

The George Wright

FORUM

Volume 10

1993

Number 2



LESSONS OF THE PAST • FOUNDATIONS FOR THE FUTURE

The George Wright Society

Dedicated to the Protection, Preservation and Management
of Cultural and Natural Parks and Reserves
Through Research and Education

The George Wright Society

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The George Wright Society is a member of
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Editorial guidelines may be found on the inside back cover.
The text paper of the FORUM is made of 50% recycled fibers.
Printing is by Weber & Sons, Park Falls, Wisconsin.

On the Cover

Gull Rock Lighthouse is located on a rock outcrop just off the tip of Michigan's Keweenaw Peninsula. Built in the 1800s, the light guided ships in the often treacherous waters of Lake Superior. Courtesy of Ron Trapp of Mohawk, Michigan, who spends much of his free time sketching historic sites and buildings throughout the Keweenaw area.

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Society News, Notes & Mail

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Call for Papers

National Council on Public History—March 1994

The National Council on Public History solicits papers, workshops, and presentations for its March 1994 annual meeting to be held in Sacramento, California. The theme of the conference is "Public History and the Environment."

The program committee invites sessions that reflect the work of public historians in a variety of areas, as well as any other topics of interest to public historians. For more information or to submit your one-page proposal plus a brief resume due by July 1, 1993, contact 1994 Program Committee, c/o Alan S. Newell, Program Chair, Historical

Research Associates, Inc., P.O. Box 7086, Missoula, MT 59807-7086. Phone: 406-721-1958; FAX: 406-721-1964.

Conference registration information will not be available until January 1994. However, the conference will be held at the Capital Plaza Holiday Inn in Sacramento. There will be space available for exhibitors; anyone interested in more information concerning exhibits is encouraged to contact Jim Williams, Chair, Local Arrangements Committee, De Anza College, 21250 Stevens Creek Blvd., Cupertino, CA 95014—or phone 408-864-8964.

Call for Papers

Ecosystem Monitoring and Protected Areas

2nd International Conference on Science and the Management of Protected Areas

May 16–20, 1994, Dalhousie University

Halifax, Nova Scotia, Canada

A number of plenaries and workshops will form part of the conference. The conference is endorsed by IUCN—The World Conservation Union, WWF (Canada), Man and the Biosphere Program (Canada), The George Wright Society, Science and the Management of Protected Areas Association, and Environment Canada.

The first conference held in 1991 drew participants from 20 countries and resulted in a text published by Elsevier in early 1992. Building on

this success, the organizers of the 1994 International Conference invite all those interested in presenting a paper, or poster, to send a brief abstract prior to October 30, 1993, to Mr. Neil Munro, Director, Policy Planning and Research, Environment Canada, Canadian Parks Service, Historic Properties, Upper Water Street, Halifax, Nova Scotia, Canada, B3J 1S9 or by FAX (902) 426-7012.

.....continued next page

Topic Areas Proposed for Paper Sessions and Workshops are:

- 1) Ecological monitoring programs and networks
- 2) Research into monitoring methodologies/state of the environment reporting
- 3) Ecological and environmental indicators
- 4) Defining ecosystem integrity
- 5) Monitoring biodiversity
- 6) Monitoring intensive and extensive monitoring networks
- 7) Monitoring program design and statistical analysis
- 8) Multi-disciplinary approaches to monitoring through partnerships, volunteers
- 9) Environmental impact assessment
- 10) Monitoring for landscape management
- 11) Monitoring and human health
- 12) Ecological monitoring and public education
- 13) Protected areas, biosphere reserves, and global change research

1995 George Wright Society Conference Planning Underway

The Committee planning the 1995 George Wright Society conference met for the first time on site at the Portland Marriott Hotel, Portland, Oregon, on May 23. The committee members (so far) consist of Stephanie Toothman, Chairperson (Seattle, Washington); Billy Garrett, Cultural Resource Program Coordinator (Falls Church, Virginia); Gary Larson, Natural Resource Program Coordinator (Corvallis, Oregon); and Cindy Orlando, (Astoria, Oregon) and Dave Herrera (Vancouver, Washington), Local Arrangements and Field Sessions Coordinators.

As stated in the last issue of the FORUM a call for papers will be issued in the Autumn of 1993. The reason for the year-and-a-half lead on this is that it is planned to distribute all submitted papers (including poster sessions) in a bound volume at the conference when it convenes on April 17, 1995. This will require more than the usual amount of time—especially considering normal procrastination tendencies.

Each issue of the FORUM will update the status of planning for this conference; stay tuned.

The Jepson Manual: Higher Plants of California

In 1991 GWS contributed \$5,000 to the Friends of the Jepson Herbarium (University of California-Berkeley) to assist in the production of *The Jepson Manual: Higher Plants of California*. It seemed appropriate to do so, since UC Berkeley was the "birthplace" of George Wright's intense interest in developing science-based management in parks and equivalent reserves.

Now, after ten years in the making, a copy of the finished product has been received by the GWS office. The work is a masterpiece of botanical literature, and is superbly illustrated. The 1424-page book may be found in many bookstores in the California area, or ordered directly from the University of California Press—1-800-822-6657. The price is \$55.

Guest Editor: John Donahue

Introduction

This century and the millennium are moving steadily into the past. The years, the days, the seconds are slipping away from us like the drops of water in an ebbing tide. With each increment of time that passes the next century is closer to being upon us.

I was born at the midpoint of the 20th century, and when I was young we still had trolley cars on the streets of New York City. The now-ubiquitous medium of television grew up with me as much as I did with it. I remember the challenge to walk on the moon that John F. Kennedy set before us, when most of us still did not own an automobile. Shortly thereafter, we watched the first space vehicle launches and men walk on the moon. As JFK predicted, once the vision of men in space had been outlined, the technology to implement it quickly followed. In my short life, human culture has changed immensely.

These personal reminiscences present a superficial measure of the tidal wave of change I anticipate in the next century. This issue is dedicated to land management issues involving all types of public land (and water) set aside for the future. Our forebears did an excellent job of preparing the world for us and preparing us for our world. The question now is how well will we do in the same task. I firmly believe that now is the time, and the only time, to plan for the issues of 2050 and 2090.

We all realize that change is inevitable, and yet we sometimes forget that change can be for the better as well as for the worse. Just the other day I crossed the magnificent Hudson River—until only recently an international symbol of indiscriminate pollution of the planet. As I crossed its breadth, I thought of how one man had made a difference in the ecological condition

of this river. That man, a poet and a singer, had determined the river could and would be cleaned up. In his mission, Pete Seeger set sail up and down the Hudson, singing and talking to people about restoring the river and helping them see the ensuing benefits to all.

In the last century John Muir popularized the idea of national parks. That self-acclaimed tramp and vagabond used his pen and paper, as if they were flint and steel, to strike a spark of an idea in our minds. He used his poetry and his personal experiences to fan the flames of our imagination and to transform his dreams into our vision.

What captures my thoughts most in these scenarios is that a single person did make a difference by capturing our imagination. A single person can serve to focus the energy of the multitudes in one direction. Once we are focused, "*we the people*" can accomplish anything. What we all yearn for today are those individuals who can take a concept and help us all see the possibilities that await us in the transformation of that concept into reality. The ability to help us see the future and inspire us to reach out to it is what truly makes one a leader.

The group of authors that I have gathered for this issue are all individuals who have the ability to see beyond what exists today into the realm of what we can accomplish together. At my request each author has focused his or her specific expertise on the next century and what we can expect—as well as on what should be expected of us.

I sincerely hope that one thought included herein will capture your imagination and that you, the reader, will fan the flames of that thought into a firestorm of action. I propose that we enter the next century as a people with a vision for cultural and natural resource management that will elicit pride and amazement from our descendants a century hence.

Bobby Kennedy said that "old men dream dreams, but young men see visions." I would like to paraphrase that thought: Old countries and organizations dream dreams; young ones see visions. Conservation, preservation, ecology, and environmentalism are young ideas. The United States is a young nation and we should be gazing into the future to see the possibilities, and to plan for the great opportunities awaiting us.

—John Donahue

Fountains of Life

John Donahue

U.S. NATIONAL PARK SERVICE
Washington, D.C.

Wildness is a necessity; mountain parks and reservations are useful not only as fountains of timber and irrigating rivers, but as fountains of life for the spirit of man.

– John Muir

It is easy to see today just how right John Muir was in his philosophy and in his dire predictions. In the last century, however, when all the eye could see across the expansive horizon was mountains, rivers, and forests, most of us would not have thought that someday it would be contiguous metropolis, instead of contiguous habitat, for the great animals and majestic trees.

As we pass through the next seven years of this decade, we are marking not only the end of the century, but also the passage of the millennium. These two events are symbolic of the great and sweeping changes that human society is experiencing. Every aspect of life on this planet reflects our own great advances in technology. Every place we look we also see the impacts technology is having on our ever-merging, but still diverse, culture.

The geological record will demonstrate whether human beings (*Homo sapiens*) are successful as a species, but if reproduction is any measure of our significance, then we are presently enjoying bountiful success. This very success and its ramifications are elements of the future that planners for every segment of society must incorporate as an over-arching concern.

The burgeoning human population is the one universal element that will impact every aspect of culture and the natural environment. If we do not address the immense impact of our own numbers on cultural sites and public lands in the future, we will have failed miserably in our attempts to leave an environmental and cultural heritage for our descendants.

There are two segments to the population issue. First of all, there are the sheer numbers of our own kind. We often discuss the various carrying capacities of a particular species and a particular habitat, but few dare to examine the human condition in a scientific manner. There is obviously a biological carrying capacity for the human species on this planet. If we were to apply the same standards to our own species that we apply to others, we would have to assume that we have already surpassed biological carrying capacity. Famine, starvation, and pollution around the globe are certainly evidence supporting this assumption. Because of our nature, we cannot, nor perhaps should not, apply those standards to ourselves. We must, however, face the direct implications of the uncontrolled growth of human population on future generations and the lands we strive to protect. An increased population will require further development and further reduction of open space. The increased population will also require further consumptive use of natural resources.

The 1990 census in the United States showed a higher fertility rate than previously anticipated among older women and minorities. As a result, the 1992 projections for the U.S. population in the year 2050 have been revised to approximately 390 million people. These figures are significantly higher than the 1989 projections and I for one would not be surprised to see continuing revisions in an upward spiral.

The second dramatic issue related to population in the United States is the demographics of the future population. As a result of the 1990 changes in the immigration laws, the Census Bureau predicts 76% more immigrants entering the U.S. by 2050 than anticipated in the previous estimates.

We cannot simply sit back and expect future populations, with far greater consumptive-use needs and with a greater variety of cultural backgrounds, to accept the land-management paradigms that we struggle to accept ourselves. It has been said that people only protect what they love, only love what they know, and only know what they are taught. Our planning for the future preservation of lands must focus on more than laws and greenbelts. We must plan wisely so that the new population does not lightly disregard what we have held so dear.

We must plan now for the obviously greater needs of the future. We must plan now for the tremendous cultural diversity that the United States is certain to experience. We must remember that if the majority does not understand the need for wilderness and wildlife, then there will be no such aspects to the legacy we leave behind. The laws that we sanctify and the lands that we spend our lives defending are protected at the whim of a democratic majority.

We preserve and conserve lands and waters only at the direction of the people of our nation. We must recognize that if we do not educate our constantly changing population about the need for historical sites and lands to be preserved, then they will not be preserved. Congress can deauthorize our sanctified public lands and, in the end, Congress does exactly what the people want. If we allow the teachings of conservation and environmental philosophies to fall by the wayside, then the popu-

lace will cast off the special designations that protect our public lands.

Public forests and parks can be deauthorized with a voice vote and the stroke of a pen. We must set aside our differences and work together toward the education of the populace. We must develop serious national- and state-level planning for future land-use needs. Developers and preservationists, hunters and animal rights groups, must work together toward a common goal of insuring some national heritage for future generations.

Another issue which should be examined is the basic philosophical premises on which we base our efforts. Many of the basic paradigms that we employ and base our land-management practices upon are relics of the past. The time has come for us to enter the 21st century by first entering the 20th. The technological leaps and bounds of the last twenty years have transformed our once-seemingly infinite planet into a veritable global village. A protest in Yellowstone National Park over the management of wildlife, taking place at 9:00 in the morning, can be viewed on television in New York and London before the late news has concluded for the evening. An oil spill into a river from a government-managed lease will incite a furor from people on both coasts by the time the well is capped.

In this atmosphere it is foolish and short-sighted to continue leaving the management of complex and intricate problems to land managers who may have little or no experience and understanding of those problems. Land-management agencies are based on philosophies that focus on the decentralized nature of the often-remote lands that they manage. As a result, decisions are routinely left to field managers on subjects so numerous that no one person can be knowledgeable about all of them in a professional manner.

The field-level manager is expected to hold the knowledge of the world like some modern-day "renaissance man." The renaissance person of the next century will not be one who knows everything, but one who knows how to employ the vast array of specialized expertise available.

To plan properly for the future, we must address the adequacy of the basic paradigms underlying our planning and daily management. I would suggest that the time has come for land-management organizations to embrace a more programmatic approach. Subjects as diverse as wildlife management and hazardous waste need to be addressed by central offices with true expertise in the subject area. Public-land managers in the 21st century will need to understand that there are issues they do *not* want to supervise or direct.

We are no longer the decentralized society we once were. Decentralization of land-managing agencies cannot be an excuse for non-action or a lack of leadership. The issues today are more complex than where to locate the campground. Land managers need strong leadership from their central offices. Local managers can no longer be left to solve every problem. Neither can they be left to absorb public dissatisfaction when a policy goes awry. Plausible deniability must come to be regarded as a cardinal sin in government.

One of the most difficult and important issues land managers of tomorrow will face is wildlife management. As the expanding human population continues to move closer to formerly remote and pristine parks and forests, the issues involving wildlife, its carrying capacity, and wildlife movement corridors become increasingly important. As human interaction with wildlife becomes more frequent, the conflicts between them are likely to increase

as well. This is not an issue for animal rights activists or hunters, but for every man and woman who wishes to leave behind a legacy rich in those things that make life worth living.

Those lands set aside as remnants of nature in its wild state will become increasingly attractive to populations sharing an ever-decreasing supply of raw materials. We cannot blame the people of the future if they fail to preserve open space, wilderness, and wildlife (which is the critical measure of wilderness). If our heirs are forced to choose between their own survival and the survival of wildlife it will be the legacy of our failure to plan for the future. The time to plan for 2060 and 2080 is upon us now.

I fear greatly for our children's children, seven generations hence, if they are forced to live in a world that does not know the cry of the red-shouldered hawk or the flight of a herd of elk. The song of the warbler is a legacy that we should strive to leave for those to come after us. It is a legacy every bit as inspiring as the pyramids or flight to the moon. Just as people do not plant trees for themselves, but for posterity, so we must work together to leave land, water, air, and forests in some form that can provide habitat for all the creatures of the planet.

One example of the complex nature of these issues is the present status of the white-tailed deer (*Odocoileus virginianus*) in the eastern United States, and its ramifications for state agencies and the U.S. National Park Service. This issue symbolizes both the need for comprehensive planning for wildlife management and for a programmatic approach to policy issues for all land-management agencies.

A variety of forces and pressures have combined synergistically to compound the frequency of negative deer-human interactions in the urban and suburban environment.

They include such things as auto collisions and depredation on crops and horticultural plantings. Many national parks and historic sites have a high population density of this species. As a result of both perceived resource degradation and public pressure resulting from the impact of deer population densities on adjacent private lands, a great deal of white-tailed deer research has taken place in national parks.

In many of the parks studied, research has confirmed anecdotal observations about population numbers and the nutritional status of the herds in question. In some cases the research has been thorough enough to detail dietary preferences and the impact upon vegetation. In addition to the importance of forest succession and exclosure data for vegetation analysis, home range information has been critical for most research studies.

Other critical information collected on a less-frequent basis is historical data relating to the composition of the forest or landscape. In the case of many historical parks, this information is essential to the decision-maker. Managers need a concise concept of what they are attempting to protect and an understanding of how that relates to enabling legislation and organizational mandates.

Many eastern USNPS sites do have high population densities of white-tailed deer. In addition, proponents of maximum-sustained-yield management techniques tend to blame park areas for their lack of success in controlling herd size. The "refuge effect" theory claims that wildlife species in season flee into non-hunted areas to evade hunters. In many of these cases, however, the deer population density is equally or nearly as high outside of the park boundaries as it is within.

Although there may be validity to the refuge effect in some areas, in

most it is a point of no practical significance because of the high population density of the same species in the surrounding area. There may be some situations in which the reduction of the herd will alleviate depredation pressure in the surrounding area, but this will likely be more the exception rather than the rule in the coming decades.

The USNPS will have to determine its wildlife management policies and strategies based strictly upon its own mandates and goals. The necessity for action must be determined on a case-by-case basis. It may become necessary for the Park Service to establish its own wildlife management strategies, including, perhaps, its own nomenclature.

In the past, wildlife management techniques, strategies, and philosophies have been based upon the conservation ethic of maximum sustained yield. This has been sufficient and has led to successful management of various species. There are two distinct problems with applying this strategy to USNPS sites. First of all, the strategy is not enjoying the success it once did. The increase in urban-natural area interfaces has severely limited hunting access to the areas with high population densities of white-tailed deer. The zones managed by state agencies to dramatically reduce the herds are the same ones where access is denied to the hunter by private landowners, including farmers.

Secondly, the theory of maximum sustained yield is based firmly upon a harvest ethic. The current terminology of wildlife management makes it apparent that harvest is its ultimate goal. Traditional wildlife management programs hold that a properly managed hunt will provide a fine crop of healthy animals. The ultimate driving force is obviously the harvest, as reflected by the terminology. What is a healthy animal? One that provides a good harvest for the hunter. What is carrying

capacity? Very often, it is a number set according to economic factors as much as biological ones.

The USNPS may employ hunting techniques to achieve its goals. However, the USNPS mandate is completely different from that of other agencies in relation to wildlife management. It is incumbent upon the USNPS to separate the harvest ethic from its management goals.

This is not to suggest that the USNPS must be passive to meet its mandate. It seems likely that the remainder of this century and the next will require proactive management. The nature of that action and the precepts that drive it must be established carefully.

Controversy is certain to ensue if USNPS areas assume an active wildlife management program, particularly if the species is to be managed is the white-tailed deer. Taking action to reduce white-tailed deer in a national park unit that has never before been subjected to hunting pressure will cause significant controversy. Regardless of the fact that superintendents have the acknowledged authority to manage wildlife within federal reserves, the anticipated controversy and legal challenges call for senior-level policy interpretations and decisions.

In addition, it is possible that some managers may view the decision for proactive management as one too controversial to be made at the park level. The possibility that some managers may choose to avoid the controversy and the rigors of environmental compliance by deferring any action is distinct. The potential for non-action in areas that require action is obvious. It is equally possible that some parks may endeavor to act on this issue in a premature or ill-advised fashion.

Although wildlife management actions could be undertaken based on the history of this issue and previous success with case law, it would be much wiser to begin with a clari-

fication of USNPS policy. It would also be wise for the regional and field-level personnel to function with strict guidance and under the auspices of the Washington office.

A careful analysis of this issue leads to the conclusion that the best approach to white-tailed deer management is for it to be handled on a programmatic level. The behavioral variability among individual deer herds can be large. The number of problems presented by overpopulation are limited, however, and very similar from one area to the next. The number of solutions available to the manager are also limited and similar in scope and depth. A programmatic action plan and environmental compliance document should be written to examine the alternatives for deer management available to the USNPS. The USNPS should use this opportunity to share its dilemma and potential alternatives with the public, and seek the best advice from its constituency—the American people.

This is one area where strong leadership from the top down is necessary for a positive resolution. The amount of controversy the issue will generate will overwhelm any single USNPS superintendent, as it did to the U.S. Fish & Wildlife Service in their Mason Neck unit. The final resolution will come from senior policy officials, who should make the decision on a programmatic level with full knowledge and understanding of the controversy, emotions, and ecological considerations involved.

I do not wish to leave the impression that present systems and paradigms have not served us well in the past. John Muir told us that “the battle for conservation will go on endlessly. It is part of the universal warfare between right and wrong.” Yet America’s parks, forests, and rangelands are in remarkably good condition considering the circumstances and the immaturity of the

nation and the preservation movement. Last year marked the 75th anniversary of the U.S. National Park Service. If we gauge success by the amount of change over this period, then most of the parks have fared fairly well. In a time that saw two World Wars, the Great Depression, the dawning of the nuclear age, the Cold War, detente, and perestroika, the United States managed to sustain the finest national forest and park system in the world. This success was accomplished with little in the way of science and operations funding.

This is not to say that all is well, nor that every decision made by land management agencies over the years has been correct. The decisions, however, were the best ones managers could make with the available information. This is, after all, what managers must do even in a technological world of bits and bytes.

In most areas our green spaces were not planned with ecological principles in mind, but with scenery, commercial potential, lack of commercial potential, or other considerations that we cannot identify any longer. Muir told us long ago that “whenever we try to separate out any thing we find that all things are hitched together in the universe.”

What we must begin to realize is that we are not simply preserving nature for its own sake, but for our own. We as a species will not preserve or destroy nature. Even if we pave the Earth from end to end, nature will eventually prevail. At some time in the future the human species will pass into the fossil record, and all of our accomplishments will be a thing of the past. Cities will disintegrate, concrete will erode, and all traces of our existence will be gone. There may be many species that will suffer and become extinct as a result of our activities, but other species will survive and new ones will arise.

As we move into the next hundred years, we face a much greater challenge than our predecessors. They operated in a world where many of our lands were separated from the pressures of civilization by distance, in a nation with an abundance of resources, and were often insulated by a buffer of pristine adjacent lands. Today, parks are more likely to be surrounded by an expanding population and an ever-increasing shortage of resources. Our charge is sure to more difficult and ever more important, for among the shortages of the world will be those of silence, wildlife, and habitat—not only for the animals, both great and small, but for the human soul.

Now is the time to establish a vision for the management of our treasured public lands in a comprehensive and objective manner. We are capable of setting aside our petty desires for immediate gratification to

ensure a heritage of natural resources for our progeny. The last century has provided a platform for many great minds and visionaries who taught us what conservation and preservation mean. It is our duty to leave in place both the resources and the infrastructure to protect them, including an informed and supportive public.

Nature tears down and builds and destroys each and every day, and with each day, the Earth is born anew; or, as Muir put it, "one learns that the world, though made, is yet being made. If this is so, the morning of creation, with mountains long conceived, is now being born, channels traced becoming rivers, basins hollowed for lakes to be followed by still others in endless rhythm and beauty." So it must be with a young society or organization seeking to implement its vision and to preserve the very fountains of life.



A Letter from Friendship Hill

Roger Kennedy

THE NATIONAL MUSEUM OF AMERICAN HISTORY
Washington, D.C.

We don't have to invent a connection between conservation and preservation. We feel the same awe in the presence of both a grand natural landscape and the mighty achievements of our human predecessors. Of course, neither grandeur nor might are requisites to an intelligent diffidence toward our inheritance from nature or from humankind: just a prudent sense of trusteeship will do.

Sometimes the reasons for conservation of culturally significant places emerge more clearly when we examine afresh places we have considered primarily as important natural areas, and vice versa. I have had reason, lately, to be surprised and instructed anew by Yellowstone National Park, Isle Royale National Park, Friendship Hill National Historic Site, near Pittsburgh, and the Jefferson National Expansion Memorial National Historic Site, in St. Louis.

The stress in this paper will be upon the reinterpretation of Friendship Hill, because it permits us to draw wisdom from Albert Gallatin, the heroic figure who built the house, as well as from a great document about the preservation of cultural sites: the "Report on the Mound Explorations of the Bureau of Ethnology," prepared and largely written by the Bureau's director, Cyrus Thomas. That report, published in 1894, was the outgrowth of Gallatin's passionate enthusiasm for racial justice and for historic preservation.

It may not be immediately evident that Yellowstone, Isle Royale, Friendship Hill, and the Jefferson arch have much in common. But Cyrus Thomas and Gallatin instruct us that they do. It is a very good thing that all four of these places are now the responsibility of the U.S. National Park Service. Any one of them is a good place to rediscover an aspect of America's ancient past and the diversity of its peoples.

The building of popular support to preserve the wonders of Yellowstone commenced with John Colter's account, but it gained important impetus from an archaeologist, between 1810 and 1816. He was also a pirate, and his name was Bartholomy Lafon. Lafon wrote a report urging that Yellowstone be protected that may have had considerable circulation—there is a copy in the archives of the Spanish Secret Service. Lafon already had created a following: he laid out the Garden District in New Orleans, designed Jean Lafitte's headquarters on Galveston Island, advised Thomas Jefferson on routes for his explorers of the West, and proposed a very good idea—a great national atlas of American antiquity. He had also made the first systematic search for mounds in the lower Mississippi Valley.

Lafon should have a memorial somewhere, possibly along a new National Antiquities Trail in Arkansas, Louisiana, and Mississippi. Such a trail would link the sites later described by Thomas, but to which Lafon first called our attention, as he did to Yellowstone.

There is another archaeological association with Yellowstone: in the years between the time of Christ and the fall of Rome, the Indians of the Ohio Valley received obsidian from Yellowstone's obsidian cliff in large enough chunks to make some of their most beautiful sculpture. We do not always connect Yellowstone

to the Hopewell culture, but the Hopewell Indians of Ohio did, as they brought into their exchange networks not only Yellowstone obsidian but also copper from Isle Royale and shark's teeth from the Atlantic Coast of Florida.

On the way to Friendship Hill, let's pause in the shadow of the Jefferson National Expansion Memorial's great arch in St. Louis—or, better still, let's ascend to its apogee, to survey what might have been seen from that perch in 1779 and 1879. In 1779 we would be looking down at the center of the fortifications within which the Spanish garrison, with the town's French inhabitants and a few Americans provided by George Rogers Clark, stood off siege by 1,000 Sioux and British.

Thanks to some help from local geographers, we have now been able to place those fortifications upon a GIS map of St. Louis. The Revolutionary War in the West is part of the story of "expansion"—it considerably enriches the story of what we mean by Expansion—expansion by whom, at the expense of whom, and with help from whom? Conservationists and archaeologists might ask, in addition, at the expense of what?

Cyrus Thomas and the Bureau of Ethnology would be more interested in a second addition to a map of St. Louis: the placement, within its current grid of streets, of the mighty architecture present in St. Louis in the fourteenth century. Portions of the ruins of that architecture of earth, and portions of the ruins of the Spanish fort, were called to Gallatin's attention in 1819. So late as that, visitors to the hustling, bustling river port could recognize hanging gardens, platform mounds, cones, and two plazas. So late as that, one could go to St. Louis for a sense of the antiquity of human endeavor in the Mississippi Valley. From the arch one can still look across the

Mississippi and see, on a clear day, Monk's Mound—larger in extent than the great pyramid of Egypt, nine stories tall. Unlike the prehistoric city of St. Louis, the central plaza at Cahokia is protected by a park and interpreted in an excellent museum.

Cyrus Thomas admonished his fellow countrymen a century ago to give better attention to American antiquity. We know now that a good reason for doing so is to reinforce the lessons of our natural areas. In St. Louis, for example, we can learn that the great metropolis, thronged with people in 1300, was vacant by 1450. The reason for its evacuation is clear enough. Those people befouled their environment, depleted its resources, and had to straggle away, producing what archaeologists are calling the American "Vacant Quarter" a century or more before Europeans arrived there. There's a lesson there about conservation which was lost when, in the 19th century, we failed in the historic preservation of St. Louis.

Now let us turn to the lessons of Friendship Hill, surely one of the least-appreciated of all the National Historic Sites. Friendship Hill is related to ancient peoples too. It lies within a few miles of the Meadowcroft Shelter, where archaeologists have found evidence of human habitation for at least 12,000 years. But it is Friendship Hill's association with Albert Gallatin which makes it a national shrine.

In the 1780s, Gallatin became the first great American statesman to stake his political future west of the Appalachians. Swiss-born, he became a congressman and senator from Pennsylvania, Secretary of the Treasury, diplomat, abolitionist, and founder, in effect, of Cyrus Thomas's Bureau of Ethnology. Gallatin was for decades America's most eloquent sponsor of studies into its ancient past, especially the importance of the ancient West.

Let's look in on him sixty years after he arrived at Friendship Hill. It is 1844. Gallatin is in the midst of his last political battle, standing beside Abraham Lincoln, John Quincy Adams, Henry Clay, John C. Calhoun, Frederick Douglass, and Thomas Hart Benton, in opposition to the Mexican War.

What a story to be told at Friendship Hill! Here was a Founding Father who had been seeking emancipation of the slaves since 1790, going into battle beside Lincoln, who would become only two decades later a Great Emancipator! We all know how slowly Lincoln came to full participation in Gallatin's emancipationist views—only after Antietam, some would say. But they were together, in 1844, during an earlier, and a losing, struggle against the power of the slave-owners. Had the outcome been different in 1844, the balance of forces at Antietam would have been quite different.

It was, perhaps, a bitter memory of Gallatin's own acquiescence in the continued expansion of slavery into Louisiana in 1805, which led him in 1844 to oppose its continued expansion into Texas and northern Mexico. He said then, as he had not said on the earlier occasion, that the United States should not add "a foreign state, and a foreign slave-holding state, to the union" and urged that no new territories should become states with slave-owning recognized in their constitutions.

In 1844, the nation did not choose to depart from the course leading it toward civil war, a course upon which it had been set by the acquiescence to slavery in the terms of the Louisiana Purchase and the organization of the lands acquired. (That is another element worth re-emphasis in St. Louis). That war was brought closer after the acquisition of Texas and the Mexican War. Old men such as Gallatin remembered: during the Louisiana debates of

1805-6 and the Missouri debate of 1819-20, the advocates of expanding slavery prevailed. On the other hand, they remembered precarious victories: how antislavery Virginians—such as Thomas Worthington and Edward Coles, governors of Ohio and Illinois—held the line against slavery, drawn by the Northwest Ordinance along the Ohio River.

In the 1840s, the advocates of the expansion of slavery had special interests in Texas and Mexico, and those advocates controlled the policies of the government of the United States. Spanish officers, commanding garrisons along the vague western frontier of that purchase, issued invitations to American slaves to climb aboard an early version of an underground railroad to find freedom in Texas. The Blacks were offered freedom, grants of land (anticipating the Freedman's Bureau), and instruction in the Roman Catholic Faith.

The Americans responded with diplomatic remonstrance and threats of invasion. The Spanish authorities withdrew their offers, but slaves continued to find refuge in Texas. One of the first acts of the Mexican government after independence from Spain in 1820-21 was to declare the abolition of slavery. Mexico still held Texas, and Texas became a sump, drawing off runaway slaves from the American plantations.

In the 1830s, the slaveowners of the South turned their attention to this threat to their interests, and, beyond Texas, to abolitionist Mexico. Texas was acquired in 1845. The Mexican War ensued, despite the opposition of Gallatin and the others. The president, James K. Polk, solicited a war, and lost no time in responding to a Mexican raid across the Rio Grande with a full-scale invasion, justified to the public as a war over yet another inferior people.

When Mr. Polk got his war, Gallatin set aside his studies of Native American archaeology at Friendship

Hill. Buckling on the armor of righteousness, he set forth on the last campaign of his life. Lincoln and the other younger men were his allies, but his partner was John Quincy Adams, the former president who had returned to Washington as a member of the House of Representatives. They went into battle together, these old tellers of truths, full of that kind of idealism which is reduced to its essence by the heat of experience.

Their opponents were those who advocated a sort of American equivalent to the White Man's Burden. Military adventures abroad were being justified by a vaunted racial superiority over the victims. George Wilkins Kendall wrote that Mexicans displayed "few of the instincts which govern other races." Brantz Mayer colored things in: Mexicans were dark; though brave, theirs could only be berserk bravery, of "Mahomedan fatalism derived . . . from . . . Moorish kindred." Mexican cavalry were, he said, the "Arabs of the American continent."

Gallatin and Adams would have none of this borrowing of antipathy from Blacks to apply to Mexicans by way of Moors. They argued that a delusion of racial superiority over African-Americans and Native Americans was now determining the conduct of foreign affairs.

The two old patriots infuriated the jingoes—the believers in Manifest Destiny. Adams and Gallatin portrayed the triumphant advance against Chapultepec as slavery's triumph; when the Stars and Stripes was unfurled over the Halls of Montezuma, it was, they said, "Slavery's Flag."

In his essay *Slavery and the War*, Adams insisted that the slave-owning American nation, not the Mexican, required redemption. Thereafter he commenced voting against appropriations for the war while offering a stream of abolitionist resolutions, ceasing his labors only when he died

at his desk in the House of Representatives.

Nor did Gallatin permit the Polk Administration to go uncontested in what he called was "unjust aggrandizement by brutal force." He derided the claim that the war was fought to "enlighten the degraded Mexicans." As he had championed Indians as a people capable of great art and architecture, and as he had asserted the talent of African-Americans to be equal to those of the Whites, Gallatin rejected assertions of Mexican unworthiness as incompatible with the "principle of democracy, which rejects every . . . claim of . . . an hereditary superiority of races."

A steadfast adherence to that "principal of democracy" permitted Gallatin to develop an understanding of what was happening on the frontier fifty years before Cyrus Thomas issued his report. In the early decades of the 19th century, the architectural achievements of the Mound Builders had been rediscovered by a people engaged in imposing their rule upon the Great Valley. One of the benign consequences of the Mexican War was that Americans learned to make analogies among the antiquities they had found in the Ohio, Mississippi, and Ouachita valleys and what their soldiers saw in Mexico (Gallatin called their attention to New Mexico) and to what Napoleon had found in Egypt.

From those analogies and from a growing awareness that they were trespassing upon an ancient and admirable past came the naming of cities such as Cairo, Illinois, and Memphis, Tennessee, and Lincoln's reference to the Mississippi Valley as the Egypt of the West. Lincoln understood about cultural resources!

From 1780 until Lincoln's election in 1860, several million Americans made their homes in the shadow of large works of earthen architecture, and constructed cities upon the ruins of older cities. The

Indians were still there, though much reduced in numbers and in condition, demoralized and sickened by European and African diseases. The newcomers were astonished at the evidence that Indians had been capable of monumental architecture—of making buildings far larger than any these invaders had ever seen before.

We have learned recently that some of the largest of these buildings are five thousand years old. At Frenchman's Bend and Hedgepeth in Louisiana, Americans were building very large complexes of structures before the first stepped pyramids were attempted in Egypt. These astonishing earthworks require protection, as does the old growth forest which surrounds some of them.

The architecture of Poverty Point is merely 3,500 years old, but it is seven times larger than its contemporary, Stonehenge. The great pyramid at Cahokia, as high as a nine-story building, occupies a larger area than the Great Pyramid at Gezah.

Anyone in Gallatin's time who came into St. Louis or Nashville, or the Ohio towns of Cincinnati, Newark, Portsmouth, or, certainly, Chillicothe, would find the ruins of ancient buildings dominating the landscape. By 1890, much had been lost. It was even possible for historians to treat the Mississippi Valley, with its thirty thousand or more ancient buildings, its cities built upon cities, as if it were open, vacant land—a "new" rather than a very old world.

The amnesia of this is largely explicable as a scar left by racial prejudice, in this case, a prejudice against Indians as having an architecture. Like Gallatin in the 1840s, Thomas in 1894 contested against the pervasive racism of nineteenth century America. Thomas was living among the Jim Crow generation; that generation had witnessed the final victory of American arms over the Indian nations of the West, and had

been directly and bitterly conditioned by the Civil War and its ugly, dispiriting aftermath. The bitterness for some arose from the corruption of Reconstruction, and for others from the failure of Reconstruction to achieve those war aims to which Lincoln called the nation.

When we visit Friendship Hill, we are induced to reflect again upon those war aims, because they are precisely the ideals of Albert Gallatin. And we can recapture two truths well known to him. The first is the central significance to the American story of slavery. The second is "an appreciative estimate of the importance" of the ancient West in the American story.

Cyrus Thomas insisted that his contemporaries should "register," that is, see as real *and* important, the evidences of the ancient West. Americans were reluctant to do that. At first, they insisted that Native American earthen architecture was not, in fact architecture—because it was made of earth. (Some people may still be heard making that assertion.) Others suggested that though perhaps architecture, the work was not Native American, but, instead, the creation of Hindus, Welsh, Egyptians, Lost Tribes of Israel, even Japanese.

People are still heard to argue that the Indians whose culture was under attack in the nineteenth century were not the sort of people who could have accomplished such things.

Fifty years earlier, Gallatin had pointed out that genealogical nonsense about a master race (Anglo-Saxons) was being coupled to the defense of *slavery* and to the doctrine of Manifest Destiny. Slavery was gone by 1890, but not its economic or intellectual legacy. By 1904, the destiny having manifested was already surging outside the continental limits. Gallatin's "Saxon Race" has enjoyed itself, but not enough to be completely self-assured; its anx-

ious insistence upon the racial superiority seems still to require a refusal to credit Indians with a grand history.

Who is an American? This is the question asked by Frederick Jackson Turner and by Alexis de Toqueville. Gallatin had given the answer in 1814, while representing the United States in the negotiations leading to the Treaty of Ghent. He was offered what Henry Goulburn, the British emissary, thought to be a compliment: Goulburn commented that Gallatin was still more European than American. Gallatin flared back that the only true Americans were "the Red Indians."

By this he meant, of course, that we are all becoming Americans, and that some have pride of place among us. Americans were—and are—a new people. We are not mere carriers of Europe's genes or Africa's or Asia's. In Gallatin's time, people still contended that the truest of all were what they called the "Anglo-Saxons." You can still hear that said at meetings of the Ku Klux Klan. Gallatin reminded his countrymen that the very term Anglo-Saxon was unscientific. The British in America were as much "Frenchified Normans, Angevins and Gascons" as Angles and Saxons. He doubted, as well, the virtue of "doubtful descent from men who lived one thousand years ago," who were, he added, a barbaric lot clearly "inferior to Goths."

Warming to his subject, Gallatin went on to say that "it is not [to] their Anglo-Saxon descent that the English are indebted for their superior institutions. In the progressive improvement of mankind much more has been due to religious and political institutions than to races." And, he might have added, to frontier conditions, as well.

The master of Friendship Hill hoped that America would embrace all races as co-equal partners. Then "there will be no trace left of the pre-

tended superiority of one of those races above the other. . . . [T]he claim is but a pretext for covering and justifying unjust usurpation and unbounded ambition."

Albert Gallatin was an authentic American hero. Perhaps more than any other of the Founding Fathers, Gallatin had words which may catch the conscience of our own time. The issue which he put in 1844 is still with us: how shall we achieve a society in which all Americans respect each other, and recognize the human achievements each represents?

At Yellowstone, obsidian cliff reminds us of Hopewell sculpture, and of an architect and archaeologist who called for a national atlas of an-

tiquity. His other profession, piracy, merely makes Bartholomy Lafon easier to remember. The Hopewell lead us to recall copper from Isle Royale, and the other Indians who, eight or nine centuries after them, built the first great architecture in the shadow of the arch at St. Louis. At St. Louis, too, there are ecological lessons to be learned, just as there are at Friendship Hill, where the home of Albert Gallatin was barely rescued from the depredations of a mining company which would have denied us the only tangible reminder we retain of the life of this great man. That life and that place are full of lessons for today.

(Portions of this essay are drawn from a forthcoming book by the author entitled Found in the Valley. After this essay was submitted, Roger Kennedy was appointed director of the U.S. National Park Service.)



Wilderness and the 21st Century

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The idea of formally protected wilderness is quintessentially American; the word itself expresses virtues absent from its connotations in other languages. Our idea of wilderness on public lands contains some elements that have been constant over time, but the perception of wilderness, its value and its role has evolved as American society has changed.

For the 21st century, the idea will further evolve to reflect a new understanding of natural systems, their needs, and their significance. If “wild forever” has expressed the motivating aim of wilderness protection efforts for the last three decades, “wild again” will be the goal of much of that work in the decades ahead.

Most of the major ideas of western civilization contain both general and specific components that are capable of adaptation as new interpretations, conditions, and needs emerge. Those ideas often serve as theoretical frameworks into which site- and time-specific pieces are fitted. Wilderness is such an idea.

Because designated wilderness areas (in the United States) are a legislative creation, it is perhaps not surprising that we look to the legislation itself—the Wilderness Act of 1964—for a definition. What is surprising is to find there not the usual sterility of statutory language but a definition still remarkable today for its elegance:

A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this chapter an

area of undeveloped federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation. . . .

The Congress also told us *why* it decided that wilderness and its protection are important and necessary to us as a people:

In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas leaving no lands designated for preservation and protection in their natural condition, 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. For this purpose there is hereby established a National Wilderness Preservation System to be composed of federally owned areas designated by Congress as "wilderness areas," and these shall be administered for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness. . . .

Wilderness is not likely to be redefined, nor does it need to be. The congressional definition will form the core of the American perception of the term for generations. What will change—what has already changed—is the generalized view of

the function of wilderness. That stems not from a reinterpretation of the purposes the Congress set forth in the 1964 Act but from a maturing understanding and appreciation of wilderness and its value.

From the earliest designations until fairly recently, the value of wilderness was explained far too often in terms of direct human use, as though the Congress had said *only* that wilderness was meant to provide "outstanding opportunities for solitude or a primitive and unconfined type of recreation." Environmentalists themselves often cast their arguments for wilderness in such narrow terms. One result of that was to arm wilderness opponents with the charge that wilderness is only a private playground for young, fit, rich backpackers, a fundamentally elitist idea and intended to exclude most Americans.

Another result was to allow some federal agencies to evaluate candidate wilderness areas with absurd narrowness when they sought to exclude, not include, as much wilderness as possible. The most egregious example, perhaps, was the Bureau of Land Management's elimination of huge tracts of qualified wild land from the Utah BLM inventory in the late 1970s. The agency dropped Mancos Mesa, a magnificent 110,000-acre expanse of sand, stone and sagebrush that rises 5,000 to 6,000 feet above the surrounding desert. Mancos failed, the BLM said, because it lacked "sufficient opportunities for solitude." (That, even though a helicopter pilot who had set BLM inventory team members down there in the vastness one morning

was unable find two of the three when he returned later to retrieve them.)

So common was the human-centered interpretation that Representative John Seiberling, then chairperson of House Interior Subcommittee on Parks and Public Lands, saw fit to remind us all in 1986 that direct human use is not the only, nor even the principal, reason for wilderness protection.

The notion of wilderness as a venue for human recreation, challenge, and spiritual renewal, is still very much—and very appropriately—a part of our view of wilderness values, but no longer the dominant one. We have begun to think of wilderness, and thus to describe and defend it, as a place—maybe the only place—where natural systems can operate naturally. It is as though we have only lately discovered and finally given weight to those other important words of the Act which define wilderness as a place “which is protected and managed so as to preserve its natural conditions.”

More likely, though, the shift simply exemplifies the amazing speed with which our knowledge of the environment, its processes, and our impact on them is growing.

It is odd to think that the splendid words of the Wilderness Act—not yet 30 years old—and our undiluted faith in them, reflect a somehow more innocent time. But they do. When the Congress passed the Wilderness Act, the term “environment” was neither widely used nor understood. Recycling was unheard of. The first Earth Day was six years away and Rachel Carson’s *Silent Spring* was still an obscure book for specialists which, like the whole field of ecology, was mostly unknown to the general public.

Small wonder that in such a time we were so confident that wilderness designation, in and of itself, would achieve the “preservation and pro-

tection” we sought, would maintain these lands in their natural condition against change by humans, by visitors who do not remain. We have learned much since that recent but somehow so-remote time and we continue to learn. We know that lines on a map will not prevent humans visiting their works on protected wilderness areas, either from within or from without. And before we’ve quite fully matured in this better understanding of wilderness—that it has intrinsic value, whether humans ever go near it or even spare it a thought—we confront a new and even more unsettling certainty. Even our largest wilderness areas, even were they as secure as we once so naïvely believed, are inadequate to protect the resources we thought were safe in them.

There is in that discovery, at least, a historical consistency, for there was never a time when our capacity to do damage did not outstrip our knowledge of the consequences (or our willingness to accept them.) It isn’t that the Wilderness Act wasn’t visionary enough, either, or that its ends were too modest; it is rather that its means, which seemed so revolutionary, would falter in a world more complex than we could possibly have known.

The words of the Act speak eloquently of protecting “the earth and its community of life.” They convey with perfect clarity the very ideas of interrelationship and interdependency that Aldo Leopold first articulated in his land ethic and that we struggle to invoke today in defense of what we now call “biological diversity,” or “biodiversity” for short.

In only a few years, preserving biodiversity has become the most commonly stated goal for management of our public lands (though as yet we see little enough of it on the ground). We have come to recognize, as Mark Shaffer of The Wilderness Society explains it, that . . .

...the diversity of living things as a resource of fundamental value to human society. We have also begun to recognize that this diversity of life is a product of natural dynamics that operate over entire landscapes and that only landscape-level conservation can maintain biodiversity. Life's diversity cannot be saved one endangered species at a time or in a few parks or reserves.

If we are to maintain biodiversity, we must accept that some proportion of every region be left in a natural or semi-natural condition. We need a network of habitats throughout the country; a network sufficiently large, varied and interconnected to allow nature's dynamics to perpetuate all facets of biodiversity. We can think of this network, collectively, as America's life-lands.

Biodiversity is disappearing at an alarming rate—some scientists say an uncontrollable rate—and endangered species are the painful evidence of it. The loss is primarily attributable to the disappearance of natural habitats. The numbers are sobering. The U.S. Fish and Wildlife Service lists over 700 native species as threatened or endangered; several thousand others are candidates for listing. The Nature Conservancy considers 9000 species to be at risk. Against this, set our population numbers and trends. Today, the U.S. is a nation of 250 million people. By the middle of the 21st century, it may number 383 million people—an increase of about 50 percent in just over 50 years.

In growing to our present population, we have altered every natural habitat type in the country, reduced all of them and utterly eliminated others. What toll will half again as

many of us take on the natural landscape if our land-use patterns continue unchanged?

It is against this backdrop that wilderness designation and management must occur for the remainder of this century and well into the next. Each of the United States' federal protected area systems—the National Wilderness Preservation System, the National Park System and the National Wildlife Refuge System—is indispensable. But even taken together they are nowhere near enough. As Shaffer says, "saving biodiversity means saving some of every natural habitat and saving enough of each to last. We face a crisis in maintaining biodiversity not because our past conservation efforts have been wrong, but because they have been neither systematic nor of sufficient scale. We haven't saved some of everything and we haven't saved enough to last."

We have shaped wilderness areas for political reasons, not natural ones—drawn their boundaries along political geographic features for "management efficiency" rather than along ecosystem lines that describe "a community of life" or otherwise make natural sense. In significant ways, the political process of wilderness designation has been one of constricting wilderness to the smallest possible area and dedicating the public land that surrounds it as a commodity free-fire zone. And to make sure the failure is complete and permanent, every recent western wilderness bill contains the now-standard Congressional prohibition against "buffer zones" that might soften the impact of our activities on protected areas.

We have selected our parks mainly for scenic beauty—not a bad thing unless it's the only thing—and given them political rather than ecological boundaries into the bargain. Our wildlife refuges are engineered

to produce waterfowl. In sum, they are all too few, too small, and too scattered to be much more than desperately fragile islands in a sea of development.

Public lands will continue to be important as we move rapidly toward management for biodiversity and ecosystem integrity. The main reason is obvious: public lands account for nearly a third of the nation's land area. They offer ownerships large enough, even now in some cases, to provide long-term viability for many natural communities and species.

But public lands no longer contain a full representation of all natural habitat types and scarcely exist at all in some parts of the country, such as the Midwest. What The Wilderness Society's Shaffer and others are calling for is a truly *national* habitat conservation program that is both systematic and of sufficient scale, one that complements existing conservation areas by weaving together a network of lands across the nation that will provide the habitat variety, stability, and continuity essential to maintaining our native biodiversity over the long haul.

Several promising programs are already well along in their development. The Wildlands Project, based in Tucson, Arizona, proposes to develop a "system of large, wild core reserves where biodiversity and ecological processes dominate." Biological corridors would link reserves and permit "natural dispersal of wide-ranging species, for genetic exchange between populations, and for migration of organisms in response to climate change. Buffers would be established around core reserves and corridors to protect their integrity from disruptive human activities." A number of grassroots organizations are part of the Project, advocating the development of regional wilderness proposals

based on principles of conservation biology.

The Nature Conservancy takes a somewhat different approach in its Last Great Places program but it, too, is rooted in the principles of biodiversity. The Conservancy explains that projects in the Last Great Places program "will demonstrate that the protection of functioning ecosystems for the preservation of species diversity can accommodate human economic and cultural needs as well." There are twelve "bioreserve sites" in the Conservancy's pilot list, ranging from southwest ecosystems in Arizona and New Mexico to the Florida Keys, with an Ohio watershed in between, as well as several in other countries.

The Wilderness Society has proposed creation of an American Lifeland Trust that would bridge the mainly private and the mainly public land protection efforts to create a national network of habitat to maintain biodiversity. The trust would be built from existing public lands, future land acquisitions and the voluntary enrollment of private lands for which incentives would be paid and on which many human activities could continue. The Society defines lifelands as "areas that support a habitat type not currently protected; or lands necessary to provide a sufficient amount of a particular habitat type that is not now adequately protected."

Significantly, these lifelands may also be lands that must be *restored* to a semblance of their previous condition in order to recover and maintain certain elements of biodiversity—lands made wild again. (There are models for this in American land protection. Shenandoah National Park, for example, was created from a number of worn out, used up farms; a portion of the park is now designated wilderness.) Without this piece—wild or nearly wild again—the goal of true biodi-

versity is unattainable because of what we have already lost. Half our wetlands are gone. No more than two percent of the longleaf pine forests of the eastern coastal plain remain and less than one percent of the original prairie survives.

This will be the context for wilderness designation and wilderness management in the decades ahead. Wilderness will continue to serve as the indispensable heart of public-land protection efforts well into the 21st century, even as we acknowledge that wilderness, by the mere act of designation, is neither safe nor sufficient. Wilderness is an idea of almost religious power for millions of Americans. That personal love of the land and the place will continue to galvanize wilderness activism. Increasingly, that activism will be informed by the certain knowledge that a wilderness—or a world—bereft of its native life is a sad, impoverished place.

Wilderness will thus be fitted into and will anchor broader and more diverse land protection schemes, private as well as public, and we will increasingly measure our success by the extent to which we not only protect but restore biodiversity.

The Wilderness Society has long envisioned a National Wilderness Preservation System of around twice the present 90 million acres, a goal which is, if anything, too modest.

To reach it, we will describe our wilderness proposals differently, map them differently, advocate for them differently. We will draw fewer and fewer wilderness boundaries to *exclude* ore bodies, hoped-for oil and gas deposits, off-road-vehicle trails, or pie-in-the-sky water project sites. We will draw more and more to *include* critical pieces of a natural whole and will use science to defend them.

There will be nothing easy in the political process by which we must, of necessity, achieve this goal. Every acre of wilderness ever added to the National Wilderness Preservation System was a victory over powerful interests for whom the first acre of wilderness was one too many. They will violently oppose the doubling of the system to include the still-wild places; they will fight even harder against any proposal to make wild again places they thought were safely zoned for destruction.

It was only a few months ago that Alaska Governor Walter Hickel (a former secretary of the Department of the Interior) proposed the aerial gunning of several hundred wolves so Alaska's marketable game herds would burgeon. In defense of his scheme, he said, "We can't just let nature run wild."

That fairly describes the challenge of wilderness preservation in the 21st century.



Ecosystem Management: The Relationship Among Science, Land Managers, and the Public

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A place is nothing in itself. It has no meaning, it can hardly be said to exist, except in terms of human perception, use and response.

—Wallace Stegner (1989:169)

Ideas are the very stuff of politics. People fight about ideas, fight for them, and fight against them. . . . Every idea about policy draws boundaries. It tells us what or who is included or excluded in a category. These boundaries are more than intellectual—they define people in and out of a conflict or place them on different sides.

— Deborah Stone (1988:25)

Ecosystem management is one of the most intriguing developments in contemporary natural resource policy. On the one hand, it has the potential for ushering in a new era of management which rivals the changes brought about by the conservation movement at the beginning of the 20th century. Indeed, ecosystem management can be understood as an attempt to realize the call issued by Aldo Leopold (1949) in his famous essay, "Land Ethic."

But on the other hand, initial attempts to implement ecosystem management suggest that it is a concept which has not generated public acceptance. In 1990, the United States National Park Service (USNPS) and United States Forest Service (USFS) proposed adoption of ecosystem management for the Greater Yellowstone Area (GYA). The authors of the proposal hoped to pro-

vide a new "vision" capable of resolving long-standing management issues in the GYA. However, the *Vision* (1990) document precipitated a major controversy which has led many observers to conclude that the process was a failure.

Elsewhere we have offered an assessment of the conflict over the *Vision* document (Cawley and Freemuth 1993). What we seek to do in this essay is explore what might be learned about the attempt at Yellowstone in the hope that it will help inform ecosystem management efforts as we move towards 2000. It is our contention that ecosystem management is, first and foremost, an *idea* about public land policy that assigns a new set of meanings for *places* in the federal estate. Not surprisingly, these meanings come into conflict with other, more established, meanings which have developed about those same places.

Viewed in this light, arguments over Yellowstone and ecosystem management fall into the realm of politics as defined above by Deborah Stone. This realm is not one many of us are familiar with because the politics which occur here are about ideas, discourse, and community. It is a dialogue that links our ideas about public lands to broader discussions about the type of society in which we should, or ought, to live. Hence, debates over ecosystem management will be contentious and highly emotional. But the character of these debates should excite us, not discourage us. This essay, then, seeks to link politics with place in a way that will help our discussions on ecosystem management as they develop into the next century.

YELLOWSTONE: VISION POLITICS

It is certainly not surprising that the Yellowstone area was chosen as the focal point for ecosystem management. It has always been a touchstone for natural resource pol-

icy both at home and abroad. Moreover, the full title of the document that set off the controversy—*Vision for the Future: a Framework for Coordination in the Greater Yellowstone Area*—was quite appropriate. Rather than a management plan, the document offered general principles intended to guide future management decisions. It was, therefore, an attempt to conceptualize how ecosystem management might be implemented.

At the heart of the *Vision* (1990:4-1) were three primary goals for the Yellowstone area: (1) conserve the sense of naturalness and maintain ecosystem integrity; (2) encourage opportunities that are biologically and economically sustainable; and (3) improve coordination. Nods were made to both the environmental and multiple-use communities. "Ecosystem management" was to be pioneered, but "opportunities for recreation and commodity development, including timber harvesting, grazing and mineral development will be provided on appropriate federal lands" (*Vision* 1990:3-1). While acknowledging that there would be "disputes and controversies over [the proposed] management direction," the document also suggested that such conflicts were "part of the democratic process" (*Vision* 1990: 3-1).

In short, the *Vision* document proposed a view about the type of Yellowstone community that could exist, but recognized that the community contained diverse members with equally diverse views. The project, then, was to engage the Yellowstone community in a discussion that would produce a new meaning for the GYA. The question, therefore, is why this apparently well-intentioned effort precipitated open conflict punctuated with suspicion and acrimony.

Part of the answer, of course, is that the *Vision* seemed to be flawed. Key ideas in the proposal, like

ecosystem and sense of naturalness, were given vague, almost contradictory, definitions. In consequence, the document fell prey to criticism from environmentalists who believed it failed to fully embrace preservation goals, and commodity users who believed it was a veiled attempt to abolish multiple-use activities in the GYA. However, to conclude that the drafters of the *Vision* document should have been more precise in defining their terms misses what we believe is the more important lesson to be learned from the controversy.

Ecosystem management is based on knowledge gained from the science of ecology. Ecology, in turn, is based on a holistic view of the physical world. It is not difficult, therefore, to understand why ecosystem management seemed to offer an ideal approach to the management of the GYA. At least since the early 1960s, there has been general agreement about the problems confronting the GYA. Legally and administratively, the GYA was understood to be a collection of places with different meanings and different management regimes. In consequence, management decisions tended to focus on specific resources or areas with little attention to how those decisions might affect the whole region.

What ecology offered, then, was a new way to conceptualize the problems of the GYA. Rather than a collection of *places* (area), it was an integrated *place* (ecosystem). It then followed that managers needed to change their approach from coordinating different management regimes to developing an integrated management regime. Viewed in this light, the ambiguity in the language of the *Vision* document was not necessarily troublesome. Indeed, the *Vision* document was about building consensus over new ideas, new principles. Once those ideas and principles were accepted, details like the

exact boundaries of the Greater Yellowstone Ecosystem could be worked out.

Given the events since the publication of the original *Vision* document, it is fairly obvious that a consensus did not develop. It is our argument that the *Vision* process fell into disarray because land managers involved with it did not understand the dynamics of public discourse as a tool for developing consensus. To be sure, the drafters of the *Vision* document recognized the need for public input by developing a relatively sophisticated public involvement plan as a component of the overall *Vision* process. However, public input is not public discourse. As theorist Benjamin Barber (1984:136) explains, democratic discourse is a process in which "preferences and opinions earn legitimacy by forcing them to run the gauntlet of public deliberation and public judgement."

This brings us back to ecosystem management. For many professional resource managers, ecosystem management is nothing more than the application of sound scientific principles to resource management questions. As such, it is neither an opinion nor a preference, and its legitimacy has already been established. The problem, however, is that ecology and ecosystem are also ideas used in the policy dialogue to draw boundaries. At least since Aldo Leopold's time, ecology has symbolized an alternative, if not oppositional, approach to traditional resource management practices. Viewed in this light, ecosystem management is a preference or opinion that has not yet been legitimated by public deliberation.

What occurred at Yellowstone, then, was a showdown over the political legitimacy of ecosystem management. Consider, for example, Robert Barbee, Paul Schullery, and John Varley's (1991) thoughtful and spirited account of what when wrong

with the *Vision* process. In their view, the only players that openly endorsed the *Vision* document were the USNPS and USFS. But even that support was not complete: "though forest supervisors and park superintendents involved were strongly committed to the *Vision*, many staff members weren't" (Barbee, Schullery, and Varley 1991:84). Some local environmental groups endorsed the *Vision* process, but most of the national groups simply "bowed politely toward the process," while refusing to "jump in with both feet and take a major part in the dialogues" (Barbee, Schullery, and Varley 1991:82, 84). And then there were "commodity groups of many persuasions" who mounted a "powerful regional campaign" by convincing their members that the proposal represented a "giant landgrab, another Federal lockup" (Barbee, Schullery, and Varley 1991:82, 85).

In short, the *Vision* process submitted ecosystem management to public judgement which determined that the idea had not yet earned legitimacy. Aside from a relatively small group of agency personnel, the members of the Yellowstone community were either not interested in the principles of the *Vision* document, or openly hostile to them. To proceed with the proposal under these conditions, therefore, would be tantamount to turning control of the GYA over to a small group of resource professionals.

This assessment is based on the premise that the Yellowstone controversy represented a public deliberation. There is another possibility however. As Barbee, Schullery, and Varley argue: "Public sentiment did not have a great deal to do with the process. The American public, the owners of the parks and foresters of the greater Yellowstone area, played virtually no role at all" (1991:85). This is a reference, of course, to the fact that "attempts to hold hearings

on the *Vision* in other parts of the country—far from intense local pressures—failed" (Barbee, Schullery, and Varley 1991:85).

Moreover, this view of the situation has recently received additional support. A fifteen-month investigation into "alleged improprieties in the directed reassignments" of Lorraine Mintzmyer and John Mumma by the Subcommittee on the Civil Service of the U.S. House of Representatives "revealed a conspiracy by powerful commodity and special interest groups and the Bush Administration to eviscerate the DRAFT *Vision* document" (U.S. Congress 1992:2). Some of the steps in this "conspiracy" were: "(1) closing previously planned national hearings to avoid anticipated positive public comment; (2) employing outside groups to 'rig' the appearance of negative public opinion at a few, select, local public meetings; (3) maneuvering the scientific interdisciplinary team out of the revision process, and (4) using the manufactured, negative, public comment to explain why the revision were allegedly necessary" (U.S. Congress 1992:11). It might be noted parenthetically that part of the evidence used to support these charges was Barbee, Schullery, and Varley's account.

Several issues emerge at this point. First, it seems to us that dubbing opposition to the *Vision* document a "conspiracy" is overstating the case. For example, Barbee, Schullery, and Varley note that the "governors of Montana, Wyoming, and Idaho wrote a joint letter criticizing the process" (Barbee, Schullery, and Varley 1991:82). In addition, the Wyoming Legislature passed a resolution opposing the *Vision* document. We seriously doubt that these actions were part of a conspiracy. The governor of Idaho, Cecil Andrus, a life-long Democrat and President Carter's secretary of the Interior, hardly strikes us as a likely

participant in any conspiracy of the Bush Administration.

Second, the suggestion that "negative public opinion" was "manufactured" simply demonstrates a lack of understanding about the *Vision* process and public land conflicts in general. The *Vision* document confirms that the idea of ecosystem management encountered opposition from the beginning. Barbee, Schullery, and Varley (1991) complain that "repeated meetings . . . with mining associations and other commodity extraction groups" led inevitably to the conclusion that "you can meet forever with opponents, and if they truly disagree with your position, you will not change their position." Finally, as noted above, anyone familiar with contemporary public land conflicts knows that ecology and ecosystem are political code words guaranteed to meet opposition from commodity user groups. In short, if negative public opinion was manufactured, the *Vision* document was what produced it.

Third, and perhaps more intriguing, the account by Barbee, Schullery, and Varley, as well as the Subcommittee's report, contain a view of the public which is problematic at best. On the one hand, if the national parks and forests are owned by the "American public," then how can there be "outside groups"? On the other hand, what criteria are used to determine that opponents of the *Vision* document, which included governors and legislators as well as commodity users, are excluded from the American public?

The point here, of course, is that the political boundaries in question were not between the "American public" and some other public, but rather between supporters and opponents of the *Vision* document. Stated differently, supporters understood that local hearings would be heavily populated by their oppo-

nents. The public input during the early stages of the *Vision* process made that abundantly clear. Their belief, then, was that hearings held in places outside of the region would be populated by interests sympathetic to the process. This brings us to our final concern.

If Barbee, Schullery, and Varley's assessment was an accurate reading of the political landscape, then it was not at all clear that hearings outside of the region would have produced different results. One of their key complaints was that national environmental groups expressed very little interest in the proposal. What is missing here, then, is evidence that these groups would have been more interested in the proposal had the hearings been held in some other location. At the same time, given the intensity of opposition to the proposal, there is every reason to believe that opponents would have been "brought in by the busload" (Barbee, Schullery, and Varley 1991:82) wherever the hearings were held.

In sum, it seems to us that the various accounts about what went wrong with the *Vision* process lead back to our earlier contention—the managers involved simply did not understand the dynamics of public discourse. Rather than trying to build a public consensus around the idea of ecosystem management, the *Vision* process was an attempt to play one part of the public against other parts. It is not surprising, therefore, why the document became the focal point of divisiveness and acrimony, replete with charge and counter-charge about conspiracies.

So much for the question of *Vision* politics. Let us now turn to the question of what might be learned from this situation about the future of ecosystem management.

THE FUTURE?

We began this essay by suggesting that ecosystem management had the

potential for establishing a new era in federal land policy. Given the outcome of the Yellowstone controversy, this might seem to be an overly optimistic view. However, most of the major resource agencies have begun exploring the application of ecosystem management to their missions. Moreover, Interior Secretary Bruce Babbitt has announced his intention to establish a "National Biological Survey" that will undertake the task of mapping ecosystems and biological diversity in the U.S. It would seem, therefore, that our public deliberations over ecosystem management have not yet finished.

The question, then, is whether or not the Yellowstone controversy can instruct our future discussions about ecosystem management. We believe that it can. One of the most obvious lessons from the Yellowstone controversy is the need to develop a clearer definition of ecosystem management. This project requires attention to at least two issues.

First, we must clarify the process by which ecosystem boundaries are determined. Here is where our earlier comments about the politics of place become important. Admittedly, the existing boundaries of places on the federal lands (national parks, national forests, etc.) were established by a relatively arbitrary method which paid little attention to natural processes. Nevertheless, these places have meanings that the public recognizes and accepts. What needs to be articulated is how redefining these places in terms of ecosystems will affect established meanings.

A second and related point is that we also need to clarify the link between science and public discourse in ecosystem management. Science is certainly an important component of ecosystem management. But as Robert Keiter (1989:1003) reminds us science "cannot define a new ethic (or management priorities) in an

area like Greater Yellowstone. Science attaches no significance or value to the many human interests that figure prominently in policy judgements about the public lands." In short, we must develop definitions of ecosystems that harmonize science with the values people attach to places.

This brings us to another, perhaps more important, lesson of the Yellowstone controversy. At least since the early 1900s, land managers have been charged with the task of managing the federal lands following the dictates of their professional and technical expertise. What we must remember, however, is that the role of modern land managers was originally an opinion or preference that gained legitimacy by running the gauntlet of public deliberation and public judgement.

Indeed, Gifford Pinchot who served as the first chief of the USFS, and was a leading spokesperson for the conservation movement during the early 1900s, understood the need for public acceptance. Early in his training, Pinchot learned "a great truth" that helped "save the National Forests in America." This lesson was that "in the long run Forestry cannot succeed unless the people who live in and near the forest are for it and not against it" (Pinchot 1947:17-18). The Yellowstone controversy suggests that much the same could be said of ecosystem management.

The federal lands, whether as national parks, national forests, or ecosystems, are owned by the American public. But they are also places in which local communities have developed. In consequence, management decisions are as much about defining the character of those local communities as they are about defining land-use practices. It would be misdirected, of course, to allow local desires to dictate national policy. However, it is not only misdirected but ultimately counterpro-

ductive to dismiss local concerns as somehow not part of the public discourse over national policy.

What early conservationists like Pinchot understood was that major policy shifts required developing a discourse in which scientists, professionals, local publics, and national publics could find common meanings. It was not an easy task, nor did it occur overnight. Nevertheless, conservation did, at least for a time, define a consensus position about the management of the federal es-

tate. To expect that the changes implied by ecosystem management will be realized without an equally lengthy and difficult effort is to doom the project to failure. Viewed in this light, Barbee, Schullery, and Varley offered important advice when they characterized the *Vision* process as a first step in a "long, arduous, and probably painful campaign to change some fundamental aspects of resource management in our bioregion" (Barbee, Schullery, and Varley 1991:82).

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Related Lands and the U.S. National Park Service

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When Yellowstone National Park was established in 1872, one of the reasons that the Act passed the Congress of the United States was that the park was situated in lands which people felt were not developable. Indeed, the park was so far from anywhere that many people paid little attention to the fact that this land was being set aside. And, although many people recognized that the significant values for which the park was established depended upon land or activities taking place outside the boundary of this newly established preserve, because it was so far away from other developments people believed that those values would be safe.

The same process took place when many of the historic areas were established in the East. Some of the battlefields were established as memorials rather than historical parks. Since most of the battles or other events took place in rural agricultural settings, the feeling was that they would always remain so and that only smaller portions of the battlefields which marked trenches or other significant features needed to be purchased or set aside as part of the park. Many of the Civil War

battlefields, such as Fredericksburg and Richmond, were designed to protect earthworks, gun emplacements, and other visible physical remains of the war. The rest of the battlefields would remain in farm lands, as had existed at the time of the battle. Since it was envisioned that these lands would always be farms, there was no need to include them in the parks.

Although we have been operating national parks in this country for well over 100 years and the Park

Service itself has existed for some 75 years, the term "related lands" and the philosophy and strategies of dealing with effects of activities on related or adjacent lands is a relatively new phenomenon. The early superintendents, I am sure, were quite unfamiliar with such a term. In fact, their whole USNPS management philosophy was much different from what it is today. The early superintendents were indeed masters of their domain. They ran their parks with little interference from the public. For the most part, the public couldn't have cared less about what went on inside the parks and the superintendents paid little or no attention to what happened outside of their boundaries.

Gradually, in the 1950s and 1960s we began to realize that many of those values with which we were entrusted were being affected by activities taking place outside the parks. For a long time, however, it was felt that there was little to be done to either prevent those activities or mitigate their effects on park values.

In the late 1970s a survey of park superintendents was made to assess threats to national parks. Although many of the threats listed were from activities occurring solely within the confines of the parks, a substantial number were the result of activities on related lands. Indeed, in the East the principal threat listed was urban encroachment. Aside from seeking legislation to expand the boundaries or to surround many parks with what some people described as "buffer zones," there was little success in mitigating many of the adverse effects. As the popularity of the national parks exploded in the late 1950s and 1960s, the effects on parks throughout the nation increased tremendously.

As park superintendents grew more and more concerned about the growing threats, they became even more frustrated. They were not trained in land development or

zoning issues, nor did they have sources to go to, nor available assistance in dealing with the ever-increasing concerns. Gradually, however, a few creative and innovative superintendents and other Park Service officials began to experience some success in dealing with these issues. By the mid-1980s enough of these successes had developed throughout the System that the term "adjacent land strategy" was being used. Indeed, the USNPS's Denver Service Center put on a training course at the Everglades to discuss strategies in dealing with related lands issues. This seminar was designed to expose others to some of the few successes which existed at that time.

Today it is clear that although the Park Service works to conserve a wide range of resources outside the parks through many programs, an expanded ability to address issues affecting park-related resources is needed. These resources may often be critical to carrying out the preservation, interpretation, and commemoration objectives of the parks. In many cases the resources of areas beyond the park boundaries have no protection from any of the impacts of modern development. Unless a positive alternative is created, there is no doubt that changes in land use detrimental to important resources will occur.

I would like to discuss very briefly some of the strategies which have been used to deal with these impacts. I am sure there are many others of which I am not aware but which would be useful for park managers to know and understand.

One of the most threatened of all of the units of the National Park System is the Richmond National Battlefield Park. This park was initiated by individuals in the private sector who purchased eight separate and small tracts of land and donated them to the commonwealth of Virginia and then to the USNPS in the

1920s–1940s. The congressional legislation allows for additional donations of battlefield land to the Park Service but provides no authorization or appropriations for land purchase by the federal government. The park has stayed extremely small in terms of acreage for that reason, but has grown to eleven units and 769 acres through donations. In each case only slivers of the battlefields have been preserved—an average of 2 percent of each action.

The battlefields are located within a 20-mile radius of the city of Richmond on public roads; the park commemorated two major Civil War campaigns, from 1862 and from 1864, in addition to the defensive earthen fortification system of the capital of the Confederacy. A total of 35 battles occurred in the Richmond metropolitan area, where development of land in the city and three adjacent counties has been accelerating for use as shopping centers, industrial parks, roads, and residences.

Efforts to include battlefield preservation as one criterion for planning were nil in the counties until 1987. In that year the USNPS initiated a cooperative planning effort with the commonwealth of Virginia, the city of Richmond, and the three counties. All signed a memorandum of understanding in 1988 to work toward ways to conserve battlefields in the Richmond area. After public meetings and numerous working sessions with county staff and private citizens, a draft document of ideas and maps was prepared. Some residents of one of the counties became upset with the effort and disagreed with some of the premises and persuaded their county to renege on its commitment to the memorandum of understanding. Although the discussions had been open and inclusive and the ideas flexible in their application, a few individuals succeeded in creating a

localized atmosphere of hysteria centered on perceived threats to private property rights.

Even so, the need for battlefield conservation was generally reestablished and the will to find ways toward that end was reinstalled in parts of the private sector and elements of the county governments. The city's interest has also been piqued. The Park Service continues to work with the counties, the city, and the private sector to conserve key battlefield land. Some significant successes have been achieved by two of the counties.

At Gettysburg National Military Park in Pennsylvania, the Park Service conducted an extensive series of public workshops and landowner meetings which led to public consensus on a new boundary concept for the park. The park developed objectives for all of the areas adjacent to the park boundaries. These objectives were understood and agreed upon by landowners and public officials.

Legislation based on this proposal was recently passed by Congress, adding an additional 1,000 acres to the park and implementing a broad cooperative strategy for conserving resource values in the Gettysburg area. It enabled the Park Service to provide some planning money to the town of Gettysburg and gave the agency an opportunity to work with the borough of Gettysburg in developing a plan for that community.

Shenandoah National Park in Virginia was created in 1926 to preserve a typical section of the Appalachian range with its flora and fauna conserved and made accessible for public use. It is apparent today that what occurs on lands outside the boundaries of this park has a direct effect upon the character and quality of the park. The decisions made by surrounding communities and landowners have

led to conflicts among competing resource values within the park and on lands related to the park. This park is surrounded by eight counties and thousands of individual landowners. The park felt that it was important to identify specifically what interests it would have in all of the lands surrounding the park. A decision was made to undertake a related lands study for Shenandoah that would seek to answer a number of questions, such as what are the physical characteristics of the lands; what are the important wildlife resources, habitat, natural ranges, endangered species, and landscapes; and what are the existing and committed uses associated with the lands adjacent to the park.

The study began in 1991 in two of the counties surrounding the park. These counties were selected because they were undergoing revisions to their comprehensive plans and because the county government showed an interest in receiving the resource data from the study. The University of Virginia is undertaking a Geographic Information System analysis and doing the study in these two counties. The early reviews of the draft results are encouraging to the park staff. The data appears to be useful in answering questions of what lands are important to the park, landowners, communities, the state, and others. The plan, which will be developed from this related lands study, will identify those lands associated with the park that have values significant to the purposes for which Shenandoah was established and that require some degree of protection. The park plans to pursue this process in the remaining six adjacent counties and intends to try to work with all of the public and private interests to identify strategies for conserving resources of mutual interest.

Perhaps some of the most significant successes have come at Freder-

icksburg and Spotsylvania County Battlefields Memorial National Military Park, also in Virginia. This park was established in 1927 to protect four battlefields. Today, roughly one-half of the significant ground in each of the battlefields remains outside the boundaries of the park. The park is located in five separate localities, each with its own government and planning commission. One of the counties is the fastest growing in Virginia, and has been so for over a decade. The park has about 120 miles of boundary, which includes more than 8,000 acres, all of which are starting to become cluttered with shopping centers, housing developments, roads, and other developments. Some of the construction has already destroyed battle-related resources which existed outside the boundaries. Other proposals threaten key values within the park. Furthermore, the park came to be seen by the local communities as an impediment to development. The park's comments about any proposed new developments always seemed to be negative and usually lacked constructive alternatives or suggestions. The conclusion on the part of many was that the park was opposed to all development.

This has all been changed in recent years. The park staff has participated in a variety of community planning groups and have developed partnerships with local preservation organizations and regional councils. The park hosted a series of dinner seminars for elected officials where innovative planning techniques and approaches to open space development were discussed that might be particularly appropriate to areas around the battlefields. The park staff also began to try to find ways to help local communities in their own planning needs and through a variety of opportunities was able to help in securing roughly \$30,000 in grants for preservation,

exhibit design, and construction for those communities.

The park also began to analyze the kinds of comments they had made to the development proposals. Similar to what had been done at Gettysburg, the park began to take positions that focused on key park values. These are the specific elements of the visitor experience or historic resource that are present at each individual site. Developed in relation to the management objectives of the park, this list of values captures the park's significant concerns about a given tract or area. The park staff found that not all the values were threatened by every development proposal and modification of a proposal often removed the threat.

The park staff began to spend a great deal of time looking at these threats and proposing some simple and inexpensive solutions which they felt would mitigate them. The first time the park made such a comment at a public hearing caused an uproar. In this case, park neighbors who had expected the park to be their principal ally in opposing this development were shocked and disappointed at the park's position. However, the developer used most of the suggestions and the result is a proposal that poses no threat to the values at that site.

As a result of the park's approach to land management issues, one of the counties asked the park to prepare some design standards for development on related lands. Since the park had no legal interest in any of the lands, staff members were concerned that there would be quite a misperception of the park's intent. The park worked quietly with the county for a couple of years and the county began to revise its comprehensive plan. At that time, the park worked with the USNPS regional office and the American Battlefield Protection Program to provide fin-

ancial support for the county's planning process. The American Battlefield Protection Program has also agreed to fund some additional work responding to the county's original request for design standards. As a result of all of this, the park has maps and definitions of values of the related lands and is working on standards for cultural landscapes and a voluntary land-owner stewardship program developed in close cooperation with the comprehensive planning process of the county. A strong working relationship has been developed which already has resulted in the mitigation of significant threats and promises to ensure long-lasting protection for that park.

The principal values which may be threatened from development on areas surrounding historical parks often is quite different from the kind of threat seen by the large natural areas. Many of the large natural parks exist as part of a much greater ecosystem. Not until recently has there been an understanding that the values of the entire ecosystem must have some form of preservation if the park itself is to survive. One of the United States' most threatened natural areas is Everglades National Park in southern Florida. Although the very values of this park are now at a crisis stage, at least some optimism can be drawn from the fact that almost everyone in South Florida talks about the need to preserve the Everglades ecosystem, not just the park. In South Florida the superintendents of Everglades, Biscayne National Park, and Big Cypress National Preserve have all had extensive experience in working beyond park boundaries. Given the condition of the Everglades ecosystem, one might be tempted to argue that these superintendents have had limited successes; however, I believe they deserve a lot of credit. The South Florida parks took on an active role

in the state of Florida's planning processes.

Florida requires each region of the state to develop a regional plan which is to be consistent with criteria provided under state law. The USNPS was a major contributor to both the development of the regional plans and to the development of subsequent county plans. Water quality and quantity is probably the most significant factor in sustaining the ecological health of South Florida's parks. And, under Florida law, the management of water is the responsibility of the South Florida Water Management District. The USNPS has taken a very assertive position with regard to planning activities which had come before the board of directors of the Water Management District. Park Service managers often have testified before the governor and the cabinet or other state boards and legislative committees to reflect the Park Service's position.

Although all of the problems in South Florida are far from being resolved, the various agencies have begun to work closely together to develop some strategies for the restoration of this ecosystem. The recognition that the entire ecosystem needs attention is significant and is a result of USNPS management in South Florida speaking up on these issues. A significant factor in establishing credibility for the Park Service position was good, sound science and resource information which had been developed by the South Florida Research Center, a USNPS facility located within Everglades National Park.

The planning process is central to the success of all these efforts. It is imperative that all involved understand and agree to the natural

and cultural resource values of the area which relate to the park purposes.

One of the best ways to achieve this understanding and acceptance is through a public process to develop management objectives. Objectives have always been included in the Park Service's General Management Plans and more specifically in the Statements for Management. However, often they had little meaning, were not understood or accepted by the public, and would really not stand up to any scrutiny. Nor were they used in the development of specific plans. When management objectives are developed in a public workshop, based on the legislation which established the park, they become the basis upon which all planning documents are prepared.

There is a well-documented need for an expanding regional ability to address issues arising from beyond park boundaries. Clear management objectives should be developed to give guidance on the significance and objectives for lands outside the park. Within its regional offices, the USNPS needs to develop the skills to provide technical assistance to parks to address immediate related-lands issues for the development of long-term, park-wide comprehensive strategies.

It is apparent to many that what happens outside park boundaries is as important (in many cases, more important) for resource protection than what happens inside. If the USNPS is to fulfill the stewardship responsibilities entrusted to it, it must develop a strategy which accomplishes the protection of resources and values on related lands outside of the parks.



Thinning the Blood—Another Myth

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Former secretary of the Interior James Watt, like former director of the U.S. National Park Service James Ridenour, preached a gospel of containment. Contain the Congress and oppose congressional designation of new units within the National Park System. Secretary Watt proposed that Congress appropriate only minimal amounts of money to acquire lands, including lands within already-existing units of the National Park System.¹

Opponents of creating National Park System units assert that Congress must choose between protecting the nation's remaining natural and cultural areas *or* taking care of what the National Park System already has. That choice was, and continues to be, a false one.

When James Watt came to office as secretary of the Interior he testified before Congress that "our parks and park facilities have been deteriorating while we have been rushing to acquire more land." He proposed placing a five-year moratorium on expenditures from the Land and Water Conservation Fund for land acquisition in established parks, and proposed diverting the monies from the Fund to the task of "restoration and improvement of our National Parks."²

Congress ultimately dismissed James Watt's argument that the

USNPS faced a choice between land acquisition for parks or allowing the parks to deteriorate. Congress concluded that the long-term integrity of a park's resources requires more than sprinklers in lodges, paved roads, or more employee housing. Congress approved both \$200 million a year for five fiscal years to rebuild park infrastructure (the Park Restoration and Improvement Program) *and* \$332 million from Fiscal Years 1982 to 1984 for land acquisition in National Park System units.

In 1991, ten years after Secretary Watt, the assistant secretary of the Interior for Fish and Wildlife and Parks, Mike Hayden, said: "We believe the infrastructure needs to be shored up. But Congress is oriented just the other way. They want to run out and buy all kinds of new land and create all kinds of new parks. They created 16 new parks in the

last two years. And the Park Service has opposed most of those creations because we think the money should go to shoring up what we have.”³

Former Director Ridenour stated at the end of his tenure that his greatest legacy to the National Park System was halting the thinning of its blood. In the November–December 1992 issue of the *Courier* (the USNPS’s internal news magazine), Ridenour said, “I coined the term ‘Thinning the Blood’. . . . [E]very time the Congress creates a new area that is not of national significance, they have thinned the quality of the National Park System, both in terms of availability of funds and the watering down of the quality of the system.” In February of 1992, I asked Ridenour if he could specify the units that were “thinning the blood” but he politely declined to name any. Ridenour deserves credit for the term “thinning the blood,” but the theme has been with us at least since Watt’s day and perhaps for many years before.

NATIONAL PARK SYSTEM GROWTH IN THE REAGAN-BUSH ADMINISTRATIONS

The record does not support former Assistant Secretary Hayden’s assertion that Congress has “run out” and created “all kinds of new parks” in the last twelve years. Congress authorized 27 new units in that period, and abolished one. For perspective, consider that in one year alone, 1978, Congress and the President together established more than 30 units.

The 97th Congress (1981–1982) did not authorize a single new National Park System unit. That Congress thus became the first not to authorize a unit for USNPS administration since the 70th of 1927 and 1928.⁴

The 99th Congress (1985–1986) added two new units to the National Park System: Steamtown National Historic Site in Scranton, Pennsyl-

vania, and Great Basin National Park in Nevada. That Congress also abolished one unit, Lehman Caves National Monument, incorporating it into Great Basin National Park.

The 100th Congress (1987–1988) authorized thirteen new units: Jimmy Carter National Historic Site (Georgia), El Malpais National Monument (New Mexico), Timucuan Ecological and Historic Preserve (Florida), Charles Pinckney National Historic Site (South Carolina), Natchez National Historic Park (Mississippi), the National Park of American Samoa, Poverty Point National Monument (Louisiana), Zuni-Cibola National Historic Park (New Mexico), City of Rocks National Reserve (Idaho), Hagerman Fossil Beds National Monument (Idaho), Mississippi National River and Recreation Area (Minnesota), Bluestone National Scenic River (West Virginia), and Gauley River National Recreation Area (West Virginia). San Francisco Maritime was given separate status as a National Historic Park, but the unit was previously a portion of Golden Gate National Recreation Area.

The 101st Congress (1989–1990) authorized Petroglyph National Monument (New Mexico), Ulysses S. Grant National Historic Site (Missouri), and Weir Farm National Historic Site (Connecticut).

The 102nd Congress (1991–1992) authorized the Niobrara National Scenic River (Nebraska), Mary McLeod Bethune Council House National Historic Site (District of Columbia), Salt River Bay National Historic Park and Ecological Preserve (Virgin Islands), Manzanar National Historic Site (California), Marsh-Billings National Historic Park (Vermont), Little River Canyon National Preserve (Alabama), Brown v. Board of Education National Historic Site (Kansas), Keweenaw National Historical Park (Michigan), and the Dayton Aviation Heritage National Historical Park (Ohio).

unable to meet their basic operational needs. Some of the real increase in ONPS has been used to fund large, expensive, and necessary special units in the Washington Office, such as Air Quality, Water Resources, Geographic Information Systems, Mining and Minerals, and Hazardous Waste. The Federal Employee Retirement System (FERS) increased the costs of benefits for newly-hired employees who now constitute an increasing proportion of all employees. The staffing levels in regional offices have increased dramatically, with the creation, not only of new divisions, but also of new associate and deputy associates directors and new assistant regional directors. The ranks of the Denver Service Center have swelled dramatically in the last twelve years. Special funds dedicated to Service-wide initiatives that are not incorporated into park bases but arrive instead as "soft money," also help mask the real increase in ONPS.

From 1981 to 1992 the number of units in the National Park System increased approximately 7%. The National Park System, measured in number of acres, grew in that same period by approximately 2.9%.

THE EFFECTS OF NEW UNITS ON THE FISCAL HEALTH OF THE NATIONAL PARK SYSTEM

ONPS, the operating budget of the U.S. National Park Service, supports the salaries and benefits of its employees, rental of office space and equipment, utilities, procurement, travel, and training, among other things. ONPS does not include appropriations for land acquisition or construction.

ONPS has fared well over the last twelve years. Consider that ONPS for Fiscal Year 1982 (beginning October 1981) was \$521 million. ONPS for Fiscal Year 1993 (to date) (beginning October 1992) is \$984 million. After discounting wage and other inflation, as measured by the Consumer Price Index, the real increase in ONPS is approximately 40%.

One of the most-often-cited reasons for the poverty in unit operating accounts is the creation of new units. Yet, the total operating budgets for all the new units created since 1981, according to data compiled by the House Subcommittee on National Parks, Forests and Public Lands, makes up \$15 million⁵ of the total FY 1993 ONPS of \$984 million.

There are, in fact, many reasons why, despite a real increase of 40% in operating dollars, many parks feel

unable to meet their basic operational needs. Some of the real increase in ONPS has been used to fund large, expensive, and necessary special units in the Washington Office, such as Air Quality, Water Resources, Geographic Information Systems, Mining and Minerals, and Hazardous Waste. The Federal Employee Retirement System (FERS) increased the costs of benefits for newly-hired employees who now constitute an increasing proportion of all employees. The staffing levels in regional offices have increased dramatically, with the creation, not only of new divisions, but also of new associate and deputy associates directors and new assistant regional directors. The ranks of the Denver Service Center have swelled dramatically in the last twelve years. Special funds dedicated to Service-wide initiatives that are not incorporated into park bases but arrive instead as "soft money," also help mask the real increase in ONPS.

There are many reasons why parks find it hard to meet operational needs. Among the least of them, however, is the creation of new units. In short, while some blame new units (and the Congress that authorized them) for the lack of operational dollars, there is no evidence upon which to base this claim.

The solution to the problem of impoverished park operating accounts does not lie solely in increasing ONPS more rapidly than inflation. Congress has consistently done so in the last twelve years. Nor does the solution lie in halting the creation of new units, or in placing a moratorium on land acquisition.⁶ Part of the solution may lie in more creative and intelligent allocation of existing dollars.

Perhaps the National Park System would benefit by fewer units. For example, it could have seven, as opposed to ten, regional offices. While it is not the intent of this pa-

per to suggest that the USNPS needs fewer regional offices, it may be time to consider such "unthinkable" options before we close parks, campgrounds, and scenic drives, or fail to protect valuable resources, such as the East Mojave Desert in California.

THE EFFECT OF NEW UNITS ON THE INTEGRITY OF THE NATIONAL PARK SYSTEM

Has Congress adulterated the National Park System by creating unworthy units? This question is at the heart of the debate over expanding the System. James Watt stated that "most of the truly unique areas of national significance requiring Federal management and funding are already a part" of the National Park System.⁷

In 1988, the National Parks and Conservation Association produced a study entitled *The National Park System Plan: A Blueprint for Tomorrow*. Volume Eight of the Plan listed approximately 46 natural and 40 cultural sites that merit protection as part of the National Park System. For Watt, the National Park System was essentially complete. For others, the System has yet to encompass some areas of true national significance.

The question, then, of whether additions enrich or detract from the National Park System is a subjective one. For some, the addition of Wind Cave National Park in 1903, or Cape Hatteras National Seashore in 1937 adulterated the System. Those who envisioned the National Park System as being a phenomenon of the West, thought that Shenandoah and Great Smoky Mountains would dilute the System.

The 1933 Executive Orders⁸ of Franklin Roosevelt added more, and different kinds of, units to the System than at any other single time. More than a thinning of the blood, the Roosevelt reorganization was akin to a blood transfusion. In our

lifetime, the addition of urban recreation areas touched off intense and still smoldering debate about the propriety of including them with Yellowstone. The debate about thinning the blood has always been present.

When Congress directed the secretary of the Interior to study an area in Florida for possible designation as the "Tropical Everglades National Park," Congress did so with some doubt as to "whether such areas measure up to national park standards."⁹ In 1993, none of us, including perhaps James Watt, would doubt the worth or merit of the "Tropical" Everglades National Park. Society perception of what is valuable and worth protecting in the National Park System has changed with time. In 1950, Congress would not have conceived of setting aside a site to commemorate the internment of Japanese-Americans during World War II. In 1993, such a site, at Manzanar, California, is a valuable addition to our heritage.

The process of establishing parks in the United States has always been, like the enactment of any law, a political process. Parks are expressions of social value as Congress determines that value. The process of park designation is therefore not static. Congress may, from time to time, authorize a unit that may be truly unworthy of designation. We must bear in mind, from the examples of the past, that what we deem unworthy today, our children may cherish in the year 2050.

The Park Service has some newfound political friends, such as some of the minority-party senators from the West, who oppose adding new units to the System ostensibly because of concern for the integrity of the existing units. Oddly, many of these political friends may also advocate increasing commercial uses of the very same park system they do not want adulterated by the addition of more units.

Before the USNPS finds common cause with such allies, be aware that hiding behind their proffered concern for the parks may lie another agenda. In the 102nd Congress, a group of minority-party members introduced legislation in the U.S. House of Representatives that would require any federal agency to divest itself of lands in several western states if the federal estate grew by any acquisition, whether purchase, donation, or exchange. As a key objective of the "Wise Use" movement, similar proposals have been introduced into state legislatures.

Not all citizens subscribe to the USNPS mandate of preservation. For some citizens, multiple use of lands for grazing, timber, water diversion, hunting and other commodity extraction is the model for all federal lands, including parks.

It can be argued that increasing demands to open parks to commercial and recreational consumptive uses pose a far greater threat to the National Park System's long-term integrity than the establishment of a Steamtown.

No one disagrees that the USNPS director and the secretary of the Interior must be intimately involved in the process of designating new units. The USNPS may use a tool that Congress fashioned for that purpose in 1976.

On October 7, 1976, in Public Law 94-458, Congress directed the Secretary of the Interior "to investigate, study, and continually monitor the welfare of the areas whose resources exhibit qualities of national significance and which may have potential for inclusion in the National Park System. At the beginning of each fiscal year, the Secretary *shall transmit . . . comprehensive reports on each of these areas upon which studies have been completed.* On this same date . . . the Secretary *shall transmit a listing . . . of not less than twelve such areas which appear to be of national significance and which*

may have potential for inclusion in the National Park System" [emphasis added].

Beginning in the Kennedy Administration, the president sent an annual Conservation Message to Congress, a practice long-since abandoned. The 1962 message to Congress from John F. Kennedy¹⁰ contained a list of units to be added to the National Park System.

The message urged the establishment of the following units: Point Reyes National Seashore, Great Basin National Park, Ozark Rivers National Monument, Sagamore Hill National Historic Site, Canyonlands National Park, Sleeping Bear Dunes National Lakeshore, Prairie National Park (in Kansas), Padre Island National Seashore, a National Lakeshore in northern Indiana, and Ice Age Scientific Reserve in Wisconsin.

The foresight of past leaders, like John Kennedy and Lyndon Johnson, enriched the heritage of the United States and its people. It is not too late to demonstrate that same foresight after its long absence from the halls of the Department of the Interior. The Prairie National Park still remains unconsummated. The California Desert and a dozen other places furnish our generation an opportunity to place ecosystems and historic places under conscientious custody for the future.

It is time for the USNPS to come out from under the rocks and once again assert that lands placed under its stewardship serve a broad public good; that Federal land acquisition for parks is no less vital for our society's health than was federal land acquisition for military bases during the Cold War.

Some of the elected officials whose political agenda only thinly masks an underlying antipathy for strict preservation are gone. Now USNPS managers who fail to protect natural and cultural values, wilderness, water rights, or habitat, or who

do not err on the side of preservation, may no longer blame others.

The call of the "Vail Agenda" for USNPS "Environmental Leadership" will not be served by cosmetic actions and lip-service. The season now favors a re-enunciation of a singularly noble yet difficult mission: to conserve for the people of the

United States and the world, "the scenery and the natural and historic objects and the wild life" of the national parks, and to "provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."¹¹

NOTES

¹ U.S. Department of the Interior, Budget Revisions Fiscal Year 1982, at 2, 3, 96, and 98 (March, 1981).

² U.S. House of Representatives Subcommittee on Appropriations for The Department of the Interior and Related Agencies (March 6, 1981).

³ *Federal Parks and Recreation*, Vol. 9, Number 18 (September 26, 1991).

⁴ Congress established Bryce Canyon National Park in 1928. However, the lands in that unit were actually reserved and established by Congress in 1924 as the Utah National Park. In 1927 and 1928, Congress authorized three National Military Parks under the control of the War Department that would later be placed under USNPS administration in 1933.

⁵ ONPS for all units created since January 1983 is \$15,329,000. However, even that figure overstates the net impact of unit creation on total ONPS expenditures of \$984 million. Of the \$15.3 million, approximately \$4.2 million is ONPS for Timucuan and San Francisco Maritime. Had Timucuan and San Francisco Maritime not been established, the NPS would still have spent ONPS on Fort Caroline National Memorial (now administered and funded as part of Timucuan) and on the San Francisco Maritime unit of the Golden Gate National Recreation Area. Perhaps the real figure of the impact of new units on overall ONPS is closer to \$12 million.

⁶ One may propose, like James Watt, that if Congress halted land acquisition, that money could be used to augment ONPS. Yet the \$80 million for land acquisition in Fiscal Year 1992 would have increased ONPS by only 9% that year.

⁷ U.S. House of Representatives Subcommittee on Appropriations for The Department of the Interior and Related Agencies (March 6, 1981).

⁸ Executive Order Nos. 6166 (June 10, 1933) and 6228 (July 28, 1933).

⁹ Act of Congress, March 1, 1929 (45 Stat. 1443).

¹⁰ President Kennedy's Message on Conservation to the Congress of the United States (U.S. Department of the Interior, March 1, 1996).

¹¹ Act of Congress, August 25, 1916 (39 Stat. 535).



The Evolution of Wildlife Management Ethics: From Human-Centered to Humane

Wayne Pacelle

THE FUND FOR ANIMALS
Silver Spring, Maryland

Since the advent of agriculture about 10,000 years ago, the human relationship to other animals has been a hegemonic one. From Aristotle to Aquinas to Descartes, leading western philosophers, clergymen, and scientists have imprinted society with the view that animals existed for human use.

Animals were mere human instrumentalities, to be killed for our palates, our profits, and our progress. They neither possessed nor should be accorded rights. Descartes, for instance, believed animals were merely automata, an assemblage of parts little different from clocks or carts. They could bleed and scream, but could not feel. According to Descartes, humans had no direct duties to these quasi-machines.

While some such as Erasmus, Sir Thomas More, and Leonardo Da Vinci had challenged the human-centered paradigm in the post-Middle Ages period, it was not until the late 18th and the 19th centuries that such alternative views gained anything more than passing ridicule. The British utilitarian philosopher Jeremy Bentham was one of the first to advance a cogent line of argument that humans engaged in a form of tyranny over other animals. "The French," Bentham stated in 1780, "have already discovered that the blackness of the skin is no reason why a human being should be abandoned without redress to the caprice of a tormentor. It may come one day to be recognized that the number of legs, the villosity of the skin, or the termination of the os sacrum are reason equally insufficient for abandoning a sensitive being to the same fate." He added, "The question is not, Can they reason? nor, Can they talk? but, Can they suffer?"

It was not, however, until the second half of the 19th century that Americans began to reassess their relations with the non-human world. I identify four happenings as crucial in catalyzing this ethical reexamination: Charles

Darwin's theory of evolution, the abolition of slavery, the birth of the organized humane and environmental movements, and the market-driven slaughter of wildlife.

Few people in western culture have had a more penetrating impact on societal values than Darwin. His theory of natural selection as the engine of species evolution served as an implicit challenge to the dominant world view of absolute human superiority over the natural world. In *The Descent of Man* (1871), Darwin asserted, "There is no fundamental difference between man the high mammals in their mental faculties.... Even the lower animals . . . manifestly feel pleasure and pain, happiness and misery. . . . Only a few persons now dispute that animals possess some power of reasoning." In that book and his previous one, *The Origin of Species*, Darwin pointed out that humans are not fallen angels, but risen apes; humans and the "higher" non-human animals were composed of the same constituent parts. In short, there was a unity and continuity of life. The implication: if humans and other animals shared physical and emotional characteristics, it would become increasingly difficult to justify radically different treatment of them.

While Darwin initiated a revolution in natural history, abolitionists throughout the western world completed a social revolution, by helping to eradicate slavery and stripping away a gross abuse of humans by humans. As society redressed a massive societal injustice—human bondage—Americans could more readily investigate and analyze other malignancies in their social relations with others. Animals and the environment were among the beneficiaries of the end of legal slavery.

In his book *The Rights of Nature*, American environmental historian Roderick Nash argues that western culture has seen an ever-expanding moral concern for others—a process

of ethical extensionism—beginning with the writing of the Magna Carta in 1215 and taking expression in such documents as the Declaration of Independence 1776 and the Emancipation Proclamation in 1863. It is this inexorable expansion of ethical concern that has brought once disenfranchised or disregarded groups such as the non-proprietyed, women, people of color, and children into the sphere of moral concern. It is this same western tradition of liberalism that provides the basis for our examination of the rights of animals and the environment.

It follows then that the organized environmental and humane movements were born as human slavery was abolished. In 1864, George Perkins Marsh wrote *Man and Nature* and chronicled the devastating human impact on the environment. He, along with giants of American philosophy such as Ralph Waldo Emerson and Henry David Thoreau, provided a foundation upon which an environmental movement would be constructed. In 1872, Congress established the country's first national park, Yellowstone, and signaled a dramatic change in attitude; wilderness, long considered a hostile place to be conquered, was recognized as an invaluable national treasure to be preserved for the benefit of future generations.

Not long after Marsh's work was published and only one year after the end of the Civil War, Henry Bergh, a New York socialite, founded the American Society for the Prevention of Cruelty to Animals in New York. Dedicated to ending cruelty to animals, Bergh focused attention on society's reckless disregard for animals and worked to pass the nation's strongest anti-cruelty law in 1867, a law that would serve as the template for many succeeding anti-cruelty codes enacted in other states. Not long after the ASPCA was established, George Angell founded the

Massachusetts Society for the Prevention of Cruelty to Animals. Interestingly, Angell, like so many humane leaders to follow, was provoked to take action by anger, after reading a news account of a horse race from Boston to Worcester in which no horse survived.

Finally, while humans had believed in their superiority over animals, they had been limits to their ability to tame nature and kill wildlife—although the Romans and many subsequent westerners proved adept at slaughter and spectacle. But by the second half of the 19th century—with the advent of repeating rifles and with the completion of the transcontinental railroad—humans had penetrated all parts of the country and unleashed their unbridled killing power. Motivated by profit, humans massacred wildlife, and drove even the most bountiful species, such as the bison and the passenger pigeon, to the very precipice of extinction. The recognition that humans possessed the ability to destroy whole species in a matter of a few years prompted some Americans to question the human prejudice against animals and nature.

As the 20th century dawned, the clamor over our appropriate relations with animals and the environment reached a new intensity. The debate over the divergent philosophies of preservation and “wise” or sustained use was crystallized in the conflict between naturalist and Sierra Club founder John Muir and U.S. Forest Service chief Gifford Pinchot over the construction of the Hetch Hetchy dam in the Yosemite Valley. An even more complicated debate, known as the “nature faker” controversy, arose over the behavioral attributes of wildlife and the ethics of sport hunting. The antagonists were none other than President Teddy Roosevelt, a self-proclaimed “Great White Hunter,” and two extraordinarily popular nature

writers, Ernest Thompson Seton and William Long, who were avowed opponents of sport hunting.

While the media controversies surrounding the debates between Pinchot and Muir and Roosevelt and the nature writers reached some sort of closure, the issues central to their debates remain hotly contested today. During the past few years, there has been a national controversy over the management of old-growth forests in the Pacific Northwest. Some advocate preservation, others “wise use.” Directly related to the old-growth forest controversy, there will be a pitched battle over the reauthorization of the Endangered Species Act in Congress this year or next. What type of balance should be struck between preserving species and habitat and saving jobs? Some believe that short-term economic considerations should take precedence over issues of species preservation.

But while the endangered species debate will reach a crescendo soon, it is all-but-assured that Congress will keep intact a strong Endangered Species Act. A large majority of the public supports the preservation of endangered species, according to recent polls sponsored by The Nature Conservancy and the National Audubon Society. Most people now believe in the credo of Aldo Leopold, who declared more than 50 years ago that “the first rule of intelligent tinkering is to preserve all the parts.” The question is not whether, but by what means, we should save species.

While Americans recognize a responsibility to the surviving members of endangered species, what are their responsibilities to non-imperiled animals? While every state has passed an anti-cruelty code, these laws, as applied, only prohibit the wanton neglect or intentional harm of certain animals, mainly domestics. Inflicting harm upon wild animals is perfectly legal, as long as it is

done within prescribed limits. Presently, sport hunting and commercial trapping of dozens of species remain legal in every state.

While the broad topic of wildlife management ethics includes a gamut of concerns, ranging from habitat protection and species preservation to predator control, no issue is more contentious or more socially relevant than the debate over sport hunting and trapping. For the most part, the state fish and game agencies have been procurers of game, not protectors of wildlife. Today, these agencies are principally engaged in activities to facilitate or regulate hunting and trapping, whether through game animal research, hunter education, game stocking, habitat manipulation, or law enforcement. In 1988, Defenders of Wildlife released a state-by-state survey indicating that fish and game agencies spend more than 90 percent of their funds on game animals, even though they constitute a small percentage of faunal species.

The state game agencies—long dependent on the revenue from the sale of hunting, trapping, and fishing licenses, along with federal revenue derived from excise taxes on guns, ammunition, fishing equipment, and motorboat fuel—have only recently, and somewhat grudgingly, accepted some responsibility for non-game species management. Even the U.S. Fish and Wildlife Service, though it also implements the Endangered Species Act, spends considerable time and money on devising annual framework regulations to facilitate the sport hunting of migratory birds and on opening national wildlife refuges to hunting, fishing, and trapping.

Hunting proponents—relying on the rationale of Roosevelt and, to some extent, the game management philosophies of Aldo Leopold—believe that animals can be sustainably used. In their eyes, sport hunting and trapping are not only justifiable,

but beneficial uses of animals that provide recreation, meat or fur, and cost-effective management of wildlife populations.

While the use of animals is a deeply imbedded social tradition in western culture, I believe that already established societal standards against animal cruelty will gradually, and appropriately, lead us in the direction of banning sport hunting and commercial trapping. In a society that has already granted legal protection to some animals, wild animals are the next logical beneficiaries.

Before delving into that argument, it is necessary to challenge a standard hunters' defense: that hunting is a form of essential population control. Without question, this practical defense of hunting is, in virtually all circumstances and with all species, utterly specious. Yet, it is an argument that many unquestionably accept.

Obviously, population control has never been a motive for hunters. They hunt for fun, for meat, for camaraderie, but not for population control purposes. It is hard to imagine hunters worrying about the need to control populations the night before opening day.

Beyond that, it is obvious that no responsible ecologist would argue that the vast majority of hunted animals are shot to control their numbers. Annual kill totals for several widely hunted species as estimated by state fish and game agencies are as follows:

Birds

- 50 million mourning doves
- 25 million quail
- 20 million ring-necked pheasants
- 10 million ducks
- 2 million geese
- 1 million ptarmigan

Mammals

- 25 million rabbits
- 25 million squirrels

4 million deer
150,000 elk
120,000 pronghorn
250,000 coyotes
20,000 black bears
1,500 mountain lions
1,000 grizzly bears
800 wolves

The states allow lengthy seasons and permissive kill limits for birds and small mammals, such as doves, ducks, quail, pheasants, rabbits, and squirrels, because the populations can sustain the impact, not because they must be hunted. Also, few would argue that top-line predator species, such as coyotes, mountain lions, wolves, and bears need to have their numbers regulated by hunters. These are low density species whose numbers are self-regulated by habitat conditions, densities of conspecifics, and prey availability.

If hunting had to be justified on the basis of population control, well more than 90 percent of hunting activity would be eliminated with little debate. The population-control defense only has some limited resonance when discussing the management of ungulates, such as elk and deer. It seems disingenuous, however, for the state fish and game agencies and hunters to claim that their activity is necessary to control ungulate numbers when they have been engaged in a variety of tactics to increase their numbers.

Since the 1930s, the states have attempted to inflate ungulate numbers to provide shooting opportunities for hunters by killing predators, by manipulating habitat to favor deer, and by altering the natural sex ratio of deer. In many parts of the country, because hunters disproportionately kill bucks, five to ten times more females than males inhabit the woods. In some regions, it's worse. In Michigan's northern lower peninsula, according to the June 14, 1991, *Detroit News*, "does outnumber bucks

by as much as 30-1." A population with a disproportionate number of females possesses a greater reproductive potential.

Though hunting proponents reflexively state that deer must be hunted, even some pro-hunting texts admit this is not the case. A standard game managers' text, *White-Tailed Deer Management and Ecology*, states, "Most wildlife biologists and managers can point to situations where deer populations have not been hunted yet do not fluctuate greatly nor cause damage to the vegetation. Certainly deer reach overpopulation in some park situations, but the surprising thing is how many parks containing deer populations have no problem."

Adds ungulate biologist Grahame Caughley, "I do not know of any system dislocated permanently by a bout of overpopulation. The phenomenon is temporary and its remission spontaneous. Most treatments of overpopulation are justified by a dire prediction of what might have happened had the treatment been withheld. A more convincing case would be made by demonstrating that the effects of untreated abundance are irreversible."

Indeed, the array of state parks and national parks throughout the country—which collectively represent millions of acres of non-hunted habitat—provide practical and virtually incontrovertible evidence that sport hunting is seldom, if ever, needed as a mechanism of population control for deer or any other species. From Acadia to Joshua Tree and Olympic to Everglades, the one dominant management motif of national parks and monuments is a prohibition on sport hunting; yet the health of animal populations and ecosystems remain intact in the absence of this form of human-caused mortality. In fact, of the country's 130 national parks and monuments, 128 prohibit hunting.

In short, the justification of hunting as a mechanism of population control rings hollow. Japan has recently adopted this argument in attempting to justify its resumption of commercial whaling. Rather than concede that the nation merely has a commercial and cultural interest in killing whales, Japan has tried to mask its rapacity under the guise of "scientific" whaling. The argument, in reality, is scientific fantasy whether it's applied to marine mammals, terrestrial mammals, or birds.

Thus, the perpetuation of hunting does not rest upon its biological necessity, but upon its consonance with existing societal standards toward the treatment of animals. In short, the question is, what is our appropriate relationship to other animals? Is it acceptable to pursue them and kill them for sport?

Indeed, the use of animals in western society, as pointed out earlier, is deeply imbedded. But over the past two centuries, society has begun to extend a legal mantle of protection to animals. While many uses of animals have been and are still widely tolerated, society increasingly recognizes that the deliberate infliction of unnecessary harm to animals is wrong.

As evidence of the growing intolerance for cruelty, we need only review the legal codes of the states. Today, there are anti-cruelty codes in 50 states, dog-fighting prohibitions in 50 states, and cock-fighting prohibitions in 44 states.

Cock-fighting and dog-fighting are not only seen as cruel, but unnecessary. In short, people do not need to fight dogs or cocks to survive. In a similar vein, hunting too is no longer necessary. This is not the 17th century when some people needed to hunt for food or cloth. Today, according to the 1991 U.S. Fish and Wildlife Service National Survey of Hunting, Fishing and Wildlife-Associated Recreation, there

are 14.1 million hunters—or about seven percent of the U.S. population—above the age of 16 in the United States. The remainder—about 93 percent of the public—subsist without hunting. In fact, they obtain their food at a less expensive market value than an average deer hunter, who will probably invest about \$20 for every pound of deer flesh returned to the table (Cartmill 1993).

If standard taboos against cruelty are logically applied, sport hunting can no longer stand ethical scrutiny. For instance, in any state, a person who chooses to impale a domestic cat with a broadhead arrow could be prosecuted for cruelty; yet 11 states permit hunters to shoot the wild cousins of domestic cats—mountain lions—with broadhead arrows, usually after having been chased up a tree by a pack of radio-collared hounds. Similarly, if you shoot a domestic dog with a 30.06 rifle for mere fun, you are likely to be arrested; but the shooting of their wild cousins—the coyote—is legally sanctioned. These are severe inconsistencies.

If cock-fighting, dog-fighting, and bull-fighting are wrong, so too is sport hunting. As author Matt Cartmill points out, "If killing animals is wrong as a spectator sport, it should also be wrong as a participatory sport."

Some offer an economic defense of hunting: that the activity provides the financial backbone for the operations of this nation's wildlife agencies. Above, I pointed out that most the bulk of resources spent by these agencies are devoted to game-species projects. Thus, if the flow of hunters' dollars were cut off, it would be hunting programs, not conservation programs, that would suffer.

What's more, it is fallacious to think that hunter dollars support the operations of the vast majority of public lands in this country. The

five largest public land managers in United States are federal agencies: the Bureau of Land Management (271 million acres), the U.S. Forest Service (191 million acres), the U.S. Fish and Wildlife Service (91 million acres), the National Park Service (80 million acres), and the Department of Defense (25 million acres); the operations for all of these agencies are provided through the appropriation of general tax dollars, not through specific expenditures of hunters.

But even the limited level of support that hunters self-servingly provide to state agencies is not sustainable. Hunting numbers are shrinking, from 17.5 million hunters in 1975 to 14.1 million today (U.S. Fish and Wildlife Service 1993). In certain areas, like California, where hunter numbers have declined by 50 percent over the past 20 years, the drop has been precipitous.

While hunter numbers have been stable or decreasing, the number of non-hunters has increased dramatically. There are, for instance, more people who visit the nation's three most popular national parks than who hunt each year. According to the U.S. Fish and Wildlife Service, there are about 80 million non-consumptive wildlife enthusiasts. If the resources of these people can be adequately tapped, this group, which is bound to increase further in number, can provide substantial, long-term support land and wildlife management in this country.

The programs of wildlife managers in the 21st century must be geared to this burgeoning constituency, not the fading legacy of hunting culture. A restructuring of wildlife management programs in this country not only makes ethical sense, but also economic sense. This new wildlife constituency will

demand, and will undoubtedly pay for, wildlife viewing programs, urban parks, wilderness parks, and threatened and endangered species survival plans.

Mistakenly, consumptive-use advocates have long attempted to equate sport hunting, fishing and trapping with management, and have all but flatly labeled consumptive-use critics as "anti-management." Nothing could be further from the truth. As the human population expands and encroaches on wildlife and their habitat, it will be more important than ever to have environmental planning and ecosystem management. There will also be a pressing need for agencies to provide active and humane solutions to human-wildlife conflicts; the old model of lethal control, especially predator control, will not be viewed as either humane or effective.

Managers will need to provide direct service or consultation to people interacting with wildlife. Mountain communities will need bear-proof dumpsters installed in bear-inhabited areas; municipalities may need to regulate the flow of water being released from beaver dams; and livestock operators will need technical advice on guard dogs or other deterrents to coyotes.

Indeed, a change in society's ethical standards will compel a serious change in wildlife management in America in the 21st century. Society will no longer unthinkingly accept a resourcist and entirely human-centered model of management. Not only will people demand that species and systems be safeguarded, but also that individual animals be treated humanely. There is nothing incompatible about preserving species and ecological systems and stopping the human-caused harming of sentient creatures.

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The management of wildlife populations has reached a point where a number of forces are requiring change in our approaches to old problems (Gavin 1989; Wagner 1989; Yahner 1990). Nowhere is this more true than on public lands, and in particular, because of their unique mission, in our national parks (Houston 1971). New technologies, developed in disciplines seemingly far removed from conservation biology, are now available with which to answer old questions with new methods of inquiry. Two of these technologies include wildlife contraception and non-capture physiological studies which are based on urinary and fecal hormone analysis. This paper will describe some recent fertility control research and non-capture methods of studying physiology which have been successfully applied to wildlife in national parks of the U.S.

Dramatic increases in certain wildlife populations are a real or perceived problem today in many areas of the world. In some cases, such as wildlife refuges and national parks, the protection afforded to animals by laws and regulations, and the absence of sufficiently large numbers of predators, have resulted in populations of wildlife that occasionally exceed the habitats' biological carrying capacities. In other cases, increasing urbanization and changing public values and attitudes regarding traditional lethal wildlife control methods have led to large increases in some species of wildlife in urban and suburban America (Kirkpatrick and Turner 1985).

The species which have increased in number on public lands are generally large ungulates, such as elk (*Cervus elaphas*), bison (*Bison bison*), feral horses (*Equus caballus*), or feral donkeys (*Equus asinus*), which have no serious predators. In urban areas, the species which have increased dramatically are characterized by great adaptability to the human presence, and include such animals as white-tailed deer (*Odocoileus virginianus*), skunks (*Mephitis mephitis*), raccoons (*Procyon lotor*), and even beaver (*Castor canadensis*). In these latter cases, urbanization, and protection from intentional lethal controls, has been coupled with human-made increases in food and shelter, and the results are rapid population increases.

The population increases are often only imaginary problems, perceived by human populations that are often intolerant of wildlife and the competition it provides for something of value to humans, e.g., ornamental plants, flowers, vegetable gardens, park trees, access to back country, or conflict over range land that could be occupied by cattle or sheep. In some cases, the problems are real, and include animal-borne diseases such as rabies, or Lyme disease, or threats to human health through vehicle-animal collisions. In other cases the perceived or real problems include degradation of habitat or deteriorating health of the animals themselves, as a result of the population increases, or the mere existence of non-native species.

The decline of traditional lethal methods of wildlife management is a relatively recent event. Historically, population increases among wild and feral species have been controlled through hunting, trapping, poisoning, and occasionally relocation. Controlled hunting, although successful in certain instances, is coming under increased public scrutiny. Trapping, particularly with leg-hold devices, is extremely unpopular among growing segments of society, and legislation against steel traps has been passed or is pending in many states, provinces, and even countries, and even where still tolerated, trapping is relatively ineffective as a population control technique because of declining fur prices. Live-trapping and relocation of overpopulated species is expensive and works only where sufficient habitat exists. Poisoning animals is distasteful, often dangerous to humans, and notoriously non-specific. The shortcomings of poisoning are multiple and serious. First, the target animals are destroyed in less-than-humane fashion, healthy animals along with diseased ones. Second, population reduction is only

temporary, and each new breeding season results in new increases. Third, the poison kills non-target species (Kirkpatrick and Turner 1985).

An alternative to the control of animal populations through mortality control is the concept of fertility control. Until relatively recently, the concept was confined mostly to captive animals and was largely untested in wild populations, and skeptics considered the approach bizarre. However, the technology associated with chemical or immunological control in humans is impressive, and its application to domestic, wild, or feral species is fundamentally sound. The history of fertility-control research in animals has been extensively reviewed (Kirkpatrick and Turner 1985, 1991a).

No single animal has been more responsible for the resurgent interest in wildlife contraception than the feral horse. Attempts at contraception in the horse have occupied researchers since 1972 (Kirkpatrick et al. 1982; Kirkpatrick and Turner 1987; Turner and Kirkpatrick 1982, 1991; Plotka et al. 1988; Plotka and Vevea 1990; Eagle et al. 1992). The first successful attempts at contracepting free-roaming feral horses involved capture and the administration of large doses of long-acting testosterone (Kirkpatrick et al. 1982; Turner and Kirkpatrick 1982) to feral stallions in Idaho. The injected hormone reduced sperm counts in the stallions, without altering their behaviors, and, while the results were encouraging, and mares bred by treated stallions had 83 percent fewer foals, the capture of the animals and the resulting stress, the cost of the drugs, and the amount of drug that had to be administered to each animal made the process logistically difficult. In 1987, the U.S. National Park Service embarked upon a research program designed to humanely reduce reproductive rates among the feral horses of As-

sateague Island National Seashore, off the coast of Maryland. The author and two colleagues, Irwin K. M. Liu, of the University of California-Davis, and John W. Turner, of the Medical College of Ohio, turned to the future of modern contraceptive technology—immunocontraception.

Basically, immunocontraception is a method which stimulates the immune system of the target animal to produce antibodies that interfere with some fundamental event in the reproductive process, i.e., ovulation, sperm production, fertilization, implantation. Initially, Liu's laboratory prepared an experimental vaccine made from the protein membrane which surrounds the pig egg, known as the zona pellucida. The vaccine, now known as porcine zona pellucida, or PZP, was first injected into 14 captive mares in California and it caused infertility in 13 of them. The PZP injections caused the mares to produce antibodies against the pig protein. However, these antibodies also attached to the zonae pellucidae of the mares' own eggs, thereby preventing recognition and attachment by sperm and, therefore, fertilization (Liu et al. 1989).

The next task was to discover if the PZP vaccine could be administered to free-roaming feral mares remotely, without capturing or handling them. It was important to determine if the vaccine was safe to give to pregnant animals, whether its effects were reversible and whether the normal social behavior of the horses would be altered in any significant way. The vaccination program began in February 1988. Twenty-six Assateague mares known to be fertile were identified and each one was given two or three inoculations of PZP, by means of a self-injecting, barbless darts fired from a capture gun. The results were excellent. About 60 percent of the mares were pregnant at the time of inoculation, and they all delivered healthy foals in the spring of 1988, following

the inoculations. However, a year later, in 1989, contraception was 100 percent effective and not a single foal was produced by the treated mares. The social behavior of the treated mares was unaffected by the vaccine; females mated but did not get pregnant (Kirkpatrick et al. 1990a).

In 1989, the effectiveness of a single annual booster inoculation was tested. However, before this could be accomplished, the contraceptive effectiveness of the 1988 inoculations had to be known, yet the foaling season was still several months away. These were wild creatures and capture was not permitted. How does one pregnancy-test an uncaptured feral mare? To accomplish this seemingly impossible task, the investigators turned to some established zoo technology. During the 1980s, B. L. Lasley, then at the San Diego Zoo, and now at the University of California-Davis, developed a number of urinary endocrine tests for pregnancy and to monitor ovarian function in captive exotic species (Lasley and Kirkpatrick 1991). In October 1988, several methods of extracting urine from the island's sand and marshes were devised, after witnessing a mare urinating. Next, Lasley's tests were applied to the samples from the treated and control animals. The results indicated 100 percent success in inhibiting fertility and foal counts in August 1989 confirmed these results. Thus, the research team knew which mares were pregnant 7-8 months before the mares foaled, and not a single animal was handled.

During February 1989, armed with the newfound knowledge of pregnancy (or, rather, non-pregnancy) rates, the scientists split the original test group by administering single-dose booster inoculations to 14 of the 26 mares. Only one booster-treated mare produced a foal in 1990. The 12 mares that did not get booster inoculations pro-

duced foals at their normal, pre-treatment rates. This confirmed the reversibility of the vaccine, at least after short-term application (Kirkpatrick et al. 1991a). In March 1993, the Assateague horses received their sixth consecutive annual PZP contraceptive treatment. This research is now supported by the National Institutes of Health and The Humane Society of the U.S., as well as the USNPS, and it is focusing upon long-term effects upon ovarian function, and the development of a one-inoculation, multiple-year vaccination. The work on Assateague Island has resulted in only a single foal in 60 mare-years, among treated animals, instead of the predicted 30 foals. This contraceptive effectiveness, coupled with the vaccine's safety, has prompted park officials to begin developing a comprehensive management plan which utilizes contraception but which has a minimal effect upon the composition of the herd. If one accepts the use of darts, it appears that a humane solution to the management of the Assateague horses is at hand.

Increasing interest in controlling urban white-tailed deer, in settings where hunting is not legal, wise, or safe, led to the research team to turn its attention to these prolific animals. With the financial support of the PNC Corporation, The Ontario Department of Natural Resources, and The Humane Society of the U.S., the PZP vaccine was next tested in 7 captive white-tailed deer. Each treated doe was given two inoculations of the PZP vaccine, remotely, by means of a blow gun, in September 1989. None of the 7 treated does produced fawns a year later, while 6 of 7 control does produced fawns. These captive deer were given booster inoculations in the fall of 1990, and after three years of treatment not a single fawn was born (Turner et al. 1992).

In addition to feral horses and captive white-tailed deer, the PZP

vaccine has been used to inoculate and inhibit fertility in feral donkeys inhabiting Virgin Islands National Park, and numerous zoo animals. The latter experiments are designed to prevent unwanted reproduction among captive exotic species and to provide some relief for the large and growing "surplus" animal problem of zoos. At the same time the captive exotic species provide opportunities to test the contraceptive vaccine on species for which there may be an application in the wild. Thus far, with the financial support of individual zoos, the American Association of Zoological Parks and Aquariums, and The Humane Society of the U.S., the PZP vaccine has been demonstrated to be effective in Przewalski horses (*Equus przewalski*), banteng (*Bos javanicus*), sika deer (*Cervus nippon taiwanus*), axis deer (*Axis axis*), sambar deer (*Cervus unicornis*), muntjac deer (*Muntiacus reevesi*), Himalayan tahr (*Hemitragus jemlahicus*), and West Caucasian tur (*Capra ibex*) (Kirkpatrick et al. 1992a). Experiments are currently underway with addax (*Addax nasomaculatus*), llama (*Llama glama*), giraffe (*Giraffa camelopardalis*), blackbuck (*Antelope cervicapra*), wolf (*Canis lupus*), African lion (*Panthera leo*), tiger (*Neofelis tigris*), river hippopotamus (*Hippopotamus amphibius*), pygmy hippo (*Hippopotamus choeropsis*), and North American elk (*Cervus elephas*).

To evaluate various wildlife contraceptives, the characteristics of the ideal wildlife fertility control agent was described by several investigators (Seal 1991; Turner and Kirkpatrick 1986). These characteristics include (1) a high degree of effectiveness, (2) a lack of toxicity and harmful side effects, (3) reversibility and a flexible duration of action, to preserve the reproductive and genetic integrity of the target animals, (4) low cost, (5) minimal or no effect on social organization or behavior, (6) remote delivery, preferably with a single administration, and (7) inability

ity of the contraceptive agent to be passed from the treated animal to predators or scavengers, or humans through the food chain (Kirkpatrick and Turner 1991). The PZP vaccine met, for the most part, these characteristics, with the exception that during the initial year of treatment, the vaccine had to be delivered in two inoculations, about one month apart. This one shortcoming was a major problem when considering the use of the vaccine in secretive or elusive animals such as free-roaming feral horses or white-tailed deer. Consequently, attention has turned to the development of a one-inoculation, multiple-year form of the vaccine, with the financial aid of the Geraldine R. Dodge Foundation, The Eppley Foundation for Research, the Morris County (New Jersey) Parks Commission and The Humane Society of the U.S.

Technology already existed that might be used to produce a form of the PZP vaccine that would result in a slow, continuous release after injection. This technology had been developed for the delivery of human vaccines (Eldridge et al. 1989; O'Hagan et al. 1991) and its application to the PZP vaccine seemed reasonable. The initial attempt at producing a one-inoculation PZP vaccine focused upon creating lactide microspheres, which contained the PZP antigen and which might release the antigen slowly, over the course of several months. A homogeneous mixture of the PZP antigen and D,L-lactide was made and the material was formed into small ($\approx 50 \mu$) spheres. Upon injection into the muscle of the target animal and contact with tissue fluids, the microspheres begin to degrade, releasing the antigen slowly. The D,L-lactide is metabolized to water, CO_2 , and lactic acid, all three of which are normal products of metabolism in mammals.

Controlled experiments with the first prototype of this form of the vaccine, using domestic mares, re-

vealed no difference between a single inoculation of the raw vaccine and the microspheres. It was thought that the size of the microspheres permitted release of the antigen too fast and thereby prevented both a prolonged release and a prolonged contraceptive effect. As a result of these experiments, a second generation of microspheres was developed and tested in December 1992, in experiments described below. However, the tests with the domestic mares provided another unanticipated and positive result. It was discovered that a single inoculation of the raw vaccine, in a thick emulsion with an oil-based adjuvant, provided contraceptive antibody titers for about 200 days. This unanticipated discovery suggested that a single inoculation might prevent pregnancy in those animals that were vaccinated immediately prior to their breeding season, and for which the breeding season did not last longer than 200 days.

This hypothesis was immediately tested in feral horses and white-tailed deer. Fourteen previously untreated feral mares on Assateague Island National Seashore were given a single inoculation of the raw vaccine in March 1992. On Assateague, mares normally begin to ovulate and breed in April and complete breeding activity by August, a period of 150 days. Eleven of these treated mares were pregnancy tested in October 1992, and only a single animal was pregnant, indicating that the one-inoculation was effective. In September 1992, a field test of the remote delivery of PZP to white-tailed deer was conducted at the National Zoo's Conservation and Research Center, in Front Royal, Virginia. Ten does were given two inoculations, 10 were given a single inoculation, and 10 were given sham injections. The results of this study will not be available until June 1993, but behavioral observations of mating behavior, through early March 1993, suggest

that the does receiving the one- and two-inoculation treatments are not pregnant. Equally important, the data suggest that non-pregnant does will not continue having estrous cycles beyond January, or at least the males will pay no attention to them after January (W. McShea, Smithsonian Institution, pers. comm.).

The final field study, as of March 1993, involved feral horses in Nevada. In early December 1992, with the financial support of the U. S. Department of the Interior, and the Bureau of Land Management, 500 feral horses were captured in eastern Nevada, and 131 mares between the ages of 5-12 were inoculated with one of three forms of the PZP vaccine, or with injections which contained no vaccine. One group received two inoculations of raw vaccine, given about one month apart. A second group received a single inoculation of the raw vaccine, and a third group received a single inoculation of the second generation of microspheres, which are thought to be a slower-releasing form of the vaccine than the first generation described above. The results of these experiments will be available in late 1993.

At the current time, still another approach to the one-inoculation, multiple-year PZP vaccine is being investigated. In this process, the PZP antigen is *encapsulated* with the biodegradable lactide material, rather than being incorporated into a homogeneous mixture, as with the microspheres (Eldridge et al 1989). The antigen is coated with the lactide material, and the thickness of the coating determines the time of release. After injection and exposure to tissue fluids, the coating begins to erode, and at some point the antigen is released. The microencapsules represent a type of injectable Contact® cold pill, and result in pulsed releases rather than continuous releases, as in the case of microspheres. The first prototype of

the microcapsules will be available by late summer 1993.

Research directed at the humane control of smaller wildlife species which have adapted to urban areas extremely well is also promising. One such animal is the common skunk. These highly adaptable animals have colonized urban areas, but as populations grow, the threat of rabies accompanies the population growth. Historically skunks have been destroyed by shooting trapping, or poisoning. The irony is that virtually all the skunks that are killed are healthy skunks. Furthermore, removal of the skunks only creates habitat vacuums, which draw skunks in from surrounding areas. Thus, programs of killing are forced to go on forever. A strategy was developed to permit a core population to exist but to contracept it. In this way the animals would defend their territories, prevent immigration of new skunks into the area, and not produce six or seven new skunks per female annually. To accomplish this, females were live-trapped, lightly anesthetized with ketamine, and a small contraceptive rod was implanted under their skin. These contraceptive rods, recently approved for use in humans by the FDA and known commercially as Norplant®, are only 30 mm long and about the thickness of a drink stir-rod. The single rod was placed just under the skin without surgery, by pushing them through a large hypodermic needle, and the small puncture wound was dusted with a topical antibiotic. The entire process took only minutes and virtually anyone can be trained to carry out the simple procedure. Each of the treated and control skunks was given an ear tag and fitted with a radio-collar and released. The following year, four of the treated and six of the control skunks were located and captured. None of the treated skunks and all six of the control skunks had litters. Following this

successful pilot experiment, 20 captive skunks were given a single implant, and three years later, not a single litter has been born to the treated animals (Bickle et al. 1991). It is the ultimate goal of this line of research to train animal control personnel to control skunk populations in this way. Just consider that every ten skunks thus treated translate into 70 new skunks that never appear, and, best of all, no skunks have been killed. Similar experiments are already underway with captive raccoons.

Tests are also being conducted with urban beaver in Denver, Colorado. In this case, the beaver have moved into waterways within the city and its suburbs and created dams and destroyed trees within greenbelts and parks. During 1992, six female beaver were live-trapped, anesthetized, and given one to three Norplant® rods, and fitted with radio transmitters. Results of these experiments will be available in June 1993. The U. S. Forest Service has already expressed interest in using this method to control beaver in national forests (Sherri Tippi, Wildlife 2000, pers. comm.).

With each advance in wildlife contraception, however, comes greater threats of abuse of this technology. Should feral horses be contracepted just to provide more grass for cattle and sheep? Should predator populations be reduced in order to produce more game animals for hunters? Should contraception ever be used in an endangered species, such as the elephant? If so, under what conditions? Who should make the decisions about the use of contraceptive technology on wildlife? What criteria should be used? What are the allowable limits of stress to which animals should be subjected in order to apply wildlife contraception? Such questions must be answered before fertility control becomes a common wildlife management tool. There is a multitude of

ethical and moral questions to consider if we are to solve wildlife problems rather than make them worse. Such questions have already been posed and the remaining step is to develop responsible and ethical guidelines for wildlife contraception.

Another technological advance is aiding in wildlife research, particularly in national parks, where the capture and handling of animals properly comes under intense public scrutiny. The urinary and fecal hormone analysis technology used so successfully by zoos, for the purpose of understanding reproductive biology in captive exotic species, has now been applied to numerous studies in U.S. national parks. Indeed, the application of urinary and fecal hormone analysis has been pioneered within the national parks. The first attempt at measuring pregnancy in uncaptured horses was accomplished with feral horses, on the Pryor Mountain National Wild Horse Refuge in Montana, a portion of which includes Bighorn Canyon National Recreation Area. The object of this initial study with free-ranging wildlife was to understand if fetal loss played an important role in reproductive physiology of these unique and valuable horses (Kirkpatrick et al. 1988). Twenty-five feral mares were identified and urine samples were collected from each in August 1985. The mares were observed until they urinated and the urine was aspirated directly from the ground, or centrifuged from the urine-soaked soil. The samples were analyzed for estrone conjugates (E₁C), which are significantly elevated in mares during pregnancy. During the summer of 1986, the mares were located and observed for foals and the results indicated extreme accuracy in the diagnosis of pregnancy in this non-invasive way. These same techniques were applied to the horses of Assateague Island National Seashore during the contraceptive studies mentioned above,

in order to determine pregnancy rates months in advance of the foaling season and thereby design new experiments with more efficiency. These techniques are also being used to study the long-term effects of the PZP vaccine upon ovarian function in the Assateague horses. Urine samples are collected from treated and untreated mares on an every-other-day basis, between May 1 and June 30, during the period of peak breeding activity. The samples are analyzed for E₁C and urinary progesterone metabolites (iPdG) (Kirkpatrick et al. 1990c), and the patterns reveal even the most subtle changes in ovarian endocrine function, yet again, no animals are handled (Kirkpatrick et al. 1992b).

Another important advance developed at Assateague Island national Seashore, was the ability to diagnose pregnancy by means of fecal hormone analysis. As little as a half-gram of fresh mare feces can be analyzed for E₁C, iPdG or total estrogens, providing accuracy approaching 100 percent (Kirkpatrick et al. 1990b, 1991b). Using a combination of urinary and fecal steroid analysis, studies have been carried out which show that mares taken over by new stallions are not induced to abort, as had been previously reported (Kirkpatrick and Turner 1991a), and that unlike the management of the Assateague horses, the infamous roundup and sale of foals from Chincoteague National Wildlife Refuge causes a two-fold increase in foal production among those animals (Kirkpatrick and Turner 1991b). These studies were accomplished without capture or handling of the horses, under the scrutiny of many thousands of visitors and without any complaints. These pregnancy diagnosis techniques are currently being used to monitor pregnancy rates among PZP-treated feral donkeys in Virgin Islands National Park. Most recently, research on Assateague Is-

land National Seashore has led to the development of non-instrumented field tests for pregnancy (Kirkpatrick et al. 1993a).

One of the most exciting applications of urinary and fecal steroid analysis to wildlife research is occurring in Yellowstone National Park. Under the sponsorship of the National Science Foundation, remote monitoring of ovulation, pregnancy, and fetal loss has been accomplished with the Yellowstone bison, in an attempt to understand the mechanisms of reproductive self-regulation. After three years of study, it has been demonstrated that fetal loss is almost non-existent among the Yellowstone bison, that the unusually low fecundity of the Yellowstone bison is the result of ovulation failure among lactating cows, and that ovulation is rare among cows younger than four years (Kirkpatrick et al. 1993b). The information regarding the low incidence of fetal loss had other implications and cast serious doubt on the extent of brucellosis among these animals, a fact that was subsequently validated by examination of 220 animals destroyed by the state of Montana outside the park in 1992. In still another study within Yellowstone, pregnancy diagnosis in elk is being accomplished by means of fecal steroid analysis (R. A. Garrott, University of Wisconsin, pers. comm.).

Modern technologies of wildlife contraception and non-capture physiological studies will not completely eliminate the need for lethal controls, or the occasional immobilization and capture of animals. However, the state-of-the-art of wildlife contraceptive technology has already reached a point where it can be applied to certain populations of wild and feral species within national parks and other public lands, and there is much valuable information that can be collected from wildlife without capture, through

urinary and fecal hormone metabolite analysis. Wherever possible, the first choice for controlling animal populations or studying reproduction or diagnosing reproductive and endocrine status in free-ranging wildlife in our national parks should be these non-capture, non-lethal techniques. These approaches ben-

efit the animals studied and improve the overall quality of science. Additional technical advances soon will expand the capabilities of contraception and non-capture research, but the application of this technology for conservation biology will depend upon the willingness of researchers to routinely use these new methods.

ACKNOWLEDGMENTS

Many individuals and organizations are responsible for the research reported herein. Those deserving acknowledgment and who have not already been acknowledged in the paper include, Bruce Rogers, Gordon Olson, and John Karish of the USNPS; Allen T. Rutberg and John W. Grandy of The Humane Society of the U.S.; U.S. Senator Harry Reid; Ron Keiper and Rick Naugle of Pennsylvania State University; Lydia Kolter and Waltraut Zimmermann of the Cologne (Germany) Zoo; Paul Calle of the Bronx Zoo; Karen Goodrowe of the Toronto Metropolitan Zoo; S.E. Shideler, M. Bernoco, and C. Munro of the University of California-Davis; and Karen Allen of the American Association of Zoological Parks and more recently Conservation International. The author gratefully acknowledges the Deaconess Research Institute and The Humane Society of the U. S. for financial support for the preparation of this manuscript.

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Sustainable Forestry

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A NEW LAND ETHIC

The roots of sustainability lie in the Multiple Use Sustained Yield Act of 1960 ("to develop and administer the renewable surface resources of the national forests for multiple use and sustained yield"), but the meaning has changed over the past three decades. Initially, the U.S. Forest Service (USFS) interpreted "sustainability" primarily as a sustainable flow of products. These days, we interpret sustainability to include not only a sustainable flow of *products* and *services*, but also sustainable *ecosystem values*. This expanded concept is the foundation for several recent changes in the USFS's strategic planning and management. The new focus on sustainability affects not just the implementation of forestry practices on the U.S. national forests, but all of the agency's land and visitor management activities. The ecosystems on which the management takes place have no respect for academic disciplines, jurisdictional boundaries, or even budget line items!

How does one go about managing natural resources to assure sustainability of ecosystem values? We suggest that there is no correct formula, no "cookbook" approach. For management practices themselves to be sustainable and result in sustainable ecosystem values, they must be socially acceptable, economically viable, and within the biological capacity of the resource. Each of those conditions may fluctuate over time, and space, and in relation to each other. The land is capable of accommodating many

combinations of management practices and uses; there is no single set of acceptable choices.

In three short years since the publication of the 1990 Resources Planning Act (RPA) program, which gives long-range national strategic direction for the USFS, our management philosophy has evolved significantly. We grappled successively with the "new forestry" concept, our own "New Perspectives" program, and, now, with the concept of "ecosystem management." Sustainability provided the foundation for this

paradigm shift. New forestry provided some new tools to assist our management. The New Perspectives program expanded our thinking beyond just forestry to include all our goods and services in the multiple-use charter. In so doing, New Perspectives allowed us to reach for new goals and to look for new and better ways to do business. New Perspectives principles began to guide the management and research activities necessary to achieve the 1990 RPA program. The next logical step was the development and formal designation of ecosystem management as a key management philosophy.

Ecosystem management means using an ecological approach to achieve the multiple-use management of national forests and grasslands by blending the needs of people and environmental values in such a way that these lands represent diverse, healthy, productive, and sustainable ecosystems. Make no mistake—people are part of the ecosystem and must be factored into the equation of management. As the USFS implements ecosystem management, we aim to accomplish many goals. Our management practices will be ecologically possible,

economically feasible, and socially desirable. These three ingredients are all essential, and each forms a leg of a triangle that is not complete without the others (Figure 1).

The USFS will take care of the land by restoring and sustaining the integrity of its soils, air, waters, biological diversity, and ecological processes. Within the sustainable capacity of the land, we intend to meet the needs of people who depend on natural resources for food, fuel, shelter, livelihood, and inspirational experiences. Within the sustainable capacity of the land, we also intend to assist with improving the well-being of communities, regions, and the nation through diverse, cost-effective, and environmentally sensitive production, use, and conservation of natural resources. We seek balance and harmony between people and the land with equity between interests, across regions, and through generations, meeting this generation's resource needs while maintaining options for future generations to also meet their needs.

Admittedly, this is a tall order and one which can only happen with effective citizen participation. Ecosystem management will succeed when the proponents and adver-

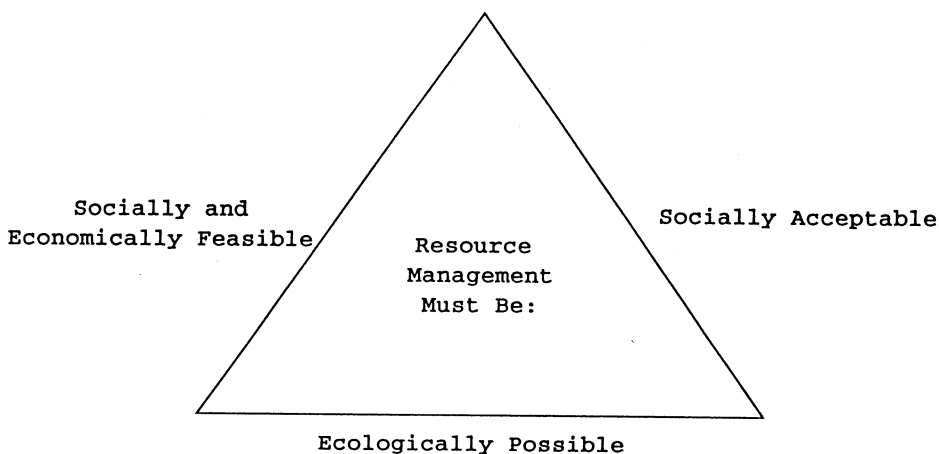


Figure 1. Three essential ingredients.

series of options truly become decision-makers—recapturing the essence of democracy. Responsibility for the stability and success of the chosen solution will be shifted to those who affect and will be affected by its outcome.

Is the public willing to accept this new role? We think so. The increase in volume of appeals to decisions made on every imaginable management or preservation action indicate not only a willingness of interest groups and individuals to get involved in decision-making; it signals that society is no longer willing to abdicate their decisions on natural resource use to scientists and public land managers. Admittedly, providing background, science, assistance, and facilitation to diverse groups of citizens and coaxing them into making and taking responsibility for decisions is a departure from business as usual in the federal government. But it is not as much a departure in the USFS as might be expected.

The process of public involvement in developing Forest Land Management Plans introduced the agency to techniques for acquiring information from external sources in ways that could be used in decision-making. New skills and expertise were infused into the agency that more fully represented the cultural diversity of the country as well as the diverse range of public opinions and values. For example, the ranks of "ologists" (wildlife biologists, ecologists, archaeologists, geologists, etc.) swelled in unprecedented fashion to bring new dimensions to the decision-making arena. Volunteers became welcome members of the team to help care for the land and serve people. The introduction of Challenge Cost Share Authority in 1986 opened the door to shared decisions and shared power with outside groups, as long as projects were within the parameters of existing Forest Plans. More and more, National Forests have infor-

mally begun to work with external parties to plan, as well as accomplish, objectives. It is reasonable to assume that the USFS is well-positioned to depend less on procedures and bureaucracy and more upon relationships and cooperation to accomplish a sustainable flow of public values.

LAND MANAGEMENT, ECOSYSTEM STYLE

There are at least four critical actions that we believe are needed to make ecosystem management work. These include: (1) completing inventories and assessments, (2) identifying the range of natural variability for ecosystem types, (3) gaining a better appreciation of scale, and (4) empowering an ecologically literate society.

Assessments and Inventories

The inventory and assessment of social values, ecological factors and social and economic conditions are essential in defining desired future conditions for each Forest Plan at both the programmatic-forest level and the management-area level. In essence, they help define the space within which decisions about management can be made and implemented. They become the basis on which interested publics, working with the USFS, build and carry out management direction. They are the common ground between interest groups. They are the shared understanding of what is ecologically sustainable, socially acceptable, and economically feasible (Figure 2).

The **Social Values Assessment** helps define people's wants and needs, ranging from desire to use public lands to facilitate employment and income or lifestyles, like ranching, to the use of public lands for spiritual enrichment or recreation, to the desire to protect lands from all human activities and maintain them as vestiges of wilderness. It helps quantify and qualify various

social values of the forest components so decisions can be made with a better understanding of the effects they will have on the owners of the National Forests, the people of the United States.

are performing. Such things as employment, income, and tax revenues help us assess economic diversity and dependency of communities. The assessments address community infrastructure needs such as schools,

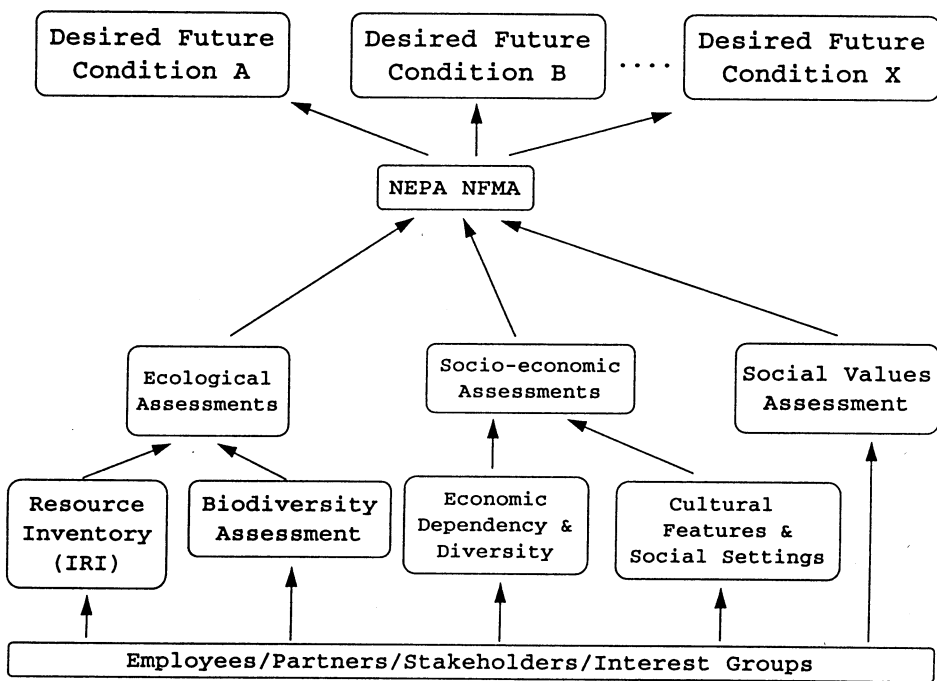


Figure 2. Ecosystem Management.

The **Social/Economic Assessments** consist of two parts: Economic Dependency and Diversity and Cultural Features and Social Settings Inventories.

The economic assessments tell us what products, services and amenities we can acquire from the land on a sustainable basis and within the framework of a community-based land ethic. Products can be commodity, cultural, aesthetic, or spiritual in nature as long as they have economic value—provide jobs and income to the surrounding area. They also tell us what socio-economic systems are in place and how they

hospitals, housing, transportation and law enforcement needs.

The social assessments also rely on inventories of cultural features and social settings.

Cultural Features Unit

- Roads
- Trails
- Recreation Facilities
- Buildings
- Communities, etc.
- Polygons, Lines, and Points

Social Settings Unit

- Recreation Opportunity Spectrum
- Visual Quality
- Polygons

Most of this information is currently available or is easily obtainable. Its purpose is to clearly define the present extent of human influence on the physical and biological components of the ecosystem.

The **Ecological Assessments** consist of two parts: Integrated Resource Inventory, and Biological Diversity Assessment. This information is critical, for it provides the means to create ecological literacy and understanding, both internally and with individuals and groups who wish to participate in decision-making.

The Integrated Resource Inventory (IRI) is an effort to prepare our basic resource information for entry into a Geographic Information System (GIS). The end product is reliable, integrated resource information that is consistent across the Region and understood by everyone. The Rocky Mountain Region's basic resource information will consist of three themes:

Common Water Unit

- Watershed Boundaries
- Stream Network
- Ponds, Lakes, and Reservoirs
- Polygons, Lines, and Points

Common Land Unit

- Landscape
- Potential Natural Vegetation
- Soils
- Polygons

Common Vegetation Unit

- Existing Vegetation—Trees, Shrubs, Forbs, Grasses/Sedges, Cropland, and Barrenland
- Polygons

The initial IRI efforts are focused on developing three distinct, integrated maps containing polygons, lines, and points that represent basic resource information. A fourth IRI layer, that contains point information for all sample plots associated with any of the three Common Unit layers, will be needed.

Concern for biological diversity is changing how we do business. The Biological Diversity Assessment provides baseline information about some of the components of biological diversity. It provides a framework for looking at the range of natural variability, threatened, endangered, or sensitive (TES) species, special communities or features, and different scales of time and space.

Sustainability and the Range of Natural Variability

As we develop management plans, we need to understand how the ecosystems we manage have functioned over time and across large landscapes. This understanding, which comes from a "range of natural variability assessment," provides a context for management and a set of lessons from nature that we can use to design management activities. This understanding also provides a context for discussing the concept of ecological sustainability.

Ecological processes and conditions of habitat that existed for the last several thousand years are those that supported native biological diversity. Biological diversity provides the machinery that makes ecosystems work. The recent explosion in human population has produced increasing alteration of the Earth's ecosystems. As ecological conditions across landscapes change from those that existed for centuries or thousands of years, chances increase that some vital element or process will cease to exist. Highly altered ecosystems may continue to be productive with continuous subsidies of energy and materials. In addition, the time span over which we can be sure they will be productive is often shortened in proportion to the degree of alteration.

Alteration may change the capability of the ecosystem to photosynthesize, cycle nutrients, and maintain other basic processes. A

corn field, for example, may be highly productive with subsidies of fertilizers, water, tillage, and pest control. A forested landscape in the Rocky Mountains managed for old-growth forests may require fire, insect and disease suppression. A similar area managed for a natural mix of seral stages may require the use of prescribed fire. The probability of long-term ecological sustainability increases as the ecosystem retains the machinery provided by biological diversity and natural processes. We use the metaphor "saving all the pieces" to describe our attempt to retain biological diversity and manage for ecological sustainability (Figure 3).

people management. Not only is featured species management generally expensive, it frequently generates conflicting results for different species.

Where possible, conservation of biological diversity in the Rocky Mountain Region will result from management that approaches ecological processes and habitat conditions discovered during a range of natural variability assessment. Management practices will be distributed over space and time to achieve a broad range of conditions. The appropriate mix of featured species and landscape habitat management must be designed for each individual ecosystem. While a combi-

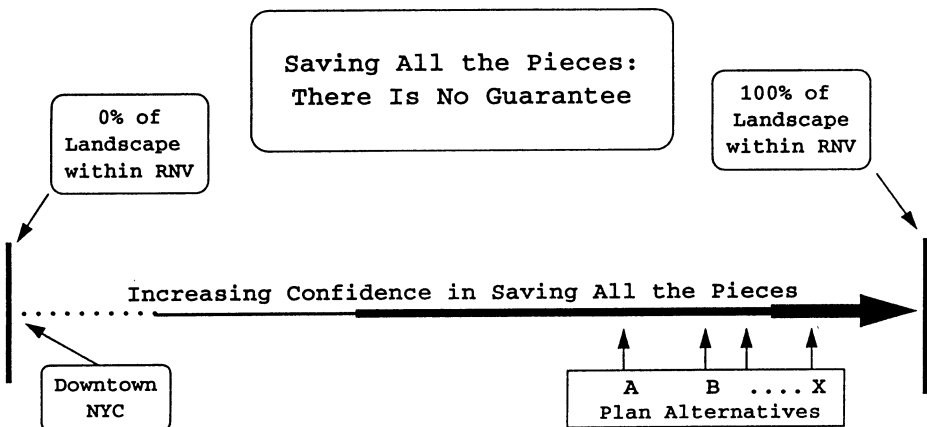


Figure 3. Saving all the pieces.

There is no single point along the continuum from slightly to highly altered ecosystems where we can say that some condition "is" or "is not" sustainable. However, there are at least two vital signs that signal declining sustainability: loss of species and loss of inherent site capability (due to accelerated erosion, for example). The former will usually occur before the latter. If species loss has occurred, or conditions otherwise dictate, management practices must focus on individual "featured" species, habitat, and

nation of these two approaches will often be appropriate, we will emphasize management that emulates natural conditions wherever possible. This is not to say that we will manage for natural conditions. We must continue to operate as a multiple-use agency, but will use our understanding of natural processes to do so in an ecologically sustainable fashion.

The goal of USFS stewardship is to understand and retain natural processes, thereby increasing the chances of long-term sustainability,

while providing for multiple uses. The range of natural variability assessment is our tool for understanding these processes.

The range of natural variability assessment must be a useful description of the composition, structure, and function of ecosystems over space and time. Over long periods of time (thousands of years), climatic variation has caused major shifts in the kinds of ecosystems present in landscapes and the disturbance regimes that affect them. From a pragmatic point of view, assessment of the range of natural variability is difficult beyond the normal life-spans of most tree species and is more difficult in grass- or shrub-dominated ecosystems. The time span for assessment could be broken into three parts, reflecting periods of accelerated change: 1) the period of reduced fire frequency since effective fire suppression began (usually early 20th century), 2) the period of increased fire associated with the mining, railroading, and timbering activities of early European settlement (generally 1840 to the start of fire suppression period), and 3) the background period before European settlement. This separation pulls out the different major recent shifts in disturbance regimes and may be appropriate for much of the Rocky Mountain Region.

Composition can be assessed for each ecosystem type by developing a list of species by seral stage or aquatic habitat type under natural conditions. This information can come from the scientific literature (where relevant to the ecosystem), inventories in representative and relatively undisturbed areas (integrated resource inventories, stand exams, reforestation exams, range exams, etc.), and professional management experience. In addition to a list of species, each species should be categorized by its dominance or abundance in each seral stage. Lists

and abundances at the broad landscape scale will most often not be all-inclusive.

Structure assessment at the stand level describes the typical sizes of plants, their spacing, and the amounts and kinds of dead material (e.g., downed logs and snags) for each seral stage under natural conditions. For aquatic ecosystems, the structure of riparian vegetation, amounts and sizes of large organic debris, and physical form of stream channels, lake margins, etc. are analogous features.

A description of the structure or pattern of stands across large landscapes is also important. Pattern assessment at the broad landscape scale consists of qualitative or quantitative descriptions of the sizes, shapes, and landscape position of vegetation patches generated by stand replacement disturbance and physical site conditions. Indices of edge and fragmentation calculated for existing conditions or proposed activities are only meaningful when compared with habitat conditions described by assessments of the range of natural variability.

Pattern in time should also be described. The frequency and intensity of disturbances (fire, insect/disease, flood, etc.) has a major impact on the abundance of different seral stages or aquatic habitat conditions across a landscape. It is more important, at the large landscape scale, to answer the question "Were the stands in this ecosystem reset by disturbance once in 300 years or every hundred years or less?" rather than the question "Is the natural fire rotation in this ecosystem 250 or 300 years?"

Scale

Analysis at large landscape scales provides a context for project analysis. For example, it is difficult to estimate the effects of proposed actions on a sensitive species unless you know the distribution and popu-

lation status of the species across a larger landscape. The range of natural variability for a watershed or planning area in which proposed actions will occur might be appreciably different from the general range of natural variability for a whole ecosystem type across a larger landscape. Analysis at larger scales should include two focuses: the distributions and populations of TES species or special features (such as unusual, unique plant communities, wetlands, bogs, etc.) and the range of natural variability in terrestrial and aquatic ecosystems.

We need to more clearly understand the scales appropriate to describe ecological processes. Our knowledge of scales, from the universe to the particle world, traverses forty-two orders of magnitude, yet only about seven orders of magnitude (the organism to the biosphere) cover the Earth and those things we can view directly. We can observe and plan management at any scale we choose, but we must be knowledgeable of the processes that we can expect to observe at a particular scale in order for that scale to have utility. A rigorous analysis of sustainability requires us to "think big." It is not until we approach at least the ecosystem level or, more often than not, the landscape level, that we are thinking big enough.

Empowering an Ecologically Literate Society

One of the greatest challenges facing all land management agencies is to work with people who have great passion for the resource but who may have little understanding of ecology and the natural world. As the population of this country shifts to urban areas and is influenced more by slick promotional campaigns from various interest groups and less by experience and observation, reaching an informed consensus about the desired condition of the resource is increasingly difficult.

The multiple-use management mission of the USFS is a given, but the emphasis given each of the uses shifts with public opinion and values—whether or not they are informed opinions and values. Historically, public agencies have tried to convert the public to agency values rather than incorporate new values into management practices. That era is ending. We run the risk, now, of trying to be all things to all people without adequately educating ourselves and our publics about the trade-offs that must be made, one way or the other.

As the USFS begins the job of ecosystem management, from developing the inventories, to identifying the range of natural variability, to looking at different scales, we need to recognize that we are developing tools for a public process. These are only aids to help all of us decide what management activities should occur on the public estate. In the past, we have assumed that the public would accept some form of active management. We can no longer make that assumption. The people of this nation are often not convinced that management is necessary to provide the goods, services, and values they demand. Many people do not consider humans to be intrinsically part of the Earth's ecosystems. It is imperative that our environmental education efforts include the concepts that humans are part of ecosystems and that management to deliver agreed-upon goods, services, and values is often necessary. We must also recognize that production of goods, services, and values on the National Forests must be in the context of long-term sustainability.

A CHANGING U. S. FOREST SERVICE

There are many opportunities and challenges ahead. It is not realistic to think we can get the job done with the same USFS organiza-

tion, people, and skills that existed even five years ago. We are moving toward a more multi-cultural and diverse organization. Our employees will have different experiences and insights that will help us solve problems. We value diversity in the workplace as much as we do in the forest and range lands.

Nor can the job be done without the advantage of expanding technology to more effectively process, display, and use information. We will do Integrated Resource Inventories. We will use Geographic Information Systems.

We will continue to hire people with diverse skills. We will continue to look for more cost-effective ways of doing business. Partnerships with other agencies and the private sector will be a way of life. Ecosystem management will be an integral part of Forest Plan revisions and implementation. Local communities must be involved with National Forests to assure sustainable local economies. With help from both our partners and critics, we intend to generate predictable, sustainable products, services and values within the framework of sustainable ecosystems.

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Pushing the Limits of Boundaries

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*Not everything that can be measured is important,
Not everything that is important can be measured.*

— author unknown

I

Each spring, millions of birds migrate from their winter sojourn in Central America, South America, and the Caribbean, to their summer breeding grounds in the north. This global pilgrimage is an extraordinary reaffirmation of ecological processes that transcend jurisdictional boundaries.

A characteristic of modern humans is our tendency to establish lines of ownership and jurisdiction, to draw clear boundaries, to compartmentalize ideas. These abstract distinctions often become limitations to our thinking and our understanding of the world around us.

The history of humankind can be seen as an on-going struggle to define boundaries in understanding our place as a species in the great and complex universe in which we live. It was not long ago that we gazed into the sky and perceived that the sun revolved around us. We carried with us the arrogance that we were a sovereign species, at the top of the pyramid of life and, in fact, at the center of the universe. However, mathematics and science eventually proved us wrong and we were forced

to accept that we were, in fact, not at the center of the universe. While Sigmund Freud saw the history of man as the history of "the dethronement of man," Roderick Nash (1989) described the progressive extension of rights—from the aristocracy to common people, women, diverse races, and perhaps to other species and to Nature itself—as an expansion of the boundary dividing those perceived as "us," or within our own community, and those perceived as outside of it.

The history of humankind has also been one of changing paradigms where the existing framework for perception becomes less and less adequate in interpreting the observed world. When the framework finally becomes no longer usable, a new one is adopted (Kuhn 1962). In the early 1900s Einstein and other physicists found that the sub-atomic world did not follow classical Newtonian laws of physics. Their discovery of the dual particle/wave nature of matter called into question the very foundation of their world view—their concept of the reality of matter. Their view of matter as consisting of progressively smaller parti-

cles no longer worked. Their willingness to accept a new approach, quantum physics, led to tremendous advances (Capra 1982).

As we shall show below, our tendency to draw boundaries and compartmentalize is not only counterproductive, but actually destructive. As our conscience and intellect have grown and evolved, and our ability to anticipate and predict the future has improved, and our power to transform the earth around us has become more potent, our tendency to draw boundaries has become both a practical and a moral dilemma.



My discoveries have satisfied me that it is possible to reach knowledge that will be of much utility in this life; and that . . . knowing the nature and behavior of fire, water, air, stars, the heavens, and all the other bodies which surround us. . . . We can employ these entities for all the purposes for which they are suited, and so make ourselves masters and possessors of nature.

— René Descartes,
Discourse on Method

II

Discourse on Method (1637) was a swift and powerful triumph of technique over philosophy, in which Descartes laid the foundation for utilitarian science and analytical reasoning as the basis for all discovery and understanding of the universe around us. These assumptions so prevalent in our society today are a result of a unique blending of Judeo-Christian, early Greek, and medieval views regarding the place of *Homo sapiens* in the organizational structure of the universe. The union of these philosophies with rational, analytical techniques during the Age of Enlightenment set forth a framework of perceiving the earth known as “Cartesian rationalism”: the notion that all aspects of the universe (including *Homo sapiens*) can be understood through analytic deduction and mathematically correct, logical, universal principles.

Modern science is based on Cartesian rationalism. It carries with it an underlying assumption that only that part of the universe which can be objectively measured, described, or predicted, is important, and thus, useful (Bowers 1992). Cartesian rationalism is so prevalent today, that many ecologists and other scientists do not even conceive of the possibility of any approach other than the Cartesian approach (Capra 1982), and problems that cannot be framed

in Cartesian terms are considered unworthy of study.

The mechanistic objectification of nature, and the subsequent lack of concern for the spiritual and emotional (or subjective) qualities of the human species has led to a separation or *dualism* between *Homo sapiens* and the rest of the universe (Capra 1975). This has led to a view of human-environment relations in which *Homo sapiens* is the dominant force—a perspective in which the purpose of

science is to predict, control, and use nature for our own purposes. Nature is viewed as an object rather than as a thing with dignity, which deserves respect and has intrinsic value in and of itself (Kant 1959; Taylor 1981).

Analytic reasoning and utilitarian science affect our daily life, acting as filters for our perception of reality: how we recognize and define problems, how we approach problems, and the alternative solutions that we see as being possible. This reductionist framework has led us to dissect and compartmentalize the world around us in an attempt to better understand it. Ironically, we may be building more barriers than bridges to understanding, for systemic properties—the interrelationships, patterns, and dynamics—are destroyed when a system is dissected, either physically or theoretically, into isolated elements. Although we can discern individual parts in any system, the nature of the whole is always different from the mere sum of its parts. Living form is essentially an indicator of the dynamics of underlying processes (Capra 1982).

*Sweet is the love
which nature brings
Our meddling intellect
misshapes the beauteous form of things
We murder to dissect.*

—William Wordsworth,
"The Tables Turned"

David Orr (1993) suggests that we experience nature as a medley of sensations that play upon us in complex ways—as sights, sounds, smells, touches, tastes. If this is so, then why do we analyze and divide landscapes into soil, water, vegetation, geology and air quality, and then attempt to re-synthesize the pieces using complex modeling and other analytical techniques? *All the King's horses, and all the King's men, couldn't put Humpty Dumpty together again.* Like Humpty Dumpty, once the landscape has been dissected

and organized into abstractions for intellectual convenience, we are not able to put it back together again.

We have made enormous progress in understanding the structures and functions of many of an ecosystem's subunits. Nevertheless, we remain largely ignorant of the coordinating activities that integrate those operations into the functioning of the ecosystem as a whole. It is becoming increasingly clear that the integrative activities of living systems cannot be understood within a reductionist framework. We can understand the axis and rotation of the earth, and still miss the sunset.

Our failure to question the underlying assumptions of Cartesian rationalism and a mechanistic and compartmentalized view of the world has also resulted in a system of academic, political, and economic institutions that support each other and have become all but blind to the dangerous imbalance of the value system which motivates them (Capra 1982). With compartmentalized disciplines and knowledge we become loyal to the abstraction of the discipline rather than loyal to the earth (Orr 1993).

The Cartesian reductionist method has brought spectacular progress in certain areas and continues to produce exciting results. The fact that it is inappropriate for other problems has left entire areas of questions and problems neglected. Whether we talk about cancer, environmental degradation, or energy shortages, the dynamics underlying these problems are but different facets of a single crisis. They are systemic problems, closely interconnected and interdependent. They cannot be understood within the fragmented methodology characteristic of our approach. Such an approach will never resolve any of our difficulties but instead merely shift them around in the complex web of social and ecological relations.

The great ecological issues of our time have to do in one way or another with our failure to see things in their entirety.

—David Orr,

"The Problem of Disciplines / The Discipline of Problems"

III

OWLS VS. JOBS

The northern spotted owl is one species that has been imperiled by the loss of 90% of the old-growth forest in the Northwest. Scientists have established that, in general, spotted owls need multi-layered forest with at least 50% of the trees eleven inches in diameter or larger, and a 40% canopy coverage. After the northern spotted owl was listed as a threatened species in 1990, an interdisciplinary, interagency team drafted a recovery plan for it. The plan defines a comprehensive program, including interagency efforts to ensure that the species will survive over the long run. A major component of the plan is its designation of "conservation areas" where forest and other land management activities must give precedence to the owl. In the intervening areas, 50% of an agency's land must be managed to retain habitat through which owls can disperse to neighboring conservation areas.

Through political and scientific reductionism, the complex issues related to the management and protection of the forests has been reduced to a question of saving owls or saving jobs. Debate has raged over the impact of loggers' activities on the old-growth forest community, over the minimum number of owls necessary for long-term viability, over what habitat characteristics are the minimum necessary for owls, and over how many jobs will be lost in order to save the owl.

Through reductionist thinking a large complex issue is broken into smaller pieces. A great question becomes reduced in scale and value, and what should be a moral debate becomes a mathematical problem. But arithmetic is no a substitution for wisdom. Numbers do not provide the answers we seek.

Countervailing scientific expertise is offered on both sides of the mathematical argument. While these experts might bring more detail to the problem, they rarely bring more light or clarity regarding the great underlying question. We continue to dissect the problem until each side's focus is so narrow that neither side is right.

PRIVATE VS. PUBLIC LANDS

Environmental groups and other interest groups as well as private citizens place considerable value on their ability to influence the decisions of federal agencies. The National Environmental Policy Act provides for public participation in agency decision-making. Some agencies, such as the U.S. Forest Service, have administrative appeal processes to resolve differences short of the courts. Where the government fails to follow prescribed procedures or where individuals consider themselves harmed by a government action, people have the right to legal redress in the courts. These avenues provide significant opportunities for citizen oversight over the way federal lands and resources are managed.

However, two-thirds of the land in the United States is not owned by the federal government. It should be obvious that ecosystems and ecological processes cross the boundaries of ownership and jurisdiction. How can ecosystems be conserved if we ignore private lands?

In presenting a program for the long-term conservation and recovery of the northern spotted owl, the draft recovery plan focuses primarily

on the management of federal and state lands. Required action on private land is largely related to the prohibition against "taking" owls. Many other steps that would contribute to the long-term survival of the species are left to the voluntary discretion of the individual landowner (Bart et al. 1992).

By ignoring ecosystem processes on private lands we are in effect giving license to individual landowners to impair or destroy the ecosystems on their lands. Inevitably, ecosystems over a much wider area are also damaged. By taking a compartmentalized and reductionist approach to protecting ecosystems, we eliminate all possibility of success.

THE ROLE OF SCIENCE

As ecological knowledge has expanded, its application in the management of national parks has steadily, albeit slowly, expanded. Following its own history of Cartesian rationalism, however, science too often concentrates on only those things that are quantifiable, turning living systems into mathematical models. More often than not, the objective of this research has been to increase our technological capability to protect and restore or, in other words, manipulate resources.

What are the ethical values associated with how we undertake these studies? What should the future of science in national parks be? These questions are all the more important with the establishment of the National Biological Survey, under which all biological and related research on Department of the Interior lands will be subsumed, and the diversity of researchers' perspectives will inevitably decline.

In the 20th century, physics has gone through several conceptual revolutions that clearly reveal the limitations of the mechanistic world view and lead to an organic, ecological view of the world which shows great similarities to the views of mystics of all ages and traditions. Physicists no longer see the universe as a machine, made up of a multitude of separate objects, but as a harmonious indivisible whole, a network of dynamic relationships that include the human observer and the observer's consciousness in an essential way. One of the main lessons that physicists have had to learn is the fact that all the concepts and theories we use to describe nature are limited. Scientific theories can never provide a complete and definitive description of reality. They will always be approximations of the true nature of things.

Science must journey beyond the limitations of Cartesian rationalism and concentrate efforts on understanding the interrelationships between *Homo sapiens* and all other species who live in an interconnected world of ever-changing, dynamic processes. This new paradigm of science would view the world in terms of relationships and integration, rather than as building blocks that can be reduced to smaller units. The difference between our current approach based on the Cartesian system and this new approach can be seen in the way that an anthill, a beehive, and a family are more than just the sum of individual ants, bees, and humans. Similarly, a wilderness is more than just the sum of individual trees and animals inhabiting it. Science must focus on the complex web of relationships rather than on the individual parts (Capra 1982).



Wisdom demands a new orientation of science and technology towards the organic, the gentle, the non-violent, the elegant and beautiful.

—E. F. Schumacher

IV

If we are to move towards a more sustainable path we need to develop a new way of understanding ourselves, and our relationship with nature. We need to recognize that actions we take based on Cartesian rationalism are in fact disrupting the sustaining capacities of the earth's ecosystems. This perspective, on which our cultural beliefs and scientific practices are based, is not the only possible view of the world. It must be replaced with a new ecologically sustainable vision, complete with new rules, and a new vocabulary. This paradigm shift will require non-exploitive science and technology, together with the cultivation of wisdom and conscience, and a holistic approach to the art of discovery and investigation of the world around us.

Sustainable thinking emphasizes respect for living ecological systems, and a sense for dignity in the land. According to David Orr (1992a), sustainable thinking is "the set of perceptual and analytic abilities, ecological wisdom, and practical wherewithal essential to making things that fit in a world of microbes, plants, animals, and entropy. In other words, [sustainable thinking] is the careful meshing of human purposes with the larger patterns and flows of the natural world, and careful study of those patterns and flows to inform human purposes."

A sustainable approach involves removing artificial limitations such as the boundaries between the U.S. Bureau of Land Management, U.S. Forest Service, and U.S. National Park Service land, as well as boundaries between private land and public land. We are not recommending that parks and wilderness be opened for exploitation, nor should all lands

be treated as parks and wilderness. Instead, the boundaries should be replaced with respect, for respect implies a different kind of limit: "things one does not do, not because they cannot be done, but because they should not be done" (Orr, 1992b). Sustainable thinking does not ask what is the minimum number of owls we need or what is the greatest number of trees that can be legally cut, nor does it distinguish between human activities and "natural processes." Caring for the Earth involves people at all levels, acting at a variety of scales, from a grove, to a watershed, to a bioregion. It requires that everyone—agency managers, scientists, planners, and designers, as well as loggers, environmentalists, and politicians—understand and integrate the principles of sustainability in their work and their lives. Most importantly, we must learn to manage ourselves, and not the land.

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Exploration of the atom at the turn of the century forced physicists to revise their basic concepts of the nature of physical reality in a radical way. The enormity of today's crises demand a new way of thinking as well.

—Fritjof Capra

V

We have attempted to show that our cultural beliefs and attitudes are responsible for the approach we take to solving environmental problems. This approach has been counterproductive, and the attitude it reflects concerning

the relationships between humankind and the Earth has, in fact, exacerbated our environmental problems. By recognizing that we are part of the Earth, and attending to dynamic interrelationships rather than retaining a mechanistic focus on components and a reliance on boundaries, we will not only be more successful in resolving environmental problems, but there will be fewer problems in need of solving.



EPILOGUE

During the controversy last winter over whether to kill wolves in Alaska to provide more game for hunters, scientific debate focused on two points of view. On the one hand there were the wildlife biologists and managers who talked of harvesting the wolves, of caribou calf crops, and game population densities (Peterson 1993). On the other hand were those who cared for the well-being of the wolves, but who felt compelled to bring in their own countervailing expertise to present opposing facts on population densities and distribution. It was as if a simple reverence for life was not a sufficiently persuasive argument. In the end, both sides had reduced the great question to such a narrow view that they were both wrong.

Not burdened by the reductionist limitation of Western utilitarian thinking, the Nootka Indians of the Pacific coast of Canada understood the value of all life. They gave utmost respect to the wolf. For they knew that when orca whales went walking on the land they did so as wolves (Peterson 1993).

ACKNOWLEDGMENTS

The authors would like to thank Geoff Swan, senior landscape architect, Pacific Northwest Region, U.S. National Park Service, with whom ongoing discussions led to many ideas in this paper.

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The Rise and Decline of Ecological Attitudes in National Park Management, 1929–1940

Part II: Natural Resource Management Under Directors Albright and Cammerer

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When the wildlife biologists under George Wright began their survey of national park wildlife in 1929, the U.S. National Park Service had been in existence nearly 13 years, yet it had never systematically researched the parks' flora and fauna, nor had it articulated a comprehensive set of policies for the management of nature in the parks. By chance, publication of the biologists' survey report, *Fauna of the National Parks of the United States*, known as Fauna No. 1, came in 1933, shortly after Congress created the Civilian Conservation Corps (CCC). Particularly through the CCC program, funds were soon available for national park biologists to implement the policies recommended in Fauna No. 1. Thus, Fauna No. 1 provided policies and the CCC provided funds for the Park Service to conduct its own natural resource management.

During the era of director Stephen T. Mather (1916-1929), the Park Service had relied heavily on scientific expertise from other federal bureaus; now it began to develop its own cadre of scientists, who were "park-oriented," as Park Service biologist Lowell Sumner later expressed it. Reflecting on the emergence of biological research and management in the Park Ser-

vice, Sumner also recalled that Fauna No. 1 had quickly become the "working 'bible' for all park biologists."⁶⁵ This report truly represented the state of the knowledge for national park biological management in the 1930s. However, al-

⁶⁵ Sumner, "Biological Research and Management," 6, 10.

Though the report did infuse more ecologically sensitive thinking into national park activities and was soon declared official policy, implementation of its recommendations was frequently disputed and never fully realized.

With the build-up of Park Service biological programs in the 1930s, a tension developed between management which focused on scenery and public enjoyment of the parks *versus* that which was based on the newly formulated concerns of the wildlife biologists. This tension had no real precedent, since the scientific, ecological perspective had not previously been expounded to any degree within the Park Service. Indeed, more than that of any other professional group in National Park Service history, the wildlife biologists' vision of the national parks challenged traditional management practices of manipulating natural resources to ensure public enjoyment—practices which had been accepted as standard procedure during the Mather era. The biologists stressed ecological preservation and would let nature take its course, except when manipulation of the resources was deemed necessary for ecological purposes. Yet, because of already powerful traditions within the Park Service, the wildlife biologists frequently encountered conflict and compromise (and often total rejection) in their efforts to change management. The conflicts over natural resource management that arose within the Park Service during the 1930s were a prelude to similar conflicts that would arise in the 1960s, involving many issues which remain meaningful today.

Among Fauna No. 1's recommendations, two were most fundamental: The Park Service should base its natural resource management on scientific research, including conducting "complete faunal investigations . . . in each park at the earliest possible date." And each

species should be left to "carry on its struggle for existence unaided" unless threatened with extinction in a park. In effect, the remaining recommendations qualified or elaborated upon these two basic tenets, with specific statements on such concerns as protection of predators, artificial feeding of ungulates, protection of ungulate range, removal of exotic species, and restoration of extirpated native species.⁶⁶

Regarding scientific research, the national park naturalists had noted at their 1929 conference that scientific data on the parks' natural history was "almost infinitesimal." This disheartening situation would begin to change that very year, as preparation of Fauna No. 1 got under way. Following completion of Fauna No. 1, scientific research continued under the guidance of George Wright, head of the Park Service's newly created Wildlife Division. Lowell Sumner later estimated that during the 1930s about half of the biologists' work involved research and wildlife management, while the other half was devoted to review and comment on proposed development projects (many of them being CCC projects). He calculated that prior to World War II the biologists had produced perhaps 1,000 reports. Having joined the Service in 1935, Sumner estimated that he himself prepared about 175 reports before the war began.⁶⁷

The wildlife biologists conducted research on subjects such as bison, elk, and bird life at Wind Cave; white-tailed deer and winter birds in Shenandoah; grazing mammals in Rocky Mountain; and deer and bighorn in Glacier National Park.

⁶⁶ Wright, Dixon, and Thompson, *Fauna of the National Parks* (1933), 147-148.

⁶⁷ National Park Service, "Proceedings," First Park Naturalists' Training Conference, Berkeley, California, 1-30 November 1929, typescript, 152, HFLA; Sumner "Biological Research and Management," 11.

Park naturalists contributed further to the gathering of information, such as at Great Smoky Mountains, where plant specimens of about 2,000 species were collected by the mid-1930s.⁶⁸ Given the large number of documents prepared and the limited number of biologists in the Park Service (about 27 at most), only a few of the reports and studies could have been in-depth works. Among the most thorough were Joseph Dixon's *Birds and Mammals of Mount McKinley National Park* (1938), published as number three in the Fauna Series, and Adolph Murie's *Ecology of the Coyote in the Yellowstone* (1940, Fauna No. 4). Murie's next major study, *The Wolves of Mount McKinley* (Fauna No. 5), was begun in 1939 and published in 1944.⁶⁹

Research Reserves.

An important element of the biologists' programs during the 1930s was the establishment of "research reserves"—areas within national parks designated to be used for scientific research only. Likely at the urging of the Ecological Society of America and leading biologists such as John C. Merriam of the Carnegie Institution, who feared the disappearance of all unmodified natural areas in the United States, the Park Service in the mid-1920s gradually began to develop a research reserve program. In 1927, Yosemite Na-

tional Park designated approximately seven square miles of high mountain country north of Tuolumne Meadows as a "wilderness reserve," later termed a research reserve, the first of its kind in the National Park System.⁷⁰ At their November 1929 conference, the park naturalists discussed the reserves, and concluded that they should be permanently set aside and should be primarily for scientific study. These areas were to be, as the naturalists phrased it, "as little influenced by human use and occupation as conditions permit." Park Service director Horace Albright followed up in the spring of 1931 by issuing a research reserve policy to "preserve permanently" selected natural areas "in as nearly as possible unmodified condition free from external influences." In effect, the areas would help meet Fauna No. 1's recommendation for each species (whether flora or fauna) to "carry on its struggle for existence unaided." The reserves were to be entered only in case of emergency or by special permit; and, as a further means of protection, their location was not to be publicized.⁷¹

The research reserves emerged in the 1930s as the most preservation-oriented land use category the Park Service had yet devised—an important philosophical and policy descendant of Congress' mandate to

⁶⁸ Victor H. Cahalane, "Activities of the National Park Service in Wildlife Conservation," (ca. 1935), typescript, Central Classified File, RG79; *Annual Report of the Secretary of the Interior for the Fiscal Year Ending June 30, 1936* Washington: Government Printing Office, 1936), 123.

⁶⁹ Sumner "Biological Research and Management," 11; Joseph S. Dixon, *Birds and Mammals of Mount McKinley National Park*, Fauna Series No. 3 (Washington: National Park Service, 1938); Adolph Murie, *Ecology of the Coyote in the Yellowstone*, Fauna Series No. 4 (Washington: National Park Service, 1940); Adolph Murie, *The Wolves of Mount McKinley*, Fauna Series No. 5 (Washington: Government Printing Office, 1944).

⁷⁰ Harold C. Bryant, "A Nature Preserve for Yosemite," *Yosemite Nature Notes*, Vol. VI, No. 6 (June 30, 1927), 46-48. John Merriam's interest in research reserves is found in Merriam to Members of the Committee on Educational Problems in National Parks, 12 February, 1930, with attachments, Entry, 17, RG79.

⁷¹ National Park Service, "Proceedings," First Park Naturalists' Training Conference, 169, 171-174. Albright's policy on research reserves is stated in Arno B. Cammerer to All Superintendents and Custodians, 27 May 1931, with attachment, Research Reserves file, YOSE. The Fauna No. 1 quote is in Wright, Dixon, and Thompson, *Fauna of the National Parks* (1933), 147.

leave the national parks "unimpaired," and much more restrictive than the traditional policy of allowing park backcountry to be developed with horse and foot trails. The reserves were also precursors to national park wilderness areas established under the Wilderness Act of 1964. Designations such as primitive, primeval, wilderness, virgin, and roadless were used at times in association with the reserves.⁷² In George Wright's view, the reserves' greatest value lay in providing scientists the opportunity to learn what certain portions of the parks were like in their original, unmodified condition—a "primitive picture" which would provide a basis of knowledge to benefit all future research. He also believed that the reserves would not become "an actuality" until their flora and fauna had been surveyed. To Wright, setting aside the reserves was a "most immediate urgency" which should be accomplished before further biological modifications took place.⁷³

The research reserves became an integral part of park management in March 1932, when Director Albright asked that they be formally designated through the cooperation of the park superintendents and naturalists and the Washington office. He requested that the superintendents indicate the location of the reserves in the five-year park development plans (master plans), and he assigned the wildlife biologists responsibility for gathering information and tracking the progress of this

program. By 1933, research reserves had been designated in Yellowstone, Sequoia, Grand Canyon, and Lassen Volcanic national parks. Others followed, in Great Smoky Mountains, Glacier, Mount Rainier, Rocky Mountain, Zion, as well as Yosemite, for a total of 28 designations in 10 parks.⁷⁴

However, the research reserve idea worked better in theory than in practice. The wildlife biologists apparently did not participate in the actual selection of many of the reserves, likely because a number of the areas were designated while the biologists were busy completing Fauna No. 1, and because the biologists were unable to gain a meaningful role in the master planning process. As late as February 1934, the Wildlife Division seemed poorly informed on the exact location and character of many of the reserves; moreover, on those they knew something about, Wright noted that some of the areas did not lend themselves to becoming worthwhile research areas—indications that the biologists had little input in designating the reserves. A reserve in Lassen Volcanic National Park was no more than a strip of land three-quarters of a mile wide and about 5 miles long; while two of Grand Canyon's reserves were so close to the park boundary that activities outside the park were certain to affect their biotic makeup. Noting the potentially serious effects of external influences on the reserves, Wright advocated the establishment of "buffer areas" around the parks (including additional winter range for wildlife), rather than "withdrawing further and further within the

⁷² See for instance *The Director to Wild Life Survey*, 4 March 1932, Entry 35, RG79; and Arno B. Cammerer, "Maintenance of the Primeval in National Parks," ca. 1934, typescript, HFLA. As conceived, the research reserves were analogous to the "primitive areas" being designated in the national forests, although there is no indication that the idea was borrowed directly from the U.S. Forest Service.

⁷³ George M. Wright to The Director, 14 March 1932, Entry 35, RG79.

⁷⁴ *The Director to Wild Life Survey*, 4 March 1932; George M. Wright, "Research Areas," 1933, typescript, Entry 34, RG79; Kendleigh, "Research Areas in the National Parks," 236-238.

park" to create reserves.⁷⁵ Like the parks themselves, the reserves were not truly satisfactory biological units.

Expressing deep concern about the reserve program, Victor H. Cahalane, Wright's assistant division chief, wrote in September 1935 of the problem of selecting research reserves in parks so "artificialized and mechanized." To Cahalane, the difficulty of finding even relatively small unaltered research areas to be specially protected indicated the extent to which the Park Service had failed to meet its basic mandate to protect the parks' wilderness character. Reflecting biologist Ben Thompson's earlier comments about alterations to the parks' natural conditions, Cahalane wrote that Glacier National Park had no pristine area worthy of becoming a research reserve. This had occurred "not by reason of a network of roads" in Glacier, but because

all streams now contain exotic species of fish, because the wolverine and fisher have been exterminated from the entire park and the bison and antelope from the east side, and because exotic plants . . . have been carried to practically every corner of the park.

Recognizing the existing problems with "pristine" areas in the parks, Cahalane called for a "show-down on this matter of preservation of the greatest resource of the National Park Service—the wilderness."⁷⁶

But beyond the difficulty of identifying largely unaltered natural areas to be designated research reserves, the reserves were the product of decisions made wholly within the Park Service, and thus were subject to administrative discretion and vulnerable to shifting philosophies of management. The reserves had no specific mandate from Congress. They could be supported, ignored, or, as happened to Andrews Bald research reserve in Great Smoky Mountains National Park, created and then summarily abolished. Indeed, the "show-down" that occurred over Andrews Bald went directly against the scientists' recommendations and reflected the Park Service's traditional disregard for scientific research. The outcome was an ominous portent for the science programs overall.

Designated a research reserve in the mid-1930s, Andrews Bald was one of several reserves in Great Smoky Mountains intended to be strictly preserved so that "ecological and other scientific studies" could be conducted on a long-range basis, especially to determine natural plant succession. (The "grassy balds"—open, mountain-top areas of grasses and low-growing shrubs, and without tall trees—were one of the primary scenic features in the Smokies, and were then and remain of special scientific interest). In early April 1936, a terrific wind storm knocked down trees in the vicinity of Andrews Bald and within the established reserve, precipitating a sharp debate in the Park Service as to how to manage the area.

Blown over by the storm, dead and dying trees cluttered the landscape and, in the minds of the superintendent and most of his staff, constituted a fire hazard which needed to be cleared up.⁷⁷ Superin-

⁷⁵ Wright to The Director, 14 March 1932; Wright, "Research Areas"; Thompson to Cammerer, 23 February 1934; and U.S. National Park Service, Wild Life Division, "Report for February, 1934," Classified File, RG79. Comments on buffer zones for the national parks are also found in Wright and Thompson, *Fauna of the National Parks* (1935), 109.

⁷⁶ Victor H. Cahalane to George M. Wright, 7 September 1935, Entry 34, RG79.

⁷⁷ H. W. Jennison, Memorandum for Superintendent J.R. Eakin, 21 July 1936, Balds file, GRSM.

tendent J.R. Eakin wanted a cleanup, as did the park's rangers and foresters, and in a letter to Park Service director Arno Cammerer, Eakin stressed the potential fire problems. Reflecting an ongoing disagreement over what to do with naturally downed trees, the superintendent noted that "again," the Wildlife Division and the naturalists were "not concerned with fire protection" and the danger that might arise if the dead trees were left in place.⁷⁸ Particularly concerned about scenery, Frank E. Mattson, the park's resident landscape architect, argued for cleanup of the windfall, stating that because the bald attracted so many sightseers it should be treated "much as a trailside or roadside" area.⁷⁹

By contrast, the wildlife biologists (supported by park naturalist Arthur Stupka) advocated special consideration for the reserves, so that "ecological and other scientific studies . . . may be started and continued thru the years to come." They urged that the downed trees be left untouched. Although recognizing the fire prevention concerns, the biologists argued that the wind storm was a natural phenomenon and that cleanup of the area would "thwart the objectives" of Andrews Bald research reserve.⁸⁰ Still, Superintendent Eakin believed the area constituted a serious fire hazard and, in an exchange of correspondence with the Washington office, insisted that the damaged trees should be cleared.⁸¹

In a stinging reply to Eakin, Acting Director Arthur E. Demaray finally granted permission to clear the downed trees, but added that the Andrews Bald Biotic Research Area

was thereby abolished. He further stated that "I wish to call your attention to several factors which you seem to have overlooked"—the reserve had been approved by Eakin himself, it was included in the park's master plan, and preservation of such areas was "an established policy of the Service." In the Acting Director's view, the superintendent's insistence was forcing a change in the official use of the area from research and strict preservation to recreation: "The reason the research area is now abolished is that you have convinced us you made an error in approving its establishment. Its apparent proper use is primarily recreational."⁸²

Andrews Bald illustrated the vulnerability of the reserves to administrative discretion, and, as well, the vulnerability of research itself. An area committed to serve research purposes over a long period of time was subject to sudden modification as a result of internal decision making. Indeed, the urge to clear the damaged trees was not truly based on whim, but reflected the deep-seated, traditional allegiance of the superintendents, foresters, and landscape architects to preserving national park scenery and accommodating public use—while generally evidencing not much interest in science.

Even though the research reserves were supported by the director's policy pronouncement of 1931 and represented the bureau's strongest commitment to preservation of natural conditions, the Park Service eventually disregarded the entire program. Certainly most reserves did not vanish in as confrontational way as did Andrews Bald, yet Lowell Sumner later recalled that the research reserve program came to be largely ignored,

⁷⁸ J.R. Eakin to The Director, 27 July 1936, Balds file, GRSM.

⁷⁹ Frank E. Mattson, Memo for Mr. Eakin, 27 July, 1936, Balds file, GRSM.

⁸⁰ H.W. Jennison, Memorandum for Supt. J.R. Eakin, 21 July 1936, Balds file, GRSM.

⁸¹ Eakin to The Director, 27 July 1936.

⁸² A.E. Demaray to J.R. Eakin, 4 September 1936, Balds file, GRSM.

beginning about the time of World War II. The Park Service itself acknowledged in 1963 that the reserves were "dormant," and that many of the areas had "remained 'on the shelf,' awaiting a more favorable period for their utilization."⁸³ (This statement came at the very time Park Service leadership was withholding genuine support for the proposed Wilderness Act because it did not want to lose administrative discretion over national park backcountry.)

While it may seem that ignoring the research reserve program meant that these areas would be left alone and thus remain in an unaltered condition, this was very likely not the case. With the program unintended and the reserves in effect forgotten, these areas of special research value were likely to be altered through such practices as fire protection (for example, the removal of dead trees from Andrews Bald), forest disease control, grazing, and fish stocking and harvesting. The neglected research reserves were subject to the kinds of modifications which concerned George Wright in the early 1930s when he stressed the "most immediate urgency" of establishing the reserves.⁸⁴

⁸³ Sumner, "Biological Research and Management," 10-11. In his history of wildlife management, Gerald Wright states that there is "no evidence" that the reserves were ever used as intended. Wright, *Wildlife Research and Management in the National Parks*, 19-20. The 1960s perception is found in Conrad L. Wirth, Memorandum to All Field Offices, 15 April 1963, HFLA.

⁸⁴ Wright to The Director, 14 March 1932. Keith R. Langdon, natural resource management specialist in Great Smoky Mountains National Park, recently commented on the considerable value Andrews Bald and other research reserves could have had for today's efforts to understand and manage the park's natural resources: If the park had maintained the reserves as originally intended, he stated, we would be "in the cat bird's seat." Personal communication with Keith R. Langdon, 18 July 1991.

Range Management and Concern for the Ungulates

In contrast to the research reserve program which was intended to leave selected natural areas undisturbed, allowing each species to fend for itself, the biologists believed that in other instances it was necessary to interfere with nature and (as stated in Fauna No. 1) assist certain species to combat the "harmful effects of human influence" in order to restore the parks' "primitive state." Fauna No. 1 also specifically called for preservation of ungulate range, and advocated that a park's "deteriorated range" should be "brought back to [its] original productivity."⁸⁵ During the 1930s, of all the Park Service's attempts to interfere with nature, the manipulation of Yellowstone's "northern elk herd" received the greatest attention and ultimately became the most controversial.

To many familiar with Yellowstone, the park's northern elk herd seemed to have become so large that it was overgrazing its range. The resulting deterioration appeared to adversely affect use of the range by competing ungulates, such as deer and pronghorn. Concurring with this assessment, the wildlife biologists determined that the population of Yellowstone's northern elk herd needed to be reduced, in line with Fauna No. 1's recommendations. Reducing animal populations was not new to the Park Service, given the long-running predator control activities, and (beginning in the mid-1920s) the slaughtering of limited numbers of Yellowstone's Lamar Valley bison herd for population control. In addition, although concerns about over-population of elk had evolved by the early 20th century and the park had practiced limited elk removal for more than a

⁸⁵ Wright, Dixon, and Thompson, *Fauna of the National Parks* (1933), 4, 147-148.

decade, there seems to have been no concerted reduction program prior to that encouraged by the wildlife biologists.

Reduction involved shooting large numbers of the park's northern herd, which mostly inhabited the Yellowstone and Lamar river basins. For humane reasons, shooting the animals seemed far preferable to allowing them to die of winter kill when heavy snows restricted their range; furthermore, reduction could bring the population to a specified level. As believed at the time, this plan would prevent overgrazing and deterioration of the winter range and benefit all grazing species. The elk reduction program thus sufficed as the principal management strategy for the park's grazing animals, with the exception of bison.

The wildlife biologists concluded that "human influence" had caused the winter range problems in Yellowstone. This state of the knowledge in the 1930s (which decades later would become intensely disputed) was based on several fundamental assumptions: National Park Service scientists and managers believed that, prior to Anglo-American settlement of the valleys to the north of the park, the herd had wintered in those valleys; and after the park was established its protected elk population had expanded enormously. They also believed that the elk population had crashed in the period 1917-1920, and that this dramatic decline had been caused by range deterioration through overgrazing. With drouth conditions affecting the range in the late 1920s and early 30s, and with elk populations believed to have increased due to protection in the park, a second population crash was seen as imminent—one which the Wildlife Divi-

sion expected to bring on "hideous starvation and wastage."⁸⁶

In 1931 Park Service biologists Joseph Dixon and Ben Thompson (who were working with George Wright on Fauna No. 1) had participated in a reconnaissance of the deer population irruption in the Kaibab National Forest, north of Grand Canyon. Their report asserted that an over-population of deer threatened the national forest, and recommended reducing the deer herds. Likely influenced by what seemed to have happened in the Kaibab, the biologists made their recommendation that Yellowstone's elk population also be reduced. And in a February 1934 report documented with numerous photographs (and reprinted in Fauna No. 2), the Wildlife Division announced that, as a result of an overpopulation of elk, Yellowstone's northern range had been overused to the point that it was in "deplorable" condition. The biologists believed that the situation had worsened since they first saw the area in 1929 and that it now threatened the survival of other animals dependent

⁸⁶ Wildlife Division to the Director of the National Park Service, "Report Upon Winter Range of the Northern Yellowstone Elk Herd and a Suggested Program For Its Restoration," 28 February 1934, reprinted in Wright and Thompson, *Fauna of the National Parks* (1935), 85; Douglas B. Houston, *The Northern Yellowstone Elk: Ecology and Management* (New York: Macmillan Publishing Co., 1982), 24-25; and Don Despain, Douglas Houston, Mary Meagher, and Paul Schullery, *Wildlife in Transition: Man and Nature on Yellowstone's Northern Range* (Boulder, Colorado: Roberts Rinehart, 1986), 22-24. See also Arno B. Cammerer to Joseph Grinnell, 10 December 1934, with attachment, Arno B. Cammerer files, MVZ-UC; and Victor H. Cahalane, "Wildlife Surpluses in the National Parks," in *Transactions of the Sixth North American Wildlife Conference*, 1941, Washington, American Wildlife Institute, 357-358. Douglas Houston's detailed analysis of the management of the parks northern elk herd, *The Northern Yellowstone Elk*, 12-15, refutes the belief that a population crash occurred in 1917-1920.

upon the range. The report argued that the overpopulated elk herd was on the "brink of disaster," and warned that the next hard winter would cause starvation and death for thousands of elk.⁸⁷

Indeed, the elk reduction program had strong, apparently unanimous support among the Park Service's wildlife biologists. Their statements and reports did not equivocate on the wisdom of artificially lowering Yellowstone's elk population. Commenting in the late winter of 1935 that, without reductions, the elk problems would continue—the "old winter range ghost will be walking again"—Wright himself saw the program as critical to the success of the park's wildlife and range management.⁸⁸ Also, Olaus Murie, who had overseen the Bureau of Biological Survey's elk management in Jackson Hole, south of Yellowstone, provided supporting insights on the northern herd. He urged reducing the herd, as did his brother, Adolph, a respected National Park Service scientist. In late December 1934, just before the first big reduction began, Olaus Murie wrote to Ben Thompson approving elk reduction, noting that "if carefully handled it will be successful," and adding that he looked forward "with great interest to the outcome of the experiment."⁸⁹

⁸⁷ Dunlap, *Saving America's Wildlife*, 69; Wright and Thompson, *Fauna of the National Parks* (1935), 85-86.

⁸⁸ George M. Wright to H.E. Anthony, 15 March 1935, George M. Wright files, MVZ-UC. Victor Cahalane later indicated that outside support for the reduction program existed, but that there was "constant protest by a few local organizations." However he was not specific as to which organizations or individuals supported or opposed reduction. Victor H. Cahalane, "Elk Management and Herd Reduction—Yellowstone National Park," *Transactions of the Eighth North American Wildlife Conference*, 1943, Washington, American Wildlife Institute, 1943, 95-97.

⁸⁹ Olaus J. Murie to Ben H. Thompson, 27 December 1934, Entry 7, RG79 (copy from

Beyond their own observations, the biologists based their elk policy on research conducted in the region in the 1920s and early 1930s by U.S. Forest Service biologist W.M. Rush, whose work was privately funded with money obtained by Park Service director Horace Albright. Rush's conclusions supported the biologists' views.⁹⁰ Also, since they believed that longer hunting seasons and increased bag limits in Montana and on adjacent Forest Service lands would provide only limited help, the biologists recommended that the park itself be involved in the reduction to ensure that the proper number of elk would be taken each winter. As the biologists noted, until the desired population level was reached, Yellowstone must be prepared "to slaughter elk as it does buffalo."⁹¹

Much more cautious, however, was the opinion of Joseph Grinnell, head of the University of California's Museum of Vertebrate Zoology and mentor to numerous Park Service biologists. Asked by Director Cammerer to comment on the proposed reduction, Grinnell observed that the elk situation in Yellowstone was "truly disturbing from any point of view." He remarked on the "dam-

files of William E. Brown); Adolph Murie to Victor H. Cahalane, 26 July 1936, YELL.

⁹⁰ Wright, Dixon, and Thompson, *Fauna of the National Parks* (1933), 118. Albright mentions securing private funds for Rush's research in Horace M. Albright to the Director, 18 October 1937, Central Classified File, RG79.

⁹¹ Wildlife Division to the Director, "Report Upon Winter Range of the Northern Yellowstone Elk Herd," 85-86; Arno B. Cammerer, Memorandum for Assistant Secretary Walters, 21 November 1933, Central Classified File, RG79. The Park Service also saw overgrazing as a "landscape problem," and Fauna No. 2 advocated close cooperation between the wildlife biologists and landscape architects to address this concern. Wright, Dixon, and Thompson, *Fauna of the National Parks*, (1933), 109-120. It does not appear, however, that the landscape architects became much involved.

age" which he believed elk grazing had done to the winter range, and agreed that human influences had been an important factor in bringing on the situation. Although he carefully avoided criticizing the decisions of his former students and close friends, Grinnell withheld support for the reduction program. Rather, he expressed hope that the killing of any park animals, including predators as well as elk, would become a thing of the past. In his summation, Grinnell advocated "adjustments through natural processes" to restore the "primeval biotic set-up."⁹² More than the Park Service biologists of the 1930s, Grinnell expressed faith in allowing "natural processes" to control elk populations, with aggressive measures taken to reduce adverse human influences on the animals. He thus voiced elk management policies that the Park Service would eventually put into effect, after the reduction program had been underway for more than three decades.

Reduction began in January 1935, with Yellowstone's rangers shooting the elk and preparing their carcasses for shipment to tribes on nearby reservations. With the intention of reducing elk population to the range's "carrying capacity," the Park Service's goal of killing 3,000 elk the first winter included animals to be taken outside of the park under Forest Service and Montana State Fish and Game Department regulations liberalized to increase the number killed by hunters.⁹³ During the first reduction effort, hunters on lands adjacent to Yellowstone took 2,598 elk (up from only 136 the previous year) and park rangers killed 667 (up

from only 11 in 1934), for a total of nearly 3,300.⁹⁴

Responding to an inquiry from the American Museum of Natural History in March 1935, George Wright expressed relief that the Park Service itself had not had to kill large numbers of elk during the initial reduction; yet he wrote that "we are glad to have established a satisfactory precedent" regarding the "propriety of direct control" in the national parks. Yet, even after further reduction in 1936, biologist Adolph Murie studied Yellowstone's range and found it "undoubtedly worse" than it had been in six or seven years. Murie recommended that the kill be increased to 4,000 the following winter. A lengthy 1938 report by Yellowstone ranger Rudolph L. Grimm again confirmed the belief that the range was overgrazed, and advocated continued reduction.⁹⁵

With a "satisfactory precedent" established in the mid-1930s, Yellowstone's elk reduction program began its long history, with the policy eventually being applied in other areas, particularly Rocky Mountain National Park. At the end of the decade, the wildlife biologists reported that the "basic and most important problem" at Yellowstone continued to be the condition of the park's range. "As in the past," they

⁹⁴ A list of annual elk "removals" from 1923 to 1979, including those taken by hunters near the park, is found in Houston, *Northern Yellowstone Elk*, 16-17.

⁹⁵ Wright to Anthony, 15 March 1935. Murie to Cahalane, 26 July 1936. Rudolph L. Grimm, "Northern Yellowstone Winter Range Studies," 1938, typescript, 28-29, YELL. Although convinced that the range was still overgrazed, Grimm perceived that some "range recovery" had occurred, particularly in the two years just before he wrote his report. However, he credited "favorable climatic conditions," i.e. the end of the drought (rather than the elk reduction program), as the "agency most responsible for the improvement of the range plant cover." (p.27)

⁹² Joseph Grinnell to Arno B. Cammerer 26 December 1934, Arno B. Cammerer files, MVZ-UC.

⁹³ Cammerer to Grinnell 10 December 1934.

assessed, the abundance of elk "depletes the forage of other ungulates using the same range."⁹⁶ Although he did not speak out aggressively against the reduction program, Joseph Grinnell continued to oppose it, writing to Arno Cammerer in January 1939 that he did not approve of regulating "the numbers of certain animals in certain Parks."⁹⁷ Grinnell urged that the Service submit the problem to a group of specially trained ecologists. (This approach, when implemented in the early 1960s, resulted in the "Leopold Report," which clearly recommended that the reduction policy be continued, not terminated. Only later, in 1967-68, did the Park Service change its elk policy to the "natural processes" concept, in line with Grinnell's ideas.)⁹⁸

⁹⁶ National Park Service, *Wildlife Conditions in National Parks*, 1939, Conservation Bulletin No. 3, Washington D.C., 1939, 8. Other parks which eventually initiated limited control programs included Yosemite and Sequoia. Wright, *Wildlife Research and Management in the National Parks*, 77-78.

⁹⁷ Joseph Grinnell to Arno B. Cammerer, 23 January 1939, Arno B. Cammerer files, MVZ-UC.

⁹⁸ A. Starker Leopold *et al.*, "Wildlife Management in the National Parks," in *Transactions of the Twenty-eighth North American Wildlife and Natural Resources Conference*, ed. by James B. Trerethen, (Washington, D.C.: Wildlife Management Institute, 1963), 39-41, 43. Philosophically and policy-wise, the elk management situation became more complicated when, in 1967-1968, the Park Service terminated elk reduction in Yellowstone. Likely as a gambit to find an acceptable justification in a politically charged situation, the Park Service attempted to base its decision to terminate reduction on the Leopold Report's recommendations—which in fact had urged continued reduction. Starker Leopold, who was the report's principal author (and who also had studied under Joseph Grinnell), continued to doubt the wisdom of the Park Service's new "natural process" elk management policy. In June 1983, a little more than two months before his sudden death, Leopold made perhaps his last written comments on this issue. Seriously questioning the natural process concept of park management as it applied to elk and other grazing animals, he in effect sided with the Park Service biologists of the 1930s,

Bison Management

As with elk management, bison management in the 1930s did not create discord between the wildlife biologists and other Park Service personnel. Moreover, throughout the decade, management of bison in Yellowstone's Lamar Valley (the herd of most concern to the Park Service) remained more intensive and varied than that given the park's elk. Using domestic livestock ranching methods first developed by the Army, then expanded during Director Mather's time, bison management changed little during the decade. With operations still headquartered at the Buffalo Ranch along the Lamar River, bison work primarily involved rounding up and corralling the herd in the winter for feeding, vaccination (for hemorrhagic septicemia), and for removal of excess animals (or those not wanted for breeding) by slaughtering or shipping them live to other areas.⁹⁹

observing that the national parks were "too small in area to relegate to the forces of nature that shaped a continent." National Park Service, United States Department of the Interior, News Release, "National Park Service Director Hartzog Initiates Elk Management Program for Yellowstone National Park," 1 March 1967, with attachment, George B. Hartzog, "Management Program, Northern Yellowstone Elk Herd, Yellowstone National Park," 1 March 1967; A. Starker Leopold to Jack Anderson, 16 March 1971, Hartzog Papers; and A. Starker Leopold to Boyd Evison, 9 June 1983, Leopold Papers. See also A. Starker Leopold, Interview Conducted by Carol Holleuffer, 14 June 1983, Sierra Club Oral History Project, Sierra Club History Committee, typescript, 19-20.

⁹⁹ The Lamar Valley bison herd, introduced in the early twentieth century, came from two subspecies, both different from the remnant wild herds located in other areas of the park. While the wild herds at times interbred with the introduced Lamar Valley herd, they were almost always left alone and did not receive the intensive management as did those in the Lamar Valley. See Margaret Mary Meagher, *The Bison of Yellowstone National Park*, National Park Service Scientific Monograph Series no. 1 (Washington: National Park Service, 1973), 26-37.

Principally, the lack of discord resulted from the wildlife biologists' acceptance of the need to manipulate the herd for ecological purposes. In fact, in Fauna No. 1 the biologists had little to recommend regarding bison management, stating only that winter feeding of the animals was "absolutely necessary." Yet, regarding *all* park fauna, the report's recommendations called for putting threatened species on a "self-sustaining basis" when such measures as feeding were no longer necessary. Similar counsel was included in Fauna No. 2. Noting that bison had been saved from extinction in the park by intensive management, the latter report urged returning this species to its "wild state" to the degree that the "inherent limitations" of each park would permit. The biologists believed that such measures as winter feeding and slaughtering would have to continue until "artificial management" was no longer necessary.¹⁰⁰

Based upon recommendations made during the late 1920s and early 30s, the park sought to keep Yellowstone's Lamar Valley herd limited in size, at first seeking a population level of 1000 animals, then 800 beginning about 1934—levels believed within the "carrying capacity" of the bison range and what the Buffalo Ranch facilities could accommodate.¹⁰¹ But even by the following year, some concern was being expressed that the population was much too high. Harlow B. Mills, a

biologist at Montana State College who had worked in Yellowstone, wrote an extensive report on wildlife conditions in the park in 1935, recommending that the Lamar Valley herd be reduced to "100 or less animals." Mills believed there were likely too many bison in Yellowstone, and that the current population was probably greater than under primitive conditions. The ranching operations seemed to be a loss of "energy, time, and money." And while Yellowstone had helped save America's bison from extinction, Mills added that the bison "has been saved and there is now no necessity of fearing that the species will disappear." But, despite Mills' recommendations, the Park Service maintained the population level at close to 800 through the remainder of the 1930s.¹⁰²

The methods used to maintain the desired population were reported in Fauna No. 2, which also provided statistics on bison losses in recent decades: Since the Army began its bison management in 1902, 682 of the animals had been slaughtered, 279 had been shipped live, and 48 "outlaws and cripples" had been destroyed. In addition, 124 bison had died from disease during this period.¹⁰³ In 1935, the year Fauna No. 2 was published, George Wright expressed his considerable displeasure with live shipping, whether of bison or elk, and whether to other national parks or to state or local parks. He believed that such activity involved the "inadvised mixing of related forms and the liberation of certain species in areas unsuited to their requirements," which brought "great and ir-

¹⁰⁰ Also, both Fauna No. 1 and No. 2 recommended reestablishing bison in Glacier National Park, in cooperation with local Indian tribes. The comments on bison are found in Wright, Dixon, and Thompson, *Fauna of the National Parks* (1933), 117, 147; and Wright and Thompson, *Fauna of the National Parks* (1935), 59-60.

¹⁰¹ For carrying capacity figures, see Curtis K. Skinner, *et al.*, "History of the Bison in Yellowstone Park" [with supplements] 1952, typescript, various pagination, YELL; M.R. Daum to Theodore C. Joslin, 9 January 1929, YELL; and Meagher, *Bison in Yellowstone*, 32.

¹⁰² Harlow B. Mills to Ben Thompson, 21 June 1935, Entry 34, RG79; Skinner, "History of the Bison in Yellowstone Park."

¹⁰³ Wright and Thompson, *Fauna of the National Parks* (1935), 59.

reparable damage in many instances."¹⁰⁴

Regardless of the wildlife biologists' disapproval, live shipping remained a regular activity in the parks, as did slaughtering and occasional destruction of "outlaws." Yellowstone superintendent Edmund Rogers reported in late 1937 that 59 bison, including "some old animals that we wish to take from the herd," were being held for live shipment. The park planned shipments to the Springfield, Massachusetts, zoo; to an individual in Wolf Creek, Montana; and to Prince Ri Gin, in Korea. In addition, bison carcasses were intended to be sent to the Wind River Agency, in Wyoming, for distribution to local Indians. In Wind Cave National Park, where until the mid-1930s the Bureau of Biological Survey had been in charge of wildlife management, efforts were begun to reduce bison and elk to satisfactory numbers. The Service reported the following year that both Wind Cave and Platt national parks were reducing their bison populations, mainly by shipping carcasses to nearby Indian tribes.

These live shipments or distributions of carcasses may not have provided much political advantage, but the shipment of buffalo robes was at times partly intended to reap political gain. Recognizing this possibility, Director Cammerer wrote Secretary of the Interior Harold L. Ickes in 1936 that disposition of the hides "to friends of the Service and the Department, upon their special request, has been and will be helpful in maintaining a special interest in matters relating to this Department

¹⁰⁴ Specifically regarding elk, Wright cited the situation in Mount Rainier, where non-native elk from Yellowstone had been transplanted—making it, in his opinion, "impossible ever to realize the restoration of the native Roosevelt elk to the park." George M. Wright to Arno B. Cammerer, 18 January 1935, Central Classified File, RG79.

and the Service." In this regard, Yellowstone superintendent Rogers noted that requests for hides had been received from a number of persons, some of them highly placed, such as Senator Robert F. Wagner of New York, and Clyde A. Tolson of the Federal Bureau of Investigation.¹⁰⁵

Animal Enclosures

Wind Cave and Platt shared another management practice with Yellowstone, in that these parks set up fenced-in areas for wildlife (particularly bison) to be viewed by the public. Only a few hundred acres in size, Platt had no choice but to build a display area for viewing bison, originally shipped in from a nearby wildlife preserve. The Park Service took over wildlife management in Wind Cave with fences already in place, and despite expressed intentions to remove the fences, continued to maintain an animal enclosure for the public's benefit.¹⁰⁶ As to Yellowstone's bison, Director Albright had stated in 1929 his determination to make the animals "more accessible to the visiting public." The problem as he saw it was how to manage the bison population "under nearly natural conditions and at the same time get it

¹⁰⁵ Edmund B. Rogers to the Director, 10 December 1937, YELL; *Annual Report of the Secretary of the Interior for the Fiscal Year Ending June 30, 1939* (Washington: U.S. Government Printing Office, 1939), 280-281; *Annual Report of the Secretary of the Interior* (1940), 180-181; Arno B. Cammerer to the Secretary of the Interior, 6 February 1936, YELL.

¹⁰⁶ Palmer H. Boeger, *Oklahoma Oasis: From Platt National Park to Chickasaw National Recreation Area* (Muskogee, Oklahoma: Western Heritage Books, 1987), 107, 111-112, 135-137; *Annual Report of the Secretary of the Interior for the Fiscal Year Ending June 30, 1935* (Washington: Government Printing Office, 1935), 198; Ise, *National Park Policy*, 584.

near the main highways where it can be easily and safely observed.”¹⁰⁷

Predictably, the biologists opposed enclosing park wildlife behind fences. In 1931, George Wright made his opposition clear to Albright, pointedly reminding the director that the purpose of park wildlife “does not end with their being seen by every tourist,” and that people see many of these animals “when the circus comes to town.” To Wright and his fellow biologists, an animal enclosure had the appearance of a “game farm” and was an inappropriate display of park wildlife to the public.¹⁰⁸

Wright’s position was reflected in Joseph Grinnell’s remarks to Director Arno Cammerer in 1933, after Yosemite’s fenced-in Tule elk herd (not native to the park) had been returned to their native habitat in California’s Owens Valley. Keeping a close watch on Yosemite’s wildlife management, Grinnell wrote Cammerer applauding Superintendent Charles Thomson’s decision to remove Tule elk from the park. And, in reference to overall national park policy, Grinnell added that parks were not places “in which to maintain any sorts of animals in captivity,” adding that it was the “free-living native wild animal life that . . . gives such rich opportunity for seeing and studying.” Moreover, he took it for granted that maintaining free roaming wild animals was the Park Service’s “general policy.”¹⁰⁹

However, Grinnell was mistaken as to the bureau’s true policy on wildlife enclosures. Yellowstone’s most ambitious effort to display bison came in 1935, only two years af-

ter Grinnell’s letter to Cammerer, when the park established “Antelope Creek Buffalo Pasture,” an approximately 530-acre tract south of Tower Falls in the northeast part of the park. Located along the park’s main tourist road, the pasture accommodated about thirty bison and included a 5-acre “show corral,” to assure visitors a chance to see the animals.¹¹⁰ Remaining an important part of the park’s wildlife display for several years, the Antelope Creek enclosure would be discontinued in the 1940s by Director Newton B. Drury—causing a heated controversy over the very policy issues that Grinnell and the other wildlife biologists had raised.

Predator Control.

The Park Service in the 1930s faced the problem of what to do with native predators—a matter of great concern to the wildlife biologists, who urged that the remaining predators be protected. Again, the Park Service’s actions in this regard exposed internal disagreements over policy, and revealed difficulties which the biologists encountered in seeking to change traditional practices. Already by 1931, when Director Albright announced the policy of limiting predator control to that which was absolutely necessary, wolves and mountain lions (major predators which were believed to have kept populations of the more favored species reduced) were virtually eradicated from all national parks in the 48 contiguous states.

Accordingly, the new policy had only limited effectiveness. Of the triumvirate of carnivores most targeted for reduction by the Park Service in past decades (wolves, mountain lions, and coyotes), only the coyote remained in substantial

¹⁰⁷ Horace M. Albright, “Our National Parks As Wild Life Sanctuaries,” *American Forests and Forest Life*, 35 (August 1929), 507.

¹⁰⁸ George M. Wright to the Director, 19 December 1931, Entry 35, RG79.

¹⁰⁹ Joseph Grinnell to Arno B. Cammerer, 9 November 1933, Arno B. Cammerer files, MVZ-UC.

¹¹⁰ Skinner, “History of the Bison in Yellowstone Park”; Rudolph L. Grimm, “Report on Antelope Creek Buffalo Pasture,” (1937), typescript, YELL.

numbers, other than in the Alaska parks which had populations of wolves. And, despite the new predator policies, during most of the decade coyotes continued to be hunted, mainly on an occasional basis, and limited control of wolves was undertaken in the Alaska parks.¹¹¹

Indeed, the 1931 predator policy itself reflected traditional biases against the coyote. Rather than a flat prohibition, the policy stated that there would be "no widespread campaign" against predators, and that "coyotes and other predators" would be shot only when they endangered other species. Thus, the policy did not totally eliminate predator control; rather it only restricted control (no "widespread" campaigns)—and it specifically identified the coyote as a potential target, the only species so designated. Moreover, at the 1932 superintendents' conference, a lengthy discussion of predator policy focused mainly on how to deal with coyotes. The consensus was that coyotes were to be subject to "local control"—i.e., reducing this species would be a matter of each superintendent's discretion. In fact, two biologists attending the meeting, Joseph Dixon and Harold Bryant, conceded that coyote reduction might at times be necessary.

By far, the strongest support for control of the coyotes came from the ranks of park management. Horace Albright wanted to control coyotes when they do damage to "more useful species." He particularly feared that antelope populations were threatened, and that without the current "intensive" con-

trol of coyotes, there would soon be no antelope in Yellowstone. Roger Toll, Yellowstone's superintendent, concurred. To Toll, a herd of antelope and deer was "more valuable than a herd of coyotes"; and he stated that rather than predators, the elk, deer, and antelope "were the type of animal the park was for."¹¹²

With support from leaders such as Albright and Toll, "wholesale coyote killing" (in the words of a Park Service report) continued in Yellowstone until the fall of 1933.¹¹³ Earlier that same year, in Fauna No. 1, George Wright's team of wildlife biologists had declared a more rigid predator policy than before—perhaps a factor in easing Yellowstone's aggressive coyote control. As stated in Fauna No. 1, predators were to be "special charges" of the National Park Service, and would be killed only when the prey species was "in immediate danger of extermination"—and then only if the predator species itself was not endangered.¹¹⁴

In truth, the 1930s witnessed a decline in the killing of coyotes. Under the guidance of Sequoia superintendent John R. White, biologist Harold Bryant, and especially George Wright, the Park Service began to rely on "increased scientific data rather than ancestral prejudice" to address the predator issue.¹¹⁵ In November 1934, Director Cammerer issued a prohibition of all predator control unless written authority was

¹¹¹ In 1945, Victor Cahalane recalled that the Park Service "practiced very limited control of wolves and coyotes in our Alaska areas from about 1932 to 1939 or 1940." Victor H. Cahalane to Mr. Drury, 14 March 1945, copy from the files of William E. Brown. See also Brown, *A History of the Denali-Mount McKinley Region*, 198.

¹¹² Horace M. Albright, "The National Park Service's Policy on Predatory Mammals," *The Journal of Mammalogy*, 12 (May 1931), 185. Quotes from the 1932 superintendents' conference are found in National Park Service, "Policy on Predators and Notes on Predators" (1939), various pagination, typescript, Central Classified Files, 715, RG79.

¹¹³ National Park Service, "Policy on Predators and Notes on Predators."

¹¹⁴ Wright, Dixon, and Thompson, *Fauna of the National Parks* (1933), 147.

¹¹⁵ The quote is found in National Park Service, "Policy on Predators and Notes on Predators."

obtained from his office. Yet the following year, in Fauna No. 2, Wright and Ben Thompson acknowledged that coyote management was still controversial. They defined Park Service policy as allowing "judicious control of coyotes" to be undertaken in any park with the necessary authorization from Washington.¹¹⁶

Ongoing coyote control clearly demonstrated that these predators were not altogether "special charges" of the Park Service. Particularly in Yellowstone, efforts to reduce coyote populations continued, although apparently with less zeal after 1933. A matter-of-fact report in March 1935 revealed a cavalier attitude toward eliminating coyotes, as one ranger described how he discovered a pair of coyotes copulating "just at daylight," near lower Slough Creek; then (although aware that he had never seen coyotes do this before) he shot one of the animals dead.¹¹⁷ By contrast, some Yellowstone staff doubted the wisdom of continued coyote control. In April 1935, Assistant Chief Ranger Frank W. Childs recommended that the park suspend the killing of coyotes for at least two years, with the intention of carefully studying the resulting effect on prey populations. Childs and others recognized the conflicts between, on the one hand, efforts to reduce elk populations, and on the other, killing predators that themselves were presumed to help reduce the numbers of elk. He suggested that scientific research might prove that discontinuing coyote control permanently would be best for the "general wildlife balance" in the park.¹¹⁸ Evidence indicates that the

park eased up on coyote control in 1935, but by 1937 considerable interest in further coyote reduction had developed.¹¹⁹

Pressure on the National Park Service to reduce its predator populations stemmed from several factors, including demands for protection of the spectacular game species so that they could be enjoyed in the parks (and hunted on lands adjacent to the parks), and demands for protection of livestock on adjacent lands. Concern for the game species and domestic livestock kept the Park Service under constant pressure from sportsmen's clubs and livestock growers associations to reduce or entirely remove major carnivores from the parks. In November 1935, Crater Lake superintendent David H. Canfield responded to the Southern Oregon Livestock Association's "sweeping condemnation" of predatory animals in national park areas. The association was particularly anxious about coyotes in the vicinity of Lava Beds National Monument (a park under Canfield's supervision); and Canfield stated that the wildlife problems of the area would be ad-

Recommendations for Future Treatment," 19 April 1935, YELL. There was also interest among Yellowstone's staff in restoring some of the park's extirpated species. Naturalist Assistant Harlow B. Mills wrote to Ben Thompson in 1935 that,

As a policy I can see no great obstacle in the way of our, at least, attempting the introduction of cougar and wolves into the Park. They were a vital part of the picture at one time, a picture which can never be the same in the Park in their absence. This should be done, I realize, with considerable forethought and care, but I believe that it should be done, nevertheless.

Harlow B. Mills to Ben Thompson, 21 June 1935, Entry 34, RG79. Such interest would have been in accord with the recommendations of Fauna No. 1 that "any native species which has been exterminated from the park area shall be brought back if this can be done. . . ." See Wright, Dixon, and Thompson, *Fauna of the National Parks* (1933), 148.

¹¹⁹ Murie, *Ecology of the Coyote*, 16; Sumner, "Biological Research and Management," 14.

¹¹⁶ Wright and Thompson, *Fauna of the National Parks* (1935), 71.

¹¹⁷ Curtis K. Skinner to Dr. Mills, 12 March 1935, YELL.

¹¹⁸ Frank W. Childs, "Report on the Present Status of Wildlife Management in Yellowstone National Park With Suggested

дресsed through scientific research. Subsequent research on coyotes in Lava Beds supported protection of these predators rather than control.¹²⁰

The Park Service's policy for protection of predators, although flawed in its implementation, nevertheless contributed to sportsmen's associations and other groups opposing new national park initiatives for the Kings Canyon area in California and Olympic Mountains in Washington.¹²¹ As elsewhere, such groups wanted the predators in these areas eliminated to protect game species. Resentment over the Service's policies motivated the California state legislature to petition Congress to force strict predator reduction in the national parks, but to no avail. This proposal would have been, in the words of Joseph Grinnell, who had long opposed predator control, a "calamity" to those "who see in national park administration the last chance of saving to the future entire *species* of certain animal groups." Viewing predators in an ecological context, Grinnell wrote to Arno Cammerer of the need to protect the "biotic mosaic" of each park, including predators. The Park Service should protect the whole "biotic superorganism uninjured—to the benefit of *all* its constituent species and populations" (emphasis Grinnell's).¹²²

In addition to pressure from outside organizations, repeated rec-

ommendations that some predator populations be reduced came from within Park Service circles, such as from Horace Albright. Maintaining a keen interest in national park management long after he resigned from the bureau—indeed until his death in 1987—Albright seemed most alarmed about what effect suspension of coyote control would have on the spectacular grazing species, for instance antelope. Although Albright had established the Wildlife Division after George Wright had funded the initial wildlife survey, the former director was intensely interested in assuring public enjoyment of the parks' more popular animals, and he remained steadfastly loyal to the Park Service's traditional management practices.

Albright's letters to Director Cammerer on predators and antelope were strongly and plainly worded. In October 1937, the former director wrote that he deplored the ongoing, as yet inconclusive studies of the coyote's impact on Yellowstone's antelope population. He advocated "open war" on coyotes for the purpose of studying stomach contents to determine how much coyotes fed on antelope. In fact, he urged reducing the coyote population under almost any pretext, stating that, in spite of Park Service policy or the results of the studies of coyote stomachs, he would:

continue to kill coyotes on the antelope range for the reason that the coyotes are of no possible advantage in that part of the park, can rarely be seen by tourists . . . while on the other hand there will always be danger of depleting the antelope herd. It must be remembered that one of the animals most interesting to tourists is the antelope. . . .

Albright also feared that, if protected, the coyotes would "over-run adjacent country," causing conflict

¹²⁰ C.A. Henderson to David Canfield, 21 November 1935; and David Canfield to C.A. Henderson, 30 November 1935, Entry 34, RG79. Victor H. Cahalane, "Evolution of Predator Control Policy in the National Parks," *Journal of Wildlife Management*, 3 (July 1939), 236.

¹²¹ David Madsen, Memorandum for The Director, 20 May 1939, Entry 36, RG79. See also Susan R. Shrepfer, *The Fight to Save the Redwoods: A History of Environmental Reform* (Madison: The University of Wisconsin Press, 1983), 61-63.

¹²² Joseph Grinnell to Arno B. Cammerer, 10 April 1939, Central Classified File, RG79.

with land managers and owners outside of the park.¹²³

When Albright made these remarks, the Park Service was beginning its most in-depth research to date on coyotes as predators. In line with recommendations from the wildlife biologists and from the park itself (such as ranger Frank Childs' suggestions), biologist Adolph Murie initiated in 1937 a study of Yellowstone's coyotes, at a time when there was renewed interest in predator control in the park. Murie's findings, entitled *Ecology of the Coyote in the Yellowstone*, were published in 1940 as the fourth in the Wildlife Division's "Fauna Series" (Fauna No. 4). His research indicated that coyote predation did not appreciably affect prey populations—having, for instance, only a "negligible" impact on elk populations. Murie noted that in view of the National Park Service's "high purpose" of preserving "selected samples of primitive America," the parks' flora and fauna should be subjected to "minimal disturbance." He concluded that coyote control was "not advisable under present conditions."¹²⁴

Coming from one of the most outspoken Park Service biologists, Murie's conclusions drew severe criticism from those within the bureau who did not want to see coyotes protected. Indeed, there is indication that some individuals in top management wanted Murie fired.¹²⁵ Moreover, already aware of

Murie's findings and the Wildlife Division's opposition to coyote reduction, Horace Albright wrote Cammerer in January 1939, reiterating his disagreement with the biologists. Believing there was nothing to be gained "either in wildlife management or in service to the public" by protecting the coyotes, Albright stated that, if not controlled very strictly, "powerful predators" such as the coyote were certain to menace the "more desirable species of wildlife." But despite the criticism, Murie's findings gained support from Director Cammerer, who opposed further coyote reduction. As Cammerer stated in his 1939 annual report, the coyote was a "natural and desirable component of the primitive biotic picture," not affecting the well-being of any of its prey species, and "not requiring any control at present"—words that sound as if they were written by Murie himself.¹²⁶

Cammerer also noted in his 1939 report that Murie had begun long-range studies of the wolves in Mt. McKinley National Park. Public pressure for wolf control in McKinley (which resulted from fear that this predator was reducing Dall sheep and other popular wildlife populations) prompted Murie's study, which would extend into the early 1940s. As with the coyotes in Yellowstone, the Service sought to establish a scientific basis for its treatment of Mt. McKinley's wolves.

¹²³ Horace M. Albright to the Director, National Park Service, 18 October 1937, Central Classified Files, RG79.

¹²⁴ Murie, *Ecology of the Coyote*, 146-148.

¹²⁵ Thomas Dunlap, in *Saving America's Wildlife*, 75, indicates that some Park Service officials "wanted to fire" Murie. Alston Chase, in *Playing God in Yellowstone: The Destruction of America's First National Park* (Boston: The Atlantic Monthly Press, 1986), 126-128, describes the "fierce Park Service resistance" which Murie faced during the coyote controversy. Lowell Sumner, in

"Biological Research and Management," 15, recalled that, following the coyote study, "Murie's findings, and his personal concepts of ecological management of park resources, continued to be unpopular in various administrative circles." However, given that Murie was very soon assigned to a similar study of wolves in Mt. McKinley National Park, it is clear that he had support in high places, very likely from Director Cammerer himself.

¹²⁶ Horace M. Albright to A. B. Cammerer, 11 January 1939, Central Classified Files, RG79; *Annual Report of the Secretary of the Interior* (1939), 282.

Again, however, Horace Albright's comments on this matter revealed the differences between the wildlife biologists' recommendations and traditional Park Service attitudes. In his January 1939 letter to Cammerer, the former director stated that he found it "very difficult" to accept the idea of protecting McKinley's wolf population in the "territory of the beautiful Dall sheep." Albright believed the Park Service was taking a "grave risk" in spending so much time and effort caring for predators, a responsibility which in his opinion "does not or need not fall on the National Park Service at all."¹²⁷

Writing to Cammerer in May 1939, Park Service biologist David Madsen reflected on the state of national park predator management near the close of the decade. Noting the ambivalence that still existed, Madsen observed that:

In one breath we say that it is a good thing to have large predators present in the park to control what would otherwise be an over supply of our large mammals; and in the next breath we state that the large predators in particular the coyotes are not a factor in reducing the antelope in Yellowstone Park.

Madsen cited Adolph Murie's belief that the Park Service was troubled with "confused thinking" and did not have a "philosophical point of view" on predators. In part, Madsen attributed this indecisive attitude to a lack of scientific information, affecting all bureau personnel, both managers and biologists. He saw a "need for enlightenment" on the predator issue, to help the Park Service handle the "crossfire" between

the scientists and such groups as sports-men and livestock owners.¹²⁸

Although influenced by the wildlife biologists (who found support from park management at different levels, such as from Director Cammerer or Yellowstone ranger Frank Childs), the Park Service moved slowly and erratically during the 1930s toward a more scientific understanding of predator and prey populations and the discontinuance of predator control. Murie's work at Yellowstone and Mt. McKinley, and the coyote studies at Lava Beds, evidenced a willingness in the Park Service to use scientific research to address specific predator concerns. Nevertheless, as Madsen recognized, a strong ambivalence existed. The scientific perspective within the Park Service was countered by traditional biases which favored the popular game species over important carnivores, and by agitation from livestock owners' and sportsmen's organizations. Such pressure would continue to affect predator management in the national parks.

Fish Management

Similar to practices during the Mather era, the Park Service's fish management under Albright's and Cammerer's leadership was primarily intended to enhance sport fishing as a means of providing for public enjoyment of the parks. The Park Service took considerable pride in maintaining high-quality fishing in the national parks, even though it involved harvesting and consumption of native park fauna and the introduction of exotic species. In its management of fish, more than any other natural resource, the Park Service grossly violated known ecological principles. Yet so deeply entrenched was the tradition of fishing national park rivers and lakes that the wildlife biologists themselves

¹²⁷ Murie, *Wolves of Mount McKinley*, xiii-xv; Albright to Cammerer, 11 January 1939. Murie's wolf study is discussed in Brown, *A History of the Denali-Mount McKinley Region, Alaska*, "198.

¹²⁸ Madsen to the Director, 20 May 1939.

seemed ambivalent and did not categorically challenge management practices.

That these practices contradicted the idea of preserving park wildlife in its natural state was, however, clearly recognized. In Fauna No. 1, the wildlife biologists noted in a section suitably entitled "Conflicts With Fish Culture" that fishing in parks was an "important exception to general policy." Yet, granting the long-established fish management practices, they conceded that the benefits to park visitors overruled the "disadvantages which are incidentally incurred" by allowing fishing.¹²⁹

Already, in 1928, five years before Fauna No. 1 appeared, the Park Service had detailed a biologist from the Bureau of Fisheries to become the Service's specialist in "fish culture" and coordinate with the Bureau in raising fish and planting them in park lakes and streams. The specialist was probably David Madsen, who by the early 1930s, was in fact working with the Park Service, on detail from the Bureau. Like his fellow biologists, Madsen recognized that the Park Service's fish management was "entirely inconsistent" with other wildlife policy. Yet as a fish culture specialist he predictably appreciated the popularity of fishing in the parks and stated that the sport should be "maintained and in some instances developed to the highest point possible in the interest of the visiting public."¹³⁰

Moreover, in an effort to improve fishing elsewhere in the country, the

Park Service regularly shipped fish eggs to areas outside the parks—thus its manipulation of fish populations and distribution extended far beyond national park boundaries. The Yellowstone Lake Hatchery was particularly active, shipping millions of native and non-native fish eggs to numerous states and some foreign countries.¹³¹ In maintaining the sport for the visiting public, and in shipping eggs to areas outside of the parks, the Park Service continued Director Stephen Mather's policy of extensive reliance on expertise in the Bureau of Fisheries and the state game and fish departments—offices which shared the Park Service's interest in promoting sport fishing.

Early in 1935, just as Madsen was being converted to permanent Park Service employment, assigned to the Wildlife Division, he reviewed the fish cultural activities in the national parks. Madsen observed that in the past "other agencies" had run national park fish programs, and in fact often with very little direction from the Park Service. He wrote that the Bureau of Fisheries had managed fish culture in Glacier, Mount Rainier, Yellowstone, and Grand Teton, while state offices had overseen the work in the national parks of California, and in Crater Lake and Rocky Mountain national parks. However, the Park Service had recently begun asserting a greater voice in fish management, by using park rangers to do the planting (and by hiring Madsen), thereby assuming greater control over what species were planted, and where. But Madsen urged that the Park Service take charge of "all fish cultural activities" in the parks, in the same way that it oversaw other activities which were "properly the function of the Park

¹²⁹ Wright, Dixon, and Thompson, *Fauna of the National Parks* (1933), 63.

¹³⁰ David H. Madsen, "A National Park Service Fish Policy," (ca. early 1930s), typescript, Entry 36, RG79; and Madsen, "Outline of a General Policy of Handling the Fish Problem in the National Parks," 10 May 1932, typescript, Central Classified File, RG79. The records do not indicate whether Madsen was first detailed to the Park Service in 1928 or in the early 1930s.

¹³¹ John D. Varley, "Record of Egg Shipments from Yellowstone Fishes, 1914-1955," Yellowstone National Park, Information Paper No. 36, May 1979, YELL.

Service.”¹³² His greater concern seemed to have been to exert control over the fish programs, rather than change policy.

Nevertheless, although Park Service biologists seem to have voiced only limited opposition to fishing in the national parks, apparently not recommending banning fishing altogether, Madsen and the other biologists were largely responsible for the slight modifications in the Service’s fish policy that did occur in the 1930s. As a fish culture expert who encouraged fishing in the parks, Madsen still acknowledged that “indiscriminate introduction” of non-native fish had adversely altered the natural conditions of park lakes and streams—a concern shared by the other biologists.¹³³ Fauna No. 1 contained clear recommendations to reduce populations of exotic species already present in the parks, and to prevent the invasion of other exotics. In addition, the report advocated setting aside one watershed in each park to assure “preservation of the aquatic biota in its undisturbed primitive state.” No introduction of fish or fish food would be allowed in any of these watersheds, except as might naturally occur; and fishing would be permitted, but only if it did not “deplete the existing stock.”¹³⁴

Overall, since there was apparently no strong push to eliminate fishing and fish culture in the national parks, the concerns about exotic species and the recommendation to keep selected park watersheds in an “undisturbed primitive state” were the only factors likely to be affected by a policy change. Thus

when Director Cammerer issued the National Park Service’s first written policy for fisheries management (in April 1936, and almost certainly prepared by the biologists), it dealt primarily with the question of exotic fish species, and, to a lesser degree, the idea of leaving some park waters in their natural condition. That fish cultural activities would continue in parks was a given in the new policy—in fact, the document’s introduction specifically stated that it was a policy for “fish planting and distribution.” Still, the policy favored protection of native species, emphasizing that the intent was to “prohibit the wider distribution” of exotics within park waters. Among other points, exotic species were not to be introduced in waters where only native fish existed; and in waters where exotic and native fish *both* existed, the native species were to be “definitely encouraged.”¹³⁵

The new policy contained, however, significant deviations from the protection of native species and restrictions on exotics—deviations that left substantial options open to park managers and thereby reduced the degree of true change from earlier policy. Despite the concern about “indiscriminate introduction,” stocking was allowed in waters previously barren of game fish, based on the Park Service’s judgment whether or not a lake or stream was of “greater value without the presence of fishermen.” And in waters where exotic species were “best suited to the environment and have proven of higher value for fishing purposes than native species,” stocking of exotics could continue if approved by both the park superintendent and the director. Subsequently, Cammerer refined this last point in his 1936 annual report by specifying that native species would be “favored” in waters where such species “are of equal or

¹³² David H. Madsen, “Report on Fish Cultural Activities,” 5 April 1935, Central Classified File, RG79.

¹³³ David H. Madsen to Arno B. Cammerer, 6 October, 1933, Central Classified File, RG79.

¹³⁴ Wright, Dixon, and Thompson, *Fauna of the National Parks* (1933), 148, 63.

¹³⁵ Arno B. Cammerer, Office Order No. 323, 13 April 1936, Entry 35, RG79.

superior value from the standpoint of fishing.”¹³⁶

The new fish management policy thus allowed continued alteration of national park aquatic conditions for utilitarian purposes—i.e., the promotion of sport fishing and the enhancement of public enjoyment. As during the Mather era, fish management remained essentially commodity based, with stocking and harvesting on a massive scale. And the Park Service continued to plant exotic species in large numbers in such waters as Yellowstone’s Madison, Firehole, and Yellowstone rivers in the years following issuance of the 1936 policy. In some instances, as at Mammoth Beaver Ponds in the Yellowstone River drainage, previously fishless lakes were first stocked about the time the policy was declared, and such stocking continued for years afterward.¹³⁷ Not even mentioned in the new policy, the shipment of millions of fish eggs (including both native and exotic species) from national parks to non-park areas continued undiminished throughout this period. Director Cammerer reported in 1937 that 20 million rainbow and Loch Leven trout eggs (both exotic species) were collected near Yellowstone’s west boundary, with only one-fifth of them returned to park

waters, the rest shipped elsewhere.¹³⁸

Indeed, the Park Service’s first detailed fisheries policy—which would remain essentially unchanged for two decades—had limited effect on fish management in the parks. Park Service biologist Carl Russell’s remarks to the North American Wildlife Federation in March 1937 reflected the continuity in national park fish management when he asserted that the new policies would mean continued “maintenance of good fishing,” and that the Park Service was “definitely” committed to fishing as a “recreational activity in parks.” Similar observations came from other biologists. Victor Cahalane commented in 1939 that the Park Service deemed fishing to be acceptable because of the “readily replaceable nature of fish resources,” and because sport fishing results in “recreational benefits far outweighing any possible impairment of natural conditions.” But, evidencing the ambivalence among the biologists, Cahalane also stated that it was the Park Service’s responsibility to address the contradictions “existing between use of fish resources and of other natural resources within the parks.”¹³⁹ Due to

¹³⁶ Cammerer, Office Order No. 323, 13 April 1936; *Annual Report of the Secretary of the Interior* (1936), 124.

¹³⁷ John D. Varley, “A History of Fish Stocking Activities in Yellowstone National Park Between 1881-1980,” Yellowstone National Park Information Paper, no. 35, 1 January 1981, typescript, 9, 13, 17, 19, 21, 26, 52-53, YELL. The stocking of Mammoth Beaver Ponds took place in 1936, quite possibly in the months after the park had received the new fish policy, issued by Cammerer in mid-April of that year. In the case of McBride Lake, also in the Yellowstone drainage, exotic rainbow trout were introduced in 1936, where previously only native cutthroat trout existed. Varley, “History of Fish Stocking,” 17.

¹³⁸ Varley, “Record of Egg Shipments”; *Annual Report of the Secretary of the Interior for the Year Ending June 30, 1937* (Washington: U.S. Government Printing Office, 1937), 44. As another example of fish production and shipment during the 1930s, the collection of approximately 60,000,000 trout eggs in one year from several unspecified national parks, with about half of them being shipped to various states, is mentioned by Cammerer in *Annual Report of the Secretary of the Interior* (1936), 124.

¹³⁹ Carl P. Russell, “Opportunities of the Wildlife Technician in National Parks.” Paper presented at the North American Wildlife Federation conference, St. Louis, Missouri, 1 March 1937, typescript, HFLA. Victor H. Cahalane, “Thoughts on National Park Service-Bureau of Fisheries Agreement,” draft, 4 August 1939, Entry 36, RG79. Cahalane accepted that the Service would continue its dependency on other agencies for fish culture work. And Director Cammerer had reported

the very deeply ingrained acceptance of angling in national park waters, however, the contradictions in fish policies would never be fully resolved. And with widespread acceptance of fish stocking and harvesting, as sanctioned by the 1936 policy, extensive manipulation of park fish populations and distribution to areas outside of the parks would continue long after issuance of the policy.

Protecting the Forests

Similar to fish management, the treatment of national park forests was at odds with known ecological principles. Nevertheless, traditional forest practices endured. The entire emphasis was on maintaining green, attractive forests, even though this policy was strongly challenged by the wildlife biologists, who wished to adhere to the current ecological principles which they articulated. The debates over forestry policies highlighted fundamental differences between the wildlife biologists and much of the rest of the Park Service, with the biologists' views of park management being far ahead of the times. The failure of their challenge to forest management showed the weakness of the biologists' position within a very traditional organization, and conversely, the considerable bureaucratic strength which the foresters were developing in the Park Service.

National park forestry operations expanded tremendously during the 1930s, receiving far more funds and support from the New Deal's emer-

gency relief programs than any other natural resource management activity in the parks. So important was forestry in the overall work of the CCC that the organization was at times referred to as "Roosevelt's Tree Army." And, as the 1916 National Park Service Act itself had done, the 1933 act creating the CCC specifically called for protection of the forests. Among the CCC's other responsibilities, Congress mandated that it would protect the forests from fires, insects, and disease damage—goals which fit perfectly those of most national park managers.¹⁴⁰

In his 1933 annual report, Horace Albright's comments on the initial work of the CCC foreshadowed the virtual explosion of national park forestry. The director stated that the newly established CCC crews were accomplishing "work that had been needed greatly for years," but which had been "impossible" under ordinary appropriations:

Especially has the fire hazard been reduced and the appearance of forest stands greatly improved by clean-up work along many miles of park highways; many areas of unsightly burns have been cleared; miles of fire trails and truck trails have been constructed for the protection of the park forests and excellent work accomplished in insect control and blister-rust control and in other lines of forest protection; improvements have been made in the construction and development of telephone

in 1937, the year after the new fish policy was issued, that cooperation was closer "than ever before" between the Service and the Bureau of Fisheries and state game departments. Cooperation became even closer in 1940, with the transfer of the biologists to the Bureau of Biological Survey and its subsequent merger with the Bureau of Fisheries. Cahalane, "Thoughts on National Park Service-Bureau of Fisheries Agreement"; *Annual Report of the Secretary of the Interior* (1937), 44.

140 John C. Paige, *The Civilian Conservation Corps and the National Park Service, 1933-1942: An Administrative History* (Washington: National Park Service, 1985), appendix A, 162. The National Park Service Act authorized the Service to "sell or dispose of timber in those cases where...the cutting of such timber is required in order to control the attacks of insects or diseases or otherwise conserve the scenery. . . ." Hillory A. Tolson, *Laus Relating to the National Park Service, the National Parks and Monuments* (Washington: U.S. Department of the Interior, 1933), 10.

lines, fire lookouts, and guard cabins; and landscaping and erosion control has been undertaken.¹⁴¹

Park Service forestry programs of the 1930s came under the direction of John Coffman, who had been hired from the U.S. Forest Service in 1928 and placed in the Division of Education and Forestry, supervised by Ansel Hall. That same year, with assistance from the recently established, multi-bureau Forest Protection Board, which the Park Service had joined, Coffman and Hall drafted the Park Service's first formal forestry management statement, declared official policy by Director Albright in 1931. And during the buildup of CCC-funded forestry programs in 1933, Director Cammerer designated Coffman the Park Service's "Chief Forester," in charge of the newly created Division of Forestry, separate from Hall's educational work.¹⁴²

The 1931 forestry management policies promulgated by Albright provided guidance for the Park Service throughout the decade, and beyond. Under the new policies the park forests were to be "as *completely protected* as possible" against fire, in-

sects, fungi, and "grazing by domestic animals," among other threats. This comprehensive protection was to be extended to "*all park areas*," such as those associated with "brush, grass, or other cover" (*italics in the original*).¹⁴³ The CCC provided the Park Service with sufficient manpower to implement these forestry policies. Armed with new policies and staffed by thousands of CCC enrollees, Coffman's forestry programs became an increasingly important force in national park operations during the New Deal era.

The forest management practices drew frequent and sometimes barbed criticism from George Wright and the other wildlife biologists. Central to the biologists' concerns were the various "pre-fire" protection activities. They objected to the Park Service building fire roads through natural areas, or clearing hazardous dead trees and snags which contributed to the fuel buildup and increased the possibility of fire (for example, the insistence on clearing storm-damaged and dead trees from the Andrews Bald research reserve in Great Smoky Mountains). Some national park areas were particularly affected by pre-fire development. On the North Rim of Grand Canyon, fire protection preparations by the CCC included improvement of existing roads; and construction of primitive fire-access roads and trails, lookout towers, warehouses, a fire cache, maintenance shops, residences, telephone lines, and water ponds.¹⁴⁴

Significantly, although the Park Service established a Wildlife Division in the 1930s and (mostly using CCC funds) hired about 27 wildlife

¹⁴¹ *Annual Report of the Secretary of the Interior* (1933), 157.

¹⁴² John D. Coffman, "John D. Coffman and His Contribution to Forestry in the National Park Service," n.d., 36-39, typescript, HFLA. Because of the CCC's heavy emphasis on forestry, Coffman was also given the huge responsibility for overseeing CCC operations within the national parks. However, in 1936 the director consolidated oversight of these operations with the Service's state parks assistance program (also funded by the CCC). This expanded office combining all CCC-related national and state park work was supervised by Assistant Director Conrad L. Wirth, leaving Coffman free to concentrate on directing forestry management in the parks, which continued to rely on CCC manpower and money. See Coffman, "John D. Coffman and His Contribution to Forestry," 44; Conrad L. Wirth, *Park, Politics, and the People* (Norman: University of Oklahoma Press, 1980), 118; and Paige, *Civilian Conservation Corps*, 39-40, 48.

¹⁴³ "A Forestry Policy for the National Parks," approved by Horace M. Albright, 6 May 1931, typescript, Entry 18, RG79.

¹⁴⁴ Stephen J. Pyne, *Fire in America: A Cultural History of Wildland and Rural Fire* (Princeton: Princeton University Press, 1982), 300.

biologists, the bureau did not hire plant biologists *per se*. Also, the Park Service foresters (not known as biologists or botanists, but as for-esters) were deeply influenced by the management practices of the U.S. Forest Service, particularly regarding control of forest fires, insects, and disease. With such forest protection concerns dominating Park Service thinking regarding plant life, the wildlife biologists were, by default, left to deal with many plant biology issues. And as evidence of their broad ecological interests, the biologists did not shrink from the task. Moreover, they advocated ecological-attuned forest management, placing them in direct conflict with Park Service foresters.

Indeed, the wildlife biologists were never in agreement with the forest management policies made official in 1931. Although forests were not the focus of Wright's initial wildlife survey, preserving natural habitat, including plants, was recognized as fundamental to successful park management. In direct contradiction to ongoing Park Service forestry practices, Fauna No. 1 declared that park forests should be left in a natural condition: "It is necessary that the trees be left to accumulate dead limbs and rot in the trunks; [and] that the forest floor become littered. . . ." ¹⁴⁵ Nevertheless, the CCC programs provided funds and manpower for extensive clearing of forest underbrush and dead trees—and this clearing became of increasing concern to the biologists.

Among other clearing work, roadside clearing, a widespread practice in national parks, was intended as a fire protection measure, but was equally important, in the words of a Park Service manual, as a means "to improve the appearance of the immediate landscape of the

main drive" through parks. A conflicting view came from George Wright, who wrote Director Cammerer early in 1934 of the need to consider "all sides of the question" regarding clearing of hazardous debris along park roadsides, including the concern for "wild life values." Wright realized that clearing dead limbs and trees affected habitat, and he urged that the Park Service "reconsider" and determine "exactly under what conditions and in what parks road-side clean-up is a benefit and to what extent it should be carried on." He also told Cammerer that the biologists had discussed this matter with park superintendents and rangers, and that it was "amazing to discover that there was anything but unanimity of opinion on the value of this work." Some superintendents and rangers recognized the impacts on natural conditions, while others believed cleanup did not help prevent fires. ¹⁴⁶ Nevertheless, clearing was sufficiently accepted by the Park Service rank and file so that it remained a common practice in the parks.

An even stronger opinion than Wright's came from biologist Adolph Murie in the summer of 1935, during an extended debate over whether or not to clear a twelve-square-mile area on Glacier National Park's west slope, just north of McDonald Creek, an area covered with damaged trees as a result of a recent fire. With many of the trees only partially burned, the tract seemed ripe for another fire, which could spread to adjacent, unburned forests. A meeting in the

¹⁴⁶ U.S. Office of National Parks, Buildings and Reservations, "Instructions for Superintendents of Eastern National Park ECW Camps and CW Projects Concerning Roadside Clean-up, Fire Hazard Reduction, Brush Disposal," Chapter IX, 3, Supplement No. 7 to *Forest Truck Trail Handbook* (Washington: U.S. Forest Service, 1935); George M. Wright to the Director, 28 February 1934, Central Classified File, RG79.

¹⁴⁵ *Fauna of the National Parks* (1933), 33.

park in July provoked strong disagreement on the propriety of cutting and removing all of the dead trees, whether standing or down. The contentious debates reflected sharp divergence between the wildlife biologists and the foresters on fire protection and on overall national park policy and philosophy.

Following the July 1935 meeting in Glacier, Murie reported to the Wildlife Division in Washington his intense opposition to the proposed clearing. In a lengthy letter, Murie wrote that the burned area was still a natural area, and he questioned the desirability of "removing a natural habitat from a national park." With roads for trucks, bulldozers, and other equipment, the clearing operation would cause "gross destruction," which, he believed, would interfere with the normal cycles of forest decay and growth, creating instead a "highly artificial appearance of logged-off lands." The removal of the trees would reduce the area's organic material and its soil fertility, and would cause drying of the soil and increased erosion. Moreover, this large clearing project would be a precedent to justify "almost any kind of landscape manipulation" in the future. "For what purposes," Murie asked, "do we deem it proper to destroy a natural state?" His answer was that almost no purpose justified such destruction. He concluded his argument with an opinion surely unheard of in national park management before the wildlife biologists began their work under George Wright: "To those interested in preserving wilderness," Murie wrote:

Destroying a natural condition in a burn is just as sacrilegious as destroying a green forest. The dead forest which it is proposed

to destroy is the forest we should set out to protect.¹⁴⁷

Murie's remarks were quickly challenged. Lawrence F. Cook, head of John Coffman's forestry operations in the western parks, had also attended the July meeting in Glacier. Cook found Murie's report "rather typical"—and took a directly opposite position, fearing the long-term loss of green forests. "Nature," he commented, "goes to extremes if left alone." He reported that "gross destruction" had been done by the fire itself, despite the Park Service's best protection efforts, which were carried out with trained employees working under professional plans and with good equipment. In addition to adequate detection, fire protection depended on "easy access" into the forests, and the "reduction of potential fuel" through clearing—both of which would result from the proposed work in Glacier. Cook anticipated a rapid recovery of forest growth, but only if the area was cleared of dead trees so it would not be burned over by another, more damaging fire. Seeking to protect the beauty of the forests, he also recognized that this part of Glacier was intensively used; it was seen, he claimed, "by more travellers than any other in the park." Thus, Cook argued that the question was not whether to allow nature to take its course in the national parks, but to what extent the Park Service "must modify conditions to retain as nearly a natural forest condition as possible for the enjoyment of future generations."¹⁴⁸

In a separate memorandum to Coffman, written the same day, Cook reflected on his concern that the Park Service's foresters had been

¹⁴⁷ Adolph Murie, memorandum for Ben H. Thompson, 2 August 1935, Entry 34, RG79.

¹⁴⁸ L.F. Cook, memorandum for the Chief Forester, Reply to Dr. Murie's report on the Glacier National Park Cleanup Project, 28 August 1935, Entry 34, RG79.

accused of being "destroyers of the natural." Their promotion of physical development for fire protection, such as truck trails and fire look-outs, and their efforts to clear forests of fuel hazards had been criticized not only by the biologists but by other Park Service officials, including some superintendents, rangers, and landscape architects. Cook insisted, however, that the foresters were seeking to preserve the "natural values" of the parks, while also providing for the "greatest use and enjoyment of the parks with the least destruction." He summed up his credo of national park management, and fire protection in particular:

The parks have long since passed the time when nature can be left to itself to take care of the area. Man has already and will continue to affect the natural conditions of the areas, and it is just as much a part of the Service Policy to provide for their enjoyment as it is to preserve the natural conditions. There is no longer any such thing as a balance of nature in our parks—man has modified it. We must carry on a policy of compensatory management of the areas.

"Forest protection," he added, is a "very necessary part of this management"; and without protection, the Park Service faced the destruction of "any semblance of biological balance, and scenic or recreational values, as well as the forests with which we are charged." Certainly Cook's views prevailed within the Park Service. But, before any significant clearing could get underway in the area north of McDonald Creek, the huge Heaven's Peak fire swept through Glacier in 1936, drawing attention from McDonald Creek and

likely meaning that the disputed cleanup was never completed.¹⁴⁹

Indeed, the Park Service's biologists and foresters all believed they were seeking to preserve "natural values," which would allow for the "greatest use and enjoyment of the parks with the least destruction." But the two groups were operating from fundamentally different perceptions as to exactly what constituted "natural values," and what constituted "destruction" in national parks. Adolph Murie opposed the extensive alterations which resulted from the Park Service's fire protection methods employed before, during, and after fires. And in his letter on the proposed clearing in Glacier, he concluded that:

My feeling concerning any of this manipulation is that no national park should bear the artificial imprint of any man's action of this sort. We have been asked to keep things natural; let us try to do so.¹⁵⁰

Cook, by contrast, had written Chief Forester John Coffman that human modifications to national parks meant there was no longer a "balance of nature"—thus his argument for "compensatory management," including determined efforts to protect the forests. His compensatory management would also preserve the beauty of the forests, so important to the public's enjoyment of the parks. Cook's philosophy of national park management reflected the Park Service's forestry policies as well as its overall management practices. And with funds and manpower coming from the CCC program, the Park Service continued its intensive

149 L.F. Cook, memorandum for the Chief Forester, Re: Criticism of Forestry Recommendations by Other Technicians, 28 August 1935, Entry 34, RG79. Personal communication with Bruce Fladmark, Glacier National Park, August 1991, regarding clearing in the McDonald Creek area.

150 Murie to Thompson, 2 August 1935.

protection and suppression activities, very much against Murie's wishes.¹⁵¹

The biologists' and foresters' different approaches to national park management were evidenced in disagreements over other aspects of forestry. Continuing practices of the Mather era as stated in the 1931 forest policies, both Albright and Cammerer supported aggressive war against forest insects and disease, regularly calling upon the Bureau of Entomology and the Bureau of Plant Industry for expert assistance. In his last annual report (1933), Director Albright noted that "successful campaigns" had been waged against insects in park forests, ending or reducing several major epidemics. The Park Service, he said, had sought to eradicate infestations of the bark beetle in Yosemite and Crater Lake, and the mountain-pine beetle in Sequoia National Park. Both Glacier and Yellowstone faced insect infestations of such magnitude that studies were being made to determine if control efforts were practicable. It seemed to Albright that the national parks were truly under siege from insects, as well as from disease. Among the many threats, the disease known as blister rust was "spreading rapidly," threatening the western parks. "Unless checked," Albright reported, it was "only a matter of time" before blister rust would invade the white pine forests of Glacier and the sugar and white pines of the California parks.¹⁵² As with fire protection, the CCC provided the Park Service with funds and manpower to wage intensive campaigns against forest insects and disease.

Again, however, the wildlife biologists challenged these efforts. George Wright wrote Director Cammerer in August 1935 regarding use of the New Deal work relief programs to the greatest advantage, but he cautioned against too much "zeal for accomplishment," particularly in insect and disease control. Generally, the biologists directed their criticism toward widespread control efforts, while accepting limited control in and around park development. Wright would largely confine control to "heavily utilized areas" most frequented by visitors. The piñon pine scale infection in Colorado National Monument was, he pointed out, a natural phenomenon which seemed "best to leave undisturbed" outside of developed areas. Similarly, reporting on CCC work in Grand Canyon during 1935, Victor Cahalane commented that the Wildlife Division "disapproves of insect control, outside of developed areas," unless a native plant was threatened with extinction.¹⁵³

Much more critical comments came from Adolph Murie, who, after a visit to Mount Rainier in 1935, strongly objected to the Park Service's disease and insect control. Murie acknowledged to George Wright that "possibly some effort" was necessary to save "certain outstanding forests." But he opposed extensive control, emphasizing that in its forest management the Park Service should not "play nursemaid more than is essential." Since beetles were native insects and ribes native plants (currants and gooseberries which serve as an alternate host to the blister rust fungus—the reason the foresters sought to eradicate

¹⁵¹ Cook to Chief Forester, 28 August 1935. In Cammerer's 1939 annual report, the director discusses fire prevention and fire protection work undertaken with CCC funds and enrollees. *Annual Report of the Secretary of the Interior* (1939), 272-275.

¹⁵² *Annual Report of the Secretary of the Interior* (1933), 180-181.

¹⁵³ George M. Wright to Arno B. Cammerer, 1 August 1935, Entry 35, RG79; Victor H. Cahalane to A.E. Demaray, 23 September, 1935, Entry 34, RG79. For comments on CCC involvement in insect and disease control see Paige, *Civilian Conservation Corps*, 101-103.

ribes), Murie advocated leaving them alone and "permitting natural events to take their course" because "the cure is about as bad as the disease." Ribes were, in his words, "just as desirable in the flora as is pine," and Murie concluded that "justification for destroying a species in an area should be overwhelming before any action is taken."¹⁵⁴

Arguments such as Murie's did not at all sway the foresters. In his letters to Coffman on fire management, Lawrence Cook rebutted the biologists' position and defended the Park Service's forest disease and insect control policies as an essential part of park management. Just as with fire suppression, the foresters believed that "some modification," including insect control, "is necessary to preserve for the future the living values of the parks." And indeed, forest insect and disease control continued especially strong while CCC money and manpower were available. Late in the decade, Director Cammerer reported on aggressive blister rust control and beetle eradication in a number of parks, noting the support of the Bureau of Entomology and that all control was carried out through the CCC program.¹⁵⁵ The termination of the CCC just after World War II began would drastically reduce the resources available to the Park Service for control work—but the policies remained in force.

Leadership in National Park Policy and Operations

During the 1930s, guidance of the Park Service's natural resource management had become the responsibility of two professions, forestry and wildlife biology, and they often clashed over the basic principles and the specifics of national park management. The wildlife biologists had found a voice in national park policy and operations, but so had the foresters, who were able to continue their practices despite the biologists' objections. Decades later, Lowell Sumner reflected that "even George Wright was unable to make much progress" in establishing more ecologically sound forest management.¹⁵⁶ Indeed, the biologists' criticism of various forest practices had little effect on the bureau's management policies—a reflection of the fact that the foresters' practices were not seriously questioned by Park Service leadership. The policies on forest fires, insects, and disease were aimed at maintaining the beauty of the parks and thereby enhancing public enjoyment, thus bringing the foresters much more into the mainstream of national park thinking than were the wildlife biologists. Moreover, the foresters were backed by CCC money and by the mandate of the act establishing the CCC, much less by the National Park Service Act itself.¹⁵⁷

At the end of Cammerer's directorship and while the biologists' influence was in eclipse, the foresters

¹⁵⁴ Adolph Murie to George M. Wright, 26 March 1935, Entry 34, RG79. Similar statements regarding insect control are found in biologist Harlow B. Mills letter to Ben Thompson, 21 June 1935.

¹⁵⁵ Cook to Chief Forester, 28 August 1935; and *Annual Report of the Secretary of the Interior* (1939), 272-274. For similar comments made earlier by Cammerer, see *Annual Report of the Secretary of the Interior* (1937), 42-43.

¹⁵⁶ Sumner, "Biological Research and Management," 13.

¹⁵⁷ The utilitarian aspects of the National Park Service Act and the act's ramifications for national park management are discussed in Richard West Sellars, "The Roots of National Park Management: Evolving Perceptions of the Park Service's Mandate," *Journal of Forestry*, 90 (January 1992), 16-19; and Sellars, "Science or Scenery? A Conflict of Values in the National Parks," *Wilderness* 52 (Summer 1989), 29-38.

were truly in the ascendancy. The Park Service's official organizational chart, revised in mid-1941 (a year and a half after Interior Secretary Ickes transferred the wildlife biologists to the Bureau of Biological Survey), showed the Branch of Forestry with no less than three divisions: Tree Preservation, Protection and Personnel Training, and Administration and General Forestry.¹⁵⁸

Furthermore, foresters entering the Park Service in the 1930s and subsequent decades were heavily influenced by the policies of the U.S. Forest Service; individuals such as Chief Forester John Coffman had worked with the Forest Service before employment by the Park Service. Also, many national park rangers who did not have the specific title of forester nevertheless had been trained in forestry at such schools as Colorado A&M College. The "ranger factory," which was just coming into being at Colorado A&M by the late 1930s and would flourish during the ensuing decades, trained young men to become national park rangers under a program administered by the forestry school.¹⁵⁹

Altogether, an alliance was building between the Park Service's foresters and rangers (they would be combined organizationally in the mid-1950s). The strength of this alliance was bolstered by the fact that these

two groups fed directly into top leadership positions, in charge of national park policy and operations. With an increasing number of forestry graduates attracted into the ranks of the National Park Service, the profession was evolving into one of the most influential in the organization. By the end of the decade (with the few remaining wildlife biologists transferred to the Biological Survey and Fauna No. 1's influence on national park management swiftly declining) the foresters' bureaucratic power had begun to rival that of the landscape architects and engineers under Thomas C. Vint and Conrad L. Wirth, whose authority had also been greatly enhanced by the New Deal programs.¹⁶⁰ Although not always in full accord, the foresters, rangers, landscape architects, and engineers formed the core of National Park Service leadership and would dominate national park philosophy and operations for decades.

[See page 109 for a key to the meaning of abbreviations used in the footnotes.]

¹⁵⁸ Russ Olsen, *Administrative History: Organizational Structures of the National Park Service, 1917 to 1985* (Washington: National Park Service, 1985), 63. Under Coffman, the Park Service also provided considerable training in forest protection, including techniques in fire, insect, and disease control. In many parks, rangers, park naturalists, and maintenance staffs all received this training. John W. Henneberger, "To Protect and Preserve: A History of the National Park Ranger," 1965, typescript, unpublished manuscript, copy courtesy of the author, 307.

¹⁵⁹ Tom Ela, interview with the author, 26 January 1989; Arthur Wilcox, interview with the author, 17 March 1992.

¹⁶⁰ As an example of the growing strength of the forestry programs, a list of 137 professionally trained foresters in the National Park Service by 1952, shows most of them in key positions. Robert N. McIntyre, "A Brief History of Forestry in the National Park Service," March, 1952, Appendix A, typescript, BL. About eight wildlife biologists were transferred back into the Park Service around the end of World War II, yet Lowell Sumner later recalled that Fauna No. 1 itself became "forgotten." Moreover, the number of biologists did not increase until the 1960s. Sumner "Biological Research and Management," 16-17, 19.

This is the second of a three-part series, excerpted from Richard West Sellars' forthcoming history of natural resources management in the U.S. national parks. Part III will examine the wildlife biology programs in the context of the Park Service's growth and expansion in the New Deal era.

Abbreviations Used in the Footnotes

BL

Bancroft Library, University of California at Berkeley

GRSM

Great Smoky Mountains National Park Archives

Hartzog Papers

George B. Hartzog Papers, Clemson University

HFLA

Harpers Ferry Library and Archives, National Park Service

Kent Papers

William Kent Papers, Yale University Library

Leopold Papers

A. Starker Leopold Papers, Department of Forestry and Resource Management, University of California at Berkeley

MVZ-UC

Museum of Vertebrate Zoology, University of California

RG79

Record Group 79, Records of the National Park Service, National Archives

YELL

Yellowstone National Park Archives

YOSE

Yosemite National Park Archives



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Richard West Sellars is currently environmental historian with the US National Park Service, Santa Fe, New Mexico, researching and writing the history of natural resource management in the National Park System. He previously served as Chief, Southwest Cultural Resources Center, USNPS in Santa Fe, overseeing programs in history, archeology and historic architecture for the Southwest Region, as well as Servicewide programs in submerged cultural resources (underwater archeology), 1979-1988. He has published widely and lectured at a number of institutions concerning historic preservation.

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