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On the Cover

FRONT: Snorkeling in the kelp forest of the marine sanctuary at Channel Islands National Park, Santa Cruz Island, California. [Ian Shive ©–International league of Conservation Photographers]

INSET: Jellyfish, Channel Islands National Park, Santa Cruz Island, California. [Ian Shive ©–International league of Conservation Photographers]

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

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

Wilderness and Baseline Experiences

BY CHAD P. DAWSON

When we first see or experience any setting or activity in life, we consciously and subconsciously develop an opinion and a relative reference point for all related experiences that follow. As Professor Peter H. Kahn, Jr. (1999) points out, this all starts at a very young age and strongly influences a child's view of the environment and how they perceive and interact with nature. Several bloggers on the Wildnet Listserv recently reminded me of Kahn's point in his 1999 book that each generation is seeing a more degraded environment and most likely will accept that as their internal and experiential baseline or reference point. The relationship between children and nature has become an increasingly investigated topic among psychologists, sociologists, conservationists, and educators (Kahn and Kellert 2002).

Thus, by extension my fellow bloggers on Wildnet expressed concern that incremental degradation to wilderness character and quality must be of great concern to wilderness stewards and defenders because of the sometimes impacted or degraded conditions being experienced by new and younger visitors. Based on the conditions they experience, these visitors will set personal reference points from which they will evaluate nature, wilderness, and their related experiences. Actually, as it turns out, Professor Kahn is a psychological researcher and wilderness visitor, who writes equally clearly about the biocentric and anthropocentric statements of children regarding nature, as well as his own reflections in wilderness and wild places during his personal retreats and recreational experiences (Kahn 2009). He concludes from a personal and evolutionary perspective that "today wildness remains part of the architecture of the human mind and body, and that to thrive as individuals and as a species we need to cohabitate with it" (Kahn 2009, p. 38).

Concern about incremental degradation to wilderness character and quality, and its impacts on human perceptions, is another reminder why being vigilant about stewardship is necessary for the sake of present and future generations.

In this issue of *IJW*, Roger Kaye recounts the story of the designation of the Arctic National Wildlife Refuge and celebrates 50 years of protection. Hawk Rosales reflects on the creation of the InterTribal Sinkyone Wilderness and the importance of these ancestral lands to tribal life and cultural heritage. Three research studies report on the effectiveness of bear-resistant canisters, the experiences of visitors following wildland fires, and new techniques to monitor impacts at campsites. Lisa Eidson shares insights into the use of electronic communications to support wilderness stewardship. Vance Martin and several other features in this issue of *IJW* focus on the experiences and results from WILD9, the 9th World Wilderness Congress held in Mérida, Mexico, from November 6 through 13, 2009.

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SOUL OF THE WILDERNESS

Celebrating a Wilderness Legacy

The Arctic National Wildlife Refuge

BY ROGER KAYE

We will soon celebrate a milestone in American conservation history. The year 2010 is the 50th anniversary of the establishment of a landmark wilderness, and now a symbol of the dilemma we face regarding our effect on the global environment and what quality of it we are to leave future generations—the Arctic National Wildlife Refuge (ANWR).

ANWR didn't come to us easily. Through the 1950s, powerful economic interests and Alaska's political leaders stridently opposed the proposed 9-million acre (3.6 million ha) wilderness reserve. But after a hard-fought, seven-year campaign and failed legislative attempts, widespread public support persuaded the Eisenhower administration to establish this "Last Great Wilderness" through an executive order with a stated purpose "to preserve unique wildlife, wilderness, and recreational values"—the tangible values for which ANWR is renowned today (U.S. Public Land Order 2214). But beyond perpetuating the wildlife and wildness within its boundaries, there had been another purpose in the minds of those who led the fight.

To understand their underlying motive—and the larger significance of their victory—we need to realize that the ANWR campaign was rooted in a growing fear for the future. ANWR's establishment was among the first of the sweeping conservation initiatives of the 1960s that came about in response to concern over the worsening environmental degradations accompanying the prosperous post–World War II march of progress. The rapid loss of natural landscapes, the destructive logging, mining, and agricultural practices, the spread of pollution and pesticides, and the awesome power and fallout of the atomic bomb: these were among the concerns that were awakening many Americans to a new order of environmental threat. Some even questioned whether future generations would inherit the same Earth. Among them were Olaus Murie, director of The Wilderness Society, and his wife, Mardy, who together led the long struggle.

Roger Kaye in Glacier National Park. Photo courtesy of the author.

Expeditions into Northern Wilderness

This was a team uniquely suited to the challenge. Olaus had grown up in northern Minnesota, hunting and trapping to help support his widowed mother and siblings. These experiences and his early immersion in turn-of-the-century nature literature led him to become a biologist. In 1920, the U.S. Biological Survey, now the U.S. Fish and Wildlife Service (USFWS), sent him to Alaska to conduct a detailed six-year study of the territory's caribou herds. In 1924, Olaus married a lively Fairbanks girl, Mardy Thomas, the first woman graduate of the University of Alaska. After a brief ceremony on the remote Yukon River, the couple took off on a 550-mile (887 km) boat and dogsled research honeymoon through the Brooks Range, recounted in Mardy's 1979 classic book, *Two in the Far North*.

During far-flung expeditions throughout Alaska and Canada, Olaus interpreted his keen observations from the combined perspectives of the emerging science of ecology and the transcendental tradition of Henry David Thoreau and John Muir. He came to what he described as "a realization of a kinship with all life on this planet" (O. J. Murie

Figure 1—Recreationist along the Canning River. Photo by Gary Wheeler, USFWS.

1961a, p. 15). Olaus's focus became "what I consider human ecology … the importance of nature by which we live—not only physically, but aesthetically and spiritually as well" (O. J. Murie 1961b, p. 61).

In 1956, the Muries led a five-member, summer-long expedition to the heart of the proposed wilderness, the mountain-lined Sheenjek River, the so-called Valley of Lakes (see figures 3 and 4). They arrived as "humble guests," Mardy said, accepting this landscape's intrinsic purpose, that "it is itself, for itself" (M. E. Murie 1979, p. 321). Such was "the spirit of the place" in which their scientific exploration of "the whole ecological ensemble" would be conducted and their impressions of it recorded (O. J. Murie 1958a, p. 10). Their writings established the free-roaming caribou as a symbol of the area's untrammeled natural processes. The wolf came to represent its freedom from human control and subjugation.

But their studies focused on the interrelatedness of all life-forms, not just the large charismatic mammals (see figure 5). Mice and sparrows received their full attention, as did the 23 species of spiders and 40 species of lichens they catalogued. Here was one of the nation's few remaining ecological systems fully intact and large enough for scientific study of how nature functions when left alone. Thus, Olaus argued that it should be kept wild "for our understanding of the natural processes of the universe … which throughout the ages have made this planet habitable" (O. J. Murie 1961b, p. 67).

Wilderness Experiences

Olaus and Mardy Murie believed the area ought to be left unaltered for the unique recreational opportunities it affords, although *recreation* is a wholly insufficient term for the experiences they wanted to be available here.

This should remain an adventuring ground, they believed, the antithesis of the domesticated and convenience-oriented tourism that national parks were promoting at the time. Visitors could come to experience the conditions that helped shape our national character (see figure 6). They could explore and discover, experience freedom and self-reliance, and confront challenge, even hardship. "For those who are willing to exert themselves for this experience, there is a great gift to be won," Mardy wrote, "a gift to be had nowadays in very few remaining parts of our plundered planet—the gift of personal satisfaction, the personal well-being purchased by striving" (M. E. Murie 1960, p. 60).

Within the area's silent vastness, absent the reminders of civilization, the Muries also experienced the gift of true solitude. They found peace, wholeness, and restoration, and through them, transcendent insight. This was one of those places, as Olaus

Figure 2—Schrader Lake, deep within the ANWR wilderness. Photo courtesy of the USFWS.

Figure 3—The Sheenjek River is a designated Wild River and one of approximately 40 pristine rivers within the ANWR. Photo courtesy of the USFWS.

Figure 4—Last Lake, in the ANWR. Photo courtesy of the USFWS.

Figure 5—An aggregation of 80,000 caribou on ANWR's coastal plain. Photo by Fran Mauer.

said, "to contemplate and try to understand our place in the world" (O. J. Murie 1959, p. 18).

Wilderness Philosophy

At the time, Olaus and his partner at The Wilderness Society, Howard Zahniser, were working to enact what would become the 1964 Wilderness Act. Beyond the practical benefits of providing for recreation and protecting wildlife, habitat, and scenery, they believed areas set apart as wilderness would serve another increasingly important need. As Zahniser summarized it, "We deeply need the humility to know ourselves as the dependent members of a great community of life." He explained that "to know the wilderness is to know a profound humility, to recognize one's littleness, to sense dependence and interdependence, indebtedness and responsibility" (Zahniser 1956, p.40).

Thus, when Olaus declared that "we human beings need to muster the wisdom to leave a few places of the earth strictly alone" (O. J. Murie 1958b, p. 31), he meant preserved for reasons beyond the uses and benefits that wilderness areas might provide us. They were also to be left there for themselves, as touchstones to that better part of ourselves that holds reverence for something beyond human utility.

Preservation of this place would be a gesture of humility, an encouraging demonstration of our willingness to accept restraint and limit our effect on the larger community of life. Its establishment would affirm our capacity to rise above the commodity orientation that has come to dominate our relationship with nature—an orientation obscuring our embedded role in the community of life and ultimately, underlying all our environmental threats.

"This attitude of consideration and respect," Mardy wrote, "is an integral part of an attitude toward life, toward the unspoiled, still evocative places on our planet" (M. E. Murie 1979, p. 289).

The Arctic wilderness of ANWR exemplified the natural qualities the Muries, Zahniser, and others sought to protect in the 1964 Wilderness Act. As well, its purpose embodied their larger hope for the wilderness concept—that it might stimulate Americans to think beyond conservation of resources to the protection of whole ecosystems, and beyond that, to rethink their relationship to the larger biosphere we jointly inhabit. It's the reason that, over and over, through their writings and testimonies, the ANWR founders placed their advocacy for this wilderness in the larger context of the globe, the planet, the world, and the Earth.

As Olaus and Mardy Murie (see figure 7) intended, the struggle over the future of this distant place did become emblematic of the larger contest between competing views of the appropriate relationship between postwar American society and its rapidly changing environment. But the question their generation resolved has reemerged to confront ours: Which notion of progress should this again-contested landscape represent? Should it be the idea of progress underlying the prevailing rush toward attaining an ever-higher material standard of living? Or should it represent the emerging biospheric perspective emphasizing sustainability and calling for restraint? Controversy over this area's future began as—and is again—emblematic of "the real problem," as Olaus Murie characterized it, "of what the human species is to do with this earth" (O. J. Murie 1960).

Today, we again face a new order of environmental threat. Increasingly, scientists warn of a non-analog future, a "perfect storm" convergence of global energy and resource scarcity, climate change, and widespread environmental alterations. "The real problem" Olaus spoke to is upon us. And again, ANWR serves as a point of reference for rethinking our national conservation policy. It has come to symbolize the question of where we will draw the line on our profligate energy use and unsustainable behavior toward nature. Its inviolate boundary lines continue to serve as heartening affirmations of the boundaries American society is willing to place on its consuming quest for more consumption and an ever-higher standard of living. ANWR remains the finest example of the wilderness that serves, in Wallace Stegner's phrase, as "our geography of hope" (Stegner 1980, p. 17).

And that's the reason millions who will never visit ANWR find satisfaction, inspiration, even hope in *just knowing* it's there.

As we celebrate the 50th anniversary of ANWR, let's remember that ANWR represents the sense of obligation a past generation felt toward the future. Let's remember that we inherited not only this remarkable place, but that same obligation to think beyond ourselves—to think of those people and creatures, of the present and future, here and everywhere—with whom we share this conflicted globe.

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Figure 6—A hunter overlooks the Canning River Valley. Photo by Roger Kaye.

Figure 7—Olaus and Mardy Murie at Last Lake, Sheenjek River Valley during their 1956 summer-long exploration of the proposed refuge. Photo by George Schaller.

Figure 8—Floaters on the Sheenjek River. Photo by Andrew Weik.

The InterTribal Sinkyone Wilderness

Ten Tribes Reclaiming, Stewarding, and Restoring Ancestral Lands

BY HAWK ROSALES

The 4,000-acre (1,619 ha) InterTribal Sinkyone Wilderness is located along the "Lost Coast" of northern California, an area that holds great cultural and spiritual significance for the indigenous Tribal Peoples of this region. Located 200 miles (323 km) north of San Francisco, this portion of the Sinkyone land is the longest stretch of permanently protected coastal wilderness in the lower 48 states of the United States. It is the westernmost part of the vast Sinkyone Indian Aboriginal Territory that includes the Wild and Scenic Eel River, the stunning and mountainous Lost Coast, and the vestiges of a 3,000-year-old temperate rain forest.

Hawk Rosales.

History of Designation

For thousands of years, the indigenous people of this land employed a complex and sophisticated system of cultural stewardship that significantly influenced the biological diversity and abundance of the Sinkyone temperate rainforest. The land management methods employed by the Sinkyone and other neighboring Tribes of California's North Coast included rotational burning of understory plants to ensure the health and productivity of important species; selective thinning and harvesting of seaweeds, basket-making materials, medicines, and a host of other plants; breaching of berms at river mouths to enable salmon migration (see figure 1); the transplanting of desirable plant species; and countless other practices that were conducted hand-in-hand with prayers and ceremonies for eons throughout this land. The success of their cultural management was informed by close observations of the seasons and other natural phenomena; the understanding that one must never take more than one needed; a unique set of original instructions that had been given spiritually to the people; and a vast body of unsurpassed wisdom and knowledge gained by thousands of years of living daily with respect upon Mother Earth.

Figure 1—InterTribal Sinkyone Wilderness, Wolf Creek salmonid jump pools. Photo by Joe Scriven; © InterTribal Sinkyone Wilderness Council.

The Sinkyone people established and inhabited permanent villages and seasonal encampments throughout their territory. Although autonomous, the many Sinkyone groups inhabiting these villages and encampments shared distinctive cultural and social characteristics that distinguished them from neighboring Indian peoples. These shared characteristics included an Athabaskan language unique to the Sinkyone, a common system of spiritual beliefs and practices, distinctive styles for their art forms and architecture, and commonly understood territorial boundaries within which members of the Sinkyone bands socialized, gathered and hunted food sources, and conducted trade. They utilized the prairies and meadows, the river valleys, the redwood forests, and the coastal areas throughout the year to gather traditional foods (see figure 2). This varied land was the place in which they lived and practiced their traditional ways for untold generations.

In the mid-1850s, however, the Sinkyone people were suddenly and violently confronted with invading multitudes of Euro-American settlers who considered themselves entitled to indigenous peoples' lands and resources. Within 15 years, most of the Sinkyone people were annihilated through a combination of massacres, slavery, forced relocations, starvation, land theft, introduced diseases, rape, impoverishment, and other atrocities. The state and federal governments paid white citizens for the scalps of Sinkyone men, women, and children, and many Indian toddlers and young people were sold as slaves to wealthy families throughout California. The U.S. Army removed Sinkyone survivors to concentration camps, called reservations, which were established throughout the region. In the ensuing years, Sinkyone people married other peoples of local Tribal affiliations and eventually became enrolled members at several Tribes located throughout the region.

Figure 2—Looking south from Needle Rock to Bear Harbor. Photo by © Hawk Rosales.

In the face of this profound suffering and loss, the descendants of the original Sinkyone people retained their ancient connections to Sinkyone and, throughout the generations, have continued to travel seasonally to their ancestral lands to harvest traditional food and medicine plants and to offer their prayers.

Redwood Ecosystem

With the genocide of the Sinkyone people came the ecocide of the ancient forests of Kahs-tcho (redwood tree), considered by local Tribes as especially sacred. The people used various parts of the redwood in the manufacture of their houses, clothing, baskets, fish traps, canoes, and a host of other items. Carved parts of the canoe corresponded to various parts of the human body, such as the heart and lungs. The Sinkyone people considered their canoes to be alive, and they often spoke to them. A traditional religious leader of the Chilula people, whose territory is located to the northeast of the Sinkyone, expressed the spiritual beliefs of Native peoples of the redwood region when she explained the importance of this great tree:

> The redwood trees are sacred. They are a special gift and reminder from the Great Creator to the human beings. The Great Creator made everything, including trees of all kinds, but he wanted to leave a special gift for his children. So he took a little medicine from each tree, he said a prayer and sang a powerful song, and then he mixed it all with the blood of our people. Then he created this special redwood tree from this medicine. He left it on Earth as a demonstration of his love for his children. The redwood trees have a lot of power: they are the tallest, live the longest, and are the most beautiful trees in the world. Destroy these trees and you destroy the Creator's love. And if you destroy that which the Creator loves so much, you will eventually destroy mankind. (National Park Service 1994, unpaginated)

Commercial harvest of the old growth redwoods of the region began as early as the 1850s, but large portions of

Four separate conservation easements protect the land's cultural and ecological values in perpetuity.

the ancient forest remained intact until the late 1940s when an "improved" style of bulldozer dramatically changed logging methods and the rate of extraction. With the advent of this new equipment, steep slopes that had been previously inaccessible were now open to unrestrained clear-cut harvesting. The ensuing pillage destroyed most of the original redwood ecosystem and set in motion a severe decline in the health and productivity of native salmonid fisheries.

Beginning in the mid-1800s, a long succession of commercial timber interests held title to a vast acreage of redwood forestland within the Sinkyone territory and neighboring aboriginal Tribal lands. These interests grew wealthy from their exploitation of the sacred redwood trees, while the Tribal communities who had occupied these lands for millennia suffered economic impoverishment as well as oppression from societal racism and unjust governmental policies. In order to survive, many Tribal members were forced to work for the timber companies, felling the ancient and sacred redwood trees that had sheltered and provided for their prosperity for countless generations. During the 100-year heyday of North Coast timber operations, many in white society viewed the juxtaposition of timber industry profits and Native impoverishment through the lens of the Manifest Destiny doctrine that supported this dreadful disparity. Today, we refer to it as genocide and environmental racism.

Because redwoods regenerate both by seed and stump sprout, and grow rapidly, many areas of the North Coast redwood rain forest have been subjected to clear-cutting three or more times. Less than 4% of the region's original old growth redwoods are still standing. Fortunately, organizations such as California State Parks, Redwood National Park, Save the Redwoods League, and others have helped preserve scattered residual stands of ancient redwoods, thus ensuring at least some legacy for future generations of humans.

Figure 3—Looking north from the Sinkyone Wilderness State Park into the King Range National Conservation Area. Photo by © Hawk Rosales.

Environmental Movement

During the 1960s and 1970s another kind of settler began arriving in the North Coast. People who had become disillusioned by the consumerism, aggression, and hypocrisy of American society sought refuge and peace in remote locations within the forests of the North Coast. They soon were confronted by horrific clear-cut logging operations within their viewsheds and watersheds as the timber companies expanded into previously unentered areas of old growth. The new settlers quickly organized by inspecting and documenting damage, researching environmental laws, and protesting at locations where old trees were being cut or were scheduled for cutting. They chained themselves to redwoods, blockaded logging sites, were arrested, and reached out to other potential North Coast allies. Efforts were made to contact local Tribal representatives and an important dialogue began between the leaders of the indigenous community and the environmental movement.

Soon, Tribal members were joining nonnative activists and protesters at various sites on Sinkyone land threatened by logging. A lawsuit was brought by the Environmental Protection Information Center, the International Indian Treaty Council, and other plaintiffs against landowner Georgia-Pacific Corporation (G-P), California Department of Forestry, and the State Board of Forestry. The lawsuit alleged serious violations of the California Environmental Quality Act (CEQA). A key element of the lawsuit was the timber company's blatant

violation of state requirements to protect documented cultural resources, which the company was caught in the act of destroying. The case also highlighted the fact that state forest regulatory and policy-making agencies were turning a blind eye to the timber company' violations. The case, known as *Environmental Protection Information Center, Inc. (EPIC) v. Johnson*, was won by the plaintiffs in July 1985 when the State Appellate Court ruled that G-P and the state had violated four important elements of CEQA in that they had failed to: (a) adequately consult with Native Americans; (b) protect Native American cultural resources; (c) provide adequate public notice regarding the timber harvest plan; and (d) consider cumulative impacts. As a result of this ruling, the State Board of Forestry revamped timber harvest rules for the entire state of California.

InterTribal Sinkyone Wilderness Council

The lawsuit opened the door for the eventual return of nearly 4,000 acres (1,619 ha) of aboriginal Sinkyone land to local tribal control and stewardship. In 1986, a Native peoples' cultural land conservation organization, known as the InterTribal Sinkyone Wilderness Council (ISWC), was formed in response to G-P's planned divestiture of 7,100 acres (2,875 ha) of its coastal Sinkyone holdings. The council was founded by and for the benefit of local Tribes retaining cultural and ancestral ties to the Sinkyone region. It was established with the specific purpose of acquiring and permanently protecting 4,000 acres (1,619 ha) of G-P land from further commercial harvesting, and reestablishing and revitalizing traditional cultural uses for local tribal members.

The ISWC is unique in that it is a cultural land trust established by, and for the benefit of, so many Tribes. Seven

Figure 4—Bear Harbor and the mouth of Wolf Creek. Photo by © Hawk Rosales.

Tribes originally formed the ISWC. Over the ensuing years, the number of member Tribes has grown from seven to ten, all of which are sovereign nations recognized by the U.S. federal government. Member Tribes have joined the ISWC through certified tribal resolutions that identify the delegate (and alternate) who represent their Tribe on the ISWC board of directors. Continued consensus on common cultural goals, and the dynamic of contributing to and benefiting from this intertribal effort, are important factors that have enabled the Tribes to achieve their original purpose in founding the ISWC.

InterTribal Sinkyone Wilderness

Two weeks after the ISWC received its nonprofit status, Trust for Public Land (TPL) acquired the 4,000 acres (1,619 ha) with the intent of eventually transferring it to a local conservation-oriented organization. After receiving a loan for the purchase from the California State Coastal Conservancy, TPL placed the conservancy under contract to develop a disposition plan for the property.

During the 10 years following TPL's acquisition of the land, the ISWC worked hard to raise funds for purchase of the 4,000 acres (1,619 ha), and the support necessary to convince the state and TPL that the land should be transferred back to Indian hands. As part of this effort the ISWC developed educational tools and initiatives; built a multifaceted fundraising program; designed and implemented fisheries restoration projects, forestry inventories, and cultural-educational programs on the 4,000 acres (1,619 ha) and the adjacent Sinkyone State Park; collaborated with universities; developed an intertribal restoration workforce; created a documentary film (J. Rosales 1994) that screened at the Sundance Film Festival and 10 other film festivals; and garnered an international support that ultimately enabled the ISWC to acquire the land.

The ISWC purchased the 4,000 acres (1,619 ha) in August 1997, thereby legally returning local Indian peoples' presence to the land and protecting it in perpetuity from future threats of development, industrial extraction, and fragmentation. The ISWC holds title to the InterTribal Sinkyone land and is solely responsible for its management. The ISWC's primary focus is to protect

Figure 5—Dancer, Sinkyone Cultural Gathering event, August 2008. Photo by © Hawk Rosales.

and revitalize this critical part of Sinkyone through the reintroduction of tribal members' cultural-ecological stewardship and traditional land uses. Four separate conservation easements protect the land's cultural and ecological values in perpetuity. The ISWC is believed to be the first tribal entity in the United States to have entered into a conservation easement with private land trusts.

The ISWC's tenacity demonstrates that adhering to tribal mandates and the determination to reclaim ancestral lands can eventually pay off. Ten years' worth of on-the-ground experience gained from wilderness land management and restoration, as well as important cultural, educational, and recreational project work, was all gained prior to the ISWC's purchase of the Sinkyone property. This proactive approach helped strategically position the ISWC to acquire and conserve this important area of ancestral land.

Since its acquisition of the 4,000 acres (1,619 ha), the ISWC has continued its focus on salmonid fisheries restoration, watershed rehabilitation, planning for backcountry hiking trails and campsites, protection of cultural resources, cultural-educational outreach, and involving tribal members in the healing and stewardship of the land. It has forged important alliances with environmental and conservation organizations and has been recognized for its unique partnership with the North Coast Redwoods District of California State Parks (see figure 3), a collaboration that enables the ISWC to conduct restoration projects, stewardship work, and cultural activities on the 7,250-acre (2,935 ha) Sinkyone Wilderness State Park (California State Parks 2009), with which the ISWC shares a common 12-mile (19.4 km) boundary.

The ISWC's land includes the upper reaches of seven coastal watersheds, the lower half of which are all located on the adjacent Sinkyone Wilderness State Park (see figure 4). An important collaborative effort between the ISWC and California State Parks has been the rehabilitation of large portions of several of these watersheds. This recently completed multiyear project entailed the removal of abandoned logging roads, landings, and stream crossings in order to stabilize slopes that had been severely altered by past logging activities. Tribal members worked as cultural monitors and heavy equipment operators during the project, which utilized bulldozers and excavators to reform roaded hillsides and reconstruct the original gradients of stream channels. This project has dramatically reduced sediment in streams, and improved stream water quality and habitat of native fish species.

Reestablishing Traditional Relationships

Although the people and the land have suffered tremendous losses from genocide and ecocide, both the Tribes and the ecosystem are resilient and can recover. Both have been here for countless generations and are able to adapt and to heal. The Indian people believe that the Earth recalls how the ancestors once walked and lived here in a sacred manner. Memories of the people's traditional songs, prayers, dances, and ceremonies are forever embedded in the Earth (see figure 5). As these ways are brought back to Sinkyone, the healing of the land and the people is being realized.

Hard work and determination are key ingredients to developing and nurturing a successful intertribal land trust. In sharing the story of our experience in reestablishing Tribal control over ancestral Sinkyone land, our ISWC hopes to encourage other indigenous communities around the world to undertake similar efforts so that they also can regain the stewardship and management of culturally important areas of their ancestral homelands.

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Wilderness Food Storage

Are Bear-resistant Food Storage Canisters Effective?

BY STEVEN R. MARTIN and KATE McCURDY

Abstract: By way of three visitor surveys, we evaluated the effectiveness of visitor use of food storage canisters in deterring bear-human interactions in Yosemite National Park. We found that although 87% of respondents reported using a canister on their trip, only 62% reported full compliance by fitting all their food, trash, and toiletries into their canisters on every night of the trip. The main issues are overflow and inadvertently leaving items sitting out or in packs or tents, which led to incidents in which bears obtained food. The overflow issue is largely due to backpackers not realizing how much space their food will take up, or conversely underestimating the actual capacity of a food storage canister. Although the rate of carrying canisters is high, the actual rate of full compliance with food storage regulations is much lower. Bear-human conflicts are likely to continue as long as ineffective canister use and practices such as hanging, hiding or guarding food continue, even at low levels, especially in highly visited backcountry sites.

Introduction

Conflict between backpackers and black bears in the Sierra Nevada Mountains of central California is a serious threat to visitors and a serious problem for managers seeking to protect naturally functioning wilderness ecosystems (Graber 1981). Given the region's widespread popularity as a seasonal recreation site for wilderness enthusiasts, bear-human risks must be mitigated. Past studies in popular wilderness areas indicate that as visitor densities increase, reported bear incidents increase linearly (Merrill 1978; Singer and Bratton 1980; Keay and van Wagtendonk 1983). Approximately 100 wilderness bear incidents are reported in Yosemite annually, although the number of incidents that actually occur is thought to be much higher (Graber 1981; McCurdy 2006).

Significant negative impacts to wildlife can occur as a result of human-wildlife interactions, particularly those involving the availability of human-provided food, including alteration of wildlife behavior, nutrition, habitat use, dependency, and foraging ability (Hammitt and Cole 1998; Orams 2002; Marion et al. 2008). In evaluating methods to keep bears from obtaining human food in the Yosemite wilderness, options such as installing poles or cables to facilitate food hanging, or installing metal food lockers, were ultimately rejected because they were determined to be ineffective, an inappropriate installation in wilderness, high maintenance, a source of visitor conflict, and because they concentrated use and impacts in undesirable ways or places, sometimes leading to more habituated bears (Fincher 2009).

Steven R. Martin

Kate McCurdy

While studying the interactions of bears and humans in the Yosemite wilderness, Graber (1985) and Dalle-Molle et al. (1985) offered an innovative strategy to alleviate bear-human conflict: a bear-resistant food canister that could be carried by backpackers. Although a novel idea in the 1980s, canisters have gradually supplanted the use of metal lockers,

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Figure 1—Improper food storage may habituate bears to humans and lead them to aggressively seek human food. Photo courtesy of Steven Martin and Kate McCurdy.

food hanging poles, and tree cables to become the preferred method of food storage for Sierra land managers (Koy and Anaya 2002). However, even with widespread and voluntary use of canisters, a sufficiently low level of food availability to discourage food-conditioning behavior in bears has not been realized, and incidents continue (National Park Service 2004). Van Wagtendonk (2003a) suggested that the establishment of a canister requirement in Yosemite National Park was needed to increase compliance to a level that adequately reduces the prevalence and severity of bear-human encounters.

Figure 2—Obtaining human food can negatively impact bear behavior, nutrition, habitat use, dependency, and foraging ability. Photo by Kate McCurdy.

In other regions of North America where black and grizzly bears exist, managers have enacted bear-resistant canister regulations to minimize backcountry human-bear conflict. Public lands where bear canisters are required include portions of the Inyo National Forest and Sequoia-Kings National Parks in southeastern California; Denali, Glacier Bay, and Gates of the Arctic National Parks in Alaska; Olympic National Park in Washington; the Lost Coast Wilderness in northern California; and some wilderness areas in the Adirondack State Park in New York. Other parks and forests in the western United States where bears are present encourage the use of canisters but do not require them. (See Mazur 2008 for additional discussion of the history and background of food storage canisters.)

Starting in April 2004, canister use was made mandatory in all Yosemite National Park wilderness areas within seven miles (11 km) of park roadways and anywhere above 9,500 feet (2,900 m) in elevation (based on the average tree line elevation in the Sierra Nevada Mountains). This regulatory action also removed the technique of counter-balancing food from tree limbs as a legal means of food storage where canisters are required. During the summer of 2005, we evaluated the effectiveness of this new regulation by asking backpackers how prepared they were to properly store food on their wilderness trips, and what food storage outcomes they experienced during their trip.

Methods

Yosemite National Park encompasses 747,956 acres (302,687 ha) on the western slope of the Sierra Nevada Mountains in central California. Elevations vary from 2,000 feet (600 m) on the western boundary to 13,000 feet (4,000 m) along the Sierra crest. The climate is Mediterranean with hot, dry summers and cool, moist winters. Plant distribution in Yosemite is strongly influenced by elevation and topography, with five major vegetation types largely dictating the seasonal distribution of black bears in the park (Graber 1985).

More than 94% of Yosemite National Park was officially designated as wilderness in 1984. There are 55 trailheads, with 695 miles (1,118 km) of trail providing access to 375 camping destinations in the Yosemite Wilderness (van Wagtendonk 2003b). The Yosemite Wilderness is bordered by the Emigrant Wilderness to the north, the Hoover Wilderness to the east, and the Ansel Adams Wilderness to the south. Two of the west's most popular hiking trails, the John Muir Trail and the Pacific Crest Trail, traverse the Yosemite Wilderness. Nearly 38,000 people spent more than 114,000 visitor-nights in the Yosemite Wilderness in 2008 (Watson 2009).

Three visitor surveys were administered within Yosemite National Park from May to October 2005. A first survey (19 questions) was given to visitors at randomly selected trailheads as they prepared to enter the wilderness. This survey focused on planned food storage methods and visitor preparedness relative to food storage. Of 501 groups contacted, 485 surveys were completed for a 97% response rate. A second longer survey was administered at randomly selected wilderness trailheads as groups exited the wilderness. This survey focused on actual food storage behaviors and outcomes, beliefs and attitudes toward bears and food storage, and group/trip characteristics. See Martin and McCurdy (2009) for survey questions and more comprehensive results. Of 924 contacted individuals, 360 questionnaires were completed by backpackers at trailheads, and 208 surveys were completed over the Internet at a later date. The overall response rate for the survey was 61%, with the response rate being similar when taken in person (62%) or with the Internet option (60%).

The third survey was administered at trailheads only to groups who reported having had a bear incident (defined as an attempt to open a food storage container, or an interaction that resulted in property damage, loss of food, trash or scented item, or personal injury). Of the 26 groups we contacted who reported such an incident, 23 (88%) completed a bear incident survey.

Results

The median age of the sample population was 36 years, with a range of 18 to 79 (minors were excluded from the survey). Respondents were primarily (63%) California residents, 28% were from other states, and 9% were foreign visitors. Fifty-nine percent had been on at least one previous wilderness trip in Yosemite National Park, and 49% planned their trip at least six months in advance. Of those with previous Yosemite wilderness experience, 57% reported having used canisters "always" or "most of the time," and 18% said bears had damaged property and/or obtained food from them. (Statistics drawn from the largest of our three surveys, the post-trip survey, n = 568.)

Pre-trip Survey

Of the 485 pre-trip survey respondents, 60% reported that they had been aware of the canister regulation changes for a year or more; 25% found out about the canister regulation when making their reservation more than one week, but less than one year in advance of their trip; 11% found out about the canister regulation when picking up their permit in the park (typically the day of or the day before the trip); and 4% reported being unaware of a canister requirement when contacted at the trailhead. Previous Yosemite trips (30%) and the Internet (30%) were the two most common sources of learning about the canister requirement, and 19% obtained their information from rangers or other park employees after arriving at Yosemite National Park. Only 5% of respondents reported that the canister requirement caused them to alter the schedule or route on their

Figure 3—When properly used, food storage canisters are an effective method of securing food from bears. Photo by Steven Martin.

Figure 4—Yosemite National Park maintains a large inventory of rental food storage canisters to facilitate proper food storage. Photo by Kate McCurdy.

trip (e.g., to choose a destination with a food storage locker to avoid carrying a canister).

Eighty-eight percent of respondents reported that their group was carrying one or more canisters on their trip (not all wilderness locations required a canister in 2005). Of the canister users, 72% reported that they would be able to achieve full compliance by fitting all their food, trash, and toiletries into their canisters on the first night of their trip; another 19% were unsure, and the remaining 8% knew that they would have excess (1% hadn't thought about it yet and couldn't answer). Of the 12% of groups not carrying a canister, nearly all planned to either use a food storage locker (63%) at one of the six wilderness locations where lockers are installed, or hang their food (30%), which, in 2005, was legal in remote portions of the wilderness. The remaining 7% admitted they would improperly store their food.

Canisters are extremely effective when used properly and conscientiously, but there is still room for human error.

The most common type of canister (69%) being used in Yosemite in 2005 was the Backpacker's Cache, commonly known as the Garcia (after the name of the manufacturer). Forty-seven percent of the canisters used in Yosemite in 2005 were rented from the park, which rents only Garcia Backpacker Cache canisters; 42% were personally owned; and the remaining 11% were borrowed or rented outside of Yosemite National Park.

The final five questions of the survey pertained to the food backpackers packed into their canisters. Sixteen percent of respondents bought their food within a day of their trip; an additional 55% bought their food within a week of their trip; and 28% bought their food more than a week prior to their trip. Fifteen percent did not pack their food into their canister(s) until the day of the trip, and 55% packed their canister(s) the day before the trip; the remainder packed their canister(s) two or more days prior to their trip. One group in three reported purchasing all of their food with canister capacity in mind, and an additional 21% purchased most of their food (80% to 90%) with canister capacity in mind. Forty percent reported repackaging most or all (between 70% and 100%) of their food to reduce bulk, and 79% said that all of their dinners consisted of dried or dehydrated food. Logistic regression was used to determine that backpackers who took measures to maximize the space in their canisters were more likely to fit all their food, trash, and toiletries in their canisters on every night of their trip (R^2 = 0.133, $F_{(2,424)}$ = 3.8, p < .05). Significant correlations were found between the number of canisters carried and both group size (r = .78) and trip length (r = .11), but not between the number of canisters carried and any of our three measures of canister packing effort (percentage of dried or dehydrated dinners, percentage of food purchased with canister capacity in mind, and percentage of items that were repackaged to reduce bulk). The number of person-nights per canister was calculated by multiplying group size by length of trip (number of nights) and dividing by the number of canisters being carried by the group. The median number of person-nights per canister was 4.0.

Post-trip Survey

Of the 568 respondents who completed the post-trip survey, 87% reported using a canister on their trip. Of canister users, 85% reported packing their canister(s) before leaving the trailhead to see if everything would fit, yet only 62% reported being able to achieve full compliance by fitting all their food, trash, and toiletries into their canisters on every night of the trip. Of those who could not fit everything into a canister on every night of the trip, 45% said they were able to fit all their food, toiletries, and trash by the second night of their trip, 35% by the third night, and 11% by the fourth night; 7% reported never being able to fit all their food-related items into a canister. We found a significant positive correlation (Spearman's rho = .153, sig.< 0.01) between number of person-nights per canister and the extent to which all food, trash, and scented items fit into the canister.

When queried about what was done with items that didn't fit in their canisters, respondents supplied a range of answers, only 19% of which (at most) represented legal alternatives to storing their food—12% reported using a food storage locker, 6% counterbalanced their food from a tree limb (a legal practice in 2005, but only if camped more than 7 miles [11.3 km] from a road), and 1% borrowed canister space from a neighbor. The remaining 81% of noncompliant canister users hung (but did not counterbalance) food, trash, or toiletries in a tree (27%), left food, trash, and/or toiletries sitting out (27%), buried, hid, suspended over a cliff, sunk underwater, or covered in rocks (15%), kept in tent (7%), or kept in pack (5%).

The 77 respondents who opted to not carry a canister cited four general reasons: 43% said they limited their

trip to destinations where food storage lockers exist so they could avoid using canisters; 38% gave reasons of inconvenience, weight, bulk, expense, and size; 17% thought they could get by without one or didn't expect to encounter bears; and one respondent admitted pure negligence prevented him/her from taking a canister.

Despite backpackers' relatively high rate of compliance with the park's new wilderness food storage regulations, 28% of those surveyed reported that a bear visited their camp during their trip. Of those 156 encounters, 26% reported the bear attempted to open or break a food storage container (none successfully), 8% reported that the bear damaged property such as a tent, backpack, or stuff sack, and 3% reported that the bear bluff charged or exhibited other threatening behavior. Most germane, 9% (14 separate incidents) reported that the bear successfully obtained food, trash, or other scented items that were not properly stored. In 12 of those 14 incidents the group had a food storage canister with them on the trip, but in 9 of those 12 incidents the respondent admitted that they had overflow items that did not fit into the canister. In two incidents, food or trash was inadvertently left out, and in the final incident, food was left out unattended during meal preparation as the campers were a short distance away. In the two incidents where a canister was not being used, food and/or trash was being stored in the tent in one case, and was inadvertently left out of a food storage locker in the other.

Follow-up questions from the third survey reveal more detail about incidents in which bears obtained food or trash. In more than half of the incidents, the food/trash was fewer than 50 feet (15 m) from the campers, and in half of the incidents the bear came within 5 feet (1.5 m) of a person at some point during the encounter. Overflow items were "stored" by sitting out in camp within 50 feet (15 m) of tents (n = 4); counterbalanced from a tree branch (2), hung, but not counterbalanced, in a tree (n = 2); and left in a backpack (n = 1). Reasons included food and/or trash being accidentally (unknowingly) left in a pack or tent, purposely left out because there was no room in the canister, accidentally (unknowingly) left outside the canister, left outside the canister because it wasn't known that the item should have been in the canister, and being surprised at mealtime when food was out but campers were not close enough to deter bear. When asked if there were actions they could have taken to prevent the bear(s) from obtaining food or trash, respondents said they could have better guarded their food or unsecured canister, used a more effective food storage method, repackaged their food or chosen foods that packed smaller so that everything would fit into the canister, taken more canisters, and made sure the canister lid was properly secured.

Significant negative impacts to wildlife can occur as a result of human-wildlife interactions, particularly those involving the availability of human-provided food.

Discussion

Despite a relatively high rate of canister use, backpackers' actual use of canisters was somewhat ineffective. We found that only 62% of canister users were able to store all their food, trash, and other scented items (toiletries, bait) in canisters on every night of their trip (despite 85% of the pre-trip sample saying they packed their canister(s) ahead of time, and 72% of the pre-trip sample saying everything would fit). This forced canister users to continue ineffective practices of hanging, hiding, or guarding their food on one or more nights of their trips, leading to bears continuing to get food rewards even when canisters are used. Martin and Harris (2004) reported similar results for the Lost Coast Wilderness—of the 14 groups who reported that a bear visited their campsite, 13 had food storage canisters, yet three still lost food to a bear due to overflow or food being inadvertently left out.

Additionally, in half of our reported incidents in which bears obtained food or trash, the bear came within *5 feet* (1.5 meters) of respondents in their campsites. This suggests bears may be adapting their behavior in response to the prevalence of canisters in the wilderness. Canister use clearly does not guarantee that bears will avoid campsites where campers are using canisters to store all or some of their food.

Our survey revealed a wide range of variability in backpacker preparedness levels in Yosemite National Park. Clearly Yosemite backpackers are making an effort to comply with the new canister use regulation. Most (88%) wilderness users are carrying canisters, even to places where their use was, in 2005, optional (e.g., backcountry camps where lockers exist and remote wilderness areas where food hanging was still permitted at the time); this is consistent with both Mazur (2008) and Martin and Harris (2004). A large percentage of back-

Table 1—Summary results of visitor surveys of food storage canister use in Yosemite National Park Wilderness

Survey question or item	Frequency (%)	Survey source[1]
Groups carrying one or more canisters	88	Pre-trip
Groups that said they packed canister before leaving trailhead	85	Post-trip
Groups predicting that they would be able to achieve full compliance on first night of trip	72	Pre-trip
Groups self-reporting that they did in fact achieve full compliance on first night of trip	62	Post-trip
Groups that knew in advance they would not be able to achieve full compliance	8	Pre-trip
Groups self-reporting that they never achieved compliance on any night of their trip	7	Post-trip
Groups renting canisters from Yosemite National Park	47	Pre-trip
Groups using personally owned canisters	42	Pre-trip
Groups that did not purchase food for trip until day before departure	16	Pre-trip
Groups that did not pack food into canisters until day of departure	15	Pre-trip
Groups that found out canisters were required when picking up permit in park	11	Pre-trip
Groups that were unaware of canister requirement when departing trailhead	4	Pre-trip
Groups reporting that a bear visited their campsite	28	Post-trip
Percentage of groups visited by a bear who reported the bear tried to open or break a food storage canister	26	Post-trip
Percentage of groups visited by a bear who reported having lost food and/or trash to a bear (n=14 groups)	9	Post-trip
Number of groups out of the above 14 groups who had a food storage canister with them and still lost food to a bear	n=12	Post-trip
Number of groups out of the above 12 groups who admitted to having overflow items	n=9	Post-trip
Median number of person-nights per canister	4.0	Pre-trip

[1]Pre-trip survey sample size = 485; survey administered at trailhead prior to departure; and Post-trip survey sample size = 568; survey administered at trailhead or via Internet.

packers are buying dried or dehydrated food to reduce bulk, and are repackaging their food to reduce the space it takes in a canister. However, we found that many groups still brought more food than could fit in their canisters and consequently intended to use ineffective (and often illegal) methods to store their excess. Bear conflict is likely to continue as long as ineffective food storage practices of hanging, hiding, or guarding food continue, even at low levels, especially in highly visited backcountry sites.

The main issues are overflow and inadvertently leaving items sitting out or in packs or tents. Mazur (2008) also found excess food and trash to be a significant problem for canister users in Sequoia and Kings Canyon National Parks, as did Martin and Harris (2004) in the Lost Coast Wilderness. The overflow issue is largely due to backpackers not realizing how much space their food will take up, or conversely underestimating the actual capacity of a food storage canister. Our data are consistent with this: backpackers who said they had "always" used canisters on previous Yosemite trips were more likely than expected to report that all their food and trash fit every night, whereas those who said they "rarely" or "never" used canisters on previous trips were more likely than expected to report overflow issues. Likewise, groups with a larger ratio of people and/or nights per canister were more likely to report overflow issues than groups with more canister capacity per person-night.

Most backpackers still rent canisters and, therefore, usually don't obtain their canister until the day of the trip (or at earliest the afternoon before their trip). Many also reported not completing purchases of food for their trip until the day before the trip. These two factors—not having all of the food and not having the canister until the day of or day before the trip—make it difficult for backpackers to realize, until it's too late, that they will not be able to fit everything in the canister. They often don't come to this realization until they are at the trailhead getting ready to start hiking. At that point they are simply not interested in driving back to a ranger station to rent another canister, they may not have room in their packs for an additional canister, and even if they do, the weight and space of an additional canister makes this an unappealing option.

In light of our findings, those who require their users to carry canisters may want to consider taking steps to increase backpackers' canister packing efficiency. Visitors who have never used a canister before would benefit from specific facts and details about canister packing and their holding capacity. We encourage agencies to continue, as most already do, to disseminate food storage and canister information to potential wilderness users long before they arrive, but also to strongly suggest to visitors a rule-of-thumb of a certain number of person-nights per canister; our data and personal experience suggests four person-nights per canister. The value of purchasing compact foods and repackaging cannot be overemphasized; removing bulky product packaging can

free up a large amount of space in a canister. Offering inexpensive zip-lock bags to backpackers may provide the necessary encouragement to repackage. Backpackers should similarly be strongly encouraged to choose dehydrated and/or freeze-dried food, as these items are more efficient to pack. Making rental canisters available to overnight wilderness users more than one day in advance of their departure may help some visitors. An increased emphasis on enforcement of canister requirements may be warranted. Although some might consider it an extreme measure, compliance with canister regulations might be best achieved if rangers withheld wilderness permits until backpackers can display packed canisters. This wouldn't guarantee that campers didn't also have additional food items, but it would make it clear to campers ahead of time whether or not all of their food and toiletries fit into their canister(s) before they left the ranger station, where they could obtain an additional canister if needed.

Other possible actions include agencies holding canister packing clinics at popular trailheads or ranger stations or otherwise assisting people with canister packing, making smaller rental canisters available for users who need additional space, and mailing (to backpackers who have requested a permit) a list of canister packing tips along with a bear-related DVD—*Are You Prepared for a Visit by a Bear*? (or at least a URL to the video at the park or forest website), and a canister-sized plastic bag so that backpackers who don't own a canister will know the true capacity of a canister before they arrive at the area. (An alternative might be to provide a size reference to cutting a plastic kitchen trash bag down to canister size.)

It is clear that there are, in effect, two types or levels of compliance, and the distinction is important. The first is the rate at which wilderness users carry canisters. This type of compliance is easier to assess, but it is equally if not more important to assess compliance as the percentage of users who properly store *all* of their food, trash, and other scented items in the canister(s) *every* night of their trip. This second type of compliance tends to be much lower. However, we do not believe there is sufficient reason for managers to reconsider requiring or encouraging canister use. The problems with effective canister use are not insignificant, but neither are they insurmountable. In many places canisters are still the best solution, and in wilderness may represent the minimum tool.

In all three geographic areas where surveys have been conducted (this study; Mazur 2008; Martin and Harris 2004), it was clear that there is much visitor support for using, and even requiring, canisters. The vast majority of our respondents said they care deeply about protecting bears, and want to do the right thing. But the answer to the question in the title of this article—Are bear-resistant food storage canisters effective?—is at best a qualified yes. Canisters are extremely effective when used properly and conscientiously, but there is still room for human error, and that is the root cause of most, if not all, of the problems. Other investigators (Hastings and Gilbert 1987; Seher 2007; Mazur 2008) have reached the same conclusion as this study, that compliance approaching 100% is likely necessary to avoid human-bear conflicts.

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Wildland Fire and the Wilderness Visitor Experience

BY SIERRA L. SCHROEDER and INGRID E. SCHNEIDER

Abstract: The purpose of this study was to understand wilderness visitors' perceptions of wildland fire and describe visitors' wilderness recreational experience following wildland fire in the Boundary Waters Canoe Area Wilderness (BWCAW). Qualitative interviews revealed visitors' perceptions of burned areas as well as if and how activities and behaviors were influenced by wildland fire occurrence. Results indicated that BWCAW visitors predominately perceived burned areas as interesting landscape features worthy of exploration. Route choices did not change due to burned areas but site selection and camping behaviors did. Wilderness planning and management implications include adjusting for spatial displacement and developing education material.

Introduction

Wildland fire has significant effects on many levels and subsequently has been the subject of a variety of research endeavors.

Sierra L. Schroeder in the BWCAW. Photo by Stefanie Bergh.

Visitor research generally indicates that the impacts of wildland fire on recreation visitation fade over time (Englin et al. 1996) and that, although areas experiencing fire may see use fluctuations, long-term visitation impact is unlikely (Englin et al. 2001; Brown et al. 2008). Beyond visitation information, however, information on fire's effects on wilderness recreation experience is lacking, and, therefore, a rich examination is warranted. This study described recreational visitors' perceptions of fire in a wilderness context recently affected by wildland fire. Specifically, among other objectives, this project sought to understand if and how fire influenced visitors' experiences, activities, and behaviors in the Boundary Waters Canoe Area Wilderness (BWCAW) of northern Minnesota.

Situated in the northern one-third of the Superior National Forest, the BWCAW is a unique area that contains more than 1,500 miles (2,414 km) of canoe routes (see figure 1), nearly 2,200 designated campsites, and more than 1,000 lakes and streams (USDA Forest Service 2009). During the summers of 2006 and 2007, more than 100,000 contiguous forested acres (40,500 ha) burned, including areas that had not been burned in hundreds of years.

Previous research has documented post-fire recreational visitation (Beattie 1992; Borrie, McCool, and Whitmore 2006; Brown et al. 2008; Englin et al. 2006), revealed visitor support for fire as a management tool (Knotek et al. 2006), and explored the role of trust between land managers and the public (Liljeblad et al. 2009; Winter et al. 2005). Visitation-related studies indicate that wildland fire is

Figure 1—Paddling in the BWCAW. Photo by Sierra L. Schroeder.

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unlikely to cause a significant long-term decrease; visitation may decrease for the first year, but it is unlikely to be lower in the following years (Beattie 1992; Brown et al. 2008; Englin et al. 2001; Starbuck et al. 2006).

Only since 2006 has research assessed how wildland fire impacts visitors' attitudes and behavior (Borrie et al. 2006; Knotek et al. 2008). In a mail survey of wilderness visitors, Knotek et al. (2008) found a variety of visitor attitudes toward management-ignited fire in a wilderness area, with slightly more support than opposition. Borrie et al. (2006) conducted a visitor trend analysis using data from two years in the Bob Marshall Wilderness area, one year when wildland fire occurred and a year without fire. The data revealed that: (1) visitor characteristics were not significantly different between the two years; and (2) that visitor attitudes toward only 5 of 46 potential management actions differed. However, some visitor activities and length of stay changed: during the year with a large-scale fire, the number of hikers increased, fishing and horseback riding decreased, and overall stays were shorter (Borrie et al. 2006).

Beyond visitation, wilderness recreation experience and travel pattern are of interest. Perhaps not surprisingly, empirical studies regarding the aesthetics of forests reveal that evidence of fire detracts from beauty (Ribe 1989). However, a paucity of data documents the indirect and continuing impacts of wildland fires on visitor experiences (Morton et al. 2003). To fill this void, this study examined the effects of wildland fire on wilderness recreation experiences and visitors' behavioral changes.

Methods

In-depth face-to-face interviews allowed individual visitors to talk openly about their unique stories and to share rich insights regarding their BWCAW experience with wildland fire and burned areas. The depth and breadth inherent in a qualitative approach captured and conveyed the stories of BWCAW visitors in their own voices (see figure 2).

Figure 2—Chet Kukuk portaging between Muskeg Lake and Long Island Lake not long after the 2007 Ham Lake fire in the BWCAW. Photo by Jeff Kukuk.

A purposive sample identified BWCAW visitors. Purposive sampling reflects the diversity of a group and seeks to include any "outliers" that perhaps would be discounted in a statistical study (Barbour 2001). The purposive sample for this study was obtained using a chain referral technique. Fliers were posted at outdoor sporting goods stores in the area, and a template email was circulated to known BWCAW visitors requesting referrals. As a result, 98 potential participants completed an online questionnaire that assessed BWCAW visits and relationship with the area. The sample was selected from this group to include visitors with various relationship strengths.

As the majority of BWCAW visitors are from the Minnesota twin cities of Minneapolis and St. Paul, interviews were conducted in and around this area in convenient settings for the participants, such as a coffee shop, library, or office. This relatively informal setting provided a relaxed tone, and the interviews were conducted as "directed conversations" (Charmaz 1991). A semistructured interview guide was developed with various open-ended questions and probes to keep the conversation centered around the research themes while simultaneously employing probes to elicit further observations, perceptions, and responses (Kvale and Brinkmann 2008). All interviews were digitally recorded and transcribed verbatim.

Interview analysis consisted of meticulous reading and rereading of each transcript, organizing the data into categories, identifying themes and coding, and interpretation. The data were entered in and coding was facilitated by the qualitative analysis software NVivo (QSR International

Pty Ltd 2002). Dual readers provided interpretation discussion opportunities and validation of the interpretations. Also, participants commented via email on the accuracy of the interpreted individual's story and experience. This "member checking" is the process through which participants review and comment on the interpretations and the findings presented by the researcher (Creswell and Miller 2000), and according to Lincoln and Guba (1985, p. 314), is "the most crucial technique for establishing credibility." Note: references to respondents are all pseudonyms.

Results

Twenty-five BWCAW visitors, 12 females and 13 males, shared their stories in individual interviews between November 2008 and May 2009. Of these participants, 19 people had been to fire-impacted areas in the BWCAW and are included in this analysis. During the interview, each person was asked what, if anything, had changed in the BWCAW since their first visit. Fire and the resultant impacts on the landscape were the most frequent response; thus, perceptions of burned areas and subsequent impacts on activities and behaviors were explored in more depth. Results discuss data across individuals and focus on themes that describe BWCAW visitor perceptions of burned areas and the impacts of fire on recreation activities and behavior.

Visitor Perceptions of Burned BWCAW Areas

Several recurrent themes emerged across cases to provide a description of how visitors perceived fire-affected wilderness areas. Burned BWCAW areas were predominantly perceived as interesting landscape features, areas that sometimes incentivize a visit, and areas that offer a unique perspective.

Burned areas were interesting—Interviewees consistently perceived burned areas as interesting landscape features. Liz explained her perception of a burned area: "It's interesting to see what a forest fire can do, you know, a brand new fresh forest fire and say you're there a week later, there's already green coming up and it's really an interesting thing." Others mentioned exploring a post-fire forest to witness the new trees grow in; Andrea described it as fascinating and cool to see the fireweed and the aspens start to grow after a burn.

Interviewees consistently perceived burned areas as interesting landscape features.

The dramatic revealing of topographic features following fire was the most memorable to some respondents. Ted remarked that it was interesting to go to a fire-affected area because "the topography is so different. You know the rock has been so burnt out, the algae has been burnt off, it's just this white-ish kind of look to it." Exploring this exposed surface can be enjoyable, and Brandt commented that "it's fun to be able to walk through … and see the bedrock poking through and the regrowth, the species that come out, it's part of the experience."

Wildland fire prompted exploration—A recent fire was sometimes an incentive to explore an area. Paul explained that after an area was burned he would "want to plan a route where I wasn't going to miss some of that." For Bill, "the fact that the fire was there, was just an added little incentive" to explore the eastern side of the BWCAW. Isaac saw a magazine photograph of early successional plants and flowers growing in the BWCAW after a fire disturbance. "I gotta get in there, I gotta see it!" he said. Isaac added: "I am excited to go get back into that area, maybe not every year, maybe every two or three years, just to see the ecological succession as it grows."

Wildland fire and burned areas offered perspective—As both a destructive and creative force, fire symbolized the duality of nature to BWCAW visitors and provided a unique perspective. For Isaac, the impact of fire was a "double-edged sword … to see what it destroys is really sad … and on one hand it's really good, almost happy, especially when you get out and see all the new life that comes about from it." Gerald also shared a story reflecting on the dual nature of fire:

> We were portaging and we came out in an open area and it was just "Strawberry Fields Forever" but it was raspberries! It was just unbelievable to witness that kind of rebound you know, but it's just, it is really heart-wrenching to see some of the beautiful pine trees that have been there for hundreds of years maybe being scarred, but as you know, fire brings out the worst and the best of everything.

Respondents shared the idea that fire and burned areas provided a unique perspective to witness the transformation where the old and familiar was destroyed to make way for the new growth. Wildland fire was a reminder that the BWCAW is dynamic; Brandt described this: "Just realizing that it's a living breathing system makes me happy!" Justin enjoyed the unique opportunity to observe nature as it manifests itself in the wilderness, free

from human intervention; he explained, "Nature's not always going to be pretty, but it's always going to be awesome." The post-fire forest transformation was personally inspiring to Gerald. He noted that on his desk he keeps "a bouquet of jack pine branches with some open cones and some closed cones, and it just reminds me in those times in my life when I have been tested or been under fire, that growth can come out of times of testing."

Influence of Fire on Visitor Activities and Behavior

Overall, trip planning and entry point were not affected by fire; however, visitor campsite selection and behavior were impacted. Respondents explained that although they were interested in seeing and experiencing a post-fire area, they were not likely to choose a campsite that had been recently burned. Visitors had a limited length of time they wanted to spend in burned areas. As Mark explained, "I wouldn't want to camp in a burned out area, so you'd pass it and go on to another lake." Although he had gone specifically to explore an area that had been burned, Ted indicated, "Now that I've seen it, I'm not gonna camp there." Experiencing a unique post-fire landscape would be interesting to Bill, but after half a day exploring that setting he said he would want to "go someplace else because once you see a burned area, that's enough." Liz stated firmly that wildland fire "is a good thing," but when she went on to talk about selecting a campsite she said, "It's okay for a while … I wouldn't go in and stay in an area like that … it's not very pretty."

Campfire activities were influenced by fire. Several respondents became more cautious with campfires and expressed an increased concern and sense of responsibility regarding fire safety. After seeing a burned area in the BWCAW, James was reminded that "you have to be very mindful and respectful of the campfires that we do have." He explained that now he always double-checks that the fire is put out before leaving the site or going to bed. Charlotte shared a similar story, mentioning that after seeing some of the BWCAW fires and also seeing how the wind can pick up embers and sparks, all this "makes me a little more cautious with my own fires, and I try pretty hard to make sure that they're out!" Rick, who has visited the BWCAW since 1971, said that he recently started using a gas stove to prepare food, and he explained that seeing burned areas in the BWCAW "might be a reason why we may have gotten into more using gasoline stoves for cooking than wood, less chances of sparks flying off to start fires perhaps."

> Overall trip planning and entry point were not affected by fire.

Discussion and Conclusions

In-depth interviews with BWCAW visitors indicated that perceptions of and behaviors in fire-impacted areas were influenced by fire. In summary, interviews revealed that fire-impacted areas of the BWCAW were frequently perceived as interesting, and this sense of novelty sometimes incentivized a visit. Although route choice and trip planning were not impacted, interviewees indicated that campsite selection and campfire use were influenced by the occurrence of wildland fire.

When considering this study within the context of the limited research on wildland fire and wilderness visitors' perception and behaviors, some similarities as well as some differences were found. The stories shared by interviewees in this study are similar to the quantitative results reported by Dvorak, Borrie, and Watson (2008) and support the finding that route choice and trip planning are not generally affected by wildland fire. Dvorak et al. found that both day and overnight users rated the occurrence of lightning-ignited fire and of prescribed burning as an unimportant factor in choosing an area to visit. In addition, nearly all survey respondents indicated that trip plans were not affected by lightning-ignited fires or prescribed burns (Dvorak et al. 2008).

Quantitative findings reported by McFarlane, Boxall, and Watson (1998) differed notably from the stories and perspectives shared by participants in this study. Wilderness visitors to Nopiming Provincial Park, Manitoba, Canada, rated the "presence of burned areas along the route" as unenjoyable in a mail questionnaire (McFarlane et al. 1998). In contrast, interviewees in this BWCAW study described burned areas as interesting features in the landscape, offering a unique perspective.

In terms of visitor behavior change, this BWCAW study did not find changes in activity as did Borrie et al. (2006), but rather found that wildland fire influenced visitor travel patterns and campfire logistics. Although respondents generally confirmed that their broad trip plans would not change as the result of a fire, participants expressed that they would not select a campsite that had been affected by fire. Therefore, there is an increased possibility for crowding post-fire at campsites not affected by fire as well as the possibility of intra- or intersite displacement. This change in spatial use distribution may influence the social experience in the wilderness,

as crowding may occur at unaffected sites and opportunities for solitude may be diminished. In addition, biophysical impacts may result from increased use on more heavily used campsites. In their study of 19 heavily visited wilderness areas, Hall and Cole (2007) found that temporal or spatial displacement was a common response to undesirable conditions and certainly burned campsites were identified in this category by participants. As such, direct management and planning implications include understanding and adjusting for spatial displacement and subsequent changes in user density due to campsite selection.

Management strategies for social and biophysical impacts range from direct regulations to more indirect approaches such as visitor education (Manning 1999). Indirect educational approaches, particularly in wilderness areas, are often preferable to direct regulations as legislation and management agency policies mandate that wilderness visitors' opportunities for recreation be "unconfined" (Manning 1999, p. 214). Study results suggest that a variety of educational opportunities exist, including additional education regarding the short- and long-term impacts of fire on ecological systems and the novel experiences provided by such changes. Participants mentioned the appeal of witnessing ecological succession post fire. Although there is evidence that some visitors have an understanding of ecology and fire's role, others would benefit from additional information on this topic. This is an opportunity to teach wilderness visitors about the longer term impacts of fire and to provide educational materials about the ongoing process of post-fire ecological succession (see figures 3 and 4).

Education and information programs were critical after the 1988 fires in Yellowstone National Park (YNP). Several agencies, including the USDA Forest Service and the USDOI National Park Service, worked together to educate the public about the ecological role of fire and to restore the worldwide image of YNP (Beattie 1998). Notably, the BWCAW also engaged in educational opportunities and has created informative brochures. A brochure titled *What to Know Before You Go* is available online on the Superior National Forest BWCAW website. The brochure describes the BWCAW as a fire-adapted ecosystem, provides a recent history of fire occurrences, and outlines fire management strategies for the area (USDA Forest Service 2009). Educational tools, such as this brochure, help interested and uneducated visitors broaden their knowledge in the long term and provide depth of understanding about the role of wildland fire from multiple perspectives that include ecological, historical, and managerial.

Figure 3—Aerial view of 2006 Cavity Lake fire showing the mosaic burn pattern. Photo by Mike Ferris, USDA Forest Service.

BWCAW study results indicate that wildland fire does not necessarily have a negative impact on visitor wilderness recreation experience. Specifically, participants in this study shared generally positive perceptions of wildland fire, including the idea that burned areas were interesting landscape features. Therefore, this holds promise for attracting visitors to an area and providing unique landscape experiences for them. Future research can determine if these perceptions hold true in other fire-affected wilderness areas.

This initial inquiry into BWCAW visitor experiences in fire-impacted wildernesses is useful, but future research opportunities include long-term follow-up on experiences, monitoring of visitor use patterns, and subsequent impacts. Additional research can explore if and how visitors' perceptions might vary depending on geography, experience use history, or other variables of interest. Although study participants expressed an interest in wildland fire and exploring burned areas, there were parameters around the extent of time this interest lasted. Future research can begin to identify the factors that influence the parameters around extent of interest in wildland fire and burned wilderness areas.

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Figure 4—Vegetative regeneration on the portage trail to Alpine Lake in 2009 in the BWCAW. Photo by Jeff Kukuk.

Monitoring Campsite Conditions with Digital Image Analysis

An Examination of an Assessment Procedure

BY CHRISTOPHER A. MONZ AND PETER D'LUHOSCH

Abstract: Assessing and monitoring the condition of backcountry campsite resources is often an important component of wilderness area planning and management. This research investigated whether overhead digital images obtained in the field could be used for the determination of two important site assessment parameters—campsite size and percent vegetation cover. The method proved reliable and practical for small to medium backcountry sites (up to 25 m^2; 269 sq. ft.) but more difficult for larger sites due to photographic limitations. Image analysis procedures have the advantage of being rapid in the field, and of eliminating possible observer bias in assessing the extent of vegetative ground cover. In some circumstances, image analysis presents an additional option for managers seeking to implement efficient and cost-effective long-term monitoring of campsite conditions.

The Challenge of Campsite Monitoring

Monitoring the condition of recreation resources is a perennial challenge for wilderness and protected area managers. In addition to the technical aspects of determining indicators and accurate measurement protocols, managers often face significant limitations on the financial and personnel resources required to carry out field data collection and subsequent data analysis (Leung and Monz 2006). Long-term monitoring is particularly challenging as personnel change over time, potentially compromising the accuracy and precision of field methods and trend analyses. These challenges are manifest in that many parks and wilderness areas have little data on which to base management decisions (Cole and Wright 2003). As such, there remains an interest in continuing to enhance the ability of monitoring efforts to produce accurate and precise data while minimizing associated fieldwork, data entry, and processing time.

Christopher A. Monz. Photo by Wyatt Lutsk.

Peter D'Luhosch. Photo by Chris Monz.

This study reports on an exploratory approach to measuring two important campsite condition parameters—site size and total vegetation cover. We initiated this work as part of two recreation resource monitoring projects in collaboration with the U.S. National Park Service (NPS). These projects involved site visits and manager interviews at 12 NPS units in diverse environments of the eastern coastal United States and in southwest Alaska (Monz and Leung 2006).

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Managers consistently reported challenges with implementing their campsite monitoring protocols, citing issues related to field time, consistency with earlier data collection, and measurement accuracy. These concerns were particularly acute for the parameters of campsite size and vegetation cover. Campsite size is an indicator of the spatial extent of trampling damage, since large impact areas are problematic from both resource protection and visitor experience perspectives (Hammitt and Cole 1998). Site size is often measured using the geometric figure or radial transect methods (Marion 1991; Hammitt and Cole 1998). Although accurate and reliable, managers frequently cited time limitations in the field and measurement error as concerns regarding these currently available options. For vegetation cover, managers also reported consistency concerns, as these estimates are often performed as ocular estimates by field personnel who frequently change from season to season.

Existing Monitoring Methodologies and New Opportunities

The methodology for campsite condition monitoring is well developed in the recreation literature, going back at least to the work of Frissell (1963, 1978). This early work focused on rapid assessments, using easily observed ratings-based assessments of conditions. Continued methodological refinements that included measurement-based assessment parameters were contributed by several practitioners, especially Cole (1989) and Marion (1991, 1995). More recently, issues of sampling and assessment efficiency have been discussed (Newman et al. 2006) along with the possible utility of additional measurement techniques (Newsome et al. 2002).

The reduced cost of high-resolution digital cameras and widespread application of image analysis in the environmental field suggests that this technique holds some promise for monitoring in park and wilderness settings. Photographic monitoring has long been associated with campsite assessment (Brewer and Berrier 1984; Hammitt and Cole 1998; Marion 1991), but heretofore images were most frequently utilized for only illustrative and site relocation purposes. As recent advances in remote sensing technology and applications illustrate (Lillesand et al. 2007), considerable information can be extracted from digital images. Although remote sensing technology has been employed in campsite and recreation resource monitoring (Price 1983; Hammitt and Cole 1998; Kim et al. 2007), and may be an effective method for campsite monitoring in treeless environments, the vast majority of campsite monitoring programs need to assess areas under dense tree canopies, making satellite images or air photos difficult to utilize. In addition, remote sensing technologies remain expensive and require specialized skills, rendering them problematic for many park and wilderness managers facing budget constraints.

Some recent research has explored the use of close-range digital image analysis to analyze vegetation cover and bare ground of plots and sites. Several research studies have examined the use of these techniques in rangelands for the determination of vegetation cover (Bennett et. al. 2000; Booth et al. 2004, 2005) and found favorable comparisons with point frame methods, reduced judgment error, and increased field efficiency. In particular, image analysis has been shown to facilitate greater data collection due to ease and efficiency in the field, to be superior for determining relative change over time, and useful for providing a permanent visual record of plots for future analysis (Booth et al. 2005).

Although some variation exists in the particular type and capabilities of the software used for analysis, the basic process is similar across these studies. First, overhead images are obtained of the study sites using a standard digital camera with the image sensor plane parallel to the ground surface. Images should contain a reference of known size for area or length calculations or be taken at a known height and focal length. For vegetation cover, images are then analyzed by software capable of converting the color bands in the image (red, green, and blue, or RGB) to hue-intensity-saturation (HIS) space. This process minimizes intercorrelation among the RGB bands (typical in vegetation images) and functionally helps isolate and identify the green material. Once isolated, the area of green material can be determined and expressed as a percent of the total area in the image within campsite boundaries (i.e., percent cover). Area determinations are performed by calibrating a number of pixels in the image to a known length included in the image. For a further discussion of the details of the process typically used, see the discussion in Laliberte et al. (2007).

The goal of this project was to investigate whether basic image analysis methods could be readily adapted to measure campsite size and vegetation cover and to increase the efficiency of field data collection for these parameters. In addition, we sought to maintain or improve the accuracy of established campsite assessment techniques (e.g., Marion 1991, 1995) and provide a protocol feasible for managers and field staff to conduct. To accomplish the

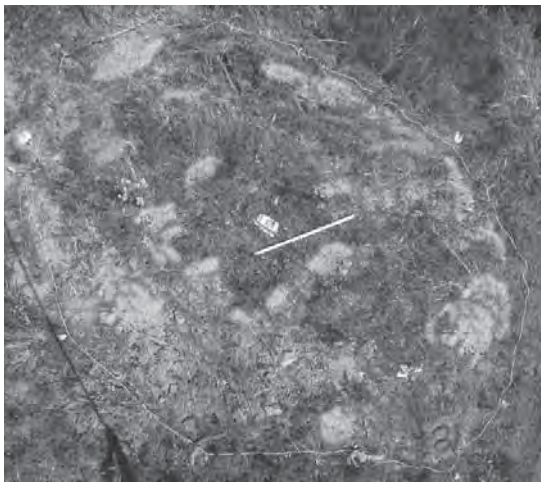

Figure 1—An example overhead campsite image obtained for analysis; note meter ruler in photo. Photo by Peter D'Luhosch.

latter, the field methodology had to be rapid, straightforward, and inexpensive. Although some wilderness monitoring efforts have benefited from the services of agency engineering and technology laboratory efforts (e.g., automated trail use counters), we were further constrained to utilizing only readily available software and hardware.

Study Approach

Although several of the aforementioned monitoring options appeared feasible, some relied on expensive and complicated software that may prove inaccessible to many wilderness and protected area managers. The following methodology appeared to be the most promising after consideration of the available low-cost hardware and software.

Overhead images of campsites were obtained with a lightweight Nikon Coolpix 5000 5MP digital camera with a 19mm lens (35mm equivalent) fixed to a 2.5 m (98.4 in.) aluminum boom. The boom was held at or above shoulder height at approximately a 45 degree angle to ground level, with the camera pointed downward and positioned directly above the approximate center of the site. The camera was mounted on an adjustable ball head that allowed for positioning the camera's focal plane to be approximately parallel to the ground surface. With the wide angle lens, sites as large as approximately 40 m^2 (430 sq. ft.) could be captured in one image by holding the boom overhead, but images of smaller sites (25 m^2 and smaller; 269 sq. ft.) were more easily obtained (see figure 1). All images included a meter stick placed on the ground for size reference and for the required calibration for area calculations by the analysis software.

Images were edited in Adobe Photoshop (where needed) and analyzed for site size and vegetation cover using Able Image Analyzer software (Mu Labs, Ljubljana, Slovenia, version 3.6). Mu Labs provided technical guidance on the analysis process. This software is easy to use, readily available, and inexpensive ($US100). In Able Image Analyzer and other image analysis software, the threshold for color recognition is somewhat variable. The software was calibrated by adjusting the threshold slightly for each campsite image, comparing the standard color image with the binary image. This technique has the advantage of adjusting for subtle variations in color in the initial image, and with practice can be performed with little bias. Standard procedures included in the software allowed for the calculation of percent cover and total campsite area. It should be noted that the software employed in this study is limited in capabilities compared to more sophisticated programs used in remote sensing. This represents an advantage in being easy to use and low cost, but also limited the nature of the information that could be extracted from each image.

Experimental trials were conducted to test the accuracy of determining percent live vegetation cover and the size of known site areas. Comparisons with established standard campsite assessment techniques (e.g., Marion 1991) were also conducted on 36 campsites in a mixed hardwood/softwood forest typical of the northeastern United States (Adirondack Mountains, New York). For cover accuracy determinations, cover estimate templates of known vegetation cover were created in a 30 x 50 cm (11.7 x 19.5 in.) area using 15 cm^2 (2.3 sq. in.) cut leaf segments of common forest understory vegetation (broadleaf forbs). Known cover templates of 1, 5, 25, 50, 55, and 70% cover were created on an area of exposed mineral soil largely devoid of organic material. Images were taken directly overhead with a handheld camera and subject to the aforementioned image analysis procedure. Site size accuracy determinations were performed analyzing overhead images of simple geometric shapes outlined on the ground with flagging tape. Shapes were of known sizes of 5, 10, and 25 m^2 (53.8, 107.6, and 269 sq. ft., respectively) typical of small- to medium-size backcountry campsites.

For comparisons with established campsite assessment techniques, a standard assessment was conducted on actual campsites following Marion (1991) that included ocular estimation of percent vegetation cover categories (1 = 0–5%; 2 = 6–25%; 3 = 26–50%; 4 = 51–75%; 5 = 76–95%; 6 = 96–100%) and a variable radial transect measurement of campsite area. Overhead images were taken of each site as previously described. Site boundaries were delineated with flagging tape and pin flags to highlight the impact boundary on the overhead image. The identical boundaries (as

delineated by the pin flags) were used for the radial transect measurements, allowing for a direct comparison of the two methods. Control areas for each site (adjacent areas with no observable disturbance) were selected according to Marion (1991) and assessed for percent vegetation cover via both ocular estimation and image analysis to allow for the calculation of estimated vegetation cover loss (mid-point value of percent cover in control plots—mid-point value of percent cover in campsites).

Findings

Analysis of known cover templates indicate that percent error (variation between measured and known cover) diminished as cover increased, from a high of 9% at 1% cover to a low of 3% at 70% cover. Most of the measurements in the mid-range of the scale (where many backcountry campsites would fall) were in the 4% range. Image analysis of site areas of known sizes demonstrated accuracy in the range of 4.4% to 6.3%. In both of the above trials three images were analyzed independently and no apparent pattern of over- or underestimation was observed.

For both percent vegetation cover estimates and size measurements significant differences were observed in comparisons of standard techniques and image analysis. In comparisons of all sites (N = 36) paired T-tests showed significant differences in percent cover (P = .046) and campsite size (P = .022). A more detailed depiction of typical results for six sites illustrates how the two methods compare for vegetation percent cover estimates, cover loss calculations, and site size measurements (see tables 1 and 2). Site size measurements from image analysis averaged 6% difference from the variable radial transect measurements (N = 36), whereas cover estimate differences were more dramatic (e.g., table 1).

Implications and Applications

Developing accurate and cost-effective resource assessment protocols requires consideration of area-specific needs and requirements and a reexamination of established techniques as new technologies become available. Moreover, recent large-scale monitoring efforts on the part of agencies in the United States have spurred interest in monitoring methods development (e.g., Leung and Monz 2006). In this context, examination of a potential new campsite assessment protocol is timely. Campsite monitoring protocols traditionally have sought to balance accuracy, precision, and efficiency, and require compromises between these attributes. The image analysis technique presented here has some advantages but is not without limitations. Regardless, in the correct circumstances, image analysis represents an additional option for managers interested in developing a comprehensive campsite monitoring protocol.

The image analysis tests suggest that the methodology shows promise for being practical and accurate for assessing campsite sizes and vegetation cover. Comparisons conducted with known simulated cover and known areas suggest that the method is reliable with minimal error. Although encouraging, these results should be interpreted with a degree of caution, as neither test completely simulates field conditions. Nonetheless, the method compares favorably with established field techniques where a degree of error can be determined (i.e., radial transect methods; see table 2) and has the ability to minimize field observer bias and enhance precision in percent cover assessments.

Determinations of site vegetation cover have long been a standard component of campsite assessment. By

Table 1—Comparison of selected campsite cover estimates using the ocular estimation technique and the image analysis (IA) method

Test #	Ocular (%)	Ocular cover loss (%)	IA (%)	IA cover loss (%)
8	63	23	53	33
12	16	70	28	52
20	86	12	59	36
21	63	23	61	7
29	63	23	55	6
32	63	23	74	5

Table 2—Comparison of radial transect and image analysis (IA) methods for determining campsite size

Test #	Radial (m^2)	IA (m^2)	Difference (%)
8	8.5	8.6	1.1
12	8.3	8.9	8.2
20	7.4	7.9	8.0
21	15.2	13.9	8.2
29	17.1	15.6	8.6
32	10.1	9.7	4.0

Monitoring the condition of recreation resources is a perennial challenge for wilderness and protected area managers.

comparing an on-site assessment with the cover of associated unused control sites, vegetation cover loss can be determined. The standard ocular methodology uses a relatively coarse measure by employing a categorical cover approach that allows for accuracy and ease of use in the field. This approach requires field staff to estimate vegetation cover over an entire campsite. In comparison, image analysis involves no judgment by field personnel and potentially yields measurements capable of resolving smaller differences in vegetation cover. It is not surprising, given the differences in approach, that the standard ratings method yields markedly different results than image analysis.

Campsite size, an important measure of the areal extent of resource changes due to wilderness use, has been estimated by various means (Hammitt and Cole 1998; Marion 1991). Recently, the variable radial transect method has become a more common procedure (Marion 1991, 1995) with relatively high precision and accuracy once campsite boundaries are identified. A challenge with this approach often cited by managers is that it is somewhat time-consuming in the field. In our examination, image analysis produced different results from radial transect measurements in paired comparisons ($N = 36$; $P = .022$), but results are comparable given the known error with each measurement (see table 2). For example, Marion (1991) reports an error of approximately 4% to 8% with radial transect measurements with a similar number of transects as performed in these tests, and the image analysis results fall close to this range. Moreover, image analysis can be performed rapidly in the field, thus significantly reducing field-staff time, often a major limiting factor in campsite assessments. For the sites assessed in this study, site boundaries depicted on overhead images could be measured with the software in approximately 5 minutes, whereas radial transect measurements took 15 to 20 minutes per site. Subsequent computer analysis can be performed during the off-season, with hourly personnel, also reducing the burden of field staff during the busy season. With some training, image analysis can generally be performed in fewer than 5 minutes per site.

Image analysis techniques are not without limitations. First, our experience suggests that the practical size limit of sites that can be captured in one image is in the 25m^2 (269 sq. ft.) range. Although many backcountry campsites are this size or smaller, sites in popular areas with larger visitor groups can often exceed this size (Monz and Twardock 2004). Although it is possible to take multiple images that capture larger sites and merge these images into one mosaic image for analysis, this process may be more cumbersome than utilizing traditional measurement techniques, such as the radial transect method. An advantage of the image analysis method is increased precision and accuracy in percent cover determinations, so for larger sites, radial transect measurements of area could be combined with image analysis of intrasite quadrats for cover determinations. Intrasite quadrat methods for assessing vegetation and soil properties have been utilized in previous studies (e.g., Brewer and Berrier 1984) but have been found to be tedious and time-consuming (Hammitt and Cole 1998). Future research should examine the effectiveness of using image analysis with this approach.

It is likely that more sophisticated image analysis procedures could also provide data on other important campsite attributes, such as cover of individual vegetation classes (grasses, forbs, mosses, etc.) and soil exposure. Given the exploratory nature of this study and the limitations encountered, the authors remain guardedly optimistic that image analysis procedures—with further testing and development—will become an effective procedure for assessing campsites. Some future research and development directions include testing this and similar methods in a wide range of vegetation and soil types, developing a straightforward technique for combining multiple images of larger sites, and expanding the image processing to include determinations of bare ground and vegetation classes.

Acknowledgments

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PERSPECTIVES FROM THE
ALDO LEOPOLD WILDERNESS RESEARCH INSTITUTE

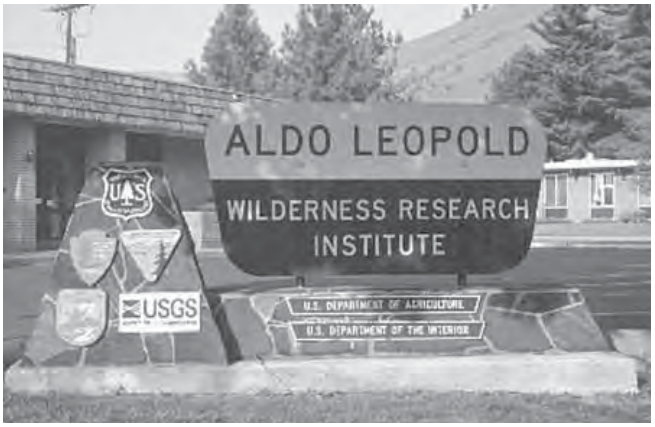
Reflections on WILD9

BY DAVID J. PARSONS

The 9th World Wilderness Congress (WILD9), held November 6–13 in Mérida, Mexico, provided a vivid reminder of the magnitude of the challenges—both environmental and human—facing advocates for the protection of wilderness resources and values. From a U.S. government scientist's perspective, it was also a reminder of the differences in wilderness focused conservation priorities and programs between the United States and much of the rest of the world.

WILD9 provided for an amazing gathering of conservationists, government officials, scientists, artists, educators, nongovernmental organizations (NGOs), and others interested in protecting and preserving wildland ecosystems across the globe. Under the overriding theme of Wilderness: The Climate's Best Ally, much discussion focused on the importance of large intact ecosystems for preserving both biotic and human health. It emphasized threats posed by land use change, such as deforestation and degradation of native vegetation, to local communities and ecosystems, as well as the importance of protecting natural ecosystems for the stabilization of global carbon emissions. Perhaps the primary message to come from Mérida was recognition of the importance of the conservation of large, intact ecosystems, including ecological connectivity between such areas. This message was clearly articulated by scientists, land managers, nature photographers and writers, as well as indigenous peoples. It was in turn recognized and supported by high level government officials from around the world, including President Felipe Calderón of Mexico.

For me, WILD9 reinforced the importance of supporting science that transcends spatial and temporal scales. In contrast to much of my past experience, conducting and directing research for two different land management agencies (National Park Service and U.S. Forest Service) that are primarily focused on the needs of specific designated tracts of land (either national parks or wilderness areas), it is clear



that the relevance of the science and management supported by federal agencies can be greatly enhanced when placed in the context of the broader landscape-scale issues that are the focus of international conservation. Whereas designation of parks, wilderness, and similarly protected lands is critical to global conservation, it is insufficient. Maximizing the benefits of protected lands must be viewed as a part of a larger strategy that includes protection of migration corridors, planning that focuses on watersheds rather than political boundaries, communication and coordination with local communities, and recognition and communication of the ecological and social values that generally transcend political boundaries. Effective conservation must look beyond traditional administrative, political, and even national boundaries. It must also look across disciplinary boundaries, engaging the social, biological, and physical sciences.

The importance and challenges of global conservation are of particular significance in the face of anticipated global climate change as was emphasized repeatedly at WILD9. In this vein, principle themes followed throughout WILD9 included climate change mitigation and adaptation, large landscape connectivity, water (including both freshwater

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Social Media in Wilderness Stewardship

BY LISA EIDSON

Today's media system is no longer a top-down environment, and advocacy groups and government agencies are just beginning to embrace this new reality by identifying ways in which they can use Web 2.0 technologies to communicate more effectively with their constituents and employees. Although a recent study of social media use by 102 large national trade and advocacy organizations showed that almost 75% use 4 or fewer of the 14 most popular online social tools, the Sierra Club and the League of Conservation Voters topped the list by using 10 and 7, respectively (Ross, Stineman, and Lisi 2009). In government, the Transportation Security Administration, Department of Defense, Department of Health and Human Services, Library of Congress, and the Environmental Protection Agency, for example, are now uploading videos, blogging, tweeting, and networking through partnerships negotiated with social media sites such as Flickr, Twitter, YouTube and Facebook (General Services Administration 2008, 2009). Despite increasing adoption in both government and the private sector, many organizations remain skeptical, adopting a "you first" strategy. As our media systems continue to undergo profound transformation, how should we harness the power of the Internet and its new digital tools to reshape the ways that we manage information about our natural resources and wilderness areas?

An opportunity exists to discover how new media tools can be used for better government, advocacy, and public purposes. This article identifies three ways in which emerging Web 2.0 technologies can assist in wilderness stewardship by changing how employees, advocates, and volunteers share information and communicate about wilderness resources.

Blogging: Storytelling in a New Context

In a world where "each of us can create the content and tell our own story" (Center for Digital Democracy 2007, p. 1), one important use of storytelling in the context of wilderness stewardship is to preserve institutional knowledge. Knowledge management research suggests that storytelling is a powerful knowledge disclosure method and its existence and quality are measures of the health of an institution and its ability to transfer complex tactic knowledge (Snowden 1999). Although not a traditional institution when liberally defined as a patchwork of government workers, advocacy organizations, research institutions, and volunteers, the wilderness workforce is largely made of committed, experienced, long-term members, many of whom will likely retire within the next decade. Estimates suggest that 40% of the American workforce, in general, is age 45 or older and, as such, increasing numbers are approaching retirement age (Dohm 2000). As growing numbers of Generation Y (18–30 year-olds) fill key stewardship positions, it becomes critical to bridge the generation gap, since Snowden warns that when tactic knowledge is the property of a limited number of individuals, it is at risk of being lost.

Lisa Eidson backpacking in the Scapegoat Wilderness in Montana. Photo courtesy of the author.

In the federal government, many wilderness managers reminisce about the genesis of their careers when the way to solve a common problem was to simply call people on a phone list or contact someone through a master performers network. These were the days when knowledge was transferred through stories. IBM's Knowledge Socialization Project describes a narrative as deeper, richer, more compelling, and more memorable than other modes of knowledge transfer because stories evoke truths that are commonly understood and communicate more information than is necessarily obvious (IBM Research 2009). In recent years, however, story sources have faded, as has the workforce's knowledge of and connection to itself, and "celebrity" managers, such as members of the

Arthur Carhart National Wilderness Training Center, have instead become the focal point of inquiry. Inundation with repeat questions has produced valuable online resources, including Wilderness.net's issue toolboxes (www.wilderness.net/toolboxes), as the primary tools for mining and preserving institutional knowledge from both internal and external sources. Although these online resources are products of pooled talent and expertise, they are an anonymous, impersonal, edited, one-way broadcast that has replaced storytelling and its foundational element of personal connection.

Today, however, the potential exists to revive storytelling through blogging as a way of transferring institutional knowledge. Stories often reveal lessons learned, and although capturing such lessons is certainly not a new organizational learning strategy—take the Wildland Fire Lessons Learned Center at www.wildfirelessons.net, for example—blogging enhances this type of storytelling as a two-way dialogue. A blog, or web log, is a web page on which an individual or group regularly posts items—text, images, embedded audio or video, links, blogrolls (links to other blogs), search terms, and more—that are displayed in reverse chronological order. Blog content is often distributed via Really Simple Syndication (RSS), a standard web feed format for viewing through a feed aggregator, such as FeedReader or FeedBurner, or for republishing to other web sites or social networks. In addition to providing an increasingly popular virtual venue for telling stories, blogs provide the opportunity for reader engagement, one of the qualities of good storytelling.

Research on blogging shows that 33% of Internet users are regular blog readers, with 11% doing so on a typical day, and 12% are blog creators (Smith 2008). According to the Pew Internet and American Life Project (PIALP), increasing trends in Internet usage and technology adoption, in general, suggest that these numbers will continue to climb rapidly across all age brackets (Jones and Fox 2009). A PIALP survey specifically on blogging found that most bloggers view blogging as a way of communicating personal experiences, documenting ideas and events, storing resources, sharing knowledge and skills, and motivating others, and most blogs serve a relatively small audience of niche readers (Lenhart and Fox 2006). Overall, blogging provides individuals with a digital identity and a distributed, open, uncensored, persistent, and independent platform for sharing, while facilitating the connectivity necessary to transfer institutional knowledge via storytelling.

Social Networking: An Often Misunderstood Community of Practice

According to Shirkey, "Every webpage is a latent community" (2008, p. 102). Social networks, one form of online communities of practice, transform latency into action through connection, often by connecting geographically dispersed individuals. Social learning theorist Etienne Wenger defines communities of practice as groups of mutually engaged people involved in the sustained pursuit of a joint enterprise through shared repertoire (Wenger 1998); in other words, "People who share a concern or a passion for something they do and learn how to do it better as they interact regularly" (Wenger 2009, p. 4). Professional social networks are simply groups of workers or colleagues who do this virtually. For example, in 2000 Wilderness Watch created WildNet as a way to share articles, news, and action alerts with other wilderness advocates (Serra 2009). As a private advocacy-oriented Listserv currently serving just over 100 members, WildNet is an early, niche example of a wilderness community of practice.

Recent informal discussions with the federal wilderness management agencies suggest that support exists for a broader wilderness-related professional social network inclusive of government; however, mention of such a network often produces questions such as the following from supervisors: How often should we *instruct* employees to participate in social networking, and how will this additional duty impact employee workloads? Who will *police or moderate* the network to ensure that erroneous information is not perpetuated as employees learn from each other? Emphasis is added to these questions that reveals a profound and abounding misunderstanding of crowd sourced content and of the role administrators should play.

The word *instruct* implies equality of participation; however, participation in any online social setting—social networks or listservs such as WildNet, where the most frequent contributors number fewer than 20 (Serra 2009)—occurs with "predictable imbalance" (Shirkey 2008, p. 122). A power law distribution generally characterizes any online social activity ranked by frequency of occurrence, in this case frequency of participation. As an example of a power law distribution, figure 1 shows the number of discussion forum posts, one type of online social interaction, made by each person in a hypothetical social network. A handful of network members are frequent and avid participants, making large numbers of contributions each; a minority of network members are moderate contributors, making between 10 and 30 posts each; the majority of network members, however, are infrequent contributors, making only a handful of posts, if any, each. Although this might

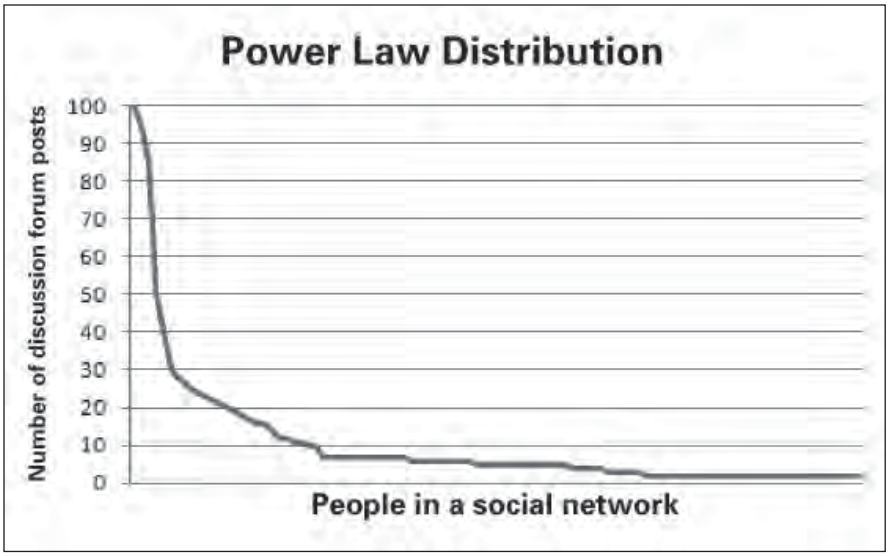

Figure 1—A power law distribution characterizes the frequency of participation in a social network.

appear disheartening, "Imbalance drives large social systems rather than damaging them" (Shirkey 2008, p. 125)—for example, a small percentage of Wikipedia users contribute to a tool that provides tremendous value for millions of noncontributors.

In addition to misunderstanding participation levels in social networks, comments suggesting the need for authoritarian monitoring reveal misunderstandings about oversight. In his social media blog, Edward Lenert, University of San Francisco media studies professor, writes that a network moderator "functions as the host of a conversation that features editor and audience in the co-production of content" (2009, p. 6). In a social network of any substantial size, crowd-sourced content becomes too voluminous to sufficiently police (Shirkey 2008). Although it might sound counterintuitive to allow a network to police itself, communities of practice have a vested interest in generating high-quality information because individuals in these communities are dedicated to bettering themselves at whatever task or interest they have in common. In fact, during WildNet's 10 years of communication, even heated discussions have generally remained civil, and only two members have been expelled from the group (Serra 2009). Self-improvement starts when individuals in a community share what they know and then converse with others about it. These interactions weed out useless, irrelevant, or incorrect information, and over time, the knowledge of the group, the collective intellectual capital of its members, far exceeds that of any individual overseer or oversight group. As such, supervisors and administrators should view themselves as participants in and contributors to the network, engaging others on the same level, with the same freedom of participation, and with the same goal of bettering themselves and the network through distributed oversight.

New Forms of Volunteerism

Volunteerism is playing an increasingly important role in wilderness stewardship and wilderness politics. Advocacy organizations routinely rally their members to take action in support of or opposition to various political measures. Declining budgets for land management have also increased reliance on volunteers to perform on-the-ground work. In fiscal year 2002, for example, the Forest Service relied on 115,600 volunteers who performed the work equivalent to 8,400 full-time employees (Jensen and Guthrie 2005). In the past, formal organizations have typically relied on traditional media to organize volunteers; however, critical mass activism and volunteerism are now possible using new media.

Websites such as The Point (www.thepoint.com) and Fundable (www.fundable.com) apply the tipping point concept to group action, where the tipping point is the moment of critical mass, the threshold, "that one dramatic moment in an epidemic when everything can change all at once" (Gladwell 2000, p. 9). This means that coordinated action (e.g., a trail cleanup project) doesn't occur until a sufficient number of people have committed (e.g., 50 people) and/or a certain amount of money has been pledged (e.g., $100 for trash bags). Similarly, Meetup (www.meetup.com) helps groups achieve critical mass virtually for physical events or causes by matching them with interested local individuals and providing tools for coordination and outreach. In 2007, Friends of Oregon Badlands Wilderness began using Meetup as a "good way for a small, new organization to get started" coordinating volunteer work in what was recently designated the Oregon Badlands Wilderness (Eddleston 2009). The use of this new social tool has resulted in 25 successful meetups, including weed pulls, fence removal projects, trail cleanups, signage replacement, introductory hikes, and planning meetings for more than 200 Bend-area residents (Meetup Inc. 2009).

In his statement above, Gladwell likens the achievement of critical mass to an epidemic, and the popular term *going viral* is often used to describe how information travels from person

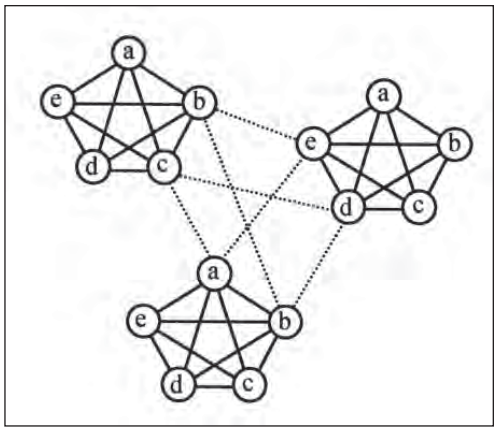

Figure 2—The Small World Network theory explains how people (lettered nodes) are connected to each other through dense connections or strong ties (solid lines) and sparse connections or weak ties (dashed lines) (adapted from Shirkey 2008, p. 217).

to person to result in a tipping point, or some form of coordinated action. Instant messaging, text messaging, and status updating services such as Twitter (www.twitter.com) facilitate viral information distribution. On May 12, for example, the Washington Trails Association used the following tweet to recruit volunteers for the 2009 field season: "WTA volunteer trail crews have already put in 19,816 hours of trail work in 2009. Have you earned your hardhat yet?" (Twitter 2009a). In October, the Forest Service Rocky Mountain Region used its Twitter feed to publicize volunteer trail work on the Continental Divide National Scenic Trail (Twitter 2009b).

Key to viral information distribution is the Small World Network theory, sometimes referred to by the common phrase "six degrees of separation," which describes how everyone is connected to everyone else via a short chain of intermediaries, through the existence and balance of both dense and sparse connections (Watt 2003), as shown in figure 2. Small groups of people are tightly and strongly connected, whereas larger groups, including society as a whole, are connected through weak ties. Some individuals function as connectors, or ambassadors, in that they have proportionately more weak ties, meaning that they serve as bridges between dense but separated groups of people (Gladwell 2000; Shirkey 2008). This type of network is a "conduit for the propagation of information" (Watt 2003, p. 48), such as retweets of the Washington Trails Association or Forest Service Twitter feeds, because communication is both efficient—information can pass between two people who don't know each other by relatively few links—and robust—the loss of even several connections doesn't impair overall communication. Collectively, the types of online social tools that facilitate formation of critical masses through viral information distribution provide volunteers with new ways of spreading information and organizing themselves to conduct wilderness stewardship activities.

Conclusion: Coevolution

Lenert's (2009) website tagline touts that "we coevolve with our tools." Evolution is apparent in the accelerating flexibility and intuitiveness of each subsequent generation or iteration of social media. As wilderness stewardship organizations embrace the use of social media, more specific customization is likely to occur to tailor various tools for wilderness purposes. It's important, however, to realize that not only is the potential for the use of new social tools in wilderness stewardship paramount, the ways in which these new social tools will change wilderness stewardship are paramount also. Blogging, social networking, critical mass activism, and viral information distribution are social tools and phenomena poised to force us to coevolve and change the way we—wilderness staff, advocates, volunteers, and the public—distribute, share, and learn about wilderness.

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The 9th World Wilderness Congress

Mexico, 2009

BY VANCE G. MARTIN

The status of wilderness as a protected area category of international importance took another big step forward in 2009 when WILD9, the 9th World Wilderness Congress (WWC) convened in Mérida, Mexico, during November 6 to 13, 2009. More than 1,800 delegates from some 50 nations came to "the White City" of Mérida in Mexico's Yucatan, and an additional 10,000 people from 100 nations participated through an intensive, Internet-based conferencing initiative. Many practical conservation outcomes were accomplished and are summarized herein. Of equal importance was the tangible spirit of hope and enthusiasm among the delegates. This ever-growing community of professionals and the public around the world understands the central role of wild nature in a prosperous society and healthy world, and the important, positive results from increased collaboration and cooperation for people and the planet.

A WILD9 strategy and objectives were established, funds raised, and a structure of collaborating organizations and people created during two years of planning coordinated by The WILD Foundation (founder and steward of the WWC) and its principal partner in Mexico, Unidos para la Conservación, with intensive involvement by the International League of Conservation Photographers. Before reviewing the actual results of WILD9, it's best to understand both the general approach taken by the WWC since its inception in 1977 and the historical context of international wilderness recognition in which the WWC operates.

Vance G. Martin, president of The WILD Foundation, and Jaime Rojo, executive director of WILD9. Photo by Barca/Garcia Naranjo.

The WWC Approach–Diversity and Results

The WWC's main goals are to investigate, clarify, and communicate the many and varied values of wild nature to human society, and make measureable progress toward more protection and stewardship of wilderness globally. Several aspects of programming and philosophical approach make the WWC distinct from other environmental conferences.

First, though there are conference-like aspects to part of the process (especially when the delegates actually convene), ***the WWC is actually an ongoing conservation project (more than 30 years) implemented in a series of two- to four-year cycles***. During each WWC cycle, The WILD Foundation and its partners determine the location for the next Congress, identify potential practical results, and establish the regional and international networks that collaborate to achieve the goals, and convene the WWC toward the end of that particular project cycle.

Second, the WWC emphasizes diversity of people, professions. and perspectives. It is a public process and series of events, open to and welcoming the many different viewpoints on how wild nature needs to be protected as human society develops on planet Earth. Such viewpoints can be political, scientific, economic, industrial, spiritual, philosophical, and cultural. They can be modern or traditional viewpoints.

President of Mexico, Felipe Calderon, opened the proceedings by endorsing the concept of *tierras silvestres*, confirming its importance for climate change strategy, announcing the first international agreement on wilderness, and inaugurating the first postage stamp series on international wilderness areas (seen here). Photo by Government of Mexico.

Third, although the WWC process is meant to inspire and inform people, it also targets practical results. Therefore, each Congress cycle has a list of specific outcomes. These are as varied as being an instrumental force in creating the Global Environmental Facility of the World Bank (that has since injected more than US12 billion into environmental projects worldwide); prompting new wilderness laws and protected areas in many countries and regions; creating new organizations such as the International League of Conservation Photographers; and many more. For a good summary of WWC outcomes, please visit www.wild.org/main/world-wilderness-congress/a-30-year-success-story.

Dr Pavan Sukdhev, Director, The Economics of Ecosystems and Biodiversity (TEEB), UNEP; Senior Banker, Deutsche Bank. Photo by Barca/ Garcia Naranjo.

Finally, although the WWC involves governments, corporations, scientists, traditional communities, artists, and more, it is not a legally constituted organization, nor does it seek to perpetuate itself institutionally. It is best thought of as an ever-growing global community of people and groups who understand that wilderness is essential to a healthy, prosperous, and sane human society, and which is committed to action that integrates the needs of wild nature and people. The WWC process continues when there is such a need, a request from a region or country, willing collaborators, and funding.

The WWC is now the world's longest-running international public forum on the environment.

The Historical Context

Wilderness as a specific type of protected area was pioneered in the United States in the mid-20th century, culminating in the 1964 Wilderness Act that created the National Wilderness Preservation System (NWPS), and led to many subsequent pieces of legislation that, on an area-by-area basis, are still expanding the NWPS. Today, the NWPS includes 756 areas and 109.5 million acres (44.3 million ha) in 44 states and Puerto Rico (www.wilderness.net).

This initiative in the United States was a global, watershed event. It formally marked the transition of wilderness in modern, developed society from being uniformly regarded as something to be subdued and conquered, to something having a wide range of practical and cultural values in its own right, and important for the health and well-being of a nation.

This wilderness initiative in the United States sparked similar interest and action in other countries. By 1990, there were six countries with legislation establishing a special protected area classification for wilderness. Today, there are nine countries with wilderness protection laws, two more with laws pending, and at least 10 countries with wilderness policies or zoning mechanisms (Kormos 2008; Martin and Watson 2009). Wilderness legislation and/or recognition has been implemented in indigenous communities in Zimbabwe and the United States, and is being considered or has been adopted in many countries where the term has no direct translation (e.g., Italy, Ukraine, Mexico, Turkey) (Kormos 2008). The wilderness concept is growing in international and cross-cultural interest and application.

There have been and continue to be challenges and misconceptions. For example, as the wilderness concept first began to spread it was commonly associated with affluent people who could afford leisure time in the wilderness. As a result, legislators in developing nations often felt that wilderness policy would deny access to wild resources by local,

subsistence-oriented communities, and was inimical to economic development. The prevalence of this argument has declined (but certainly not disappeared) as the WWC continued to involve many different modern and traditional nations, and as the knowledge has increased of ecosystem services assured by large intact natural areas.

However, because of this misunderstanding, during the 1970s and 1980s it became clear that a more universal definition of *wilderness* was needed, one that could address multiple economic and cultural realities (for a brief summary visit www.wild.org/main/about/what-is-a-wilderness-area). The international political acceptance of wilderness has been achieved primarily through the International Union for the Conservation of Nature (IUCN) and the policy guidelines for protected areas developed and maintained by its World Commission on Protected Areas (WCPA). Because wilderness was not originally included in the IUCN guidelines, a group of conservationists worked through the WWC to develop an internationally accepted definition of *wilderness*, and to generate a plenary resolution at the 3rd WWC (Scotland, 1980) requesting the IUCN to create a wilderness category. This was finally achieved when the IUCN guidelines were reorganized in 1988–1990. Dr. Ed Wayburn and Mike McCloskey, representing the Sierra Club, spearheaded this effort with others such as Hal Eidsvik from Canada (then chair of the WCPA's predecessor commission), and that story is summarized in Dr. Wayburn's memoir (Wayburn 2005).

A Wilderness Task Force (since upgraded to a Wilderness Specialist Group) was proposed by The WILD Foundation in 2002 and organized within the WCPA to further integrate the importance of wilderness within the IUCN, to maintain the wilderness "category" (category 1b; IUCN 2010), and to create an official linkage between the WWC and the IUCN. This group was especially important when the WCPA formally reviewed its guidelines for protected areas from 2005 through 2008, during which one of the suggestions was that the words *wilderness* and *national park* be eliminated in favor of a numerical reference. After a concerted campaign coordinated by WILD and members of the WWC executive committee, such as Harvey Locke and Cyril Kormos, the wilderness name and category (and that of national park) remained, with its definition actually strengthened.

Planning WILD9

The WILD Foundation recognized that more significant cross-cultural progress was needed to further advance the wilderness concept internationally. Prior to WILD9, the WWC had convened eight times around the world—South Africa, 1977 and 2001; Australia, 1980; Scotland, 1983; United States (Colorado, 1987 and Alaska, 2005); Norway, 1995; and India, 1998. The WWC planning and implementation could occur easily in English because it was the primary language of business in all those countries. Simultaneous interpretation was only provided on an as-needed basis if specific delegates required it to participate (especially for indigenous representatives). It was not an ideal situation, but one dictated by finances—simultaneous interpretation is very expensive.

WILD provides financial support between each Congress and must stand behind the financial outcome. Planning for each starts at a zero budget and most of the funds need to be raised within the host region in order to maximize local ownership and involvement of this global process. Also, the WWC works best when it has a wide range of sponsors and supporters—corporate, government, NGO, individual, foundation—to expand collaboration and effective networking.

Youth and Young Professionals were well represented in all aspects of the WILD9 program. Siti Zuraida Abidin of WWF–Malaysa addresses the plenary. Photo by Barca/Garcia Naranjo.

As a result, budgets are always very tight, and are significantly impacted by major global events, such as the September 11, 2001, attacks on New York City and other U.S. locations that occurred just two months before the 7th WWC. WILD9 was impacted by the dramatic global financial recession that started suddenly after WILD9 planning was well underway and which considerably affected its budget.

It was clear during the planning of WILD9 that a significant cross-cultural step for wilderness would require

Thousands of local people from the Yucatan, including many hundreds of children and youth, visited WILD9 Expo for free. The many photo galleries by International League of Conservation Photographers, National Geographic, and others, were favorite destinations. Also, WiLDSpeak, the largest-ever gathering of conservation photographers, was organized by iLCP and Cristina Mittermeier. Photo by Barca/Garcia Naranjo.

A life-sized matriarch elephant made of recycled tire rubber on a steel frame was made by South African sculptor Andries Botha, transported to WILD9 by sponsored shipping, and trucked throughout Mexico to raise awareness of *tierra silvestres* before she was installed in the WILD9 Expo. Photo by Jaime Rojo.

increased funding and more emphasis on marketing and communications than in previous WWCs. For example, Spanish is one of the most widely spoken languages in the world, but it has no official or commonly accepted word or phrase for wilderness. Therefore, the WILD9 needed to choose and popularize a term for wilderness; budget for bilingual proceedings, web site, and reporting; and develop a type of "branding" campaign with a logo, tagline, and significant media exposure to attract attention, make the term culturally relevant, and generate interest and involvement.

Of all Spanish-speaking countries, some wilderness progress had been made in Mexico through the work of Patricio Robles Gill of Unidos para la Conservación, and Oscar Moctezuma of Naturalia. Some of these results were reported at the 8th WWC (Alaska, 2005) when Patricio and the CEMEX corporation presented their stunning achievement at El Carmen, in the Chihuahuan desert of Coahuila across the river from Big Bend National Park in Texas, their intention to declare the first wilderness area in Latin America, and the potential of wilderness legislation in Mexico (see December 2005 and August 2006 issues of *IJW*).

The WILD Foundation and Unidos met on numerous occasions after the 8th WWC and formed a committed but informal partnership to explore the possibility of convening the 9th WWC in Mexico. After six months of meetings it was determined that there was sufficient potential for fundraising and substantive involvement in Mexico. After considering two or three other Latin countries the decision was made to convene the 9th WWC in Mexico. Part of this process was meeting with potential advisors from business, conservation, government, and the arts to determine what term to use for wilderness, and what to call the 9th WWC so that it would be easily understood, culturally relevant, and marketable. A location was chosen, an executive committee and advisory groups were formed, and work started in earnest to identify practical outcomes, create collaborative networks to accomplish them, and raise the finance to support more than two years of concerted activity. *Tierras silvestres* was the consensus choice for a Spanish term for wilderness. Dr. Exequiel Ezcurra—the renowned, highly regarded, and popular Mexican biologist and ecological thinker— agreed to chair the 9th WWC. WILD Nueve—Siente, Piensa, Actúa (WILD9: Feel, Think, Act) was underway.

WILD9 Results

Opened by Mexico's President Felipe Calderón, the WILD9 program was a diverse range of plenary and working sessions, and a large exposition of educational, commercial, and cultural displays. The plenary sessions featured 50 world leaders such as Dr. Jane Goodall; Dr. Sylvia Earle; Dr. Pavan Sukhdev; Chief Tashka Yawanawa; Grand Chief Samuel Gargan; government ministers; the heads of land management agencies from North America and other regions; Heinz Center director Dr. Thomas Lovejoy; Nobel laureate Mario Molina; Dr. Amory Lovins; Dr. Exequiel Ezcurra; leaders from Coca-Cola, Grupo Bimbo, and others.

- Forty-four targeted resolutions were adopted, and are available online at www.wild.org for discussion and reporting on outcomes.
- The "Message from Mérida (El Mensaje de Mérida)" is an international call to action with specific policy guidelines to integrate wilderness and biodiversity conservation into global climate change strategy. The message was delivered to the Copenhagen climate

Native people and traditional communities are an essential part of protecting wildlands and diverse cultures throughout the world. Tashka Yawanawa (Chief of the Yawanawa, Brazil) and wife Laura Soriano are key figures in this important movement. Photo by Vance G. Martin.

change negotiations with 85 organizational cosigners; it is still growing and will now target the next climate change negotiations in Mexico in 2010.

- The first international agreement on wilderness conservation, initiated by WILD and signed by the governments of Mexico, Canada and the United States.
- Launch of "Nature Needs Half," a science and common-sense based conservation vision and campaign that positions nature as a core concern of global development and human well-being (see below).
- The first-ever Corporate Commitment to Wilderness, a results-oriented initiative for wilderness, signed initially by 15 corporations and with others to follow.
- New protected areas in Mexico and elsewhere, including a new private sector commitment of 50,000 hectares (20,242 acres) in the Carpathian Mountains (Romania); the intention to create the first marine wilderness areas in the United States and territories; a new coastal mangrove protected area in Mexico; and the commitment to significantly increase protected area coverage in the Yucatan.
- Creation of six new intergovernmental working groups involving U.S., Canadian, Mexican, and other government agencies to stimulate ongoing collaboration on conservation matters concerning payments for ecosystem services; marine wilderness; recreation and visitor experience; fire management; wildlife and biodiversity; and public-private partnerships.
- Extensive government agency collaboration with NGO and indigenous partners to strengthen peer-to-peer networks and produce numerous targeted trainings, including:
  - The 2nd Global Wilderness Forum for Government Agencies
  - Wilderness management training (for 25 professionals from 15 countries and 4 tribal communities), plus the first accredited wilderness conservation training in Mexico (30 days with 25 NGO and government professionals)
  - Four-part payments for ecosystem services workshop
  - Climate change training for protected area managers
  - Wilderness policy for Latin American attorneys
  - Four-part global wildlands connectivity workshop
  - The second meeting of the Native Lands and Wilderness Council
  - Four two-day training sessions on wildlands and water
  - Science and stewardship sessions involving 200 professionals.
- Marine wilderness—The formal launch of the Marine Wilderness Collaborative to engage stakeholders in a consensus-driven process to define the term *marine wilderness* and set common objectives for the management of marine wilderness protected areas; launch of a New Vision for Protecting the Marine Wilderness of the Gulf of California.
- Wilderness and water—announcements by the Government of Mexico including:
  - A new and important national standard starting in 2010 that sets minimum standards of adequate water flow in rivers to support wild lands and natural systems
  - A national inventory of wetlands to determine the current state of these ecosystems, learn about the goods and services they provide, and consider measures for conservation and sustainable management.
- Engaging young professionals on substantive issues of wilderness, biodiversity, and climate change
- Communications and conservation—Integrating media, culture, public opinion, science, and policy:
  - Launching the new concept of wilderness as *tierras silvestres* (wilderness) in Latin American public awareness and for professional use
  - The International League of Conservation Photographers (established at the 8th WWC in 2005) convened WiLDSPEAK, the largest-ever assembled gathering of conservation photographers and their work; coordinated a four-day symposium; managed four large exhibit galleries; and implemented the Yucatan RAVE, in which 32 international photographers documented the Yucatan ecosystem for seven weeks prior to WILD9 and presented their work at the WILD9 opening, illustrating the unique features of this ecologically, biologically, and culturally important area.
  - Extensive use of new web-based communications tools to reach a large and diverse group of international participants beyond the delegates at WILD9
  - The world's first series of postage stamps dedicated to international wilderness (featuring Russia, South Africa, Mexico, and the United States) produced by Unidos para la Conservación/WILD and the Mexican Postal Service, and initiated at WILD9 by Mexico President Felipe Calderón

Conservation heroines and renowned scientists, Dr Sylvia Earle and Dr Jane Goodall, confer over one of Jane's "friends". Photo by Barca/Garcia Naranjo.

- Establishment of the International League of Conservation Writers
- Extraordinarily wide media coverage of WILD9 in national newspapers and mainstream magazines (such as *Este Pais*, *Elle*, *National Geographic*, in-flight magazines, etc.)
- The public launch of three new books on wilderness and protected areas, published in Spanish and English
- Local outreach, including daily participation in the WILD9 Expo and WildScreen film festival by thousands of Mérida residents, including local school groups of all ages; a project with local charities to create 20 life-size jaguar sculptures which now decorate the city of Mérida
- Body Painting—Applying the Ancient Art to Endangered Species and Spaces, a stunning evening exhibition by 20 artists and models documented by five of the world's top conservation photographers.

The Next Step—Nature Needs Half

For the first time in a WWC, WILD9 ended by outlining a new vision for WWC as it moves forward. Coordinated by The WILD Foundation, the Nature Needs Half initiative (originally "At Least Half Wild"): A science and common-sense based conservation vision and campaign that positions nature as a core concern of global development and human well-being, with a goal of protecting and interconnecting at least half of the world's lands and seas.

The mechanisms for such protection should be culturally appropriate and be implemented at a variety of scales, including international, national, provincial, aboriginal, regional, and municipal, as well as private individual, corporate, and NGO landowners. This is the right thing to do for ourselves and for everything that shares this beautiful planet with us. Wild nature is as necessary to our psychological well-being as it is to our ability to breathe clean air, drink pure water, and have a livable climate. The love of nature exists in every culture but it has been relegated to secondary status by the idea of "progress," modeled on the Industrial Revolution.

The "at least half" idea moves nature to the center of the human endeavor in the 21st century and away from being treated simply as another competing interest. Achieving it will require a global movement for the reintegration of the arts, sciences, business, efforts to address the climate and biodiversity loss, and the integration of the needs of wild nature with those of human society (see www.wild.org).

As the science, policy, and communications involved in Nature Needs Half are organized and underway with many collaborators, information will be collated and made available initially at www.wild.org, then on a dedicated website.

Acknowledgments

Special thanks to all of the WILD9 financial sponsors, program partners, and advisors; a complete listing of sponsors and partners is at www.wild9.org. A full archive of video, images, and other material on program outcomes is available at www.wild.org/main/world-wilderness-congress/wild9/. Contact Emily Loose, director of communications, at emily@wild.org for further information on WILD9 materials.

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Announcements

COMPILED BY GREG KROLL

John Hendee Receives Lifetime Leadership Award for Wilderness Education

Dr. John C. Hendee, University of Idaho emeritus professor and editor-in-chief of the *International Journal of Wilderness (IJW)*, was honored by the U.S. Forest Service with a Lifetime Leadership Award for Education in Wilderness Management and Stewardship. The Lifetime Leadership Award was presented to Dr. Hendee by Forest Service deputy chief Joel Hoeltrop, at a plenary session of the 9th World Wilderness Congress (WILD9) in Mérida, Mexico, November 12, 2009. Dr. Hendee worked for the U.S. Forest Service from 1961 until 1985, became dean (1985–1994) and professor at the University of Idaho, and retired in 2002. He was responsible for launching the *IJW*, coauthored four editions of the textbook *Wilderness Management*, the book *Wildlife Management in Wilderness*, and the 6th and 7th editions of *Introduction to Forests and Renewable Resources*.

John Hendee (*left*) receives a Lifetime Leadership Award for Education in Wilderness Management and Stewardship from U.S. Forest Service deputy chief Joel Hoeltrop at the 9th World Wilderness Congress in Mérida, Mexico.

John and Marilyn Hendee admire his Lifetime Leadership Award at WILD9.

Decade of Discovery Science Symposium

The U.S. Bureau of Land Management's (BLM) National Landscape Conservation System (NLCS) is celebrating its 10th anniversary in 2010. As part of the celebration, the BLM is sponsoring A Decade of Discovery Science Symposium, to be held May 24 to 28, 2010, in Albuquerque, New Mexico. Consisting of wide-ranging presentations, posters, panels, and field trips, the symposium will reflect on a decade of research and look forward to the future of science within the NLCS. The NLCS contains more than 27 million acres (10.9 million ha) of protected lands, including nearly 9 million acres (3.6 million ha) of designated wilderness. The symposium will provide an interdisciplinary forum for exploring research related to the BLM's wilderness and wilderness study areas, wild and scenic rivers, national scenic and historic trails, national monuments, and national conservation areas. Anyone who has been involved with research or land management issues within the NLCS is encouraged to attend. (Source: www.blm.gov/nlcs)

United States, Canada, Mexico Sign Wilderness Agreement

In a groundbreaking event for wilderness globally, high-ranking U.S., Canadian, and Mexican officials signed a Memorandum of Understanding (MOU) on Cooperation for Wilderness Conservation during the opening ceremony of the 9th World Wilderness Congress (WILD9) in Mérida, Mexico, in November 2009. In the words of Mexican President Felipe Calderón, who announced the MOU, "This agreement will make it easier to exchange successful experiences and facilitate monitoring and the training of human resources, as well as financing projects that will protect and recover wilderness areas."

The MOU provisions address ecosystems, migratory wildlife, and natural resources that are not limited by geographical boundaries; it also encourages cooperative efforts to conduct and share scientific research. The character of the agreement is cross-cultural and respects native approaches to conserving wild nature, accommodates indigenous customs, prioritizes species survival, and integrates national environmental policy. It recognizes the importance of wilderness conservation in climate change adaptation and mitigation.

Submit announcements and short news articles to GREG KROLL, *IJW* Wilderness Digest editor. E-mail: wildernessamigo@yahoo.com

The MOU was facilitated by The WILD Foundation and signed by representatives of seven agencies: the Secretariat of the Environment and Natural Resources of Mexico; Parks Canada Agency; the U.S. National Park Service, Fish and Wildlife Service, Bureau of Land Management, and Forest Service; and the U.S. Office of Ecosystem Services and Markets. A copy of the MOU is available at www.wild.org.

New Wilderness Social Network Is Launched

A new social network has been launched to facilitate conversations about pressing wilderness issues among federal wilderness managers and their partners. Built through the Ning platform, connect.wilderness.net strives to connect federal, state, and local government agency employees; academics, researchers, and K through 12 educators; and position-holding members of wilderness-related nongovernmental organizations around the topic of wilderness management and stewardship. "The underlying philosophy is that the collective wisdom of the network is greater than any individual," stated Lisa Eidson, webmaster of www.wilderness.net and creator of the social network website. "Through meaningful interactions we can connect people from the field, office, and classroom and facilitate communication around wilderness management issues to better serve and manage public wilderness lands." For additional information about this members-only social networking site and how to obtain membership, go to connect.wilderness.net.

Bison Repopulate Chihuahua Grasslands

A nine-year effort by conservationists resulted in the protection of a large swath of endangered Mexican grasslands when President Felipe Calderón designated the Janos Biosphere Reserve in December 2009. The first federally protected area in Mexico dedicated to the perpetuation of grassland ecosystems, the 1,350,000 acre (547,000 ha) preserve is located in the northern state of Chihuahua and has been identified as a critical component of the Spine of the Continent Initiative, a continent-wide effort to establish a 5,000-mile (8,000 km) long wildlife corridor between Alaska's Brooks Range and Mexico's Sierra Madre Occidental.

Within the Biosphere Reserve, The Nature Conservancy-Mexico (TNC-Mexico) manages the 46,000-acre (18,600 ha), privately owned El Uno Ecological Reserve. These lands were once populated by herds of bison (*Bison bison*), and now, through the efforts of the Mexican government, TNC-Mexico, and a consortium of Mexican environmental advocates, bison once again graze these prairies. Twenty young bison cows and three young bulls were shipped from Wind Cave National Park, South Dakota, to the reserve, with the ultimate goal of reestablishing herds in each of the four Mexican states where they were known to have historically occurred.

The Wind Cave herd, which numbers about 500, is one of only two genetically pure (no cattle DNA) wild bison herds in the United States. And unlike the genetically pure herd at Yellowstone National Park, Wind Cave bison don't harbor brucellosis, a disease that poses a potentially serious threat to the cattle industry. Steps are being taken to ensure there will be no contact between the recently reintroduced bison and an existing transboundary herd that moves back and forth between Chihuahua and New Mexico, and which is known to have some cattle gene retrogression.

The bison restocking program will benefit Mexico's mixed grassland ecosystem. The ungulates' presence will improve the habitat for a wide range of plants and animals, including the black-tailed prairie dog, the burrowing owl, the black-footed ferret (which was also recently translocated from the United States), and other important species of the southern Great Plains and Chihuahuan Desert. (Sources: wildlandsnetwork.org; www.nationalparkstraveler.com, November 4, 2009; www.nps.gov/wica/parknews/newsreleases.htm)

U.S. Forest Service OK's Helicopter Landings in Idaho Wilderness

The U.S. Forest Service has authorized the Idaho Department of Fish and Game to land helicopters in the Frank Church River of No Return Wilderness in order to collar wolves. Responding to Idaho State requests dating back as far as 2005, regional forester Harv Forsgren of the Intermountain Region, based in Ogden, Utah, has decided to allow a limited number of landings during Fish and Game's annual aerial surveys. The state and Forest Service say the landings, intended to collar up to 12 wolves, would produce valuable information on the 8 to 10 uncollared wolf packs in the wilderness. Idaho Fish and Game already landed once without permission in April 2009 after darting a wolf.

In spite of the fact that 95% of public comments opposed the landings, Forsgren declared that "too often people say you cannot do things in wilderness, but this is clearly a case where the activities are allowed under the Wilderness Act and our policies." Since Forsgren's decision cannot be administratively appealed, only litigation could stop it. (Source: *Twin Falls Times-News* [Idaho], December 18 and 23, 2009)

SPOT Users Trigger "Yuppie 911"

Backcountry adventurers are increasingly employing the SPOT Satellite Messenger (see *IJW* Digest, April 2009), a handheld communication and safety device, to call for rescue assistance whether they need it or not. According to Matt Scharper, the head of California's Search and Rescue operation, the contraption should be named Yuppie 911. "Now you can go into the backcountry and take a risk you might not normally have taken," Scharper says. "With the Yuppie 911, you send a message to a satellite and the government pulls your butt out of something you shouldn't have been in in the first place."

Grand Canyon National Park has been especially hard hit with unfounded SPOT rescue calls. In September 2009, the National Park Service (NPS) responded to a 911 call along the canyon's Tanner Trail. Just prior to the resulting early-morning launch of a NPS helicopter with rescue personnel, a ranger arrived on the scene to find three people asleep in their tents and in no need of assistance. One of the hikers claimed to have become alarmed during the night when her group ran out of water and she heard "odd" respiratory noises coming from the group's leader as he slept. At that point, she decided the group was in trouble, activated her SPOT messenger device, and promptly went back to sleep without making any contact with her hiking companions.

A more notorious abuse of the system occurred later that same month when rangers were advised of repeated calls for help from a rented SPOT device located on the canyon's challenging Royal Arch loop. Due to darkness and the remoteness of the site, rangers were unable to reach the distressed party via helicopter until the following morning. When found, the fathers-and-sons group had moved a mile and a half to a water source. They declined rescue although they had activated the device due to the lack of water. That night, the same SPOT device was activated, locating the campers less than a quarter mile from where searchers had found them that morning. This time an Arizona Department of Public Safety helicopter, whose crew utilized night vision goggles, was brought in. The hikers were concerned that the water they'd found tasted salty, but no emergency existed and the helicopter crew declined their request for a night evacuation. Finally, next morning another SPOT request was received from the same group. This time they were flown out by park helicopter and the group leader was cited for creating hazardous conditions for the rescue teams. He said he would never have attempted the hike had he not had the SPOT device.

There are instances when SPOT was used appropriately in the Grand Canyon. In November 2009, an individual with multiple fractures of his lower leg was short-hauled by helicopter from Elves Chasm, adjacent to the Colorado River, after alerting park authorities via his SPOT beacon. (Sources: Associated Press, October 26, 2009; Grand Canyon National Park district ranger office; www.nationalparkstraveler.com, November 18, 2009)

Desert Bighorns Ignore Kofa Wilderness Guzzlers

Remote cameras intended to detect desert bighorn sheep use at two controversial human-made water developments (known as guzzlers) constructed in Arizona's Kofa Wilderness in 2007 suggest the tanks have completely failed to attract bighorns (see *IJW* Digest, December 2007). The cameras, installed by the U.S. Fish and Wildlife Service (USFWS) at the McPherson and Yaqui Tanks, captured photos of mule deer, hawks, doves, vultures, coyotes, and bobcats, but not a single bighorn drinking from the tanks in the two years since their construction. A coalition of local and national conservation groups, including Wilderness Watch, the Sierra Club, and the Arizona Wilderness Coalition, filed a lawsuit in June 2007 after learning the USFWS had constructed one 13,000-gallon (49,200 liter) tank within the Kofa Wilderness and was planning to install a second. In 2008, the District Court in Phoenix ruled in favor of the USFWS. The conservation groups have appealed that decision to the U.S. Court of Appeals for the Ninth Circuit.

Following a decline in the desert bighorn sheep population in 2006, the USFWS issued a Categorical Exclusion (CE) under the National Environmental Policy Act to construct the tanks. The agency provided no public notice of, or opportunity to comment on, the CE or the decision to construct the tanks. The Arizona Game and Fish Department (AGFD) and the Yuma Valley Rod and Gun Club partnered with the USFWS in building the tanks. The AGFD's McPherson Tank Habitat Enhancement and Wildlife Management Proposal lists the benefiting species as bighorn sheep (90%) and mule deer (10%). AGFD's website also lists both the McPherson Tank and the Yaqui Tank in a table of "waters considered to be critical to bighorn sheep, based on their locations in sheep habitat and documentation of sheep use from waterhole counts, aerial surveys, and remote cameras." However, retired Kofa biologist Ron Kearns stated, "These waterholes were clearly constructed for desert mule deer as any wildlife biologist or hunter familiar with bighorn habitat would understand a priori." Wilderness Watch

obtained the camera data through two Freedom of Information Act requests. The data included more than 650 photos taken at the McPherson Tank and more than 3,500 images taken at the Yaqui Tank.

Congress designated the 516,200-acre (209,000 ha) Kofa Wilderness in 1990. The wilderness makes up more than 80% of the Kofa National Wildlife Refuge, established by President Franklin D. Roosevelt in 1939 as the Kofa Game Range. (Source: www.wildernesswatch.org)

New Zealand World Heritage Site Is Threatened

A leaked government report recommends that New Zealand remove up to 20% of Mt. Aspiring National Park from protection in order to allow for mining within this designated World Heritage Site. Minister of Energy and Resources Gerry Brownlee had previously announced a government review of the prohibition against mining and exploration in national parks. According to Rob Mitchell, president of the Federated Mountain Clubs, the proposal is a serious threat to the future of the "iconic" national park. The area of the park threatened with mining includes the Wilkin, Siberia, and Young Valleys, as well as the "stunningly beautiful" Mt. Brewster, he said. The report states that the park's northeast sector contains high "prospectivity" for at least 11 types of mineral deposits, particularly tungsten and rare earth elements. Bruce Jeffries, New Zealand's spokesman for the World Commission of Protected Areas, said the government's stance was disappointing and would damage New Zealand's international standing. (Source: *Otago Daily Times* [Dunedin, NZ], December 1, 2009)

Ecuador to Leave Oil Under Yasuni National Park

Ecuador's Yasuni National Park, created in 1979, encompasses nearly 2.5 million acres (1 million ha) of primary tropical rain forest at the intersection of the Andes, the Amazon River, and the equator. This UNESCO Biosphere Reserve is the ancestral territory of three tribes living in voluntary isolation: the Woarani, the Tagaeri, and the Taramenane. Considered to be one of the world's most biologically important tropical rain forests, Yasuni is critical habitat to 23 globally threatened mammal species, including the giant otter, the Amazonian manatee, the pink river dolphin, the giant anteater, and the Amazonian tapir. Ten primate species live in the park, including the threatened white-bellied spider monkey. Yasuni contains what are believed to be the greatest variety of tree and insect species on the planet. However, oil extraction from within the Yasuni area was begun several decades ago by Texaco, followed by several other foreign oil companies. Scientists say this exploitation has resulted in pollution of the land and rivers, deforestation, and poisoning resulting from toxic water seeping into the Amazon River system.

Ecuador has taken the initiative to help protect Yasuni National Park, as well as the world climate, by agreeing to leave this, its largest oil reserve, in the ground in exchange for a multi-donor trust fund that will offset lost oil revenue. The Ecuadorian government has asked for compensation of $350 million a year for 10 years for keeping the oil in the ground in the Ishpingo, Tampococha, and Tipuntini (ITT) regions. Prohibiting the extraction of an estimated 850 million barrels of crude oil will not only help preserve the rain forest, it will prevent the release of an estimated 407 million metric tonnes (449 million U.S. tons) of carbon dioxide into the atmosphere.

The trust fund will be managed by the United Nations Development Programme. In addition to permanently foregoing extraction of fossil fuels from the park, the initiative seeks to develop alternative energy programs, protect indigenous groups, and reduce poverty and inequality through sustainable social development. According to Matt Finer of Save America's Forests, "The establishment of the trust fund is a critical, and long-awaited, step towards making the Yasuni-ITT Initiative a success … we will soon see what countries are serious about backing this revolutionary initiative." (Source: Environment News Service, December 21, 2009)

Romania Criticized for Ignoring Protected Natural Areas

Romania was criticized at the Copenhagen climate summit after United Nations (UN) experts concluded that the country is the only European Union member that did not treat its protected areas seriously, according to Radio Romania. The UN report concluded that some areas are protected only on paper, that there are no long-term management plans, that there is no national authority for administering protected areas, and that no funds are budgeted for their conservation. The Copenhagen report comes after the European Union sued Romania in September 2009 at the European Court of Justice for these shortcomings. If Romania ultimately loses the trial, the country could forfeit tens of millions of Euros destined for environmental conservation. (Source: www.hotnews.ro, December 10, 2009)

Book Reviews

Wilderness in National Parks: Playground or Preserve

By John C. Miles. 2009. University of Washington Press. 344 pages. $35.00 (paperback).

Two definitions of *wilderness* exist: one is a subjective definition continuously shaped by social and cultural attitudes and values, and one is legislative and/or policy directed, created by various political agencies. A critical question in every nation that debates the need for and management of wilderness is how the former definition affects the latter (and vice versa). In *Wilderness in National Parks*, John Miles examines how the subjective definition of *wilderness* affected the establishment of designated wilderness areas in American national parks.

Miles' analysis of the influence of the wilderness concept on national parks is wide-ranging, but focuses on: (1) the impact of special interest groups on National Park Service (NPS) wilderness policy, (2) the impact of the bureaucratic battle between the NPS and the Forest Service (FS) in focusing the agencies' attention on the wilderness issue, and (3) the political reasons why NPS administrations were challenged by the wilderness concept. Miles suggests that the NPS was "continually conflicted" (p. 189) about wilderness in national parks. Although the preservation of wilderness character "became an integral mission of those advocating and caring for the parks" (p. 23) from the beginning, the NPS became almost totally focused on increasing visitation in order to ensure public and political support for the national parks; wilderness was simply expressed as those areas *not* being developed in national parks.

Miles suggests this long-time (and still existing) perception of wilderness as undeveloped national parkland was increasingly challenged by a number of overlapping forces. The constant battles with the FS provided one impetus to embrace wilderness in national parks, as did the growing view of park biologists that undeveloped lands were not necessarily wilderness, and pressure from special interest groups who were concerned about the NPS's focus on park development. At the same time, national park administrators were also very worried that designating wilderness areas would result in a loss of "administrative discretion" (p. 200) over much of the national park system.

Although Miles's analysis discusses events from the beginning of national parks to the present, the book focuses on the 1920s and 1930s, when the nascent agency began articulating its perspectives on wilderness, and the 1950s to 1970s, when the long awaited passing of the Wilderness Act required a reluctant NPS and other land management agencies to identify potential wilderness areas on federal lands. The central theme, according to Miles, was the ever-present tension in the NPS between the development of the front country and leaving the remainder "unimpaired for the enjoyment of future generations" (i.e., as wilderness). *Wilderness in National Parks* is an outstanding addition to the wilderness literature, an impeccably researched, well-argued work that provides important new perspectives on how the wilderness concept was perceived and incorporated by American national park administrators and bureaucrats in the 20th century.

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The Great Experiment in Conservation: Voices from the Adirondack Park

Edited by William Porter, Jon Erickson, and Ross Whaley. 2009. University of Washington Press. 344 pages. $35.00 (paperback).

Adirondack Park has always been unique. Although many of the reasons behind its establishment in 1885 were similar to other early protected areas (e.g., concern over the private sector's tendency to destroy nature-based tourist attractions), there were important differences too. The combination of private and public land in the larger-than-normal park and the inclusion of communities in the park were very unusual. So too was the 1894 legislation that called for the public lands to be "forever kept as wild forest lands" (p. 134) and the regional planning process begun by the creation of the Adirondack Park Agency in 1971. In many ways, sometimes on purpose, sometimes by accident, the Adirondack Park attempted what would later be called "sustainable development" on a

regional scale, attempting to find a balance between preservation and use.

The passionate authors all are aware of the unique history and properties of Adirondack Park, and the range of topics and viewpoints they provide is a key strength of this book. Although pro-environmental voices dominate, those focused on championing individual and community interests are also heard. As several authors note, the essence of the lengthy, contentious debate over the management of Adirondack Park really centers around the private/public land split, and the role of government in regulating individual rights for the good of the many. As Terrie notes, "In the Forest Preserve we have nature, and on some of the private land we have often unfettered, laissez-faire individualism" (p. 360). Or, as Schneider suggested in an earlier book on Adirondack Park, we "need to find an acceptable definition of wilderness that can survive our culture's seemingly insatiable desires" (p. 497).

The Adirondack Park is an admirable, yet highly contested microcosm of contemporary global society. Wilderness has been both romanticized and commodified, and individuals demand power and actions that diminish nature and society. How will we find that elusive balance? As the editors suggest in the final chapter, "if we are to find a means of sustaining a vibrant economy amidst a wilderness ecosystem, we will need to forge a new consensus for a shared vision not just within the Adirondacks, but within our larger society" (p. 533). In a world seemingly becoming more divisive each day, how will we create this shared vision?

No one book can answer these questions, but this book does provide an interdisciplinary, integrated discussion of the promises and challenges of the unique microcosm called Adirondack Park. By doing so, it paints a wonderfully challenging picture of the battles we will face in maintaining both wilderness and society for a truly sustainable future. By assessing the past, present, and future of the Adirondacks, it serves as a wake-up call for those attempting to create a shared vision for humankind and wilderness on a global scale.

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and marine), ecosystem services, communicating conservation priorities, wilderness and people (including relationships with local constituencies), comanagement by indigenous communities and governments, and sustainable financing (including corporate commitment and public-private partnerships). Many of these themes are relatively foreign to the traditional focus of government scientists.

The importance of good science upon which to base sound conservation decisions has never been greater. The sustainability and resilience of our most intact remaining natural ecosystems depend on it. We need to better understand the integrity of and ecological services provided by wilderness, as well as the threats to such. We also need to better understand the human factors, including values and relationships associated with natural ecosystems. Ultimately, we need to understand, evaluate, and communicate tradeoffs between the difficult societal decisions that must be made and how those decisions will affect both natural and human resources. Science can help reduce the uncertainty behind such decisions, but it will not make the decisions. It was in this context that one suggestion on how we should proceed particularly caught my attention at WILD9: the importance of managing for redundancy and surprise. This approach, suggested by Lisa Graumlich of the University of Arizona, recognizes how the uncertainties we face are only compounded by a changing climate.

Another clear message from WILD9 was that science, although important, is not sufficient. The arts, including nature photography and writing, and experiential engagement also have a critical role to play in global conservation. We have to bring all of our diverse resources to bear if we are to succeed in this enormous challenge. Perhaps Jane Goodall said it best in her plenary discussion of the reasons she sees for hope in the face of what some see as discouraging odds. She identified the human mind, the human spirit, the resilience of nature, and children as the greatest reasons she has hope that we will be able to regain the wisdom needed to save our home.

I cannot think of a more important experience for the managers and scientists working in federal land management agencies than participating in the kind of international conservation forum offered by WILD9. It broadens your perspective, putting your work in a context that day-to-day pressures make difficult to appreciate. It is both a humbling and exhilarating experience.

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