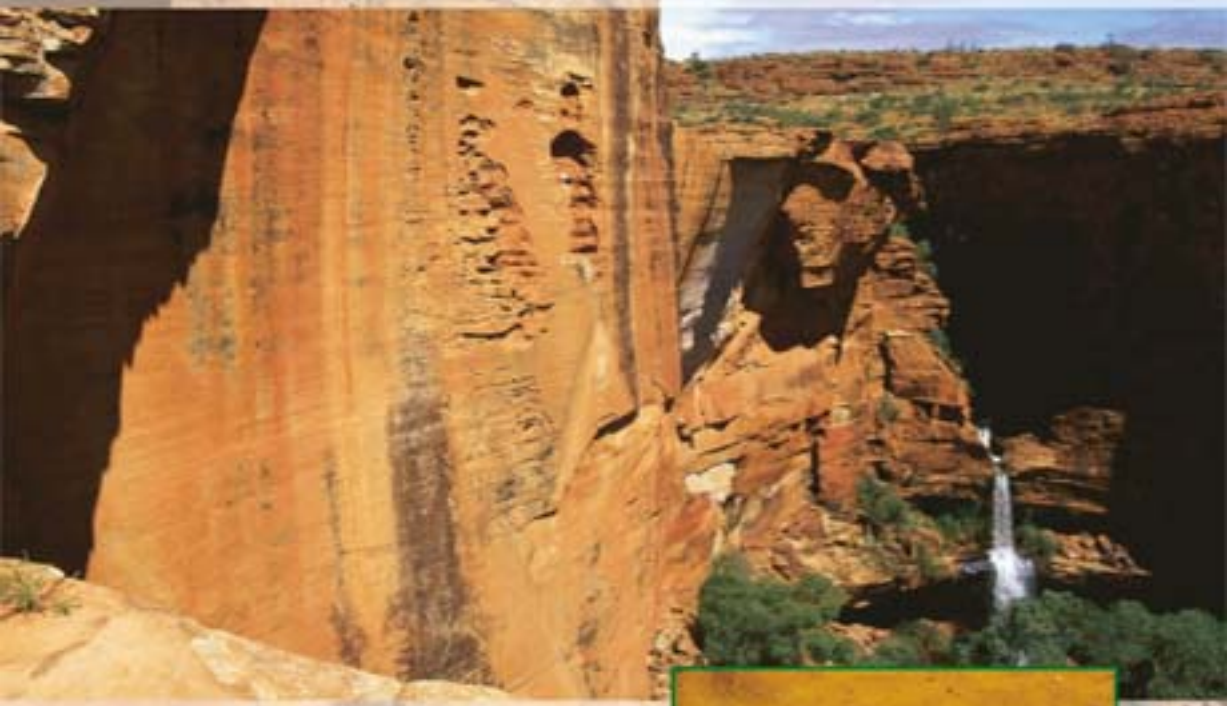
INTERNATIONAL

Journal of Wilderness



In This Issue

- Using Information and Education in Wilderness Management
- Olaus Murie's Spiritual Connection with Wilderness
- Proposal for a Wilderness Stewardship Organization
- Tasmania, South Africa

APRIL 2003 VOLUME 9, NUMBER 1

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FEATURES

STEWARDSHIP

SCIENCE AND RESEARCH

EDUCATION AND COMMUNICATION

EDUCATION AND COMMUNICATION, *cont.*

INTERNATIONAL PERSPECTIVE

WILDERNESS DIGEST

FRONT COVER image shows the sandstone canyon walls and waterfall of Kings Canyon, Watarrka National Park, Northern Territory, Australia. INSET PHOTO is of a Thorny Devil *(Moloch horridus)* Alice Springs Desert Park, Alice Springs, Northern Territory, Australia. Both photos are courtesy of Alan Watson/Forest Light, Caledonia, Findhorn, Forres IV360YY, Scotland Tel: 01309-690934/691 1292.

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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EDITORIAL PERSPECTIVES

Mindful Education

Building a Wilderness Renaissance

BY REBECCA ORESKES

On a rainy October afternoon in northern New York, I was surrounded by wilderness advocates from the Adirondacks and across the country. In the state that created wilderness by decree long before the federal government thought to do the same, in these woods that sheltered the cabin from which Howard Zanhiser wrote much of the U.S. Wilderness Act, I felt privileged to be in the company of women and men whom had devoted long and illustrious lives to the preservation of wild places. In this company of scientists, writers, lawyers, teachers, artists, and managers, I felt surrounded by the ideals of the renaissance: broad thinkers with openness to new ideas and growth. At that moment, I felt deeply that understanding wilderness is about creating a renaissance—a new birth with new ways of thinking. This new birth allows people to hold multiple values—to exalt in the artistic and the intellectual, the scientific and the spiritual; to understand our humanity and the life force of nature as part of our existence. These traits are all part of an expanding spirit, a piece of the mindfulness of which Bob Manning writes in this issue.

If mindfulness is our goal, then we can explore its possibilities through this issue devoted to wilderness education and outreach. How do we enliven people's minds to help them nurture and protect wilderness? James Glover takes us through the life of Olaus Murie and helps us to see the deeply personal traits of wilderness: humility, spirituality, and the meaning we must all seek behind the trappings of outward endeavors.

If Murie's life and work had unconscious ties to the Tao, then Bob Manning's article makes a direct tie to helping wilderness visitors become mindful of their actions in wilderness. "A mindful visitor … consciously thinks about appropriate ways to behave." The articles that follow give the managers' perspectives on the challenges of creating mindfulness.

Would our work, as mindful wilderness stewards, be furthered by a professional organization, as suggested by Connie Meyers and Wayne Freimund? John Hendee responds by wondering if a new professional organization might help or hurt the cause of wilderness stewardship.

Article author Rebecca Oreskes.

All too often education is used as nothing more than a forum for propaganda and channeling rather than opening people's minds. When education is truly grounded in helping us better understand ourselves and our place in the world, as so many articles in this issue point out, then it helps us reach mindfulness and begin to create the kind of renaissance that values wilderness. Laurel Boyers, Gary Koy, and Barb Miranda share their vision that "in education is the preservation of wilderness." Perhaps mindfulness through education leads to the expression that "in mindfulness is the preservation of wilderness."

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SOUL OF THE WILDERNESS

Olaus Murie's Spiritual Connection with Wilderness

BY JAMES M. GLOVER

In the early 1950s the U.S. National Park Service considered building a church on the south rim of the Grand Canyon. Olaus J. Murie thought it was a bad idea. "Architectural gymnastics," he argued, would not add to the sacredness of the place. He continued as follows:

> The Grand Canyon and the other beautiful and meaningful dedicated portions of our wonderful earth, should not be cluttered with mere man-made-contrivances. … And we human beings should forget our modern exultation in material progress and approach the Grand Canyon and similar places with humility, in the hope that we can improve ourselves (Murie, ca 1953).

Article author James M. Glover.

By that time Murie was into his sixties but still active in wilderness issues. As reflected in that quote, he had developed a spiritual attitude toward the Earth and its natural processes that was reflected in nearly everything he did.

Murie rarely gets mentioned these days among the great heroes of wilderness preservation. But he should, for several reasons. For starters, through direct experience, he was probably more familiar with the wildest places in North America than anyone has ever been. His skills as a wilderness traveler were extraordinary, built up over years of studying caribou, elk, grizzlies, and many other species for the U.S. Biological Survey. He made landmark studies of North American elk and caribou, was one of the first scientists to point out the ecological relationship between wolves and caribou, and was among the first scientists to take up the cause of predators and raptors on both ecological and ethical grounds. As an activist, he was directly involved in several of the most significant preservation efforts of the 20th century. He wrote prolifically of the American wilderness and its wildlife. He illustrated several books with very accomplished drawings of animals and landscapes. In his later years, he served as a kindly mentor to a variety of young naturalists and conservationists who would in turn make an impact in conservation (Glover 1989; Kendrick 1978; Murie 1952).

But despite all his tangible accomplishments (and there were many more than those mentioned here), what fascinates me most, and what I admire most, about Murie, is that deep spiritual connection to the earth. He felt it as early as the summer of 1920, when he found himself camped in Denali National Park as part of his landmark study of Alaskan caribou ecology. Writing to his fiancée, Margaret Thomas, back in Fairbanks, he said: "I guess I am still enrolled in the Lutheran Church at home, but there is no one church or creed with which I fully agree. For one thing, I am crazy about Nature, and almost worship it, but isn't Nature the direct work of God?" (Murie 1920)

This spirituality of Murie's, then, was not some costume he wore to impress others, or a fad he went through on the way to maturity. It was his maturity. It takes maturity to really accept the *un*importance of human achievements, or to recognize how much humans do *not* know, or to understand that it's sometimes best to leave things alone.

These and other aspects of Murie's philosophy, it turns out, are remarkably similar to those advocated some 2,500 years ago, in the *Tao de Ching*. I say "remarkably" because there's no evidence that Murie ever read much or received any instruction about Taoism. He seems to have found it on his own without realizing it had a label. Or, perhaps more likely, he had some idea that his philosophy was much

like the ancient Taoists, but did not care to label himself.

In either case, Murie's philosophy and actions fit well into such Taoist principles as noninterference, nonaction, the importance—even the beauty—of death, the value of intuitive knowledge, and the sacredness of cycles.

Another Taoist precept is humility, which Murie valued greatly. If you will forgive the paradox, he took great pride in his humility. He also thought it should be carefully developed in every child, cultivated by every nation.

What Murie saw instead was a culture growing increasingly arrogant toward other cultures and toward nature. Examples, for Murie, were everywhere, especially in the years after World War II when a sort of blind faith in technology seemed to sweep the country. The arrogance was there in the effort to do away with "harmful" forms of wildlife, in the construction of enormous dams to "control" wild rivers, in the spraying of chemical pesticides from airplanes in the cattle country of the west, and in the usurpation of wildlands by a rapidly growing military.

Murie expressed concern about all these major issues. Even more revealing, perhaps, was his concern with the small signs of expanding human arrogance. He was disgusted by the relatively harmless practice of naming natural features after human beings. Similarly, he opposed the construction of human monuments, especially in places where the much greater power and mystery of natural processes were on display. This opposition resulted in an ironic situation when he died, in the fall of 1963. Admirers wanted to build a rather large monument to Murie in Jackson, Wyoming. His widow, Margaret, had to argue strenuously to prevent them from doing so, knowing that it would violate one of Olaus's strongest beliefs.

Members of the 1954 Murie Arctic Expedition that resulted in establishment of Arctic National Wildlife "Range" in 1960. Left to right: Olaus Murie, Mardy Murie, Murie family doctor who visited, George Schaller, Brina Kessel. Courtesy Robert Krear.

You might be surprised that Murie was not especially keen on the effort by his partner in The Wilderness Society, Howard Zahniser, to get a wilderness bill passed. As most readers know, Zahniser's effort did result in The Wilderness Act of 1964 and the creation of a federal wilderness system. Murie's uncertainty was based on two concerns. The first was that Zahniser, for about eight years, was focusing nearly all of The Wilderness Society's resources on a piece of legislation that stood an excellent chance of never being adopted, much like a high stakes gambler who bets it all on one hand. In the meantime, Murie feared, real wilderness in real places was slipping away.

Second, Murie was suspicious of efforts to create a centralized governmental "system" to solve a problem that, in his view, could best be addressed through educational efforts and grassroots movements in specific regions. Much of Murie's viewpoint on this issue was colored by his own experience working for the federal government—the U.S. Biological Survey—for nearly 25 years. He had seen the potential for corruption, incompetence, and counterproductive results that such a centralized system holds. He had personally experienced being given orders from an office 5,000 miles away that had no relevance to his real work. He had seen his agency sold out to industries bent on extirpating everything from wolves to magpies in order to better mass-produce corn and cattle. He had seen some of his own research suppressed when it did not conform to bureau policies. And, on at least one occasion, he found himself forbidden to give a presentation at a wildlife conference because of what he had to say.

And so, his own experience reinforced what his Taoist-like intuition probably told him: that centralized, legalistic approaches to problems are easily corrupted—or are a sign of a culture already corrupted. One is reminded of the chapter in the *Tao de Ching* that reads in part:

It takes maturity to really accept the *un*importance of human achievements, or to recognize how much humans do *not* know, or to understand that it's sometimes best to leave things alone.

The more laws and restrictions there are,
The poorer people become …
The more rules and regulations,
The more thieves and robbers
(Lau Tzu 1989).

It seems today that Murie was wrong and Zahniser was right, having won his all-or-nothing gamble. No doubt, had he lived to see this, Murie would have been delighted to be proven wrong. In any case, again, Murie's skepticism about a wilderness bill, though surprising at first glance, was consistent with his philosophy.

The great challenge for Murie was to do what he could within a culture whose institutions seemed increasingly to represent values he opposed, such as the single-minded pursuit of wealth. Murie's written statements, speeches, and letters are full of reminders that economic values are not the only ones humans ought to have. He enjoyed pointing out, much like Thoreau did, that material wealth can be more enslaving than liberating. Once, in response to the common cry that wilderness was just a playground for the rich, he replied, "Many of us who travel in wilderness have not been burdened by large bank accounts."

Murie in Alaska with favorite sled dog, Jack. Photo by Jesse Rust, courtesy Mardy Murie.

In his writing, Murie was a minimalist before it was considered a cultural trend. He used short, clear declarative sentences. There was no academic jargon, and no wasted words. The result was four books and a couple hundred articles ranging from technical academic reports to essays in magazines like *Audubon*, *The Living Wilderness,* and *The Atlantic Monthly*. To me, his masterpiece is *A Field Guide to Animal Track.* First published in 1954, it was one of the first guides in the famous Peterson series, and it's still in print. To borrow an overused phrase from the marketing business, it's much more than a field guide. Murie did his own drawings for it, including pictures of most mammals, their tracks, and their other signs. In the drawings, the animals all have a friendly look about them that I believe subconsciously expresses Murie's affection for them. The narrative, meanwhile, goes way beyond identification marks of tracks, describing the animals' behaviors and Murie's experiences with many of them. My favorite is this one, about wolves:

> One night four of us, including our year-old baby, were encamped on a gravel bar of the Porcupine River, in northeastern Alaska. It was clear September weather, and we slept that night in the open without a tent. At dawn we were awakened by a voice across the river. Soon we realized we were being serenaded by two wolves, one upstream, the other below our camp. First one, then the other, raised its muzzle and howled. Apparently we were intruding on their home ground. At any rate, we lay there in the crisp autumn morning, comfortable in our sleeping bags, and listened to this song of the Arctic wilderness with a feeling of awe. (Murie 1954, p. 93)

You don't get something like that in too many field guides.

The two most important preservation efforts that Murie led were the addition of Jackson Hole Valley to Grand Teton National Park in Wyoming and the establishment of the Arctic National Wildlife Range (now Refuge).

The Jackson Hole National Monument controversy began in March 1943 when President Franklin Roosevelt created a national monument from some 221,610 acres (89,720 hectares) of national forest, state, and private land in the flat sage country east of Grand Teton National Park. Murie thought this was a good idea because he saw the Tetons and the adjacent valley as a whole unit. He saw little point in preserving the mountains while developing the adjacent valley, which would likely be done if some protection were not given it.

The majority of Jackson Hole residents, however, were bitterly resentful

of Roosevelt's act and vowed to do everything possible to fight the monument. The argument became heated, emotional, and sometimes personal. Murie was accused of various misdeeds. A false rumor went around that he had stated that a mouse was more important than a human. He was thought to be a tool of the federal government, and was called various unflattering names.

No fewer than four conservation groups also opposed the monument at first. Two of these were The Wilderness Society (of which Murie was not yet director) and the National Parks and Conservation Association. They mainly objected because the new monument would include a large human-made intrusion, the Jackson Lake Dam. Murie turned those two groups around, primarily through an article called "The Spirit of Jackson Hole," in which he emphasized the ecological connection between the valley and the adjacent mountains.

The other two groups whose minds he changed were the game-oriented Izaak Walton League and Federation of Western Outdoor Clubs. At a gathering of the latter group in Utah, a club official who thought the monument would destroy elk hunting in the region tried to prevent Murie from speaking. A motion overruling the official had to be passed. Murie then explained that elk migration routes would be *protected* by the monument and that adjacent national forests would continue to allow hunting. The clubs, as Murie later recalled, then "changed their attitude" toward the monument.

There were various other turf disputes, lawsuits, and congressional hearings before the monument was finally added to Grand Teton National Park in 1950. In one of the suits, Murie was a star witness for the Park Service, again asserting that the valley and the mountains should be seen as a unit.

Had Murie not been willing to be ostracized in his community, or unable to change the minds of four conservation groups, the Jackson Hole Valley might look much different today than it does. There would still be some wildlife around, but the buffalo would be roaming and antelope playing among a lot more condominiums, T-shirt shops, putting greens, and motels than is now the case.

Crowning Achievement: The Arctic National Wildlife Refuge

As many know, the Arctic National Wildlife Refuge of northeast Alaska and adjacent Northern Yukon National Park of Canada, comprise one of the last great wild places on Earth and one of the last great wildlife spectacles. Every summer, the coastal plain turns into a riot of color and animal activity. Caribou, musk ox, grizzly bears, polar bears, wolves, and other large mammals have the space they need. G'witchen people still build their culture around the wide-ranging porcupine caribou herd.

Murie first visited the region in 1926 and felt it was a very special place. By the 1950s he and a few others decided that it urgently needed protection from military, oil, mineral, and other interests that were impacting the arctic regions. And so, in 1956, Murie organized and led a summer-long expedition to inventory the natural history there. The information would be used in a proposal to make the region a two-nation international park.

The expedition crew was small: Murie, his wife Mardy, two university scientists, and an undergraduate zoology major named George Schaller who had written Murie offering to work for free.

Murie painting an albatross aboard the *Brown Bear*, August 1937. Photo by Victor Scheffer. Courtesy Scheffer and National Archives.

The survey lasted a couple of months. All would later agree it was among the highlights of their lives. The work involved seemed almost incidental to the magical experience of living in one of the last great wild places in the world—the "Serengeti of the North," as it is sometimes called. Murie had given the crew a little speech at the beginning of the summer, reminding them to be aware of the experience for its own sake, and what a privilege it was to have it.

In any case, the data were collected, a film was made, and at summer's end the crew disbanded. Olaus and Mardy Murie went back home and spent most of the next four years convincing the U.S. government to protect that region. They organized people, wrote articles, talked to groups around the country, and went to Washington to testify at hearings on the matter. At some point it became clear that the United States was not going to go for

Olaus and Mardy Murie in Jackson Hole in late 1950s. Courtesy Mardy Murie.

the permanent protection that national park status would offer. Canada, of course, did make a national park on its side of the border. Finally, however, in 1960 the U.S. interior secretary declared a large chunk of the region a National Wildlife Range. It was less than hoped for, but it gave Murie an enormous sense of joy and relief. Upon hearing the news, he wept openly—one of the few times in his adult life he did so.

The "range" was made a "refuge," and expanded to eight million acres (3.2 million hectares) in 1980 as part of the famous Alaska National Interest Lands Conservation Act. Today, of course, it remains controversial because of the large amount of oil that may (or may not) lie under the coastal plain.

A Transition

Murie died, at age 74, in October 1963. He was interested in wilderness and environmental matters until the end. He sent information on western pesticide abuse to Rachel Carson and began referring to the Cold War era as "the age of poison."

He was not bitter, though. One day, George Schaller, the former student who joined Murie on the 1956 Arctic survey, came to visit. Schaller had been studying primates in Africa. His later book, *The Serengeti Lion: A Study in Predator-Prey Relationships* (1972) would win the National Book Award and he would be awarded the World Wildlife Fund Gold Medal for contributing to the protection of endangered species. Schaller once said that Murie had taught him "that the collecting of scientific facts is only the first step of a long process to give work meaning and value" (Schaller 1986). When he visited Murie, they took a short hike into the Teton hills. Murie was weak and could not go far, yet he still loved being outside. Schaller watched with admiration as Murie carefully snapped photographs and remarked at the vibrant colors of wildflowers he had seen and photographed hundreds of times before. Soon after that hike, Murie died and Schaller published his first book, *The Mountain Gorilla* (1963). It was dedicated to Olaus Murie.

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Proposal to Establish a Professional Society for Wilderness Stewardship

BY WAYNE FREIMUND and CONNIE G. MYERS

Introduction

It is both an exciting and challenging time for people with a passion for wilderness. The 1990s in particular were a period when the land area and demand for quality wilderness grew dramatically (Cordell et al. 1998; Meyer and Landres 2000). However, a recent report on the state of wilderness management in the United States (Brown 2002), along with our own experiences, reminds us that there is still considerable progress to be made. In this article we briefly review developments of the wilderness stewardship community during the end of the last century. We suggest the establishment of a membership organization for wilderness stewardship to provide a valuable forum for linking wilderness managers, scientists, and others to address common stewardship challenges and bring focus to the profession of wilderness stewardship. Within such a venue, we could move toward an integrated and collaborative system of wilderness stewardship. This organization would serve as a professional home for people who wish to see themselves as wilderness professionals.

Article co-authors Wayne Freimund and Connie G. Myers.

Progress

During the end of the 20th century, we saw a number of developments building the professional capacity of wilderness managers. In 1993, the U.S. Forest Service (USFS) founded the Arthur Carhart National Wilderness Training Center (ACNWTC). The ACNWTC provides wilderness training, information, and education to reconnect agency employees and the public with their wilderness heritage. The ACNWTC is funded and staffed by the Bureau of Land Management (BLM), Fish and Wildlife Service (FWS), USFS, and the National Park Service, and reports to an interagency steering committee. The Aldo Leopold National Wilderness Research Institute (ALNWRI) was also dedicated in 1993. The ALNWRI grew out of the USFS's wilderness research program and is now complemented by a scientist from the United States Geological Survey and also gains financial support from the U.S. Department of the Interior (USDI), BLM, and FWS. The ALNWRI provides scientific leadership in developing and using the knowledge needed to sustain wilderness ecosystems and values.

Education on wilderness to an international audience continued throughout the decade at Colorado State University (CSU). Through consortia between CSU, the University of Montana (UM), University of Idaho, and USFS, the Office of International Programs, an annual international seminar on protected area management, developed with related regional

We suggest that establishment of a membership organization for wilderness stewardship to provide a valuable forum for linking wilderness managers, scientists, and others to address common stewardship challenges and bring focus to the profession of wilderness stewardship.

seminars throughout the world. The UM Wilderness Management Distance Education Program continues to be offered. Each of these educational endeavors is supported by ongoing research and educational materials provided by ALNWRI, ACNWTC, and colleagues at universities and in agencies.

Wilderness stewards have convened on several occasions, such as the 6th and 7th World Wilderness Congresses in India and South Africa, a 1999 wilderness science conference in Missoula, Montana, and a 1996 conference dedicated to eastern wilderness held in Gatlinburg, Tennessee. The Wilderness Society and regional advocacy groups also sponsored several wilderness conferences.

Communication about wilderness was greatly enhanced in 1995 with the launching of the *IJW.* The journal, now in its ninth year, with financial support and sponsorship by wilderness management agencies, wilderness organizations, and universities, has grown in circulation, and has published hundreds of articles on the stewardship of wilderness. In 1996 Wilderness.net, a cooperative project between the UM Wilderness Institute, ACNWTC and ALNWRI, was developed (Besancon and Freimund 2002). This resource provides electronic access to wilderness information, including a library of over 600 downloadable articles, textual and graphic information on each U.S. wilderness area, current news, and a discussion forum. Wilderness.net is visited by approximately 800 people per day. During the time between December 14, 2001, and January 13, 2002, approximately 8,000 documents were downloaded from the library to over 20 countries. Wilderness.net was selected by the John F. Kennedy School of Government at Harvard University as a case study for successful use of the Internet to achieve agency goals. Research from the National Survey on Recreation and the Environment is being used by nongovernment organizations (Cordell et al. 1998) to raise public awareness of wilderness through development of audience-appropriate wilderness messages.

In 2000 a National Wilderness Policy Council was formed. This council, composed of high-ranking officials from each federal agency charged with managing wilderness in the United States, was tasked with seeking agreement on systemwide wilderness policy. To the extent that the council embraces its leadership potential, wilderness will be well served (Brown 2002).

No list of accomplishments would be complete without recognizing the incredible work being done on the ground by wilderness managers all across the country, in spite of dramatic reductions in staff and funding. Finally, in the last decade, the National Wilderness Preservation System (NWPS) had added units constituting over 8 million acres (3.3 million hectares) of designated Wilderness to increase the size of the NWPS to over 106 million acres (42.5 million hectares).

This is not intended to be an exhaustive list of the accomplishments within the United States wilderness community over the past 12 years. Rather, it is an indication of a growing institutional capacity for the stewardship of wilderness. Our wilderness managers today must be better prepared then ever because the intensity of demands upon them continues to increase, and there are more threats and issues than ever surrounding the management of wilderness (Hendee and Dawson 2001). Whether it is the result of high use areas, exotic species, fire policy, or acid rain, the decision making associated with wilderness is increasingly complex.

Enduring Challenges

In spite of the growing NWPS described above, there remain significant internal and external wilderness stewardship challenges. Internally, our current science, administrative structure, program funding, accomplishment reporting, and leadership inadequately reflect the significant contributions that wilderness makes to the public land system and to society. Externally, legislative proposals challenging wilderness stewardship programs and the integrity of the NWPS are on the increase. There is no cohesive national wilderness movement focused on management and stewardship of the NWPS, and the majority of Americans do not understand what designated wilderness is and how it is linked to their lives. These challenges and the lack of an integrated approach to address them continue to frustrate wilderness managers across the country. Indeed, these and other

issues were specifically identified in a recent report to the federal agencies as contributing to the NWPS functioning as a set of subsystems rather than an integrated and collaborative system of lands. Brown (2002) points out that actions of wilderness stewardship are spread across four agencies, vast geopolitical regions, and institutional cultures. Further, the nature of wilderness results in a dispersed workforce that continues to function with limited funding, and often part-time assignments or split job responsibilities.

It is our opinion that this lack of cohesion in stewardship of the NWPS represents perhaps our greatest current challenge. Brown (2002) concludes that there is a need to forge an integrated and collaborative system across the four wilderness management agencies. We believe one way to move toward that integration is to establish a professional membership organization for wilderness stewardship. Such an organization would provide a valuable forum for linking wilderness managers, scientists, and others to explore and collaboratively address common stewardship challenges and bring focus to the profession of wilderness stewardship. A critical mass of organized, focused wilderness professionals crossing agency, organization, and academic boundaries can help ensure an enduring resource of wilderness.

A Field-Driven Approach to Integration and Collaboration

The Brown (2002) Commission process of hearings demonstrated that wilderness managers have little trouble articulating the unique values of wilderness; rather, they have trouble articulating those values to the policy makers. When newly elected officials and appointed administrators are welcomed to Washington by letters with recommendations for policy from organizations representing thousands of professionals (e.g., The Society of American Foresters), the voice for wilderness management and stewardship is too often absent. This is not to discredit the hard work by our friends in organizations such as The Wilderness Society, but rather to point out that their mission is not to create a professional membership organization dedicated to the stewardship of wilderness. Forestry, range management, wildlife biology, and many other disciplines enjoy the support and benefits of professional membership organizations. We believe it is the right time to integrate wilderness and the stewardship of this resource through establishment of a professional membership organization.

The typical functions and activities of a professional society focus on communication forums that build and connect a critical mass of kindred spirits. These forums include journals, newsletters, websites, and conventions. Conventions and conferences are generally designed around professional development, technology transfer, working-group activities, discussion or debate of contemporary issues, and development of position papers on those issues. Annual or semiannual conferences allow for the building of connections and relationships over time. Some organizations develop resolutions on specific policy-issue positions and lobby their positions to agency leadership, Congress, and the administration.

Value is added in the organized guidance of these processes and the opportunity exists to address system-wide issues. Ideas can be thoroughly developed, debated, and clearly articulated and promoted. Ideas such as professional certification, academic accreditation, or the criteria for a professional employment classification series can be agreed upon and promoted. Recommendations on staffing, funding, research, internal training, and external education can be developed and successfully promoted. In our observation, the wilderness stewardship community currently needs the organization a professional society would provide.

Challenging Questions

While discussing this concept with professionals from many sectors of the wilderness community, we have been asked some difficult questions. First, is there a critical mass of people who would like to be viewed as wilderness professionals first and disciplinarians second? Since wilderness, it is argued, is a land designation and not a discipline, if an organization for wilderness stewardship were established, how many professionals would join? A counterpoint to this argument is that wilderness is more than a land designation. It is an idea as integral to American values as ecology and wildlife. Total demand for such an organization is very difficult to gauge. What we do know is that there are 644 units in the NWPS, all of which have someone who is responsible for them. The *IJW* has been able to survive for eight years with the help of its sponsors and subscribers. We are also reminded of the numerous people responsible for the progress in science and stewardship that has been made to date.

Second, how big would such a professional wilderness organization need to be to be effective? Perhaps it could start small and focus on the coordination of existing efforts and conferences. Certainly, there is little room for diluting the hard work people are already doing.

Third, what about joining an existing professional organization? This is also an excellent question. Perhaps the best way to get organized would to become a subsidiary of an existing and

larger organization such as the Society of American Foresters Wilderness Working Group. The fundamental challenge lies in the unique composition of wilderness values. Each existing organization was developed with fairly clear missions and scope. We are unsure of where the development of a wilderness stewardship professional fits within those various missions.

Conclusion

In welcoming readers to the first issues of *IJW* in 1995, John Hendee expressed that after 20 years of discussion about a wilderness journal that "the time is right." Given the success of the journal and several other initiatives over the past 12 years, it is clear that he was correct. The idea of a wilderness profession has been discussed for over a decade and perhaps the time is right for that as well. We would like to envision a future in which students could get degrees in wilderness stewardship that would prepare them for long and rich careers dedicated to the protection of our global wilderness treasures. Moreover, we would like to see an integrated and collaborative system of wilderness stewardship forged across the four wilderness management agencies in the United States. Given the institutional and disciplinary fragmentation of wilderness stewardship professionals, we see these goals as a continued uphill climb. The voice of a committed critical mass of wilderness stewards could be an important development, and a professional society for wilderness stewardship could be that voice.

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From ALDO LEOPOLD on page 19

limited travel funding, this is often not possible. Therefore, in addition to conducting site visits and giving presentations at management workshops, the Leopold Institute intends to continue synthesizing existing information on key wilderness issues. We will also continue to identify barriers to research application as well as potential solutions. While research results are interesting to inquiring minds, they are of little use to wilderness stewardship when managers are not aware of relevant results.

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From EMERGING PRINCIPLES on page 27

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Commentary on the Freimund-Myers Wilderness Stewardship Organization Proposal

BY JOHN C. HENDEE

Thank you Wayne and Connie for advocating the formation of a professional wilderness stewardship organization. Your leadership is timely, as was your session on the topic at the 7th World Wilderness Congress in Port Elizabeth, South Africa, in fall 2001.

I fully embrace the need for more professional dialogue about and involvement in wilderness stewardship, but I must be candid in my concerns about creating yet another wilderness organization. Would it empower existing organizations and their collective support for wilderness stewardship, or would it dilute them by competing for already stretched professional time and membership dues? We don't want to weaken the focus and strength of any organization's wilderness stewardship voice—the challenge is to bring them all together to make a more powerful voice.

Perhaps there is a synergistic way to append a wilderness stewardship society or association to an existing organization, as you mention, or to be linked to many of them in a coalition. Regardless of the approach, the *IJW* stands ready to embrace any collective effort to strengthen wilderness stewardship, and to serve it as an ongoing communication vehicle.

My experiences in helping found and produce *IJW* for eight years makes me cautious about your proposal. Are there enough professionals in wilderness stewardship? Could they be a political voice since most work for public agencies? Were it not for the sponsorship of 15 wilderness organizations that believe in *IJW* as an independent wilderness information medium, we would not exist, because subscriptions by wilderness stewards and others are only half-sufficient to produce *IJW.* Would it be different for a new wilderness stewardship organization? Would it detract from *IJW* subscriptions, or membership in other organizations' wilderness stewardship activities, such as the Society of American Foresters Wilderness Working Group, similar groupings in The Wilderness Society, the Sierra Club, Wilderness Watch, and many other national and local environmental organizations? Would it further divide wilderness users, advocates, and managers, who need to work more closely together toward the integrated and collaborative system we need? Can other new organizations offer instructive experiences, such as the Forest Stewards Guild (www.foreststewardsguild.org)?

Perhaps a survey of wilderness stewards and others would help define whether there are sufficient potential members willing to join and financially support a new wilderness stewardship organization. And we need to think broadly about who would be eligible to join. It is a continuing challenge to bring everyone together in support of wilderness stewardship—scientists, managers, educators, citizen environmentalists, wilderness users—and the thousands of volunteers and nonprofessional seasonal employees who are at the front lines of wilderness stewardship. *IJW* is especially interested in an effort that will expand cooperation, communication, and support for wilderness stewardship among all of the wilderness constituencies—the largest possible critical number of members is needed.

JOHN C. HENDEE retired in 2002 as emeritus professor and director of the University of Idaho Wilderness Research Center; and former dean of the University of Idaho College of Natural Resources 1985–1994. He is *IJW* editor in chief and vice president for science and education at the WILD Foundation. E-mail: hendeejo@uidaho.edu.

Managing Bushwalker Impacts in the Tasmanian Wilderness World Heritage Area, Australia

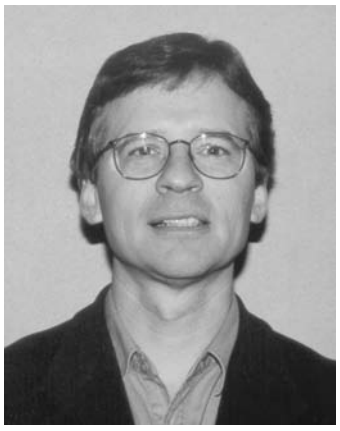
BY MARK A. BENNETT, LORNE K. KRIWOKEN, and LIZA D. FALLON

Abstract: As recreational use of the Tasmanian Wilderness World Heritage Area in Australia increases, associated environmental impacts must be controlled. Tasmanian bushwalkers were surveyed to obtain their opinions and attitudes toward potential tools to manage impact problems and an overnight permit system. There was support for nine of the 11 potential tools, with most support for priority erosion control, track stabilization, and rerouting. Respondents did not support the introduction of an overnight walker permit system for the entire Tasmanian Wilderness World Heritage Area, but did support a permit system if it was targeted at impacted areas.

Introduction

The Tasmanian Wilderness World Heritage area (TWWHA) was added to the World Heritage List in 1982 (World Heritage Commission 1982) and extended in 1989 (World Heritage Commission 1989) to become one of Australia's largest conservation reserves. The TWWHA occupies approximately 20% of the state of Tasmania (1.38 million hectares, or 3.4 million acres) and is managed by the Tasmanian Parks and Wildlife Service (TPWS) in accordance with the Tasmanian Wilderness World Heritage Management Plan (TPWS 1999) (see Figure 1). The TWWHA includes five main national parks: Cradle Mountain-Lake St Clair National Park, Walls of Jerusalem National Park, Franklin-Gordon Wild Rivers National Park, Southwest National Park, and Central Plateau Conservation Area.

The World Heritage Commission (WHC) lists 730 properties on the World Heritage List globally (World Heritage Centre 2002). The TWWHA is a mixed property, satisfying all criteria for natural values and three of seven criteria for cultural values. The undisturbed natural values of the TWWHA are largely free from human interference (TPWS 1999). These values include glacially formed landscapes and karst systems, extensive unmodified coastal formations, alpine and rainforest ecosystems, and endemic and threatened flora and fauna. The outstanding cultural value of the



Article co-authors (top) Mark A. Bennett, (left) Lorne K. Kriwoken, and (right) Liza D. Fallon.

(PEER REVIEWED)

TWWHA is the significant number of relatively undisturbed Aboriginal sites over 35,000 years old. In addition, the more recent colonial convict sites are outstanding early examples of major global social phenomenan, and along with other historic sites including Huon pine logging and mining, they provide a source of reflection, inspiration, and testimony to cultures that have disappeared (TPWS 1999).

Limited, and often conflicting, data are available concerning the number of visitors to the TWWHA, but estimates place approximately 245,000 bushwalkers in the area each year, including 22,000 overnight bushwalkers (TPWS 1996). Visitor numbers to the TWWHA are believed to be increasing by 7% per annum (TPWS 1996).

Increasing visitor numbers to the TWWHA has resulted in environmental impacts to some of the area's internationally significant values (see Figures 2 and 3). Physical and biological effects include vegetation damage, track (trail) formation, soil loss and compaction, water pollution, and the spread of weeds and pathogens (Whinam and Chilcott 1999; TPWS 1998; Sun and Liddle 1993; Calais and Kirkpatrick 1986; Calais 1981). Generally, impacts of these types tend to be concentrated in high-use areas, such as campsites and tracks, while nearby areas are often relatively undisturbed (Cole 1995; McEwen and Tocher 1976).

In response to increased levels of environmental impacts, the TPWS produced a walking track management strategy for the area in 1994 (TPWS 1998), based largely on relevant literature that considered strategies for managing impacts on natural areas. For example, Cole, Petersen, and Lucas (1987) detailed management strategies for combating common wilderness recreational problems, and Cole (1994) identified six mechanisms to manage impacts: controlling type of use, encouraging low impact use behavior, avoiding use when areas are vulnerable, encouraging use of durable sites, constricting use in popular areas, and dispersing use in lightly used areas. A contentious issue discussed in the strategy was the introduction of an overnight walker permit system as a mechanism to help manage and limit the number of walkers to the TWWHA. This system was proposed as a suitable management option, proposing to divide the TWWHA into walking areas with quotas specifying usage limits, depending on the environmental sensitivity of each area.

The proposal was rejected by Tasmania's bushwalking community, who believed that a permit system would unnecessarily interfere with freedom in the TWWHA. The Tasmanian state minister responsible for the TWWHA subsequently formed the Track Assessment Group (TAG) in 1999 to recommend the most appropriate solution to the bushwalker impact problem (TAG 2000).

The aim of this article is to report research on the level of support by Tasmanian bushwalkers for 11 potential tools discussed by TAG and the introduction of an overnight walker permit system in the TWWHA.

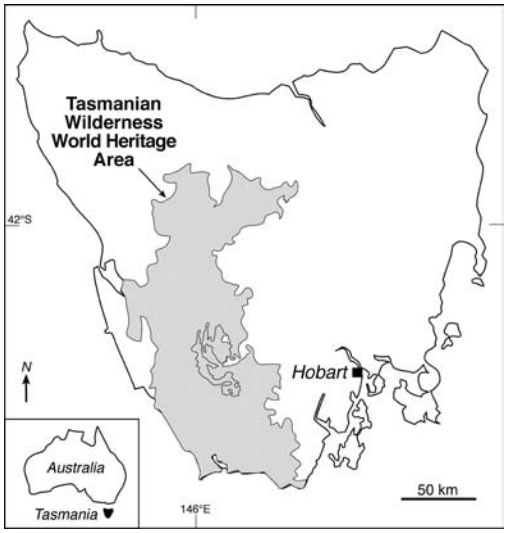


Figure 1—Tasmanian Wilderness World Heritage Area.

Figure 2—Vegetation damage and soil compaction caused by bushwalkers in the Western Arthur Range, TWWHA, that have resulted in degradation to natural values. Photo courtesy of the TPWS Track Management Team Slide Library.

Track Assessment Group

TAG included representatives of major stakeholder and interest groups, including the TPWS, TWWHA Consultative Committee, Tourism Tasmania, Federation of Tasmanian Bushwalking Clubs, independent bushwalkers, and the University of Tasmania.

In response to the minister's request, TAG made preliminary recommendations for user regulations in the TWWHA (TAG 2000). TAG members were selected for their expertise on the TWWHA, bushwalking, and natural area environmental impacts. Management tools were developed at meetings held in late 1999 to early 2000 and the final report included a discussion of 11 potential management tools to solve bushwalker-impact problems. These management tools varied in their level of acceptability and implementation costs and are listed here in the order of expected decreasing acceptability to bushwalkers:

- Create education/self-regulation system to encourage walkers to use less impacted tracks
- Promote Tasmania's "Great Bushwalks" and other appropriate or less impacted tracks
- Use volunteers to help manage the TWWHA
- Undertake priority erosion control, track stabilization, and rerouting
- Liaise with organizations to obtain agreement to minimize use in environmentally sensitive areas and advise on more suitable areas
- Change patterns of use (e.g., track rotation, disperse use, and the

nonprovision of certain facilities) to reduce overuse of vulnerable areas
- Remove information (e.g., track markers, maps, routes, and obscuring entrances) facilitating access to sensitive areas
- Establish party size limits to reduce unacceptable impacts by regulating usage
- Create new tracks to take pressure off currently overused tracks
- Impose quotas to regulate usage
- Close pads (camping areas) either temporarily or permanently to prevent further degradation or allow the recovery of the areas

TAG recognized that environmental impact varies across sites and that no single management approach would be successful for the entire area. The minister stated that the system (or systems) recommended by TAG must meet three conditions: it must be (1) workable and cost effective, (2) environmentally effective, and (3) supported by bushwalkers. An often-quoted figure of 70% had been estimated for bushwalker support of a permit system, but this was frequently refuted by bushwalkers who did not support a permit system (Bennett 2000; TPWS 1996).

Table 1—Level of Support for Potential Tools As Discussed by TAG

Potential strategies as discussed by TAG	Primary instrument	Validation instrument
	Bushwalking club respondents (%)[a]	Bushwalking community respondents (%)[a]
Undertake priority erosion control, track stabilization and rerouting	93	92
Establish party size limits appropriate to the walking area and campsites on specific tracks	85	85
Use volunteers to help manage the WHA (working with walking community, maintenance of tracks, adopt-a-track)	85	80
Liaise with organizations and the public that hold walks to obtain agreement to minimize use in sensitive areas and advise of more suitable areas	84	83
Promote the "Great Bushwalks" and other appropriate tracks to encourage walkers to use less impacted tracks	81	81
Create new tracks to take pressure off currently overused tracks, to provide different/new walking experiences	73	55
Create education/self-regulation system (Internet and telephone)	68	66
Change patterns of use, such as track rotation, fan out, nonprovision of certain facilities	58	64
Close pads (camping areas) and tracks to prevent further degradation and, in some cases, to allow the recovery of pads	50	56
Impose quotas to reduce unacceptable walker impacts by regulating usage through a quota system	33	44
Remove information facilitating access to sensitive areas, such as track markers, maps, routes, and obscuring entrances	26	31

[a] Percentages include the sum of "support" and "strongly support" responses from a scale: strongly support, support, uncertain, do not support, strongly against, and cannot decide/not enough information.

Research Design

A self-administered questionnaire survey was used with bushwalkers who were classified into two user groups: (1) those in Tasmania's bushwalking clubs and (2) the broader Tasmanian bushwalking community. The survey was administered to samples of both groups using two different methods. Though it may have been desirable, surveys were not distributed directly to visitors of the TWWHA via trailhead contacts due to the immediate need to obtain bushwalker input over the winter season (May–July 2000). Respondents were considered members of the bushwalking community, not as participants during specific outings.

The most reliable existing source of information on Tasmanian bushwalkers was an Australian Bureau of Statistics (1995) survey that investigated participation in Tasmanian sporting and physical recreational activities. The survey estimated that 19,700 Tasmanians aged 15 years or older (9.3% of the total adult population) had bushwalked in the 12 months prior to October 1994 (50.8% were male; 49.2% were female).

A mail-out, random probability survey, as described by de Vaus (2001), was used with one follow-up mailing. Members from Tasmania's bushwalking clubs were targeted, and an unbiased simple random sample was drawn. Bushwalking clubs with at least 20 members were invited to participate. Thirteen clubs were approached, with 10 willing to participate. In total, 15% of members from each club were selected, resulting in a total of 277 potential subjects.

The second research phase relied on targeting available subjects from the broader Tasmanian bushwalking community. The reliance on nonprobability availability sampling is an extremely risky sampling method, as this technique does not allow any control over the representativeness of the sample (Babbie 2002; Henry 1990; Gardner 1976). Therefore, great caution has been exercised in generalizing the results from the data (Hall and Hall 1996), and the findings have only been used to verify the reliability of the random survey results. Consequently, 327 questionnaires were opportunistically and anonymously distributed at workshops, at nature-based slide presentations throughout Tasmania, at adventure stores, and at walker registration booths in the TWWHA. Respondents were provided with a postage-paid reply envelope to return their completed questionnaires.

Researchers realized that bushwalkers with some awareness of TAG and released recommendations would potentially provide more informed responses, but may

have a predisposition toward solutions. As a result, researchers asked if respondents were either aware of, or had read, the draft TAG report. Given that the availability sample targeted participants, the second research phase was likely to include a bias toward those who had read the report. Alternatively, bushwalking club respondents were randomly sampled; therefore, it was likely that the number of these respondents who had read the report would be lower. Although the results from the random sample are less likely to be biased, the other bushwalkers may have a better understanding and knowledge of the issues investigated here.

Results and Discussion

Of the questionnaires distributed to bushwalking club members, 196 were returned (71% response). Of the 327 questionnaires distributed to the broader bushwalking community, 176 completed questionnaires were returned (54% response).

The majority of respondents from both the random (bushwalking clubs, 69.4%) and availability (broader bushwalking community, 74.4%) samples were aware of the TAG report. Furthermore, 16.8% of bushwalking club respondents had read the report, as had 40.9% of the broader bushwalking community.

Males represented 47% of the bushwalking club sample, and 53% were female; for the broader bushwalking community, 62% were male and 38% were female. Bushwalking club members ranged from 14 to 85 years in age (mean and median of 52). The broader bushwalking community ranged from 17 to 80 years (mean and median of 44).

Bushwalking club respondents indicated the highest level of support for priority erosion control, track stabilization, and rerouting (see Table 1). The two least supported tools were the removal of information facilitating access to sensitive areas (26%) and the imposition of quotas (33%). The validation survey data from the broader bushwalking community is comparable.

Bushwalking club respondents were asked to list their level of support for the introduction of an overnight permit system (see Table 2). A majority of these respondents (61%) support the introduction of an overnight walker permit system where they can be demonstrated to effectively deal with the particular area/problem. The broader bushwalking community results are comparable. A minority of bushwalking club respondents (27%) do not support permits in any shape or form anywhere in the TWWHA, and 53% of respondents only support permits after other management options have been tried and failed. Only 17% of bushwalking club respondents supported a permit system for all the TWWHA.

Table 2—Level of Support for an Overnight Walker Permit System in the TWWHA

Respondents were asked if they supported the following statements:	Primary instrument: Bushwalking club respondents (%)[a]	Validation instrument: Bushwalking community respondents (%)[a]
I support permits where they can be demonstrated to effectively deal with the particular area/problem at hand	61	60
I support permits only after management options (apart from closure) have been tried and failed (e.g., education, track work)	53	44
I do not support permits "in any shape or form" anywhere in the TWWHA	27	13
I support a permit system for all the TWWHA	17	15

[a] Percentages include the sum of "support" and "strongly support" responses from a scale: strongly support, support, uncertain, do not support, strongly against, and cannot decide/not enough information.

Table 3 presents the 11 potential management tools in the order of expected acceptability projected by TAG. There was notable variation in ranking of several items. For instance, for education/self-regulation tool, TAG (2000) expected this tool would be the most acceptable, whereas bushwalking club respondents ranked it seventh. In addition, bushwalking club respondents indicated priority erosion control and track stabilization to be the most supported management tool, whereas TAG had projected this tool to be fourth.

Table 3—Level of Support for Potential Tools as Discussed by TAG

Potential strategies as discussed by TAG	TAG[a]	Primary instrument: Bushwalking club respondents		Validation instrument: Bushwalking community respondents	
	Rank	(%)[b]	Rank	(%)[b]	Rank
Create education/self-regulation system	1	68	7	66	6
Promote the "Great Bushwalks" and other appropriate tracks	2	81	5	81	4
Use volunteers	3	85	2	80	5
Undertake priority erosion control and track stabilization	4	93	1	92	1
Liaise with organizations	5	84	4	83	3
Change patterns of use	6	58	8	64	7
Remove information facilitating access to sensitive areas	7	26	11	31	11
Limit party size	8	85	2	85	2
Create new tracks	9	73	6	55	9
Impose quotas	10	33	10	44	10
Close pads	11	50	9	56	8

[a] Level of acceptability as expected by TAG.
[b] Percentages include the sum of "support" and "strongly support" responses from a scale: strongly support, support, uncertain, do not support, strongly against.

Figure 3—Unplanned track development and associated environmental deterioration caused by walkers at Lake Cygnus, TWWHA. Photo courtesy of the TPWS Track Management Team Slide Library.

The rankings of some tools did not vary between TAG and the bushwalkers. For example, TAG's ranking of the expected level of acceptability for the imposition of quotas was identical to the rankings derived from bushwalkers. As expected, a minority of bushwalking club respondents (33%) supported the tool.

Conclusions

As the TWWHA is increasingly recognized and marketed for its nature-based tourism and bushwalking opportunities, it is likely that bushwalker associated environmental impacts will continue to increase unless controls are implemented. This research found that the majority of bushwalkers surveyed did not support the introduction of an overnight walker permit system for the whole TWWHA or the removal of information facilitating access to sensitive areas. However, support was found for nine of the 11 potential management tools investigated. In addition, the majority of bushwalkers surveyed support the introduction of an overnight walker permit system in the TWWHA if it is targeted at impacted areas where it can be shown to effectively mitigate negative environmental impacts. This finding is important, as it is contrary to the belief espoused by some bushwalkers.

Finally, this article highlights that although TAG followed assumptions frequently made about user support for management actions, they were often different than those currently held by bushwalkers. Consequently, this research indicates that predictions held by those managing wilderness and heritage areas can be different than those held by the users of these areas.

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PERSPECTIVES FROM THE
ALDO LEOPOLD WILDERNESS RESEARCH INSTITUTE

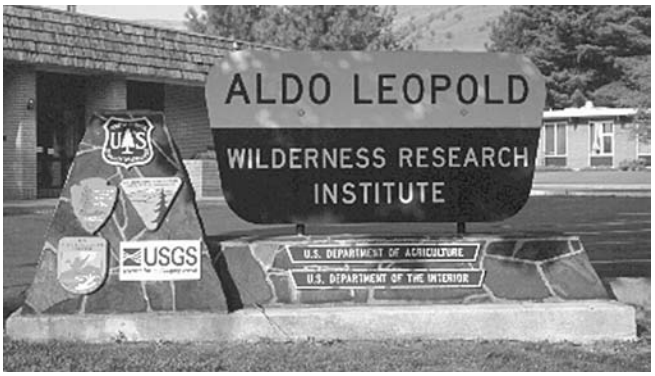
Reducing Barriers to Science-based Management

BY VITA WRIGHT

Each of the United States federal wilderness management agencies requires access to the best available scientific information to meet legislative and policy mandates. Scientists, including those in federal agencies and universities, have worked diligently to develop and publish scientific knowledge to support policy and management decisions. However, wilderness managers report a variety of barriers to their ability to access and use scientific information. These barriers include, but are not limited to, heavy workloads and a lack of time to search for scientific information, a large body of seemingly irrelevant research, the absence of research on specific topics, contradictory research results, publications written for scientific audiences, lack of training, and managers' attitudes toward science.

Working cooperatively with the federal wilderness management agencies (Bureau of Land Management, Fish and Wildlife Service, Forest Service, National Park Service, and U.S. Geological Survey), the Aldo Leopold Wilderness Research Institute (Leopold Institute) strives to develop and apply the science needed to sustain wilderness resources and values. To improve the application of wilderness science, the Leopold Institute initiated its Research Application Program (RAP) in 1999. The RAP is dedicated to understanding and minimizing barriers to the use of science by managers. This includes increasing access to and understanding of scientific information, as well as identifying information needs.

Researchers and managers can work together to improve research application through two avenues: (1) identifying pertinent questions for future research, and (2) exchanging information about research results that are already available. Several national agency efforts were implemented to identify future research needs as well as to improve collaboration between scientists and managers. However, less attention has been given to helping



managers search through the plethora of currently available research information.

Recognizing that managers have limited time to search for scientific information, the Leopold Institute's RAP has focused early efforts on improving access to scientific information. Specifically, the RAP has been working to organize research results by subject, so managers working in short time frames can quickly access pertinent information. Managers can now search for Leopold Institute publications as well as current and past research project descriptions by subject on a website (http://leopold.wilderness.net). Additionally, a new series of annotated reading lists summarizes existing knowledge about broad topics such as managing fire, visitor experiences, user fees, and invasive plants in wilderness. The most relevant publications are annotated and organized according to subtopics that allow managers to easily find publications addressing the specific issues in which they are interested (http://leopold.wilderness.net/resapp.htm).

Developing personal relationships between researchers and managers may ultimately be the most effective solution to the need for better communication about scientific information; however, in the face of increasing workloads and

Continued on page 12

Emerging Principles for Using Information/Education in Wilderness Management

BY ROBERT E. MANNING

Abstract: Studies on information/education as a wilderness management practice are highly diverse, providing both theoretical and empirical understanding, employing a variety of message types and media, and addressing a variety of management issues and target audiences. Generally, these studies suggest that information/education can be an effective and desirable management tool. Moreover, a number of principles for using information/education tools are emerging from this literature.

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Introduction

Information/education is generally seen as an "indirect" and "light-handed" wilderness management tool; it is designed to persuade visitors to adopt behaviors that are compatible with wilderness management objectives without regulating visitors directly. This approach tends to be viewed favorably by wilderness visitors (Roggenbuck and Ham 1986; Stankey and Schreyer 1987; McCool and Lime 1989; Roggenbuck 1992; Vander Stoep and Roggenbuck 1996; Hendee and Dawson 2002). Research suggests that information/education can be effective, and a set of principles for application to wilderness management is emerging.

Conceptual and Theoretical Foundations

Problem behaviors of wilderness visitors can be classified into five basic types (see Table 1), and this conceptual approach suggests the potential effectiveness of information/education on each. At the two ends of the spectrum, problem behaviors can be seen as either deliberately illegal or unavoidable. In these instances, information/education may have limited effectiveness. However, the other three types of problem behaviors—careless actions, unskilled actions, and uninformed actions—may be considerably more amenable to information/education programs.

Another approach to describe the application of information/education relates to the "mindfulness" or "mindlessness" of visitors (Moscardo 1999). "Mindlessness" relies on existing behavioral routines, and this may limit a visitor's ability to recognize and process new information. Alternatively, a "mindful" visitor actively processes new information, creates new categories for information, and consciously thinks about appropriate ways to behave. Strategies to enhance mindfulness can facilitate learning and better decision-making (Moscardo 1999).

A third conceptual approach to the application of information/education is based on two prominent theories of moral development (Kohlberg 1976; Gilligan 1982). Both theories suggest that people tend to progress through stages of moral development, ranging from being very self-centered to highly

(PEER REVIEWED)

Table 1. Application of Information/Education to Wilderness Management Problems
(adapted from Hendee, Stankey, and Lucas 1990; Roggenbuck 1992; and Vander Stoep and Roggenbuck 1996.)

Type of Problem	Example	Potential effectiveness of information/education
Illegal actions	Theft of Indian artifacts; use of wilderness by motorized off-road vehicles	Low
Careless actions	Littering; shouting	Moderate
Unskilled actions	Selecting improper campsite; building improper campfire	High
Uninformed actions	Using dead snags for firewood; camping in sight or sound of another group	Very high
Unavoidable actions	Disposing of human waste; trampling ground cover vegetation at campsite	Low

altruistic, based on principles of justice, fairness, and self-respect. A wilderness visitor may be at any of the stages of moral development. Management implications are that information/education should be designed to reach visitors at each of these stages (Christensen and Dustin 1989; Duncan and Martin 2002). For example, to reach visitors at lower levels of moral development, managers might emphasize extrinsic rewards or punishments for selected types of behavior. However, communicating with visitors at higher levels of moral development might be more effective by emphasizing the rationale for selected behaviors and appealing to a sense of altruism, justice, and fairness.

Fourth, communication theory suggests that the potential effectiveness of information/education is dependent upon a number of variables associated with the content and delivery of messages to visitors (Roggenbuck and Ham 1986; Stankey and Schreyer 1987; Manfredo 1989; Vaske et al. 1990; Manfredo and Bright 1991; Manfredo 1992; Roggenbuck 1992; Bright et al. 1993; Bright and Manfredo 1995; Basman et al. 1996; Vander Stoep and Roggenbuck 1996). For example, visitor behavior is at least partially driven by attitudes, beliefs, and normative standards. Information/education aimed at "connecting" with or modifying relevant attitudes, beliefs, or norms may be successful in guiding or changing visitor behavior. Moreover, the substance of messages and the media by which they are delivered may also influence the effectiveness of information/education programs.

Finally, from a theoretical standpoint, information/education can be seen to operate through three basic models (Roggenbuck 1992):

1. *Applied behavior analysis*. This approach to management focuses directly on visitor behavior rather than antecedent variables such as attitudes, beliefs, and norms. For example, visitors can be informed of rewards or punishments that will be administered dependent upon their behavior. Applied behavior analysis is the simplest and most direct theoretical model of information/education. However, since it does not address underlying behavioral variables such as attitudes, beliefs, and norms, its effectiveness may be short-term and dependent upon continued application.
2. *Central route to persuasion*. In this model, relevant beliefs of visitors are modified through delivery of substantive messages. New or modified beliefs then lead to desired changes in behavior. While this is a less direct and more complex model, it may result in more lasting behavioral modification.
3. *Peripheral route to persuasion*. This model emphasizes nonsubstantive elements of information/education messages, such as message source and medium. For example, messages from sources considered by visitors to be authoritative or powerful may influence behavior, while other messages may be ignored. This model may be especially useful in situations where it is difficult to attract and maintain the attention of visitors, such as at visitor centers, entrance/ranger stations, and bulletin boards, all of which may offer multiple and competing information/education messages. However, like applied behavior analysis, the peripheral route to persuasion may not influence antecedent conditions of behavior and, therefore, may not have lasting effects.

Empirical Evaluations of Effectiveness

Empirical studies have examined the effectiveness of a variety of wilderness-related information/education programs. These studies can be described as: (1) those designed to influence visitor use patterns; (2) studies focused on enhancing visitor knowledge, especially knowledge related to minimizing ecological and social impacts; (3) studies aimed at influencing visitor attitudes toward management policies; and (4) studies that address depreciative behavior such as littering and vandalism.

1. *Visitor Use Patterns.* Wilderness visitor use patterns are often of uneven spatial and temporal distribution. Campsite impacts and crowding may be reduced if use patterns could be changed. An early study in the Boundary Waters Canoe Area in Minnesota explored the effectiveness of providing visitors with information on current use patterns as a way to alter future use patterns (Lime and Lucas 1977). Visitors who had permits for the most heavily used entry points were mailed an information packet including a description of use patterns, noting in particular heavily used areas and times. A survey of a sample of this group who again visited the study area the following year found that three-fourths of respondents felt that this information was useful, and about one-third were influenced in their choice of entry point, route, or time of subsequent visits.

Figure 1—Information can be provided through simple brochures on site.

A study in the Shining Rock Wilderness Area, in North Carolina was designed to disperse camping away from a heavily used meadow (Roggenbuck and Berrier 1981, 1982). In one treatment, a brochure explained resource impacts associated with concentrated camping and showed the location of other nearby camping areas. Another group was given the brochure in addition to personal contact with a wilderness ranger. Both groups dispersed their camping activity to a greater degree than a control group, but there was no statistically significant difference between the two treatment groups.

Prior to obtaining a backcountry permit, a sample group of hikers in Yellowstone National Park (Montana, Wyoming, and Idaho), was given a guidebook that described the attributes of lesser-used trails (Krumpe and Brown 1982). Through a later survey and examination of permits, it was found that 37% of this group had selected one of the lesser-used trails compared to 14% of a control group. Results also indicated that the earlier the information was received, the more influence it had on behavior. Studies employing user-friendly microcomputer-based information approaches (e.g., "touch screen" programs) have also been found to be effective in influencing recreation use patterns (Huffman and Williams 1986, 1987; Hultsman 1988; Harmon 1992; Alpert and Herrington 1998).

Hikers in the Pemigewasset Wilderness in New Hampshire were studied to determine the influence of wilderness rangers as a source of information/education (Brown, Halstead, and Luloff 1992). Only about 20% of visitors reported that the information received from wilderness rangers influenced their destination within the study area. However, visitors who were less experienced and who reported that they were more likely to return to the study area were more likely to be influenced by the information provided.

Potential problems in using information/education to influence visitor use were illustrated in a study in the Selway-Bitterroot Wilderness in Montana (Lucas 1981). Brochures describing current recreation use patterns were distributed to visitors. Follow-up measurements indicated little effect on subsequent use patterns. Evaluation of this program suggested three limitations on its potential effectiveness: (1) many visitors did not receive the brochure, (2) most of those who did receive the brochure received it too late to affect their decision making, and (3) some visitors doubted the accuracy of the information contained in the brochure.

2. *Visitor Knowledge.* A second category of studies has focused primarily on enhancing visitor knowledge to reduce ecological and social impacts. In Rocky Mountain National Park in Colorado (Fazio 1979b), information was provided on low-impact camping practices through a series of media. Exposure to a slide/sound exhibit, a slide/sound exhibit plus a brochure, and a slide/sound exhibit plus a trailhead sign resulted in significant increases in visitor knowledge. Exposure to a trailhead sign and brochure was not found to be very effective.

In a more recent study, a sample of day hikers to subalpine meadows in Mt. Rainier National Park in

Washington state was given a short, personal interpretive program on reasons for and importance of complying with guidelines for off-trail hiking (Kernan and Drogin 1995). Visitors who received this program and those who did not were later observed as they hiked. Most visitors (64%) who did not receive the interpretive program did not comply with off-trail hiking guidelines, while the majority of visitors (58%) who did receive the interpretive program complied with the guidelines.

A study of day hikers at Grand Canyon National Park in Arizona found that an aggressive information/education campaign featuring the message "heat kills, hike smart" presented in the park newspaper and on trailhead posters, influenced the safety-related hiking practices (e.g., carrying sufficient water, starting hikes early in the day) of a majority of visitors (Stewart et al. 2000). Bulletin boards at trailheads have also been found to be effective in enhancing visitor knowledge (Cole, Hammond, and McCool 1997). Visitors exposed to low-impact messages at a wilderness trailhead bulletin board were found to be more knowledgeable about such practices than visitors who were not. However, increasing the number of messages posted beyond two did not result in increased knowledge levels.

Workshops and special programs delivered to organizations can also be effective in enhancing knowledge levels as well as intentions to follow recommended low-impact practices. For example, Leave No Trace (LNT) is a public/private national educational initiative that integrates outdoor recreation research into wilderness education. LNT establishes a collaborative framework connecting managers and researchers and providing visitors with current minimum-impact skills and information (Monz et al. 1994). The effectiveness of these types of information/education programs has been demonstrated in several studies (Dowell and McCool 1986; Jones and McAvoy 1988; Cole, Hammond, and McCool 1997; Confer et al. 1999). Research also suggests that commercial guides and outfitters can be trained to deliver to clients information/education programs that are effective in enhancing visitor knowledge (Seig, Roggenbuck, and Bobinski 1988; Roggenbuck, Williams, and Bobinski 1992) and that trail guide booklets can also be effective (Echelberger, Leonard, and Harnblin 1978).

Research suggests that information/education can be effective, and a set of principles for application to wilderness management is emerging.

Not all research has found information/education programs to be as effective as indicated in the above studies. A study of the effectiveness of interpretive programs at Great Smoky Mountains National Park in North Carolina and Tennessee found mixed results (Burde et al. 1988). There was no difference in knowledge about general backcountry policies between backcountry visitors exposed to the park's interpretive services and those who were not exposed. However, the former group did score higher on knowledge of park-related hazards. A test of a special brochure on appropriate behavior relating to bears found only limited change in actual or intended behavior of visitors (Manfredo and Bright 1991). Visitors requesting information on wilderness permits for the Boundary Waters Canoe Area Wilderness in Minnesota were mailed the special brochures. In a follow-up survey, only 18% of respondents reported that they had received any new information from the brochure, and only 7.5% reported that they had altered their actual or intended behavior.

3. *Visitor Attitudes.* A third category of studies has examined visitor attitudes toward a variety of management agency policies (Robertson 1982; Olson, Bowman, and Roth 1984; Nielson and Buchanan 1986; Cable et al. 1987; Manfredo, Yuan, and McGuire 1992; Bright et al. 1993; Ramthun 1996). These studies have found that information/education can be effective in modifying visitor attitudes so they are more supportive of wilderness and related land management policies. For example, visitors to Yellowstone National Park in Montana, Wyoming, and Idaho were exposed to interpretive messages about fire ecology and the effects of controlled-burn policies (Bright et al. 1993). These messages were found to influence both beliefs about these issues and attitudes based on those beliefs.
4. *Depreciative Behavior.* A fourth category of studies has focused on depreciative behavior, especially littering. A number of studies have found that information/education can be effective in reducing littering behavior and even cleaning up

littered areas (Burgess, Clark, and Hendee 1971; Clark, Hendee, and Campbell 1971; Marler 1971; Clark, Burgess, and Hendee 1972a, b; Powers, Osborne, and Anderson 1973; Lahart and Barley 1975; Muth and Clark 1978; Christensen 1981; Christensen and Clark 1983; Oliver, Roggenbuck, and Watson 1985; Christensen 1986; Roggenbuck and Passineau 1986; Vander Stoep and Gramann 1987; Horsley 1988; Wagstaff and Wilson 1988; Christensen, Johnson, and Brooks 1992; Taylor and Winter 1995). For example, samples of visitors to a developed campground were given three different treatments: a brochure describing the costs and impacts of littering and vandalism, the brochure plus personal contact with a park ranger, and these two treatments plus a request for assistance in reporting depreciative behaviors to park rangers (Oliver, Roggenbuck, and Watson 1985). The brochure plus the personal contact was the most effective treatment; this reduced the number of groups who littered their campsite from 67% to 41% and reduced the number of groups who damaged trees at their campsite from 20% to 4%. Types of messages and related purposes found to be effective in a number of studies include incentives to visitors to assist with clean-up efforts and the use of rangers and trip leaders as role models for cleaning up litter.

Other Types of Studies

Several other types of studies, while not directly evaluating the effectiveness of information/education, also suggest the potential of information/education for wilderness management. First, studies of visitor knowledge indicate that marked improvements are possible, which could lead to improved visitor behavior. For example, campers in the Allegheny National Forest in Pennsylvania were tested for their knowledge of the area's rules and regulations (Ross and Moeller 1974). Only 48% of respondents answered six or more of the 10 questions correctly. A similar study of visitors to the Selway-Bitterroot Wilderness Area in Idaho tested knowledge about wilderness use and management (Fazio 1979a). Only about half of the 20 questions were answered correctly by the average respondent. However, there were significant differences among types of respondents, type of knowledge, and the accuracy of various sources of information, providing indications of where and how information/education might be channeled most effectively. Visitors to the Allegheny National Forest in Pennsylvania received an average score of 48% on a 12-item true-false minimum impact quiz (Confer et al. 2000), while visitors to the Selway Bitterroot National Forest in Montana received an average score of 33% on a similar quiz (Cole, Hammond, and McCool 1997).

Second, several studies indicate that information/education programs could be substantially improved (Brown and Hunt 1969; Fazio 1979b; Cockrell and McLaughlin 1982; Fazio and Ratcliffe 1989). Evaluation of literature mailed in response to visitor requests has turned up several areas of needed improvements,

Table 2. Use and Perceived Effectiveness of 25 Information/ Education Practices According to Wilderness Managers
(adapted from Doucette and Cole 1993)

Practice	Percentage used	Mean perceived effectiveness rating
Brochures	74	2.5
Personnel at agency offices	70	2.7
Maps	68	2.1
Signs	67	2.3
Personnel in backcountry	65	3.8
Displays at trailheads	55	2.6
Displays at agency offices	48	2.7
Posters	48	2.3
Personnel at school programs	47	2.9
Slide shows	36	2.9
Personnel at campgrounds	35	2.9
Personnel at public meetings	34	2.8
Personnel at trailheads	29	3.3
Personnel at visitor centers	26	3.0
Videos	21	2.6
Agency periodicals	18	2.3
Displays at visitor centers	18	2.5
Guidebooks	13	2.5
Interpreters	11	3.6
Computers	11	1.9
Commercial radio	9	1.9
Commercial periodicals	8	2.4
Movies	7	2.6
Commercial television	4	2.3
Agency radio	1	2.4
Mean of personnel-based techniques		3.1
Mean of media-based techniques		2.4
Mean of all techniques		2.6

Effectiveness scale: 1= "not effective"; 5 = "highly effective"

including more timely response, more direct focus on management problems and issues, greater personalization, more visual appeal, and reduction of superfluous materials.

Third, a survey of wilderness managers identified the extent to which 25 visitor information/education practices were used (Doucette and Cole 1993). Study findings are summarized in Table 2. Only six of these practices—brochures, personnel at agency offices, maps, signs, personnel in the backcountry, and displays at trailheads—were used in a majority of wilderness areas. Managers were also asked to rate the perceived effectiveness of information/education practices. It is clear from Table 2 that personnel-based practices are generally considered to be more effective than media-based practices.

Finally, several studies have examined the sources of information/education used by outdoor recreation visitors for trip planning (Uysal, McDonald, and Reid 1990; Schuett 1993; Confer et al 1999). Many respondents report using information/education sources that are not directly produced by management agencies, such as outdoor clubs, professional outfitters, outdoor stores, guidebooks, newspaper and magazine articles, and travel agents. This suggests that management agency linkages with selected private and commercial organizations may be an especially effective approach to information/education.

Emerging Principles for Designing and Implementing Wilderness Information/Education Programs

Despite the fact that the studies described above are diverse in terms of geographic area, methods, and issues addressed, a number of principles for using information/education are emerging from the scientific and professional literature (Roggenbuck and Ham 1986; Brown, McCool, and Manfredo 1987; Manfredo 1989, 1992; Roggenbuck 1992; Doucette and Cole 1993; Bright 1994; Basman et al. 1996; Vander Stoep and Roggenbuck 1996):

- Information/education programs may be most effective when applied to problem behaviors that are characterized by careless, unskilled, or uninformed actions.
- Information/education programs should be designed to reach visitors at multiple stages of moral development.
- Information/education programs designed to "connect" with or modify visitor attitudes, beliefs, or norms are likely to be most effective in the long-term, and to require less repeated application.
- Use of multiple media to deliver messages can be more effective than use of a single medium.
- Information/education programs are generally more effective with visitors who are less experienced and who are less knowledgeable.
- Brochures, personal messages, and audiovisual programs may be more effective than signs.
- Messages may be more effective when delivered early in the visitor experience, such as during trip planning.
- Messages from sources judged highly credible may be especially effective.
- Strongly worded messages and aggressive delivery of such messages can be an effective way of enhancing the "mindfulness" of visitors, and may be warranted when applied to issues such as visitor safety and protection of critical and/or sensitive resources.
- Computer-based information systems (e.g., "touch screen" educational programs) can be an effective means of delivering information/education.
- Messages at trailheads and bulletin boards should probably be limited to a small number of issues, perhaps as few as two.
- Training of volunteers, outfitters, and commercial guides can be an effective

Figure 2—Southeast Alaska Discovery Center. Photo by Robert Manning.

Figure 3—Old Faithful Visitor Center. Photo by Robert Manning.

and efficient means of communicating information/education.

- Nonagency media, such as newspapers, magazines, and guidebooks can be an effective and efficient means of communicating information/education.
- Information on the impacts, costs, and consequences of problem behaviors can be an effective information/education strategy.
- Role modeling by wilderness rangers and volunteers can be an effective information/education strategy.
- Personal contact with visitors by rangers or other employees can be effective in communicating information/education.
- Messages should be targeted to specific audiences to the extent possible. Target audiences that might be especially receptive include those who request information in advance and those who are least knowledgeable.
- Messages should be targeted at issues that are least well understood or known by visitors.

Studies on information/education suggest that this can be an effective and desirable management tool. Generally, the 18 principles outlined above are based on understanding both theoretical and empirical studies reported to date, and they recommend employing a variety of message types and media and addressing a variety of management issues and target audiences.

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Continued on page 12

Wilderness Information and Education in the Three Sisters Wilderness

BY LES JOSLIN

Manning's emerging principles of wilderness information and education (2003) [in quotes in this article] reflect in the work of the Central Oregon Wilderness Education Partnership (COWEP) through which the Deschutes National Forest, two institutions of higher education, and individual citizen volunteers and student interns promote wilderness experience and resource protection in the Three Sisters Wilderness of Oregon (Joslin 2000).

For the past 10 summers, qualified uniformed U.S. Forest Service volunteers—called Wilderness Information Specialist (WIS)—at trailheads and on trails have served as friendly faces and helping hands to thousands of Three Sisters Wilderness visitors. They implement Manning's principles that "personal contacts with visitors by rangers … can be an effective information/education strategy" and that "messages from sources judged highly credible may be especially effective". According to Doucette and Cole (1993), personnel at trailheads and in the backcountry are the two most effective wilderness information and education practices.

A volunteer wilderness information specialist assists hikers at the Green Lakes information station in the Three Sisters Wilderness. U.S. Forest Service photo by Les Joslin.

These personal contacts occur daily at the Green Lakes Trailhead Information Station at the most used entrance to the Three Sisters Wilderness, and on weekends at the trailhead used by the thousands who summit South Sister during the visitor season. Although trailhead contacts don't communicate messages to visitors before they arrive at trailheads, they are delivered "early in the visitor experience" and are especially effective for those who are less experienced and less knowledgeable. Also, since the WIS personnel quickly "size up" each visitor or group of visitors to ascertain information and education needs during a brief trailhead contact, Manning's principles that "messages at trailheads should be limited to a small number of issues" and "targeted at specific audiences to the extent possible" are observed. When the WIS provides the visitor with a map, regulation brochure, other printed information, or even assistance in completing a self-issued wilderness permit (on which regulations are printed), the principle is followed that "use of multiple media to deliver messages can be more effective than use of a single medium."

Personal contacts on the trails reinforce trailhead contacts, and sometimes address "problem behaviors that are characterized by careless, unskilled, or uninformed actions" not prevented by previous information and education efforts. Additionally, the mere presence of uniformed personnel—even volunteer WIS personnel without enforcement authority—impresses on visitors the fact that the agency really cares about the quality of *their* wilderness experience and *their* wilderness resource.

Wilderness personnel—volunteers and employees—must both appear to be and actually be credible, because a volunteer WIS at the trailhead or on the trail may be the only ranger many wilderness visitors meet, and because,

as Manning notes, "messages from sources judged highly credible may be especially effective." WIS need to know their stuff, and they need to look like they know their stuff. They need to look and act the part of the ranger. Looking the part includes wearing the agency uniform properly. Acting the part means being friendly—and authoritative when necessary. Even when strong messages may be warranted in cases of visitor safety and protection of resources, they should be delivered in a manner respectful of the visitor.

Manning notes that "role modeling by wilderness rangers and volunteers can be an effective information/education strategy." Ensuring this is part of the wilderness manager's leadership role of recruiting, training, supervising, *and setting the example for* the right people to carry out a well-designed personal contact program.

The fact that most trailheads are not staffed and that many trails are not regularly patrolled places much of the wilderness information and education burden on trailhead signs and bulletin boards. Communicating with visitors through these media is not as straightforward as it might first seem. Wilderness visitors at trailheads will read and heed a little information if it's presented properly, but will ignore poorly presented and excessive information. Manning's (2003) suggestion that "messages at trailheads and bulletin boards should probably be limited to a small number of issues, perhaps as few as two" challenges managers to realize that one bulletin board won't do the whole job and to therefore prioritize their messages.

Because the most accurate wilderness use data essential to management probably comes from mandatory visitor-permit systems (Hendee and Dawson 2002), and because in the Three Sisters Wilderness such permits communicate important wilderness messages (e. g., regulations and Leave No Trace tips), self-issue of these permits at trailheads is a top priority. Visitor compliance with this requirement, and the attendant benefits of use data collection and information and education, can be diminished by cluttered bulletin boards that confront visitors with a plethora of information in which priority messages are lost. When this is the case, more effective signs that get the high priority message(s) across clearly and quickly must be developed and deployed. Competing lower priority messages must be eliminated. A review of Three Sisters Wilderness trailhead permit station and bulletin board message priorities is underway.

Wilderness visitors at trailheads will read and heed a little information if it's presented properly, but will ignore poorly presented and excessive information.

The fact that the best venue for providing wilderness information and education is neither at the trailheads nor on the trails, but at visitors' homes where wilderness trips are planned, is recognized by several of Manning's (2003) emerging principles. In addition to an annual community college course and occasional talks to groups, COWEP has produced a 30-minute video entitled *The Wilderness Concept and the Three Sisters Wilderness*, which is shown on local cable television in order to reach these audiences. The partnership is exploring use of other mass media and public venues through which to communicate the wilderness message.

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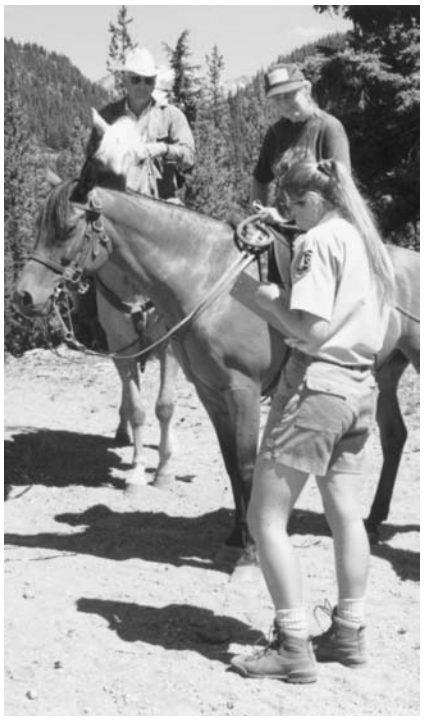

A volunteer wilderness information specialist assists Three Sisters Wilderness visitors. U.S. Forest Service photo by Tom Iraci.

Leave the Rocks for the Next Glacier

Low Impact Education in a High Use National Park

BY CHARLIE JACOBI

With 2.7 million annual visits and 45,695 acres (18,500 hectares), Acadia National Park, located in coastal Maine in the United States, is not a designated wilderness. Yet park managers are concerned about preserving the wilderness values that remain, and they are acutely aware that management decisions and visitor actions may easily erode these values. Acadia is a day hikers' paradise with 130 miles (210 kilometers) of trails enjoyed by some 5,000 or more hikers every summer day. The low impact education challenges are substantial, but they are not so different from those facing wilderness managers, except perhaps in scale.

Figure 1—Unnecessary cairns built by visitors. Photo courtesy NPS.

Figure 2—Visitors build various rock sculptures throughout the park. Photo courtesy NPS.

In this article, we describe our ongoing efforts to address one aspect of the Leave What You Find principle from the Leave No Trace (LNT) Program. We illustrate multiple education principles as outlined by Manning (2003). Finally, we will assess the success of our efforts.

Stone cairns mark the trails ascending Acadia's granite-domed summits. With an ample supply of rock available, hikers frequently succumb to the all-too-human urge to leave some mark of their passage. They add and remove rocks from cairns at will, build their own cairns (see Figure 1) and other rock objects (see Figure 2), and destroy cairns. Park managers consider this a problem for three reasons: (1) resource damage—visitors remove rocks directly from thin mountain soils, contributing to further soil erosion and plant loss; (2) loss of wilderness values—extra cairns and rock objects degrade the natural landscape and the visitor experience; and (3) safety—extra cairns may lead hikers off the trail during inclement weather, leading to injuries or lost hikers.

The cairn/rock issue is an example of uninformed behavior by visitors. Our efforts have focused on informing visitors of the impacts or consequences of their actions as described above, and the following discussion illustrates how we have used multiple media to deliver our message.

For five years we have had four ridgerunners out hiking, maintaining cairns, and talking to visitors about LNT, especially Leave What You Find, as it relates to rocks and cairns. We find the two duties, maintenance and education, work well together. During a 12-week season, ridgerunners contact about 2,000 hikers with a substantive LNT message.

We have tried in many ways to reach visitors before their hike. We constructed a cairn exhibit and installed it in the park visitor center. With partners, we developed a video entitled *Leave*

No Trace in Maine. The cairn/rock issue was featured prominently in the video, which was distributed to more than 200 summer camps, university outing clubs, and other organizations throughout the state and the region. And several outdoor sports shops around the state play the video on television monitors in their shops.

We have used nonagency media frequently. Information about the cairn issue was included in one hiking guidebook, thanks to cooperative authors. In a series on science in Acadia, Maine Public Radio reported on an experiment we conducted using signs to combat the cairn issue. We wrote an opinion piece about the issue for a local newspaper; it was a very personal message and strongly worded. With the editor, we timed publication for the July 4 holiday, in order to reach the most readers possible. The article was repeated in the summer edition of the park's visitor newspaper and in the journal of the park friends group.

Visitor tampering with cairns is most prevalent at the summit of Cadillac Mountain, the highest point in the park, where an auto road and four hiking trails converge. We conducted an experiment to test the hypothesis that visitor tampering would decrease with the installation of interpretive signs on a problematic section of trail near the summit. We built 67 simple four-stone cairns on this section. With these simple cairns, any tampering would be obvious. We monitored cairn condition every five days for six weeks before placing the signs. We then installed three signs (see Figure 3) at either end of the trail section and at a trail junction in the middle and continued monitoring for another six weeks. The average percent of intact cairns (no tampering) increased from 64% without signs to 81% with the signs. We had hoped for better results and wonder if this result justifies three signs. It also raises questions about the value of using signs to solve this problem at other sites.

Hikers frequently succumb to the all-too-human urge to leave some mark of their passage.

A graduate student observing visitor behavior on Cadillac noted a few instances of children, with or without the tacit approval or assistance of parents, constructing or dismantling cairns. We had targeted children directly by developing an LNT patch sold by the local cooperating association in park visitor centers. The patch reads: "Leave the Rocks for the Next Glacier" and shows a picture of a cairn. Each patch is sold with a hang tag explaining more about the LNT message. We know, however, that adults were also responsible for tampering with cairns because large rocks were moved.

After five years of a variety of education efforts, we believe many of our visitors are inexperienced, and we are *not* convinced our efforts have been very effective yet. It takes significant time and energy to maintain cairns and destroy visitor-built cairns and other objects. Anecdotally, there may have been some overall improvement parkwide, but it is difficult to monitor conditions. Not all our cairns are made of only four stones. We also recognize it may only take one contrary person a few hours to undo much of our effort. With more than 500,000 visitors annually, Cadillac Mountain alone presents a huge challenge that education alone cannot solve.

We have not reached the bottom of the toolbox, either. Under a new concessions plan, the park will use space in a gift shop on Cadillac Mountain to create a summit education center. We can use targeted LNT messages in park campgrounds more effectively. More nonagency media are available. But there is the question of how much effort we should expend to mitigate this one issue. We have made a concerted effort locally, but we believe the LNT ethic must also permeate the broader world of outdoor enthusiasts to solve this and other issues.

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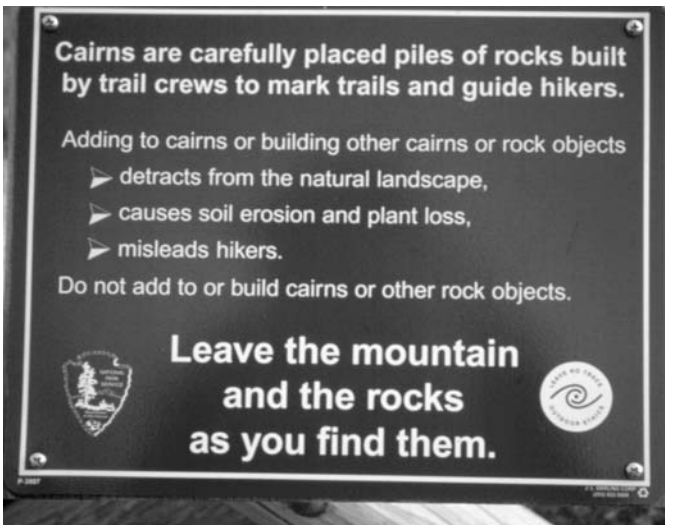

Figure 3—An interpretive sign to reduce visitor-built cairns and rock sculptures. Photo courtesy NPS.

Frontcountry Visitor Information/Education Programs

Are There Lessons for Wilderness?

BY YU-FAI LEUNG and ARAM ATTARIAN

Among various wilderness visitor information/education programs, the national Leave No Trace (LNT) program is one of the most consistent and well-known efforts supported by all major federal land management agencies. The LNT program and its seven guiding principles originated and evolved primarily in wilderness and backcountry settings. However, there seems to be a recent trend of the LNT program finding its place in frontcountry and urban recreation areas. The Boulder, Colorado, Open Space Do the Wild Things program was the first LNT frontcountry application that has shown a great deal of success (Jones 1999). A second LNT frontcountry program was initiated in the city of Durango, Colorado (Leung and Attarian 2002). Each of these LNT frontcountry programs benefited tremendously from the knowledge gained through wilderness applications. Given the recent interest and growth in frontcountry recreation, the question now becomes, "What have we learned from the LNT frontcountry applications that might benefit wilderness information/education programs?" We briefly highlight the Durango LNT program and discuss its relevance to wilderness management, particularly as it illustrates the emerging principles outlined by Manning (2003).

Figure 1—The modern graphic-rich and traditional posters developed for the LNT frontcountry program in Durango, Colorado. Photo by Yu-Fai Leung.

We developed the Durango LNT program and evaluated its effectiveness for the Animas River Trail (ART) between 2000 and 2002. The ART runs through the heart of Durango, serving residents as an important recreation and commuting route. We identified six salient visitor impact issues based on discussions with City of Durango Park and Recreation staff and local groups. The issues addressed in our LNT intervention included dogs being off leash, dog waste, human litter, social trails, trespassing on private properties, and not yielding to other visitors. The intervention consisted of two types of posters (modern and traditional) containing exactly the same information. They differed only in design, with the modern poster containing rich graphics and the traditional poster mimicking the typical U.S. federal land management agency design (see Figure 1). The graphics for the modern poster were largely adapted from the Boulder Study (Jones 1999). Only one type of intervention was shown at one of three study locations during a sampling period. Effectiveness of the posters was assessed through a variety of methods, including an on-site preference survey, an intervention study with on-site/mail-back questionnaires, and behavior observation.

In July 2000 we contacted visitors on the ART and asked them to comment on the two poster designs. A total of 169 surveys were completed. The results indicated that the vast majority of respondents chose the modern poster on all design variables except "authority," for which 92% of the respondents preferred the traditional poster. Most of those who preferred the traditional poster for other design variables were male (Wirsching 2001).

During the summers of 2000 and 2001 an intervention study was conducted (Leung and Attarian 2002). A total of 232 visitors participated in the on-site pretest survey. One important component of the pretest survey was to determine the respondents' current level of LNT knowledge as measured by a seven-item knowledge test. Results suggested that the majority of respondents had a good level of understanding of visitor resource impacts and had heard about the LNT program from a variety of sources. Those with high education levels, had previous exposure to the LNT program, or were affiliated with outdoor and conservation groups, exhibited a higher level of LNT knowledge. A mail-back posttest survey was conducted on the pretest respondents to evaluate their retention of LNT knowledge and possible effects of the intervention. A general increase in LNT knowledge between pretest and posttest was found, particularly on questions regarding the decomposition of orange peels and the LNT program objectives. When data were classified into three groups (control, traditional poster, and modern poster), however, little change of knowledge was noted following the intervention. The behavior observation results showed that visitors were about as likely to stop and read the traditional poster (4.4%) as the modern poster (2.6%). However, when a brochure box containing copies of the miniature-size modern poster was attached to the modern poster, one in every 13 visitors (7.5%) stopped and read the modern poster. Walkers were more likely to stop and read the posters compared to one out of 100 joggers, cyclists, and river users (Leung and Attarian 2002).

The majority of respondents had a good level of understanding of visitor resource impacts and had heard about the LNT program from a variety of sources.

Research findings and our experiences gained from the Durango study supported a number of principles summarized by Manning (2003). For example, we found that using multiple media is an effective approach to exposing visitors to educational/information programs. Word of mouth, signs, trailhead contacts, and newspapers appeared to be the most common sources of LNT information in the Durango study. Also, providing brochures along with the poster may make visitors more likely to stop, which is an essential first step in the persuasive communication process. Messages at trailheads should probably be limited to a small number of important issues, particularly for the target audience who move at a faster pace (e.g., joggers or river runners).

The frontcountry application of the LNT program in Durango seems to have some implications for wilderness programs. First, graphic-rich design may not necessarily be the most effective for delivering LNT or related outdoor ethics information. Our findings show that most visitors preferred a graphic-rich modern poster design; however, this preference did not translate into effectiveness, as indicated by measures of observed behavior and knowledge testing. Visitors were actually somewhat more likely to stop and read the traditional poster than the modern poster unless brochures were provided with the latter, and the knowledge gained by visitors who were exposed to the modern poster was not significantly different from those who were exposed to the traditional poster. Second, the majority of visitors chose the traditional federal agency poster design for its authority (Wirsching 2001); hence, when authority is an important element in the message, a traditional design might be more effective.

While LNT applications in frontcountry settings are still at the beginning stage, information/education programs can become stronger and more effective if we share and learn from the experiences gained in both wilderness/backcountry and urban/frontcountry settings.

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Yosemite's Principled Approach to Wilderness Education

BY LAUREL BOYERS, GARY KOY, and BARB MIRANDA

In the heart of the most populous state lies one of the largest wilderness areas in the lower 48. Yosemite's Wilderness, at 704,624 acres (285,273 hectares), makes up almost 95% of this highly visited park. The Yosemite Wilderness and the contiguous Forest Service and Park Service wildernesses form a Sierra Nevada wilderness complex of almost 2.5 million acres (1 million hectares). The management challenges are large, and staff employ almost all of the educational principles outlined in Manning (2003) not only to assure public access without harm to wilderness resources, but also to establish wilderness relevancy and long-term stewardship for groups that aren't current users. We strongly agree with all of the 18 principles outlined in the article.

Yosemite employs a multitiered, interagency approach to wilderness education, using a full spectrum of information/education principles and techniques. The targets of Yosemite's wilderness education program vary from addressing immediate on-the-ground concerns such as keeping bears wild, to instilling an appreciation for wilderness values in nontraditional users and diverse populations. Consider the techniques used to address the problem of keeping backpacker food away from black bears. Although many mitigation techniques have been tried, Yosemite black bears have proven themselves more determined than humans to win the calories. In 1993 bear-resistant food canisters became available and were an effective means of food storage that was consistent with the wilderness values of self-reliance and minimizing structures in wilderness. However, the canisters were bulky, heavy, and new. Wilderness staff were tasked with convincing people to use this untried device.

Figure 1—Bear resistant food canisters are used in Yosemite Wilderness. Photo courtesy of NPS.

Messages were geared to the development level of the wilderness user and ranged from "Failure to use approved food storage techniques could result in a citation," to "If a bear gets your food your trip will be cut short," to "You can help keep this a place where your grandchildren can still see wild bears by using a bear canister." Staff sometimes used all arguments geared at any development level in order to make the point, but generally learned how to judge receptiveness through initial discussions.

In addition to direct personal contact from credible sources, such as uniformed and volunteer staff who had used or were currently using the canisters (see Figure 1), information was presented through brochures, the park newspaper, and trailhead signs. Information was added to the park's wilderness website and to written materials to reach wilderness users during their trip planning stage. Supporting information was disseminated by the Forest Service and private organizations such as Leave No Trace and Pacific Crest Trail Club. An interagency website (www.sierrawildbear.gov) provided a computer-based source of information for visitors planning their trips from home. Although canister use is not mandatory except above treeline, the benefits of their use was pointed out at every opportunity.

Through an integrated information/education program, visitor attitudes and behaviors were changed. Current surveys of wilderness users show that people are using canisters and think they should be mandatory. A survey conducted during the summer of 2001 showed that nearly 87% of Yosemite Wilderness users favored mandatory canister use, and in 2002, more than 85% were using food storage canisters rather than the still-legal hanging of food bags.

The WildLink program illustrates another approach to wilderness education. WildLink, a product of the interagency Sierra Nevada Wilderness Education Project, uses a combination of web-based information (http:\\wildlink.wilderness.net), multimedia messaging, direct classroom outreach, hands-on fieldwork, and role modeling by trained volunteers to take culturally diverse students from rural and urban settings through multiple levels of wilderness development. Students are taken from a level of no wilderness awareness to the role of wilderness ambassadors. After completing the program, students are asked to take the wilderness values they have learned back to their schools, their friends, and their families. To date, over 160 kids have completed the program, and former WildLink students are now mentors for current students.

Through an integrated information/education program, visitor attitudes and behaviors were changed.

"In wildness is the preservation of the world," said Thoreau. The wilderness managers at Yosemite believe that "in education is the preservation of wilderness."

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From EVALUATION OF WILDERNESS on page 40

learn and integrate the wilderness curriculum into their existing curriculum.

The results of this study indicate that school-based wilderness education curricula can be effective in educating the wilderness visitor and future visitors on appropriate wilderness behavior. Wilderness managers and teachers will benefit from reviewing the results of this study to determine the most effective methods of providing school-based wilderness education programs and professional development for educators.

Acknowledgments

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The Superstition Wilderness Education Program

A Vision That Made a Difference

BY GREGORY HANSEN

Just as fire management cannot succeed without fire prevention, wilderness management cannot succeed without impact prevention, notes a founding father of wilderness education, Jim Bradley. Through the 1970s and 1980s, most wilderness education efforts primarily focused on the prevention of physical resource impacts. Wilderness managers then began pondering the idea that wilderness education should not merely center on improving user behavior, but should also integrate messages that conveyed the myriad benefits that the enduring resource of wilderness provides. As a more balanced educational philosophy began to unfold, Bradley's vision began to advance. The birth, lifespan, and effectiveness of the Superstition Wilderness Education Program is an example of that vision … a vision that has made a difference.

The late 1970s found the urban-interface of the Superstition Wilderness area in a management catastrophe. Due to its proximity to a population of over 3 million people, an international reputation gained through fictitious stories of lost gold and treasure, and the ever-growing interest in backpacking, this fragile arid-land wilderness was taking a real resource beating. Legal and illegal mining activity was rampant and rogue outfitting was the norm. Trail signs and information boards could not be kept up for more than a few months at a time.

Campsites were endless chasms of fire-scarred rocks and soil, while pillaged desert vegetation and human waste deposits filled the once flourishing riparian environs. Something had to be done to save this Wilderness Area from literally being loved to death and education was the answer.

In 1978, Forest Service wilderness manager George Martin contacted a well-known wilderness specialist by the name of Jim Bradley to help him evaluate and develop a management approach that would work to recapture the natural integrity and value of the Superstition area before it was lost forever. The two managers patrolled the country and carefully analyzed the problems. They agreed that the only means of moving this area back toward a natural condition would be to implement a program that utilized education as the common thread that would tie all management decisions and actions tightly together. In 1979 the Superstition Wilderness Information Specialist (WIS) Program began, and a successful education model was born. The key was educating visitors on all possible fronts and adding stronger educational components into primary programs: in-town outreach efforts, trailhead education and data collection, and traditional backcountry and trail work projects.

WIS volunteers were the original backbone of the program and were rotated through these three program areas. Regular wilderness management activities were accomplished as usual, and the additional focus was consistent educational programming.

The Superstition Wilderness education program made a difference and will continue to do so because of the efforts of many dedicated wilderness champions.

By 1984, under new leadership, education took on an even stronger role. Although volunteers still made up a portion of the primary workforce, paid positions were created, and these new employees were all trained to educate. An education coordinator was added to

plan, coordinate, and supervise in-town education presentations. Instead of offering only a few canned wilderness programs, a progressive educational scheme was implemented. A 20-minute Woodsy Owl presentation was delivered to second graders and was used to build a solid foundation of environmental awareness and responsibility (see Figure 1). The infamous "Impact Monster" program was redeveloped and presented to fourth graders as the second step in this progressive educational strategy (see Figure 2). The Junior Ranger program was given at the middle school level, and a variety of wilderness awareness and low-impact presentations were made available to the numerous Superstition user groups.

Partnerships with local outfitter guides, hiking and equestrian clubs, and local school systems were in place and prospering. Upper and lower division wilderness management courses were developed and taught by the Superstition wilderness manager at Arizona State University, and fieldwork was incorporated into the course curriculum. Students from these classes were selected for jobs in wilderness management, much to the benefit of local managers. Wilderness education also expanded into the inner city and local American Indian reservations. By 1986 the program was in full swing, with Superstition Wilderness employees and volunteers contacting an average of 45,000 visitors and students annually.

So can wilderness education really improve visitor behavior and minimize resource impacts in your area? After only five years of aggressive education, litter became almost nonexistent throughout the entire wilderness. Vandalism of trail signs and trailhead information boards was reduced by almost 90%. The construction of unwanted fire rings was reduced by over 65%, and a newfound understanding of wilderness and a sincere feeling of ownership and responsibility had been instilled in the area's users. Between 1979 and 1999 over a half million wilderness visitors and students had been educated, and conditions in the Superstition Wilderness not only improved but have been maintained.

Figure 1—Tonto National Forest staff interact with a second-grade class during a Woodsy Owl program. U.S. Forest Service photo.

However, not all of the area's management concerns were solved, nor will they all ever be completely solved. Wilderness management is a constant challenge that will continually test the creativity, longevity, and technical skills of managers. The reality is that education will work if it is well organized, has solid attainable goals, and is aggressively implemented and evaluated. The following tips could be helpful in starting a wilderness education program in your area: (1) know what your real management problems are, know who your target audiences are, and identify what educational methods will work best to solve each specific problem; (2) start with priority issues, only expand as issues are solved or new ones arise and continually evaluate and report your educational success; and (3) be aggressive with your educational efforts; but do it in a way that builds public partnerships and does not foster wilderness antagonists.

The Superstition Wilderness education program has made a difference and will continue to do so because of the efforts of many dedicated wilderness champions. Many of the individuals who worked in the Superstition Wilderness have taken on leadership roles that entrust them with the protection and care of America's remaining wildlands. Today, their voices can still be heard on a warm Superstition wind, just as Jim Bradley's vision continues to burn bright in the eyes of future wilderness educators.

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Figure 2—Superstitution Wilderness staff connects with a fourth grade class during an Impact Monster program. U.S. Forest Service photo.

An Evaluation of the Wilderness and Land Ethic Curriculum and Teacher Workshops

BY KARI GUNDERSON and LEO H. McAVOY

The Effectiveness of Wilderness Education

Many researchers and managers consider education the key to solving recreational use problems in wilderness. They believe education to be the most effective light-handed management strategy to reduce impacts and conflict in wilderness, while retaining visitors' freedom of choice. Yet little is known about the effectiveness of existing educational programs in changing knowledge, attitudes, and beliefs of visitors. Despite the diversity of wilderness information and education techniques, there has been little research on the design, application, and effectiveness of wilderness education programs (McCool and Lucas 1990). Educating the public has long been considered an important function of land stewardship. In the past, this has largely meant training wilderness visitors in low-impact camping techniques and user ethics. However, many wilderness managers and researchers believe wilderness education needs to expand by instructing visitors on how to build a shared understanding of the role and value of wilderness to society.

Article co-authors Kari Gunderson and Leo H. McAvoy.

During the past decade wilderness managers have turned to school-based programs as one wilderness education technique (Hendricks 1999). These programs may be effective in influencing the behavior of current and future wilderness users, but little is *documented* about that effectiveness. Wilderness education programs have not been tested for their effectiveness in changing levels of knowledge about desired behavior, or changing behavior. This study sought to determine how the Wilderness and Land Ethic curriculum and teacher workshops could be improved to better address knowledge, attitudes, and beliefs about wilderness.

Wilderness and Land Ethics Curriculum and Teacher Workshops

The K–8 wilderness education curriculum on Wilderness and Land Ethic is distributed by the interagency Arthur Carhart National Wilderness Training Center. It was designed to provide classroom teachers, land managers, and outdoor educators with an interactive resource to promote awareness and appreciation of the cultural, environmental, and experiential values of wilderness. The curriculum lessons and activities are tied to a collection of educational resources, including skulls, skins, puppets, maps, books, and videos known as the Wilderness and Land Ethic Box (Arthur Carhart National Wilderness Training Center 1995).

The teacher workshops are a vehicle for implementing the Wilderness and Land Ethic curriculum and are designed to educate teachers about wilderness and to familiarize them with the materials box and curriculum. Since 1992, teacher

workshops have been led by workshop instructors and are offered in a number of states. Instruction is provided by environmental educators, K–8 teachers, professors, wilderness advocates, and wilderness managers. Content of the workshops includes: (1) curriculum organization and ideas for implementation; (2) information about wilderness values, the National Wilderness Preservation System, and an overview of the national history of the wilderness movement; (3) experiential teaching opportunities with lessons from the curriculum; and (4) participation in low-impact camping methods. Workshop length ranges from a half-day to three days, and locations vary from classroom settings to outdoor education centers. Training in curriculum use has been offered for academic credit from state colleges and universities. Teachers attending the workshops are supplied with a copy of the curriculum and are asked to evaluate the workshop in a formal evaluation. Teachers who take the workshop for academic credit are required to field-test lessons from the curriculum and report the results back to the workshop instructors.

Because the Wilderness and Land Ethic curriculum and teacher training workshops are modeled after Project WILD, a review of Project WILD research studies was conducted. Project WILD, a nationally recognized K–12 interdisciplinary wildlife education program, has been widely used since its inception in 1983 and has undergone several evaluations for program effectiveness. Comprehensive studies conducted on teachers' use of Project WILD identified barriers to implementation and reasons why teachers attend workshops (Fleming 1983; Pitman 1996). A large majority of Project WILD workshop participants used the materials in their classrooms. If teachers did not use Project WILD materials, the most common reasons were: they were planning on using them in the future, but had not yet; lack of planning time; lack of instructional time; difficulty integrating materials into their curriculum; no opportunity to use in their current position; and lack of administrative support.

Methods

The research design in the Gunderson study (2001) used multiple qualitative and quantitative data collection methods. Evaluation of the Wilderness and Land Ethic curriculum used teacher interviews and a mail-back survey. The teachers selected for this study had participated in a Wilderness and Land Ethic workshop and had used the curriculum with their students.

Telephone interviews were conducted with 12 teachers, two from each of six geographic areas of the United States. The focus of these interviews was on three issues: (1) to arrive at a set of objectives that helped guide the curriculum evaluation process; (2) to determine how teachers believe the curriculum influences students' knowledge, attitudes, and beliefs about wilderness; and (3) to identify the patterns of curriculum use, characteristics of teachers, and factors influencing implementation.

Using the results from the initial telephone interviews, a mail-back survey was developed and administered to a sample of 224 teachers who had used the Wilderness and Land Ethic curriculum to determine their perceptions of its effectiveness and how it could be improved. The survey used a multiple-choice scale and included some open-ended questions.

A follow-up telephone contact was initiated with 15 nonrespondents. The intention was to telephone these nonrespondents to determine why they had not responded, and if there were significant differences in responses from the 52% of teachers who had returned surveys. The nonrespondent follow-up indicated responses similar to those of teachers who had returned the survey.

A teacher workshop field trip on the Rocky Mountain Front in Montana. Photo by Kari Gunderson.

In a third data collection method, teachers who had recently completed a workshop were interviewed by telephone. Individual telephone interviews were conducted with 24 teachers within six months of their participation in a training workshop to (1) determine if there was a relationship between workshop attendance and use of the curriculum, (2) determine if teachers were receiving adequate information on best practices for current state and national educational standards, and (3) develop guidelines for an optimal training workshop model or delivery mechanism to meet curriculum goals and objectives. Comparisons were made between information gathered from teacher surveys and interviews

Teachers and natural resource professionals study wilderness maps. Photo by Kari Gunderson.

Table 1—Teachers' Evaluation[a] of the Wilderness and Land Ethic Curriculum in 2001	
In general, the curriculum:	**Mean**
Has a clear focus on wilderness concepts	4.42
Helps students understand benefits of wilderness	4.31
Is well designed	4.24
Responds to different learning activities	4.24
Presents information and ideas relevant to wilderness	4.23
Challenges students to use critical thinking skills	4.23
Improves students' ability to address wilderness issues	4.20
Is easy to use	4.16
Provides adequate background information	4.13
Offers adequate resource materials in the box	4.09
Has everything needed to teach the lessons	3.82
Meets curriculum standards	4.04
Gives teacher confidence to teach something previously taught by guest speakers	3.80
[a] Teachers responded on a 5-point scale with 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree.	

with teachers who attended training workshops.

Results and Discussion

The analysis of teacher mail survey results indicated that 80% of the teachers who responded have used the curriculum in their classrooms and tend to use it as individual, supplementary lessons. Over 90% of teachers surveyed who used the curriculum said the curriculum is well designed (see Table 1). Teachers who used the curriculum tended to use it to fulfill educational standards (82%) and would like a cross reference of lesson plans with science, math, and social studies standards. Two variables, where teachers grew up and the size of the school where they teach—did not appear to influence curriculum use. However, teachers who live close to a designated wilderness (within 100 miles) are more likely to be curriculum users (80%).

A horse-packing demonstration. Photo by Kari Gunderson.

Teachers involved in this study indicated that the Wilderness and Land Ethics curriculum was well designed, has a clear focus on wilderness concepts, improves students' ability to address wilderness issues, and challenges students to use critical thinking skills. Teachers who used the curriculum to satisfy academic standards tended to rate the curriculum design highly. If the curriculum is to be used by teachers, individual lessons need to be correlated with the Excellence in Environmental Education Guidelines for Learning by the North American Association for Environmental Education, and national and state standards for science, mathematics, social studies, language arts, and physical education. Through a constructivist approach, lessons could be sequenced to build a level of background knowledge on the subject of wilderness in order to broaden its understanding.

Despite attendance at a teacher workshop, teachers expressed a lack of confidence about introducing wilderness concepts to their students and would like a guest speaker to come into the classroom. Teachers also expressed concern for relevancy of the curriculum to students. One teacher said, "Somehow we have to make wilderness relevant to students. In their world wilderness isn't even a consideration." Grade level relevancy is also a concern. Teachers suggested that the curriculum be separated into individual curricula for primary, elementary, and middle school levels.

Analysis of the telephone interviews with 24 teachers six months after they attended a workshop revealed that the workshops increased teachers' knowledge of wilderness, wilderness values, appropriate behaviors, and uses. Of the teachers who have used the curriculum, 70% used it to supplement their science program. Teachers indicated that the greatest strengths of the workshops were (1) the workshop format that allowed participants to teach and actively participate in lessons from the curriculum, (2) the teaching resources made available to them, and (3) the in-depth knowledge of the instructors. Teachers also indicated it is important to offer workshops for academic credit (92%) and renewal credits (88%). Teachers want more age-appropriate lessons and more professional enhancement opportunities. They suggested that a wilderness education courseshould be made available on the Web, so teachers in remote areas can

Continued on page 35

Wilderness Research in South Africa

Defining Priorities at the Intersection of Qualities, Threats, Values and Stakeholders

BY MARETHA SHROYER, ALAN WATSON, and ANDREW MUIR

Introduction

While South Africa is a leader in wilderness conservation on the African continent (Muir 2002), the term wilderness is often used inconsistently by the public, the media, and even by some conservation organizations. To many people, wilderness means almost any natural outdoor recreation area in public or private ownership. In South Africa there is no formal, agreed-upon definition of wilderness, and the only legal protection of wilderness is in State (national) Forests. The National Forest Act no. 84 of 1998 (part 2, section 8) gives the minister power to declare protected wilderness areas. Permissible land use in wilderness, however, is not stipulated, leaving it open to interpretation by reserve managers.

This article identifies, from recent literature on wilderness in South Africa, some potential defining qualities of wilderness, threats to those qualities, and the values of wilderness to different stakeholder groups. The ultimate purpose is to arrive at some collective agreement on the important components of the definition of wilderness in South Africa and establish priorities for science to support actions to identify and protect these places.

Article co-authors pictured left to right: Alan Watson, Maretha Shroyer, and Andrew Muir in Plettenberg Bay, South Africa.

Forming a Partnership to Identify Wilderness Qualities and Research Priorities

Awareness about wilderness in South Africa was significantly strengthened at the 7th World Wilderness Congress (WWC) in Port Elizabeth in November 2001. South Africans that attended the 7th WWC came from many sectors, including the Minister of Environmental Affairs and Tourism, public sector managers, academic scientists, nongovernmental organizations (NGOs), traditional healers, and owners of private areas protected for wilderness character. Various scientists, academics, conservationist agencies, and NGO representatives presented papers and posters. A special session that focused on South Africa, within the Symposium on Science and Stewardship to Protect and Sustain Wilderness Values, revealed the need to establish a science program to inform wilderness training programs and academic education, and to explain wilderness benefits to the larger population.

A partnership project, funded by the Wilderness Foundation of South Africa, WILD Foundation (USA), the Sierra Foundation, and the International Programs Office of the USDA

Forest Service was launched in March 2002. The purpose of this project was to identify gaps in knowledge and the relative importance of these gaps in order to guide wilderness-related research activities for the next 5 to 10 years.

Defining Wilderness Qualities, Threats, Values, and Stakeholders

There were two methods used to arrive at a list of wilderness qualities, threats, values, and stakeholders for South Africa to use in providing the foundation for an effort to prioritize research needs. From papers submitted for publication in the *Proceedings of the WWC Symposium on Science and Stewardship to Protect and Sustain Wilderness Values* (Watson and Sproull in press) and insight gained from interviews with key individuals in the wilderness community, a unique set of 18 wilderness qualities (see Table 1) and 15 threatening forces to wilderness (see Table 2) were identified as central to wilderness in South Africa.

While some insight into the values that would accrue from protection of these 18 wilderness qualities were gained from the papers submitted to the proceedings, the authors were mostly informed by the interviews with a variety of wilderness interests in South Africa. The interviews were aimed at articulating the range of potential values and identifying the stakeholder groups that could lose or gain from wilderness protection. Values (see Table 3), in this context, are the set of 18 meanings or outcomes (Watson 2000) derived from protection of the set of wilderness qualities (see Table 1) from the set of threats described previously (see Table 2). Stakeholders (see Table 4) represent 18 identified interests with unique relationships to wild places (Watson and Borrie 2002), from casual to intense, local to distant. Rather than assuming a set of values extends across all segments of society, this approach is aimed at describing unique relationships for identifiable stakeholder segments based upon unique sets of outcomes received.

Obtaining Input on Priority Information Needs

The set of wilderness qualities and threats were placed into a matrix, with each quality representing a row of the matrix and each threat a column. Values and stakeholders were similarly placed into a matrix. Representatives of the wilderness community in South Africa were asked to evaluate the intersection of each row and column in two ways: (1) the first entry from a respondent indicated the level of knowledge he/she believes exists about the relationship between the threatening force and

Table 1—Wilderness Qualities in South Africa

Uncorrupted by humans—Places for sacred rituals and experiencing unspoiled environments that are out-of-bounds for ordinary daily human activities
Unmodified/undeveloped—Areas without roads, fences, windmills, buildings, communication masts, power lines, or other facilities evident to visitors
Wilderness-type experiences—Opportunities to enjoy nature in small groups or alone (e.g., solitude, harmony with nature, challenge)
Indigenous wildlife populations—Populations in natural predator/prey balance
Indigenous plant populations—Plant populations, without exotic or invasive species and without influence of human disturbance
Pristine water catchment—Water catchments with the ability to provide optimum flow of high-quality water
Low-density human presence—Low density of residents, managers, and visitors within the area
Extensive area—Wilderness is perceived to be large enough for individual isolation and natural functioning of ecosystems
Harsh conditions—Traveling in wilderness can lead to challenges and risks related to weather, landforms and hazards
Sacred pools, rivers, and landscapes—Many water bodies, forests, or mountains are considered sacred and protection is desirable for rituals
Wildlife in natural habitat—Wilderness is home to wildlife in their natural, unmodified habitats
Clean water—Free of pathogens, carries no foreign objects, and is free of turbidity
No motor vehicles, air traffic, or motorized watercraft—Wilderness has no motor vehicles, air traffic, or motorized watercraft, except in circumstances where absolutely necessary as a minimum management tool
Natural sound—Sounds that emanate from within the wilderness, principally the sounds of nature
Representative of critical, intact ecosystems—Areas represent important ecosystems to protect and are relatively intact
Natural disturbance regimes intact—Fires, mud slides, and floods occur within natural levels of variability
Low levels of technology—Visitors or residents possess items of very low levels of technology, and facilities or equipment for comfort and mechanical advantage are not appropriate
Scenically attractive—The landscape is an appealing representative of natural forces

Table 2—Threatening Forces on Wilderness in South Africa
Pollution—Contamination of soil, water, landscape, or air by artificial or foreign devices or products (e.g., plastic bags, chemicals, fuel, exhaust fumes)
Development within protected areas—Infrastructure, roads, fences, or other modifications to natural ecosystems within areas managed as national, provincial, or private reserves
Land/water use changes on adjacent lands—Development or changes in infrastructure, roads, fences, agricultural practices, or other modifications to conditions in areas adjacent to formally protected natural ecosystems
Alien flora and fauna—Exotic plant and animal species
Pressures to produce income—Internal or external demands to make profit from wilderness resources
Off-road vehicles—Vehicles or motorcycles used by management or visitors
Facilities for comfort—Facilities providing visitor convenience versus providing resource protection
Mechanized wildlife management—Active manipulation of wildlife species by use of helicopters, vehicles and other motorized equipment
Island effect—Fragmentation of ecosystems or habitats to land units that do not provide adequate opportunities for conservation of genetic diversity and biodiversity
Land reforms and land claims—Change of land use or change in ownership of land units
Recreation use and management—Recreation visitors and management of visitor behavior and impacts
Dams—Artificially constructed structures to contain water
Agriforestry—High technology forestry practices aimed at maximizing fiber production
Privatization and commercialization—Change in ownership from public to private enterprise or giving exclusive private access to public resources for commercial purposes
Anthropogenic climate change—Climate change induced by human activities that contribute to carbon dioxide release, primarily from burning fossil fuels in industry and automobiles

Table 3—Wilderness Values in South Africa
Water conservation
Spiritual fulfillment/sacred values
Healing
Pharmaceuticals
Economic/income
Quality of life
Scientific
Biodiversity protection
Protecting endangered species
Appreciative/experiential
Wildlife conservation
Traditional knowledge
Education
Personal growth
Cultural preservation
Resource harvesting
Identity (cultural icon)
Undefined or unanticipated future values

the wilderness quality, or the ways that a particular stakeholder group gains or loses on a particular value associated with wilderness; and (2) the second entry from a respondent in each cell indicated how important he/she believed that information will be to obtain within the next 5 to 10 years in order to make wilderness designation or stewardship decisions. Evaluation ratings were made in each cell according to the directions provided in Table 5.

These evaluations were completed by representatives of the Wilderness Action Group of South Africa, the Mountain Club of South Africa, the Northern Province Department of Environmental Affairs, an independent conservation consultant, South African National Parks, the Kwa-Zulu Natal Wildlife Service, and the Western Cape Nature Conservation Board. After examining the responses, it was decided to present the findings in terms of where the most severe information needs exist. This was determined by recording the rows and columns within each matrix with the greatest number of cells indicated to have "no knowledge about interaction between items in cells" and "the knowledge about interaction between items is extremely crucial information with implications for immediate application" (i.e., "1C" ratings).

Results

The highest-priority information needs were indicated by four qualities with the greatest number of "1C" ratings across the range of threats: (1) wilderness-type experiences, (2) representative of critical intact ecosystems, (3) unmodified/undeveloped, and (4) sacred pools, rivers, and landscapes. The threats that were indicated to present the most severe needs for information: (1) privatization and commercialization, (2) pressures to produce income or subsistence, and (3) off-road vehicles. Below these qualities and threats, there were substantial drops in numbers of significantly important cells indicated.

Generally, the indicated cells with the highest level of importance were

Table 4—Wilderness Stakeholders in South Africa

South African youth
Visitors to privately owned wilderness
Future human populations
South Africa National Parks and provincial park visitors and trail users
Traditional healers and their communities
Adjacent landowners
Urban residents
Consumers of science
Nongovernmental organizations
Guides, lodges, transportation providers (i.e., tourism industry)
Mountaineers
Traditional authorities
Politicians
Neighboring communities
Ecosystems
Developers
Exchange students
International communities

individual cells found within the 12 cells represented by the intersection of the four qualities and three threats listed above. For example, the single cell with the greatest agreement that it was indeed both lacking knowledge and high priority was at the intersection of "wilderness-type experiences" and "pressures to produce income or subsistence."

The four values indicated to be in most severe need of information across the range of stakeholders were (1) education, (2) biodiversity protection, (3) economic/income, and (4) water conservation. Respondents consistently indicated three stakeholder groups as central to the most important information needs: (1) traditional healers and their communities, (2) politicians, and (3) future human populations.

The individual cells with the greatest information needs tended to be among those 12 cells representing the intersection of these four values and three stakeholder groups. For instance, the four cells with very high numbers of "1C" evaluations were within the "traditional healers and their communities" column at the "education," "biodiversity protection," and "economic/income" rows. One exception was the very highest importance cell, which was within the "traditional healers and their communities" column, but in the row labeled "protecting endangered species."

Table 5—Instructions for Evaluating Wilderness Information Gaps in Survey about South African Wilderness

Entry 1:

1 = no knowledge about interaction between items in cells;

2 = limited knowledge about interaction between items in cells;

3 = good understanding about interaction between items in cells.

Entry 2:

A = the knowledge about interaction between items is not very important to develop;

B = the knowledge about interaction between items is relatively important and worthy of effort to obtain;

C = the knowledge about interaction between items is extremely crucial information with implications for immediate application.

N/A (not applicable) = the relationship between items in the cell is not relevant in the context of decisions to protect wilderness character.

Discussion

While these results have brought some level of focus to the discussion of appropriate wilderness qualities to use to describe wilderness in the South African context, these qualities have not yet been defined at the level needed to map them. An application priority is to represent these attributes on maps of specific places, or across the whole of South Africa in a way that allows examination of the distribution of wild places and to follow trends in wilderness character of the national landscape. Carver, Evans, and Fritz (2002) have demonstrated the usefulness of such a mapping process in the United Kingdom, including obtaining human input into how these attributes are valued.

The Mountain Club of South Africa and cooperating partners have proposed to measure the qualities listed here so they can map wilderness conditions of the proposed Olifants River-Cederberg-Tankwa Karoo Mega-Reserve in the Cape Floristic region of South Africa. To do that wilderness condition mapping, they will need to operationalize each conceptual quality. For instance, the quality indigenous plant populations might be represented by at least two indicators of the relationship between that quality and the list of potential threats: (1) presence and distribution of alien flora, and (2) island effects and inbreeding due to existing boundaries issues. Similarly, the threats to wilderness-type experiences could be assessed by measuring the cumulative amount of off-road vehicle tracks per square kilometer, probability of encountering commercial activities each day, and the number of encounters with recreation groups each day.

A proposed socioeconomic profile has now become an assessment of the relationships (set of values) between these wilderness qualities and stakeholders (e.g., local communities, private

landowners, visitors, the tourism industry, and mountaineers). A mixture of quantitative and qualitative methods will be employed to understand these relationships in such a way that Geographic Information System overlays can be developed that will map the meanings of all places, with particular interest in depicting the relationship between wilderness qualities and these values.

Greater exploration into the significance of these wilderness qualities, threats, values, and stakeholder groups for the future of wilderness conservation is vital to understanding and pursuing these research priorities. For example, the need to understand the range of wilderness-type experiences and how they are influenced by pressures to produce income or subsistence, off-road vehicles, privatization, and commercialization points to several important issues in resource management in South Africa. With a challenging economy, there is great interest and incentive to benefit from ecotourism promotion and public-private partnerships via concession agreements. Commercialization of wilderness opportunities and pressures to develop off-road opportunities to meet tourist demands could directly impact many wilderness qualities, and indirectly impact many of the unique values derived from these places. Similarly, there is great interest in protecting or restoring relationships between the variety of indigenous groups and natural and spiritual aspects of the landscape. However, these user pressures will have unknown effects on the experiences of other users, spiritual values associated with sacred places, and protection of critical, intact ecosystems. Better information is needed in order to implement societal programs and still retain wilderness qualities of some places and the many meanings associated with them.

The expressed need to understand how wilderness affects the values derived by traditional healers and their communities shows a commitment to this part of the local, rural population. Particularly, the educational, biodiversity protection, and endangered species protection values of these wild places to this segment of the population need to be clarified. Those in the wilderness community have also expressed need for greater understanding of how wilderness protection relates to politics and politicians, suggesting the educational challenge associated with moving beyond the emotional aspects of protection to a logical explanation of the collective benefits to the populace in supporting legal protection efforts. The challenge associated with defining the values of wilderness protection to future generations looms large on the South African horizon. The contribution of wilderness protection to water conservation and biodiversity protection for future generations could be the dominant outcome of current efforts to understand, restore, and protect wilderness qualities in South Africa.

Understanding the threats to wilderness-type experiences is a high-priority science issue. Roodeberg Peak in the Hex River Mountains, Western Cape, South Africa. Photo by Maretha Shroyer.

Protecting wilderness qualities may assure biodiversity and water conservation values for future generations. Knysna Forest, Western Cape, South Africa. Photo by Maretha Shroyer.

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Announcements and Wilderness Calendar

COMPILED BY STEVE HOLLENHORST

Nearly Half the Earth is Still Wilderness

Wilderness areas still cover close to half the Earth's land, but contain only a tiny percentage of the world's population, according to the result of a study conducted by Conservation International and Agrupación Sierra Madre, with support from the Global Conservation Fund. More than 200 international scientists contributed to the analysis that is published in the book *Wilderness: Earth's Last Wild Places* (University of Chicago Press 2003).

The 37 wilderness areas identified in the book represent 46% of the Earth's land surface, but are occupied by just 2.4% of the world's population, excluding urban centers. Nine of the wilderness areas fall, at least in part, within the United States. Although the wilderness areas are still largely intact, they are increasingly threatened by population growth, encroaching agriculture, and resource extraction activities. Barely 7% of the areas currently enjoy some form of protection.

Nineteen of the wilderness areas have remarkably low population densities—an average of less than one person per square kilometer. Excluding urban centers, these 19 areas represent 38% of the Earth's land surface, but hold only 0.7% of the planet's population.

To qualify as wilderness, an area has to have 70% or more of its original vegetation intact and cover at least 10,000 square kilometers (3,861 square miles), and most have fewer than five people per square kilometer. Only five wilderness areas are considered "high-biodiversity wilderness areas," because they contain at least 1,500 endemic vascular plant species, found nowhere else in the world. The five areas are Amazonia, the Congo Forests of Central Africa, New Guinea, the North American Deserts, and the Miombo-Mopane Woodlands and Grasslands of Southern Africa.

"As striking as these wilderness numbers are, they only serve to underscore more than ever the critical importance of protecting the biodiversity hotspots, areas which represent only 1.4% of the Earth's landmass but contain more than 60% of its terrestrial species," said co-author Russell Mittermeier, president of Conservation International. "If we are to succeed as conservationists, we have to take a two-pronged approach of protecting the biodiversity hotspots and high-biodiversity wilderness areas simultaneously." Source: www.conservation.org.

Court Reinstates Roadless Ban

The federal Ninth Circuit Court of Appeals in San Francisco overturned a preliminary injunction, effectively reinstating the ban on road construction in 58.5 million acres (23.7 million hectares) of United States forestland. The plan under former President Clinton's administration aimed to prevent road construction and the removal of oil and lumber on these forestlands, unless needed for environmental reasons or to reduce the risk of wildfires.

Environmental groups, including the Sierra Club, went to the appeals court seeking to lift a May 2001 injunction issued by a federal judge in Idaho. That judge ordered a postponement of the Clinton plan, saying that the previous administration hurried the rule and did not allow sufficient time for the public to comment.

Following are key points in the opinion: First, the Ninth Circuit ruled that the Roadless Rule complied with the National Environmental Policy Act's (NEPA) notice and comment procedures. The court was persuaded by the fact "that the Forest Service held over 400 public meetings about the Roadless Rule and that it received over 1,150,000 written comments."

Second, the Ninth Circuit concluded that the Forest Service had considered a reasonable range of alternatives in the Environmental Impact Statement on the Roadless Rule. In reaching this conclusion,

Submit announcements and short news articles to STEVE HOLLENHORST, *IJW* Wilderness Digest editor. E-mail: stevenh@uidaho.edu.

the Court of Appeals gave considerable weight to the conservation and environmental values embodied in the Roadless Rule. The court ruled that "it would turn NEPA on its head to interpret the statute to require that the Forest Service conduct in-depth analyses of environmentally damaging alternatives that are inconsistent with the Forest Service's conservation policy objectives."

Finally, the Ninth Circuit ruled that the Idaho district court did not properly assess the balance of harms in deciding to issue the injunction. In a slap at the current administration's failure to defend the Roadless Rule in the Idaho court case, the Court of Appeals also observed that the district court had relied partly on admissions made by the attorneys representing "a new presidential administration which is perhaps less sympathetic to the Roadless Rule." Source: The Wilderness Society at www.wilderness.org/.

Volunteer in Western Cape Wilderness Areas

The Western Cape Nature Conservation Board (WCNCB) invites wilderness rangers from the United States to become involved in its wilderness and protected areas. The board currently manages four wilderness areas: Cederberg, Grootwinterhoek, Boosmansbos, and Doringrivier. Several activities are identified that require the assistance of volunteers or students, such as path maintenance, rehabilitation of old roads and jeep tracks, eradication of nonnative and invasive plant species, and education of wilderness users. This could initiate a two-way exchange opportunity, partly because of the direct relevance between wilderness and protected area management, and similar challenges in both countries.

The WCNCB will provide free accommodation (excluding meals) and transport to its wilderness and protected areas. Volunteer contributions include sponsorship from their employee, funding traveling expenses, and camping equipment. All work done is at the volunteers' risk, and WCNCB is not liable for any work-related injuries. Although interested U.S. wilderness rangers might not be permanent staff of a federal agency, they will represent their country and the quality of work required by U.S. federal agencies. The quality of work and enthusiasm will determine the future potential and viability of this exchange program. A résumé and contact information for references is required from interested volunteers. Contact: Kas Hamman, director of professional services, Western Cape Nature Conservation Board, E-mail: khamman @pawc.wcape.gov.za; phone: (021) 483 4232; fax: (021) 423 0939.

National Landscape Conservation System

The Bureau of Land Management has established the National Landscape Conservation System (NLCS) to help protect some of the United States' most remarkable and rugged landscapes. The decision establishes a system that includes the agency's national conservation areas, national monuments, wilderness areas, wilderness study areas, wild and scenic rivers, and national scenic and historic trails. With 817 areas totaling over 40 million acres (16.2 million hectares), 2,000 miles (3,226 kilometers) of wild and scenic rivers, and 3,623 miles (5,844 kilometers) of national historic and scenic trails, the system ensures that future generations will enjoy some of the United States' last great open spaces. Equal in size to the state of Florida, and representing about 16% of the BLM land base, NLCS lands will enable the public to experience the solitude and splendor of these undeveloped landscapes by providing numerous opportunities for exploration and discovery. Source: www.blm.gov/nlcs.

From BOOK REVIEWS on page 48

provided by the original western parks, and park officials were forced to re-envision the typical development patterns provided in the western parks. He notes that park officials saw themselves as representing what he calls "high culture," but were forced to also include and respond to mass tourism in the Atlantic parks.

Finally, another major difference in eastern regions brings us to the fourth major contribution: MacEachern discusses the rationales and impacts of expropriating private lands and entire communities from Cape Breton Highlands (Nova Scotia), Prince Edward Island (PEI), Fundy (New Brunswick), and Terra Nova (Newfoundland) National Parks, a topic not often addressed in developed nations.

Natural Selections is a beautifully written and meticulously researched analysis of the conflicting relationship between nature and culture in park creation and management, and the associated struggle between the conflicting goals of preservation (i.e., nature) versus use (i.e., culture) among bureaucrats and field managers in Parks Canada. MacEachern reminds us how long the ongoing battle between preservation versus use in our park systems has been raging, and demonstrates how the blending of nature and culture—through ever-changing scientific findings and topics, aesthetic ideals, recreation and tourism patterns, and park management philosophies—intersect in societies' creation and management of protected areas.

Review by JOHN SHULTIS

Book Reviews

The Wilderness from Chamberlain Farm: A Story of Hope for the American Wild

By Dean Bennett. 2001. Island Press, Covelo, Calif. 359 pp., $30.00 (hardcover).

Chamberlain Farm is the name of a small point of land that shelters a narrow cove on Chamberlain Lake on the Allagash Wilderness Waterway in northwestern Maine. In this study of the various economic, political, and cultural forces that have profoundly affected this land, historian Dean Bennett tells the story of how these forces "reflected society's evolving beliefs and attitudes regarding nature and wilderness." Archaeological evidence indicates that the area was for many years an indigenous settlement. By the mid-1800s the site had attracted lumber barons who, valuing wealth and dominance over nature, established a lumber depot on the site. Even then, however, urbanites valuing the remote wilderness character of the area began to visit. Desire to preserve these amenity values increased with the emergence of an affluent middle class and the dwindling number of pristine places. Over time, this minority interest displaced extractive, exploitive interests.

Formal protection efforts began in the 1960s, when growing interest in both the physical and psychological values of wilderness prompted people like William O. Douglas, Edmund Muskie, Edmund Ware Smith, and others to fight to preserve the area as part of the Allagash Wilderness Waterway under the nationwide Wild and Scenic Rivers Act. Despite these protections, however, Bennett argues that only constant vigilance against private interests can protect unique places like Chamberlain Farm. While the logger barons are gone, modern-day threats come from those who view the area as a playground for their motorized boats and bikes.

The story offers lessons that illustrate the vital interconnections between nature and human activity with Chamberlain Farm as a case study. The photos and maps included in the book enhance this narrative. The lessons identified by Bennett at Chamberlain Farm are applicable to places throughout the United States—and indeed the Western world—still in need of protection. Written with meticulous attention to historical detail and a sincere affection for the forests and rivers of northern Maine, Bennett highlights the many conservationists, recreationists, and government officials involved in the effort to sustain the genius loci of this area. This book also exemplifies the value of studying one small area in detail to better understand a much larger landscape, and our society itself.

Review by STEVE HOLLENHORST, *IJW* Digest Editor

Natural Selections: National Parks in Atlantic Canada, 1935–1970

By Alan MacEachern. 2001. McGill-Queens's University Press, Montreal and Kingston, Canada. 342 pp., $49.95 Canadian (cloth).

Alan MacEachern's regional and historical analysis of the creation and management of national parks in the Atlantic region of Canada is valuable for a number of reasons. First, it is inherently valuable as an addition to the growing collection of books allowing us to assess the similarities and differences between the development of national park systems across the globe. For example, the historian's concept of worthless lands, the importance of political figures and ideologies in park creation, and park agency fixation on the "use" functions of national parks are all noted in this book. Yet MacEachern also provides numerous new insights on these now familiar themes.

Second, as MacEachern notes, he addresses a time period that has typically been ignored or glossed over by most other researchers, both in Canada and the United States. By covering the time period ranging from the interwar period, the Great Depression, and the post–WWII boom period to the beginnings of the environmental movement, he is able to provide an uninterrupted study of how public and bureaucratic attitudes toward park creation and management changed. Moreover, MacEachern describes how ecological science and Parks Canada's attitudes toward and use of such research underwent significant changes during this time.

Third, such historical analyses have tended to concentrate on western parks—again, both in Canada and the United States—while the eastern parts of North America provided significantly different challenges for park managers and users. Perhaps most importantly, the Atlantic parks did not include the sublime mountainous wilderness landscapes

Continued on page 47