THE GEORGE WRIGHT
FORUM
A JOURNAL OF CULTURAL AND NATURAL PARKS AND RESERVES

Volume 11 ❖ 1994 ❖ Number 4

An Action Plan for European Parks

and Three Views of Wilderness

THE JOURNAL OF 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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US/ICOMOS (International Council on Monuments and Sites–U.S. Committee),
IUCN–The World Conservation Union, *and*
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On the Cover:
A hiker checks a sign board in Trebon Biosphere Reserve, Czech Republic. Adrian Phillips explores recent developments in European park planning in "Parks for Life: Action for Protected Areas in Europe," starting on p. 57. *Photo by Michele Depraz, © WWF; courtesy the Royal Society for the Protection of Birds.*

Society News, Notes & Mail

1995 Conference Registration Opens; Space Still Available in Poster Session

The Society is now accepting registrations for the 8th Conference on Research and Resource Management in Parks and on Public Lands, to be held April 17-21, 1995, in Portland, Oregon. Thirty-five concurrent sessions are on tap, along with a poster session and three plenaries. While the concurrent and plenary sessions are full, there is plenty of room in the poster session. We will be accepting proposals for posters until February 15. The registration brochure, which includes a detailed preliminary program listing paper presentations to be given in the concurrent sessions, was mailed in early November to all GWS members as well as others on the FORUM mailing list. If you missed this mailing and would like a brochure, or want more information about presenting a poster, get in touch with the GWS office at P.O. Box 65, Hancock, MI 49930-0065; (906) 487-9722 voice, (906) 487-9405 fax.

Nominations Still Being Accepted for GWS Awards

Every two years at our conference, the GWS bestows one or more awards on people who have made valuable contributions towards our goal of improving protected area research, management, and education. The next awards will be made at the 1995 conference in Portland. At the Board's 1994 fall meeting it was decided to extend the nomination deadline for the following awards to February 15, 1995. The awards are:

- **The GWS Cultural Resource Management Award,** given in recognition of excellence and achievement in managing the cultural resources of parks, reserves, and other protected areas.
- **The GWS Natural Resource Management Award,** given in recognition of excellence and achievement in managing the natural resources of parks, reserves, and other protected areas (given in memory of Francis Jacot).
- **The GWS Communication Award,** given in recognition of excellence in communication, interpretation, or related areas pertaining to the purposes of the Society.
- **The GWS New Scholar Award,** given in recognition of excellence in published research in any field applicable to furtherance of the purposes of the Society. It will be given to recipients early in their professional career (age is *not* a criterion).

Nominations for the Society's highest award, **The George Melendez Wright Award for Excellence** (given in recognition of senior-level contributions on behalf of the Society or in furtherance of its purposes), are closed for this cycle. For the others, GWS members are invited to submit nominations to the Awards Committee of the GWS Board, which will make the final decisions. Nominees do not have to be members of the Society; however, only members may make nominations, which should include the name, address, telephone, and fax number of the candidate, as well as those of the

member making the nomination. The nomination should be in the form of a one-page summary of the candidate's specific accomplishments as appropriate to the award being sought. Recommendations for the New Scholar Award should further include a copy of the published work for which the nominee is being considered. Recognition for all awards will include a travel stipend to the GWS conference, a waiver of the conference registration fee, a framed certificate, and a year's complimentary membership.

Nominations should be sent by February 15, 1995, to The George Wright Society, Attention: Awards Committee, P.O. Box 65, Hancock, Michigan 49930-0065 USA.

New Guidelines on Coordinating Research and Management Now Available (at a Nominal Cost!)

Over two years have passed since the GWS participated in the 4th World Parks Congress in Venezuela. As part of our role in the Congress, we committed to overseeing the publication of a set of guidelines on how researchers and managers might work together more effectively for the benefit of parks and reserves. Since Caracas we have collaborated with IUCN and SAMPAA (the Science and Management of Protected Areas Association) to put together such guidelines. They have now been published by IUCN's Protected Areas Programme, with funding from the European Union. *Coordinating Research and Management to Enhance Protected Areas* is a 116-page softbound book, edited by David Harmon, that draws on worldwide experience in realizing the interdependence of research and management.

The book explores the sometimes-rocky relationship between researchers and managers, suggests a blueprint for thinking critically about park problems, and outlines the elements of a coordinated research and management program, taking into account costs, the neglected area of social science and cultural research, and the need for effective communication. Appendixes and a bibliography of hands-on references round out the book. All in all, it is a source of ready-to-adapt ideas for how to coordinate research and management in parks.

Coordinating Research and Management to Enhance Protected Areas is available through the IUCN Publications Catalogue (distributed domestically by Island Press; 1-800-828-1302). However, the GWS has a retained a limited number of copies to make available to GWS Members and Forum readers for the nominal cost of $2 each (to cover shipping). If you'd like a copy, send a check to the GWS office.

Future FORUM Themes—We Need Your Help!

The thematic issues of THE GEORGE WRIGHT FORUM have proven to be quite a popular way to give some focus to our publication. We want the themes for the issues to reflect the interests of our members, and so—we'd like to hear from you! What topics would you like to see future FORUMS take on? Here's how you can propose a theme:

- Call or write with a suggested topic for a future FORUM. It is important that you also include the names of potential authors who can be solicited to contribute a paper on your suggested theme. Feel free to include yourself as an author, if you're so inclined. If you do not wish to act as Guest Editor for the issue (see next paragraph), we will handle the solicitations and follow-up for you.
- You are also welcome to volunteer to act as Guest Editor for the issue. This means that you handle contacting potential authors, set up deadlines for getting the papers in, write a brief introduction to the theme, and forward the papers to us for production. As Guest Editor, you may, if you wish, also get involved with content and/or copy editing of the manucsripts, but this is *not required*—we can do that for you. (Normally, we edit manuscripts only for clarity, grammar, and so forth; we edit for content only in cases where major revisions are obviously called for.)
- The editorial guidelines for the FORUM are found on the inside of the back cover. Please keep them in mind when formulating your suggested themes and lists of contributors. We look for manuscripts running 1,500-2,500 words exclusive of tables, figures, and so on. We particularly call your attention to our goal of promoting interagency and cross-disciplinary exchange of information. We try to steer away from programmatic discussions that affect only one agency. As examples of what we are looking for, we are planning upcoming issues on **ethics** and on **cultural resource management in wilderness areas.** If you'd like to contribute to these issues, let us know.
- Our production schedule runs about like this: we try to publish our quarterly issues in March, June, September, and December (though the December issue usually doesn't get mailed until after the holidays). We need final copy for these issues by February 1, May 1, August 1, and November 1, respectively. We are pretty much wide open right now for submissions and can schedule thematic issues starting with the June 1995 FORUM (Volume 12, Number 2).

What are the benefits to you? Of course there is the satisfaction of contributing to the GWS's ongoing discussion of protected areas, but your work will also reach a wide audience of fellow professionals: the FORUM is sent to every USNPS and Parks Canada unit, to every state and provincial park authority, to a number of other U.S. and Canadian federal land-managing agencies, to the upper levels of the Department of the Interior, and to various international oragnizations active in parks and protected areas. We also are hoping to expand the FORUM print run to allow us to mail thematic issues free of charge to target audiences specially concerned with the theme at hand.

Questions? Contact us at the GWS office (address and phone above). *We will acknowledge all suggestions, so let us hear from you!*

The FORUM'S Copyright: An Acknowledgment and Clarification

Valerie G. Kirby, author of "Heritage or Millstone? A Review of the Relevance of Historic Landscapes to Sustainable Management in New Zealand Today" (THE GEORGE WRIGHT FORUM, Volume 11, No. 1, pp. 54-62), has

recently informed us that her paper should have been acknowledged as having been first published on pp. 326-331 of *Sustainable Landscape Management: The Proceedings of the International Conference on Sustainable Landscape Management* (P. Henriques, ed.), a copyrighted publication of International Pacific College, Palmerston North, New Zealand (ISBN 0-473-01548-X). As you may have noticed, the FORUM occasionally makes use of previously published material. In these instances, it is our policy to acknowledge the particulars of the original publication either at the beginning or the end of the article. With Kirby's article, we were unaware that it had been previously published; we are glad to make that acknowledgment belatedly.

This brings up a point that calls for clarification. Our copyright notice on the inside front cover is not intended to (and in fact legally cannot) supersede any copyrights that may pertain to previously published material. Beginning with this issue we have changed the copyright notice to make this plain.

Brief Notes

Mountain Protected Area Network. We recently received a copy of an occasional newsletter put out by IUCN Mountain Protected Area Network. All kinds of research and news related to mountain ecosystems and protected areas are addressed by this working group. For more information: Dr. Larry Hamilton, Islands and Highlands Environmental Consultancy, R.R. 1, Box 1685A, Hinesburg, Vermont 05461.

Olmsted Parks Meeting. The National Association of Olmsted Parks, in cooperation with the USNPS's Preservation Assistance Division and its Southeast Regional Office, is holding a symposium on "Balancing Natural and Cultural Issues in the Preservation of Historic Landscapes." The symposium, marking the 100th anniversary of Frederick Law Olmsted's last major work, will be held at the Biltmore estate in Asheville, North Carolina, on April 21-23, 1995. For more information: Charles Birnbaum, USNPS Preservation Assistance Division, (202) 343-9597, or Lucy Lawliss, USNPS Southeast Regional Office, (404) 730-2275. The GWS has arranged the publish the proceedings of the symposium as a special book-length issue of the FORUM.

Human Ecology and Climate Change Book Due Soon. In 1993 the GWS was one of the co-sponsors of a workshop on "Human Ecology and Climate Change: The Role of Parks and Protected Areas." The organizers have informed us that a book based on the workshop, entitled *Human Ecology and Climate Change: People and Resources in the Far North,* is on track for a February 1995 publication date by Taylor and Francis, Washington, D.C. For more information: David L. Peterson or Darryll R. Johnson, National Biological Survey, Cooperative Park Studies Unit, College of Forest Resources AR-10, University of Washington, Seattle, Washington 98195.

GWS Election Results. The 1994 Fall Election ballots were tabulated at the Annual Membership meeting in San Francisco in October. Two new Board members were elected: John Donahue (Superintendent, Washington's Birthplace National Monument), and Richard West Sellars (Regional Historian, Southwest Region). Elizabeth Bertillion Smart (California State Parks Curator) was reappointed to a second term of office.

William E. Brown

Letter from Gustavus

The One Sure Line

October 17, 1994

GEORGE BUSH HAS COMPLAINED that if we adopt Al Gore's environmental notions "We'll be up to our neck in owls." A gubernatorial candidate in Idaho runs on a platform that would prohibit even one more acre of wilderness in her state. It's trees and animals over people and jobs. Wilderness is elitism. The favored few with their fancy gear and waffle boots versus the working man and his hungry family.

On the other side stands the argument "In wildness is the preservation of the world"—in all its philosophical and biological variations.

We know, too, that wilderness is a cultural concept. There are different perceptions of wild lands. Not too long ago they were the enemy—to be conquered and made productive. Today, they are seen by many as the remaining reservoirs of exploitable resources in a world running out of resources. For indigenes, what we call wild lands are homelands, sacred and functional, known in exquisite detail, source of life and way of life. Wordsworth captured the romantic sense of wilderness: "Getting and spending, we lay waste our powers [and patrimony]. Little we see in Nature that is ours—We have given our hearts away, a sordid boon."

The Wilderness Act of 1964—another product of the Great Society, now blamed for all our ills—combines the aesthetic and the functional: Wide places void of human clutter; biological and watershed sanctuaries; places of retreat, adventure, and discovery where modern, urban people can "make contact with their not-so-remote past" and "escape from a world of artifice and manipulation."

Robert Marshall, philosopher of wilderness and proponent of its preservation, bought wholly that latter notion, infusing wilderness with human values. He wanted the essence of wild lands experience to be generally available for all who needed it. This was far from an exclusivist, elitist mission. Wilderness was not to be preserved from people, but for them. In his rambles in northern Alaska he saw wilderness as a key to a saner and more civilized world, as had his predecessor on the outskirts of Concord. Will we come to understand this lovely irony—the wild and uncontrolled as solvent for a sane and civil society?

Marshall and many others have preached the need for continuing human adventure and discovery. Without this outflow of quest and energy we turn inward, get mean and selfish. We see this in the frantic seeking for edges, for beyonds in a world where the margins keep disappearing. We see this in the crowded rat-cage crucibles of ancient hatreds and conflicts. We miss (even if we know it not, in our urban prisons), the walkabout, the vision quest, the anchorite's communion with sunrise or storm.

Marshall proved his point about wilderness on a high ledge of Mount Doonerak far up the North Fork of the Koyukuk River, gazing into the heart of the Brooks Range. Sense his exhaltation:

> I realized that though the field for geographical exploration was giving out, the realm of mental exploration—aesthetic, philosophical, scientific—was limitless. Nevertheless, I still maintained a suppressed yearning for geographical discovery which I never seriously hoped to realize. And then I found myself here, at the very headwaters of the mightiest river of the north, at a place where only three other human beings aside from myself had ever been and with dozens of never-visited valleys, hundreds of unscaled summits still as virgin as during their Paleozoic creation.

The fact is that the crossroads of mountains and rivers that Marshall surveyed as he wrote these words in his notebook had been traversed and hunted for thousands of years by Eskimo and Indian people. Scores of moss-covered sites prove this long traffic. And they prove the value of wilderness—that each generation can still adventure and discover a new world, the world at creation.

The Wilderness Act has made us act. It's the one sure line we've drawn to hold the line. Maybe we will have to give a little over time for overriding social purposes, and de-designate particular wilderness lands. But we'll have to think about it, debate it, and get an act of Congress. Wilderness designation preserves the commons in a world where tragedies of the commons are all too common.

From the battles that the Wilderness Act has spawned, we now know how hard it will be to go sustainable across the board. Wilderness is the cutting edge of human carrying capacity on this Earth. Each victory in holding that line gives some faint promise that we will rein ourselves in. And expand our humanity to include our descendants.

Proposal for a National Park Institute: A Call for Interest

Gary E. Davis
President, George Wright Society
National Biological Survey, Channel Islands National Park Field Station, 1901 Spinnaker Drive, Ventura, California 93001-4354

IN AN EFFORT TO MEET NATIONAL GOALS for a better federal government, we are faced with the sudden loss of a generation of park managers. The recent or imminent retirement of so many of the "best and brightest" leaders of the National Park Service creates not only a crisis in leadership but also provides an opportunity to shape the future of protected area management and to restore the fading eminence of the United States in international conservation. Leadership in conservation needs more than mere training; it requires post-graduate education that is largely not available in American universities today.

The George Wright Society can catalyze that education. Working with the National Park Service and other interested conservation leaders, the Society would like to establish a National Park Institute. We envision the Institute as a two-year, resident, post-graduate course of study and practice, similar to the War College, designed to meet National Park Service needs for leadership development and advancement of conservation practices. The curriculum would include such topics as negotiation, facilitation and mediation, organizational leadership skills, constituency-building, strategic planning, scientific adaptive management, conflict resolution, and ecosystem management. Located at a site like the Presidio of San Francisco, the Institute could utilize resources of academic institutions and practicing park professionals extensively as instructors, with minimal needs for a permanent staff. Applied mid-career, the Institute could be used to simultaneously inspire, select, and bond cohorts of potential leaders, and provide an opportunity to encourage cultural diversity in conservation leadership.

No doubt many of you have already seen some of the material on the proposed Land Management Institute, which would use the Presidio as one unit in a campus system comprising the BLM National Training Center, USFS's Grey Towers, the USFWS National Training Center, the Williamsport Preservation Training Center, the Carhart Wilderness Management Center, the National Center for Preservation Technology and Training, the National Interagency Fire Center, the Federal Law Enforcement Training Center, BOR's National Training Center, the National Center for Ecology, NPS's Mather Training Center, the Washington Training Center, and NPS's Albright Training Center. As envisioned, the Land Management Institute would be a quasi-governmental independent agency governed by a Board of Regents. A National Park Institute

could perhaps be an additional "center" in this campus, possibly as part of the proposed Presidio Training Center.

The GWS Officers and Board of Directors would like to explore ways to facilitate development of this concept with the membership. We believe the Society's members have the collective knowledge, skills, and abilities to create an Institute, and that the Society's role is to bring those people together and focus their attention and energy on this task. If you are interested in pursuing development and establishment of the National Park Institute with your peers in the George Wright Society, contact President Gary Davis or Executive Director Bob Linn. If there is enough interest in the idea, we will schedule a special meeting at our conference this April in Portland to discuss it and plan our next move.

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The "Status of Protected Areas in North America" Project: An Introductory Note

Ed Wiken
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Tony Olsen
U.S. Environmental Protection Agency, Corvallis, Oregon 97333 USA
Miguel Esquiha-Zamora
Institute of Ecology, Xalapa, Mexico

WE MUST THINK, PLAN, AND ACT IN TERMS OF ECOSYSTEMS. This is a principle that has found wide currency in global initiatives like the World Conservation Strategy, Caring for the Earth, and Our Common Future. These initiatives represent attempts to set a broader and more unified focus. This is in contrast to the traditional orientation of viewing the world on the basis of separate countries or by the narrow mandates of line agencies or departments. A focus on ecosystems may sound rather simplistic, but ecological sustainability is a complex and paradoxically powerful tool. The U.N. Convention on Biological Diversity has further highlighted the importance of designating protected areas throughout the globe or ecosphere.

In North America, our efforts to date have largely been built around a far less robust vision. Much of the thinking has instead been restricted to the immediate objectives of particular organizations. It has resulted in systems plans for "parks," for "wildlife sanctuaries," for "forest reserves," and so on. But how should we act with a much larger, unified picture in mind? Some discussion has occurred between different governments and other organizations to meld complementary state, provincial and federal activities. However, these discussions have proved most fruitful when fairly narrow themes are addressed. Sessions on themes like national and state parks, international biosphere reserves, North American wetlands, and Canadian forest reserves are examples. These efforts are very constructive in building an improved understanding of the broader setting of complementary initiatives, but are restrictive in themselves.

A weak knowledge base concerning current protected area holdings, a poor understanding of ecosystems, and a lack of readily understood measures present widespread barriers to progress. What is lacking in bringing forward a more comprehensive picture is the absence of a simple frame of reference. Seldom do individual states or provinces, let alone nations, have an adequate foundation of knowledge from which to work. Information covering the breadth of protected areas that are held and managed by various jurisdictions is typically not known nor found in a single source. Equally, the distribution and characterization of ecosystems which many protected areas are trying to represent are not well documented nor understood. Difficulties also occur regarding how to measure ecosystem integrity and representation.

At a recent North American Workshop on Environmental Information, concerns of this nature were tabled. With state of the environment reporting interests growing at the continental level, how capable are we going to be in sharing information that we have on topics like protected areas?

How many protected natural areas are there in North America? It

is estimated that governments hold over 7,000 areas, more than 95% of them in Canada and the USA. What of protected areas held by non-governmental groups? In Canada alone, private groups hold approximately three times the number of properties as do governments.

What is the distribution of protected areas? Figure 1, based on data from the World Conservation Monitoring Centre and the Canadian Conservation Area Data Base, shows the rough distribution and broad trends according to administrative boundaries. But how well do these holdings represent different ecosystems? While the numbers of sites are numerically large along the 49th parallel and in the western half of the continental USA, how does this translate into area protected? It is widely believed that the largest proportion of land held in protective status in either country lies north of the 60th parallel. What implications will size have on questions related to representation and long-term integrity? What types of protected areas are there? How accurate are the current data bases? How well are wetland ecosystems represented? What of forest ecosystem types? Alpine ecosystems? Marine ecosystems?

Based on recommendations from the North American Workshop, a Working Group composed of members from Mexico, USA, and Canada was formed to: (1) develop a common ecosystem framework for North America, (2) document appropriate ecosystem approaches, and (3) provide a profile of the status and trends concerning protected areas and ecosystem biodiversity. Much of the work will rely on synthesizing material from ongoing and past studies. The protected area information is to be portrayed primarily against a common ecosystem framework and summarized as a state of the environment report for North America. Undoubtedly, it will be used to examine larger questions about topics such as:

- What should be used to develop protected area indicators?
- What types of conservation strategies are best suited for rural and near-urban landscapes?
- Where should we encourage the expansion of government/non-government partnerships?

Editor's note: The next issue of the FORUM *will have an expanded discussion of this project and of the potential for a parallel inventory of protected cultural areas and sites.*

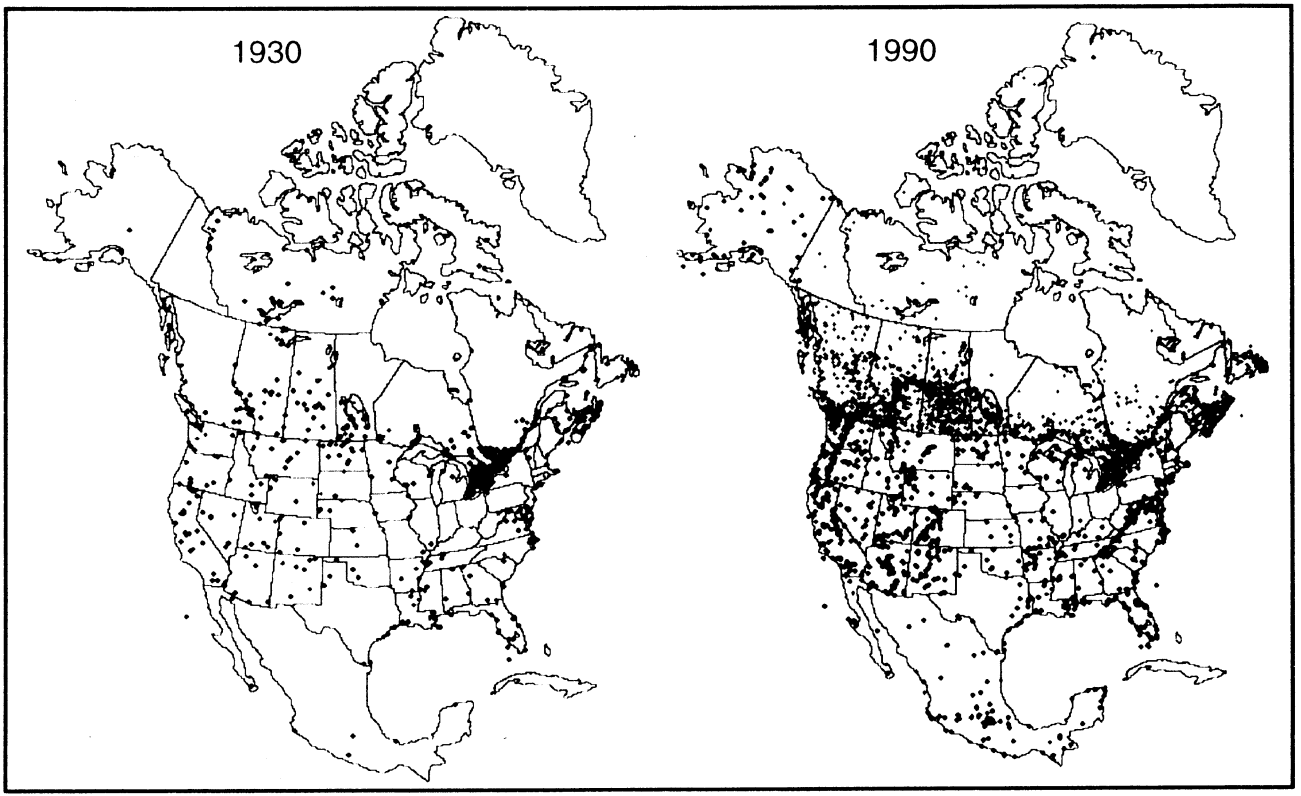

Figure 1. Growth in number of North American protected natural areas, 1930–1990.

THREE VIEWS OF THE WILD ON THE 30TH ANNIVERSARY OF THE WILDERNESS ACT

The Wildlands Project: A Vision for Life

James R. Strittholt
The Wildlands Project, 117 East Fifth Street, Suite F, P.O. Box 1276, McMinnville, Oregon 97128

I FIND MYSELF ONCE AGAIN IN A DARKENED AUDITORIUM listening to another noted biologist recite the now familiar predictions about the unprecedented human-induced worldwide decline and extinction of species. Slide after slide, the audience politely watches as the speaker reviews the charts and tables describing our current knowledge of the state of life on planet Earth. One sits hoping the projections for the ever-degrading state of the world's biological richness and the condition of the wild is somehow being overestimated. What would an Earth be like a decade away with 15-35% of all its existing life forms gone forever? What would the world be like with only relicts of wilderness scattered across a sea of human-dominated landscape? The evidence is compelling and the message sobering. Finally, images of some of these doomed world treasures are projected, filling the larger-than-normal auditorium screen. There are images of both the great and the small, the furred, feathered, finned, scaled, slimy, and green. It appears that no group has escaped, and what little rustling there was in the audience of scientists and non-scientists alike now ceases. It's quiet, and coldness fills the room. This clear winter evening in central Ohio has nothing to do with the coldness in the auditorium—this cold originates from within. The talk ends, the lights come up, and the audience applauds.

Discussion develops around the various details of *what* needs to be done to halt the current extinction crisis, and *how* some conservation goals might be accomplished through applied science. The numerous points raised are necessary and interesting to me as an ecologist, but I increasingly feel the discussion is flawed. The symposium was entitled "Evolution, Biological Diversity, and Environmental Ethics." Increasingly agitated, I wonder when the ethics are going to be examined. Over the next hour, not a word is mentioned. The evening's meeting comes to an end with nothing said about the *why* questions—more specifically, why we humans care that species are exterminated and wild places tamed. While sound utilitarian responses to

this question can be readily stated—everything from the economic value of harvested floral and faunal species to the more general ecosystem services arguments—these are not the reasons which drew the large audience to this symposium or produced the cold silence. The reasons why we care are numerous, but at the heart of each one lies a moral commitment and emotional attachment to all life: what E. O. Wilson (1984) calls "biophilia."

I left the auditorium that night saddened and disappointed. Perhaps I was disappointed in the speaker and moderator for not attempting to move the discussion to the moral and ethical considerations of the extinction crisis, or maybe I was disappointed in science as a discipline for not allowing its members to explore their souls in such a forum, or maybe I was simply disappointed in the human family as a whole for losing our way in the first place. Sadly, the experience was a vivid reminder to me of how far the separation of humans from the rest of nature has grown in our modern age. Even biologists seem to find it nearly impossible to discuss their love for life in any professional, public platform, as evidenced that cold winter night in Ohio. This experience illustrated for me the disturbing social context in which we find ourselves with regard to the human-induced extinction episode the world faces today.

Stephen J. Gould (1991) wrote that "we cannot win this battle to save species and environments without forging an emotional bond between ourselves and nature as well—for we will not fight to save what we do not love." Gould argued that cold rationality, fearless objectivity, and bit of technology (the instruments of modern science) will not be enough to solve the extinction crisis. He wrote, "If this were true, we would be a lot further than we presently find ourselves." Paradoxically, the individuals most likely to know how to begin to physically heal the planet (possessing some answers to the *what* and *how* questions) are the scientists. Unfortunately, the vast majority of us are largely conditioned by our belief in Cartesian dualism which serves to imprison our moral knowledge. Orr (1992) eloquently argues that scientific fundamentalism has grossly mistaken the relationship between passion, emotion, and good science. He wrote, "Science, at its best, is driven by passion and emotion." Perhaps the stakes have become so high that it may finally be possible to explore scientific inquiry and problem-solving in the context of the many human questions previously left to philosophers and theologians. The fundamental questions Gould and others have raised are only beginning to penetrate the well-seasoned armor of the scientific institutions and their membership, but progress is being made. Perhaps the growing ranks of scientists who call themselves "conservation biologists" is one indication of another way of thinking separate from modern scientific dogma formalized centuries ago during the European Renaissance. Conservation biology, as Soulé (1986) put it, "began when a critical mass of people agreed that they were conservation biologists." This rapidly growing body of scientists, who are coming together from a variety of traditional disciplines, share a common purpose: protecting, and where necessary restoring, the structure and function of natural biological communities throughout the world.

In recent decades, frustration with existing institutions, including science, has moved many to take action to help protect native biodiversity and wild places from the negative impact of modern societies. Driven largely by their love for nature, environmental activists have contributed fundamentally to the conservation debate. Whether acting singly or as well-organized bod-

ies, environmental activism has played a major role in the protection of life in North America. Over time, the roles and strategies of the various activist groups and individuals have evolved, becoming better informed and more effective, but throughout all of these changes, the extinction crisis has continued to unfold before us.

Some have fought tough environmental battles for so long against such staggering odds that they have become largely embittered toward their fellow humans. This state is perceived by some as another type of dysfunctionality, equally caustic to the human spirit as our modern alienation from non-human nature (Gore 1992). The interaction between humans and the rest of nature has been an elemental topic for philosophers and theologians to debate throughout the ages. It should not be surprising to learn, therefore, that many view the extinction crisis as not just one of science, but one of the human spirit. According to Rockefeller (1992), the environmental crisis can best be described as a crisis in our understanding of and commitment to community, and in order to understand the sense of community, one must first understand the Self (feeling, thought, and will of mind, body, and soul). Like many inspirational writers and visionaries such as John Muir and ancient earth cultures both past and present, this community includes the soil, the rocks, the water, the plants, and the animals. In the last few thousand years, dominant human societies have narrowed the concept of community until it has almost disappeared. In recent years, there are hopeful signs of turning this around (Nash 1989). Feeling stunned by what our narrow notions have helped rationalize, many are intensively examining Self and community in an attempt to redefine their place in a world where all things are treated as sacred (see Nollman 1990).

The Wildlands Project was born three years ago when a core of scientists and activists came together to forge a common strategy for protecting and restoring the ecological richness and native biodiversity of North America. By embracing the biocentric position that all life is intrinsically priceless, the project hopes to blend the best science, the most effective activism, and selfless wisdom to reconnect all the threads of life on Earth which have been frayed from a long history of human selfishness. As Murray Bookchin (1981) wrote:

> Indeed, there is a level at which our consciousness must be neither poetry nor science, but a transcendence of both into a new realm of theory and practice, an artfulness that combines fancy with reason, imagination with logic, vision with technique.... Poetry and imagination must be integrated with science and technology, for we have evolved beyond an innocence that can be nourished exclusively by myths and dreams.

The Wildlands Project was founded to give organizational expression to this integration. Project participants have come together at this critical time in our history to ask the difficult questions while reaching out to all who can and should contribute to finding long-term solutions. Our intention is to make what appears impossible today, possible tomorrow; what appears unrealistic today, realistic tomorrow. By engaging and confronting what E. O. Wilson calls "the folly our descendants are least likely to forgive us," we hope to protect and restore the stage upon which the evolutionary drama—including our own—can continue. As our quest for knowledge reaches into the future, we are all called upon to do our part toward the continuation of life on planet Earth.

As we seek the critical answers to assure a healthy, functioning biosphere, we must concurrently pursue the wisdom of the ages so we will never lose sight of *why* we fight for life. To do less is to betray our rightful inheritance of goodness of heart and generosity of spirit for which we continually thirst. Our vision is nothing short of the transformation of human interaction with ourselves and all life, and it is wisdom that forms the basis for our ability to live with understanding and compassion. The following article by Reed Noss is our current prescription for beginning the process of returning the continent to an ecologically healthy state. The article provides an indispensable contribution to addressing the *what* and *how* questions to biodiversity protection and the "re-wilding" of representative segments of North America. It is my hope that this article has provided at least some insight into *why* we share a vision for life.

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Building a Wilderness Recovery Network

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Introduction

We have an opportunity unique to our generation: to halt a mass extinction. In order to accomplish this feat, conservation must be practiced on a truly grand scale. Simply put, the tide of habitat destruction must be stopped. Despite growing dangers of pollution, acid rain, toxic wastes, greenhouse effects, and ozone depletion, direct habitat alteration by humans remains the greatest of all threats to terrestrial and aquatic biodiversity, from Panama to Alaska and beyond. The effect of habitat alteration, generally speaking, is to create conditions unlike those under which many species native to an area evolved. Whereas some species thrive under the new conditions (cheatgrass, Norway rats, and cowbirds are familiar examples), other species are not so adaptable–they go extinct. Hence, the biodiversity crisis.

To stop the destruction of native biodiversity, major changes must be made in land allocations and management practices. Systems of interlinked wilderness areas and other large nature reserves, surrounded by multiple-use buffer zones managed in an ecologically intelligent manner, offer the best hope for protecting sensitive species and intact ecosystems. This article is about how to select and design such systems at a regional scale.

Below, I discuss the application of conservation biology to wilderness recovery and large-scale land protection strategy in general. After reviewing the ecological goals of such a strategy and discussing approaches to reserve selection and design, I outline the basic components of a wilderness recovery network: core reserves, buffer zones, and connectivity. The most important considerations in designing and managing such systems are representation of all ecosystems; population viability of sensitive species, especially large carnivores because they are usually most demanding; and perpetuation of ecological and evolutionary processes. My hope is that biodiversity activists and bioregionalists will be able to use this information in the design of ambitious wilderness recovery networks in their own regions.

Wilderness recovery, I firmly believe, is the most important task of our generation.

Application of Conservation Biology to Wilderness Recovery

Preservation of large, wild landscapes for their natural features is not a new idea, as the history of the national parks and wilderness movements in the United States attests (Fox 1981, Runte 1987). The introduction of science to the process of selecting and managing parks and other landscape-sized reserves, however, is both new and promising. Science alone, of course, is not sufficient; it must be guided by a land ethic (Leopold 1949).

Most national parks, wilderness areas, and other large reserves were selected on the basis of aesthetic and recreational criteria, or simply because they contained little of value in terms of extractable re-

sources. The result is that high-elevation sites (rock and ice), wetlands, and other scenic but not particularly diverse lands dominate our system of protected areas; many ecosystem types are not represented, at least not in sizable areas (Davis 1988, Foreman and Wolke 1989, Noss 1990a). Because biology has been absent from design decisions, park boundaries do not conform to ecological boundaries and most parks and other reserves are too small to maintain populations of wide-ranging animals over the long term or to perpetuate natural processes (Kushlan 1979, Harris 1984, Newmark 1985).

Increasing discussion of "greater ecosystems" (Craighead 1979, Grumbine 1990), regional landscapes (Noss 1983), regional ecosystems (Keystone Center 1991), and ecosystem management (Agee and Johnson 1988) heralds a new way of looking at conservation, a way informed by ecological science. The basic idea underlying these new concepts is that most parks and other reserves are, by themselves, incomplete ecosystems. If parks or other reserves can be enlarged, and if the lands surrounding these areas are managed intelligently with the needs of native species and ecosystem processes in mind, a landscape as a whole may be able to maintain its ecological integrity over time.

If, on the other hand, surrounding lands are greatly altered from their natural condition, the chances that a reserve can maintain its integrity are slim. Animals with large home ranges (and therefore low population density) and other sensitive species will decline or fluctuate to extinction. Restoration may be needed to bring the complex of reserves and surrounding lands back to health. In any case, conservation biologists recognize that any system of parks, wilderness areas, and the public and private lands that envelop them must be managed as a whole in order to meet the goal of maintaining natural processes and native biodiversity over long spans of time.

Conservation biology and landscape ecology are both young sciences and show many signs of immaturity, such as theoretical confusion. However, the experience gained from myriad empirical case studies and observations, guided sometimes but not invariably by theory, has led to some general principles about how land might be "managed" (in a humble and nonmanipulative sense of this term) to maintain biodiversity and ecological and evolutionary processes. The principles of conservation biology are not laws; we can expect them to be refined continually as the science matures. To put off implementing these principles until the science is completely developed, however, would be foolhardy; the forces that degrade natural ecosystems will not wait for the advice of scientists. Instead, the most prudent course for conservation is to proceed on the basis of the best available information, rational inference, and consensus of scientific opinion about what it takes to protect and restore whole ecosystems.

Ecological Goals

A conservation strategy is more likely to succeed if it has clearly defined and scientifically justifiable goals and objectives. Goal-setting must be the first step in the conservation process, preceding biological, technical, and political questions of how best to design and manage such systems. Primary goals for ecosystem management should be comprehensive and idealistic so that conservation programs have a vision toward which to strive over the decades (Noss 1987a, 1990b). A series of increasingly specific objectives and action plans should follow these goals and be reviewed regularly to assure consistency with primary goals and objectives (Stankey 1982). Four fundamental objectives

are consistent with the overarching goal of maintaining the native biodiversity of a region in perpetuity (Noss 1991a,b):

1. Represent, in a system of protected areas, all native ecosystem types and seral stages across their natural range of variation.

2. Maintain viable populations of all native species in natural patterns of abundance and distribution.

3. Maintain ecological and evolutionary processes, such as disturbance regimes, hydrological processes, nutrient cycles, and biotic interactions, including predation.

4. Design and manage the system to be responsive to short- and long-term environmental change and to maintain the evolutionary potential of lineages.

Representation. Representation is one of the most widely accepted criteria of conservation. As an example, delegates of 62 nations at the Fourth World Wilderness Conference, in 1987, unanimously approved a resolution to preserve "representative examples of all major ecosystems of the world to ensure the preservation of the full range of wilderness and biological diversity" (Davis 1988). Perhaps the best way to represent all ecosystems is to maintain the full array of physical habitats and environmental gradients in reserves, from the highest to the lowest elevations, the driest to the wettest sites, and across all types of soils, substrates, and topoclimates (Hunter et al. 1988, Noss 1991a).

To accommodate seral stage diversity within vegetation types, reserves must either be large enough to incorporate functional natural disturbance regimes or be managed to supplement or mimic natural disturbances (Pickett and Thompson 1978, White and Bratton 1980). Because we do not know very well how to do the latter, as well as for ethical and aesthetic reasons, emphasis must be placed on maintaining the natural condition wherever it occurs.

Representation of all ecosystems and environmental gradients is the first step toward maintaining the full spectrum of native biodiversity in a region. Representation is subtly different from the conservation criterion of representativeness (see Margules and Usher 1981), where the best or typical examples of various community types are targeted for preservation. The latter concept is typological and static; it often results in the sequestration of "museum pieces" or specimens of nature (Noss and Harris 1986). Representation does not seek to preserve characteristic types of communities so much as to maintain the full spectrum of community variation along environmental gradients. It is understood that this variation is dynamic. The best example of a conservation program based on representation goals in North America is the Gap Analysis project directed by the U.S. Fish and Wildlife Service (Scott et al. 1991).

Viable Populations. Simply representing a species in a reserve or series of reserves does not guarantee that it will be able to persist in those areas (or anywhere) indefinitely. The representation objective must be complemented by the goal of maintaining viable populations of every species. Population viability is a central concern in conservation biology (Shaffer 1981, Soulé 1987). A viable population is one that has a high probability (say, 95 or 99%) of persisting for a long time (say, for 100 to 1,000 years). Population viability analysis is complex, with estimates depending on the mathematical model used, its assumptions, and values used for key population parameters such as population density and birth and death rates. With a few interesting exceptions, viable populations are generally on the order of thousands of individuals (Thomas 1990).

Fortunately, one does not have to worry about each of the thousands of species that may live in a

region in order to meet the ambitious goal of maintaining viable populations of all native species. Rather, "conservation should not treat all species as equal but must focus on species and habitats threatened by human activity" (Diamond 1976). Concerns about population viability should be directed toward species at most risk of extinction in the region. Vulnerable species typically include those with small populations (limited or patchy distribution or low density), large home ranges, poor dispersal abilities, low reproductive potential, as well as those subject to exploitation or persecution or dependent on habitats that are themselves rare or threatened (Noss 1991a). These are the species that require our attention; many others tolerate or even thrive on human disturbance and can get along quite well without conservation assistance. For a regional wilderness recovery strategy, large and wide-ranging carnivores—bears, wolves, jaguar, puma, wolverine—are ideal primary target species.

Although answers to population viability questions are species-specific, some general principles for managing landscapes for vulnerable species are emerging. Thomas et al. (1990:23), in their conservation strategy for the northern spotted owl, listed five reserve design concepts "widely accepted among specialists in the fields of ecology and conservation biology." I generalize their guidelines below to multiple species, adding a sixth guideline that applies to species, such as large carnivores, that are especially sensitive to human disturbance (and, therefore, greatly in need of protection).

1. Species well distributed across their native range are less susceptible to extinction than species confined to small portions of their range.

2. Large blocks of habitat, containing large populations of a target species, are superior to small blocks of habitat containing small populations.

3. Blocks of habitat close together are better than blocks far apart.

4. Habitat in contiguous blocks is better than fragmented habitat.

5. Interconnected blocks of habitat are better than isolated blocks; corridors or linkages function better when habitat within them resembles that preferred by target species.

6. Blocks of habitat that are roadless or otherwise inaccessible to humans are better than those with roads and accessible habitat blocks.

Maintaining Ecological and Evolutionary Processes. One general theme of ecosystem management is that process is at least as important as pattern (Noss and Harris 1986). In other words, our concern for maintaining particular species, communities, places, and other entities must be complemented by a concern for the ecological and evolutionary processes that brought those entities into being and that will allow them to persist and evolve over the eons. Fundamental processes critical to ecosystem function include cycling of nutrients and flow of energy, disturbance regimes and recovery processes (succession), hydrological cycles, weathering and erosion, decomposition, herbivory, predation, pollination, seed dispersal, and many more. Evolutionary processes, such as mutation, gene flow, and differentiation of populations, must also be maintained if the biota is to adapt to changing conditions.

Allowing for Change. Maintaining ecological and evolutionary processes implies that change must be allowed to occur, hopefully without a net loss of biodiversity. A glaring deficiency of many conservation plans is their failure to recognize and accommodate change in nature. Conservation strategy has implicitly assumed that natural communities are unchanging entities (Hunter et al. 1988) and has sought to freeze in time snapshots of nature and associations of species

that may have been apart for longer periods of their evolutionary histories than they have been together. The meaning of "preservation" must be revised to emphasize processes and to interpret local patterns in the context of global biodiversity over long time periods.

Short-term (years to centuries) ecological change occurs as a consequence of natural disturbance and succession. Disturbance–recovery cycles are among the most important of all ecological processes and have had a profound effect on the evolution of species (for example, many plant species are adapted to or even dependent on frequent fire). Only very large reserves or natural landscapes will be able to accommodate disturbance regimes characterized by stand replacement and large patch sizes without losing diversity (Pickett and Thompson 1978, Shugart and West 1981). In the Greater Yellowstone Ecosystem, for example, the lodgepole pine forests that cover much of the area are characterized by high-intensity, stand-replacing fires that recur naturally every two to three centuries; apparently, the landscape is not in equilibrium (Romme and Knight 1982, Romme and Despain 1989). Yellowstone National Park by itself is too small to exist in anything close to steady state with a natural fire regime—one more reason for managing the entire 19 million acres of the Greater Yellowstone Ecosystem as a whole.

Long-term (decades to millennia) change occurs largely as a result of changing climate. The response of plants and animals to climate change over time has primarily been to migrate with shifting climate zones. Communities did not migrate as intact units, however. Rather, plants and animals migrated at rates and in routes that were highly individualistic (Davis 1981, Graham 1986). The conservation strategy of maintaining all physical habitats (soil types, slope aspects, etc.) and intact environmental gradients, with corridors or other forms of connectivity linking habitats across the landscape, is perhaps the best way to accommodate change without losing biodiversity.

Approaches to Land Conservation

How might a regional land conservation program meet the objectives of representing all ecosystems, maintaining viable populations, maintaining natural processes, and allowing for change? Four approaches emphasized in recent years appear promising: (1) identify and protect populations of rare and endangered species; (2) maintain healthy populations of species that play critical roles in their ecosystems (keystone species) or that have pragmatic value as "umbrellas" (species that require large wild areas to survive, and thus if protected will bring many species along with them) or "flagships" (charismatic species that serve as popular symbols for conservation); (3) protect high-quality examples of all natural communities; and (4) identify and manage greater ecosystems or landscapes for both biodiversity conservation and sustainable human use.

These four approaches have obvious relationships to the objectives posed above. Unfortunately, they have sometimes been presented as competing rather than complementary strategies. Advocates of one approach may get very attached to it and fail to see its limitations or the merits of other approaches. In practice, the familiar strategy of protecting sites that harbor rare species or natural communities has worked quite well for plants and animals with small area requirements, but has been less successful in protecting wide-ranging animals and has been unable to capture landscape mosaics and other higher-order expressions of biodiversity (Noss 1987b). Empirical evidence has demonstrated that the small reserves selected through the site-by-site ap-

proach are heavily assaulted by external influences and often fail to retain the natural qualities for which they were set aside.

On the other hand, many so-called "ecosystem" or "landscape" approaches have lacked scientific rigor and objectivity and have failed to target those elements of biodiversity that are truly most threatened. Furthermore, most attempts to use "sustainability" as a management paradigm (Salwasser 1990) have been anthropocentric, biased toward commodity production, and seriously flawed from a biological standpoint, (Noss 1991c and in press).

These four approaches to conservation must be pursued in concert if the full spectrum of biodiversity is to be protected. Again, this can only be accomplished by representing all ecosystems (from small habitat patches to large landscape mosaics), maintaining viable populations of all native species (plant and animal, big and small), maintaining ecological and evolutionary processes, and accommodating change. The most difficult challenge is to meet all these objectives while still allowing for some kinds of human use. Most conservation biologists agree that compatible human uses of the landscape must be considered and encouraged in large-scale conservation planning. Otherwise, the strategy will have little public support. However, the native ecosystem and the collective needs of non-human species must take precedence over the needs and desires of humans, for the simple reason that our species is both more adaptable and more destructive than any other. Putting the needs of one species (humans) above those of all other species combined, as exemplified by the sustainable development theme, is one of the most pernicious trends in modern conservation.

Regionalization is a central issue in The Wildlands Project (also known as the North American Wilderness Recovery Project). Trying to make sense of the distribution of biodiversity and planning reserves across all of North America at once would be overwhelming. Regionalization on the basis of physiography, biogeography, land use, and other large-scale patterns helps assure that every physically and biotically distinct region is represented in a broad conservation strategy. Omernik (1986), for example, has produced a map portraying 76 ecoregions in the 48 conterminous states, and the Canadian Parks Service recognizes 39 terrestrial natural regions (Hummel 1989). Ecoregions or bioregions are a convenient scale for planning and often inspire feelings of belonging and protectiveness in their more enlightened human inhabitants. Many grassroots groups around the continent have defined bioregions and developed conservation plans for them. The Wildlands Project exists essentially to coordinate and provide technical support for these regional efforts.

Regionalization of reserve networks should be a hierarchical process; that is, we should consider regions within regions in our planning efforts. We can contemplate our homeland as a nested series, with our local watershed functioning as an interdependent part of a larger river watershed (a hydrologic unit), which in turn is part of an ecoregion or bioregion (for example, the Blue Ridge Mountains), then a biogeographical province (eastern deciduous forest), a continent, and eventually, the biosphere. Putting this nested hierarchy idea into practice means local nature reserve systems should be linked together into regional systems, which in turn are connected by inter-regional corridors that ultimately span continents. These hierarchical connections will help promote the multiple functions of connectivity discussed later in this article.

Reconnaissance and Selection

How do we choose reserves in a regional land conservation strategy? The process involves field inventory, remote sensing interpretation, and biogeographical research to determine the spatial distribution of biodiversity and wild areas, followed by an evaluation of which areas are most important to protect. The next step, drawing lines on maps, is not as easy as might be expected. Each line on a reserve design map represents a decision about areas to protect and areas to leave out. Within the near future, unfortunately, not every acre can be protected or restored. Decisions must be made quickly about which areas are most valuable ecologically, before they are altered irrevocably. Such decisions should not result in any area being "trashed." Ideally, all lands should be managed, at least in part, for biodiversity. But some areas deserve and require more rigorous protection than others. We call this process of picking and choosing "conservation evaluation" (Usher 1986).

Conservation evaluation is legitimate because biodiversity is not distributed uniformly across the landscape. Certain areas, sometimes called "hot spots," are unusually high in sheer number of species or contain concentrations of rare or endemic species or unusual natural communities. Areas of high physical habitat diversity, such as topographically complex landscapes with many distinct soil types, are often hot spots. Sites in a landscape also vary in conservation value as a result of historical influences, including past human activities. Roadless areas, especially when large (see Foreman and Wolke 1989), are of great importance because they harbor reclusive species and are often inherently sensitive to physical disturbance due to steep terrain or highly erodible soils (which made them difficult to exploit economically and explains why they are still roadless). Parking lots and corn fields, on the other hand, would score low in a conservation evaluation. Some degraded sites, however, may be priorities for restoration due to their locations relative to other landscape features, such as lying within a corridor that links hot spots across a landscape.

Core reserves and primary corridors in a regional network should enclose and link biologically critical areas (i.e., those that contribute to the goals discussed above) in a continuous system of natural habitat whenever possible. Some critical steps in selecting core reserves (the most strictly protected areas) and primary linkages in a wilderness recovery network, are as follows (Foreman 1976; Noss 1987a, 1991a, b,d; Foreman and Wolke 1989):

1. Select areas that, on the basis of field reconnaissance and interpretation of maps, aerial photographs, or satellite images, appear to be roadless, undeveloped, or otherwise in essentially natural condition. Center proposed core reserves on these undeveloped areas. A map of land ownership will show which of these areas are on public lands.

2. Add those landscapes with roads that are relatively undeveloped and restorable, especially when adjacent to or near roadless areas. Addition of such areas is important to increase core reserve size and to link roadless areas into larger complexes or networks.

3. Map the distribution of rare species and community types in your region, using state natural heritage program databases (these also exist for some Canadian provinces and Latin American countries). The heritage programs use a five-point scale of global and statewide endangerment developed by The Nature Conservancy, with rank 1 signifying the most imperiled elements. Map occurrences of all species, subspecies, varieties, and communities that rank 3 (very rare and local throughout range or found locally

in a restricted range) or higher at a global scale (G3 or T3, G2 or T2, and G1 or T1; the G indicates global status and the T indicates status of taxonomic subcategories). Add species that are imperiled or critically imperiled statewide (S2 and S1), though they may be less rare globally. Request a computer printout from the heritage program with data on each occurrence, including township, range, section and other location information. Map occurrences on mylar overlays on maps ranging from 1:100,000 to 1:250,000 scale (e.g., Forest Service 1/2 inch = 1 mile maps are 1:126,720). Local analyses should use 1:24,000 scale (the familiar 7.5-minute quadrangle maps) or larger. If you use a Geographic Information System (GIS), you can request a disk with longitude/latitude coordinates of occurrences. In some regions, mapping the distribution of rare species and communities might be the most practical first step in the network design process.

4. Draw polygons around clusters or constellations of rare species and community types. If not encompassed in core reserves proposed in steps 1 and 2, add these polygons to the system. Some hot spots will be naturally isolated (for instance, caves, serpentine barrens, or kettlehole bogs), so linking them by corridors is unnecessary.

5. Obtain information from the U.S. Fish and Wildlife Service GIS gap analysis (if completed for your state or states) on unprotected and underprotected vegetation types and centers of species richness in your region (see Scott et al. 1991). The purpose of gap analysis is to provide information on representation of ecosystems and species in protected areas. A similar representation study is being conducted in Canada by World Wildlife Fund-Canada (A. Hackman, personal communication). Locate areas that contain vegetation types and centers of species richness (areas where the ranges of many species overlap) that are not adequately protected in existing reserves. Add these areas to your network of sites if not already encompassed through steps 1-4.

6. You have now determined the general locations of your core reserves and some of the linkages between them. Next, you need to define boundaries more precisely, add more corridors so that all sites that would be naturally linked are reconnected, and envelop the entire network in a matrix of buffer zones (Figure 1). To do these things, you must zoom in to the landscape scale (say, 1:24,000 or larger, if feasible). Refer to detailed road maps, land ownership maps, land-use information including grazing allotments, proposed timber sales, and mineral rights, wildlife maps such as ungulate winter range and dispersal corridors, and additional data, as available (Foreman 1976, Noss 1991b,d). This information also tells you about threats to sites which must be averted. Using this information and knowledge of the land, based on field reconnaissance and maps, adjust proposed boundaries.

7. As part of your final proposal, indicate specific actions that must be taken to secure the system. These actions include land and mineral rights acquisitions, wilderness or other reserve designations on public lands, road closures, road modifications (such as underpasses to allow migration of animals beneath highways), cancellation of grazing leases and timber sales, tree planting, dam removals, stream de-channelization, and other restoration projects (Noss 1991d).

The issue of appropriate size or scope of a regional wilderness recovery network, some aspects of which will be discussed later in this article, is thorny. Each region must be assessed individually. I suggest that at least half of the land area of the 48 conterminous states should be encompassed in core reserves and inner corridor zones (essentially

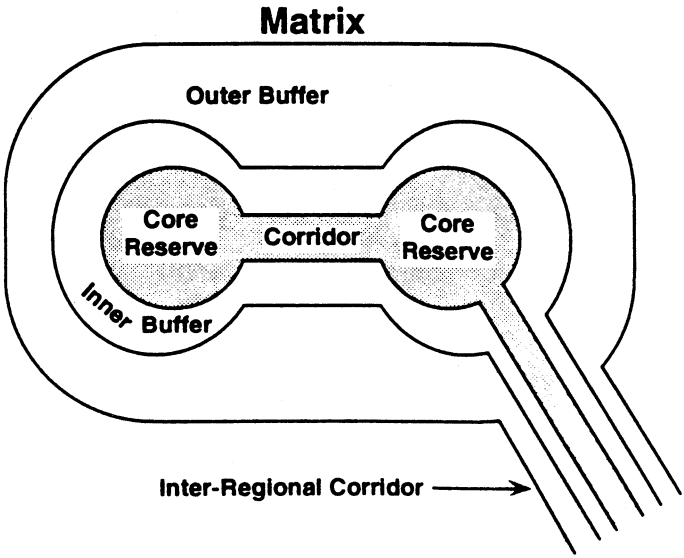

Figure 1. A regional wilderness recovery network, consisting of core reserves, connecting corridors or linkages, and buffer zones. Only two core reserves are shown, but a real system may contain many reserves. Inner buffer zones would be strictly protected, while outer zones would allow a wider range of compatible human uses. In this example, an interregional corridor connects the system to a similar network in another bioregion. "Matrix" refers to the landscape surrounding the reserve network, but this is only true in the first stages of a wilderness recovery project in regions now dominated by human activity. Eventually, a wilderness network would dominate a region and thus would itself constitute the matrix, with human habitations being the islands. In regions where wildlands is already the matrix, the inverted model should be implemented right away.

extensions of core reserves) within the next few decades; I also believe that this could be done without great economic hardship. Areas with more wild land remaining, such as much of Canada, Alaska, and parts of Mexico and Central America, should have higher targets. Some regions, such as the Midwestern Till Plains and Northeastern Coastal Zone, will take longer to restore to 50% wilderness, perhaps on the order of centuries. Nonetheless, half of a region in wilderness is a reasonable guess of what it will take to restore viable populations of large carnivores and natural disturbance regimes, assuming that most of the other 50% is managed intelligently as buffer zone.

Other authors, using different criteria, have arrived at similar estimates of what it might take to protect ecological integrity in a region. Odum and Odum (1972) suggested that managing half of southern Florida as natural area and half as cultural land was optimal. Earlier, Odum (1970) estimated that managing 40% of the state of Georgia as natural, 10% as urban-industrial, 30% in food production, and 20% in fiber production would maximize ecological services while maintaining the current standard of living. I would offer a more ambitious long-term goal, pending human population reduction, that at least 95% of a region be managed as wilderness and surrounding multiple-use wildlands. The following sections provide detailed ecological criteria for designing a wilderness recovery network.

Components of a Wilderness Recovery Network

A wilderness recovery network is an interconnected system of strictly protected areas (core reserves), surrounded by lands used for human activities compatible with conservation that put biodiversity first (buffer zones), and linked together in some way that provides for functional connectivity of populations and processes across the landscape. These basic concepts are common to many conservation strategies, including the biosphere reserves of the Man and the Biosphere (MAB) program (UNESCO 1974, Hough 1988, Batisse 1990, Dyer and Holland 1991), and the multiple-use module idea that applies these concepts at various spatial scales (Harris 1984, Noss and Harris 1986, Noss 1987a).

Below, I discuss core areas, buffer zones, and connectivity as they apply to wilderness recovery. I follow with a brief discussion of the "bigness" issue, that is, determining how large a reserve or reserve system must be to maintain its native biodiversity over time.

Core Areas. The backbone of a regional reserve system is formed by those protected areas managed primarily to maintain or restore their natural values. The selection of core reserves should be based on the criteria and objectives discussed above: representing all ecosystems, maintaining viable populations of all native species, maintaining ecological and evolutionary processes, and being responsive to change. Core reserves should collectively encompass the full range of communities, ecosystems, physical habitats, environmental gradients, and natural seral stages in each region. Design and management guidelines for specific core reserves require considerable site-specific research.

Buffer (Multiple-Use) Zones. A system of core reserves is necessary but not sufficient to maintain biodiversity. In most regions, strictly protected areas will not occupy enough land, in the short term, to meet the conservation goals suggested in this article (see Brussard 1991). For a largely wild region, such as much of the western United States and Canada, the multiple-use public lands that envelop reserves should be managed in a way more sensitive to natural ecosystems and processes than what is now the custom (to put it mildly). To the extent that buffer zones are managed intelligently, core reserves have a better chance of maintaining viable populations and regional landscapes will be richer in native biodiversity than if reserves are surrounded by intensive land use.

I use the terms "multiple-use zone" and "buffer zone" interchangeably (Noss 1991a). The former term, although tainted by misuse by public agencies and special interest groups, may be preferable because such zones can indeed provide for many human uses and function as much more than buffers. Multiple-use public lands adjacent to reserves should serve as at least

marginal habitat for vulnerable species and should insulate reserves from intensive land uses. A reserve properly insulated from high-intensity land use by one or a series of buffer zones is, to a measurable degree, functionally enlarged as a conservation unit. In many cases, private lands will need to be acquired and added to national forests and other public lands in order to serve as effective buffers.

Physical and biotic edge effects can be serious problems for small reserves with high perimeter/area ratios (Noss 1983); buffer zones have been recommended to mitigate edge effects in these situations (Harris 1984, Noss 1987a). Among forest communities, deleterious edge effects are best documented for closed-canopy forest types. Forest interior species may be sensitive to a variety of edge-related environmental changes. Increased blowdown potential may extend at least two tree-heights into a stand (Harris 1984, Franklin and Forman 1987). Some kinds of external influences, such as invasions of weedy species, penetrate much farther—perhaps 5 km or more into a forest (Janzen 1986). Weedy, exotic species of plants and animals are often abundant in human-disturbed environments; buffer zones may help screen these pests away from reserves. Core reserves, if designed according to the criteria discussed in this article, will generally be large enough that edge effects from their boundaries should not be a significant problem. Edge effects from internal fragmentation, such as that caused by road-building and clearcutting, will be a threat until artificially disturbed habitats are restored.

Multiple-use zones have functions other than ameliorating edge effects. If maintained in low road density, they can protect core reserves from poaching and other harmful human activities that otherwise would be intense near reserve boundaries. They may also protect developed areas from depredating large mammals (such as grizzly bears and wolves) that will hopefully thrive in core reserves. Outer zones of vegetation resistant to high-intensity fire (such as grasslands), supplemented by fire lanes on the perimeter, may protect private forests and settlements from fires originating in core reserves.

An ideal function of multiple-use zones is to provide supplementary habitat to native species inhabiting a core reserve, thus increasing population size and viability. To the extent that multiple-use zones can be restored and managed to increase habitat area for those species most vulnerable to extinction, they will enlarge the effective area of the reserve. In some cases, animals that depend on several different habitat types, perhaps on a seasonal basis, will require areas not represented in a reserve to meet a portion of their annual life-history needs. Obvious examples are elk and deer that make seasonal migrations between high-elevation summer ranges and low-elevation winter ranges (Adams 1982). Core reserves can be created or enlarged to protect the most critical migration corridors, but many other movement areas will need to be protected by buffer zones.

Population dynamics across reserve boundaries can be complex. The notion of "source" versus "sink" habitats is germane here. As discussed by Pulliam (1988), source habitats are those that can support a net population increase, whereas "sink" habitats have in situ death rates higher than birth rates—they are "black holes" for wildlife. Populations are maintained in sink habitats only when subsidized by source habitats. Population density, therefore, may be a misleading indicator of habitat quality (Van Horne 1983). Concentrations of socially subordinate individuals (for instance, female and subadult male bears, or juvenile songbirds) in sink habitats may lead to mistaken impressions about habitat quality in those areas.

Although most of the population may exist at any given time in the sink habitat, conservation of the source habitat is absolutely essential to the survival of the whole population (Pulliam 1988, Howe et al. 1991).

The source-sink dichotomy (really a continuum) is relevant to the planning of buffer zones, because whenever habitat quality or population density for a species differs across a boundary, we can expect net movement of individuals across that boundary. This gradient-aligned dispersal is in addition to any movements made by animals that use resources on both sides of the boundary.

The developed landscape is often a sink, relative to reserve habitat, for native species (Janzen 1986, Schonewald-Cox and Bayless 1986, Buechner 1987). In the absence of well protected buffer zones, surplus animals produced in a park or other reserve may disappear into the developed landscape matrix, seldom reproducing and often dying there. Areas near roads and developments are well-known population sinks for Yellowstone grizzly bears, even within the National Park (Mattson and Knight 1991a). Across the Greater Yellowstone Ecosystem, illegal shooting and management "removals" are the major causes of mortality for the grizzly and are associated with real or perceived threats to humans or livestock, particularly sheep (Knight et al. 1988, Mattson 1990). Road closures and removal of sheep allotments are probably essential to grizzly bear recovery in this region (Mattson and Reid 1991).

If, on the other hand, lands surrounding core reserves are managed for the benefit of a sensitive species and contain habitat of moderate or high quality for that species, those lands may be minor sinks or no sink at all. If death rates in the buffer are approximately equal to birth rates, there will be no drain on the reserve population. Furthermore, a recent model suggests that sink habitats can actually contribute to metapopulation persistence (Howe et al. 1991). Although the highest priority is to identify and protect source habitats where annual reproduction exceeds mortality, a large fraction of a species' population may exist in sink habitats and those areas may extend the survival time of the metapopulation as a whole (a metapopulation is a collection of local populations linked by dispersal; Levins 1970). A buffer zone of marginal habitat quality, even if technically a sink, can be managed to reduce mortality and contribute to metapopulation persistence. Dispersal is a key factor in metapopulation persistence (Figure 2) and can be enhanced if buffer zones are managed to minimize road density, artificial openings, and other potential barriers.

Another advantage of buffer zones around reserves may be to allow plants and animals to shift their distributions in response to disturbances and other changes. In the long term, or perhaps rather quickly (within the next few decades, if prevailing models of anthropogenic global warming prove true), organisms will need to shift their ranges in response to climate change (Peters and Darling 1985). Buffer zones or habitat corridors between reserves will help organisms make these distributional shifts and avoid extinction (see connectivity discussion, below).

In order to protect species sensitive to legal or illegal hunting or persecution, such as grizzly bear, jaguar, and wolf, buffer zones must have low road density (say, no more than 0.5 miles of road per square mile). Research has shown that road densities as low as 0.8 or 0.9 miles per square mile may make habitat unsuitable for large carnivores and omnivores (Brody 1984, Thiel 1985, Mech et al. 1988). Road access is a major threat to wildlands throughout North America (Diamondback

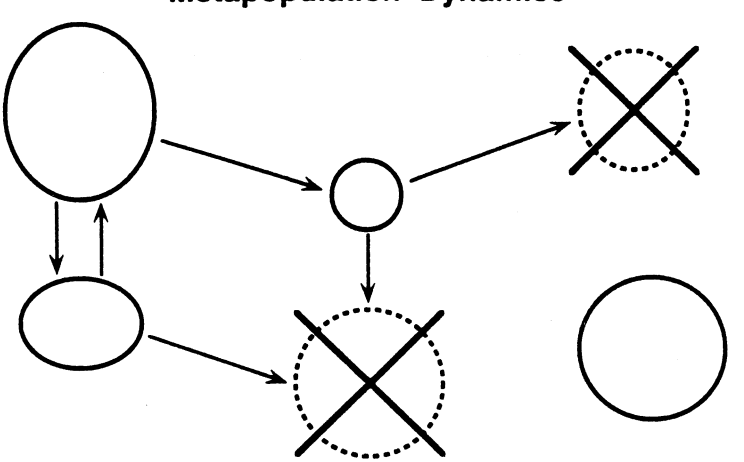

Figure 2. A hypothetical example of metapopulation dynamics. Subpopulations are connected by dispersal, which may keep local populations from going extinct (the "rescue effect") and thus stabilizes the metapopulation. In this example, two subpopulations (each marked by an "x") have recently gone extinct. Dispersal from other subpopulations allows for these areas to be recolonized. The subpopulation in the lower right is not receiving any immigrants, perhaps because developments or other barriers lie between it and other subpopulations. Should this isolated subpopulation go extinct, it can only be recolonized by restoration of dispersal corridors or active reintroduction by humans.

1990). Road closures are one of the most effective ways to make multiple-use lands function as buffers.

Connectivity. A fundamental principle for designing regional reserve systems is connectivity. Unless many millions of acres in size, individual core reserves will not be able to function alone as whole ecosystems, in the sense of maintaining viable populations of large animals and ecological and evolutionary processes (see the following section on bigness). In the long term, regions themselves must be functionally interconnected to allow for long distance dispersal and migration in response to climate change. In order to maintain their ecological integrity, many or most core reserves will have to be functionally joined to other protected areas.

Habitat fragmentation, one of the greatest of all threats to biodiversity (Noss 1983 and 1987a, Harris 1984, Wilcox and Murphy 1985, Wilcove et al. 1986), is a process where large blocks of natural habitat are broken

up into smaller and isolated pieces. Connectivity is in many respects the opposite of fragmentation. A reserve system with high connectivity is one where individual reserves are functionally united into a whole that is greater than the sum of its parts (Noss and Harris 1986).

As suggested above, properly managed buffer zones in which a constellation of reserves is embedded may provide adequate habitat connectivity. Key qualities of buffer zones that provide for animal movement are low road density and minimal development, clear-cutting, or other forms of habitat fragmentation. In some cases, however, distinct corridors of suitable habitat may be needed to link core reserves or reserve complexes into a functional network. These corridors may range in scale from short connectors a few dozen meters wide to regional corridors one hundred miles or more in length and many miles in width (Noss 1991d and 1993). I use the term "linkages" to emphasize the many types and functions of connectivity.

Linkages as Habitat. Some types of corridors are distinct in the natural landscape, riparian corridors being a good example. Riparian forests are highly productive and often very rich in species. As an illustration of how many animals may depend on riparian forests, in the Blue Mountains of Oregon and Washington 285 (75%) of the 378 species of terrestrial vertebrates either depend on or strongly prefer riparian zones over other habitats (Thomas 1979). Riparian forests are immensely valuable in their own right, aside from any role they may play as conduits for wildlife movement.

Wide protected corridors are basically extensions of core reserves. The width of corridor needed to contain an adequate amount of forest interior habitat and minimize edge effects is uncertain and depends on habitat quality both within and outside the corridor (Noss 1993). For example, the edge effect of increased blowdown risk extends at least two tree-heights into a forest (Harris 1984). If forest trees average 40 m in height, a corridor would have to be at least 360 m (approximately one-quarter mile) wide to maintain a modest 200 m wide strip of interior forest. Another consideration for determining optimal corridor width is the territory or home range size of target species expected to use the corridor. Because this issue also affects the ability of a corridor to promote dispersal, I discuss it below in the dispersal section.

Linkages for Seasonal Movements. The conservation function most commonly associated with corridors is to allow movement of animals between reserves. For wide-ranging animals, a small core reserve may not encompass a single annual home range. Some large carnivores have annual ranges of 1,000 or more sq km, and elk and mule deer may travel over 100 km in linear distance between summer and winter ranges (Noss 1991a and 1993). Maintaining safe travel opportunities for these species is largely a matter of protecting them from human predation; wide, roadless corridors will best serve this purpose.

Vertebrates often use traditional migration routes between summer and winter range. Elk generally use forested travel lanes, when available, for migratory movements (Adams 1982). Elk migration has been disrupted by removal of security cover by logging in many regions, for example on the Targhee National Forest near Island Park, Idaho. Travel corridors used by grizzly bears include ridgetops, saddles, and creek bottoms (LeFrance et al. 1987); grizzlies avoid crossing clearcuts and other large openings (D. Mattson, personal communication). Traditional wildlife migration routes should be incorporated into corridors between reserves. Habitat nodes or staging areas for migratory

animals also should be identified and protected.

Linkages for Dispersal. Dispersal refers to the movement of organisms away from their place of origin, such as the movement of subadult animals out of the parental home range. Many species are distributed as metapopulations (Figure 2). Dispersal can counteract the isolating effects of habitat fragmentation, but only if adequate dispersal habitat remains. For a regional metapopulation of a species to persist, movement of individuals between patches must be great enough to balance extirpation from local patches (den Boer 1981). Late successional species tend to be poorer dispersers and more vulnerable to extinction in fragmented landscapes than species associated with early successional stages (den Boer 1990). Therefore, dispersal corridors are most important for late successional species and for species, such as large carnivores or ungulates, likely to be killed by humans or vehicles in developed landscapes.

Dispersal is more often successful when habitat in a corridor or other linkage is similar to the habitat in which a species lives (Wiens 1989), with some exceptions (Bleich et al. 1990). Just how similar it must be is a question yet to be answered. Thomas et al. (1990) predicted, on the basis of a collective best guess, that maintaining 50% of the landscape matrix between proposed habitat conservation areas in forest stands averaging at least 11 inches dbh and 40% canopy closure would provide adequate dispersal habitat for the northern spotted owl. Other scientists might have opted for more stringent standards, for example, 75% of the matrix, more canopy closure, lower road density, and less edge to protect owls from shooting and great horned owl predation. In any case, maintaining matrix suitability, as in the multiple-use zoning strategy reviewed above, is another way to provide connectivity between core reserves. For those species most sensitive to human harassment, barrier effects of roads, or edge effects, the prudent strategy is to maintain wide corridors with roadless core zones and true interior habitat (Noss 1993).

Corridors that maintain resident populations of animals are more likely to function effectively as long-distance dispersal conduits for those species (Bennett 1990). Minimum corridor widths, then, might be based on average home range or territory diameters of target animals (Harrison 1992). Consider the grizzly bear, with an average male lifetime home range of approximately 3,885 sq km (1,500 square miles) in the Greater Yellowstone Ecosystem (Mattson and Reid 1991). A male lifetime home range may contain, at any one time, one or two adult males, and up to a few females; thus, it would provide an adequate width for an inter-regional corridor.

If the population of grizzlies in the Greater Yellowstone Ecosystem is to be connected to other populations, which seems to be necessary to assure population viability, then wide corridors with resident grizzlies must connect Yellowstone with the Northern Continental Divide Ecosystem (about 200 miles away) and the wildlands of central Idaho (Picton 1986, Metzgar 1990). Considering rectangular lifetime home ranges twice as long as wide, a between-population corridor for grizzly bears should be at least 44.25 km (27.5 miles) wide. A corridor based on annual or seasonal home ranges would be much narrower but also less secure; it is best to risk erring on the side of caution. Because road densities above about 0.5 miles of road per square mile of habitat may be a threat to grizzlies (Bader 1991), road closures would be required to make inter-regional corridors safe. Figure 1 portrays a wide inter-regional corridor of the type discussed here and others are shown in the statewide network proposed for

Florida (Figure 3; Noss 1985, 1987a).

Linkages for Long-Distance Range Shifts. A final function of connectivity is to provide for long-distance migration of species in response to climate change. Models of anthropogenic global warming predict dramatic shifts in vegetation in most regions. In the Greater Yellowstone Ecosystem, for example, the upper and lower tree lines are expected to move considerable distances (Romme and Turner 1991). Human activities have imposed a new set of barriers on the landscape that, in addition to natural barriers, may interfere with long-distance movements. Unfortunately, if rates of global warming in the next few decades are as fast as predicted, many species will be unable to migrate quickly enough, even along ideal corridors. In Yellowstone, as elsewhere, species with short and rapid life histories, such as introduced weeds, will probably adjust well to climate change, as will broadly distributed species such as lodgepole pine. On the other hand, whitebark pine and many alpine species, which already show limited and discontinuous distributions, are at high risk of extirpation (Romme and Turner 1991).

Mountainous regions with broad elevational spans are better suited for adaptation to climate change than flatter regions. A 3°C rise in temperature, as is predicted under greenhouse warming, translates to a

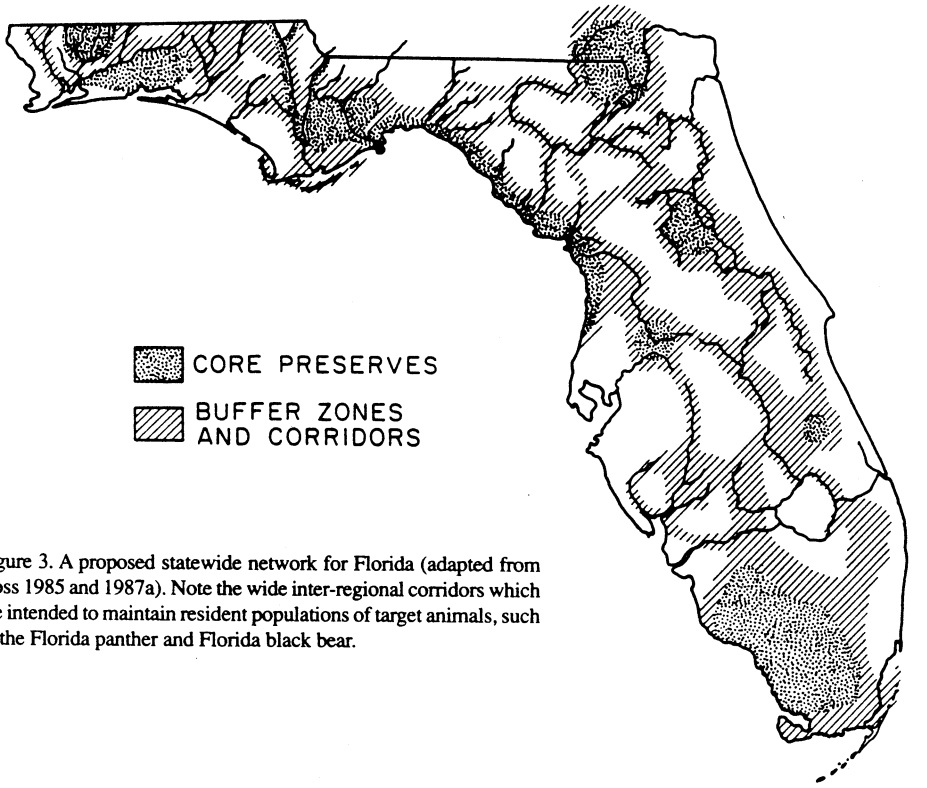

Figure 3. A proposed statewide network for Florida (adapted from Noss 1985 and 1987a). Note the wide inter-regional corridors which are intended to maintain resident populations of target animals, such as the Florida panther and Florida black bear.

latitudinal range shift of roughly 250 km (155 miles), but an elevational range shift of only 500 m (1,640 ft.) (MacArthur 1972). Perhaps the best way to facilitate adaptive migration of species in response to climate change is to maintain intact environmental gradients, as discussed earlier in this article. Complete, unfragmented elevational gradients, for example from foothill grasslands and shrub steppe up to alpine tundra, will offer the best opportunities for upslope migration of species in response to global warming.

The Issue of Bigness

The question that has most occupied conservation biologists for the last two decades has been, "How large does a reserve need to be to maintain its diversity over time?" Researchers have sought answers in various ways and have discovered many reasons why large reserves are preferable to small ones. The desirability of large reserves, all else being equal, is one of the few almost universally accepted principles of conservation biology (Soulé and Simberloff 1986, Thomas et al. 1990).

Some of the best reasons for large reserves are quite practical: per unit area, they are usually cheaper to buy and require less management effort to maintain their natural qualities than smaller reserves (Pyle 1980, White and Bratton 1980, Noss 1983). Due to the species-area relationship and its many potential causes (Connor and McCoy 1979), larger reserves also contain more species than smaller reserves in the same biogeographic region. Island biogeographic theory suggests that large islands or nature reserves contain more species because they experience higher colonization rates and lower extinction rates than smaller areas (MacArthur and Wilson 1967, Diamond 1975). But perhaps the most compelling arguments for large reserves have to do with population viability and habitat diversity in the face of environmental change.

Reserve Size and Population Viability. Estimates of minimum viable population sizes and corresponding reserve sizes are alarmingly high. Small populations are vulnerable to extinction due to a number of factors, including environmental change, demographic stochasticity, social dysfunction, and genetic deterioration (Shaffer 1981, Soulé 1987). All populations fluctuate over time; small populations are more likely to fluctuate down to zero. A recent review of empirical studies (Thomas 1990) concluded that an average population of 1,000 individuals must be maintained in order to assure population viability of species with average levels of fluctuation in abundance. Bird and mammal species with highly variable populations may require average populations of about 10,000 individuals for long-term persistence. In some cases, however, populations can persist for long periods at surprisingly small sizes, even less than 50 individuals (e.g., Walter 1990). It seems wise, however, to strive for large populations of vulnerable species whenever possible.

Habitat quality, social behavior, and other factors will determine how minimum population estimates translate to reserve size estimates. Schonewald-Cox (1983) estimated that reserves of 10,000 to 100,000 ha (25,000 to 250,000 acres) might maintain viable populations of small herbivorous and omnivorous mammals, but that large carnivores and ungulates require reserves on the scale of 1 to 10 million ha (2.5 to 25 million acres). Using a minimum viable population size of 50 (which is reasonable only under very short planning horizons), it has been estimated that grizzly bear populations in Canada require an average of 49,000 sq km (12.1 million acres); wolverines, about 42,000 sq km (10.4 million acres); and wolves, about 20,250 sq km (5 million acres)

(Hummel 1990). For a minimum viable population of 1,000 (see Thomas 1990), the figures would be 242 million acres for grizzly bears, 200 million acres for wolverines, and 100 million acres for wolves. And, of course, it is not prudent to manage down to the minimum!

Such immense areas could not be contained today within individual reserves, but only within regional and inter-regional systems of interlinked reserves, for example, the Greater Yellowstone Ecosystem linked to the Northern Continental Divide Ecosystem and on to the Canadian Rockies; the Florida network (Figure 3) linked to a network that parallels the Appalachian Trail to Maine (Sayen 1987, Hunter et al. 1988); and a southern Arizona network linked to the rest of the Southwest and to Mexico. Regional and inter-regional systems of protected areas connected by wide corridors appear to be necessary to maintain viable and well-distributed populations of most large carnivores, hence the importance of these species as targets for wilderness recovery planning.

Reserves making up a habitat system for large carnivores should be predominately wilderness, but should include appropriately managed buffer zones. In order to protect these species, which are very sensitive to human predation and harassment (Thiel 1985, Mattson et al. 1987, McLellan and Shackleton 1988, Knight et al. 1988, Craighead et al. 1988, Mattson and Knight 1991a,b), open roads and other means of human access must be tightly restricted. Recognizing (on paper) the threats posed by open roads, the Gallatin National Forest in Montana has implemented an open road density (ORD) standard of 0.5 miles of road per square mile in critical grizzly bear and big game habitat. The 0.5 ORD standard is assumed to maintain a habitat effectiveness of at least 70%, an accepted minimum for population viability of grizzlies and elk (Bader 1991). Road closures to reduce the density of roads to an acceptable level (less than 0.5 miles per square mile) in each region will be among the most difficult actions politically, but most necessary ecologically.

Reserve Size & Disturbance Regimes

Maintaining habitat diversity and the full range of species associated with different seral stages requires that natural disturbance regimes be taken into account when considering reserve size. Disturbances are patchy in time and space, so that a landscape can be viewed as a "shifting mosaic" of patches in various stages of recovery from disturbance (Bormann and Likens 1979). The mosaic appears to shift because new disturbances occur in some portions of the landscape at the same time as formerly disturbed areas are growing back into forest or other mature vegetation. Reserves that are small relative to the spatial scale (patch size) of disturbance may experience radical fluctuations in the proportions of different seral stages over time, which in turn threaten populations that depend on certain stages. Many nature reserves are smaller than the area likely to be disturbed by a single wildfire or windstorm, and therefore are quite vulnerable to loss of habitat diversity and associated species.

If a core reserve is to maintain a relatively stable mix of seral stages and species over time, it must be large enough that only a relatively small part of it is disturbed at any one time. Another requirement is that a source of colonists (that is, a reproducing population of the same species) exists within the reserve or within a reasonable dispersal distance so that populations can be reestablished on disturbed sites (see Figure 2). Disturbance patch sizes and spatial distribution, successional dynamics, potential refugia (areas within the reserve, or nearby, that are not likely to be disturbed),

and dispersal capacities of species, are the ecological factors to keep in mind when planning reserves around natural disturbance regimes.

Pickett and Thompson (1978) used these criteria to define a "minimum dynamic area" as "the smallest area with a natural disturbance regime, which maintains internal recolonization sources, and hence minimizes extinction." In theory, a minimum dynamic area should be able to manage itself and maintain habitat diversity and associated native species with no human intervention. Shugart and West (1981) estimated that landscapes must be some 50-100 times larger-than-average disturbance patches to maintain a relative steady state ("quasi-equilibrium") of habitats. In a steady-state landscape, the proportions of different seral stages in the overall landscape would be relatively constant over time, even though the sites occupied by various seral stages would change. A steady state may never be reached in some ecosystem types, such as those regularly experiencing large, catastrophic fires (Baker 1989). Romme and Knight (1982) concluded that Yellowstone National Park is not large enough to exist in equilibrium with its disturbance regime, and that a steady state for the Greater Yellowstone Ecosystem as a whole is unlikely.

Very large but infrequent fires are characteristic of many landscapes in the central and northern Rocky Mountains. Surveys by Ayres (1901) in the Lewis and Clarke Reserve of Montana (which included what are now the Bob Marshall, Great Bear, and Scapegoat Wilderness Areas) showed that over 300,000 ha (750,000 acres) burned in the area in one year, 1889, and up to 136,000 ha in a single fire. About 100,000 ha burned in the Canyon Creek Fire in 1988 (Losensky 1990). Similarly, fires in the Coast Range of Oregon have burned as much as 200,000 ha (Spies and Cline 1988). In the Northwest, fires become smaller and less severe, but considerably more frequent, along a transect from the Washington Cascades to northern California (Swanson et al. 1990, Morrison and Swanson 1990).

Although most fires are mosaics, a minor portion of the affected acreage being of stand-replacement intensity, the immense scale of many natural disturbances provides a strong argument for establishing large reserves. Active fire suppression is simply not a reasonable option in these cases. Experience and research have shown that fire is a natural part of these systems and essential to their overall diversity; moreover, many fires are impossible to suppress (Christensen et al. 1989).

A core reserve, by itself, need not encompass a minimum dynamic area. The concept implies that all natural seral stages be maintained over time and that dispersal distances between similar habitats are surmountable by native species; but there is no reason to insist that a steady state of seral stages be maintained, for this may rarely occur in nature (Pickett and White 1985). The steady-state concept is useful, however, in the sense that reserves large enough to be close to steady state will likely experience lower extinction rates than reserves where habitat conditions fluctuate wildly over time. Larger landscapes buffer the effects of disturbance on diversity of habitats and species (Shugart and Seagle 1985). Thus, the scale of management planning, including core reserves and surrounding multiple-use lands, should encompass something approximating a minimum dynamic area whenever possible; the complex as a whole can be managed to maintain habitat diversity.

Conclusions

This article has reviewed some considerations for designing wilderness recovery networks at a regional scale. The spotlight has been on

North America, but projects of the type described here are urgently needed worldwide. I have emphasized terrestrial ecosystems for the simple reason that this is my area of expertise. However, protection and restoration of entire regional landscapes, as promoted by The Wildlands Project, are intended to maintain aquatic and terrestrial ecosystems alike. Nonetheless, many aquatic biota will require special recovery techniques, such as de-channelization of streams and elimination of dams and water diversion structures, in order to be healthy again. Furthermore, marine ecosystems, particularly near shore, are in serious jeopardy in many regions and need comprehensive recovery strategies of their own.

I have highlighted the needs of large carnivores in this article because they are often acutely sensitive to human activity and hence are among the best indicators of wilderness condition. However, the stated goals of The Wildlands Project should make clear that not just carnivores, but all of biodiversity is the target of our efforts. Many sensitive assemblages (for example, neotropical migrant songbirds, anadromous fish, freshwater bivalve mollusks, and declining amphibian species) will require focused recovery work for many years to come. Importantly, ecosystem-level protection does not imply that we neglect individual species or assemblages on the brink of extinction; endangered species legislation should be strengthened and rigorously enforced to help imperiled taxa.

No substitute exists for detailed on-the-ground knowledge of the ecology and natural history of a region. General theory and insights gained from other regions are helpful, but do not transfer directly to areas with different biotas and histories. A long-term conservation plan for a region should be hypothesis-driven and adaptive; that is, we should scientifically test various approaches and techniques to see how well they work, then adjust our management to reflect new knowledge. Activists should enlist the participation of ecologists and other scientists most familiar with a region; if the latter will not themselves get actively involved in a project (some are afraid of tarnishing their cherished credibility as impartial observers), they may at least provide information and guidance. If all else fails, become an expert yourself on the ecology of your region!

The discussions above should make clear that planning on a bioregion-by-bioregion basis is incomplete. Because of the huge areas required to support viable populations of some animals and the necessity for all species to be able to migrate long distances with climate change, inter-regional and inter-continental planning is mandatory. The Wildlands Project will facilitate planning among regions and provide access to critical information, both scientific and tactical, to activists and planners worldwide. We now need, all of us, to put this information and strategy into action.

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Wilderness, Myth, and American Character

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THERE IS A JOKE AMONG EMPLOYEES OF THE U.S. FOREST SERVICE—many of whom opposed passage of the 1964 Wilderness Act—that prior to 1964 only God could make wilderness but now only the U.S. Congress can. The joke refers to the act's prohibiting release of potential wilderness land to other use or designation until Congress judges its suitability for inclusion in the National Wilderness Preservation System. That language has resulted in great fuss and fury over our public lands.

Some 57 million acres in the coterminous United States still await action from Congress on its potential wilderness value. That is considerably more than present officially designated American wilderness—approximately 34 million acres, excluding Alaska.[1] Most of the disputed land lies west of the Mississippi River; in the state of Idaho, for instance, approximately nine million acres awaits release from the language of the 1964 Wilderness Act.

These figures indicate the extent to which wilderness designation is a political hot potato. It is also a philosophical hot potato, replete with paradox. Some philosophers hold the idea of wilderness to be purely an invention of the mind, a time-bound product of humanity's triumph in successfully inhabiting all but the most inhospitable portions of Earth. Others hold it be to something real and palpable: a place corresponding to its Old English etymology—"wildeorness"—that is, a place of wild beasts.

Much of the paradox in conceiving of wilderness stems from the paradox that is human nature. How do we account for ourselves? Are we the dark angels of our various religious conceptions or the natural bodies of Darwinian evolution—bodies that through a fluke of gambling nature happened to stumble upon consciousness? To what extent are our activities and actions "natural"? It matters, you see, for if *Homo sapiens* is, as Jared Diamond argues, simply a third species of chimpanzee,[2] we have, no matter what we do, wilderness all about us. We are one kind of beast; and so the literal "place of the beasts" contains us and all we have wrought—our art and poetry no less than our skyscrapers and sewage systems.

Most conceptions of wilderness, including most drawn from evolutionary naturalism, draw a sharp distinction between humans and the other "beasts" of nature. This line of thinking resolves one paradox only

[1] John C. Hendee, George C. Stankey, and Robert C. Lucas, *Wilderness Management*, 2nd ed. (Golden, Colo.: North American Press, 1990): 166.

[2] Humans and chimpanzees share 98.4% of DNA and diverged six to eight million years ago. See Jared Diamond, *The Third Chimpanzee: The Evolution and Future of the Human Animal* (New York: HarperCollins, 1992): 21.

to create another. Wilderness lands become, in the language of the Wilderness Act, areas "untrammeled by man, where man himself is a visitor who does not remain."[3] Thanks to the attractions of this idea, our wilderness lands are threatened by the very people who love them most. Some wilderness areas as so popular as sanctuaries from the hazards and trials of urban life that it is now virtually impossible to find solitude—one of the prime values of wilderness recreation. For better or worse the four federal agencies responsible for administering wilderness lands have been forced into "wilderness management"—a paradox if ever there was one. It doesn't take a philosopher to point out that managing something wild risks laying down conditions for its eventual domestication. For instance, winter feeding of elk and deer—a widespread policy of many state wildlife agencies—may over time tame animals whose present attraction is that they are wild. Someday perhaps the sole large mammal on Earth to be genetically wild (that is, whose breeding is left to the spontaneity of nature) will be *Homo sapiens*. Perhaps, though, not even we will remain genetically wild, given our technology and accompanying proclivity to intervene in the human genome.

In mentioning the air of paradox surrounding both the idea of wilderness and the practices of managing and preserving wilderness, I invite you to think of the role of metaphor in giving substance to our various conceptions of wilderness. The phrase *wilderness as* comes naturally to our lips. Among the diverse and contending images of wilderness to be found in the literature are wilderness as a wasteland,[4] as a gymnasium,[5] as a playground,[6] as a prison,[7] and as a pharmacy.[8] Specifically, I shall examine the claim that wilderness is a special kind of proving ground, with a special connection to American character and experience. That connection is best expressed by Wallace Stegner:

> Something will have gone out of us as a people if we ever let the remaining wilderness be destroyed; if we permit the last virgin forests to be turned into comic books and plastic cigarette cases; if we drive the few remaining members of the wild species

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[3] Public Law 88-577, Section 2 (c).

[4] "For I aske whether in the wild woods and uncultivated wast of America left to Nature...a thousand acres will yield the needy and wretched inhabitants as many conveniences of life as ten acres of equally fertile land doe in Devonshire where they are well cultivated?" John Locke, *Two Treatises of Government*, 2nd ed., Peter Laslett, ed. (Cambridge: Cambridge University Press, 1967): 316.

[5] "A wilderness that can be entered only by a few of the most physically fit will act as an incentive to myriads more to improve their physical condition." Garrett Hardin "The Economics of Wilderness," *Natural History*, 78, 6 (June-July, 1969): 26.

[6] Marvin Henberg, "Wilderness as Playground," *Environmental Ethics*, 6 (Fall 1984): 251-63.

[7] Thomas H. Birch, "The Incarceration of Wildness: Wilderness Areas as Prisons," *Environmental Ethics*, 12 (Spring 1990): 3-26.

[8] "In the United States a quarter of all prescriptions dispensed by pharmacies are substances extracted from plants.... Yet these materials are only a tiny fraction of the multitude available. Fewer than 3 percent of the flowering plants of the world ... have been examined for alkaloids, and then in limited and haphazard fashion." E.O. Wilson, *The Diversity of Life* (Boston: Belknap Press, 1992): 283-4.

into zoos or to extinction; if we pollute the last clear air and dirty the last clean streams and push our paved roads through the last of the silence, so that never again will Americans be free in their own country from the noise, the exhausts, the stinks of human and automotive waste.... We need wilderness preserved–as much of it as is still left, and as many kinds–because it was the challenge against which our character as a people was formed.[9]

The Character Thesis

Like most claims related to wilderness, this one generates its share of controversy. Supporters of what I shall henceforth call the *character thesis* point to the pride we in the United States take in our wilderness heritage. They point to our leadership in conservation and preservation–our historic firsts in establishing the National Park System and, later, the National Wilderness Preservation System. They point to the spread of the wilderness idea to countries ranging from New Zealand to Zimbabwe. Finally, they find in contemporary wilderness experience manifold echoes of good character–honesty, self-reliance, and simplification of wants, to name but a few.

Critics of connecting the wilderness idea to our national character point, first, to the historical relativism of our relationship to untamed nature. Less than a century and a half before Stegner waxed eloquent on the importance of wilderness to the American character, Alexis de Tocqueville told a different story:

> ... in Europe people talk a great deal about the wilds of America, but the Americans themselves never think about them; they are insensible to the wonders of inanimate nature and they may be said not to perceive the mighty forests that surround them till they fall beneath the hatchet.[10]

In the final analysis, though, historical differences between contemporary Americans and their ancestors need not trouble defenders of the character thesis. National character, like individual character, takes on the craggy lines of wisdom because of rather than in spite of turmoil and reversal of fortune. Ideals shift–that which is lost (or nearly so) gets appreciated when we no longer have it: innocence for one, wilderness for another. In addition, de Toqueville's remarks are generalized and composite; could he, for instance, have had the privilege of meeting Virginia's William Byrd II nearly one hundred years earlier, he would have found a man in whom wilderness sensibility was highly developed.[11] The reversal in American appreciation of wilderness, a story so ably told by historian Roderick Nash,[12] was not created *ex nihilo.* It had seeds, most dying on the hard granitic soil of public indifference, but a few nurtured against extinction until a field could be cultivated for them.

A second and more intractable problem for the character thesis lies in its ethnic exclusivity. Exactly *whose* character was formed by the "challenge" of wilderness? Not Native Americans–to them, according

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[9] Wallace Stegner, "The Wilderness Idea," in David Brower, ed., *Wilderness: America's Living Heritage* (San Francisco: Sierra Club Books, 1961): 97.

[10] Alexis de Tocqueville, *Journey to America*, J.P. Mayer, ed., George Lawrence, trans. (New Haven: Yale University Press, 1960): 335.

[11] For an account of Byrd's fondness for wild nature, see Roderick Nash, *Wilderness and the American Mind*, 3rd. ed. (New Haven: Yale University Press, 1982): 51-53.

[12] *Ibid.*

to Standing Bear, an Oglala Sioux, the land of North America was never wild in conception, but rather tame.[13] Not to African-Americans, enslaved first on plantations of the New World and later confined, many of them, to urban ghettos—"city wildernesses" in the parlance of Robert A. Woods' turn-of-the-century book, *The City Wilderness.*[14] Not to Polly Beamis, a young woman kidnapped in her native China and carried off to Oregon Territory. Her character was formed by fending off lustful drunks in saloons, where she served as hostess and eventually purchased her way to freedom by surreptitiously sweeping and collecting gold dust from the floors.[15]

For all these and other diverse peoples of America, wilderness land as conceived in the mainstream preservation movement played little role in shaping character. Few people actually experienced the frontier, whose "closing" Frederick Jackson Turner built into a powerful metaphor for America's first inward glance—our first hint that we might have to re-invent ourselves by, among other things, protecting wildlands and wildlife. Fewer people still—at least to a school of revisionist American historians currently challenging the Turner thesis—have reason to care about the frontier, its wilderness edge, or its supposed vanishing.[16] According to some of the revisionists, the idea that wilderness was an especially strong force in shaping the American character is a myth in an uncomplimentary sense—"myth" as in a false and possibly misleading tale.[17]

If the enthnocentrism of the character thesis is one problem, its vagueness as to the virtues engendered by wilderness experience is another. Theodore Roosevelt, for instance, thought of the wilds as a proving ground for virility, male camaraderie, and the honing of a warrior caste.[18] These perceptions are less than palatable in these decades of deep ecology and ecofeminism.

Fundamentally, then, the character thesis is in serious philosophical trouble. The main difficulty lies in selective readings both of character and of wild nature. Human character runs the gamut from the virtuous to the vicious, with numerous shades of each. What is more, some of our favored virtues are possibly inconsistent with each other. As Isaiah Berlin observes, the honor of

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[13] Luther Standing Bear, *Land of the Spotted Eagle* (Boston: Houghton Mifflin, 1933): 38.

[14] Robert A. Woods, *The City Wilderness* (Boston: Houghton Mifflin, 1898).

[15] See Ruthanne Lum McCunn, *Thousand Pieces of Gold* (Boston: Beacon Press: 1988).

[16] See for instance Patricia Nelson Limerick, Clyde A. Milner II, and Charles E. Rankin, eds., *Trails: Toward a New Western History* (Lawrence, Kan.: University of Kansas Press, 1991).

[17] "The imagined West is a mythic West. In its everyday colloquial sense, myth means falsehood.... Myths are a deeply encoded set of metaphors that may contain all the 'lessons we have learned from our history, and all of the essential elements of our world view.' Myths give meaning to the world. In this sense a myth about the West is a story that explains who westerners—and who Americans—are and how they should act." Richard White, *"It's Your Misfortune and None of My Own: A History of the American West* (Norman, Okla: University of Oklahoma Press, 1991): 615.

[18] "Hardy sports of the field offer the best possible training for war." Theodore Roosevelt, *The Wilderness Hunter* (New York: G. P. Putnam's Sons, 1900): 272.

Achilles cannot be harmonized with the mercy of Christ. These two species of virtue are incommensurable, as only disturbing figures like Machiavelli and Nietzsche have dared to proclaim.[19] When our own dark image is glimpsed darkly in the supposed mirror of wild nature, the difficulty is compounded. Wild nature may be, with Tennyson, "red in tooth and claw" or, with Annie Dillard, gentle as a spring day on Tinker Creek—an epitome of harmony and symbiosis. We search in wildness for what we want and, unsurprisingly, find it exactly as it "ought" to have been.

Yet for all its deficiencies—its cultural exclusivity, its vagueness as to what constitutes a virtue, and its tendency to shape wild nature after its own favored image—there remains something to be said for the character thesis. It has a ring that many Americans harken to; a ring, if not of truth, at least of innocently faithful self-conception. Conceive of the point this way: Suppose the liberty bell were to be rung, and we as a people were to hear it. Thanks to the bell's famous crack, the sound would not be faithful to its original—its "true" sound if you will. But would that matter? Would it even be relevant to the spirit the bell represents? We have, of course, many detractors of the ideal of liberty represented by the bell, and many of their criticisms are apt, pointed. Freedom has not been equally extended to all within the fabric of our nation, and that is a criticism whose measure we must take. It is not to be ignored, but neither is it to be made into the whole story. Let us ask the critic this: With what would you rather take your chances—a political system whose ideal is sounded by the cracked knell of the liberty bell, or a political system with no such symbol? I, for one, fervently believe in the positive power of ideals. Their appeal is non-rational, even ritualistic; but as an aspirant to philosophy, I have concluded that concepts alone mainly divide rather than unite human beings. We need symbols and their emotive associations. Among those symbols we need most is wilderness.

Stegner's words thus emphasize that, culturally rather than ethnically or personally, to be American is to conceive of ourselves as a wilderness people. The flaws in this thesis are both as prominent and as irrelevant as the crack in the liberty bell. I challenge you to read the political history of passage of the Wilderness Act and see in it anything but a robust populism stirred from the depths of our national self-conception.[20] Sometimes, thankfully, our ideals—erroneous and unflattering as they may appear under some lights—stir us to prefer the social good to the getting and spending by which we lay waste our individual powers. Since we must believe something about ourselves, I submit that belief in ourselves as a people shaped by wilderness is productive of greater good than of evil. In this light the character thesis becomes a different kind of myth—not a false and misleading tale, but a symbolic means of uniting us in celebration of something larger than ourselves.

My defense of this thesis, however, is fideistic rather than rationalistic. Reason alone is incompetent to penetrate and sufficiently articulate the mysteries of wild nature. Reason inevitably concocts its arguments with judicious concern for the other side. For every Wallace Stegner lamenting the production of plastic cigarette cases, we have a

[19] Isaiah Berlin, "The Originality of Machiavelli" in *Against the Current: Essays in the History of Ideas* (New York: Viking Press, 1980): 25-79.

[20] See Michael Frome, *Battle for the Wilderness* (Boulder, Colo.: Praeger Publishers, 1974) and Craig W. Allin, *The Politics of Wilderness Preservation* (Westport, Conn.: Greenwood Press, 1982).

Martin Krieger making the case for plastic trees.[21] In such instances, reason carries us into the realm of computer-generated virtual realities to ask, "Why not extinguish the real thing so long as the wilderness experience can be provided in surrogate form?" Quickly forgotten when reason has its generalizing, abstracting say is the joy of particularity—a dimension of experience open only to the "inherent imbecility of feeling," in George Eliot's phrase.[22] It is the joy of knowing a specific place or person as opposed to grasping a generalized category or purpose.

Here is Rockbridge County native and wilderness philosopher, Holmes Rolston, III, on the importance of particularity:

> Wildness is nature in what philosophers call idiographic form. Each wilderness is one of a kind, so we give it a proper names—the Rawahs, the Dismal Swamp. We climb Mount Ida or canoe on the Congaree River. Even when exploring some nameless canyon or camping at a spring, one experiences a concrete locus never duplicated in idiosyncratic detail. In culture, there is but one Virginia and each Virginian has a proper name. The human differences include conscious self-affirmations and heritages for which nature provides little precedent. But nature first is never twice the same. Always in the understory there are distinctive landscape features—the Shenandoah Valley or the Chesapeake Bay—with which the Virginians interact, each with a unique genetic set. Before culture emerges, nature is already endlessly variable. This feature is crucial to what we mean by wildness.[23]

Thanks to its endless variability, the best way of capturing the particularity of wilderness lands is through narrative. As Rolston observes, "There is no narrative in biology text, but a trip into wildness is always a story."[24] Each parcel in the National Wilderness Preservation System features stories with multiple plots and restless casts of plant, animal, and human characters wandering through a unique geography. The drama lies in the pure contingency of relations. Wilderness understanding depends on emotional singularity and kinesthetic presence more than on abstract generalization. It has more the imprint of natural history than of molecular biology. Please do not misunderstand: We need molecular biology too, for among other things it allows us to test the contingent relations described in wild nature, just as it does similar work in paleontology to test the integrity of claims in natural history. But the history itself—for instance, the evolutionary mixing some 70 million years ago of fauna from North and South American known to paleontologists as the Great American Interchange—cannot be replicated. We trace it in the fossil record, speculating about

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[21] Martin Krieger, "What's Wrong with Plastic Trees?" *Science*, 179 (1973): 446-54.

[22] "... emotion, I fear, is obstinately irrational: it insists on caring for individuals; it absolutely refuses to adopt a quantitative view of human anguish, and to admit that thirteen happy lives are a set-off against twelve miserable lives, which leaves a clear balance of satisfaction. This is the inherent imbecility of feeling, and one must be a great philosopher to have got quite clear of all that...." George Eliot, *Scenes of Clerical Life* (Oxford: Clarendon Press, 1985): 301.

[23] Holmes Rolston III, "Values Gone Wild" in *Philosophy Gone Wild* (Buffalo, N.Y.: Prometheus Books: 1986): 137-8.

[24] *Ibid.*, 140.

cause and effect, but our understanding is always in the form of a story, a narrative. (Note, I do not say *only* a story, for rousing tales need no apology so long as the teller's imagination is checked by integrity and concern for truth.) Narratives of natural history abound in re-constructed details of climate, predation, birth and rearing of young, migration, cataclysm, evolutionary branching, and extinction. As a complement, narratives of wilderness offer up miniature slices within the grander narratives of natural history.

Introducing "The Frank"

Let me therefore observe the particularity of wilderness by introducing you to the Frank Church River of No Return area in my adopted home of Idaho. Begin with the name and its particularity. Frank Church, a distinguished U.S. Senator from Idaho, was senate floor manager of the 1964 Wilderness Act. "River of No Return" is the name applied to Idaho's Salmon River. The name dates to the Lewis and Clark expedition when William Clark, searching for a water passage to the Pacific, followed the river into one of its spectacular canyons and pronounced its steep cliffs and fierce rapids to be impassable either by boat or on horseback.[25]

Continue to the particularity of the area. "The Frank," as it is called by its partisans, is the largest official wilderness area outside Alaska—over 2.3 million acres. Located in central Idaho, it is contiguous with two other wilderness areas, the 200,000-acre Gospel Hump, and the 1.1-million-acre Selway-Bitterroot. Many of the surrounding lands are *de facto* wilderness, awaiting Congressional determination of their status. Sheer size gives the River of No Return area outstanding wilderness qualities of remoteness, isolation, and an ecosystem that is as undisturbed as can be found in the continental United States. In fact, some ecologists and wildlife biologists regard the Frank and its environs as unique for containing wholly within its borders both the summer and winter ranges of all its large mammals. Even Yellowstone and Glacier National Parks do not qualify on this score, for many elk winter outside their borders. Nor do the huge Alaska wilderness areas qualify, given the tremendous thousand-mile-and-more migrations of the Arctic caribou.

Following procedures outlined in the Wilderness Act, the Frank was created by a Central Idaho Wilderness Act passed by Congress in 1980. Certain special conditions apply, creating special peculiarities of management. For example, though banned in most wilderness areas outside Alaska, planes may fly into the Frank, using any of eighteen primitive airstrips. Power boats, also generally banned from wilderness, are allowed on the Main Salmon River, which forms the 86-mile-long northern boundary. The more pristine Middle Fork of the Salmon—105 miles through the heart of the wilderness—allows only rafts, canoes, and kayaks. There are many small inholdings of private land—most of them along the two rivers and in the larger creek drainages. Finally, there is a special mining reserve where in a national emergency

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[25] Clark's journal entry for September 2, 1805, tells of the dangers of riding horses in the Salmon River canyon after all thought of traveling by canoe has been abandoned: "... proceded on thro' thickets ... over rockey hill Sides where our horses were in [per]peteal danger of Slipping to their certain destruction & up & Down Steep hills, where Several horses fell, Some turned over, and others sliped down Steep hill Sides, one horse Crippeled & 2 gave out." See *The Journals of Lewis and Clark*, Bernard DeVoto, ed. (Boston: Houghton Mifflin, 1952): 232.

extraction of cobalt, a strategic mineral, may be authorized.

Lest you are tempted to accept the view perpetuated by foes of wilderness designation that wilderness areas "lock up" the land so it receives no use, let me provide you with some facts to the contrary. In 1992, over 20,000 people rafted the combined Middle Fork and Main Salmon Rivers. Thousands more traveled the Main Salmon in their jet boats, craft powerful enough to ply the rapids of the river. Registered backcountry users, traveling by foot or pack animal (llamas are now common), numbered over 10,000 people, while in the months of September and October alone—hunting season—there were some 9,000 airplane passengers.[26]

The periphery of the wilderness is growing rapidly, with thousands of people moving each year into the Treasure and Magic Valleys of Idaho and the Bitterroot Valley of Montana. Many of these people are attracted precisely because of the proximity of the Frank and other wilderness lands. Indeed, a recent national survey shows that migration into counties containing wilderness land is heavily influenced by environmental quality and opportunities for outdoor recreation. Among recent immigrants, the proximity of wilderness was cited as a special amenity by 72% of the respondents. In contrast, only 55% of longtime residents cited proximity to wilderness as a special amenity.[27] Presuming that the new arrivals act on their expressed preferences, wilderness lands will be more and more heavily used as in-migration continues. All of these particularities create management headaches for the Forest Service. The wilderness portion of the agency's budget is minuscule. For instance, the North Fork Ranger District, responsible for management of one fifth of the Frank, has a total wilderness budget, including overhead, of only $100,000.[28] Even this paltry sum is considerably larger than the wilderness budget for the other four ranger districts with responsibility in the Frank, for the North Fork district patrols the Main Salmon River, where most of the human impact is concentrated.

Somehow, despite pressure from those of us who love it too well and from others who abuse it by poaching or by littering, the Frank remains a truly magnificent political achievement. It remains so, because as a place it is exactly that—magnificent. Seeking inspiration, I spent a week in the heart of the wilderness in mid-February of 1993. The trip gave me a story and a summation all in one.

An American Serengeti

I was headquartered on Big Creek, at a former outfitter's ranch now maintained by the University of Idaho as a Wilderness Research Center. My companions were two wildlife biologists—Jim Peek and Torstein Storras, able guides with trained eyes.

In mid-winter most of the large ungulates—elk, mule deer, and bighorn sheep—are concentrated in the drainages. In six days, we saw over one hundred elk and one hundred bighorn sheep. We also spotted sixty or so mule deer. The animals graze in large numbers on the grassy, south-facing slopes, which are largely without snow even in a hard winter like that of 1993. The

[26] Figures from Rogers Thomas, District Ranger, North Fork Ranger District, during presentation to Edwin Krumpke's "Wilderness Management" class, University of Idaho, February 9, 1993.

[27] See Gundars Rudzitis and Harley E. Johansen, "How Important is Wilderness? Results from a United States Survey," *Environmental Management*, 15 (1991): 227-233.

[28] Figure from Rogers Thomas.

north slopes, by contrast, are thickly forested in Ponderosa pine and buried under two or more feet of snow. The contrast between south-facing and north-facing slopes is exotic and decisive: A south slope is a skyward-tilting Serengeti, rich with life and motion; a north slope is a Black Forest primeval, emptied of the ungulates and hence seemingly as frozen in time as in temperature.

The predators know this division well, and among the sheep and elk and deer tracks are tracks of cougars, bobcats, and coyotes. (The bears, of course, are hibernating.) Each day's outing proved a lesson in predation: A goshawk, for instance, left the feathers of a rough grouse or chukker partridge for us to examine nearly every morning. So too for the cougars: We found numerous kill sites, some new and some old; some with the bones still intact; some with bones scattered by coyotes. In one case we came on fresh cougar tracks leading away from the carcass of an elk calf, still warm to the touch. The calf, its thick neck snapped and lying on its haunch, had been eviscerated. Only a small portion along its spine had been eaten. We guessed the cougar had been scared off from its feeding by our approach, and though we scanned for an hour with our binoculars in the craggy rocks of the canyon, we never spotted it. I'm sure the cougar could see us, but was not about to return the favor.

Two days later—weather crisp, cold, and beautifully clear—we set off for the juncture of Big Creek with the Middle Fork. Walking this day was a treat, for the crusted snow held without our sinking too deeply into it. We passed our usual complement of elk and bighorn sheep, watched a golden eagle rise from its nest in one of the side canyons, and admired some 3,000-year-old pictographs left on the canyon walls by ancient hunters. We then entered a steep and narrow canyon much like the one, twelve miles west, where we had found the fresh elk carcass. Ideal cougar terrain: ample concealment, narrow passages to confine the prey, and high rocky walls for hurtling down unseen and unsuspected. At a bend in the trail, we encountered another fresh cougar print, smaller than the earlier one; probably a female. Our excitement rose: Perhaps we would find another fresh kill.

Around the bend lay a scene of carnage beyond anything we had anticipated. We first encountered an eight-foot diameter dish of blood, glistening red against the white of the snow. The bloody patch lay at the edge of a precipice marked with bloody striations indicating the path of a body fallen forty feet down into the creek. We gaped in awe, peering over the precipice. Then we walked ten feet farther, only to find a second bloody, dished-out area in the snow. Like the first, this one was eight feet in diameter; also like the first, it offered clear evidence of a body's plunging off the precipice onto the snow at creek's edge. Growing out from the walls of the precipice was a small mountain mahogany bush. Its tough bark was shredded, torn away, leaving its blond wood exposed and covered in blood.

There were cougar tracks all around, but we were too excited initially to measure or sort them out. Seeking the carcass of whatever had been killed, we circumvented the precipice to search beneath it at water's edge. Nothing, no carcass. Puzzled, we inspected the tracks. Two bloody sets of cougar prints moved up the slope, side by side, separated by perhaps three feet. Another set meandered off through the brush, finally rejoining the main trail. When we reached the trail, we were astonished to confront bloody cougar tracks—all pointing toward us—for as far as we could see. Not just a few spots or flecks of blood, but great smears of it.

We returned to the two patches of blood above the precipice. With no carcass to be found, we looked for hair: Perhaps the cougar had attacked a bull elk, weighing upward of twelve hundred pounds, and been gored. But there was no elk hair. No deer hair, no wool from the bighorns. Only cat hair, great tufts of it.

Heading downstream, we followed the cat prints. From time to time the prints widened, showing where a cougar had clawed the snow, apparently in agony. We paced on, eyes fixed on the trail: red on white, red on white, red on white. We walked for twenty minutes, a full mile. "We've got to find something soon," Torstein muttered, "one animal *can't* have lost this much blood!"

At long last we came to another bloody depression, long and narrow, the imprint of a wounded cougar lying in the snow. On the slope ten feet above was another such outline. Here was the initial site of the conflict...or at least, that is what we thought until our eyes went up. Up, up, up, high along the snow-covered rocks, the canyon so steep and narrow as to banish the winter sun even at mid-day. What we saw was a dished-out slide, as bloody as the tracks we had followed, created by an animal's four-hundred foot plunge down the slope.

As we scrambled up the pitch, Jim reported flecks of blood splattered on the snow five meters from the slide. We came to the end of the blood and continued climbing, following the depression scooped out by the falling body. It went on, bloodless, for another hundred feet. There, immediately below where the canyon rose high enough for the sun to melt the snow, we found the fresh prints of a large cougar. The animal had walked in a traverse of the slope, then suddenly bounded for fifty yards before crashing down uncontrollably.

During an excited lunch on the steep walls of the canyon, we pieced together what had happened.[29] One male cougar, lurking in the rocks above snowline, had pounced on another—the one traversing the slope. They slid down together, biting and clawing for the first hundred feet, at which point one of them sank tooth or claw into an artery of the other. The bleeding began, dyeing the snow and spurting the blood five meters downwind. They crashed into the bottom of the canyon. The wounded cougar lay below; the

[29] By stretching credulity to the breaking point, the evidence is consistent with another explanation—namely, that a single cougar had been shot from the air by an unscrupulous hunter. Though this possibility cannot be disproven, it depends on highly improbable circumstances that raise many unanswered questions. The attack would have had to occur in daylight, and we had neither seen nor heard aircraft in the area for days. To shoot a cougar moving at full speed from a fixed-wing craft would be a surpassing accomplishment, and use of a helicopter at such a remote site is unlikely. Also, if the cougar had been shot, why had it not bled for the first hundred feet of its slide down the slope? In addition, its later behavior seems very unlike that of a wounded animal. Why did it stay out in the open rather than flee for cover? Why did it shred the mahogany bush? Why did it thrash around in two different spots, leaving bloody, eight-foot diameter scoops in the snow? Why did it fall, not once or twice, but *three* times down the precipice into the creek? Why, on its second climb back up the precipice, did it follow its previous tracks at a consistent intervening space of three feet? Why, on what would have been its third climb up the precipice, did it suddenly stop bleeding and pace—apparently undisturbed—from the scene?

other, its belly matted with blood from its rival, lay ten feet above. They hissed and snarled, but kept their distance. The wounded male finally fled upstream along the trail. The competitor followed. They battled once again at the precipice, both falling onto the shore below. They paced uphill alongside each other, snarling but keeping apart. One of them shredded the mahogany bush, perhaps seeking to intimidate the other. Again they fought, creating the second dish of blood. Again both fell, this time into the creek. Only one of them, as the tracks clearly showed, got out. The other—dazed, perhaps already dead from lack of blood—slid under the ice to await the spring thaw. The victor returned to the scene of the two battles above the precipice, then headed upslope. Its bloody tracks could be followed, but the blood thinned out; the trail reached the rocks, where we could follow flecks of blood for a short distance. Then nothing.

At the time I witnessed this scene, I was one of only four people within a fifty-mile radius. Surrounding us, then, in each of the hundreds of other creek drainages, were the tracks, the evidence, the leavings, from thousands of similar stories. All of them were gone with the thaw, as was the cougar carcass in Big Creek, washed into the Middle Fork by April torrents. But what is magnificent and enduring is the wilderness itself, complete with the ennobling thought that somewhere in this great continent of ours, nature can still be so prodigal as to waste the life of a lithe, fierce, full-grown cougar.

Still, we must guard against generalizing too readily. Fights among cougars are far from an everyday affair. Males use bluff, scent markings, and intimidation to establish their territories and avoid encounters. Even when they do fight, the results are seldom fatal. Nature, though, is a gambler, a lover of chance and contingency; a sucker for particularity. She even loves a good joke—one in tune with American character, myth, and experience. The carnage we witnessed took place on February 14—and so, though lacking guns and gangsters, constituted a St. Valentine's Day Massacre.

Love of narrative for its own sake may be exclusively a human trait. But our characters are drawn from life, and animals are unequivocally the favorite characters of our young. (Imagine for a moment, children's literature without animals.) Will we have wild animals for our story lines of the future? Not unless we protect their habitat and their freedom.

Wilderness, then, is less about the mythic American character than about characters who live their natural lives apart from us. Stories such as I have just told, on an errand outside the wilderness, are scripted by powers larger than human. Nature and narrative fit hand in glove. If we will let nature abide wildly in some few remaining portions of Earth, we will be immeasurably richer for it. We will not only secure a future for coming generations, we will secure stories for them—stories of wonder, of kinship with other living beings, and of richness and fecundity from a prodigal source. Only if we succeed in preserving wilderness lands will these stories have a moral dimension, for only then will they tell of our humility and self-restraint rather than of our craving for excess.

Remembering Abraham Lincoln: History and Myth

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ABRAHAM LINCOLN IS PERHAPS THE MOST MYTHOLOGIZED FIGURE in American history. In the years following his death, the nation's memory of him assumed two rather distinct images: on one hand, the historic Lincoln—husband and father, lawyer, politician, and president; and on the other, the larger-than-life Lincoln—the mythic presidential god, the democratic ideal tragically sacrificed at the dawn of national peace. Other than such tributes as town, street, and highway names and the five-dollar bill, one important means of remembering Lincoln has been to set aside sites commemorating various stages of his life. Besides those historic places administered by state, local, or private interests, several sites honoring Lincoln exclusively are now in the National Park System. A brief survey of the national park units reveals how each reflects the historical or the mythical images of Lincoln.

Three of the Lincoln sites present a generally straightforward historical portrayal of the man. At the Lincoln Home, in Springfield, Illinois, one learns details of his legal and political careers and his friendships and family life. Not much in evidence here are the mythic, larger-than-life images of Abraham Lincoln.

At Ford's Theatre, in Washington, interpretation also focuses on the historic Lincoln—accounts of his attending the theater, the assassination itself, and Booth's escape—obviously a very brief period in Lincoln's life. Although the assassination served as a catalyst, with martyrdom providing much of the emotional power of the ensuing mythic perceptions of Lincoln, only recently has interpretation at Ford's Theatre dealt to any extent at all with the mythic Lincoln imagery.

The Petersen House, across the street from Ford's Theatre, is presented through a straight historical approach. One learns of the night's events—the intense drama and the frantic activities of friends and associates while Lincoln lay unconscious, then died quietly the next morning.

Barely evident here are elements of the mythic Lincoln associated with his death. The assassination was cataclysmic to those present (as well as to much of the nation itself); and, allegedly, in the moments following Lincoln's death, came the famous statement attributed to Secretary of War Edwin M. Stanton, that now Lincoln "belongs to the ages." At least in retrospect this statement served as a kind of prelude—a sym-

bolic transition, ultimately leading to the mythical perceptions of the man.

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In marked contrast to places emphasizing the historic person, three other sites feature impressive memorials which openly suggest the heroic Lincoln, the civic god who saved the Union, then gave his own life. They tell us more about the nation's veneration of Lincoln than about the historic individual himself.

On a hill on what was once the Thomas Lincoln farm, near Hodgenville, Kentucky, stands an imposing granite and marble temple built in the early 20th century in a classical Greek design. Within this temple is enshrined a one-room log cabin, the "traditional" Abraham Lincoln birthplace cabin. In the decades after the assassination, the birthplace farm became a sacred, hallowed site for many Americans, who in time purchased this land and erected the temple–clearly a tribute to a god-like president, the nation's savior born in humble circumstances.

The purported birthplace cabin has an unusual history. Years after the assassination, it was shipped around the country to be exhibited at numerous fairs, intermittently stored here and there, and then placed in the newly built temple a few years after the centennial of Lincoln's birth. However, detailed scholarly research has since shown that the enshrined cabin is very likely not the actual structure in which Lincoln was born–the logs are probably not the same. What is more, in order to fit the architect's design of the temple's interior space, two to three feet of the length of the cabin were sawed off so it would fit inside the temple. Thus, with these complications, the hallowed qualities of the structure may be somewhat diminished.

There is, moreover, some evidence suggesting that during storage between exhibits, the logs of the Lincoln cabin may have gotten mixed in with logs from the Jefferson Davis birthplace cabin–as both structures were at times exhibited at the same fairs. If true, this certainly would confuse the matter of hallowedness–a situation even more confounding if *neither* cabin is authentic, which indeed may be the case. In any event, the Abraham Lincoln birthplace cabin and the temple stand as symbols venerating a president and the potential of the common person–an affirmation that any one of us may aspire to the nation's highest office.

Other features at the birthplace include the remains of a venerated spring and tree, with which the young Abraham may have had direct contact (even though his family left this farm when he was only two years old). The spring, recessed into the hillside, has been landscaped with native stone and resembles a grotto. A stone bench invites contemplation at the spring. Nearby, is the preserved stump of the ancient and revered "Boundary Oak," which had to be cut down in the 1980s due to disease. Not far from the stump, a young white oak tree, apparent descendant of the Boundary Oak, is carefully nurtured as the designated successor.

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The Lincoln Boyhood National Memorial, in southern Indiana, site of his home from 1816 to 1830, even more strongly reflects the deification of Lincoln. The site's overall landscaping, based on a design by Frederick Law Olmsted, Jr., is in the shape of a cross. Located at the top of the cross is a semicircular memorial building (ca. 1943) with, on one end, the "Lincoln Chapel," and, on the other, a memorial room honoring Nancy Hanks Lincoln, the president's sainted mother. As originally

constructed, the chapel and memorial room were connected by a long covered walkway, known as the "cloister."

In bas-relief on the front of the cloister are sculpted limestone panels depicting major periods of Lincoln's life—the Kentucky, Indiana, Illinois, and Washington years. The central panel includes the famous pronouncement, "And now he belongs to the ages." This panel also graphically depicts the apotheosis—the emergence of the new American saint—a robed Lincoln ascending toward the heavens.

Along the main axis of the landscaped cross is located the grave of Nancy Hanks Lincoln. It was the mother's unmarked grave—and not specifically the site of the president's boyhood home—that first attracted people to this place in the years after the assassination. In 1872 a permanent marker was placed at the grave. Ultimately, this site became a hallowed shrine to which annual Lincoln Day pilgrimages were made.

Of all the Lincoln sites, it is here, in the woods of southern Indiana, that the mother has received special veneration—at times as great as that given her martyred son—a reverence that suggests a parallel to the adoration of the Virgin Mary. For years this entire memorial park was in fact named in honor of Nancy Hanks Lincoln. But in 1962 the memorial's designation was officially changed to "Lincoln Boyhood," reflecting a decreased emphasis on the mother, in favor of the son.

Leading from near the mother's grave toward the site where the Lincoln cabin is believed to have once stood is the Trail of Twelve Stones—a striking analogy to the Stations of the Cross. Along the trail are stones taken from sites associated with Lincoln, for instance a stone from Gettysburg Battlefield and another from the White House. Recessed areas along the trail allow for quiet contemplation.

The trail leads to a bronze casting (done in Munich, Germany, in the mid-1930s) of the sill logs and hearth stones of a typical 19th century pioneer cabin such as the Lincolns might have had. This monument is another reminder of Abraham Lincoln's humble origins, and it stands at the opposite end of the landscaped cross from the bas-relief depiction of his life and apotheosis.

The Boyhood Memorial is replete with religious symbolism. But over the years, National Park Service managers of this shrine allowed changes to some of the symbolic features. The cross-shaped landscape design was de-emphasized and not maintained in a recognizable way, and six of the stones were relocated along the trail.

In addition, the memorial building was partially converted for office and interpretive use. This included changing the cloister from a covered walkway into a fully enclosed space, with an exhibit area, theater, administrative offices, and restrooms added to the rear of the building. More than any other alteration at the boyhood site, this 1960s conversion of the cloister—from what was solely a memorial structure (built in heart-felt reverence by the people of Indiana) to a largely administrative building—revealed the National Park Service's astonishing lack of understanding of this site and its various symbolic components. Altogether it is a glaring example of mismanagement of a memorialized historic site.

In the last decade, however, in recognition of the value once placed on these symbols, more enlightened Park Service managers returned the stones and restored the landscaping to honor Olmsted's original design. Only the memorial building remains substantially altered from the appearance and function originally intended by the Indiana Lincoln Union and the State of Indiana, which together built the structure.

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Overall, after some restoration at the Boyhood Home, the icons at both the Birthplace and the Boyhood Home are largely intact, except for the cloister. These artifacts express the reverential attitudes which earlier generations of Americans held for Abraham Lincoln. Nevertheless, at both sites the interpretation (through films, exhibits, brochures, etc.) veers away from a direct, substantive encounter with the mythic Lincoln, and instead concentrates on the historic Lincoln—mostly the experiences of his family in frontier Kentucky and Indiana.

This focus on the historic Lincoln is particularly evident at the Boyhood Home, with the interpretive efforts centered around a log cabin moved from elsewhere in Indiana and placed near the foot of the landscaped cross, not far from the bronze casting. Truly a very old structure, the cabin (along with its associated outbuildings) is used to present a living history interpretation of farm life during Lincoln's time. In the late 1960s this attempt at historical realism was introduced into a landscape of otherwise largely symbolic features (features which at that time were being either purposely altered or largely neglected).

Today's public may be much less comfortable than earlier generations with the overtly worshipful aspects of the birthplace and boyhood sites. The history of the "real" Lincoln seems preferred to the psychological and historical realities of the mythic Lincoln. Under these circumstances, the monumental religious features of the Birthplace and Boyhood Home may appear rather anachronistic, and may not be readily understood by the contemporary visitor. Indeed, to an unwary traveler the first glimpse of the stately granite and marble Birthplace temple in the backwoods of Kentucky may come as a shock.

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On the other hand, in Washington, the Lincoln Memorial—which stems from the same general era of veneration as the icons at the birthplace and boyhood sites—gives evidence that the symbolic strength of the mythic Lincoln very much endures. Crowning the west end of the Mall, the Memorial is the artistic and architectural apex of America's many tributes to the Civil War president. Completed in 1922, the heroic statue of the brooding, compassionate Father Abraham enshrined in a white-marble temple is unequivocal in its portrayal of the deified Lincoln. It is today the most noted repository of the public's memory of Lincoln. Here more than anywhere else, the mythic Lincoln image sustains much of its old power—God the Father, the deity enthroned.

Nevertheless, in a small exhibit room to one side of the Memorial's stairway, National Park Service interpretation of the site has traditionally focused on such matters as construction of the building—the "marvels of engineering" approach (size, weight, etc.)—avoiding any engagement with the mythic Lincoln image. Only recently, an exhibit was installed which discusses to some extent the public image of Lincoln, as well as use of the Memorial for civil rights and related kinds of gatherings—a use fostered and nurtured by the Memorial's symbolic power.

Overall, at all three sites portraying the mythic Lincoln the National Park Service has felt far more comfortable with routine historical detail. While it is in charge of sites exemplifying the complex civic religion surrounding Lincoln, the Park Service is moving only very slowly toward a better understanding of the mythic Father Abraham.

On the interior walls of the Lincoln Memorial are inscriptions of the Gettysburg Address and the Second Inaugural Address. Lincoln's very ability to understand and to articulate eloquently the meaning of the historic events engulfing his generation in turn contributed to his being elevated beyond ordinary history and into mythic status. Myth is often derived from history—in a sense it is the other side of the coin, a different perception of the same events. In the years since his death, Lincoln became so mythologized that the myth itself has become historically important.

Normally, biographies of Abraham Lincoln end with his assassination. But a full understanding of Lincoln must go beyond that. Afterward, his mythic image emerged as a vivid, heroic persona, growing in scope and complexity until, regardless of any shortcomings Lincoln may actually have had, he became a kind of moral standard, a symbol of virtue, justice, and decency that has affected generations of Americans.

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Parks for Life: Action for Protected Areas in Europe

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Introduction

EUROPE PRESENTS A PARTICULAR CHALLENGE to international cooperation in the field of conservation. With 35 countries—and a multitude of languages, cultures, and traditions—meaningful collaboration is inevitably difficult to achieve. Indeed, until the recent meltdown of East-West tensions, it was virtually impossible across the continent as a whole.

On the other hand, although much of Europe is highly urbanised, it also presents some unique opportunities for conservation. Compared with many other parts of the world, it is a wealthy region; it is spared the sight of desperately poor people destroying nature in order to survive. Human population numbers are relatively stable (indeed in some countries they are falling). Much of Europe has a surplus capacity in food production, and so there is no compelling need to fell forests or drain wetlands (which is not to say that forests and wetlands are safe). Public awareness of environmental issues is relatively high, although this varies greatly between countries. And there is a new climate abroad o f international collaboration—though scarred of course by the tragedy of Bosnia and threatened by the revival of nationalism.

A recently published IUCN report, *Parks for Life: Action for Protected Areas in Europe* aims to seize these opportunities and show how a more effective network of protected areas—national parks, regional parks, nature reserves, protected landscapes, and so forth—can be established in the region. It is an unusual document, both for the process by which it has been prepared and for its contents.

The story begins in Caracas, the brash capital of Venezuela, which in 1992 was the venue of the Fourth World Congress on National Parks and Protected Areas. The Caracas Congress received reports on the status of protected areas in each region of the world, including Europe. The main findings for this region were:

- Although Europe has many protected areas (up to 20,000 by one estimate), there are dramatic differences from one country to another. Less than 1% of Ireland is protected; only 1.67% of Greece; but nearly a third of Denmark. In general the coverage and management of protected areas are least effective in Southern European countries.
- Whereas over 40% of the area under protection globally is in Category II, National Parks, of the IUCN categorisation (i.e., protected areas managed mainly for ecosystem protection and recreation), in Europe these account for barely 10%. Instead, over two-thirds is within Category V, Protected Landscapes/ Seascapes, (i.e., protected areas managed mainly for landscape protection and recreation). This reflects both the limited extent of wild areas in Europe and the variety and richness of its cultural landscapes. But it also indicates that little of Europe (some 3%) is given the higher degree of protection provided by categories I-IV.
- Protection of the marine environment generally lags behind

that on land, and the situation in the Northeast Atlantic and the North Sea is particularly poor.

- Although over 10 million hectares—an area larger than that of Hungary—has been added to the protected area estate of Europe since 1982, many countries still have large areas of natural or semi-natural vegetation rich in biodiversity which are not included within protected areas. This is especially true of former Communist countries in Eastern and Central Europe.
- Most protected areas in Europe are under strong pressure and subject to a wide range of threats. Those facing Mediterranean wetlands and coastal ecosystems are particularly acute, but agriculture, pollution, industry, and tourism endanger parks and reserves in every country.
- The involvement of local communities in the protection of such areas varies greatly; there is much scope to increase local support and public participation, particularly in Southern Europe.

The situation in Central and Eastern Europe is particularly interesting. The protected areas systems of several countries (e.g., Bulgaria, the Czech Republic, Estonia, Poland, and Slovakia) are of long-standing and as well developed as any in Western Europe (although those of Albania and Romania are as yet underdeveloped). However, the recent changes have brought dangers, the greatest of which is land re-distribution, either as re-privatisation (in which publicly owned land is returned to its former owners) or as privatisation (in which the land is distributed to the private sector). This policy puts publicly owned land in nature reserves and national parks at risk. On the other hand, the political changes have favoured open, public debate on environmental issues.

Recent developments in Western Europe have also been significant for protected areas. The European Union (EU) is the only supranational law-making body in the world, and the only regional body to which nation states have surrendered significant elements of their sovereignty. Many aspects of environmental and conservation policy fall within the EU's competence. Under two recent EU Directives (i.e., laws of the Union), the 12 Member States (soon to be 15 or 16) of the Union are creating a network of enforceable EU protected areas. But the Union's other policies in agriculture and so on still cause great damage to nature and landscape.

The Development of the Regional Action Plan

The Caracas Action Plan called on the Commission on National Parks and Protected Areas (CNPPA) of IUCN to prepare Regional Action Plans to address priority problems identified by the Congress. As a result, such CNPPA-led plans are at varying stages of development in several regions: East Asia, Africa, South Asia, and Central America for example. But it is the action plan in Europe which has been the most ambitious.

The preparation of the plan began in January 1993, and was completed twenty months later with a launch in September 1994. The process has been steered by a consortium of bodies put together by CNPPA: The Federation of Nature and National Parks of Europe (FNNPE), the World Conservation Monitoring Centre, the World Wide Fund for Nature, BirdLife International, and the European Programme office of IUCN. They, and representatives of some of the government funding bodies, came together in a Steering Group under the chairmanship of the author in his former capacity as Deputy Chair of CNPPA. The Group directed and guided the work of the project co-

ordinator, Hugh Synge, an expert botanist.

At first sight this may appear a very straightforward account–the usual combination of a steering group of various interests overseeing the work of an expert. However, the real thrill of the process of preparing the plan has been that this rather "ivory tower" approach was eschewed in favour of a much more participatory one. Thus the plan is the product of several hundred contributions from around Europe; and the role of Hugh Synge has been to reflect these varied views in the process of preparing the plan, knitting together the contributions and adjusting the balance of the plan in light of guidance from the network. Participation is reflected also in the number of organisations which have helped with money, and in kind, to bring the task of writing and launching the plan to a successful conclusion.

In January 1993, a small booklet was sent to all 270 IUCN members in Europe (35% of all IUCN membership), to the 90 or so individual members in Europe and to the 80 or so institutional members of the FNNPE. This defined the region of Europe for the purposes of the exercise as eastwards to the borders of the former Soviet Union, but including the three Baltic States (and therefore much more than the present 12 countries of the EU). It also explained the aim of the plan, proposed an initial structure, and requested contributions of material, ideas, even draft chapters. Over 120 substantive contributions were received by June 1993, when the first draft was reviewed at Nyköping, in Sweden, at a CNPPA regional session. Detailed examination in workshop sessions at Nyköping was followed by extensive rewriting and restructuring of the plan.

A second draft was launched in November 1993 at a conference at Maastricht, in the Netherlands, convened by the Governments of Hungary and the Netherlands to discuss the development of a European ecological network (or EECONET), a concept which is enthusiastically endorsed in the plan. This second draft was also subject to critical review and subsequently detailed workshops were convened to address sections on Southern Europe and on the role of education, both of which were felt to be in need of more work. The final version was drafted between May and July 1994, and launched on 19 September under the title *Parks for Life: Action for Protected Areas in Europe.*

As the process went from stage to stage it generated increased interest. Thus:

- By the time of the final version, the army of substantive contributors, both organisations and individuals, had grown to well over 200, from every one of the 35 countries of Europe.
- Funding came from government departments and agencies in Austria, Denmark, Germany, the Netherlands, Norway, Sweden and the UK; and from WWF.
- The Governments of Spain and France have expressed interest in providing funds for the translation of the full text into Spanish and French.
- The Government of Finland and Finnish Forest Industries provided the entire printing production for free.
- The Royal Society for Protection of Birds (UK) donated design services and the drafting of the summary and popular versions.
- A Slovenian industrial enterprise sponsored a key workshop.
- International bodies, like the European Commission, the Council of Europe and UNESCO, acknowledged the importance of the plan and its recommendations.
- The plan was endorsed by the General Assemblies of FNNPE (in

Perth, Scotland, September 1993) and IUCN (Buenos Aires, Argentina, January 1994).

Launching the Plan

If the process of production was an unparalleled exercise in collaboration, so too was the launch programme, designed to give *Parks for Life* the maximum impact at the European and national levels. An initial European launch in Brussels involving the Director General of IUCN was accompanied (and followed) by a whole string of events across Europe from Finland, Poland, and the Czech Republic to the UK, Ireland, and Spain. In all, no less than 28 national offers have been made to launch the plan. These have varied from press conferences to seminars involving Ministers, and from indoor meetings to events held in a national park or a nature reserve. The full version is expected to be printed in four languages: English, French, German, and Spanish. A summary and a short popular version have been made available for translation into other national languages, from Finnish to Slovakian, and is expected to be translated even into some regional languages, such as Welsh and Catalan.

Thus *Parks for Life: Action for Protected Areas in Europe* has been a unique exercise in partnership and joint "ownership." If, as is often said, the process is as important as the product, then *Parks for Life* is in a class of its own among European environmental initiatives.

In fact, the entire exercise is an excellent example of how IUCN—the World Conservation Union—can operate as a *union*, involving its members in the shaping of conservation policy. By bringing together governments and non-governmental organisations, IUCN provides a unique forum, ideally suited to a decentralised, network operation, such as the preparation and launch of a regional action plan. Moreover, the story of *Parks for Life* accords well with two strategic developments in IUCN: towards the greater regionalisation of action, and working more through IUCN's members.

The Aim and Vision of the Plan

But what about its content? What vision does it aim at, what does the plan call for, and what are the prospects of that call being heeded?

At the heart of the plan is a vision, based upon the aim of the plan: *to create an adequate, effective and well-managed network of protected areas in Europe.* There are four themes to this vision, and to the plan:

1) Placing Europe's protected areas in their wider context:

- The European protected areas network should be well integrated into all other parts of national life. This means that the protected areas should be embedded in **regional planning** and that policies for related sectors such as **agriculture, forestry** and **tourism** would be environmentally benign.
- Most protected areas should either include or be surrounded by **support zones** where land is used in ways that contribute to conservation aims.

2) Addressing priorities at the European, sub-regional, and national levels:

- The protected areas should form an interconnected **network**. This will require corridors and stepping stones between them. Representative samples of all the ecosystems should be included.
- The network should include most **large remaining areas** of semi-natural and natural ecosystems, managed principally to conserve or restore nature, with natural succession as the dominant process. This means better protection in many existing national

parks and an increase in their overall coverage, as much as half or more from 1994 levels.

- Other areas, usually large, should be managed to protect **unique landscape qualities**. This requires that the management capacity and conservation status of many protected landscapes be raised.
- The network should include one or more viable populations of **species threatened** on a European scale. This will require more nature reserves and, for EU Member States, the full implementation of the ambitious Natura 2000 programme.
- Systems of **marine protected areas** should be created and effectively managed–in the Northeast Atlantic, the Baltic, and the Mediterranean.
- In Eastern and Central Europe, there should be **no net loss** in the protected area systems following privatization and redistribution of land to former owners.

3) Strengthening the planning and management of Europe's protected areas.

- There should be effective **laws** to underpin the establishment and management of a range of protected area types.
- Governments should develop effective **institutions** to plan and manage the protected areas, and would provide adequate funding.
- For each protected area there should be a **management plan**.
- Within large protected areas, **zoning** should be the usual approach, reconciling uses such as traditional farming and tourism–and the resulting benefits to local people–with conservation of nature and landscape.
- The professional status of **protected areas staff** should be raised. This means staff should be adequate in numbers and have sufficient qualifications and skills. Good training should be available to all.

4) Creating a climate for success:

- Protected area agencies should work more closely with **local communities**–co-operating with them in management–and drawing on the support of many other sectors of society.
- The **public** should value their protected areas more highly, seeing them as a vital part of their nation's road to sustainable lifestyles in harmony with the environment.
- Governments should **co-operate** with others, and with international organisations, to ensure the success of protected areas at a national and European scale.

To realise this vision, *Parks for Life* does not provide a top-down blueprint of what should happen where, identifying particular places which need particular attention. Rather it makes *recommendations* for action to be taken at the national level. It also *endorses* a number of important initiatives already underway which will strengthen the role of protected areas (such as the EU's Natura 2000 programme, which will create a network of sites protected under EU law in the countries of the Union). The third kind of action are 30 *priority projects* calling for international leadership, and which will have an important gearing function.

Some examples of these priority projects are:

- A programme to raise the standards of land-use planning in relation to protected areas;
- An initiative to identify and publicise the conservation value of military land which can be added to the protected area estate;
- A programme of study visits for protected areas staff from Eastern Europe to Western Europe;

- A feasibility study of a European rural landscapes convention;
- A project to support the development of more trans-frontier protected areas;
- A programme to streamline international protected area data bases; and
- A key IUCN appointment—to provide oversight and co-ordination for the implementation of the plan as a whole.

Many of these projects have identified lead agencies, and some are already getting under way.

The plan also has great value as a reference document. For example, it contains the first comprehensive list of all the European initiatives for conservation (nearly 40); it summarises the extent of protected area coverage, country by country and Category by Category; it contains detailed information on EU directives relating to protected areas; and it sets out principles and guidelines on matters as varied as land-use planning in relation to protected areas and sustainable tourism.

Finally the plan also has relevance beyond the limits of Europe. The new Director General of IUCN, David McDowell, has remarked in his preface that, while the plan addresses the needs of Europe's protected areas, "many of the key themes addressed in the Action Plan—community involvement, the need to plan and manage protected areas in their wider context, and the importance of seizing opportunities as well as responding to threats—are relevant everywhere. So is the collaborative process by which the plan was prepared. IUCN will adapt and help apply the lessons learnt in regional plans for protected areas in other parts of the world."

Conclusion

Conservationists are familiar with this dilemma: that they speak and write a lot, but achieve little. All the effort that has gone into writing and publicising *Parks for Life* will be of no value unless it affects what happens on the ground. Here the plan faces difficulties. The resurgence of nationalism in Europe, and the current concerns over recession which have driven environmental issues down the public agenda, do not create the most auspicious climate for an international conservation initiative. On the other hand, the number of organisations which have been drawn into preparation of the plan augurs well: it suggests that many government agencies and non-governmental bodies concerned with national parks, nature reserves, and protected landscapes are eager to collaborate—and the plan provides them with a means to do so.

If, as recommended in the *Parks for Life*, groups come together at the national level to decide how the recommendations in it can be applied within their own countries, then there are real prospects of progress. IUCN's General Assembly has therefore invited governments and others to respond constructively to the recommendations in the plan, and has called upon its large and influential membership in Europe to help finance the agreed priority projects. IUCN commits itself to doing all it can to ensure that the efforts put into the plan's preparation are rewarded by action on the ground which will significantly improve the prospects for Europe's protected areas by the end of the century.

(Parks for Life: Action for Protected Areas in Europe is available from IUCN Publications, 219 Huntingdon Road, Cambridge, CB3 0DL, United Kingdom. Price £10, or $15, excluding postage. Fax (44) 223 277175; telephone (44) 223 277894.)

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About the GWS . . .

The George Wright Society was founded in 1980 to serve as a professional association for people who work in protected areas and on public lands. Unlike other organizations, the GWS is not limited to a single discipline or one type of protected area. Our integrative approach cuts across academic fields, agency jurisdictions, and political boundaries.

The GWS organizes and co-sponsors a major U.S. conference on research and management of protected areas, held every two years. We offer the FORUM, a quarterly publication, as a venue for discussion of timely issues related to protected areas, including think-pieces that have a hard time finding a home in subject-oriented, peer-reviewed journals. The GWS also helps sponsor outside symposia and takes part in international initiatives, such as IUCN's Commission on National Parks & Protected Areas.

Who was George Wright?

George Melendez Wright (1904-1936) was one of the first protected area professionals to argue for a holistic approach to solving research and management problems. In 1929 he founded (and funded out of his own pocket) the Wildlife Division of the U.S. National Park Service—the precursor to today's science and resource management programs in the agency. Although just a young man, he quickly became associated with the conservation luminaries of the day and, along with them, influenced planning for public parks and recreation areas nationwide. Even then, Wright realized that protected areas cannot be managed as if they are untouched by events outside their boundaries.

Please Join Us!

Following the spirit of George Wright, members of the GWS come from all kinds of professional backgrounds. Our ranks include terrestrial and marine scientists, historians, archaeologists, sociologists, geographers, natural and cultural resource managers, planners, data analysts, and more. Some work in agencies, some for private groups, some in academia. And some are simply supporters of better research and management in protected areas.

Won't you help us as we work toward this goal? Membership for individuals and institutions is US$35 per calendar year, and includes subscription to the Forum, discounts on GWS publications, reduced registration fees for the GWS biennial conference, and participation in annual board member elections. New members who join between 1 October and 31 December are enrolled for the balance of the year and all of the next. A sign-up form is on the next page.

The George Wright Society

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The editorial board welcomes articles that bear importantly on the objectives of the Society—promoting the application of knowledge, understanding, and wisdom to policy making, planning, management, and interpretation of the resources of protected areas and public lands around the world. The FORUM is now distributed internationally; submissions should minimize provincialism, avoid academic or agency jargon and acronyms, and aim to broaden international aspects and applications. We actively seek manuscripts which represent a variety of protected-area perspectives, and welcome submissions from authors working outside of the U.S.A.

Length and Language of Submission Manuscripts should run no more than 2,500 words unless prior arrangements with the editors have been made. Current readership is primarily English-speaking, but submissions in other languages will be considered; in such cases an English summary should be prepared.

Form of Submission We no longer accept unsolicited articles that are not also accompanied by a computer disk. Almost any 3.5-inch disk can be read in its original format (please indicate whether your disk is formatted for IBM or Apple, and note the version of the software). A double-spaced manuscript must accompany all submissions in case there are compatibility problems.

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