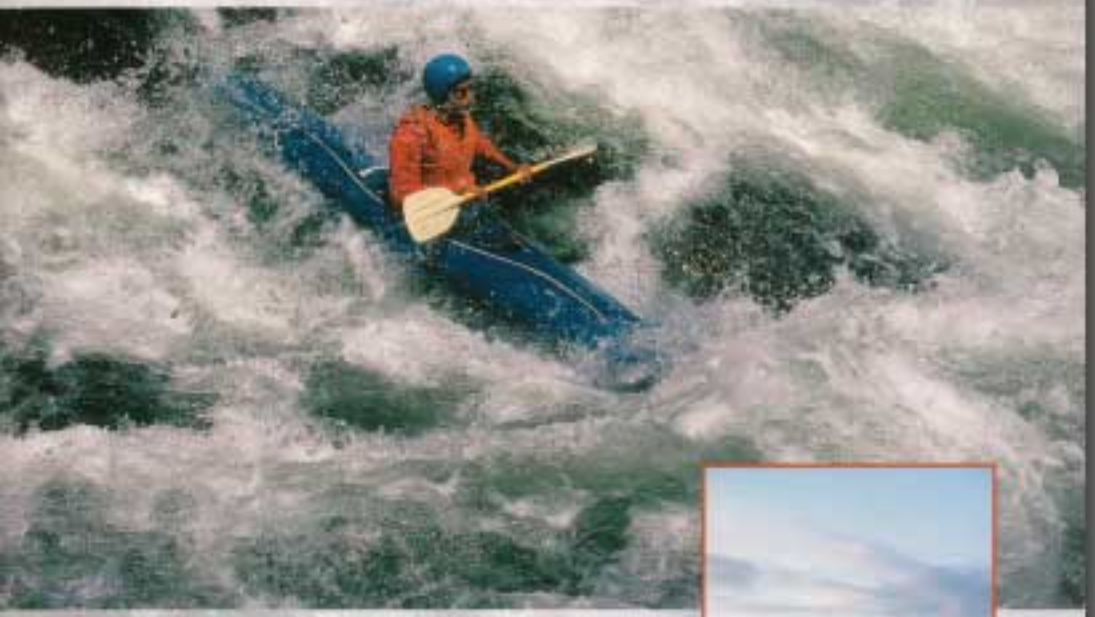
INTERNATIONAL

Journal of Wilderness



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APRIL 2001 VOLUME 7, NUMBER 1

INTERNATIONAL

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FEATURES

STEWARDSHIP

EDUCATION AND COMMUNICATION

SCIENCE AND RESEARCH

WILDERNESS DIGEST

Front cover photo of kayaker shooting the rapids on the Middle Fork of the Salmon River, Frank Church–River of No Return Wilderness, Idaho, USA © 2001 by David Cole. Photo inset of Ounasjoki in Pallas–Ounastunturi National Park, Finland © 2001 the Aldo Leopold Institute.

International Journal of Wilderness

The *International Journal of Wilderness* links wilderness professionals, scientists, educators, environmentalists, and interested citizens worldwide with a forum for reporting and discussing wilderness ideas and events; inspirational ideas; planning, management, and allocation strategies; education; and research and policy aspects of wilderness stewardship.

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Submissions: Contributions pertinent to wilderness worldwide are solicited, including articles on wilderness planning, management, and allocation strategies; wilderness education, including descriptions of key programs using wilderness for personal growth, therapy, and environmental education; wilderness-related science and research from all disciplines addressing physical, biological, and social aspects of wilderness; and international perspectives describing wilderness worldwide. Articles, commentaries, letters to the editor, photos, book reviews, announcements, and information for the wilderness digest are encouraged. A complete list of manuscript submission guidelines is available from the editors.

Artwork: Submission of artwork and photographs with captions are encouraged. Photo credits will appear in a byline; artwork may be signed by the author.

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EDITORIAL PERSPECTIVES

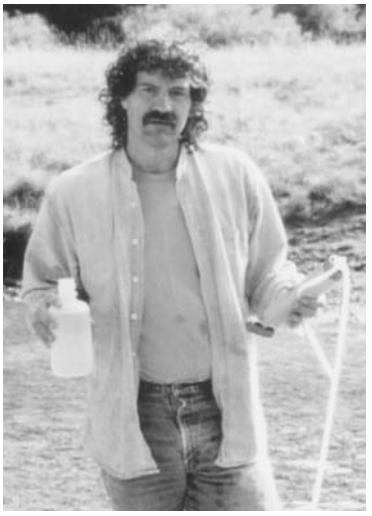
The Wildness of Rivers

BY ALAN WATSON

In 1983 I moved from the mountains of southwest Virginia to the swamps of south Georgia. There I found excitement in the wildness of the lowland rivers and streams. I described the Ogeechee River as "my mountain," meaning that I had found my connection with wildness, like I did in the oak and hickory ridges and hollows of Appalachia. In the rivers of Georgia I sensed mystery, excitement, and beauty, and a strong sense of wildness that made me feel at home.

In assembling this second issue of the *IJW* with special emphasis on wild rivers, Co-guest Editor David Cole and I have learned a considerable amount about current issues involved in defining, protecting, and even modeling the wildness of rivers. The articles here have influenced the way we think about rivers, and I hope they will influence your future relationship with rivers as well.

At the turn of the 21st century in the United States, we don't have a recognized center for river research as we did in the 1970s and 1980s. And we don't have a recognized medium for communication about research, stewardship, and education related to protecting the wildness in these waterways. We hope that this series of articles in the *IJW* will serve as a catalyst for additional papers on these important topics. The wildness of rivers is unique, and our approaches to protecting that wildness has to be unique.



Guest editor Alan Watson. Photo by Leena Vilkka.

I sincerely thank Dr. Luna Leopold for contributing his wisdom about the value of fear associated with wild places and his reflections about rivers (*IJW*, December 2000). From Texas, Utah, Arizona, and Idaho to Australia and along the Big Muddy, articles in these issues span many areas of concern about restoration, protection, education, and recreational use of rivers today. Our appreciation is gratefully extended to this group of scientists, planners, educators, and managers for helping us bring attention to the importance of the wildness we all experience when we float, hike, fish, paint, write, or simply sit and contemplate along the banks of a wild river.

SOUL OF THE WILDERNESS

The World Wilderness Congress

BY VANCE G. MARTIN

The World Wilderness Congress (WWC) is the oldest continuing international public forum on wilderness and related conservation concerns. As preparation for the 7th WWC in South Africa, November 2 through 8, 2001, *IJW* offers this perspective on the history, accomplishments, and vision of the Congress.

Overview

The WWC is unique in international conservation because of its continuity, evolving structure, and diverse professional and public participation. Here is a recap of the principles around which the Congress is organized every few years, where and when it has convened, and our perspective on its value and accomplishments. We hope this will encourage your greater involvement in international wilderness issues—and maybe even bring you to the 7th WWC in November 2001.

Article author Vance Martin.

The Roots

The WWC was conceived by noted South African and international conservationist Ian Player and his Zulu friend, mentor, and game scout Magqubu Ntombela. The idea grew from conversations while leading hundreds of small groups into the African wilderness, watching (and dodging) hippos, elephants, and lions, sitting under the African stars and around the campfire on night watch. They both knew that some important action was needed for wilderness to be understood and to survive globally, and Ntombela suggested they call an *Indaba*—-in Zulu culture, a great gathering of all factions and perspectives. Hence the WWC was born out of an idea conceived in the wilderness and rooted in indigenous traditions.

The 1st WWC convened in South Africa in 1977 during the apartheid regime and just months after the tragedy of the Soweto riots. The first congress put blacks, whites, and Bushmen on the same stage (at the time not only was this unconventional, but illegal) and featured such diverse participants as business, banking, and cultural leaders meeting with the public. Such diverse interaction turned the conservation world on its ear. Searching such new ways to protect and sustain wilderness was a radical idea then, and perhaps even unthinkable to most South Africans.

The WWC concept became the responsibility of the International Wilderness Leadership Foundation (now called The WILD Foundation), evolving into a forum convening periodically around the world (see figure 1). The diverse participation continued, creating an international agenda for wilderness, empowering local and regional action, and always involving business, political, cultural, and environmental leaders in constructive dialogue. Proceedings of cultural and technical symposia provided a continuing record of the issues, resolutions for action, and accomplishments of the gatherings.

Summary of Major WWC Accomplishments

The 1st WWC convened in Johannesburg, South Africa, in 1977, chaired by Ian Player, with 2,500 delegates from 27 countries (Player 1978). The accomplishments included introducing wilderness as an international issue of importance to developing countries, not just to Western, developed cultures; integrating diverse cultures and races in the nature conservation dialogue, along with economics and banking, thus bringing many new perspectives for the first time into the environmental agenda; and hosting the largest exhibition of conservation art assembled to date in Africa.

The 2nd WWC convened in June 1980 in Cairns (Queensland), Australia, chaired by Australian farmer and conservationist Wally O'Grady, with 1,000 delegates from 25 countries (Martin 1981). Beginning the practice of using each congress to stimulate action, Prime Minister Malcolm Fraser opened it and recommended the Great Barrier Reef as a World Heritage Site. The premier of Queensland then announced the protection of additional areas of virgin lowland rain forest as parks. Bob Brown, president of the Tasmanian Wilderness Society, focused international attention to wilderness conservation in Tasmania, helping make this issue a critical factor in the subsequent election of a new labor government under Prime Minister Bob Hawke. The value of indigenous, aboriginal knowledge to nature conservation, and how to define wilderness as an internationally relevant concept, were prime topics of discussion again, establishing them as continuing themes for future congresses.

The 3rd WWC convened in October 1983 at Inverness and Findhorn, Scotland, chaired by Scottish forester and environmentalist, Finlay MacRae, with 600 delegates from 25 countries (Martin and Inglis 1984). British Prime Minister Thatcher's government (through the secretary of state for Scotland, George Younger) announced for the first time their ratification of the World Heritage Convention (Younger 1984). Barry Cohen, minister of environment in Australia, reported on his government's protection of southwest Tasmanian wilderness (Cohen 1984). Italian environmentalist Franco Zunino was empowered in his dream to form the Wilderness Associazione Italiana, which has since led to the establishment of wilderness areas in Italy (Zunino 1984, 1995). The congress also prompted establishment of the Wilderness Action Group in South Africa to advocate for wilderness training and legislation (Hendee and Dawson 2001, chptr. 3). Professor C. A. Meier of Switzerland, a leading psychologist, launched the continuing concern of the congresses with wilderness psychology (Meier 1984). A major focus of this congress was defining wilderness as an international concept and launching the successful campaign for inclusion of wilderness as a separate and specific classification under the World Conservation Union

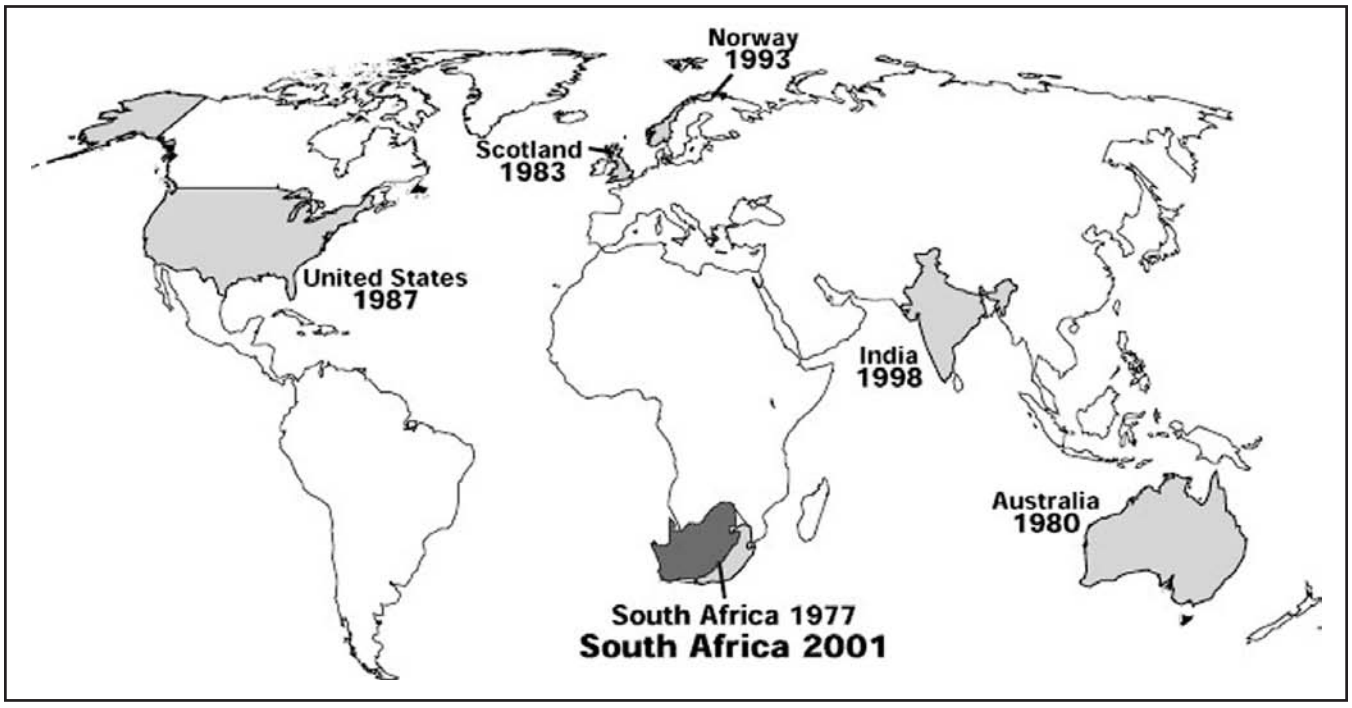


Figure 1—The World Wilderness Congress has convened in six different countries over the past 20 years.

The agreed upon definition of wilderness is: "Large areas of unmodified or slightly modified land and/or sea, retaining its natural character and influence, which is protected and managed so as to preserve its natural condition."

(IUCN) Framework for Protected Areas—more on this below.

The 4th WWC convened in September 1987 in Denver and Estes Park, Colorado, USA, chaired by Maurice Strong (director general of Stockholm 1972 and The Earth Summit 1992) and natural resource dean Dr. Jay Hughes of Colorado State University, with 2,000 delegates from 64 nations (Martin 1988). It was opened by U.S. Secretary of the Treasury James Baker, who called for an integration of economics and environmental concerns, adding weight to the congress proposal for a World Conservation Bank, initiating the process leading to establishment of the U.S. $1.3 billion Global Environmental Fund of the World Bank. Other accomplishments included presentation of the first World Wilderness Inventory by Michael McCloskey (McCloskey and Spaulding 1988); and Gro Harlem Bruntland, prime minister of Norway and chair of the United Nations (Brundtland) Commission on Environment and Development, addressed the congress and conducted the only public hearings with her commissioners in the United States (WCED 1987).

This congress was the first to feature a major science program, with several plenary addresses, eight concurrent technical sessions meeting for four days each, plus poster sessions focusing science on international wilderness concerns. One of these sessions on marine wilderness concerns, organized by the National Oceanic and Atmospheric Administration (USA), launched and empowered the idea of marine wilderness, which is only now coming to fruition. The continuing congress focus on the use of wilderness for personal growth, therapy, and education was expressed in both plenary events and technical symposia (Hendee 1987; Martin 1988).

The 5th WWC met in October 1993 in Tromsø, Norway, chaired by Nobel Laureate and explorer Thor Heyerdahl and Judge Rakel Surlien, with 600 delegates from 25 countries (Martin and Tyler 1994). Under the theme of Arctic Wilderness, the congress strengthened the wilderness concept in the circumpolar development debate, advocating specific legislation to protect wilderness areas and values while recognizing sustainable use by indigenous cultures. Environmental guidelines were proposed for the Arctic economic development strategy of the Northern Forum, an association of 20 regions and states in the circumpolar north. A strong science focus continued with plenary presentations and concurrent technical symposia (Hendee and Martin 1994; Rothenberg 1995). The first inventory of wild rivers of the north was presented by Mike McCloskey of the Sierra Club (McCloskey 1994), and the concept of sustainable living was introduced as an evolution of the sustainable development debate.

The 6th WWC met in October 1998 in Bangalore, India, chaired by Mr. M. A. Partha Sarathy, convening 700 delegates from 30 nations and the first gathering in Asia focused on wilderness (Martin and Sarathy 2001). Here we joined the region's environmental leaders in formally introducing the concept of designated, protected wilderness areas in Asia, with guidelines for policy to fit Asian conditions. Mike McCloskey, building on his world inventory work, presented the first comprehensive inventory of wild rivers of the world (McCloskey, Michael 2001), while his wife, Maxine McCloskey, presented a summary analysis of underwater wilderness and a proposal to recognize and better protect the unique values of wilderness on the high seas (McCloskey, Maxine 2001). The now familiar congress science program of concurrent technical symposia, poster sessions, and proceedings (Watson et al. 1998, 2000) were supplemented by daily meetings of an Open Council for delegates to share the personal challenges of their wilderness conservation work. This forum was especially appreciated by delegates from developing nations, for whom this "heart-space" was healing and empowering (Hendee and Riley 1999).

An Evolving Format and Inquiry

As the forgoing review demonstrates, each congress features host country leadership and important discussion focused on concerns in that country and world region. At the same time, world wilderness issues remain center stage. The evolving framework now features multidisciplinary inquiry from diverse sectors of human endeavor for example, business, culture, the arts, politics, and education; a rigorous scientific and technical program in both the natural and social sciences; a cultural program; and

an Open Council to address matters of the heart and spirit.

An underlying principle of the congress is that nonmaterial issues need to be recognized, respected, and included. Much nonmaterial wisdom and perception resides in the traditions of indigenous people who are still residing in and/or dependent upon wildland areas for practical and cultural survival. The WWC was one of the first environmental forums to integrate the needs and views of first peoples, native peoples, indigenous peoples—and we continue to do so. This will be especially important at the upcoming 7th WWC (see below) where the format will emphasize visual presentations, group dialogue, and Open Council (*Indaba*) to involve Africans and their concerns, as they hold the key to the future of wilderness in Africa. Accompanying this, of course, will be presentations by key leaders in politics, business, science, education, and culture; technical symposia and poster sessions; plus field trips to nearby areas.

The WWC is many things, but one thing it most certainly is not is an institutional process. The key to WWC accomplishments is its encouragement of leadership by individuals and organizations to protect and sustain international wilderness.

A Wilderness Definition for the World

A central concern of the WWC has been an internationally acceptable definition of wilderness. Over the years results of WWC discussions and resolutions have been submitted to the World Commission on Protected Areas of the IUCN for consideration, urging official recognition for wilderness as a protected area category. Finally, in the Framework for Protected Areas (revised 1990), wilderness was listed as an IUCN category 1 (b) area (out of five categories) with Strict Scientific Reserves as category 1 (a). The agreed upon definition of wilderness is: "Large areas of unmodified or slightly modified land and/or sea, retaining its natural character and influence, which is protected and managed so as to preserve its natural condition" (IUCN 1998).

The simplified management objectives provide further clarification:

- To ensure enjoyment by future generations of areas largely undisturbed by human action.
- To maintain essential natural attributes and qualities, long-term.
- To provide appropriate public access to best serve the physical and spiritual well-being of visitors while maintaining wilderness.
- To enable indigenous communities to continue living at low density, and in balance with available resources to maintain their lifestyle.

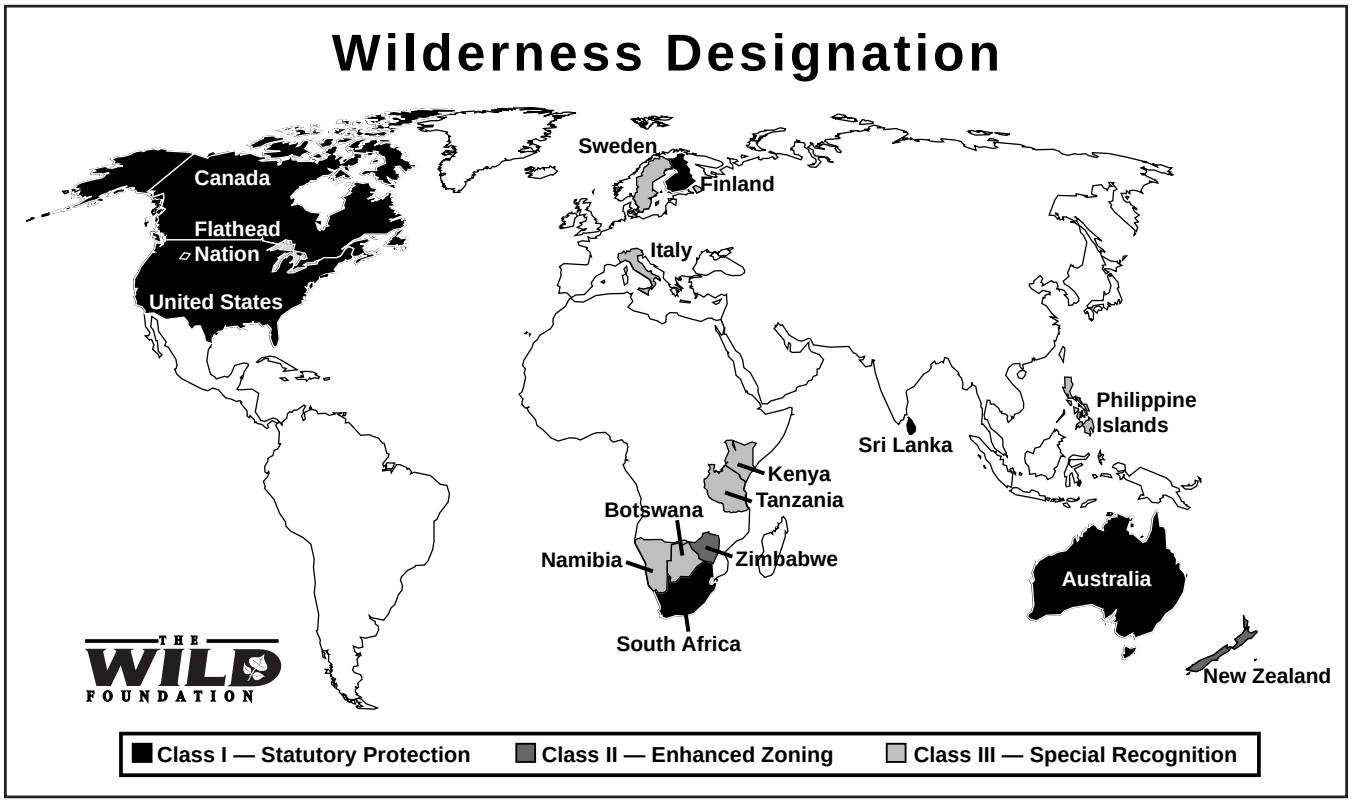


Figure 2—The classes of Wilderness Designation around the globe.

Wilderness Designation around the World

Supported by an enhanced awareness of wilderness possibilities, in part due to the WWCs, and given legitimacy by the IUCN's definition, wilderness has now been protected by law or administrative policy in numerous nations. The various types of wilderness recognition and protection have been categorized (Martin 1997) into three classes based on the degree of protection provided (see figure 2).

Class 1 Wilderness

Statutory or legally protected wilderness includes areas protected by the highest law of the nation and/or jurisdiction in which the areas reside. Such protection can only be revoked through a legislative process. Class 1 protection for wilderness is provided in the United States (The Wilderness Act 1964,) Australia (legislation in numerous states), South Africa (National Forest Act, amended 1971), Canada (National Parks Act, revised 1988), Finland (Wilderness Act, 1991), the Flathead Indian Reservation, Montana, USA, (Mission Mountains, Tribal Wilderness Ordinance, 1982), and Sri Lanka (National Heritage and Wilderness Act, 1987).

The legislation virtually always mandates a certain type of management by relevant authorities in order to sustain wilderness values such as no mechanized transport, no permanent human habitation, and so forth.

Class 2 Wilderness

Protection of wilderness by zoning, usually within some other protected jurisdiction. This provides significant protection, though less than for legislated areas. New Zealand (mandated through actions of the minister of environment), Zimbabwe (Tribal Authority Declaration in the Mavuradonha Wilderness), and Italy (various municipal acts, 1990s). Generally implicit (though not required) in these areas is a strong emphasis on management that sustains wilderness values.

Class 3 Wilderness

Wilderness is protected by administrative designation as part of a conservation or resource management program under authority of a departmental managing authority or official. Included are Namibia, Waterberg Wilderness; the

The 7th World Wilderness Congress to Convene in South Africa

The 7th WWC will return to its roots and convene in beautiful Port Elizabeth, Eastern Cape, South Africa, from November 2 through November 8, 2001.

The theme is *Wilderness and Human Communities: The Spirit of the 21st Century.*

Major objectives include:

- Wilderness on privately owned lands—models for private sector action and responsibility in designating, managing, and sustaining wilderness lands in perpetuity.
- New public wilderness areas—initiatives and opportunities for southern Africa.
- Expanded wilderness education—experience and training programs, pan-Africa.
- Science program—with posters and summary symposia for expanded participation.
- A new fund for African protected areas.

While presenting wilderness in a global context, the 7th WWC will emphasize wildlands in and for Africa and Africans. The congress will convene in a Wilderness Summit for two days, followed by a day of field trips to local wilderness and wildlife areas, and then provide four days of Wilderness Working Sessions—plenary, technical, poster, and training sessions, plus an Open Council to share the heart-space of wilderness work.

For delegates' pleasure, education, and relaxation, the 7th WWC will also include an extensive cultural program of contemporary and traditional music and art, an international environmental film competition, outdoor events under the African skies, and ample opportunities for pre- and postcongress tours to African wildlands, communities, national parks, wilderness areas, and private reserves. In all congress activities the public will join a wide range of professionals from business, politics, science, education, the arts, and humanities. This is your invitation to be a delegate.

For more information and registration details go to www.worldwilderness.org.
E-mail: info@worldwilderness.org.

Philippines, Palanan Wilderness; Suriname, Wilderness Nature Reserve; Zambia, Kafue; and more.

There are other areas and countries in the world in which the word *wilderness* is used generically as the name of a natural area, but very few of these actually have any management guidelines to maintain wilderness values.

The WWC Perspective

While wildlands conservation and sustainability have some success stories that must be recounted, evaluated, and steadily improved upon, the fact remains that they still amount to little more than triage in the face of unrelenting ecological trauma. Voices from every quarter offer solutions, criticisms, worries, and complaints; for example, "more scientific data," "better economic valuation," "improved policy and monitoring," and more. All of these ideas and issues are important, but they are still unmistakably only emergency room jargon and provide neither essential remedies nor create environmental health. We need to get out of the emergency room and into a healing process for people and the planet. This is what the WWC is all about. We are a part of nature, not apart from nature, and we need to live our life in balance with the natural world.

VANCE G. MARTIN is president of The WILD Foundation, International Director of the WWC, and an executive editor of *IJW*. E-mail: vance@wild.org.

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Hence the WWC was born out of an idea conceived in the wilderness and rooted in indigenous traditions.

Bob Marshall, 1901–1939
Wilderness Preservationist

BY CHAD P. DAWSON

Visionary, activist, advocate, author, and *wilderness resource planner* and *manager* are all words that describe Robert "Bob" Marshall. He is best remembered as a passionate advocate for wilderness preservation. The fire of activism burned so fiercely and brightly in him that his influence is still a force today. In historical narratives about wilderness preservation he emerges as a legendary figure vital to the environmental movement in the United States. This year marks the 100th anniversary of his birth.

Bob Marshall in the early 1930s. Illustration by Claude Freeman.

One of the founding members of The Wilderness Society in 1935, Marshall championed popular campaigns for wilderness preservation at the state and national levels. "We simply must band together—wherever and whenever wilderness is attacked," Marshall said. "We must mobilize all our resources, all of our energies, all of our devotion to wilderness" (Schaefer 1966). Marshall noted the benefits that accrue from wilderness—physical, mental, and aesthetic—and issued a call to action: "There is just one hope of repulsing the tyrannical ambition of civilization to conquer every niche on the whole earth. That hope is the organization of spirited people who will fight for the freedom of the wilderness" (1930). He wrote and campaigned tirelessly for the creation of wilderness areas in the United States.

Marshall grew more vocal about the need to preserve wilderness after observing the enormous demand by the American public for recreation and tourism opportunities, and he warned, "The world is full of conflicts between genuine values. Often these conflicts are resolved entirely from the standpoint of one of the competing values, and thus whole categories of human enjoyment may be needlessly swept away … the fate of unmodified Nature rests in the activity of its friends" (1937).

Despite his seemingly boundless energy, Marshall died at the young age of 38. The Bob Marshall Wilderness in Montana and Mount Marshall in the Adirondacks of New York were named in his honor. But perhaps Marshall's greatest legacy is the leadership and perseverance he championed in so many people who have taken up the challenge of ensuring that wilderness will be available for present and future generations.

Bob Marshall on a canoe trip in the Quetico-Superior country of southern Ontario and northern Minnesota. Illustration by Claude Freeman.

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From WASH on page 31

miles of closed roads—effectively stopping entry to more than 40 miles of closed roads inside BLM wilderness They lived out in the desert for 30 days and dealt with heat, rattlesnakes, and cactus. They came away really knowing the Mojave Desert and loving it.

In 2000 we brought on our second crew and again they restored 14 miles of closed routes, effectively closing 50 miles. They started out slow, learning the restoration techniques, but by the end of two weeks everyone was up to speed and the pace of work picked up. Our wilderness rangers supported crew needs and worked alongside them. In just four years we obliterated 20% of all of our routes inside 16 wilderness areas.

Our students were part of a huge cadre of about 120 SCA crews nationwide who participated in making U. S. lands better, saw some wild country, and grew in their appreciation of the natural world and themselves. As BLM employees, we thought we would be glad just to get a job done, but we were surprised that this teamwork effort changed our management vision. We recently established a Primitive Skills Team with SCA (funded for $215,000.00) and began wilderness restoration in March all over the California desert. This once insurmountable restoration job proved possible, and with it came new friends, new capabilities, and new dreams for us all.

DAVE and KATIE WASH work for the BLM, 300 S. Richmond Road, Ridgecrest, California 93555, USA. E-mail: David_Wash@ca.blm.gov or Katherine_Wash@ca.blm.gov. For more information on the SCA contact Student Conservation Associations, P. O. Box 550, Charlestown, New Hampshire 03603, USA. Telephone: (603) 543-1700. Website: www.sca-inc.org.

The New Forest Service Wilderness Recreation Strategy

Personal Viewpoints from Diverse Interests

Introduction

Increasing wilderness recreation use is damaging resources and values in the U.S. National Wilderness Preservation System. In response to this situation the U.S. Forest Service (USFS) has proposed a new Wilderness Recreation Strategy. Elements of this proposed strategy are controversial, as the following four articles demonstrate.

To set the stage, Dr. David Cole, research biologist with the Aldo Leopold Wilderness Research Institute, describes wilderness use trends and impacts and four possible strategies for responding to this situation. Then Garry Oye, acting national wilderness program leader for the USFS, explains the agency's proposed new Wilderness Recreation Strategy and why it is deemed necessary. Next, Bill Worf, president of Wilderness Watch and former member of a USFS task force to develop policy to implement The Wilderness Act, presents his views opposing elements of the new strategy. Finally, Ira Spring, noted wilderness environmentalist, photographer, and author, presents his favorable view of the new policy.

The IJW is pleased to serve as a neutral forum for the presentation of the current wilderness recreation use situation, the proposed U.S. Forest Service strategy to deal with it, and two reactions to the new strategy by wilderness stakeholders. The views and interpretations of each author are their own.

—John C. Hendee, *IJW* Editor-in-Chief

Balancing Freedom and Protection in Wilderness Recreation Use

BY DAVID COLE

A primary benefit of wilderness is the recreational opportunities it provides. Unfortunately, recreation use can also threaten wilderness conditions and values. In the 1970s wilderness managers responded to rapidly increasing recreation use by restricting both numbers of visitors and visitor behavior. In the 1980s and 1990s management emphasis shifted to visitor education. Reports that wilderness use was no longer growing gave rise to hopes that impacts could be controlled by persuading visitors to "Leave No Trace." Today, however, further restrictions—even on the number of day-visitors—are being considered to combat excessive wilderness use and impact. Such restrictions are highly controversial.

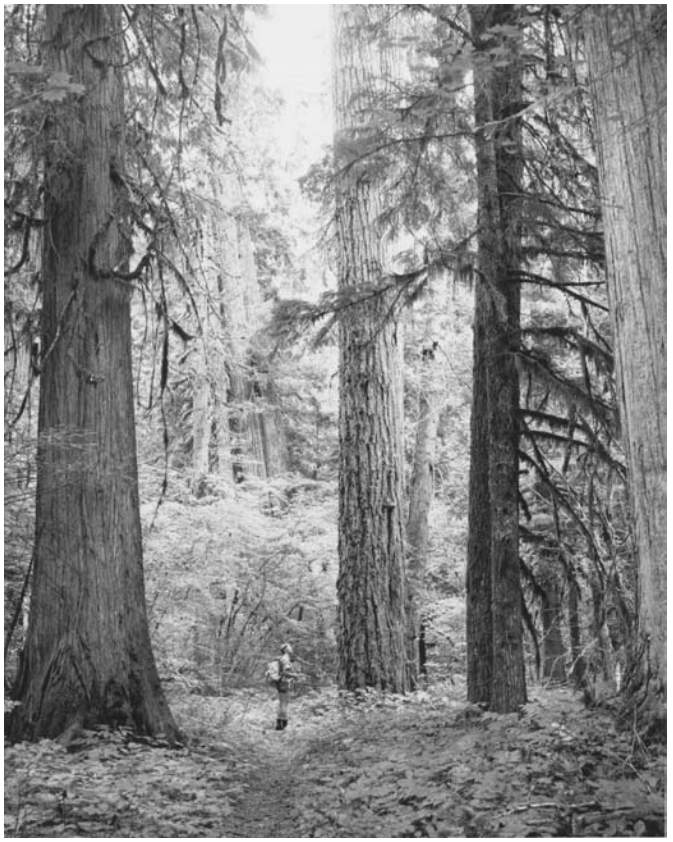
Several trends support the need for strengthened wilderness recreation management. Studies show that recreational use of wilderness is increasing, and as a result wilderness areas are slowly degrading—particularly pristine sites offering outstanding opportunities for naturalness and solitude. Visitor education, although the highly favored approach, has not been capable of controlling recreational use and impacts.

Ironically, one cause of degradation in low-use wilderness is the well-intentioned attempt to reduce recreation impact in high-use locations. This technique often displaces visitors to locations without use limits, which are often the more lightly used wilderness locations. Lightly used locations are vulnerable even to small increases in use, which can cause dramatic impacts on naturalness and solitude. In addition, the wilderness system has expanded tremendously with the wilderness designation of many heavily used areas adjacent to large urban areas.

Four Possible Strategies

Four broad wilderness management strategies are available to deal with increasing wilderness recreation use and expanding impacts. One option is to reduce and limit use so that all wilderness lands are kept in a near-pristine condition. A second option is to allow unlimited recreation use everywhere, attempting to mitigate impacts though visitor education, intensive site management, and behavioral restrictions. In the third option, problems in popular wilderness locations could be reduced by diverting use from high-use locations to low-use wilderness, creating a relatively homogeneous system of moderately used and impacted wilderness. The fourth option is to maintain a broader spectrum of conditions in wilderness, allowing high levels of visitation in some locations while aggressively protecting most wilderness lands in their current low-use condition.

None of these options is ideal. But it is time to consider the values a wilderness system can provide and develop a recreation management strategy to optimize those values. This will not be easy because there are many views among wilderness stakeholders about what should be done and where it should be done. Wilderness science over the last 25 years has identified trends in use and the impacts associated with these trends. The implications are clear that without a deliberate strategy and action many wilderness values and resources will be lost. The Forest Service has addressed the situation with a new Wilderness Recreation Strategy. But not everyone agrees with everything about the approach proposed, and debate over the strategy's merits and shortcomings will be essential to its refinement and application. This may be contentious and difficult, but it is much better than doing nothing at all.



The Lewis River trail in the Dark Divide roadless area, Washington State. Photo by Ira Spring.

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A New Wilderness Recreation Strategy for National Forest Wilderness

BY GARRY OYE

The Forest Service's Wilderness Agenda, Thinking Like a Mountain, was announced in June 1999 at the 75th anniversary of the Gila Wilderness and shared with *IJW* readers in a December, 1999 article by Mike Dombeck, chief of the U.S. Forest Service (USFS). This Wilderness Agenda proposes a three-part approach to managing recreation in wilderness.

USFS wilderness managers, based on relevant research and their own experience and expertise, developed this three-part approach to address the following concerns:

- Attempts to improve conditions in heavily-used wilderness locations consume most of the available wilderness management resources, result in limited success, and may displace problems to adjacent previously undisturbed locations.
- The majority of wilderness lands receive light use and limited management attention. Baseline inventories are essential to providing information on wilderness conditions and trends.
- The wilderness system has expanded from 9 to 106 million acres and now includes many urban-proximate, heavily-used recreation lands as wilderness. The wilderness system now includes backyards and not just backcountry.

The USFS approach is to balance the interests of the American people by providing a broad spectrum of wilderness. Wilderness management preserves relatively undisturbed wilderness ecosystems and outstanding opportunities for unique experiences. More resources are focused on lightly used wilderness to ensure that actions taken elsewhere do not inadvertently degrade these places. High levels of recreation use are allowed within designated areas to keep impacts to acceptable standards.

The Golden Horn in Washington State. Photo by Ira Spring.

HELP WANTED

Your local Forest Service wilderness managers need help with backcountry visitor contacts (information and education), wilderness conditions monitoring, and native plant restoration. Visit: www.fs.fed.us/recreation or www.wilderness.net for a list of your local wildernesses and ranger stations.

The New Wilderness Recreation Strategy

The strategy consists of three proposed actions, each of which is critical.

Proposed Action #1

Where possible, take advantage of opportunities for high-quality wildland recreation experiences on National Forest lands outside wilderness through the forest planning process. In partnership with other local agencies, state, county, and city parks departments, and local community tourism offices, identify and highlight other outdoor recreation opportunities. Potential means of implementation include: (1) completing an inventory of backcountry opportunities outside wilderness; (2) maintaining and enhancing trail opportunities outside wilderness; and (3) exploring ideas with partners for marketing backcountry opportunities outside national forests.

Proposed Action #2

Make it a priority to commit enough resources and protection to low-use wilderness to ensure nondegradation of their outstanding opportunities for solitude and near pristine conditions. Potential means of implementation include: (1) developing standards where they don't already exist; (2) establishing baseline inventory and trends monitoring, and (3) assuring protection of lightly used areas before restricting use of high-use areas from which use might be diverted.

Proposed Action #3

Manage high-use destinations as sources of inspiration and connection with wilderness, develop and implement social standards with public input, and implement management actions to ensure that impacts to physical and biological resources are contained within standards established in the forest plan. Potential means of implementation include: (1) accepting current levels of visitation in some high-use destinations; (2) developing standards where they do not exist, and monitoring conditions so that wilderness character and conditions are not unacceptably degraded; (3) delineating high-use destinations so they do not increase in number or size; (4) continuing

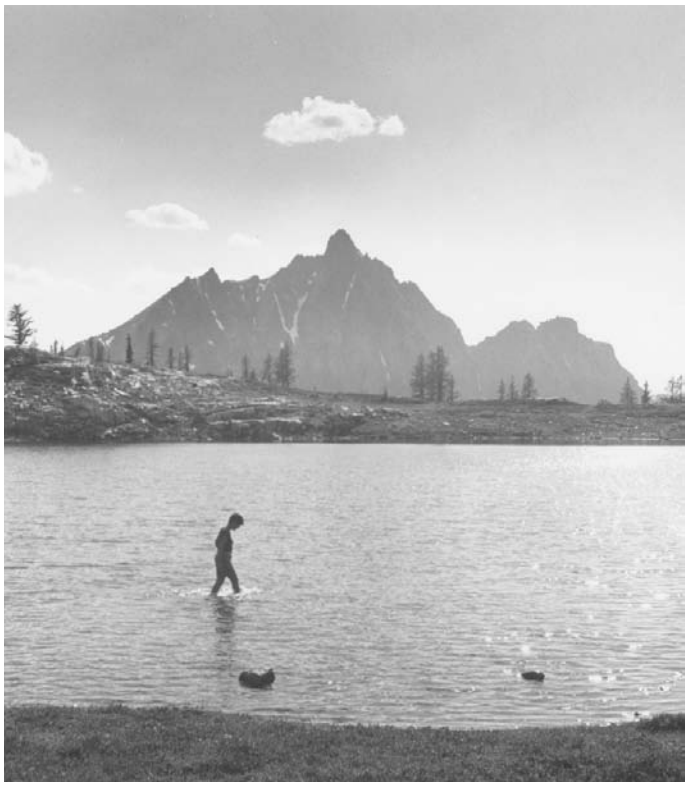
management activities and use limits where already established; (5) increasing stewardship presence to emphasize information, education, inspiration, and connection with wilderness; (6) focusing intensive site management on restoration of damaged sites and confinement of impacts; and (7) pursuing partnerships with organizations to explore new approaches to managing high-use areas and providing stewardship presence.

Commitment to Goals

USFS wilderness managers remain committed to the goals of providing for an enduring wilderness resource. To clarify our intent, we note that:

- We will not implement one of these actions without implementing all of them.
- We will not allow use to increase indefinitely in high-use areas.
- We will continue to consider social conditions and impacts on experiences.
- We will not attempt to keep encounters at low levels at all times in all places.
- We will not allow high-use areas to spread and proliferate indiscriminately.
- We will not neglect low-use areas or allow their quality to be sacrificed in attempts to deal with problems of heavy use elsewhere.

Many special places have been preserved over the years. Early wilderness designations were successful in limiting development and human influence. Thousands of visitors have journeyed to these places and left with a sense of inspiration and connection. We must now work together to address the increasing demand for these special places.



Upper Snowy Lake in the Golden Horn area, Washington State. Photo by Ira Spring.

GARRY OYE is the acting National Wilderness Program leader for the U. S. Forest Service. He began his Forest Service wilderness career in the Selway-Bitterroot Wilderness in 1978, and holds a masters degree in forestry from the University of Montana. Oye received the first Bob Marshall Award in 1991 for his efforts with the National Wilderness Advisory Group. Telephone: (202) 205-0925. E-mail: goye@fs.fed.us.

The New Forest Service Wilderness Recreation Strategy Spells Doom for the National Wilderness Preservation System

BY BILL WORF

Thirty-six years ago, Congress established the National Wilderness Preservation System "to secure for the American people of present and future generations the benefits of an enduring resource of wilderness." It was the first, and still only, time that Congress has set aside large tracts of wildlands to be preserved *undiminished* for future generations and for the lands' wild inhabitants. I believe that, rather than live up to the law's ideals, the new U. S. Forest Service (USFS) Wilderness Recreation Strategy will instead provide for managed *degradation*, which will rob future generations of the benefits of the resource of wilderness. It will lead to the piecemeal dismantling of the wilderness system.

The new strategy abandons the nondegradation mandate of The Wilderness Act (TWA). I served on the USFS's six-person task force that met in September 1964 to draft regulations and

USFS Chief Dombeck must reaffirm the agency's 35-year commitment to the nondegradation mandate and reject the new Wilderness Recreation Strategy.

policies for implementing TWA. While each task force member brought to the table strongly held views about how wilderness should be managed, no two members could agree on specific issues. To further complicate our task, the "quality" of the wilderness resource varied widely among the 54 units that made up the nucleus of the wilderness system. We knew the only policy that could survive special interest challenges and still meet the intent of Congress was one based strictly on TWA itself. Accordingly, we worked closely with USFS attorneys, members of Congress, and citizen conservation leaders in a sentence-by-sentence analysis of TWA.

One sentence emerged as the most significant management direction in TWA. That is the first sentence in Section 4(b) which states, "Except as otherwise provided in this Act, each agency administering any area designated as wilderness shall be responsible *for preserving the wilderness character of the area* and shall so administer such *area* for such other purposes for which *it* may have been established as also to preserve *its wilderness character*" (emphasis added). We understood this sentence to mean that for each wilderness:

- Maintaining wilderness character takes precedence over all other uses or activities.
- Evidence of people's works must not be allowed to become more noticeable than at the time of designation.
- Primeval character and influence must not be allowed to diminish.
- Future generations must be assured opportunities for solitude as outstanding as at the time of designation.
- Even though some trammeling of the earth and its community of life may have occurred before designation, managers must prevent all future trammeling to the extent possible.

Wild mountain goats in the Golden Horn area, Washington State. Photo by Ira Spring.

In summary, we read that sentence as a clear and unambiguous mandate for nondegradation of wilderness. We recognized that preserving wilderness character was the only way to protect wilderness against the proverbial "death from a thousand cuts," each one in itself perhaps not significant, but cumulatively destructive to the system.

I certainly see some positive aspects to the USFS's new recreation strategy. The proposal to create more opportunities for high-quality wildlands recreation outside wilderness, and to give high priority to protecting less-used wilderness, could serve wilderness well. However, the third proposed action—to manage some designated wilderness lands as less than real wilderness—more than negates any benefit from the first two. It seems to direct National Forest wilderness managers to ignore the nondegradation mandate of TWA in order to accommodate, within wilderness, the ever-increasing demand for nonmotorized recreation.

What will actually happen under the new strategy? Each forest supervisor will delineate "high-use areas" as part of the Forest Planing Process. The architects of the strategy appropriately warn that "high-use areas" cannot be allowed to spread or proliferate. In an effort to guarantee this, planners and managers will be cautioned to look

into the future, evaluate present and future demand, and decide how much of the wilderness should be allocated to "high-use." The strategy allows, and in places encourages, management to consider higher levels of use in carefully delineated and currently popular destinations. To deal with this use, the USFS says,

> *"Intensive site management may be necessary in high-use areas. In order to keep the resource impacts of heavy use to acceptable levels, high-use areas will have to be intensively managed. Behavioral restriction and site manipulation will be commonplace here. Such actions are costly—both fiscally and in terms of losing the aura of unconfinedness. These costs are necessary to avoid unacceptable resource impacts or drastic reductions in access to high-use areas. Those seeking less intensive management can find it in low-use wilderness, although gaining access may become more difficult there, as use limits are imposed to ensure non degradation." (see Recreation Strategy Controversies at www.fs.fed.us/recreation/wilderness/strategy).*

To put all this in a nutshell, I believe the new USFS Wilderness Recreation Strategy will divide each National Forest unit of the wilderness system into two classes. The less popular, lightly used land is one class. It will continue to be managed under provisions TWA. The more attractive areas that are now, or eventually may become, popular will be placed in the high-use class. This class will accommodate ever-increasing use as long as visitors remain happy. Permanent facilities (toilets, fireplaces, tent pads, corrals, etc.) will be installed to prevent water and soil damage. Wilderness character in this high-use class will degrade over time. The boundaries between classes will be only as permanent as a particular administrator desires.

The USFS is proposing to pilot test the new strategy in the Mount Hood Wilderness. Under its proposal, a hiker in parts of the wilderness could expect to meet 30 or more other parties along the trail each day. There will be no limits on this use, and it will grow. If the USFS proclaims the "test" a grand success, managers of other wildernesses will follow suit. The strategy could then be applied to impacted areas within remote wilderness as well as more heavily used areas near urban centers. Even large areas such as the 1.3 million-acre Selway-Bitterroot Wilderness would be affected if its more heavily used corridors and destination areas continue to degrade and fragment as this once large wilderness is zoned into 50 or more tiny pieces. Aldo Leopold, Bob Marshall, Arthur Carhart, and Howard Zahniser must be rolling over in agony.

USFS Chief Dombeck must reaffirm the agency's 35-year commitment to the nondegradation mandate and reject the new Wilderness Recreation Strategy. With his leadership, there are fine folks in the USFS who have the courage and wisdom to make it work. The wildness in this magnificent system can, and must, endure in perpetuity.

BILL WORF is a 32-year veteran of the U.S. Forest Service. As the "special areas specialist," he led the agency's wilderness program from 1965 to 1969. He is currently president of Wilderness Watch, a national non-profit citizens' organization dedicated to protecting the nation's wilderness and wild rivers system. Telephone: (406) 251-6210. E-mail: wworf@in-tch.com. Visit Wilderness Watch at www.wildernesswatch.org.

If We Lock People Out, Who Will Fight to Save Wilderness?

BY IRA SPRING

When Congress passed The Wilderness Act (TWA) of 1964 they proclaimed that wilderness "has outstanding opportunities for solitude OR a primitive and unconfined type of recreation." I've capitalized the word *OR*, for the interpretation of that single word is at the root of this controversy. It has been at the risk of losing a constituency of "green bonded" people who fought to save wilderness so they could use it that the U. S. Forest Service (USFS) interpreted *OR* to mean "AND," thereby requiring solitude on every wilderness acre. Now with their new Wilderness Recreation Strategy, the USFS proposes a more user-friendly wilderness policy, one based on providing "solitude OR primitive and unconfined recreation." I think this is good news for wilderness and the millions of avid hikers who want to go there.

A view of Mount Adams from the Sunrise Peak trail in the Dark Divide roadless area, Washington State. Photo by Ira Spring.

Green Bonding for a Green future

What is green bonding? *Bonding* is the term for the development of ties of any offspring to its parent—a newborn baby to its mother, a newborn fawn to its doe. Green bonding describes the emotional ties a person develops while hiking wildland trails, enjoying the flowers, trees, wildlife, and views. Green bonding generated a green constituency that prompted millions of people to support designation of 106 million acres of wilderness and has kept roads out of millions of additional acres of roadless areas.

People also bond to decent homes, good schools, adequate streets and highways, convenient shopping malls, and pleasure domes for athletic contests. As the nation's growth makes demands for more wood houses, more factories, more vacation retreats accompanied by helicopter pads in parks and wilderness, the result is a massive degreening by money-bonded entrepreneurs who efficiently organize and heavily fund an almost religious crusade to despoil the public green for profit. The 1996 session of the U.S. Congress entertained serious proposals to decommission "surplus" park and wilderness land and hand it over to the "private sector." Fortunately, there were enough green-bonded people in the nation to halt the give-away. But further raids must be expected. Will there be enough green-bonded people in the year 2005 or 2010 to protect our public lands?

The story in the Pacific Northwest is surely similar to other regions of the country. Prior to World War II, the White Chuck River country had many trails but few hikers—too few to prevent a logging road up the valley nearly to Kennedy Hot Springs, converting a long backpacking trip of many days to an afternoon stroll. Golden Horn was a hiker's paradise, but because there was no trail, few had been there, and no constituency existed that could ensure its inclusion in North Cascade National Park. The Ragged Ridge, Eagle Rock, and Jackman Creek roadless area had no trails, so again it received little support for wilderness designation as part of the 1984 Washington Wilderness Act. And since these areas still have no trails, they may lack enough green-bonded support for the next go-round.

There were trails, but no hikers, on the motor-infested Dark Divide, Mad River, and Golden Lakes trails. Hikers too disgusted with the noise and speed of motorcycles avoided these gems, so few voices were raised to include them in the Washington Wilderness Act.

In the 1950s 800 people a year hiked the trail to Snow Lake. The number now is 20,000 a year! When I worked at Mount Rainier in 1937, on a fine summer Sunday perhaps as many as 300 walkers passed over the flower trails of Paradise. Now the count is sometimes 3,000. In the 1960s 300 climbers a year reached the summit of Mount Rainier. Now it's often 300 in one day. The backcountry was uncrowded then, but there wasn't enough public support (green bonding) to prevent logging roads and motorcycle enthusiasts from gobbling up thousands of miles of favorite hiking trails.

Wilderness has many attributes: scenery, flowers, lakes, streams, virgin forests, animals, primitive recreation, birds, solitude, silence, and a physical and mental challenge, AND unconfined recreation. Your list may include more.

It is rare to find all these attributes on one hike. Most hikers are finding a quality wilderness experience on trails with only two or three of the above features. For a family of four I met in North Cascade National Park on the Pyramid Lake trail, it was an experience of a lifetime. And that trail has just one of the above attributes. Last year in Mount Rainier National Park coming down the Rampart Ridge trail, I talked to a couple who told about their wonderful experience. This trail has only one of the attributes, and it is not solitude. Who was I to proclaim before these people that a true wilderness experience must include solitude?

Solitude Alone Is No Basis for Limiting Use

TWA is a great document, but solitude is only mentioned once as an option. And USFS for years has taken "solitude"

out of context by claiming that all wilderness trails should have solitude, rather than limiting use on trails according to the amount of physical impact. Without objection from the environmental community, they would have reduced weekend use in the Alpine Lakes Wilderness by 64%. And despite objection, the Gifford Pinchot National Forest reduced wilderness use by 50% in the name of solitude, antagonizing the very green-bonded people we need to protect our wild places. In Oregon the Mount Hood Wilderness management plan called for an 80% reduction in hikers and climbers. The Forest Service estimated that 20,000 people would be displaced, with few alternative trails to serve them. This ruling caused such an outcry that it was withdrawn.

Make no mistake, human impacts *are* a big problem and controlling use may be necessary, but not in popular places in the name of solitude. Thanks to improved wilderness ethics, trails and campsites look better now than they did in the 1930s when there were only a handful of people in the backcountry.

Solitude can be found somewhere in almost every wilderness, even at Mount Rainier National Park. The Park Service guesses that 3,000 people are often on the paved trails above Paradise Inn, but no one, almost no one, is ever seen on the well-signed Moraine Lake trail that leads to my favorite flower fields.

Demanding solitude on all trails makes no sense. Even in the Alpine Lakes Wilderness there are maintained trails where solitude and beauty is almost assured. Solitude is such a precious commodity that one should be willing to work a bit harder for it. Solitude should not be handed on a platter to a lucky few at the cost of depriving thousands a quality wilderness experience.

I think this is good news for wilderness and the millions of avid hikers who want to go there. … the USFS for years has taken "solitude" [as stated in The Wilderness Act] out of context by claiming that all wilderness trails should have solitude, rather than limiting use on trails according to the amount of physical impact.

In western Washington solitude is easy to find. Last summer, with the help of a dozen volunteers, we researched some 90 abandoned logging roads. Every one of my volunteers commented that they did not see a soul all day.

The New USFS Strategy Is the Right Path

So I applaud the new USFS Wilderness Recreation Strategy. It's about time! Under the new policy people will have "outstanding opportunities for solitude" in the more pristine areas OR "a primitive and unconfined type of recreation" for greater numbers in more popular areas. And just as important, the policy calls for more attention to roadless areas outside of wilderness where quality experiences can also be found.

Photographer IRA SPRING took his first wilderness backpacking trip in 1929 with his father and twin brother, Bob. After World War II Spring and his brother began shooting photographs for a living. At least a thousand of their photos have been sold for calendars, books, and advertisements. His book, *100 Hikes*, has sold half a million copies. Telephone: (425) 778-4685. E-mail: iraspring@aol.com.

The Juniper Ridge trail and Jumbo Mountain in the Dark Divide roadless area, Washington State. Photo by Ira Spring.

Wild Rivers in Australia

BY J. L. STEIN, J. A. STEIN, and H. A. NIX

Abstract: Very few large rivers remain undisturbed in Australia. However, candidates for wild river designation have recently been identified. Over 1.75 million stream sections, with a total length of over 3 million kilometers, were examined for level of catchment disturbance (land-use activity, settlements and structures, infrastructure, extractive industries, and other point sources of pollution) and the extent of direct alterations to the flow regime from impoundments, flow diversions or discharges, and levee banks. More than three-quarters of undisturbed streams have a catchment area of less than 10 square kilometers . Only 13% of undisturbed streams occur within nature conservation reserves; over one-third were found on private land.

Article authors (left to right) J. A. Stein, J. L. Stein, and H. A. Nix. Photo by Lance Heath.

Introduction

Extensive development of water resources for agricultural, industrial and domestic uses, coupled with questionable land management practices have had major impacts on Australian river systems (State of the Environment Reporting 1996). After just 220 years of European settlement, undisturbed or wild rivers are now rare (CSIRO 1992). Such rivers are valuable for (1) baseline or reference areas for the protection of biodiversity; (2) maintenance of downstream water quality and flow; and (3) recreational and aesthetic experiences. A number of regional or statewide studies assessing river values (Kunert and Macmillan 1988; Macmillan et al. 1987; Olsen and Skitmore 1991) have been undertaken, but until now there had been no systematic national inventory.

In 1993 the Australian Heritage Commission launched the Wild Rivers Project. This national program has three concurrent themes: (1) systematic identification of Australia's wild rivers; (2) development of guidelines for the management of wild rivers; and (3) communication and consultation to promote awareness of the values of wild rivers. This article will focus on the first of these projects. This project was guided by a committee representing government agencies (water resource management and nature conservation), farmers, conservation groups, indigenous people, and the scientific community. Group meetings provided an important forum for discussion of the methodology employed and the data used.

Wild River Defined

The definition of a wild river adopted for the project emphasised the absence of alteration to the biological, hydrological, and geomorphological processes associated with river flow by modern or colonial society. Aboriginal land management certainly had some impact on catchments and rivers; however, it is thought to be relatively minor compared with European influence. Note that this definition considers only alterations to the natural processes affecting river flow and not issues of remoteness or aesthetic naturalness. This contrasts with the concept of wilderness as embodied in Australia's National Wilderness Inventory (Lesslie and Maslen 1995) in which remoteness is an essential attribute of wilderness. Thus, a river flowing through areas with high wilderness value may have low wild-river value if its headwaters are significantly disturbed. Conversely, a river close to a major settlement may have high wild-river values if its catchment is intact.

The Wild River Method

Direct measures of river condition, while preferable, are lacking or piecemeal for many Australian rivers (BIOSIS 1993). They are usually only available for more degraded rivers and may be difficult to interpret due to the lack of baseline information from undisturbed systems.

However, the intensity and extent of human activities within a catchment and, where available, data that indicate changes to the flow regime, provide surrogate measures of the extent to which natural river processes have been degraded. A GIS procedure, based on a drainage analysis of a 250-meter resolution DEM (a regular grid of elevation) (Stein, Stein, and Nix 1998), was developed to rate the level of disturbance for stream sections. This procedure uses derived indicators based on four major sources of catchment disturbance with potential to significantly alter river processes: (1) land-use activity, (2) settlements and structures, (3) infrastructure, and (4) extractive industries and other point sources of pollution.

These indicators are combined with another set of indicators based on alterations to the flow regime from in-stream disturbances: (1) impoundments, (2) flow diversions or discharges, and (3) levee banks. The composite River Disturbance Index (RDI) provides an overall rating. Wild rivers are then defined within the context of such ratings for all Australian rivers along a continuum from near pristine to highly degraded.

The Results

RDI was derived for over 1.75 million stream sections with a total length of over 3 million kilometers from the digital 1:250,000 scale map series (AUSLIG 1992). This index allowed rivers to be ranked from undisturbed (RDI = 0) to severely disturbed (RDI approaching 1). By setting an appropriate threshold, potential wild rivers can be identified. In this case, a threshold of 0.01 was chosen, in consultation with the Wild Rivers Project Advisory Committee. Stream sections with RDI values less than 0.01 are essentially undisturbed or, at most, have minimal disturbance in the catchment (for example, a minor trail some distance from the stream or a history of selective logging many decades ago in a small proportion of the catchment). Only 19%, or 591,332 kilometers, of the total stream length assessed satisfied this criterion. Not surprisingly, these undisturbed rivers are found within the less densely populated areas of Australia and outside intensive agricultural zones. More surprising, however, is the land tenure classification of these undisturbed rivers (see table 1). Only 13% of the undisturbed stream length falls within existing nature conservation reserves, and within these reserves nearly half of the stream length was disturbed to some extent. Although only 9% of the stream length

Tenure category	Total stream length (km)	Proportion of streams in tenure category (%)	Proportion of all undisturbed streams (%)
Unknown	7436	40	<1
Aboriginal	263232	61	27
Defence	8835	68	1
Forestry	80253	22	3
Mining	763	22	<1
Multiple use	8743	66	1
Nature conservation reserve	140430	54	13
Other institutional crown land	1524	21	<1
Private land other than Aboriginal land	2335437	9	36
Reserved Crown land	72154	14	2
Vacant Crown land	133909	71	16
Water (supply) reserves	11604	15	<1

Table 1—Length of undisturbed streams (RDI value less than or equal to 0.01) by tenure category.

River Basin (total stream length in km)		
Shannon River (1229)	Koolatong River (6119)	East Alligator River (11422)
Jardine River (2747)	Buckingham River (5853)	Blyth River (4784)
Gordon River (3357)	Prince Regent River (11333)	Goyder River (6896)
Sandy Cape Coast (649)	South-West Coast (3205)	Mornington Island (771)
Walker River (6552)	Moyle River (3686)	Goomadeer River (4080)
Sandy Desert (27908)	Whitsunday Island (128)	Liverpool River (7601)

Table 2—River Basins with greater than 80% of stream length undisturbed (RDI value less than or equal to 0.01).

on private lands was undisturbed, this comprised 36% of the total length of undisturbed sections.

Figure 1 summarizes the results by drainage basins (AUSLIG 1997), which provide the framework for the collation of national hydrological data and water resource planning. Only a few basins are largely undisturbed (see table 2). In many basins, only small headwater streams remain undisturbed. If individual rivers are considered, more than 13,000 were found to be essentially undisturbed for their entire length. However, 75% of these are small streams with a catchment area of less than 10 square kilometers. Only six rivers with a catchment area greater than 10,000 square kilometers were identified as potentially wild, and all of these are found in northern Australia.

Analysis of the distribution of undisturbed streams in relation to environmental domains highlights the underrepresentation of potentially wild rivers in particular environments (see table 3). Only 14% of the total length of streams in the arid/semi-arid domain (covering more than 75% of the Australian land mass) were identified as undisturbed. These generally short, ephemeral streams make up 42% of the total length of undisturbed streams in the nation, however. Another 42% of the undisturbed streams were found in the monsoonal tropical north of Australia where streams are characterized by extremely high peak flows. In the southwest Tasmanian World Heritage Area (cool temperatures, high runoff), the majority of streams (74%) were found to be undisturbed but only contributed 1% to the national total.

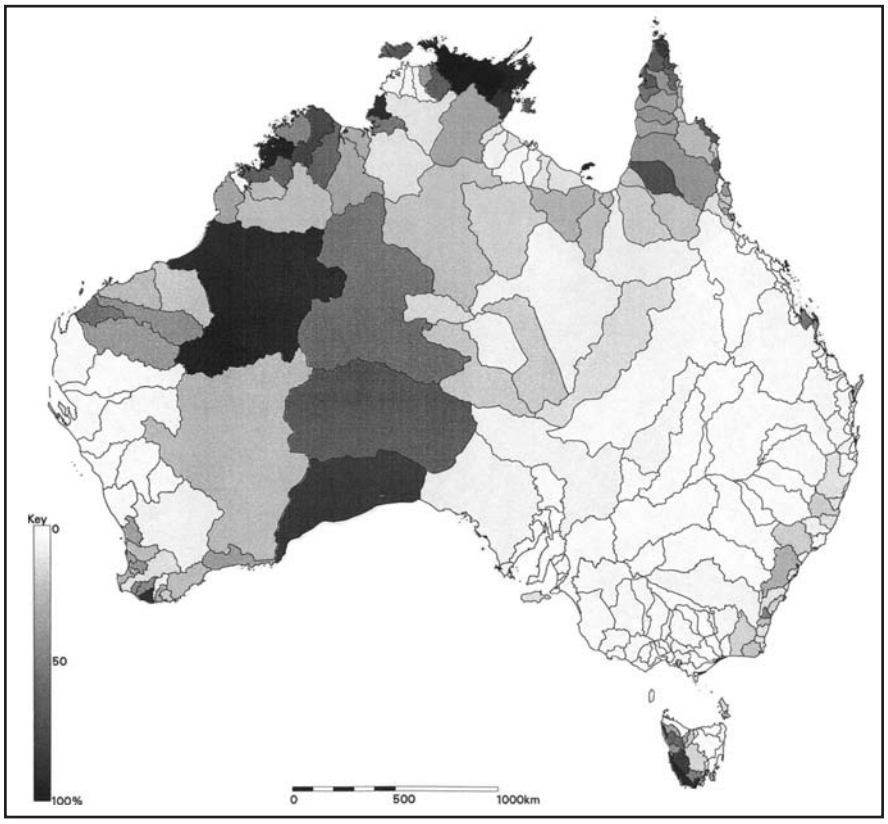


Figure 1—Australia's river basins showing proportion of stream length that is undisturbed (RDI value less than or equal to 0.01).

Discussion

A preliminary list of wild rivers was produced from those river sections with an RDI value of less than or equal to 0.01. However, RDI values represent a continuum of disturbance. In addition, the actual level of degradation to natural stream processes may vary for the same value of RDI, depending on river type and the environmental characteristics of the catchment. Thus, streams with RDI values just above the chosen threshold may also be candidates for inclusion.

A final list is being compiled in consultation with state agencies that have legislative responsibility for rivers (Environment Australia, forthcoming) after verification, which may include field checking and reference to local information. Additional criteria, such as minimum length or catchment size, may also be applied. For example, currently in New South Wales a wild river

has a minimum continuous segment length of at least 10 kilometers; in Tasmania, wild rivers have a minimum catchment area of 1,000 hectares.

A verification study was conducted for the rivers in the Kimberley region of western Australia (Williams and Penn 1995) where excessive grazing pressure is the major cause of riverine degradation. Aerial inspection and on-ground truthing was used to assign rivers to one of five major categories, ranging from wild to degraded, based principally on evidence of erosion and sediment deposition. Comparison of results found that the RDI values provided a reasonably similar indication of candidates for wild river designation but highlighted limitations in the supporting data related to grazing. For example, much of the catchment of the Drysdale River is within a national park and therefore assumed to be ungrazed. However, field inspection of this river, identified as potentially wild from its RDI ratings, showed some degradation due to grazing by feral cattle in the unfenced national park.

Other limitations of this assessment relate both to the underlying assumptions in the river disturbance model and the supporting data used (Stein et al. 1998). For example, much information of relevance to river condition was simply unavailable. This included the condition of riparian vegetation, changes in fire frequency and intensity, the presence of exotic species, the intensity of catchment grazing by feral animals, and the location of river engineering works. Nevertheless, the approach developed has a number of advantages. It rates all streams in a consistent and transparent manner and offers considerable flexibility. The database can be readily updated and parameters easily modified. Assessment of the impact of proposed developments on wild-river values is also accommodated.

The Salmond River in the Kimberley region in western Australia is one example of the 1.75 million stream sections surveyed to develop a relative disturbance index (RDI). Photo by J. A. Stein.

For the first time, a national assessment of river disturbance was produced, providing a listing of potentially least-disturbed wild rivers. Only a few major rivers were found to be undisturbed for their entire length, but many important undisturbed smaller streams and headwater tributaries were identified. Some of these may be the only undisturbed examples of particular river types. An assessment of the adequacy of the existing conservation reserve system would be an important sequel to this project. Natural catchment areas, identified by previous statewide investigations, are already offered legislative protection

The first national assessment of Australian rivers will help protect rivers like the King George in the Kimberley region of western Australia. Photo by J. A. Stein.

Many of the least disturbed streams in Australia are on private lands.

in Victoria. Many of the least-disturbed streams in Australia are on private lands. To protect their wild-river values, planning and other measures are needed, such as incentives for landholders to adopt the wild-river management guidelines (Environment Australia 1996).

Acknowledgments

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Environmental Domain[1]	"Runoff"[2] (mm)	Mean Annual Temperature[2] (°C)	Proportion of undisturbed length in domain (%)	Difference from proportion of all streams (%)	Proportion of all undisturbed stream length (%)	Total stream length (km)	Area (km^2)	Stream density (km/ 00's km^2)
1.Monsoonal tropical	2.3	26.9	44	+25	42	564403	852291	66
2.Tropical lowlands	12.6	23.8	21	+2	1	31240	27923	112
3.Tropical uplands - low runoff	0.0	22.4	16	-3	5	179244	194249	92
4. Tropical uplands-very high runoff	32.9	23.7	32	+13	1	10500	6627	158
5. Arid/ semi-arid	0.0	21.9	14	-5	42	1780135	5936725	30
6.Coastal warm tropical and semi-tropical	1.5	19.1	4	-15	0	39797	57196	70
7.South-eastern uplands/ tablelands	0.3	13.7	8	-11	4	277430	318298	87
8.Mediterranean zone	1.5	15.1	7	-12	2	131418	283764	46
9.Alpine/cool temperate	10.1	10.4	19	+0	1	36188	49715	73
10.Cool temperate, high runoff	23.7	10.3	74	+55	1	11306	20906	54
11.Tasmanian Central Plateau	10.4	6.1	50	+31	0	832	1853	45
Totals			19			3062493	7749546	40

Notes:
1. Environmental domains were derived from a numerical classification of nearly 6000 catchments based on attributes describing the terrain and climate.
2. Median value from catchments in domain. "Runoff" figures are relative values only, computed as the annual mean soil water surplus from a simple water balance model with input from long term mean weekly rainfall and potential evaporation.

Table 3—Proportion of undisturbed stream length (RDI value less than or equal to 0.01) by environmental domains.

Invasive Plant Management Along Wild Rivers

Are We Stewards, Guardians, or Gardeners?

BY BRUCE ANDERSON and KEN WOTRING

Abstract: Invasive exotic plants have the potential to transform plant communities into monocultures, altering wildlife habitat, floral diversity, recreation, and soil stability. Nonforested river canyons and mountain grasslands along the Main and Middle Forks of the Salmon River in the Frank Church-River of No Return Wilderness are at high risk of noxious weed domination. The long-term goals of healthy wilderness watersheds and fulfilled public expectations can only be achieved through rapid, effective management practices that are integrated across all affected land within and adjacent to wilderness.

Potential Goals for Invasive Plant Management in Wilderness

Aggressive, invasive weed species, particularly rush skeletonweed, are threatening to invade the Frank Church-River of No Return Wilderness (FCRNRW) in central Idaho. Weed infestations expanded by 25% from 1998 to 1999, with some of the largest concentrations occurring on private inholdings along the Main and Middle Forks of the Salmon River. A stewardship team set the task of managing these invasives. Before deciding on specific tactics, the team needed to agree on the appropriate goals for managing invasives in wilderness.

Patterson and Watson (1998) outlined four potential environmental philosophy orientations to guide management of exotics in wilderness. Within the FCRNRW, the team needed to decide which orientation fit best with The Wilderness Act (TWA), U. S. Forest Service (USFS) policy, and public sentiment. The team considered the following basic strategies: (1) conservationist (stewards of the land), a utilitarian view that emphasizes the wise use of material resources for human benefit; (2) preservationist (guardians of the land), emphasizing aesthetic and spiritual values of nature and focusing on protection through noninterference; (3) biocentrist (guardians of rights), with an origin in the writings of Muir and Leopold, emphasizing either rights assigned to individual organisms or right and wrong defined in terms of the good of the entire biotic community; or (4) restorationist philosophy (gardeners on a planet in crisis), only recently emerged with the development of restoration ecology and conservation biology, placing value on biodiversity, minimum viable populations, and restoration of ecosystems.

Article co-author Bruce Anderson. Photo courtesy of Bruce Anderson.

Article co-author Ken Wotring. Photo courtesy of Ken Wotring.

Wilderness Act and Forest Service Policy

Key phrases in TWA guide managers toward a "community of life … untrammeled by man, its primeval character … retained, and its natural conditions … preserved," and "an area where the earth and its community of life are untrammeled

by man, where man himself is a visitor who does not remain." USFS policy interpretation further directs managers to "maintain wilderness in such a manner that ecosystems are unaffected by human manipulation and influences so that plants and animals develop and respond to natural forces" (Forest Service Manual 2320.2). There are, however, two common interpretations of these official guidelines:

1. Once plants, regardless of origin, enter wilderness, they become part of the community of life, a natural force. If exotic plants displace native flora and the associated fauna and/or disrupt ecological pathways, it is acceptable. To interfere with this "natural" process could only be perceived as human manipulation within wilderness.

2. Exotic plants were introduced to North American ecosystems deliberately or by accident, but were never part of the pre-European settlement environment. When these plants enter the wilderness, either in a hay bale, with a hiker, or in the hair of a mule deer, they represent human manipulation of nature. When a mountain meadow dominated by Scotch thistle precludes camping or elk grazing, it is a modification brought about by human actions no different than if the meadow were paved.

A desirable philosophical approach to invasive species is not clear in the Wilderness Act or the Forest Service Manual. An analysis of public sentiment was necessary in the search for further guidance.

Public Expectations

The team looked closely at public sentiment specific to the FCRNRW. From research and public involvement, it is clear that people like to hike, float, ride horses, hunt, observe nature, be challenged, and experience solitude within the FCRNRW. They also like to see natural conditions and/or processes operating in wilderness. One of the most important values to river recreationists is wildlife viewing (Hunger 1996), but big game hunting is also popular within the FCRNRW. Noxious weed expansion can affect all of these important human values.

At the national level, society places high value on wilderness for the protection of threatened, endangered, and sensitive wildlife and plants (Cordell et al. 1998). Rare plants can be affected directly by being displaced by invasive weed species, and protected wildlife, such as wolves, could be affected indirectly as native plant communities that prey species rely on are altered. Surprisingly, 82% of the public comments received on noxious weed management in the FCRNRW support aggressive weed treatment actions to restore ecosystems.

Surveying invasives in the Middle Fork of the Salmon River canyon. Photo by Andy Klimek.

A Selected Approach

Cheatgrass, orchard grass, Kentucky bluegrass, timothy, and fruit trees are some of the many introduced species of plants in the FCRNRW. Some species have been brought in deliberately, while others have invaded. Some escaped species are established but compete poorly and occur sporadically on the landscape. Others are only moderately aggressive and will become well established on localized areas such as old homestead fields. The ecological ramifications of these species are not particularly severe. On the other hand, aggressive species such as rush skeletonweed and spotted knapweed are capable of seriously and significantly affecting ecosystem conditions and processes. The team felt the need to focus management on those exotic plant species, which are classified as noxious weeds, highly invasive, not yet widely established, and/or can significantly affect native ecosystems and their related wildland resource values (see table 1). From examination of relevant sources, the stewardship team decided

that a restorative approach to invasive weeds was the appropriate guiding philosophy for the FCRNRW.

In January 1998 a FCRNRW Draft Environmental Impact Statement outlining management for various resources, including invasive weeds, was released to the public. Several proposed management actions were controversial. However, as previously mentioned there was strong support to implement an integrated weed management program. The team recognized early that to be successful in managing invasive plants within the FCRNRW, we had to have continuous public support, and the only way to accomplish this was through active engagement of wilderness users and interest groups. The team began to strengthen existing partnerships and to forge new ones. Extensive interaction with various wilderness interests occurred to solicit input and identify opportunities where partners could work with the USFS in implementing a weed management plan.

The final plan outlined an integrated weed management strategy specifying treatments for approximately 300 sites encompassing approximately 2,000 acres of invasive weeds. This strategy employs a variety of techniques. Elements of the integrated system include coordination, information/education, inventory/early detection, prevention, treatments (including physical, biological, cultural, and chemical), and monitoring.

The team incorporated the following management objectives: containment, control, and eradication. Under containment, weed infestations are not allowed to increase beyond the existing perimeter. The control objective reduces the infestation through time, though some level of infestation may be tolerated. Under eradication, the goal is total elimination of the weed.

Most Invasive	
*Species such as skeletonweed, and knapweeds	
*Species such as Canada thistle and bull thistle	
*Aggressive established exotic species (cheatgrasses)	
*Less aggressive established exotic species (domestic grasses)	
*Nonaggressive exotic species (planted fruit trees, etc.)	
Least Invasive	**Native Species**
Least Impact	**Greatest Impact**
Resource Values (habitat, watershed, biodiversity, visuals)	

Table 1—Potential impacts by different exotic species.

Treatments need to be focused where they have the greatest effect on preventing or minimizing weed impacts on wilderness resources. Weed species to be managed include state-listed noxious weeds and nonstate-listed species. The delineation of plants with respect to treatment priorities is determined by: (1) a weed species' ability to invade and displace native plants communities; (2) the potential rate of expansion; (3) the physical nature of the weed (a tall and thorny species verses a small and unobtrusive species); and (4) the extent and proximity of susceptible native plant communities.

Treatment priorities outlined in the decision were to: (1) eradicate new populations of aggressive weed species, including potential invaders (species not yet found in the FCRNRW but that occur nearby with high potential to spread into the wilderness), new invaders (species recently found in the FCRNRW with limited distribution and density to make eradication feasible), and new starts from established weed populations; (2) control established aggressive weed species; (3) contain established aggressive species; (4) monitor; (5) restore; (6) eradicate new populations of less aggressive species; (7) control less aggressive species, and (8) contain less aggressive species.

Implementation

Once the plan was approved and upheld, the team focused on securing the necessary resources to implement it. We needed approximately U.S. $300,000. USFS funding alone would be insufficient, so we solicited partners to fund the rest of the program.

A two-day meeting in the FCRNRW at Mackay Bar along the Main Salmon River brought existing and potential partners together to collaboratively implement the weed program. Participants included representatives from the Idaho Congressional Delegation,

Surprisingly, 82% of the public comments received on noxious weed management in the FCRNRW support aggressive weed treatment actions to restore ecosystems.

Removing invasive weeds in the Frank Church-River of No Return Wilderness. Photo by Andy Klimek.

a USDA undersecretary and his staff, the governor's office, the Idaho State Department of Agriculture, the Student Conservation Association, private industry, an Idaho county commissioner, backcountry pilots, a jet boat association, the Rocky Mountain Elk Foundation, the Foundation for North American Wild Sheep, private landowners, and USFS representatives from the northern and intermountain regions. Groups and individuals who were unable to attend included the Idaho Fish and Game Department, the Idaho Chapter of The Wilderness Society, the Idaho Environmental Council, the Backcountry Horsemen, and the Idaho Outfitter and Guides Association. This group of interested partners raised over U.S. $400,000 in cash and in-kind commitments to implement invasive weed management in the FCRNRW.

Within the FCRNRW, priorities were established at the wilderness scale and not by land ownership, district, forest, or region. Early each spring wilderness and weed management specialists from all of the USFS units responsible for managing the FCRNRW, as well as private landowners and other partners, meet to prioritize wildernesswide management actions. Schedules are developed and people, supplies, and equipment pooled to implement agreed upon tasks.

Where Do We Go from Here?

To ensure this project is successful, we intend to move forward with the following tasks:

1. **Maintain momentum:** Without continuous attention, few resource areas stand to lose as much invested time and money as management of invasive weeds. If we cease vigilance for even a year (or less), we will lose ground gained during previous efforts.

2. **Shift program emphasis from treatments to restoration:** Over time, treatment unit costs will decline but not disappear. Hundreds of person-days may be necessary initially to treat large infestations, but will decline over time to only several person-days for maintenance activities. Even though some sort of treatment will always be necessary, the extent and degree of follow-up control will be reduced if the infestation site is restored to native vegetation.

3. **Maintain or strengthen relationships with our partners:** This project will only be as successful as the relationship with our neighbors and partners. Without support from these entities, the current plan would never have been implemented.

4. **Expand our education and awareness program:** Working with partners such as the Student Conservation Association, we intend to expand outreach programs to wilderness interests (public and private) concerning the risks of invasive weed expansion to the FCRNRW, which is an international resource. Through expanded outreach we expect to develop new partners.

5. **Expand inventories and early detection of invasive weeds:** It is essential to clearly understand the extent of the weed problem before the most effective treatment strategy can be implemented. Working with partners such as the National Outdoor Leadership School, universities, and others, we intend to pursue the latest, yet least wilderness-intrusive, inventory technology.

6. **Establish an FCRNRW Coordinated Weed Management Area (CWMA):** The CWMA and accompanying plan will outline goals, objectives, management strategies, priorities, and management actions. A recognized CWMA will allow us to better articulate our strategies to all involved with management, broaden partnerships, and compete for funding.

7. **Better coordination with weed managers outside wilderness:** More emphasis will be placed on interfacing with our neighbors. This will include cooperation with CWMAs adjacent to the wilderness and coordination of noxious weed programs and priorities on USFS managed areas.

Conclusion

The team expects mandate and public support to follow a restorative approach in managing exotics in the FCRNRW. This program may provide a national model for wilderness weed management, driven by watershed and resource needs, not an administrative or land ownership approach. Expectations at the FCRNRW from local, state, and national interests are that the USFS will move forward with an aggressive program. Recognition and assistance from the governor's office, the Idaho Congressional Delegation, and the Department of Agriculture has elevated this project so that sufficient resources have been secured to ensure its success.

Our restorative philosophy acknowledges that "a river runs through it." Weed management needs to be framed not only in the context of watersheds but of entire river systems. These rivers are a conduit or highway for invasive species movements. The success or lack thereof in the FCRNRW can affect extensive habitats within the entire Salmon River basin.

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Wilderness Champion, Congressman Bruce Vento, Will Be Missed

BY KEVIN PROESCHOLDT

Congressman Bruce Vento

Congressman Bruce F. Vento (D, Minnesota) died at his St. Paul home on October 10, 2000, from lung cancer. He was 60 years old. Vento was the preeminent champion of wilderness in Congress, and my good friend and mentor. He contracted malignant mesothelioma, cancer of the lungs caused by exposure to asbestos.

Vento chaired the House Subcommittee on National Parks and Public Lands for 10 years. He became the leading wilderness expert in Congress and passed some 300 laws during his 24-year career, many of them written to protect wilderness, parks, and public lands. He tirelessly prodded federal land management agencies to better protect and manage their wilderness areas.

Vento was strongly committed to the million-acre Boundary Waters Canoe Area (BWCA) Wilderness in his home state of Minnesota. He led the fight, with Phillip Burton (R) and Don Fraser (R), to pass the 1978 BWCA Wilderness Act, legislation that brought vital protections to the area and its wild character. Bruce maintained his commitment to the BWCA Wilderness throughout his career in Congress.
He will be sorely missed.

KEVIN PROESCHOLDT is the co-author of *Troubled Waters: The Fight for the Boundary Waters Canoe Area Wilderness*. He worked with Bruce Vento for 24 years on wilderness policy. He recently left Friends of the Boundary Waters Wilderness after directing the organization for 16 years. Telephone: (612) 724-6876. E-mail: kevin@friends-bwca.org.

The BLM in Partnership with the Student Conservation Association

Restoring Wilderness in the California Desert

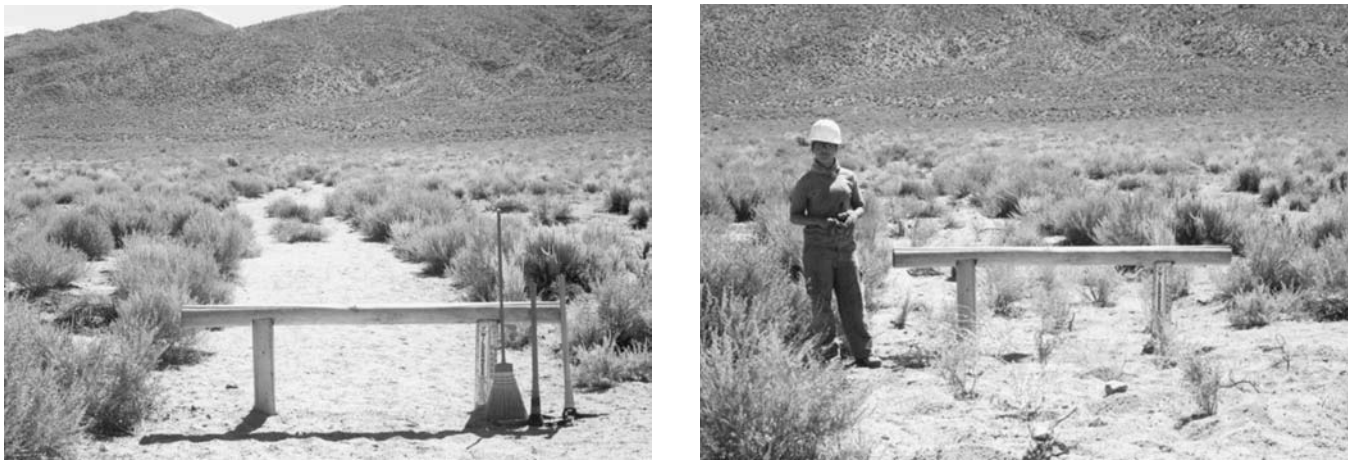
BY DAVE WASH and KATIE WASH

California Bureau of Land Management (BLM) desert lands, so visible and accessible, reveal the passage of time. These wild places afford the opportunity not only to stand on the spot where ice ages and volcanoes changed the land, but to actually feel the alkaline lakes and cinder cones. Creosote rings more than 11,000 years old perch on hillsides beneath the clear skies through which the space shuttle passes. Still evident are the rock rings and world-renowned rock art of Native Americans summoning rain as well their trails of trade. Remnants of covered wagon tracks, ruts of stagecoaches traversing the desert by night, and railroad trestles all crisscross this country. And even today ranchers and miners, like pieces of the past, still work this wild land. And the desert will continue to hold the past and the future because the California Desert Protection Act recognized and honored the underlying layer of 4 million acres of wilderness.

Managing desert wilderness is not easy. The BLM's job is to help return the deserts of California to their natural state. We do a great deal of mapping of the historical and current state of these lands. But with only two wilderness staffers, the beginnings of a wilderness ranger program, nearly 1 million acres, and more than 500 miles of old internal routes, we couldn't find the time or expertise to conduct this massive restoration project. But there is power in numbers.

Enter the Student Conservation Association (SCA). This national organization specializes in wildland work, using students working on summer crews from all over the country. They provide extensive training for crew leaders in field skills, teamwork, and leadership. In 1997 we succeeded in bringing on our first crew in California at a cost of U.S. $13,600 by partnering internally between the recreation and wilderness programs. In one month six students and a leader restored 14

Continued on page 11



Before and after SCA's wilderness restoration work in the California desert. Photo courtesy of BLM.

Economic Values of the U.S. Wilderness System

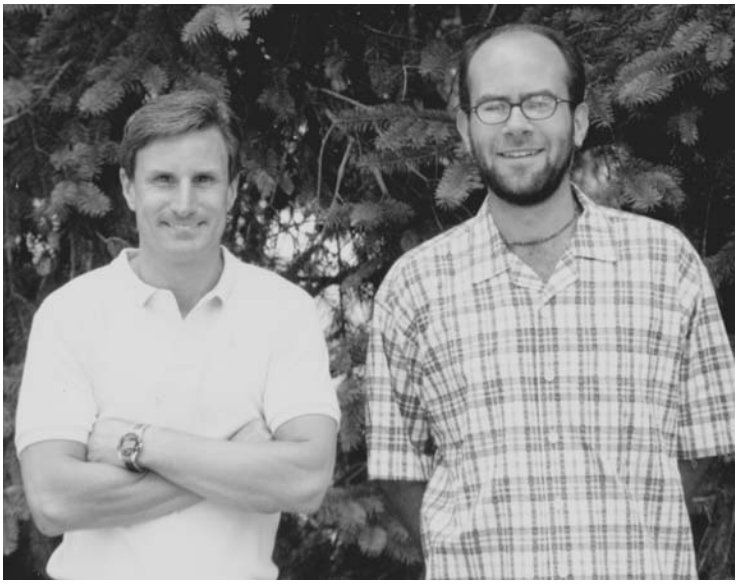
Research Evidence to Date and Questions for the Future

BY JOHN B. LOOMIS and ROBERT RICHARDSON

Abstract: Economic values from the protection of natural environments such as wilderness, can be grouped into eight categories: recreation, community, passive use, scientific, biodiversity, off-site, ecological services, and education. This article reviews what is known about these values. While monetary values can be calculated for only a few of the benefit categories and only some of the benefits within those categories, the estimated benefits amount to U.S. $3 to 4 billion dollars annually.

Introduction

Of the 100 million acres of designated wilderness in the United States, about half is located in the lower 48 states. Most of the economic benefits provided by wilderness can be classified by where those benefits are realized: on-site versus off-site or downstream (Loomis 1993). The most obvious on-site benefits provided by wilderness are recreation use and the protection of fish and wildlife habitat. Off-site or downstream benefits include protection of water quality for downstream cities, biodiversity, and passive-use values such as existence values to people who may never visit wilderness, but who still receive enjoyment and satisfaction from knowing it exists and is protected for them and future generations (Krutilla 1967). We now turn to a summary of the eight categories of benefits (also see table 1), using standard economic methods used by federal agencies in the United States.



Article author John Loomis (left) with Robert Richardson. Photo by Michael Miller.

Recreation Benefits

The available visitor use data from the four federal land management agencies that manage wilderness in the United States (Forest Service, National Park Service, Fish and Wildlife Service, and Bureau of Land Management) suggest a conservative estimate of 16 million recreation visits to designated wilderness in the lower 48 states. The benefits to visitors is estimated by their willingness (and ability) to pay over and above their current trip costs. This net willingness to pay (WTP) has been measured for wilderness recreation using both of the federally approved valuation methods, the Travel Cost Method (TCM) and Contingent Valuation Method (CVM). TCM uses variation in visitors' travel costs and trips to trace out a demand curve. From the demand curve, net WTP can be calculated. CVM uses surveys to simulate what visitors would pay if there were a market for access to wilderness for recreation. (See Loomis and Walsh 1997 for more details on the two methods.) The average economic value per visitor-day from studies that used these methods is U.S. $40.

Thus, the 16 million visitor-days has an estimated total recreation value of $634 million annually. The designation of an additional 10,000-acre roadless area in the West as wilderness would yield about 3,875 additional visitor-days per year, providing a $153,500 recreation value to visitors each year in the western U.S. The same 10,000 acres in the eastern United States is estimated to yield approximately 11,000 visitor-days per year with an annual recreation value to visitors of $435,700.

Community Effects

A review of the economic literature indicates visitor expenditures per day of wilderness use averages to $30. To calculate the direct and indirect economic impact of such spending, we multiplied this value by the estimated wilderness visitation of 16 million, and entered the product into an input-output model to correct for leakage when calculating the multiplier effects of the visitor spending on the U.S. economy. The resulting estimate suggests the level of total expenditures directly or indirectly supports 26,820 jobs. While development is restricted within wilderness, visitor spending on gasoline, hotels, restaurant meals, and so forth supports economic development outside wilderness. Designation of an additional 10,000 acres of wilderness translates into an additional U.S. $443,740 of personal income and 18 jobs from wilderness visitor spending in the eastern U.S. and $156,318 of income and 6 jobs in the western U.S. In addition, protection of wilderness may promote economic development in the adjacent counties through attraction of new residents and businesses which value the amenities protected by wilderness. Surveys indicate that in counties containing wilderness, 45% of current residents and 60% of recent migrants see wilderness as an important reason for living there.

Passive-Use Values

Existence values (knowing wilderness exists and is protected), as well as bequest values (providing this resource for future generations), were quantified using contingent valuation surveys. Generalizing passive-use values (e.g., existence and bequest values) for wilderness in the western United States, we estimate annual values at $6.72 per acre, yielding annual passive-use values of $287 million for 42.7 million acres. For eastern wilderness, we estimate a passive use value of $4 per acre, yielding annual passive use values of the 4.5 million eastern acres to be $19 million. Thus, total passive-use values are estimated to be $306 million. More studies of passive-use values, particularly in Alaska, are needed to improve our rough empirical estimates.

Scientific Values

Wilderness provides a natural benchmark or control area for judging the effects of human development on natural systems and understanding of unfettered ecological processes. Wilderness has also been the source of study for more than 400 scientific journal articles in the natural and social sciences. There

Use	Economic Value (Millions)	Economic Impact	Other Indicators
Recreation Value	$634		
Passive-Use Value (option, existence, bequest)	$306		
Ecological Services (carbon sequestration, etc).	$2,000 to 3,400		
Scientific	$5		+400 journal articles
Biodiversity			+1 million acres protected 1/3 of U.S. Ecoregions
Community (recreation related)		26,822 Jobs	
Off-Site (gain in local property values)	13%		

Table 1—Summary of annual economic values of wilderness in the lower 48 states.

are several hundred agency research publications on wilderness as well. Journal articles contribute to scientific progress, which in turn often contributes to productivity improvements and therefore increased human well-being. Using a rough estimate of the annual value per journal article, these wilderness-based articles yield an estimated economic benefit of $5 million annually. The methodology for estimating scientific benefits needs substantial improvement before this estimate can be considered as any more than a rough approximation.

Biodiversity Values

Wilderness designation provides one of the strongest levels of protection of biodiversity available to policy makers. Using the Bailey-Kuchler ecosystem classification system, we calculated that more than 10% of the land in the Everglades, American Desert Province and Coniferous Forest-Alpine Meadow provinces are protected by wilderness (Loomis and Echohawk 1999). Altogether, wilderness designation of a million acres or more protects about one-third of the 35 ecoregions of the continental United States. While CVM could potentially be used to estimate an anthropocentric value of biodiversity, economic valuation methods do not allow for the measurement of the intrinsic value.

Off-Site Benefits

Just one of the off-site benefits of wilderness, the increase in value of private property adjacent to wilderness, provides a gain of 13% in per acre values in the Green Mountains of Vermont (Phillips 1999). With about 47 million acres of wilderness nationwide, there are probably hundreds of millions of dollars in property value enhancement on private lands adjacent to or nearby these areas.

Wilderness provides a natural benchmark or control area for judging the effects of human development on natural systems and understanding of unfettered ecological processes.

Ecological Services

Ecological services provided by wilderness include watershed protection, carbon storage, nutrient cycling, and fish/wildlife habitat. Wilderness watershed protection yields a cost savings to several small towns' water treatment plants and highway departments from avoiding sedimentation associated with logging. This benefit is estimated to range from at least $130,000 to as much as $260,000 annually from just one small national forest of 631,000 acres (Loomis 1988). Given the 47 million acres of wilderness, between $9 and $18 million in cost savings could be realized if this case study is generalized to wilderness throughout the United States. In terms of climate regulation, an acre of forest has an estimated value of $65 a ton for storing carbon, and thereby helps to moderate climate change (Morton 1999). An estimated 29.5 of the 44 million acres of wilderness are forested (Loomis and Echohawk 1999). A rough estimate of the value of carbon stored in wilderness forests is $2.4 billion annually. Costanza et al., in their article in *Nature,* estimated that benefits of climate regulation from temperate forests could be valued at $35 per acre per year. This yields a value of about $1 billion annually in climate regulation benefits from wilderness forests.

These same authors indicated that temperate forests also provide waste treatment services by recovering mobile nutrients and cleansing the environment. The authors then estimated another $35 per acre from waste treatment benefits of forests. Thus, wilderness forests would provide another $1 billion in benefits per year from this ecosystem service. Therefore, the annual economic benefit from watershed protection, carbon storage for climate regulation, and nutrient cycling for waste treatment are estimated to be between $2 billion and $3.5 billion. This estimate is conservative, as it does not account for numerous other ecological services provided by the protection of wilderness.

Educational Values

Wilderness often provides a natural laboratory for many high school and college courses. Wilderness has also been used by various organizations to help teenagers and adults develop self-reliance, teamwork, and coping skills they can use in everyday life. There is a growing health industry that uses wilderness as an integral part of its treatment program. The potential economic value of these benefits is difficult to measure, but may be in the millions of dollars, while the economic impact in terms of employment may be even greater.

Conclusion

Wilderness provides many values to humans through on-site recreation use and fish and wildlife habitat, as well as off-site benefits in terms of protecting water quality, sequestering carbon, and providing an environment for scientific research and the rehabilitation of the

human condition. While economic techniques can currently estimate monetary values for some of these benefits, many of them, such as protection of biodiversity, will only be monetized in the future. A concerted effort between natural, physical, and social scientists will be necessary to more fully develop methods to accurately reflect the economic benefits society receives from wilderness preservation. Additional research is especially needed in Alaska, where a great deal of wilderness exists but few benefits have been quantified. While economic benefits are not the primary justification for wilderness protection, they do provide a very important defense.

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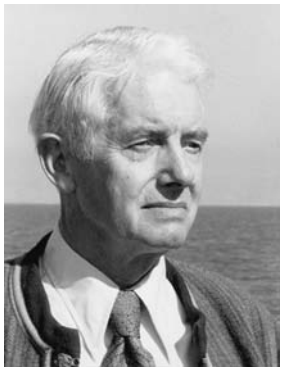
Wilderness Loses Icons David Brower and Bing Lucas



David Bower. Photo courtesy of Earth Island Institute.

Bing Lucas. Photo courtesy of Wren Green.

U.S. conservation legend David Brower has died. An accomplished mountaineer, Brower made over 70 first ascents. He applied the same kind of courage and resolve he used in mountaineering to his work in conservation; he did what had never been done before. Brower launched new organizations (Friends of the Earth, the League of Conservation Voters, and Earth Island Institute) and conservation campaigns (Glen Canyon, King's Canyon, North Cascades, Dinosaur Monument, the Redwoods) throughout his long career. His aversion to compromise was legendary. In the 1950s and 1960s he transformed the Sierra Club from a regional hiking group into a potent national political force. He was later fired for taking unflinching, extreme positions. He returned to serve on the Sierra Club's board of directors many times, until leaving once more in the last year of his life over yet another disagreement of principle. Nonconforming to the end, he cast his vote for Ralph Nader the day before he died. David Brower blazed new paths for wilderness conservation. He was 88 years old.

Bing Lucas, New Zealand wilderness conservation icon, has also died. As famous for his cooperative spirit as Brower was for his lack of compromise, Lucas literally died with his boots on, walking his beloved New Zealand mountains. As his country's first director of parks and reserves, Lucas created one of the world's most envied systems of walking trails, created new national parks, and crafted some of the best conservation policies in the world. Lucas retired as director general of lands in 1986. He continued working with the World Conservation Union (IUCN). In 30 years of voluntary service with the IUCN, he led the Parks Commission, was vice-chair for World Heritage, represented the IUCN at countless international meetings, including the World Wilderness Congress, and led many missions to study and protect wild and cultural heritage.

Go well, dear friends. You have made our work possible.

Controlling Nature
Is Science to Blame?

BY NAOMI ORESKES and REBECCA ORESKES

Abstract: Many authors, including James Glover (*IJW,* April 2000) believe that the modern compulsion to control nature is rooted in Western science, and that Eastern philosophy can provide a better alternative. However, science itself is complex and multifaceted with traditions that have emphasized understanding nature without attempting to control it. Further, wilderness preservation cannot be achieved without confronting utilitarian attitudes and economic and population pressures. Western science is a piece of this puzzle but certainly not the cause of all our woes—neither panacea nor plague.

Controlling Nature

Why do we feel compelled to control nature? Why do we think that land needs to be "managed?" Isn't it in the very definition of wilderness that it be wild? James Glover (*IJW,* April 2000) suggests that our urge to control nature is rooted in the Western scientific ethos, which biases us in favor of action and dominance over nature. Like science historians Theodore Roszak (1973) and Carolyn Merchant (1980) before him, Glover urges us to seek remedies by looking outside the scientific tradition. For Glover, this means Eastern philosophical traditions such as Taoism.

Control Comes from More than Science

While Eastern philosophies and religions have much to offer the West, there are resources available closer to home, resources that need not place us at odds with our own intellectual traditions. To cast the challenges that face us as a matter of science versus nature or West versus East is unnecessarily polarizing. Within Western science there has always been a strong intellectual tradition of learning about nature without seeking to control it.

Western science is not the cause of all our woes. Other factors include: (1) How we use science in our decision making; (2) our denial of human emotions in our decision making, and our tendency to retreat to "objectivity" in our search for answers to difficult questions; (3) human greed and economic forces based on a belief that all decisions are, or should be, materially driven; and (4) land-management agencies based in utilitarianism and/or a Protestant ethic of action over contemplation.

Article author Naomi Oreskes. Photo courtesy of the University of California.

Article author Rebecca Oreskes. Photo by Brad Ray.

A Few Thoughts on Science

It's naïve to believe we can talk about science as one unified theory or way of being. The two men Glover cites, Francis Bacon and Rene Descartes, often cited as the first to link knowledge of nature and power over it, had two fundamentally different ways of approaching the world. Descartes was a reductionist who believed in the power of ratiocination (Descartes 1637). He had far less interest in human encounters with nature than did Bacon, whose views are therefore of greater relevance here.

The Great Gulf Wilderness on the White Mountain National Forest, New Hampshire. Photo courtesy of White Mountain National Forest.

Francis Bacon (1561–1626) was a barrister, a member of the British Parliament, and ultimately lord chancellor of England. An effective propagandist, Bacon sought to convince King James of the value of supporting the fledgling enterprise we now call science. He proposed science as an alternative to medieval scholasticism, as a method of inquiring about nature that would prove more profitable than recitations and disputations on the work of Aristotle. What was the promised fruit of this new form of inquiry? Knowledge of nature, and with it the ability to do new things (Bacon 1620, 1627). As historian Markku Peltonen has put it, Bacon "wanted to replace the Aristotelian image of science as a contemplation and organization of eternal truths with a conception of science as a discovery of the unknown" (Peltonen 1996).

The vision painted by Bacon is in some sense one of letting go: of releasing the received wisdom of Aristotle and posing new questions about nature. So why do we think of science as characterized by an ethos of control? In part because the process is one in which answers are sought and solutions to problems may be found. It is a philosophy of action more than contemplation, which aligns it more easily with engineering than with poetry. But mostly, we associate science with control of nature because modern science and technological innovation grew hand in hand with capitalism and the industrialization and urbanization it fostered. The urge to control nature has been driven by commercial forces at least as much as by the scientific spirit of inquiry. Human greed and materialism are as much root causes of our inability to leave nature alone as is Western science.

Science for Discovery

This is only part of the story because it describes only part of science. There is a long history in Western science of investigation motivated by the desire for explanation that had little or nothing to do with control. One example is astronomy. Well before Bacon, astronomers studied the motions of the planets because they thought the planets influenced us and we should therefore try to understand them. Astronomers believed they could use knowledge of the planets to make better decisions in the world, but they never thought they could control nature through their study of it. On the contrary, they thought nature controlled us. Many of the great names in the history of science were involved in this work, including Copernicus and Kepler. The foundation of modern astronomy was motivated by a search for understanding without expectation of control. The motivation for astronomy and astrophysics remains much the same today. Scientists do not study the Big Bang because they think we can undo or re-create it, they study it because they want to understand it (Hetherington 1993).

By the late 18th century two distinct knowledge-seeking traditions coexisted in Western science: natural philosophy and natural history. As it is today, natural philosophy (later physics and chemistry) became closely linked with technological innovation and control during the industrial revolution. Natural history (later geology and biology) was not about control (at least not until extremely recently), but about knowing the world and suggesting how it came to be this way. The signal contribution of 19th-century geology—the unraveling of earth history—was an act of accounting and explanation. No one thought they could control the history of the earth! Charles Darwin, the greatest scientist of the 19th century, was trained as a geologist and understood his work as an attempt to explain and account for the diversity of species and the wondrous forms of life on earth. Darwin's theory of the origin of species by natural selection is an account of how things have come to be. It is a description of

the world. It neither seeks nor promises control (Oreskes 2000).

With this in mind, we can recast our attitudes and questions about science. Rather than blame science for our woes, we can ask: "What intellectual resources does science offer us now?" Rather than discard science, we can try to use it in congenial ways. By recapturing the perspectives of natural history—of understanding the events and processes of nature—we can make headway on the problems Glover poses without naming ourselves enemies of science, enemies of modernity, or worse, enemies of Western culture. With the perspective of natural history, we can make informed choices about the world without expecting or wanting to control it. We can enlist science as our ally, rather than our foe.

In blaming science, Glover and others divert attention from another, more pressing issue: economics. It is difficult for us to look at land without thinking about economic gain; we want to quantify land values as dollars returned to individuals or a national treasury. Historically, in agrarian communities, land was wealth. Therefore, it is little surprise that we have trouble accepting intrinsic value and areas set aside with no promise of economic gain. For wilderness to survive, we must confront the economic forces and population pressures that push wilderness into smaller and smaller areas.

Why Science Alone Will Fail Land Managers

Glover cites ecosystem restoration as one of the pivotal wilderness issues demanding inaction. We suggest a less categorical approach and also that we ask at least three questions before we undertake large-scale restoration: (1) is it morally acceptable; (2) is it scientifically warranted; (3) and can we achieve our aims?

While Eastern philosophies and religions have much to offer the West, there are resources available closer to home, resources that need not place us at odds with our own intellectual traditions.

To answer whether wilderness restoration is morally acceptable we need to have a discussion about our deepest collective values. In this case sources from both Western and Eastern traditions may help inform the conversation. If our objections to a particular course of action are morally grounded, we should not be afraid to say so.

As to whether a proposed restoration effort is scientifically warranted and we can achieve our aims, in all ecosystem management we face great scientific uncertainties. This is not unique to ecosystem science; virtually all questions of public policy involving natural systems entail enormous uncertainties (Oreskes et al. 1994; Oreskes 1998). We can't be sure that the actions we take will give us the desired outcomes. Our decisions quickly become both a matter of science and of how we view our relationship with the land. How much risk we are willing to take in the face of scientific uncertainty is a reflection of our values (cf. Cole 2000). A purely objective decision-making process is simply not possible when scientific uncertainties loom large.

The Roots of Land Management

To jump to the conclusion that land managers who want to restore ecosystems do so out of the desire to control nature doesn't quite seem fair. If land managers have a bent for action, it may be due to several reasons. Most wilderness managers today are overwhelmed with a series of seemingly intractable problems: increasing use, air and water pollution, laws and regulations with truck-size loopholes, and conflicting political and social signals—to name only a few. When managers want to "restore" the land, it's often not out of a desire to control nature but out of a desire to control people. For managers, it is a way to right perceived wrongs.

Moreover, the United States and its land management agencies are firmly grounded in a Protestant utilitarianism with action at its root. We believe in deeds: "Don't just stand there—do something!" Add to that a system that tends to reward action over thought, and the results are obvious. We need a new system of rewards and review for land managers that is not based solely on quantifications (acres burned, acres restored, people visiting), but also on preservation and the protection of unquantifiable goods (cf. Porter 1995).

When land managers and scientists speak of the value of wilderness, they often speak in abstract and technical terms: biodiversity, acreage, sustainability. But when people are asked why they go to wilderness, they speak in personal and affective terms: because it is beautiful, because they can rest there, or simply because they love nature (cf. Cordell et al. 1999). Wilderness managers talk of quantity, wilderness users talk of quality. Missing from our

The urge to control nature has been driven by commercial forces at least as much as by the scientific spirit of inquiry.

equations are the things that can't be equated: beauty, tranquility, and love. This is not the fault of science, but the fault of all of us who are afraid to speak honestly about how we feel.

Our society needs new ways to solve problems. We must begin to create an environment in which we can have reasonable discussions about action and nonaction. We must have the courage to speak in affective terms. How we feel needs to count. Currently, our society has few satisfactory ways to have the conversation without degenerating into a polarized them versus us, east versus west, rationality versus irrationality. Humans have heart and reason, intellect and emotions. When we speak about wilderness only with reason and intellect, we are left with an incomplete picture of why wilderness matters. If we don't also use heart and emotions in our decisions, land managers are bound to fail.

Conclusion

American society is compelled to act. But the reasons go well beyond science. It is time for us to look more deeply at the motivations behind our compulsion, and at the long-held assumptions and values that pervade our society and our land managers. Only then can we can have honest and open dialogue that will help us make thoughtful choices about when to act and when to do nothing.

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Whitewater Boaters in Utah
Implications for Wild River Planning

BY DALE J. BLAHNA and DOUGLAS K. REITER

Abstract: A survey on nine whitewater river segments in Utah indicates use limits may be appropriate on low-use river segments, but high-use segments could be managed for large numbers of boaters. This would maintain a spectrum of experiences and reduce aggregate physical impacts, even if boater numbers increase. The traditional approach taken in many protected areas, where capacities are applied in individual, high-use areas, is questioned. Wildland managers should not consider areas in isolation, but as part of regional systems.

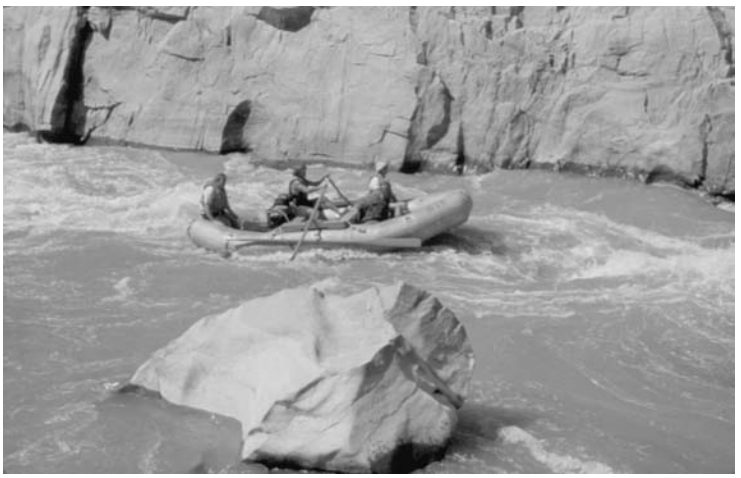
With the emergence of ecosystem management, there is a mandate to look beyond single administrative units in planning efforts (Gilmore 1997). Although there is still debate over how ecosystem management will be implemented, social and ecological scientists generally agree on the need to take a regional view for management policies and spatially explicit management objectives.

A Regional Perspective on Capacities

The importance of taking a regional perspective has been recognized in wild-river management since the 1970s (Stankey 1974; Lime 1977). One important benefit of regional planning is a diversity of recreation opportunities. Lime (1977) argued for greater emphasis on regional river studies to understand the mix of experiences desired by the public. He advocated describing rivers based on physical, cultural, and human perception attributes. Schreyer (1985) also argued that identifying river management objectives, addressing recreation impacts and conflicts, and providing a diversity of experience opportunities depended on viewing river segments as part of a system of recreational opportunities.

Use capacities are usually applied at the site level and based on facility limitations or managers' or visitors' estimates of the user density that is appropriate (Williams et al. 1992; Hof and Lime 1997). The Park Service is often required by law to identify carrying capacities and, as a result of increasing visitation, the perceived need for setting these capacities is escalating (Mitchell 1995, Hof and Lime 1997). Use capacities commonly focus on high-use areas, and, while this seems intuitively appropriate, it may be exactly the opposite of how recreational use capacities should be applied (Cole 1997).

There is increasing criticism of the use of visitor capacity limits in the recreation literature. Recreation use-impact curves tend to be curvilinear; that is, the incremental impact of each additional visitor in low-use areas tends to be high, but in moderate and high-use areas the incremental impact of each additional visitor is very low and eventually it becomes negligible (Cole 1997). Thus, limiting use in a high-use area may increase aggregate impacts by shifting



Running Skull Rapid in Westwater Canyon, Utah. Photo by Richard M. Schreyer.

The Goosenecks on the San Juan River, Utah. Photo by Richard M. Schreyer.

use to lighter-used areas. Also, correcting existing impacts often requires major reductions of, or even eliminating, use. Use limitations may be most effective in areas with relatively little use (Cole et al. 1997).

From a regional perspective, the potential secondary effects of displacement deserves attention. While there is evidence of displacement in certain areas (Manning 1999), there have been no studies of where displaced recreationists actually go. Thus the long-term regional effect of setting social carrying capacities could be a reduction in the diversity of available opportunities (Stankey 1974; Borrie et al. 1998).

Another common theme in this debate is that management objectives should be based on factors besides use density, and that these objectives should provide a diversity of opportunities within a region (Stankey 1974, Borrie et al. 1998). High use at a particular place may be a relatively minor concern to many visitors; the relative importance of use density cannot really be understood unless in a regional context.

This study describes the diversity of demands for river trips from a regional perspective. Regional riverboater data allows us to describe different experience expectations for different settings and to compare visitors' response to use density in high- and low-use areas.

Study Rivers

The Brown's Park segment of the Green River exits Flaming Gorge Dam flowing east and is usually run in a single day. The White River's headwaters are in the northern Colorado Rockies, but the Utah stretch, or Bonanza segment, is essentially flat water, and canoeists take about three days to run the river. Below the confluence with the White River, the Green River flows through Desolation and Upper Grey Canyons as it cuts through one of the most remote areas of the state, the Tavaputs Plateau. A popular destination, rafters generally spend three or four days floating this segment. The Green River then flows through Lower Grey Canyon (Green Daily segment). This segment typically takes four to

Response	*San Juan River*		*White R.*	*Green River*				*Colorado River*	
	Upper	Lower		Brown's	Daily	Labyrinth	Desolation	Daily	Westwater
Sample size (*n*)	(*126*)	(*176*)	(*47*)	(*144*)	(*155*)	(*149*)	(*257*)	(*638*)	(*556*)
Average number seen/ trip[1]	29	43	25	80	35	27	47	62	33
Average number seen per day	15	7	9	55	27	6	9	58	23
Too many people	15%	34%	13%	34%	9%	19%	32%	17%	17%
About the right number	78%	63%	79%	56%	79%	75%	66%	78%	75%
Too few people	8%	2%	9%	10%	12%	6%	3%	5%	7%
Satisfaction mean[2]	1.30	1.26	1.30	1.33	1.47	1.61	1.29	1.47	1.17
Percent satisfied with trip[3]	97.6%	99.4%	95.7%	97.2%	96.1%	92.5%	98.4%	96.5%	99.5%

[1] River trips are various lengths and averages shown are not standardized to account for the different trip lengths.
[2] Mean score based on a five point scale where 1 = Very Satisfied, 2 = Satisfied, 3 = Neutral, 4 = Dissatisfied, and 5 = Very Dissatisfied.
[3] Percents include those who indicated either "Very Satisfied" or "Satisfied" with their river running trip.

Table 1—River users' estimates of number of people seen, feelings about the number seen, and satisfaction with trip.

Expect to ...	*San Juan River*			*White River* (*n=22*)	*Green River*				*Colorado River*	
	Upper (*n=41*)	Lower (*n=56*)	Both (*n=41*)		Brown's (*n=48*)	Daily (*n=50*)	Labyrinth (*n=55*)	Desolation (*n=118*)	Daily (*n=154*)	Westwater (*n=219*)
Experience solitude	3.80	4.39	4.13	4.33	2.95	2.86	3.98	4.30	2.32	3.68
Be with family & friends	4.08	4.17	4.63	3.86	3.75	4.68	3.91	4.66	4.32	4.53
Run rapids	3.55	3.22	3.13	3.14	2.75	4.18	1.89	4.28	4.20	5.05
Learn about human history/culture	4.12	3.61	3.72	2.62	2.02	1.90	2.80	2.99	1.99	2.18
Catch a lot of fish	1.08	1.29	1.05	1.24	3.87	1.32	1.22	1.13	1.08	1.10

[1] Mean score based on a six point scale where 1 = Not at all Important, 2 = Slightly Important, 3 = Somewhat Important, 4 = Moderately Important, 5 = Very Important, and 6 = Extremely Important.

Table 2—River users' average importance ratings for five expectation variables.[1]

six hours and, depending on flow rate, has seven or eight Class II to III rapids. Starting at Green River State Park below the town of Green River, the Green flows through Labyrinth Canyon, a stretch that takes about four or five days to float. This stretch is remote, flowing through the red rock canyon country of southeastern Utah.

Westwater Canyon of the Colorado River offers the steepest gradients and most challenging rapids of the study segments. Most river runners take a full day to run this stretch. The Colorado Daily segment of the Colorado River takes about four hours, has minor rapids, and attracts many tourists visiting Moab, Utah.

The San Juan River in the southeastern corner of the state is bounded by the Navajo Indian Reservation. At certain points, its flow has cut enormous meanders through thousands of feet of sandstone, creating spectacular geologic features. Most boaters take a few days and float just the Upper San Juan or the Lower San Juan segments. Some boaters will float the upper segment in one day, and others will take several weeks and run both segments at a leisurely pace.

Study Methods

Data were collected via intercept and mail surveys. The intercept survey was conducted at 13 take-outs on the nine BLM whitewater river segments in Utah that have commercial river trips. Between May and September 1999 interviewers asked river runners to fill out a short, two-page survey. The intercept survey contained questions about the trip that were most dependent on immediate recall. The mail survey extended to experience expectation (42 items) questions derived from earlier studies conducted by Schreyer and Nielson (1978) on the Westwater and Desolation segments.

Of the 2,360 people contacted, 2,248 completed the intercept survey for a 95% response rate. About 62% (1,394) agreed to participate in the mail survey and provided their correct names and addresses. Surveys and two reminders were mailed in the summer and fall. We received 804 responses for a 58% response rate to the mail survey.

Results

Encounters vary significantly, with the most encounters on the Brown's Park, Colorado Daily, Green Daily, and Westwater Canyon segments (see table 1). Boaters on the Colorado Daily saw six to nine times as many people as boaters on the Lower San Juan, Desolation, Labyrinth, and White River segments.

Despite the large differences in contact levels, relatively few boaters on any segment said they saw too many people, and satisfaction was uniformly high. Boaters on the lower-use segments (Lower San Juan, Desolation, Labyrinth), however, were more likely to say they saw too many people. The only exception to this trend is Brown's Park, where respondents saw an average of 55 other boaters per trip and 34% said they saw too many people. Most of these contacts occurred in only one location (near the dam), however, suggesting overall consistency with the pattern of higher perceived crowding on the lower use segments.

There are many differences in boater expectations. For example, results are provided for five expectation variables that best reflect Schreyer (1985) and Lime's (1977) criteria for classifying river experiences: "experience solitude," "be with family and friends," "run rapids," "learn about human history and culture," and "catch a lot of fish" (see table 2).

Solitude is the most important expectation for boaters on the Lower San Juan, White, and Labyrinth segments. Being with family and friends was relatively important (first or second) on most segments. There are many segment differences related to expectations to run rapids. Westwater boaters indicated highest importance for rapids, with boaters on Desolation, the Colorado Daily, and the Green Daily close behind. The importance of running rapids is very low for Labyrinth boaters. Catch a lot of fish is rated unusually high on the Brown's Park segment. Learn about human history and culture was rated as particularly important on the San Juan River. Brown's Park, Westwater, and both Daily boaters rated learning experiences particularly low.

Discussion

The results provide evidence that boaters seek multiple experiences, which differ across river segments. The segments can be loosely categorized based on Schreyer's (1985) typology as providing "solitude" (Lower San Juan, White, Labyrinth, and possibly the Desolation segment of the Green River); "social interaction" (Colorado Daily, Green Daily, Brown's Park, and the San Juan segments); and "thrill-seeking" (Westwater). But fishing is the primary expectation on Brown's Park, unique among these BLM-managed rivers.

Experience expectations also reflect existing biophysical (e.g., remoteness), cultural (e.g, cliff dwellings), and managerial (e.g., use limits) characteristics of these rivers. Management objectives can be identified that balance biophysical, cultural, and managerial characteristics with social-psychological expectations; however, a broader, more multidisciplinary terminology than Schreyer recommended may be needed to categorize river segments (e.g., "remote" or "backcountry" segments [rather than solitude], "access" or "front-country" segments [rather than social], and "rapids" or "wild" [rather than thrill-seeking]). And combinations of expectations should be used to help develop management strategies for all river segments.

On a regional scale typologies of river characteristics can be compared to expectations to identify and prioritize management strategies. For example, Desolation can provide opportunities for running rapids, but within the broad context of a solitude experience, while Westwater can provide social experiences along with the rapids experiences. Both stretches of the San Juan can provide excellent opportunities for learning about human history, but on the Lower San Juan this should be secondary to providing a remote, solitude experience. In general river management objectives should focus on relatively few experience expectations, and lower-level experience-based objectives should enhance, or at least be compatible with, higher-level objectives. As such, solitude and related social-contact standards will be important on some segments, and secondary or not at all important on others.

Boaters were more likely to say they saw too many people on the lesser-used segments where solitude is more likely to be expected. While this sounds intuitively obvious, it directly contradicts the typical focus of social carrying capacity in relatively high-use areas. Viewing this system of rivers as an example, some potential problems of applying a use capacity on heavy-use segments become clear. First, some currently satisfied customers will be turned away. The displacement of "surplus boaters" from high- to low-use segments may have greater aggregate social *and* ecological impacts, and the diversity of river opportunities would be reduced in the long run. For example, limiting use on the Colorado and Green River Daily segments may increase use on a currently lightly used, day-trip segment of the Labyrinth. This would likely: (1) increase perceptions of crowding on a solitude-oriented river; (2) not reduce crowding perceptions appreciably on the heavy-use segments (where the experience appears to be nondensity-dependent); (3) increase ecological impacts along the Labyrinth segment at a far greater rate than reduction on the Daily segments; and (4) increase the difficulty and expense of correcting the more dispersed ecological and social impacts.

The take-out at Swayseys Rapid on the Green Daily, Utah. Photo by Richard M. Schreyer.

These findings suggest that social carrying capacity and related indicators (e.g., use levels, number of contacts, crowding) are most relevant on remote, backcountry rivers. On other rivers other social, managerial, and biophysical indicators may be more important.

Wildland managers rely too much on social carrying capacity and related "tools." This is probably based on the assumption that increasing visitation means decreasing recreational quality or increasing impacts. When viewed in a regional context, however, neither may be the case. In a regional context, social carrying capacity limits in high-use areas may, paradoxically, reduce the availability of solitude experiences. As a rule, planners should not expand or encourage use of lightly used areas (e.g., advertise or build new roads, trails, or facilities), or limit use in an area without evidence that: (1) experiences are density-dependent; (2) use of indirect visitor management methods have been attempted and found to be ineffective; and (3) use dispersal will not create more off-site impacts (social, ecological, and managerial) than are currently occurring.

Using recreation concentration areas as a *regional* ecosystem management tool potentially allows managers to accommodate more visitors and control regional ecological impacts. Use limitations and visitor dispersal allow neither. Either we argue for the long-term need to limit use in all wildland locations (a very questionable social and political strategy), or recognize that carrying capacity and use limitations should be rarely used, and that high-use zones can assist land protection on an ecoregional basis.

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The Colorado Daily near Moab, Utah. Photo by L. Royer

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PERSPECTIVES FROM THE
ALDO LEOPOLD WILDERNESS RESEARCH INSTITUTE

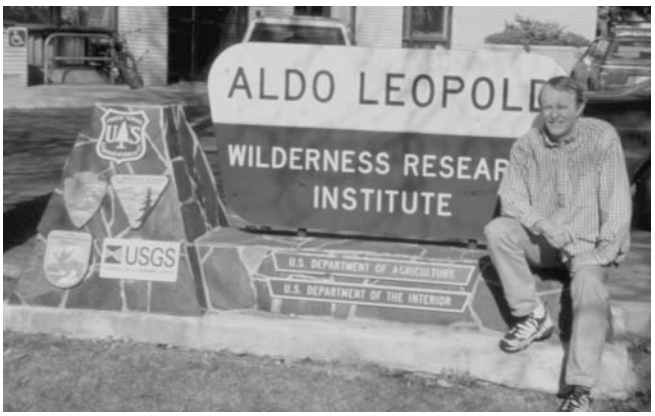
Wilderness Fire

BY DAVID J. PARSONS

The restoration of fire as a natural ecological process poses immense challenges to wilderness managers. Twentieth-century fire suppression has altered species compositions, vegetation patterns, and fuel accumulations, resulting in conflicts with goals of preserving natural conditions in wilderness affected primarily by the forces of nature. Unnaturally heavy fuel loads now threaten not only wilderness ecosystems, but adjacent human life and property. Despite policies advocating the restoration of fire to wilderness, nearly 85% of all U.S. wilderness remains under a complete fire-suppression policy. Even the most progressive wilderness fire management programs suppress many ecologically significant fires occurring during extreme fire conditions.

The National Park Service has been unable to reestablish the average number of fires, annual area burned, and average fire size achieved by natural ignitions prior to restrictions imposed following the 1988 Yellowstone fires. The Bureau of Land Management and Fish and Wildlife Service have yet to allow lightning ignitions to be managed as natural fires. Although the Department of Interior agencies make extensive use of prescribed fire to replace or simulate the effects of natural fire, the Forest Service generally permits the use of prescribed fire in wilderness only for fuel-hazard reduction. Recent analyses of fire programs in the Selway-Bitterroot (Montana) and Sequoia and Kings Canyon (California) wildernesses conclude that even those model programs have been unable to restore presettlement fire regimes.

The 2000 fire season directed attention to the problems of managing fire and fuels in wildland ecosystems. Very few natural ignitions in wilderness were managed for their resource benefits, as priorities were placed on protecting human life and property. Dialogue, funding, and policy directions in the months following focused primarily on increasing fire-fighting resources, fuels treatment, and restoring damaged landscapes. The role of fire in maintaining healthy ecosystems recognized in Federal Wildland Fire Policy received little attention.



Article author David Parsons. Photo courtesy of the Aldo Leopold Wilderness Research Institute.

If fire is to be restored to even a semblance of its presettlement role in wilderness, we need to make a concerted effort to more fully evaluate the benefits and risks associated with allowing natural fires to burn and options for the use of prescribed fire to replace those natural fires that can't be permitted. Proposals for limited mechanical manipulation of unnatural fuels—the anathema to many wilderness purists—may have to be considered in some cases where fire cannot be permitted. A full spectrum of tools exists to manage fire and fuels in wilderness. The challenge comes in evaluating the effects of alternative fire and fuels management strategies on wilderness ecosystems and values. We need to overcome the social and bureaucratic obstacles necessary to provide incentives for fire and wilderness managers to work together to maximize benefits while minimizing risks. If we are unsuccessful, some of our most valued wildlands may change in ways never anticipated.

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Announcements and Wilderness Calendar

Forest Service Chief Creates Wilderness/Wild River Director Position

Mike Dombeck, chief of the U. S. Forest Service, announced in a December 29, 2000, letter to his regional foresters and deputies the creation of a new director position for wilderness and wild rivers as the first of three important actions to enhance wilderness and river protection. The other two important actions are the creation of 100 new wilderness steward positions with oversight responsibilities for one or more wilderness areas and wild and scenic rivers, and a directive to the associate and deputy chiefs to ensure that funding to the field is sufficient "to maintain our wilderness rangers *in the wilderness* and river rangers *on the rivers* where they may monitor conditions and contact visitors." Dombeck emphasized that the goal of these actions is to increase the focus and national visibility of wilderness and wild and scenic rivers in Washington so as to develop additional support and funding to increase the presence of managers in the field. Previously, wilderness and wild and scenic rivers were managed in a division of recreation, trails, wilderness, wild and scenic rivers, and heritage resources. Clearly, wilderness and wild and scenic rivers will be more prominent now in their own division with their own director. *IJW* salutes Chief Dombeck for his support of our nation's wilderness resources and values.

President Clinton Declares Roadless Lands Off-Limits to Road Building and Logging

President Clinton, in his final days in office, moved to put almost a third of the country's national forestland forever off-limits to road building and commercial logging. The rule to protect 58.5 million acres of land would effectively prohibit oil and gas drilling as well, and could go a long way toward limiting off-road vehicle access. The road-building ban covers big pieces of the Tongass National Forest in Alaska that were exempted in a draft proposal of the rule. Alaska Republican Senators Ted Stevens and Frank Murkowski said they would fight the rule, and Idaho Governor Dirk Kempthorne (R) vowed to sue over the issue. Proponents of the rule said that the incoming Bush administration would have to conduct extensive public hearings and find a strong reason to reverse the rule before it could do so. This action follows an earlier moratorium by President Clinton against road building in national forest roadless areas subject to analysis of potential impacts

Cell Phone and GPS Use OK on BLM Lands

The Clinton Administration rejected banning cell phones and global positioning systems (GPS) on 5.5 million acres of (Bureau of Land management) wilderness in the agency's new wilderness management regulations that took effect January 16, 2001. Some environmental advocates support the ban. The new rules still allow climbing without a permit but prohibit the use of power tools to fix climbing anchors. The agency will address this contentious issue again at a later time. The rules did ban wheeled carts to carry game, sailboats, sailboards, parachutes, and other mechanical transportation. American Indians lost their bid for a privacy provision to keep people off BLM lands during ceremonies.

Five Million New Acres Protected in B.C., Canada

Following eight years of negotiations, environmentalists, Native Americans, and mining and logging representatives in British Columbia (B. C.) have approved a plan to preserve 5 million acres of land in northern B. C., Canada. This new area, along with the 11-million-acre Muskwa-Kechika preserve, is an important part of a wildlife corridor from Yellowstone to the Yukon. The area is habitat for the greatest concentration of large mammals in North America, including bison, wolves, moose, and grizzlies.

Nevada Gets New Wilderness

A recent bill passed by Congress will protect 757,000 acres of Nevada's

Black Rock Desert and High Rock Canyon region as wilderness. This rugged area is home to pronghorn, various species of raptor, and mountain lion, and is also rich in historical and archaeological sites. The bill doubles the amount of wilderness in Nevada and is the largest wilderness bill passed by Congress since 1994. For more information visit: http://www.wilderness.org/ccc/wsc/update_121500.htm#nv.

Stewart Brandborg Earns The Wilderness Society's Robert Marshall Award

The Wilderness Society named Stewart Brandborg the recipient of its highest honor, the Robert Marshall Award. The 75-year-old Brandborg is a conservationist, wildlife biologist, former government official, and environmental activist. In 1948 he earned his BS from the University of Montana, and in 1951 his MS in forestry from the University of Idaho. In his early years he worked as the northern Idaho big game for Idaho Fish and Game. During the 1950s and 1960s Brandborg was a leader in the National Wildlife Federation and Wilderness Society (where he was appointed executive director in 1964), and he played a key role in passing The Wilderness Act of 1964. In the 1970s he led efforts to the National Wild and Scenic Rivers Act, and helped expand protection of public lands. Today his colleagues see him as a visionary and a champion of wilderness. With this award, he joins the company of such distinguished conservationists as Aldo Leopold, Wallace Stegner, Sigurd Olson, and Arnold Bolle.

ORVs Given Favorable Trail Access

A recent Sierra Club report concludes that despite hikers, backpackers, and horse riders making up 83% of trail users on national forests and grasslands in Washington, Oregon, Idaho, Montana, Wyoming, Nebraska, and North and South Dakota, motorized vehicles have access to more trails. Dirtbike and ATV riders have access to 135,000 miles of roads and 26,000 miles of motorized trails among these states, while hikers and horse riders have only 35,800 miles of quiet trails. The most heavily motorized trail systems are in Idaho and Montana. Seventy-nine percent of trails on the Boise National Forest and 71% of trails on the Gallatin National Forests are open to motorized vehicles.

To download report, go to: http://www.sierraclub.org/wilderness/orv. For more information, send e-mail to: mark.lawler@sierraclub.org.

Colorado Power Plants Heed Wilderness Air Quality Monitoring Agreement

The Craig Power Plant in northwest Colorado must install and operate 90% sulfur dioxide controls and additional NOX controls to lessen impairment of visibility and aquatic ecosystems in the Mount Zirkel Wilderness. Snowpack monitoring in the wilderness shows evidence of the highest levels of atmospheric deposition ever monitored in the West. The Hayden plant has already installed pollution control equipment at a cost of U.S. $130 million. The Craig plant expects to spend U.S. $100 million. For more information, contact Dennis Haddow. Telephone: (303) 275-5759.

Jerry Stokes. Photo courtesy of Jerry Stokes.

Jerry Stokes Retires as Forest Service Assistant Director for Wilderness

Jerry Stokes, who has served for the last nine years in various wilderness and wild and scenic river program leadership roles in the Washington, D. C. headquarters of the U. S. Forest Service (USFS), retired in September 2000. For the last four years Stokes was the assistant director for wilderness on the agency's recreation, trails, wilderness, wild and scenic rivers, and heritage resources staff. Stokes served wilderness in the USFS "from the boonies to the beltway," and his field expertise was evident in his national policy leadership. He was a frequent contributor to *IJW* (Cordell and Stokes 2000; Stokes 1999, 1996), pointing to the growing threats to wilderness in a changing political environment. His leadership challenges all of us to protect wilderness for future generations. Stokes is anticipating a "second career" in which he can express his interest in a wide range of conservation challenges, including international conservation. We'll miss you, Jerry.

Book Reviews

The Trade-Off Myth: Fact and Fiction About Jobs and the Environment

by Eban Goodstein. 1999. Island Press, Washington, D. C., and Covelo, California. 208 pp., $27.50 (hardcover).

As soon as proposals introducing higher standards of environmental protection are announced, pro-development forces repeat their favorite mantra: Protecting the environment will bring about devastating job loss. Understandably, the argument carries great weight with local residents who may see the issue as a trade-off: oppose environmental initiatives and keep their jobs, or support environmental initiatives and lose their jobs.

Eban Goodstein, in his book *The Trade-Off Myth: Fact and Fiction About Jobs and the Environment*, offers balanced, compelling evidence that we can have both a flourishing economy and higher environmental standards. His central thesis is that "employment gains or losses from environmental protection are small, gradual, and tend to balance each other out" (p. 8). While he strongly argues that environmental regulations have not had negative impacts on employment regionally or nationally, he also notes that neither do these regulations create (as some environmental groups have suggested) meaningful economic growth.

Goodstein targets three related myths about environmental regulations: (1) they increase cyclical unemployment at the economy-wide level; (2) they lead to wide-scale plant shutdowns and layoffs that increase unemployment rates; and (3) they encourage manufacturing investment to flee to countries with lax standards, thus decreasing the number of jobs available domestically (the so-called pollution haven hypothesis). Goodstein suggests that the real economy-wide impacts are not on the number of jobs, but the type of jobs. He also notes that "environmentally related shutdowns are simply tiny compared to the real downsizers: technology, trade and corporate restructuring" (p. 66). And finally, Goodstein asserts that the costs of environmental regulations average only about 2% of total sales; these costs are normally an insignificant factor in plant location decisions.

Chapter four, "Coal Miners, Timber Workers, and Slopers," focuses on resource-based communities in the American West. Goodstein examines the impact of issues such as the spotted owl plan and emission reductions, and attacks the "woeful inadequacy" of worker retraining schemes (p. 108). He suggests that amenity-based growth will continue to become increasingly important in resource-based communities.

The Trade-Off Myth is a readable economic treatise. It is gold mine of ideas and findings for those who wish to better understand the relationships between environmental protection (including wilderness designation) and its impacts on employment levels and patterns.

Reviewed by JOHN SHULTIS, *IJW* book review editor. E-mail: shultis@unbc.ca.

Mighty River: A Portrait of the Fraser

by Richard C. Bocking. 1997. Douglas & McIntyre, Vancouver. 294 pp., $29.95 (hardcover).

This book gives the reader an inkling of what it might be like to travel this massive 1,400-kilometer British Columbia river: a long and exhausting trip demanding your attention at every turn. The author's regard for and commitment to the Fraser is obvious, and the book is well researched.

The author links the history of the early explorers, settlers, and native people, who have lived in the basin for thousands of years, to the present, while founding many points on strongly held environmental values. Unfortunately, in some cases, these opinions do not agree with other sources about the history of the Fraser River.

The book challenges conventional thinking about resource management, land use, and our modern way of life, but it pessimistically portrays the Fraser situation as hopeless. Bocking focuses on what historically went wrong with the Fraser, while largely ignoring contemporary efforts to correct past mistakes and find better ways of reconciling environmental, economic, and social needs. Examples of how to correct past mistakes are mentioned briefly, but the author quickly and discouragingly moves on to cite more problems. This is unfortunate, as the book might have inspired millions of potential readers living in the basin into corrective action.

Mighty River is suitable for readers with a keen interest in rivers from a historical perspective, and those who hold strong environmental values.

Reviewed by JOAN CHESS, regional coordinator, Upper Fraser Region, for the Fraser Basin Council, a not-for-profit NGO whose goal is social well-being in the Fraser Basin supported by a vibrant economy and sustained by a healthy environment. Chess can be reached care of the University of Northern British Columbia, Prince George, B. C., V2N 4Z9, Canada. E-mail: chessj@unbc.ca.

For the Health of the Land

by Aldo Leopold. Edited by J. Baird Callicott and Eric T. Freyfogle. 1999. Island Press/Shearwater Books, Washington, D. C., and Covelo, California. 242 pp., $22.95 (hardcover).

I approached Leopold's *For the Health of the Land* with a mixture of eagerness and trepidation. *A Sand County Almanac* is the most beloved and influential book in the whole genre of conservation literature, and it seems almost profane to publish another collection of Leopold's essays more than 50 years later. Often, previously unpublished writing remains so for good reason.

Happily, this book is a pleasure to read. The brief introductions to each essay by editors J. Baird Callicott and Eric Freyfogle are exceedingly helpful in understanding the context in which Leopold was writing. The foreword, introduction, and afterword remind the reader of the power and influence of Leopold's life and work.

The book is a plea to farmers to look beyond their traditional economic concerns to regain an emotional connection with their farms "for the health of the land." However, Leopold himself does not escape the utilitarian bent of his era: many of the arguments and rationale for changes to farm management relate to the provision of food and cover for wildlife, particularly game species such as pheasant and rabbit. Likely, Leopold's thesis stems from his own interest in hunting.

The six essays in part one of the book call farmers to "be their own emperor," to take the initiative in managing farmland for both human and nonhuman inhabitants. Leopold suggests that the farm landscape reflects the moral character of the farmer. Might not our wilderness landscapes then reflect our national moral character?

The 40 short essays in part two are a combination of natural history selections (similar to the seasonal chapters found in *A Sand County Almanac*) and practical techniques to maximize game animals on farmland.

The seven essays in part three focus on the idea of land health, which Leopold defines as the "capacity for self-renewal in the biota" (p. 219). The final essay, "The Land Health Concept and Conservation" (written just months before his death), is a powerful statement about the need for conservation on farmland, the damage to land health caused by government policies and the social values from which they spring, and the urgent need for both individual and collective action to preserve land health.

I was disappointed by the focus on rural landscapes and game management in this book, but I was also awed by the lyricism and power of Leopold's writing. Leopold challenges his readers to question the separation of the useful (farms) and the beautiful (wilderness). And in doing so, he reminds us that it is as important for people to reconnect with modified nature in rural areas as it is to reconnect with wilderness landscapes.

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