to be latent and therefore resistant to formal codification" (Hochschild 1979). It is this characteristic of latency that obscures the identification and measurement of the value of spiritual growth.

If spiritual growth can be defined as an awareness of self-other interrelatedness that becomes part of the individual's life-style and world-view, and the wilderness setting provides outstanding examples of this interrelatedness, then the value of spiritual growth may be viewed within perceptual zones of community structures and environments.

Based on the Driver and Brown Recreation Experience Preference Domains, it is apparent that some recent efforts have been made to identify individual spiritual/introspective benefits, and to assess their role in recreation experience. However, the occurrence of spiritual growth may have social and environmental value well beyond the individual, as depicted in Figure 6.

Spiritual growth is probably similar to many other cultural values in that its manifestation is rooted in cultural norms. For example, a Christians's view of spiritual growth is different in many ways from a Hindu's, However, some of the values of spiritual growth are universal; for example, a concern for a relationship to the omnipotent, omnipresent uniting force, whatever it is perceived to be.

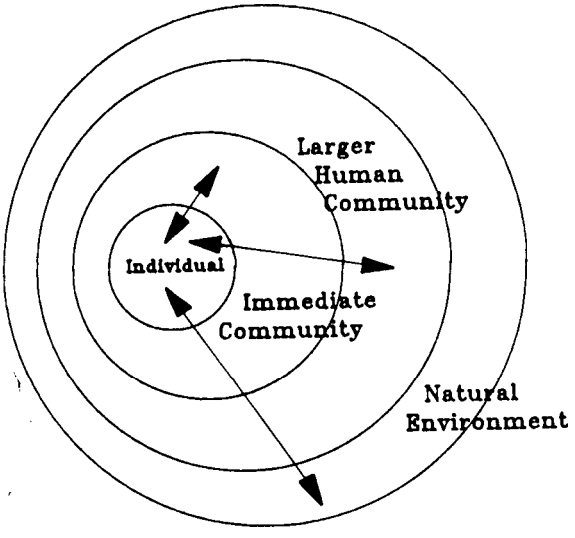
WILDERNESS MANAGEMENT IMPLICATIONS

Land managing agencies have attempted to identify the "isolation potential" of an area as a measure of its fitness for solitude. The USDA Forest Service listed physical components of wilderness isolation to assist in its inventory including, for example, size of area, topographic screening, vegetative screening, and size of area, While these are sincere attempts to inventory areas suitable for certain types of wilderness experience, they lack a depth of insight into the solitary experience, and the historical-cultural foundations of spiritual and inspirational wilderness experiences.

An inventory-like attempt to measure wilderness solitude is incomplete, however. Spiritual experiences need not be totally solitary, and spiritual opportunities and settings are undoubtedly infinite. However, wilderness managers may consider such attributes as proximity to wildlife or opportunities to view and contemplate wildlife, auditory protection from man-made (mechanical, etc.) sounds, outstanding aesthetic opportunities, and either open and expansive or closed-in and protected natural areas, high places, water resources, and environmental quality and integrity.

Wilderness areas provide a unique environment for contemplation of universal life exemplified in nature. Wilderness areas' unique character lies in their unaltered natural

Figure 6.--Expanding Spheres of Continuity



state (or one which is perceived by the user as being unaltered). If an individual were seeking a spiritual experience, to be truly alone with God or with nature, that individual would find few places for refuge. As world population continues to grow and metropolitan areas expand along transportation corridors like the spokes of a wheel, fewer untouched natural areas will be available for the spiritual pilgrim seeking true solitude. For those who come to their spiritual growth accidentally, the wilderness setting provides important opportunities for serendipitous discovery that is conducive to such growth and awareness. Therefore, a paradox emerges. If the wilderness system remains as it is, a growing population that will be consciously or unconsciously seeking its spiritual growth in wilderness will visit the areas mote frequently, creating more crowded conditions, which will be less conducive to provide the spiritual benefits all seek. Some spiritual opportunities will likely be destroyed. In a spiritual sense for some cultures and some places this has already occurred. Perhaps most individuals and cultures will adapt, and be content with finding their spiritual attunement with nature in more developed settings, such as backyards or metropolitan parks and zoos. It is inevitable that the population of the United States will increase, bringing social and environmental change that will impact the uses, experiences, and physical integrity of wilderness areas.

A recent Supreme Court Case (October, 1987) examined the relationship between the Free Exercise (of religion) Clause of the First Amendment and the government's authority to manage the public lands. At issue was a tract of land in the Six Rivers National Forest. Three tribes, the Yurok, Karok, and Tolowa, claimed that Forest Service plans for logging would destroy the religious and spiritual quality of the area, and infringe on their freedom of religion. The Forest Service management plan was upheld by the court, on the grounds that the Free Exercise Clause guarantees the right of the individual to shape their own religious conduct free from coercive government action. and the Forest Service plan could not be considered coercive action. What is important to this paper, however, is the recognition that if public land management actions may impair, prohibit, or destroy spiritual experience, the corollary must also be considered: Management may also enhance, promote, and preserve such experience.

The spiritual questions and quest of man have seemingly changed little over the centuries. Herman Hesse, writing in 1929, explored man's spiritual quest through the development of Steppenwolf, his main

character in the book of the same name. During a conversation with his new-found "spiritual guide," she says to Steppenwolf:

> "It has always been so and always will be. Time and the world, money and power belong to the small people and the shallow people. To the rest, to thereal men belongs nothing. Nothing but death...[and] eternity."

It seems reasonable to assume that the quest for spiritual understanding and experience will remain as critical in the future as it is today and has been in the past. Yet, with fewer places for refuge from modem "intrusions", such as technology, man may find that many of his spiritual questions must remain unanswered.

Spiritual growth is primarily, "in the eye of the beholder." Can land managers really enhance opportunities for spiritual growth? If spiritual growth is also related to cultural and religious norms, then broad guidelines may be established. Native Americans, in their minimal management of the land and in the design of their villages, integrated spiritual beliefs into all aspects of their lifestyle, e.g. the thousands of Kivas (some in use today) that may be found in the Southwest. With a recognition of the possible spiritual value of wilderness areas and other public lands, resource management actions may be guided by social, cultural, and environmental principles that enhance or promote the spiritual characteristics of the environment.

Research is needed to explore and identify the universal characteristics of environments conducive to spiritual growth and awareness. Perhaps a research partnership with departments of philosophy and religion, landscape. architecture, social sciences, and natural resource management could address the question in an interdisciplinary manner. More specific attention should be given to the unique and critical role that wilderness areas play in the spiritual growth and awareness of Americans. For only as we begin to understand these topics better will we understand more fully ourselves.

REFERENCES

Absher, James. Personal Communication, November 10, 1987.

Annual Report, National Audubon Society. 1986. New York: National Audubon Society 32 pp.

Annual Report. 1986. Outward Bound USA. Greenwich, Connecticut. 17 pp.

Brown, Joseph E. 1982. The Spiritual Legacy of the American Indian. New York: The Crossroad Publishing Co., 135 pp.

Brown, Michael. 1987. Wilderness Vision Quest: Exploring the Frontiers in Human Resource Development. Paper presented at the 4th World Wilderness Congress. Estes Park, Colorado. September 14-18.

Chaplain's Information, Boy Scouts of America. Irving, TX.

Driver, B. L. and Perry J. Brown. 1986. Probable Personal Benefits of Outdoor Recreation. in President's Commission on Americans Outdoors: A Literature Review. Washington, D.C.

Graber, Linda H. 1976. Wilderness as Sacred Space. Washington, D.C., The Association of American Geographers. Eighth in a Monograph Series. 124 pp.

Hearing Before the Select Committee on Indian Affairs. 1986. United States Senate. Ninety-ninth Congress, second session, on S.1453. July 16. Washington, D.C. p. 204.

Hearings Before the Subcommittee on Public Lands of the Committee on Insular Affairs, House of Representatives, 1962. Eighty-seventh Congress, First Session on S. 174, H.R. 293, H.R. 299, H.R. 496, H.R. 776, H.R. 1762, H.R. 1925, H.R. 2008, and H.R. 8237. Serial No. 12, Part III. Washington, D.C. pp. 980, 1033, and 1942.

Hochschild, Arlie Russell. 1979. Emotion work, feeling rules, and social structure. American Journal of Sociology. pp. 551-574; p. 563, 566.

Institute of Cooperative Research. 1981. Inventory of Native American Religious Use, Practices, Localities and Resources: Study Area on the Mt. Baker-Snoqualmie National Forest, Washington State. Seattle: Institute 'of Cooperative Research. 743 pp.

James, William. 1936. The Varieties of Religious Experience. New York: The Modem Library. pp. 371-372.

Lawliss, Lucy. Personal Communication. November 5, 1987.

Leopold, Aldo. 1949. A Sand County Almanac. Oxford University Press. New York. Ballantine books, A Division of Random House, Inc. 295 pp.

Market Opinion Research. 1986. Participation in Outdoor Recreation Among American Adults and the Motivations which Drive Participation.

McDonald, Barbara. 1987. Enhancing Community Awareness and Spiritual Growth Through Recreation Participation. Paper presented at the National Recreation and Park Association National Congress, New Orleans, Louisiana.

McDonald, Kimla. 1987. Sacred Land in Environmental Planning. The Environmental Professional. Vol. 9, No. 1, 1987. pp. 27-32.

Norton, Bryan G. 1987. The Spiral of Life: How it all Works, with Examples. Wilderness, Spring, 1987. The Wilderness Society.

Page, Jake. 1982. Inside the Sacred Hopi Homeland. National Geographic (November): 606-629.

Smith, Huston. 1958. The Religions of Man. Harper and Row. p. 211.

United States Code of Federal Regulations. 36 CFR Ch. 11 (July 1, 1986 Edition). Part 293- Wilderness-Primitive Areas. Paragraph 293.2 p. 205.

United States Department of the Interior, National Park Service. 1986. 1982-1983 Nationwide Recreation survey. Washington, D.C.: Superintendent of Documents, U.S. Government Printing Office. 96 pp.

U.S. Department of Agriculture, Forest Service Handbook Chapter 2310, Recreation System Planning. October 1967.

Vest, Jay Hansford C. 1987. "The Philosophical Significance of Wilderness Solitude," Environmental Ethics. The University of Georgia, Environmental Philosophy, Inc. Vol. 9, p. 307, 327, 304.

Watkins, T. H. 1987. The arachnid connection, Wildemess:Spring:l 1; 1987.

THE COMMERCIAL PRODUCTION VALUES OF WILDERNESS

Terence **Yorks***

ABSTRACT

My target is to address the use, capability, opportunities, and constraints of wilderness to produce renewable resources such as fish, wildlife, and water within wilderness for eventual consumption outside of wilderness. To go beyond theory will require an increase in specifically targeted funding. Meanwhile, it can be suggested that three basic laws drive all production: (1) as biological diversity increases, so does the presence of materials of use to humans, (2) pollution is absolutely related to energy use, (3) as energy use increases, diversity decreases. Since management as wilderness requires least energy use, it is actually in the best potential position among land optimization strategies to support our economic as well as our psychic needs. Concentrating on exceptions and management errors in the past has left us blind to this more general rule. Social, rather than practical considerations, hold back these hypotheses most sharply, including our failure to separate inappropriate use of machines from potentials for commercial production.

A CAVEAT

I am in absolute agreement with the importance of hard numbers, and the utility of the requested scheme for organization of papers in this group. Unfortunately, useful numbers always have been available only in exchange for dollars, despite a mystique among salaried scientists that they should simply be given. The following paper was prepared without financial support to allow the full use of the powerful tools, techniques, and collected information already available for the task. This is reflected in the lack of reference citations. In assessing wilderness survey work, one should begin by musing on the meaning of "professional," by definition work that is paid for, with quality related to price.

THE OTHER SIDE OF THE COIN

In the interim, there are some important points which can be made with logic, which should be at the heart of a good scientific undertaking, including observations that might help uncover some of the funding needed to begin the job aright. First is clarifying some of the underlying reasons why wilderness has the capability to produce far more renewable resources than most people expect. In this especially, numbers alone are not the whole story; the context of wilderness is indispensable. Accordingly, this sketch will follow how the very constraints that make wilderness areas require special management actually allow maximizing any land's overall productive potential. The conclusion projects a rather unique framework in which to organize a more complete analysis of that potential now and in the future.

YORKS' FOUR LAWS OF PRODUCTIVITY:

(1) In the long run, as biological diversity increases, so does the production of materials of use to humans.

(2) Pollution is absolutely and unalterably related to energy use. This puts limits on machinery in a most interesting light.

(3) As energy use increases, diversity decreases. Production losses follow. This is the reason for the two first rules' importance to wilderness and to economics.

(4) For each rule, many exceptions can be found, but three questions should follow. Does the argument using the exception obscure the overall truth? Could the exception be sustained for a million years? If a million years seems irrelevant, how long should human society last?

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THE THEORETICAL UNDERPINNING OF WILDERNESS CAPABILITY

The primary positive implication of these controversial laws is that Buckminster Fuller's oft-misused suggestion to "do more with less" can bear some surprising fruit, with wide applications that even its author did not expect.

An oversimplified example of the first law at work can be found on the high plains of Wyoming and Montana. There, most of the land is too dry to farm, and livestock grazing is a principal industry. One scheme of classification for analysis has three basic forms of plants: grasses, forbs (that is, those with broad leaves often thought of as weeds--or flowers), and shrubs. Because competition for the region's limited rain fall is usually the first restricting plant growth here, 'any one type has its ability to grow reduced by grazing that puts another selective pressure it. Cattle concentrate on grasses. Hence, shrubs and forbs tend to increase over time where cattle are the only grazing animal. The more cattle, the greater the effect. As shrubs enlarge in response to reduced competition, they further limit grass reproduction through shading and chemical secretions. They also limit the usefulness of what grass remains because the cattle can no longer reach through the brush canopy.

However, if antelope are added to the livestock, these native animals browse shrubs, thereby aiding grass growth. More antelope (up to a point, of course) mean more grass, just as cattle in increasing numbers mean more shrubs and less grass. Hence, not only can one harvest more meat by having antelope as well as cattle on the land, but one can, surprisingly, keep more cattle on a given piece of land by having antelope there as well. As each other animal type is added, the advantage from maintaining plant balance is widened through similar, though often more subtle, interactions. Bison, for example, can break through even heavy shrubs to reach grass that cattle cannot, as well as survive winters without supplementation.

There are a plethora of legal, historical, and statistical anomalies which have obscured the ought-to-be obvious overall superiority through their complex adaptation of mixtures of native animals over our domesticates. Land managers have concentrated too long on the historically familiar, and failed to catch the overall drift of ecosystem development and natural cycling. Just extending the logic of the cattle-antelope-bison equation through the variety of national plant and animal types helps prove the first law: the longer the term and the larger the area, and the more potential products of value to humans that are included in the survey, the more strongly diversity correlates with productivity.

The second law is one engineers have made great profits from overlooking, and represents the inverse side of production potential from wilderness or wilderness-like landscapes. Pollution, in its broadest definition, comes in many forms, from toxic chemicals to too much sediment to noise. Industry has bamboozled us into thinking that some form of control is possible for any form of waste. Unfortunately, it is only how much energy we use, not how it is used, that eventually determines final impacts. We were easily misled by local anomalies, such as highly toxic stuff that didn't seem to take much energy to make, or clean-ups that seemed to be effective. The general rule is that it takes effort to become really nasty. The more energy used, the greater the overall pollution that results. Period.

Sticking to the long term, large-scale, vision, all that control technologies accomplish is to move problems around. In a crude example, many people switched to electricity for cooking or heating so smells and dirt would move out of their houses. Indeed, some minor noxiousness did move away from the individual home, so we were encouraged to use ever more energy, though meanwhile the inevitable by-products of combustion became concentrated at central electric plants. We then became offended by those generating units' acrid smoke, so we built tall stacks, after precipitating out the blackest part. Now we are learning that the rest of the smoke, freed of its basic ash, didn't just go away, but continued to build in the atmosphere to come down increased in acidity many miles away, where it is just starting visibly to kill huge areas of trees and water-borne life.

It is here that wilderness comes to the point. Pollution producing devices, of which

the internal combustion engine and high-tension electricity are central examples, are already illegal in a wilderness. So are all forms of energy-intensive toxic chemicals.

The third law starts here and reflects still more kinds of disturbance from energy use. While natural systems are robust, they simply cannot survive mechanized intrusion if all their needed parts are t.o remain intact. An elk will not come willingly within a quarter of a mile of a highway. Sugar maples cannot survive acid rain. Many, if not most, critical natural pieces in the system are even more delicate. With each loss, the overall productive potential declines as well. What makes a natural system especially efficient lies precisely among the mutualistic effects of its constituents. The nice part of the third law is that if present levels of mechanized disturbance are reduced, the declines in productive potential already occurring may be reversed. This is true if, and only if, more complex natural systems are restored, and if energy use levels are kept compatible with the natural flows. However, only complete systems are self-healing, and completeness requires quite large areas.

In counterpoint, we must eat to live, so the best providers of food will be given the most room on a crowded planet. Hence, the only way to have geese in the sky or bison on the plains is to assure its value on the plate. Only then will they be given sufficient habitat; only then will they be assured protection from overuse or other abuse. Humanity watches out for what we consider most, not least, valuable. Cattle rustling was not stopped by prohibiting trade in beef or leather, after all. The same principle applies to producers of fiber or other special human wants.

In the example of the return of the American bison, it is paradoxical that the very eating or other use of an animal or plant allowed it to grow again in numbers. Only when the selling price of bison rose did these native animals in any number displace cattle for whom land was taken 100 years ago. Otherwise, American buffalo would have remained isolated curiosities in a few zoos and parks. It may seem unfortunate, but it is true that only by having sufficient economic value through sustainable consumption can endangered species be given places to thrive, as opposed to just (possibly) survive, in this humandominated world. Luckily, for us and for them, the direction of all natural systems is to produce a surplus against adversity and to spread themselves. This surplus is one that we humans, with wisdom in seeing to the systems' replacement needs, may harvest to mutual benefit.

COMMERCIAL USE VERSUS MECHANIZED INTRUSION

I do confess to bias when talking about wilderness. The few remaining truly natural places should be held sacred, honored by quiet within them. Some of this feeling was reflected by Congress in the 1964 Wilderness Act through a prohibition, within formally designated areas, of the use of machines of any sort, or any commercial harvest. The need for stillness in the woods remains, but it now should be questioned whether the assumption that machines and harvests are unalterably intertwined is actually appropriate, and what difference separating the two might make to our thinking and subsequent practice.

Most of us agree that some use of products from the land is essential for human survival, and also that mechanization is incompatible with wilderness for both spiritual and practical reasons. Amidst this, there is an alternative receiving little talk and less action: commercial use of natural systems kept as natural systems, but without bringing in fossil fuel-driven machines. Given that commercial harvests from most lands are needed by humans, only this forgotten alternative can allow expanding wilderness character into areas now used for mechanized production; it could also help us protect those many diminishing habitats now faced by imminent human need.

Certainly, there is a real place for fully undisturbed areas within the rigorous conception of the current Wilderness Act, both for scientific reference and for recreation. The fight for these should continue unabated. Many low productivity areas now formally protected can tolerate relatively limited export use. However, here I am suggesting reaching out to far larger blocks of land than commercial use prohibitions could ever contain. More respect for an expanding "less

formal wilderness" could come from our own needs for survival as well as for the requirements of the soil and its creatures. This approach could give us far more than what even the most convinced purest-wilderness enthusiast could foresee as retaining or regaining any semblance of wildness, from recreating prairies to full-scale Eastern forests, as well as saving jungles and the veldt.

Where our affection for energy intensive machines came from can be typified in a single example. I'm among those who cut more than enough wood with a human-powered cross-cut saw. It ain't fun for long, and takes too much time if any quantity is needed. The "normal" response is a chainsaw. However, from the systems point of view, if one builds or refits a house in a more respectful fashion, as Wendell Berry suggests, the need becomes only a small fraction of the wood now used, either in construction or keeping the place warm once built. The related techniques are essential for the future, without doubt, and should give us both quieter and more comfortable places to live, including reducing that need to go into the woods with greed in our hearts. But, in cutting the wood still necessary, could there be another choice?

At least one possibility has not yet been followed far enough. I once worked a little with electron microscopy. There, one has to cut things incredibly thin to look at them, and the tool of choice is called a microtome. A microtome uses a knife blade made of finely broken glass, not some magic material. Nevertheless, we were warned that if we dropped the thing, it would neatly slice off our feet. Now, glass can be environmentally rather benign, if used in reasonable quantities, and cutting rather than sawing saves a great deal of material that would otherwise become sawdust. Not making sawdust also saves a considerable amount of energy, which in turn makes things quieter, as well as leaving a cleaner surface for joints, along with more wood to work in the first place. Interestingly, quiet (not muffling) is the direction of true efficiency.

- The upshot is that there is no harvest task that cannot be done, and done better, without the use of our current assumption of a heavy machine to do that job. Correspondingly, the less energy intensive our tools, the closer we come to the wilderness ideal. I chose to attack chainsaws because they are among the hardest to deduce an alternative for, and just a hypothetical solution to illustrate the kind of innovative thinking that is so badly needed. The same kind of logic applies to transportation and virtually every harvest or management problem. If we can make a solar powered word processor, we can carry off the rest of our material tasks without needing a drop of (imported) polluting oil.

As well as new ways, we should look more seriously at the recent economic studies concluding that by far the most profitable agricultural operations in the U.S. are those of the Amish and others who have eschewed "progress" by retaining their horse-powered equipment. In either event, we need to think more carefully about the inevitability of seeing commercial use and mechanized intrusion as inseparable.

SO WHAT NUMBERS DO WE NEED?

Have we fully thought out exactly what it is we are looking for? In thinking about multiple use, have we come close to looking for all of the potential outputs of more natural ecosystems?

Have we bothered before to count the mushrooms, in time and space, that could be desired by a gourmet market? The few now sought already draw impressive prices even without fixed distribution channels. Potential medicinals are in an exceedingly crude state of analysis, understanding, and development. Decorative plants and flowers are a major greenhouse industry. How many new and impressive ones could be safely harvested from the wild, if they were taxed and protected by the proceeds of those taxes? How much more habitat could be created for them then?

With the evolving techniques for subtle chemical, genetic, and mechanical tagging of animal products to avoid poaching, how many more furs, leathers, feathers, and high priced meats could be sustainably harvested from our forests and our prairies? We already have plenty of evidence that the general interest market, both here and abroad, will pay a substantial premium for bison, elk or other

game meat, whenever it is available. Then, too, what about specialty woods or other fibers? We must remember, as a central point in approaching this kind of analysis, that it is in looking for the UNfamiliar actual progress is made.

Therefore, if we are to step beyond the valuable recreational uses of wilderness, or beyond the more familiar products of the land, and fully consider what wilderness has in its stores, we must expand our inventories to what we never considered before. Why not begin by sending in teams of bright young (or old) people with blank pieces of paper to look, to record, to discuss everything that they see and how it might be of use to humans? The broader the diversity of background of these next-generation explorers, the greater the potential for new discoveries. For example, something called "pine straw" is a significant industry in North Carolina. To a scientist from Wyoming, that was quite a surprise. Less unexpected, but even more important to the present case, I recently visited a restaurant in Idaho that quickly sold out a shipment (at $20 for four ounces) of legal moose meat. There must be literally millions of cross-cultural connections to be made for otherwise unexpected but useful, yet even more valuable, goods.

I am among those who prefer to eat what already has a track record for desirability, but I also know that we have overlooked some really good stuff that is already ready for harvest from the wilderness. The kiwi fruit is a recently commercialized example. David Arkcoll, a friend in Brazil, spent several years looking at Amazon rainforest fruits, working under the assumption that if jungle were seen as more valuable for the products already there, those forests would no longer be threatened with clearcutting. After surveying more than 500 possibilities, he found at least 50 with full commercial potential, meaning at least as tasty as a kiwi or a papaya.

We have never analyzed American wilderness for its total edibles, either for those of known goodness, like native raspberries and strawberries, or for unexpected potential. Perhaps following grizzly bears, who tend to share human tastes, to have a look at what they are eating might have more virtues than those who consider the bears as pests might expect. In this, I do not mean to imply a return to a gatherer culture, but rather an enlightened harvest, utilizing low-impact storage and distribution techniques unavailable to our distant ancestors.

From this standpoint, I would like to suggest our next generation of measurements include total amino acid nitrogen, fats, and carbohydrates that are produced by various ecosystems. These are the literal basis of our food needs. In my doctoral training as a food technologist, I was thoroughly introduced to the practicality of taking virtually anything and making it more or less edible, if the nutrients were there at the beginning. This might seem distasteful, but if we do not work fast and more effectively to limit our human numbers, we are going to need a lot more food in a surprisingly short time. Even more than is presently the case, natural environments are only going to survive if they seem productively competitive.

Relatedly, if we were able to list the totality of the available nutrients, we could have the underlying basis of biological growth cycles within the system, as well as our own potential uses. From this, we should be able to demonstrate conclusively whether natural systems more efficiently harness their resources than do artificial systems as I have suggested. Cellulose and lignin summaries would give a bottom-line indication of the available fiber and miscellaneous chemicals that are the eventual source of our clothing, renewable shelter, and regrowable fuels.

From this data scheme, we could begin a more effective comparison among alternative land uses. Current agricultural statistical thinking cannot even compare a two-acre field with both corn and beans on it to two one-acre fields, one with corn and one with beans. We have abundant proof that a combination of crops gives more overall in both the short and the long run, especially since combining reduces fertilizer requirements and soil erosion, but the statistics of reporting cannot cope with more than one crop at a time. The corn is slightly more dispersed in the mixed case, so it looks like it is giving less per acre in our books, even though each plant is more

effective, and the space between them is producing beans. For wilderness accounting, we should go further, and also list the toxic chemicals which would NOT be dispersed and the soil that would NOT be lost, as well as the more direct gains.

Clean water is a value of increasing importance. There is no better essential fiitration and purification system than an undisturbed wilderness, although Girardia (and other naturally occurring parasites or problem organisms), no matter what their actual source, often require some follow-up filtration. Nevertheless, at $1 per gallon plus prices now paid for bottled water, one can imagine a vast profit potential for wilderness generated water in an increasingly polluted world outside. The value will vary, depending on the calculation tool and the inventiveness of entrepreneurs, but there is a very large market here.

Furbearers and large native ungulates are worth spending a bit of time with, since they are particularly valuable, but at the same time a socially controversial product best grown in wilderness. They are also especially likely to stray beyond boundaries and cause immediately apparent problems among their less visionary human neighbors.

Landowners will tolerate a lot more deer, beaver, or wolves, if they see a notable return for the presence of those creatures. Otherwise, they will continue dynamiting beaver dams to keep their roads from being muddy, and poisoning predators because the sheep are worth more. The same increased toleration could be true for National Forest managers, if portions of funds gained by harvest were returned to the land from which they came. What needs to be bluntly repeated to the fur or game use opponents is, “how many native animals do you want to live at all?” The purpose of the statistics of Wilderness should be in part to illustrate how many more native animals there could be if their harvests were considered important enough.

As a social constraint in the world at large, hunting and trapping did, of course, exterminate species when no effective regulation existed. However, a tax on a valuable trade, properly channeled, can provide for a much more effective regulatory police against poaching than can absolute prohibition of that trade. This is especially true where control efforts must compete for funding against bread subsidies or spending by the military. Such taxes and targeted enforcement were quite critical to the growth of the domestic animal and fiber industries. The size of an enforcement fund that could be generated from furs, from sale of game meat, and from any other products should be among wilderness statistics.

Fur will always remains an expensive resource in many ways, since several deer or sheep may be needed to maintain one wolf. But, seen from a more complete view, fur-bearing predators tend to concentrate on smaller herbivores. These small herbivores often compete directly with the larger game or livestock for food and tend to be animals (such as rats) that we are not willing to eat ourselves. The furbearers serve, therefore, to increase the carrying capacity for the higher value ungulates (from our perspective), even if they do eat one of them every now and again. Land managers need to remember that it takes just seventeen jackrabbits to consume as much grass as one cow. It is more difficult to see what coyote (or wolf) control of rabbits and rodents gives to the sheep in the form of extra grass than to relate to a gnawed-upon carcass, but more thorough wilderness record keeping could be a place to begin.

Furbearers unequivocally provide quality control for disease in large animal herds; this is also a very real use, and one that is the opposite of competition with human harvest. Furs last a long time, too, once harvested. While the absolute number of furbearers may be low, the effective number of coats which can be produced is larger than might at first seem, since each should last at least a human lifetime. At $100 per pelt, even a few of these animals can make a lot of difference to a wilderness value balance sheet.

Fish and waterfowl fall even more into the grey area of recreation utility versus absolute food and by-product value than do large ungulates. Because there are so many hunters and fishermen who will pay more than the animals’ value as a food source alone to collect them, the total economic value of the animals is heavily shifted toward the recreation sector.

An important potential tool in commercial wilderness management lies in employing sportsmen who will pay just for being able to participate in the chase. If native fish and waterfowl could go to the gourmet trade at high prices, there are harvesters who will pay well for the privilege of going on foot to do the work. Already outfitting is allowed as a commercial enterprise even in formally designated wilderness areas. It is an activity with considerable room for commercial expansion.

The Nature Conservancy, probably the most successful pure preservation organization, has started recently to broaden its operations by selling the native products of its lands (in the first case, surplus bison). They have found that with a more complete ecosystem, there is valuable surplus that literally needs harvesting. By reinvesting that recovered surplus value, their acreage can continue to grow.

By far the biggest wilderness use restrictions lie in the social sphere. We all hear so many false promises that it is difficult to believe in something better, especially if the payback is not always immediate on that investment. There are many faster ways to make a buck than learning to work with natural systems. Longer term costs of current mechanized ways appear always pushable just a bit further off. Management of lands for wilderness values requires large contiguous areas. This demands cooperation, and reevaluation of concepts of private land ownership. Any changeover requires both time and vision. What the right set of statistics could establish is that there have been vast readjustments during the past 50 years in land management. Then, there might be less reason to doubt that there could be even more in the next fiiy.

In the context of a group of scientists, it may seem out of place to suggest that wilderness is truly Eden, in the Biblical sense, where the products we desire most are produced free for the asking. But, if we begin surveying our wildernesses from that perspective--subject to our careful stewardship in limiting our take and the manner in which that take is made, we almost certainly will get a better idea of the richness that actually is out there. If we expand our vision to look for the totality of what we might reap without the use of a plow, we would finally begin to see why the Creator was pleased with Creation, and did not hand us the planet with the intent to see it turned under or paved over.

PRACTICALLY AND FOR THE PRESENT

One way to begin is with a comprehensive literature review. I have collected many more than 1,000 particularly cogent references on the comparison of wilderness versus other land use, with strengths and weaknesses on each side, a great many of which would have added depth and scientific credibility to the tale just sketched, if they could have been cited effectively. These and many others need to be tied together in an "idea data base." The structure of the data base would include as categories all the points thus far raised, along with others such as the health benefits and potential dangers of game meat. Even cataloging the potential products from wilderness management has never been done in thorough detail.

When these ideas are structured and supplemented from other data bases, a side-by-side system comparison model should be constructed for several representative areas. Potential primary, secondary, and tertiary costs and benefits should be laid out and evaluated. There are many existing computer-based "shells" within which such a comparison could be handled. The target would be the construction of a theoretical land management plan, which would be weighed against current management strategies. Creatively handled, computers are amazingly flexible beasts.

Social barriers to changed wilderness use will also need to be examined in more detail, along with historical literature containing suggestions on how these barriers, once discovered, have been successfully overcome in the past.

Once a management plan has been sketched, practical questions such as "What is the minimum size for a land management unit?", "How to minimize fencing?", and "How to make maximal use of migration characteristics?" must

be answered, and the missing data elicited through research.

These are all tasks that cost money. The wisdom to begin spending is what I have tried to suggest.

APPENDIX

OPTIMIZING NON-RECREATIONAL WILDERNESS USES AND VALUES: RECOMMENDATIONS AND STRATEGIES FOR THE NEXT TEN YEARS

Patrick C. Reed, H. Ken Cordell, and Helen R. Freilich*

ABSTRACT

The 1988 National Wilderness Colloquium brought together professionals from a variety of federal agencies, non-governmental organizations and universities to review the status of non-recreational uses and values of wilderness. Part of the colloquium was devoted to nominal group sessions and the generation of a variety of recommendations and strategies for optimizing non-recreational wilderness use over the next ten years. Among the highest priority recommendations were an increased attention to funding, research, management direction and training, and the acquisition of underrepresented wilderness areas.

One of the primary reasons for holding the 1988 National Wilderness Colloquium was to improve our understanding of the non-recreational uses and values of the nation's wilderness for the upcoming 1989 Forest and Rangeland Renewable Resources Planning Act (RPA) Assessment. Accordingly, the nearly two dozen papers found in these Colloquium proceedings were commissioned to present facts on the nature, extent, trends, and issues of existing no-recreational wilderness uses.

But, equally important for the RPA Assessment are informed professional ideas on what changes should occur during the next 10 year RPA planning cycle in order to optimize the status of non-recreational wilderness uses. Because an end is no better than the means to achieve it, thoughts on specific programs and policies necessary to implement the desired changes were also elicited at the Colloquium.

In order to maximize the synthesis of information and exchange of ideas among the invited representatives of federal agencies, non-governmental organizations (NGOs) and universities, the Colloquium included a day devoted to the structured collection of individual opinions using the "nominal group" technique.

THE NOMINAL GROUP PROCESS

Developed by Delbecq and Van de Ven in 1968, the "nominal group" process was developed to improve group decision-making by (1) assuring that different and appropriate processes are used for each phase of creativity, (2) balancing participation among members, and (3) incorporating mathematical voting techniques in the aggregation of group judgement (Delbecq et al. 1975).

Briefly, the nominal group process generally involves the following steps:

1. Division of individuals into small groups.
2. Silent generation of ideas by each individual.

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The authors wish to thank the following for facilitating nominal group sessions at the National Wilderness Colloquium: Don English, Larry Phillips, and Allen Rowell (Forest Service). Thanks also go to Dr. Ed Krumpe (University of Idaho) for sharing his experience with nominal group processes and Dr. Elwood Shafer (The Pennsylvania State University).

3. Round-robin recording of ideas by facilitator.

4. Serial discussion for clarification of ideas.

5. Individual ranking (prioritization) of ideas.

6. Group ranking (prioritization) of ideas.

7. Group summaries.

The nominal group process was chosen to systematically and objectively capture the diversity of opinions for several reasons. First, it is a proven methodcapable of synthesizing the range of fields represented at the colloquium. Second, it has been rather successfully used in a similar context at a previous wilderness management conference in 1984 (Krumpe 1985).

At the colloquium, three different groups of approximately eight persons were formed. Each group was given a question to work on for two hours in the morning. Later, the same groups were given a second question to work on for another two hours in the afternoon relating to the results of the first question.

THE QUESTIONS

The questions posed to the nominal groups were designed to focus-in on ideas and issues that are most relevant to needs for the 1990 RPA Assessment discussion of non-recreational wilderness use, including major supply-demand findings, opportunities for improvements, and potential barriers to implementation as well as recommended programs.

For the morning session three groups were formed and asked to respond to the following question:

> *"What changes, additions, and/or events do you think should occur in the next ten years in order to optimize the recreational uses and values from wilderness (eg. scientific, educational, and ecosystem preservation values)?"*

In the afternoon session the same group members then addressed a second question related to the top five changes, conditions, or events identified at the end of the morning session:

> *"What specific programs, policies, and management strategies should the Forest Service adopt to improve non-recreational values and uses of wilderness?"*

The responses of each of the three groups were tallied and reported to the persons attending the Colloquium before the end of the day. The overall combined results of the three groups were later tabulated to produce a master list or recommendations and strategies.

10 PRIORITY RECOMMENDATIONS AND STRATEGIES

More than 50 different changes or events that would improve non-recreational wilderness uses were recommended by the three nominal groups during the morning sessions. Nearly as many specific program and policy strategies were then recommended in the afternoon session to implement the changes or events.

Listed below, in order of importance as determined by the three groups, ate the 10 highest priority recommendations and implementation strategies for optimizing non-recreational wilderness uses and values in the National Wilderness Preservation System (NWPS) and elsewhere (in most cases the original language has been retained). Several of the recommendations have more than one part,

Recommendation: Increase research into non-recreational uses of wilderness

Develop a wilderness research initiative for non-recreational benefits and values, including definitions. Mandate a mission statement for long-term social, cultural and ecological research. To achieve this, establish guidance for such studies, including the maintenance of long-term studies, types and uses of wilderness-compatible technologies, means of access into the wilderness.

Fund research for baseline data development for non-recreational wilderness values. To achieve this, develop partnerships with other organizations who can use data. Develop challenge grants for research.

Recommendation: Acquire additional wilderness

Review and inventory roadless areas for non-recreational wilderness values, and additions into the NWPS, for areas with high densities of non-recreational wilderness values (use geographic information systems, landform and ecosystem data). To achieve this, develop a national database on non-recreational wilderness values in roadless areas during the next ten years. With the next round of forest plans, do proposals for wildernesses with high densities of non-recreational values. Tie into existing legislative efforts.

Establish more wildernesses and more "wilderness-like" recreation opportunities on non-wilderness public and private land. To achieve this, establish more de facto wilderness (special interest areas). Develop cooperative programs with NGO's; increase public involvement.

Insure that opportunities exist for the NWPS to include 13% of the United States land base (5% coterminous). Acquire or otherwise insure protection of "missing" ecotypes. To achieve this, protect roadless Forest Service land. Identify and protect sensitive ecotypes from human impact. Place greater emphasis on non-recreational values in wilderness allocation/designation. Establish policy to represent all biogeographic provinces in wilderness.

Recommendation: Increase wilderness funding

Funding needs to be adequate to manage existing wilderness, acquire inholdings, and do research. Provide budget increases to support high priority items. To achieve this, have Forest Service request additional funding. Have NGO's, wilderness fees, etc., support agency budget. Earmark Land and Water Conservation Fund monies for purchasing inholdings. Use S & PF budget to support uses on non-wilderness land.

Increase the wilderness sham of federal dollars. To achieve this, provide greater flexibility for local managers in allocating funding. Establish a line item in the budget for wilderness. Get authority to allow permittees to "work off' fee in lieu of dollars payment (e.g., pack out litter, any physical work, monitor overflights, etc.).

Recommendation: Develop explicit wilderness management implementation schedule or plan

To achieve this, guidelines need to be developed for both natural and cultural resource management plans. Develop designs for prioritizing quantitative and qualitative non-recreational values.

Recommendation: Increase awareness of non-recreational values to non-traditional users, managers, and decision-makers

To achieve this, establish interagency policy review of non-recreational values and benefits. Develop training courses and public outreach programs to increase the awareness of non-recreational values, and examine interdependencies in them.

Recommendation: Require the Forest Service to complete "Levels of Acceptable Change (LAC)" studies for each wilderness

To achieve this, develop uniform standards for areas with some similarities. Develop tools to assess non-recreational wilderness values. Increase the rate of technology transfer. Develop prototypes for non-recreational LAC's (eg. water quality, exotic species intrusion, habitat alteration). Each area should have an LAC study for specific problem targets. May be workable for collecting baseline data, or for specific items or problems.

Recommendation: Establish a national register of vital data for each area in the National Wilderness Preservation System

To achieve this, inventory current efforts and available data. Flag known discrepancies. Design database elements, data sources, and a prototype. Organize a working group; seek budget funding and legislative responsibility. Keep annual reports up-to-date and in a standard place.

Recommendation: Create a "pro-active" rather than" re-active" state-of-mind

To achieve this, have NGO's publish descriptions and information on non-recreational wilderness values to inform/educate publics. Mandate better education and training of professionals and agency staff, including certification X-118 standards and curricula at all levels. Do not limit wilderness managers to foresters. Develop job classification for wilderness managers. Build bridges between government agencies and constituencies (partnerships). Give recognition for achievement/service for outstanding efforts.

Recommendation: Incorporate non-recreational values into wilderness management plans__

To achieve this, include a greater emphasis on non-recreatiohal values in RPA, Forest Plans, and other program documents. Incorporate a biodiversity element into the wilderness element of Forest management plans.

Recommendation: Conduct an assessment of threats to wilderness

To achieve this, conduct a threats analysis and amelioration strategy. Define legally appropriate non-recreational activities for wilderness.

CONCLUSION

It was a very large responsibility for colloquium participants to attempt to represent all other views from their particular disciplines during the nominal group sessions. There is no doubt that another group of experts might have come up with a different set or priority of composite recommendations and strategies than those above. However, the diversity of disciplines, interests, and groups represented at the colloquium probably minimized the range of other unrepresented views.

The general context of these and other recommendations will be included in the wilderness portion of the 1990 RPA Assessment. It is hoped that other federal agencies and non-governmental organizations alike will also consider, cooperate with or adopt these strategies for optimizing the non-recreational use of wilderness and other federal, state, regional, and private de facto wildland preservation systems over the next 10 years.

REFERENCES

Delbecq, Andre L., Andrew H. Van de Ven and David H. Gustafson. 1975. Group Techniques for Program Planning: A Guide to Nominal Group and Delphi Processes. Scott, Foresman & Company: Glenview, Illinois.

Krumpe, Edwin. 1985. Moving to Action. In: Frome, Michael, ed. Issues in Wilderness Management. Westview Press: Boulder, Colorado.

NON-RECREATIONAL USES OF THE NATIONAL WILDERNESS PRESERVATION SYSTEM: A 1988 TELEPHONE SURVEY

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ABSTRACT

In connection with the 1988 National Wilderness Colloquium, a telephone survey of non-recreational wilderness uses was conducted in the fall of 1987. Wilderness managers of all units of the National Wilderness Preservation System were polled regarding the nature, extent, and trends of various non-recreational uses. The results of the survey suggest that, in general, a wide variety of non-recreationn l uses are occurring in wilderness and that increased attention to their management is becoming increasingly necessary.

Our knowledge of the current state of non-recreational uses of the National Wilderness Preservation System (NWPS), such as preservation, scientific, educational, and spiritual uses, is limited. In many cases we have yet to begin to seriously explore the values and inter-relationships of these and other non-recreational uses. Even basic information on the type, number and distribution of non-recreational uses of wilderness today is generally less available than comparable information on the recreational use of wilderness.

The 1988 National Wilderness Colloquium was conceived of as a foundation for improving our understanding and monitoring of non-recreational uses of wilderness. A number of research papers were commissioned for the Colloquium to describe the variety of these uses. Preliminary reviews of existing research indicated that, for the most part, there was little existing information for reference. Many of the papers were able to draw upon only very limited data that was in any way current, consistent or comprehensive.

In an attempt to supplement information from the papers, Colloquium planners conducted an independent nationwide nonscientific telephone survey of all NWPS units in the fall of 1987.

SURVEY RATIONALE AND METHODOLOGY

The principal objectives of the informal telephone survey were to gather current and consistent data on (1) the nature and extent of non-recreational wilderness uses and (2) whether the trend in those uses has been increasing or decreasing over the past three years. In addition, other questions were included to better identify specific elements of the use and to better understand the relationships between non-recreational and recreational uses, management practices, and other land uses. There were two overriding concerns in the design of the telephone survey. First, information on 100 percent of the wilderness areas was desired. Second, the survey should minimize the amount of time that respondents needed to answer questions. Consequently, individual questions were designed so as not to require respondents to refer to specific quantitative information from files or other records to answer. Rather, respondents answered in general from their personal knowledge. For consistency, the same wording was used for all four agencies.

From September to November, 1987, two Colorado State University graduate students interviewed "wilderness managers" by telephone in each national forest, park, wildlife refuge, and Bureau of Land Management (BLM) district with designated wilderness'. Additional telephone interviews were again conducted in January, 1988, for 12 wilderness units added to the NWPS in late December,

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1987. Data for every unit in the NWPS--current through the end of 1987--were collected in the more than 200 hours of interviewing.

Interviewers contacted national forests, parks, and wildlife refuges, and BLM districts administering wilderness and asked to speak with that person who was most familiar (i.e., "wilderness managers") with the different uses and activities in each wilderness. Respondents were then asked to identify uses and provide general descriptions without looking up detailed information. Answers were limited to one of several pre-defined descriptions.

Due to the limitations in the survey methodology, several sources of error were possible.' Foremost was the fact that the beliefs of the wilderness managers may not accurately reflect the actual conditions. Similarly, some respondents may not have had their current responsibilities for the past three years and consequently might not have direct experience of changes and trends. However, in many cases such information may not have been available even if respondents had tried to locate it in files or records. Interviewers estimated that more than 90 percent of all questions were answered with apparent confidence.

Another problem was that some of the questions used in the survey may have been rather broad in definition and scope, leaving some room for personal interpretation. Certain terms inadvertently may have been more relevant to some agencies than others. In nearly all cases though, interviewers were able to assist respondents to their satisfaction in understanding the intent of the questions.

MAJOR FINDINGS

While the survey does not provide the definitive study of non-recreational wilderness use, it does provide some insight into the general status of such uses in the NWPS in 1987 (and over the past three years). In light of the following major findings of the survey, however, it is doubtful whether the federal agencies can afford not to actively manage non-recreational uses of wilderness:

1) There are indeed a wide variety of both well-recognized and little researched non-recreational uses occurring in the NWPS, with nearly all units accommodating a number more than type of non-recreational use;

2) For most of the non-recreational uses the trend over the past three years seems to have been fairly stable, with slightly more types of non-recreational uses increasing than decreasing;

3) With the exception of outfitting and guiding services (which are apparently growing markedly), traditional nonconforming uses such as grazing and mining appear to be declining;

4) A number of non-recreational uses may be coming into increased conflict with recreational wilderness use; and

5) Most wilderness areas do not have completed separate management plans, especially as they address non-recreational uses (although many are in progress).

As much as anything, the results of the telephone survey probably suggest that we don t know enough about the state of non-recreational wilderness uses to ask the most appropriate questions. We recommendation that a more refined, detailed and coordinated nationwide survey (written or telephone) survey be conducted annually to monitor non-recreational wilderness uses and trends.

SURVEY RESULTS

The following are the questions as they were asked in the telephone survey. Below each question are the pre-selected answers which were possible and the percent of wilderness areas falling into each category. All percents represent combined Forest Service, National Park Service, Fish and Wildlife, and Bureau of Land Management wilderness.

As evident by the annotations for the results, the understanding, concepts, and terminology for non-recreational wilderness is not well-defined and developed. This was true not only among the four different agencies but also within the agencies, particularly between eastern and western wilderness areas.

1. Are there any environmental research studies regarding fish, wildlife, vegetation, soils, geology, air, water, or ecological processes being conducted in the wilderness this year?

Response for 1987 (%)	Trend over past three years (%)
Yes ..... 37.4[3]	Increasing .. 20.7
No.. . . . . 60.9	Decreasing .. 4.1
Don't know . 1.6	Same 73.6
	Don't know ..1.6

2. Are there any social research studies regarding the public use or users being conducted in the wilderness this year?

Response for 1987 (%)	Trend over past three years (%)
Yes ..... 13.7 [4]	Increasing .. 7.0
No 86.1	Decreasing . 4.9
Don't know 0.2	Same 87.1
	Don't know . 1.0

3. Are there any special resource management training programs being conducted in the wilderness this year?

Response for 1987 (%)	Trend over past three years (%)
Yes ..... 11.9'	Increasing . 7.4
No 87.3	Decreasing . 0.4
Don't know 0.8	Same 91.0
	Don't know . 1.2

4. Are there any organized environmental or conservation education programs--such as Boy Scouts, church groups, secondary schools, or colleges--being conducted in the wilderness this year?[6]

Response for 1987 (%)	Trend over past three years (%)
Yes ..... 38.7'	Increasing . 11.5
No 59.1	Decreasing .. 2.0
Don't know 2.2	Same 84.0
	Don't know . 2.5

5. Are there any organized environmental or conservation education programs--such as Boy Scouts, Vision Quest, or Big Brothers for leadership, self-confidence, team-building, and decision making--being conducted in the wilderness this year?

Response for 1987 (%) (%)	Trend over past three years (%)
Yes 17.6	Increasing . 5.9
No 79.6	Decreasing . 2.0
Don't know 2.9	Same 87.9
	Don't know . 4.1

6. Are there any organized programs for medical or therapeutic proposes--such as for the rehabilitation of physical handicaps, mental disturbance, juvenile delinquency, or alcoholism--being conducted in the wilderness this year?[9]

Response for 1987 (%)	Trend over past three years (%)
Yes 12.1	Increasing . 5.1
No 86.3	Decreasing . . 0.0[10]
Don't know 1.6	Same 93.5
	Don't know . 1.4

7. Are there any active cattle or sheep grazing allotments in the wilderness this year?

Response for 1987 (%)	Trend over past three years (%)
Yes 35.2	Increasing . 0.8
No 64.8	Decreasing . 6.5
Don't know 0.0	Same 92.0
	Don't know .0.6

8. Are there any active 'surface or subsurface mining claims in the wilderness this year?

Response for 1987 (%)	Trend over past three years (%)
Yes 8.6[11]	Increasing . . 0.8
No . . : : : : : 88.3	Decreasing . 3.3
Don't know 3.1	Same 92 8
	Don't know . 3.1

9. Are there any active' producing oil or natural gas wells in the wilderness this year?

Response for 1987 (%)	Trend over past three years (%)
Yes 0.6	Increasing .. 0.6
No 99.0	Decreasing .. 0.2
Don't* know 0.4	Same 98.4
	Don't know . 0.8

10. Are there any active commercial outfitting or guiding services--such as hunting, fishing, boating, horse packing, or air taxi--being conducted (permitted) in the wilderness this year?

Response for 1987 (%)	Trend over past three years (%)
Yes 43.8	Increasing .. 15.5
No.. ..... 55.8	Decreasing .. 4.7
Don't know 0.4	Same 78.7
	Don't know .1.0

11. Is there any legislatively authorized non-recreational "subsistence" hunting, fishing, or gathering permitted in the wilderness this year?

Response for 1987 (%) (%)	Trend over past three years (%)
Yes 14.7	Increasing .. 1.6
No.. ..... 83.8	Decreasing .. 0.2
Don't know . 1.4	Same 96.3
	Don't know .1.8

12. Are there any known or probable threatened and endangered species of plant or animal protected in the wilderness?

Response for 1987 (%)	Tvoe of T & E species (%)
Yes ..... 58.7"	Plant only .. 11.5
No.. . . . . 33.9	Animal only 27.2
Don't know . 7.4	Both 20.0
	Neither 41.3

13. Is there any habitat which is critical for the propagation--such as rearing, migration, or wintering--of commercially important species of fish or wildlife--such as salmon, elk, or deer--in the wilderness?

Response for 1987 (%)	Commercial species (%)
Yes ..... 38.4[13]	Fish only ... 10.8
No.. . . . . 57.1	Wildlife-only 14.1
Don't know . 4.5	Both.. .... 13.5
	Neither 61.6

14. Are there any'designated or probable cultural resource sites--such as prehistoric camp and burial sites or historic cabins--protected in the wilderness?"

Response for 1987 (%)	Cultural site type
Yes 72.4	Prehistoric only 17.4
No.. . . . . 22.9	Historic only 11.7
Don't know . 4.7	Both 43.4
	Neither ... 27.6

15. Are there any known or probable sites of specific religious or spiritual significance to Native American or other groups in the wilderness?

Response for 1987 (%)
Yes ..... 20.0"
No.. . . . . 71.8
Don't know . 8.2

16. Are there any designated "research natural areas" in the wilderness?

Response for 1987 (%)
Yes 11.9
No 85.7
Don't know . 2.5

17. Are there any private land inholdings in the wilderness?

Response for 1987 (%)
Yes ..... 38.0[16]
No.. . . . . 60.9
Don't know . 1.0

18. Would you estimate that the total recreational use in the wilderness this year is, or will be, closer to 1000, 10000, or 100000 recreation visitor days (RVDs)?

Response for 1987 (%)	Trend over past three years (%)
1,000 RVDs 50.1	Increasing .. 52.1"
10,000 RVDs 39.1	Decreasing .. 3.3
100,000 RVDs 10.6	Same 42.7
Don't know . 0.2	Don't know . 1.8

19. Is the public recreational use regulated--such as through permit systems, stay lengths, or designated camp sites--in the wilderness this year?

Response for 1987 (%)	Trend over past three years (%)
Yes ..... 28.2[18]	Increasing .. 3.7
No.. . . . . 71.6	Decreasing .. 1.6
Don't know . 0.2	Same 94.3
	Don't know .0.4

20. Are there any "significant" conflicts between recreational use and non-recreational uses--such as preservation, scientific, education, cultural, subsistence, or therapeutic--in the wilderness this year?

Response for 1987 (%)	Trend over past three years (%)
Yes 17.0	Increasing .. 11.2
No 82.8	Decreasing .. 2.2
Don't know . 0.2	Same 84.5
	Don't know . 2.0

21. Is there legally authorized motorized access in the wilderness?

Resoonse for 1987 (%)	Type of motorized access
Yes ..... 27.2[19]	Aircraft 3.7
No 71.4	Land or water 1.6
Don't know . 1.4	Both 7.8
	Neither' 69.7
	Don't know . 1.0

22. Are there any national recreational trails in the wilderness?

Response for 1987 (%)
Yes .....17.8[20]
No 81.0
Don't know . 1.2

23. Are there any darns, reservoirs, or water conveyances--such as ditches, canals, or pipelines--in the wilderness?

Response for 1987 (%)
Yes ..... 15.7"
No.. . . . . 83.0
Don't know . 1.2

24. Are there any administrative structures--such as cabins or lookouts--in the wilderness?

Response for 1987 (%)
Yes 21.9
No.. ..... 78.1
Don't know . 0.0

25. Are there any navigation or communication stations or equipment in the wilderness?

Resoonse for 1987 (%)
Yes 9.6
No 89.8
Don't know . 0.6

26. Are there any weather or snow monitoring stations or equipment in the wilderness?

Response for 1987 (%)	
Yes	14.7[22]
No	81.6
Don't know	3.7

27. Are there any utilities--such as transmission lines or pipelines--in the wilderness?

Response for 1987 (%)	
Yes	6.3
No	91.0
Don't know	2.7

28. Is there a completed and approved wilderness management plan for the wilderness?

Response for 1987 (%)	
Yes	38.2[23]
No	61.6
Don't know	0.2

29. Is management zoning used--that is, division into different uses or capabilities--in the wilderness?

Response for 1987 (%)	
Yes	29.7[24]
No	70.1
Don't know	0.2

30. Are quantifiable standards below which changes would be unacceptable--such as standards developed through the "limits of acceptable change" process-set for the wilderness?

Response for 1987 (%)	
Yes	29.0[25]
No	70.3
Don't know	0.6

31. Is there a full-time person on your staff whose primary responsibility is wilderness management this year?

Response for 1987 (%)	
Yes	26.0
No	73.8
Don't know	0.2

32. Are there any volunteers assisting in management this year?

Response for 1987 (%)	
Yes	69.5
No	30.5
Don't know	0.0

33. Did any of your employees visit schools or other community programs to discuss wilderness this year?

Response for 1987 (%)	
Yes	59.3[26]
No	34.6
Don't know	6.1

34. Are there any wild and scenic rivers in the wilderness?

Response for 1987 (%)	
Yes	8.2
No	91.2
Don't know	0.6

35. Is any portion of the wilderness located on an ocean coastline?

Response for l-987 (%)	
Yes	10.6[27]
No	89.4
Don't know	*0.0*

ENDNOTES

1. *The authors would like to thank the Amenity Resource Valuation Project of the US Forest Service's Rocky Mountain Forest and Range Experiment Station in Fort Collins, Colorado for their cooperation and use of facilities.*

2. Survey results have been annotated where they are open to possible interpretation.

3. May include some routine wilderness resource monitoring programs, especially air, water quality, and acid rain studies.

4. May include routine wilderness visitor monitoring programs.

5. Does not include programs conducted outside the wilderness.

6. Such programs are actively discouraged in many wilderness areas because they are not considered wilderness-dependent activities.

7. Such programs are not conducted by agencies but by the groups themselves.

8. Such programs are actively discouraged in many wilderness areas because they are not considered wilderness-dependent activities.

9. Such programs are actively discouraged in many wilderness areas because they are not considered wilderness-dependent activities.

10. *The number of allotments may not be decreasing but total animal unit- months (AUMs) are decreasing.*

11. *May include routine maintenance of patented claims.*

12. *Includes migratory species and state designated species.*

13. *Definitions of "critical" and "commercially important" were subject to very different interpretations among agencies.*

14. Does not refer solely to active measures.

15. *Actual total is certainly higher because of poor inventories and reluctance of Native American groups to divulge sensitive information.*

16. May include patented mining claims.

17. Most commonly described as "slight".

18. May include agency's Code of Federal Regulations (CFR) standards and special administrative orders.

19. *May include emergency uses for search and rescue.*

20. Includes national scenic trails.

21. May include some historical structures which are no longer maintained.

22. Includes both temporary and permanent equipment.

23. May include larger forest, park, refuge, or district management plans. Many wilderness plans were described as "in progress".

24. May include standard Recreation Opportunity Spectrum (ROS) classifications in Forest Service wilderness.

25. Many LAC (or comparable) standards were described as "in progress."

26. Often in context of other program about the entire forest, park, refug

27. Actual lands below mean high water generally are property of states.

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Freilich, Helen R., comp. 1989. Wilderness benchmark 1988: Proceedings of the national wilderness colloquium: 1988 January 13-14; Tampa, FL. Gen. Tech. Rep. SE-51. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station. 228 p.

Twenty papers addressing the wilderness resource and its nonrecreational values and benefits to the American people are presented in six categories: Overview, Preservation Values, Scientific Values, Education Values, Social Values, and Commercial Values. Also presented, in an Appendix, are a short summary of the discussions and the results of a national telephone survey.

Example for citing article in this proceedings:

Spray, Richard H.; Weingart, Paul D. 1989. The wilderness environment: training wilderness managers. In: Freilich, Helen R., comp. Wilderness benchmark 1988: Proceedings of the national wilderness colloquium. 1988 January 13-14; Tampa, FL Gen. Tech. Rep. SE-5 1. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station:133-141.