INTERNATIONAL

Journal of Wilderness

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

On the Cover

FRONT: Black Coral (order *Antipartharia*), The Passage, Rajah Ampat, near Kri Island, Indonesia. Photo © David Doubilet

INSET: Underwater photographer Dan Baldocchi photographs a group of young villagers from the island of Pura, near Alor, Indonesia. Photo © Sterling Zumbrunn

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.

International Journal of Wilderness (IJW) publishes three issues per year (April, August, and December). *IJW* is a not-for-profit publication.

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Business Management and Subscriptions: The WILD Foundation, 717 Poplar Ave., Boulder, CO 80304, USA. Telephone: (303) 442-8811. Fax: (303) 442-8877. E-mail: info@wild.org.

Subscription rates (per volume calendar year): Subscription costs are in U.S. dollars only—$35 for individuals and $55 for organizations/libraries. Subscriptions from Canada and Mexico, add $10; outside North America, add $20. Back issues are available for $15.

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

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EDITORIAL PERSPECTIVES

Fish and Wildlife Service Wilderness Stewardship Policy

BY CHAD P. DAWSON

The U.S. Fish and Wildlife Service (FWS) published in November 2008 (73 FR 222: 67876-67882) an update of their 1986 policy on wilderness stewardship to direct implementation of the U.S. Wilderness Act of 1964 within the refuge system. The draft of this new policy had been first announced in Federal Register in January 2001 (66 FR 3708), and more than 4,130 people sent in comments and suggestions during 2001. The FWS staff considered the information and various suggestions and recommendations for changes, and responded with a new policy on November 17, 2008. The lengthy review process since 2001 and the final policy have stirred some controversy, especially related to national refuge system lands in Alaska that are reportedly exempt from wilderness reviews (see related Digest item in this issue of *IJW*).

The revised FWS policy means that all four federal wilderness management agencies (including the National Park Service, Forest Service, and Bureau of Land Management) have revised their wilderness stewardship policies since 2000 to be in compliance with policy changes within their agencies and other legislative changes related to implementing the 1964 Wilderness Act. The public documentation of each agency's policies related to wilderness stewardship and management provides a mechanism by which to review the direction of the agencies in their work within the 107-million-acre (43.3-million-ha) National Wilderness Preservation System. Whether we agree or disagree with the FWS or other federal agency policies on wilderness, we now have written documentation by which we can interact in any of the three branches of government to support or challenge those policies and directions: Do they support the intent and goals of the 1964 Wilderness Act or not? Evaluating wilderness stewardship actions and outcomes of the four agencies over time will tell us the answer.

In this issue of *IJW*, Harvey Locke relates the exciting progress in extending protected areas and wilderness policy goals in Canada, especially related to the initiative to protect at least 50% of the boreal forests in northern Canada. Two articles on ecology in the southwestern United States and northern Mexico relate to some of the challenges in understanding and planning for protecting the ecology of the inland archipelago mountain islands, or what Matt Skroch refers to as "sky islands," and Craig Deutsche ponders the need to provide artificial water sources for wildlife that have become isolated from surface water sources needed for survival.

David N. Cole and Thomas E. Ferguson outline the management approach used in the Caney Creek Wilderness to reduce campsite impacts, and Christopher A. Monz reports on the perceptions of rock climbers on recreation resource impacts in the Giant Mountain Wilderness of New York State. The second *IJW* article in a series on the Carpathian Mountains is presented by Michael C. Baltzer, David Strobel, and Vlado Vancura who tell the story of "The Wild Heart of Europe" in a historic context.

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Canada Increases Wilderness Protection and Policy Goals

BY HARVEY LOCKE

The years 2007 and 2008 have seen major advances in wilderness protection in Canada at the level of both policy and outcomes. Led by the Canadian Boreal Initiative and the Canadian Parks and Wilderness Society, calls for protecting at least half of Canada's public lands and waters are starting to take hold in public policy. Because Canada is the second largest country on Earth, and at least 90% of it has some aspect of public ownership, such an agenda is of global significance.

Protect "At Least Half" of the Boreal Forest

The public goal of protecting at least half of Canada's vast

Figure 1—Cirque of the Unclimbables in the Nahanni Park expansion area. Photo by Harvey Locke.

boreal forest was first articulated in 2003 through the Boreal Conservation Framework led by the Canadian Boreal Initiative. Its founding signatories were conservation groups (Canadian Parks and Wilderness Society, World Wildlife Fund—Canada, and Ducks Unlimited), some First Nations, and a few enlightened industrial players. To give a sense of scale, Canada's boreal forest is 6 million square kilometers (2.3 million sq. mi.) in size and contains 25% of the world's remaining intact primary forest (Bryant et al. 1997). It contains enormous blocks of roadless wilderness bigger than many countries, vast free-flowing rivers, millions of acres of wetlands, and is home to grizzly bears and caribou, as well as millions of migratory songbirds and waterfowl. About 600 aboriginal communities are located in it (many without year-round road access), and many people pursue traditional subsistence harvesting activities. It is also home to some of the largest hydroelectric projects on Earth (e.g., province of Quebec), the world's second largest oil deposit (Alberta's tar sands), a large forestry industry, and globally significant mineral deposits ranging from nickel to iron ore to diamonds. In 2003, there were only a few really large protected areas present in the boreal forest, such as Wood Buffalo National Park, Alberta and Northwest Territories (44,802 sq km; 17,298 sq. mi.), and the Muskwa Kechika Management Area in northern British Columbia (6.3 million ha; 15.5 million acres).

In 2005, the Canadian Parks and Wilderness Society (CPAWS) adopted the goal of protecting at least half of Canada's public lands and waters, which includes not only the boreal forest, but also Arctic, freshwater, and marine areas in the north and other natural ecosystems farther south. In 2008, the Mountain Equipment Co-op, Canada's largest outdoor retailer, joined forces with CPAWS to launch "the Big Wild," a public engagement project designed to promote the idea of protecting at least half of Canada's areas with wilderness characteristics.

Figure 2—Dumoine River in Quebec. Photo by Harvey Locke.

Canada is a country with provincial control over large areas of natural resources and federal control over navigable waters and oceans and some lands in the north. In addition, there are variety of different title arrangements relating to aboriginal groups and their use and ownership of lands. Thus, nature conservation is done by different levels of government, depending on where the areas are and who has jurisdiction.

This target of "at least half" is materially more ambitious than previous conservation targets that were set with a view to achieving representation of natural ecosystems. Representation is the basis of the federal government's plan to complete Canada's national park system. In 1990, the Endangered Spaces campaign set a goal of representing at least 12% of each of Canada's natural regions by the year 2000. The campaign did not meet its goals everywhere, but made material progress in British Columbia, Alberta, Manitoba, Ontario, and Nova Scotia and was successful moving the national level of protection up from 2.9% to 6.8% of the land area in 10 years (MacNamee 2008).

However, during the same period, conservation science demonstrated that representing natural systems was only one of the components that effective protected area systems need to consider. Protected area systems also need to be connected in order to protect

Calls for protecting at least half of Canada's public lands and waters are starting to take hold in public policy.

Figure 3—Otoskwin River in northern Ontario. Photo by Harvey Locke.

wide-ranging species, to provide secure breeding and rearing areas for wildlife, and to be of sufficient size to absorb natural disturbance events such as fire and flooding without losing all existing habitat (Locke 2009). By the 21st century, it was clear that the level of protection needed to be moved up to the landscape scale with interconnected networks of protected areas containing at least half of the natural systems (Schmiegelow et al. 2006). Interestingly, this scientific research corresponded to public research findings that showed Canadians wanted even more than half of the boreal forest protected (McAllister Opinion Research 2008).

Canadian Relationship with Wilderness

Canadians have a deep and nuanced relationship with the wilderness. Wilderness experiences of high quality are available close to every major city except Toronto (and even there it is only three to four hours of travel away). James Polk in *Wilderness Writers* wrote:

> From the beginning writing in Canada has centred on the wilderness. ... This is because wilderness to us is more than just empty space out there: it is part of every Canadian's idea of himself and his country. Even if he has never been out of downtown Montreal or suburban Vancouver, in his imagination he belongs to a place of thundering rivers, untrodden forests, spacious plains, sublime icefloes, and untamed animals. Without the land, what would we be? (1972, pp. 13–14)

Canada's visual arts have strong ties to the wilderness and the vastness of the land is a point of national pride. Political leaders often refer to the special role wilderness plays in the Canadian psyche. For example, Liberal Pierre Elliot Trudeau, who was Canada's prime minister in the 1970s and a passionate wilderness canoeist, wrote in 1944: "I know a man whose school could never teach him patriotism but who acquired that skill when he felt in his bones the vastness of his land, and the greatness of those who founded it" (Trudeau 1970, p. 5).

On November 25, 1992, the Ministers of the Environment of every province and the Canadian federal government (no matter what their political affiliation) signed a declaration entitled a "Statement of Commitment to Complete Canada's Networks of Protected Areas," which included the following language:

> On the occasion of Canada's 125th anniversary, the Canadian Council of Ministers of the Environment, the Canadian Parks Ministers' Council, and the Wildlife Ministers' Council of Canada have come together to recognize that: Canada's natural heritage—its wildlands, waters and wildlife—unites and defines us all as Canadians. Canada has a special global responsibility to protect its natural heritage given that Canada is steward of almost 20% of the planet's wilderness (excluding Antarctica), 20% of its fresh water, and 24% of its remaining wetlands. (Canadian Council of Ministers of the Environment, Canadian Parks Ministers' Council, Wildlife Ministers' Council of Canada. 1992)

Although Canada is very urbanized, it also has many one-industry towns with resource extraction economies based on logging, mining, or oil and gas. At the same time, there is a large wilderness outfitting industry in Canada. The Canadian relationship with wilderness is complex and ambiguous.

Canadians tend to equate any form of protected area designation with wilderness protection and biodiversity conservation. In Canada, there is not a wilderness act of broad national application, although there are some specifically designated wilderness areas under specific laws. Certain landscapes such as Banff National Park and

Algonquin Provincial Park are national icons. In 2004, CPAWS and the Dehcho First Nations mounted a high visibility national campaign calling for the protection of another iconic landscape—the South Nahanni watershed.

The heightened global public concern about climate change in 2006 provided a major catalyst for wilderness conservation in Canada. This is due, in part, to the fact that Canada's boreal and Arctic biomes are huge storehouses of terrestrial carbon (Luyssaert et al. 2008) and more significant for carbon storage than tropical forests (Mackey et al. 2008). Leaving the wetlands, peatlands, and tundra intact is both a first order climate change mitigation and an adaptation strategy. Canada's performance on meeting its environmental targets under the Kyoto protocol of the United Nations Framework Convention on Climate Change has been very poor because it is a globally significant producer of oil and gas, has vast coal reserves, and has a very large automobile industry. Nature conservation is one way for Canada to get closer to its environmental targets.

Increased Public Policy to Protect Wilderness

The net result of these combined factors has been a major surge in wilderness conservation in Canada in 2007 and 2008, and there are examples from various jurisdictions across the country.

- The first area to achieve protection of at least half of its land area was the Queen Charlotte Islands, the traditional territory of the Haida people. Half of the vast temperate rain forests of these Pacific Islands are receiving protection through a combination of national park and provincial designations that involve aboriginal comanagement. Many years of campaigning by NGOs bore fruit in 2007 when the federal government joined the province of British Columbia, First Nations, and some philanthropists to protect, through a complex written agreement, the Great Bear Rainforest in a conservation matrix that covers an area of 8.75 million hectares (21.6 million acres) and created 110 "conservancies" in about one-third of the area. Steps remain to fulfill all

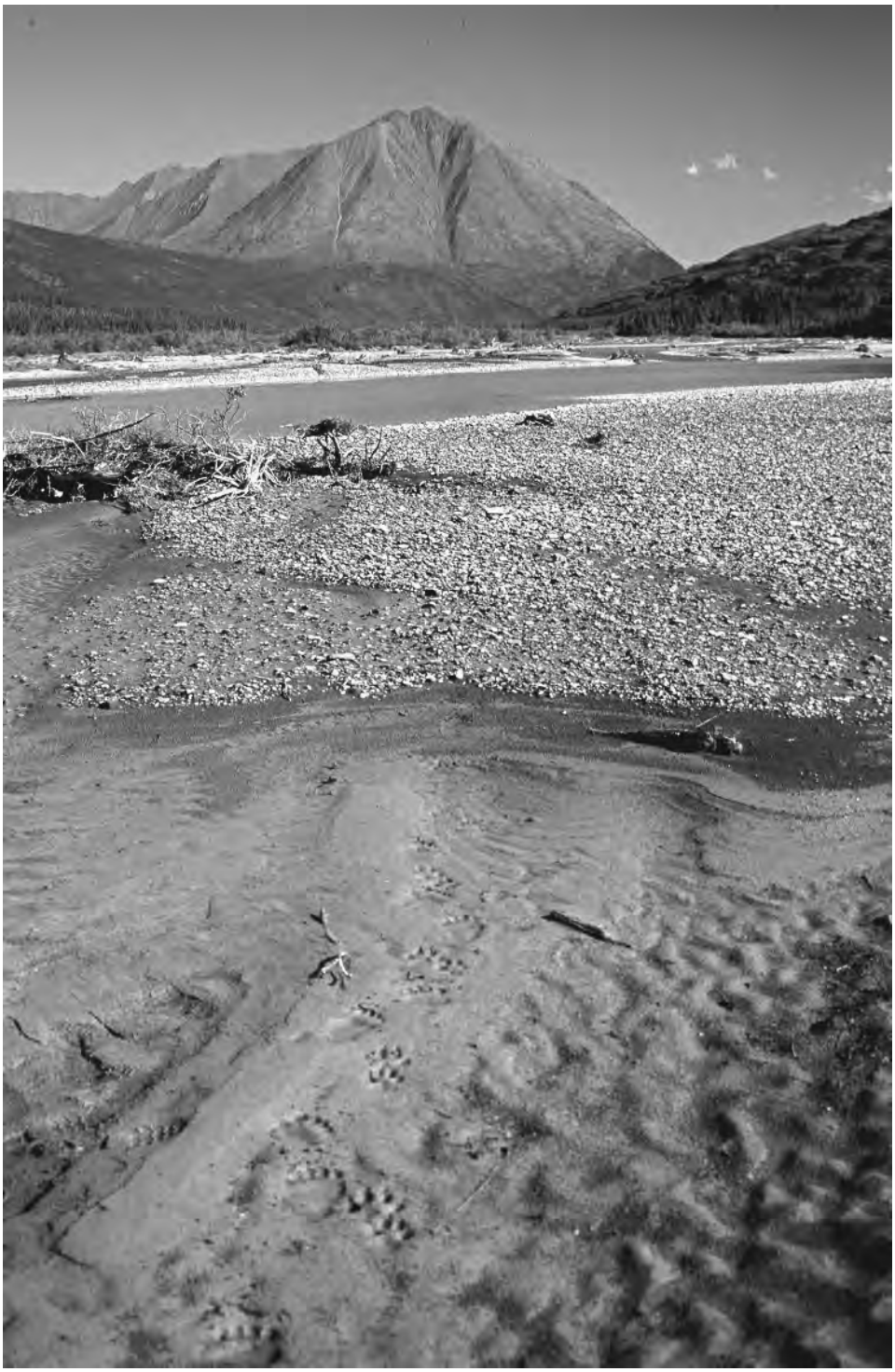


Figure 4—Grizzly bear and wolf tracks along the Snake River in the Yukon. Photo by Harvey Locke.

aspects of the agreement, such as conservancy management planning, the enactment of biodiversity areas, and establishing a regional plan for conservation outside of protected areas (www.savethegreatbear.org).

- After years of work by NGOs, the federal government, with the agreement of aboriginal communities, moved to protect on an interim basis several very large areas in the Northwest Territories, including almost all of the spectacular watershed of the South Nahanni River (36,400 sq km; 14,054 sq. mi.), the Ramparts Wetlands (15,000 sq km; 5,792 sq. mi.), the East Arm of Great Slave Lake (26,350 sq km; 10,174 sq. mi.); and Sahoyue Ehdacho was also permanently protected (5,550 sq km; 2,143 sq. mi.).
- The province of Nova Scotia passed a law in 2007 requiring protection of at least 12% of the province, it created a new wilderness area near Halifax, and it appropriated funds to buy private forestlands for public wilderness protection.
- The federal government announced plans to make a very large "marine" conservation area in Lake Superior.
- Quebec moved from less than 1% protection in 2000 to more than 6% protection (mostly on an interim basis) in 2008. Quebec is almost as big as Alaska, and each percentage point of Quebec is about 18,000 sq km (6,950 sq. mi.).
- Manitoba finally moved in 2008 to eliminate all logging from its considerable park network (with one exception).
- The most spectacular wilderness conservation event was the announcement by Premier Dalton McGuinty of Ontario in July 2008 that at least half of that province's vast Far North would be protected. A land use planning process is being developed with that policy at the center and with a goal of about 225,000 sq km (86,873 sq. mi.) of boreal forest, wetlands, and tundra being protected.
- In November 2008, during the provincial election campaign, which his party won, Quebec premier Jean Charest promised to protect at least half of Quebec north of the 49th parallel. This area would amount to 70% of the province, and the area protected would cover an area about the size of France.

Wilderness conservation has tended to come in waves that correspond strongly to periods when civil society has been engaged in advancing a public agenda in favor of conservation.

Perhaps the most encouraging aspect of the recent surge in wilderness protection in Canada has been a fairly broad public consensus that landscape conservation at a major scale needs to be implemented. In the 2008 federal election campaign, both the Liberals and Greens adopted the goal of protecting at least 50% of the land area, and the Conservatives committed to completing the national park system. These words from Conservative prime minster Stephen Harper's speech at the Bonn 2008 meeting of the Convention on Biological Diversity reflect the current national mood in Canada:

> I'd like to conclude with a quotation by the Pulitzer Prize–winning author Wallace Stegner. Stegner evoked the beauty and tranquility of the Canadian Prairies in a way that in my opinion has never been surpassed. In 1960, long before environmentalism became a galvanizing public issue, Stegner urged us to conserve and protect biodiversity in a famous tract called his *Wilderness Letter*. Let me quote from it. He said: "We need wilderness preserved—as much of it as is still left and as many kinds—because it was the challenge against which our character was formed." Ladies and gentlemen, the preservation of our wilderness today and into the future is the challenge against which our character will be measured. (Harper 2008)

Alas, not all governmental jurisdictions in Canada are performing at an acceptable level when it comes to wilderness conservation. Noted laggards in adopting new policy and initiatives are the Yukon Territory, Nunavut, and New Brunswick; the federal government's record in marine conservation is also very poor.

Wilderness conservation in Canada does not happen solely at the behest of enlightened governments. Wilderness conservation has tended to come in waves that correspond strongly to periods when civil society has been engaged in advancing a public agenda in favor of conservation (Locke 2009). Whether all these recent announcements will result in permanent protection of these vast areas of Canada

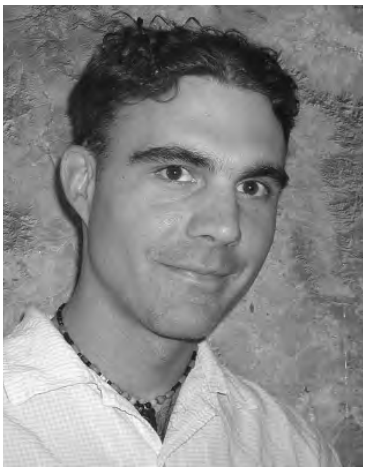
Continued on page 14

The Sky Islands of North America

A Globally Unique and Threatened Inland Archipelago

BY MATT SKROCH

From atop a mountain peak in southeastern Arizona, one's gaze falls upon a folded fabric of earth that strikes awe, resonates beauty, and hosts one of the most biologically diverse corners of the world. It is a place of subtropical oaks, soaring pine-clad cliffs, and undulating hills of grassland and forest (see figure 1).



Author photo: Matt Skroch.

The Madrean Archipelago of the North American continent is a globally unique region where several major biological provinces overlap, creating an explosion of life found nowhere else. Commonly referred to as the Sky Island region, this territory of isolated, forested mountains surrounded by seas of grassland tells a fascinating story of evolutionary convergence and unparalleled diversity. Its native inhabitants include an unusually rich assemblage of mammals and birds, including jaguars (see figure 2), thick-billed parrots (see figure 3), ocelots, Mexican gray wolves, and, though now extirpated, grizzly bears.

In addition to its rich biological diversity and wildland qualities, the Sky Island region is renowned for its human history and culture as well. The famed battles of Apache legends Geronimo and Cochise played out upon the plains and canyons of the Sky Islands, and Mexico's revolution incubated in Cananea just south of the present border. Although divided today by international borders, the Sky Island Frontera is ecologically and culturally firmly united with its past.

Biogeography of the Sky Islands

One hundred miles northeast of Tucson, Arizona, the southern terminus of the Rocky Mountains and Colorado Plateau jut into central Arizona and western New Mexico with iconic snow-capped peaks and montane rivers. These thick forests and deep canyons form the Mogollon Rim, where the last bulwark of neartic species reside before mingling with the increasing neotropical elements to the south.

The Gila, Apache, and Coronado National Forests of this northern Sky Island region played host to a young forester named Aldo Leopold, who arrived there to survey timber in 1909. Fewer than 20 years later, Leopold jumpstarted the U.S. conservation movement by successfully setting aside almost a million acres (404,858 ha) of the Gila National Forest as the first official wilderness area. Today, more than 1.5 million acres (607,287 ha) of congressionally designated wilderness exists across the region in addition to 1.5 million acres (607,287 ha) of inventoried "Roadless

Figure 1—Southeastern Arizona landscape. Photo courtesy of Matt Skroch.

Figure 2—Jaguar. Photo courtesy of Matt Skroch.

Areas." Conservationists have identified more than 1 million acres (404,858 ha) of additional public land that are suitable for permanent protection.

Southward, along the Sonora-Chihuahua border of northern Mexico, the Rocky Mountain's sister spine of North America—the mighty Sierra Madre Occidental—rises up with subtropical forests of pines and parrots with its Sky Island outliers that span the international boundary. Here, an entirely different set of biological relationships have evolved over the millennia, adapting to warmer temperatures and strong connections to the Western Hemisphere's tropical latitudes. Elegant trogons, gray hawks, and military macaws squawk along streams, challenging U.S. traditional notions of the Southwest as an arid desert and highlighting just how far the subtropics reach northward. The Mexican Commission on Biodiversity, CONABIO (Comisión Nacional para el Conocimiento y uso de la Biodiversidad), recognizes this region as one of the country's highest priorities for conservation due to its remoteness, relatively intact ecology, and high biodiversity.

Figure 3—Thick-billed parrot. Photo courtesy of Matt Skroch.

Between and connecting these two massive continental backbones, 40 distinct mountain ranges form the Sky Island region of North America (see figure 4). The north-south junction of two major cordilleras spanning the temperate and subtropical latitudes is unique among the approximately 18 inland archipelago complexes throughout the world (Warshall 1994).

A large floristic division occurs on an east-west axis in the Sky Islands. Spanning the lower elevations of western Arizona and northwestern Mexico, the Sonoran Desert and its iconic towering saguaro cacti extend eastward into the higher elevations. The cities of Magdalena, Sonora, and Tucson, Arizona—which both sit at the eastern edge of the Sonoran Desert—mark the relatively firm transition zone from Sonoran to Madrean biotic divisions (Brown 1982). East from there, the Sky Island landscape bridges the lowest gap in the continental cordillera between northern Canada and the Isthmus of Tehuantepec before the Chihuahuan Desert to its east.

These two major bioregional convergences—the north-south span of the temperate and subtropical, and the east-west overlap of the Chihuahuan and Sonoran Deserts—bring together life-forms that have significantly different evolutionary histories. The unique and almost bizarre floral and faunal associations that exist throughout the region are testament to these overlaps and convergences.

Topographical Complexity

The great topographical relief created between the region's mountain islands and desert seas creates a third phenomenon called biotic stacking (Marshall 1957). Naturally, lower elevations are hotter and drier, whereas higher elevations are cooler and wetter. Valley floors within the Sky Island region vary between 800 and 1,400 meters (2,625 and 4,593 ft.), whereas isolated mountains peaks reach 1,900 to 3,500 meters (6,234 to 11,483 ft.). Plants and animals stack themselves in tight associations at specific elevations with 40 distinct Sky Island mountains each providing up to 2,000 meters (6,617 ft.) of

elevation gradient from valley to peak within a matter of several miles.

Consider the tallest of Sky Islands, the Pinaleño Mountains of southeastern Arizona. Beginning at the valley floor on the banks of the Gila River, one walks among irrigated cotton fields surrounded by typical Sonoran Desert—saguaro and cholla cactus, ocotillo, and creosote. Heading upward and hiking towards the peak, one travels through no less than eight distinct zones: desert, semiarid grassland, chaparral, piñon-juniper woodland, Madrean evergreen oak woodland, Ponderosa pine forest, mixed conifer stands of Douglas fir and white pine, and eventually a true spruce-fir forest with burbling creeks and quaking aspens. Instead of days, the hike takes mere hours. Biotic stacking is bound to make for interesting associations of life. Imagine saguaro cacti opposite ponderosa pines, black bears lumbering downhill to eat prickly pear fruit, or a jaguar peering through the trees to gaze inquisitively at an elk.

Biodiversity

In the Chiricahua Mountains—the place that inspired the original coining of the term "Sky Island" in 1958 by author Weldon Heald—you will find more than half of all bird species that occur in the United States (Fischer 1994). In almost every Sky Island mountain, a different subtropical bird species reaches its northern limit; the Sinaloan wren in the Sierra Azul, the white-faced hummingbird in the Huachuca Mountains, the five-stripped sparrow in the Santa Rita Mountains, and the elegant trogon in the Chiricahuas, to name a few.

Less well known is that the Sky Island region hosts 104 species of mammal—double that of Yellowstone National Park. Javelinas, coatis, bighorn sheep, black bears, black-tailed prairie dogs, and many more make their home here, including 29 species of bat (Felger and Wilson 1994). In recent years, the jaguar and ocelot have returned, or perhaps were discovered again after several decades of absence. The grizzly bear was extirpated in the 1930s, and the last wild Mexican gray wolves were killed or captured in the late 1970s (Brown 1983). Today, the wolf has returned to the wild through a recovery effort led by U.S. federal and state agencies. While this U.S. program struggles to succeed, Mexico is currently considering wolf recovery plans as well, potentially adding to the return of one of the Sky Island region's most iconic species.

Figure 4—Location of the Sky Islands region. Map courtesy of Matt Skroch.

It would be remiss not to mention the herpetofauna of the Sky Islands, with 56 species of snake, 29 frogs and toads, 37 lizards, and 11 turtles. The U.S. portion of the Sky Islands is the richest in the country for herpetological species. Eight endemic species have evolved since the last ice age, having been stranded upon various mountain islands as glacial retreat brought warmer temperatures and isolated their habitat to higher elevations. This phenomenon is not exclusive to reptiles and amphibians. It has affected a number of mammals and plants unable to withstand the challenge of transmitting their genes, in some cases, just 5 or 10 kilometers (3.1 to 6.2 mi.) across the valley to a neighboring Sky Island. As time persists, evolution's invariable impact slowly changes the physiological or morphological traits of life to best match the specific conditions that develop. Today, the elevational migration of wildlife and its habitat faces a new challenge. Climate change is causing additional upward migrations on the Sky Islands, and species are literally being "pushed off" the top of the mountain (i.e., have no higher elevations to migrate into).

Threats

The ecological system within the Sky Island region is complex, diverse, and fragile. Unfortunately today, the ecosystem is being dismantled piece by piece. The greatest threat to the region's natural heritage is not unlike that which plagues our planet's other biodiversity hotspots—habitat loss and fragmentation—although its progression is occurring at breakneck speed here.

Historically, species often declined, became extinct, or became extirpated (i.e., local population extinctions) at

Figure 5—Hikers on Mt. Graham. Photo courtesy of Matt Skroch.

the hands of government trappers and hunters, aided by a general societal conviction that wolves, bears, wild cats, prairie dogs, and many other species should be done away for a variety of reasons. Combined with extensive timber harvesting and cattle grazing, the ecological effects of human disturbances during the 19th and 20th centuries are still felt today. Fortunately, enlightened policy and changing values have moved natural resource management toward more sustainable and wildlife-friendly practices, in part, thanks to laws and regulations such as the Endangered Species Act, Wilderness Act, Migratory Bird Act, and the Wildlife without Borders program jointly administered by the United States and Mexico.

New and dire threats loom in the 21st century. First, unilateral U.S. border security efforts, exempted from all applicable environmental laws, are currently in the process constructing 670 miles (1,080 km) of walls and barriers along the international boundary with Mexico. This collection of projects spans from the Pacific Ocean to the Gulf of Mexico, dividing ecosystems and communities alike along its path. Once an urban-based strategy for controlling illegal immigration, the barriers now affect national wildlife refuges, national parks, wilderness areas, and biosphere reserves. What impact will this barrier have on the integrity of the Sky Islands? Mexico's Secretariat of Environment and Natural Resources, along with the National Institute of Ecology and other partners, recently published initial findings on the border wall's impact (see Cordova and de la Parra 2007). Their work concludes that significant ecological, cultural, and political challenges are created or further exacerbated by the construction of the wall, and call on more effective binational policy to confront these challenges. Outside of the U.S. government, most scientists agree that in order to maintain healthy ecosystems along the border, the wall will need to be removed or significantly altered.

Second, Arizona overtook Nevada as the fastest growing state in the United States in 2007, adding more than 200,000 new residents (net) every 365 days. Urban cores are undefined and growth continually spills into the wildlands, creating additional expansion and dependency on transportation infrastructure. In Mexico, border towns act as coarse filters to hundreds of thousands of people migrating north every year, retaining more and more people unable to enter the United States or too impoverished to return home farther south. This bottleneck exacerbates the existing problems associated with current U.S. border policy, placing unprecedented demands upon the natural resources of the region to support this growth.

A third major driver of change in the Sky Islands is climate change. Plant and animal distributions are already changing as a result of warmer temperatures. Between 2002 and 2003, about 3.5 million acres (1.4 million ha) of piñon and ponderosa pine were decimated by high temperatures across Arizona and New Mexico (Breshears et al. 2005). This massive die-off is one example of large-scale changes of forest types in recent years. Higher-elevation mixed conifer and spruce-fir forests are declining rapidly, responding to record high temperatures, invasive species outbreaks, and increased aridity. Initial modeling predicts that with an average increase of 3°C (5.4°F) and 10% precipitation over time, conifer forests will be reduced by more than 50% of their current coverage in the Rincon Mountains of Arizona (Kupfer et al. 2005). As a result, in-situ conservation measures must incorporate adaptive change and landscape-level connectivity into current and future planning efforts.

Conservation

The future is uncertain, although hope remains for these mountain islands and grassland seas. The opportunity for ensuring that the Sky Island region's natural heritage remains intact for future generations lies in the same fundamental arena that drives the challenges placed upon it. This arena is responsible land-use planning at a

regional and local level, in addition to binational cooperation in managing this unique Sky Island ecosystem as a whole rather than two parts.

Three actionable themes are currently embedded within a growing number of organizations collaborating on land and wildlife conservation work throughout the region (see figure 5). In 2008, more than 20 researchers, government officials, and NGOs convened to assess conservation strategies and attract additional resources to address needs. These themes are:

- *Restoration of natural fire regimes, grasslands, and riparian areas*. Although the Sky Island region is still largely intact relative to large population centers and agriculture lands to the east and west, restoration is a key element to bolstering the region's ecological resiliency and function. Wildland fire use and prescribed burning have become fundamental aspects of public lands management today, and landowners are increasingly understanding the ecosystem services derived from intact riparian and upland systems beyond their worth as grazing forage.
- *Robust binational research efforts that aim to inventory and prioritize land features and natural histories.* Efforts are underway to initiate the Madrean Biodiversity Assessment over the next three years. This binational team of researchers and conservationists will be compiling the most comprehensive scientific inventory of the Sky Islands to date through collaborative field expeditions in the Mexican and U.S. Sky Islands. Data collected—much of it new to science—will inform and help prioritize conservation planning efforts across the region.
- *Protection of existing core wells of biodiversity integrated with landscape connectivity*. Currently, legislation is moving through the U.S. Congress to create the 84,000-acre (34,008 ha) Tumacacori Highlands Wilderness Area on the Coronado National Forest in Arizona, and Mexico is on the cusp of declaring a new Biosphere Reserve in extreme northwest Chihuahua. These two initiatives are associated with other efforts to protect landscape linkages between Sky Island mountains, most notably across the international boundary. Border security infrastructure has not yet reached many of the mountains that span the border, and current priorities are to keep these critical linkages intact by working with the government agencies in both countries.

The ecological system within the Sky Island region is complex, diverse, and fragile.

In the Sky Island region, hope lies with the local constituencies who are currently beginning to redefine how land and wildlife conservation must act and react to the growing pressures upon the land. Global and regional challenges have brought into focus solutions that weren't previously elucidated, and as these solutions are connected with a social consciousness that demands a better and more sustainable way of life, the Sky Islands will benefit along with many other places on Earth currently reeling from the consequences of myopic natural resource policy, growth, and climate change.

A race against the clock is occurring now. Can the people that live there—new and old alike—be empowered with the will, determination, and knowledge necessary to chart a future that provides for a functioning ecosystem that will continue to provide for human and nonhuman denizens alike, or will the faults in recent development trends not break soon enough and result in catastrophe? History teaches us that both outcomes have occurred before. Today, the fate of the Sky Islands will likely be similar to the fate of much of our planet. **IJW**

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will likely be dependent, in part, on whether members of civil society act to ensure that the various governments follow through on their recent inspiring promises. **IJW**

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Artificial Water

When Is It Justified in Desert Wilderness?

BY CRAIG DEUTSCHE

Our entire country was once a vast wilderness. Lands were covered by flora that had been present for centuries. People were widely scattered, and wildlife was largely left to work out its own fate. In the 21st century this has changed dramatically, but we are trying to save some of the most natural remaining lands as they once were—as wilderness—and to manage them so that they stay wild and natural. The naturalness of wildlife in such areas is a measure of how well we are doing.

The threats that humans have imposed on native wildlife are many, such as encroachment by city and suburban development; isolation of habitat by roads and canals; introduction of nonnative flora, fauna, and disease; poaching; and the denial of water sources to wildlife. It is the availability of water for larger mammals, specifically desert bighorn sheep in wilderness, that is the subject of this article, including when and where provision of artificial water sources are justified. A case study of the Indian Pass Wilderness in southern California is an example, but the principles can be more widely applied (see figure 1).

Humans, Water, and Wilderness Wildlife

There are situations where humans have simply removed access to surface water and less obvious cases where pumping of groundwater has depleted springs and other sources that were once available to wildlife. In drought years, the water scarcity is compounded. The prospect of global warming and its uncertain effects upon water resources has increased concern that water may be a limiting factor for some wildlife species. Although opinions differ in degree, it is generally recognized that losses in biodiversity are undesirable and that extirpation or extinction would be disastrous. Less certain is whether and how we ought to provide artificial water sources for the iconic large mammals that are affected.

Several interest groups are strongly in favor of providing artificial water sources, commonly known as drinkers or guzzlers, in certain desert wilderness areas. State agencies responsible for managing hunting are likely to support such efforts that aid the larger game animals, and hunters favor them as well. Because desert bighorn sheep are a California designated threatened species, the California Department of Fish and Game (CDFG) has an additional responsibility for their protection. There is credible evidence that water, or its absence, has significantly affected the success of bighorn populations in a number of mountain ranges in southern California. While controlling for other variables, a recent study (Wehausen 2007) indicates that mountain ranges in which bighorn have been extirpated are correlated with lower elevations, isolation from other suitable mountain habitat, and scarcity of surface water. Although nothing can be done about elevation, and the creation of travel corridors between physically separated ranges can be extraordinarily expensive, fewer people would object to providing water sources within existing sheep habitat in these lower elevations and isolated mountain ranges.

Author Photo: Craig Deutsche.

Guzzlers providing artificial water sources are currently proposed by the CDFG in several desert wildernesses. They are intended to be unobtrusive and to require minimum maintenance. Their construction, however, is no slight undertaking. Typically, a check dam is built across a small wash that carries water after a rain. The water is then stored in a large, underground tank—10,000 gallons is typical. A "drinker" for the animals is built a short distance away slightly below the level of the tank; this is essentially a trough from which animals get the water. The drinker is

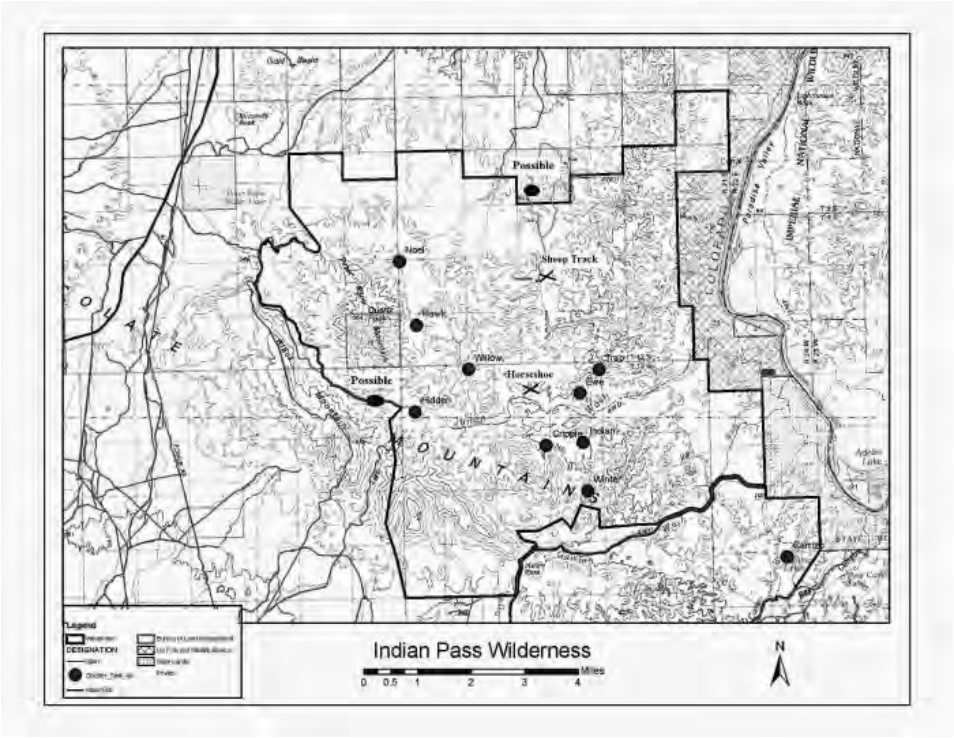

Figure 1—Map of water sources, existing and proposed, in the Indian Pass Wilderness of southern California. Dots denote natural, ephemeral tanks (water sources); crosses indicate CDFG proposed sites for guzzlers; ovals represent alternative proposals outside the wilderness. Map of existing sources produced by BLM El Centro field office; proposed guzzler sites marked by Craig Deutsche.

provided with an escape ramp so that small animals would not be trapped. All water movement is gravity fed so that there are no moving parts subject to failure. Following construction, the ground is returned to its natural contours and native vegetation restored to the extent possible. In many circumstances these installations would seem to be unobjectionable, but within federally designated wilderness, proposals for guzzlers can be contentious.

When Should Guzzlers Be Permitted?

The Wilderness Act of 1964 (U.S. Public Law 88-577) and subsequent wilderness designation acts are very specific concerning what is, and what is not, permitted. No new structures shall be created and no roads, vehicles, or machinery shall be permitted within the designated boundaries of the wilderness. These are areas in which the natural character is preserved and which, by legislative definition, "generally appear to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable." There are, of course, exceptions, such as for fire protection and law enforcement. The managing agency may also grant exceptions when a project serves to preserve the wilderness character of the area. More relevant here are provisions for fish and wildlife management in the California Desert Protection Act of 1994, the legislation designating most of the wilderness areas in which artificial water is being proposed. That act states:

> Fish and Wildlife Management—Management activities to maintain or restore fish and wildlife populations and the habitats to support such populations *may* be carried out within wilderness areas designated by this title and *shall* include the use of motorized vehicles by the appropriate State agencies. (U.S. Public Law 103-433, Sec. f)

Under this presumed authorization, the CDFG has applied to the Bureau of Land Management (BLM) to construct five bighorn sheep guzzlers within several designated wilderness areas and has expressed its intention to apply for five more permits in the future. In a somewhat related proceeding, the organization Quail Unlimited has requested motorized access under the auspices of CDFG in order to maintain bird guzzlers in the El Paso Wilderness southeast of Ridgecrest, California.

These applications raise a number of questions. It is possible to debate the intrinsic justifications for providing artificial water sources. Beyond this, one might debate the legality of constructing these guzzlers as an intrusion on wilderness naturalness. Finally, if it is decided that guzzler permits can be granted, then the conditions that might be placed upon the actual construction and maintenance of the facilities to protect wilderness quality must be decided.

To the broader question of wilderness naturalness one might argue that humans have already altered the landscape so drastically that providing water represents a restoration of earlier conditions that were more favorable to wildlife. Indeed, the wildlife is a significant part of the natural order and to allow its demise is contrary to the spirit of the Wilderness Act. This point of view has been suggested by Wehausen (2007) in an article titled "Wilderness and Guzzlers for Desert Bighorn Sheep." It has also been observed that historically, at least in the Colorado Desert of southern California, Native Americans actively managed their lands to enhance both flora and fauna for their own benefit (Hogue 2000). It might be suggested

that we should do likewise today, although on a cautious scale. On a contrary note, Kane (2008) argues in "Wilderness or Zoos?" that humans are neither sufficiently knowledgeable nor sufficiently wise to successfully manage wilderness. He and others submit that we must leave some areas entirely unmanaged as a control with which to compare the results of our other actions. This is particularly important in the relatively unpredictable prospect of future climate changes. The wisdom of managing wilderness is also debated by Smith and Gow (2008) in an article title "Unnatural Preservation."

Even accepting the desirability of providing guzzlers within wilderness, there is still a question of its legality under the Wilderness Act. In designated wilderness no structures, roads or vehicles are permitted, and some groups claim this is an absolute prohibition against construction of guzzlers. On the other hand, provisions of the California Desert Protection Act of 1994 quoted above, and which designated these areas as wilderness, make allowances for the management of wildlife. CDFG interprets those words to permit whatever they deem necessary to enhance the animal populations. Perhaps the distinction between the words *may* and *shall*, which appeared in italics in the authorizing legislation is critical. *May* is conditional; the access may, or may not, be justified and granted. *Shall* is an imperative; it suggests that motorized access is guaranteed when access is required. If this distinction is accepted, then it is the BLM, acting as land management agency for most of the desert wilderness in question, that has the responsibility for granting or withholding permission for guzzlers—and if permitted motorized access shall be used.

If wilderness preservation were easy and cheap, then there would be no need for protective legislation in the first place.

The practice as it is currently followed in the California Desert District is as follows. The CDFG applies formally for a permit to carry out construction of the guzzler. The BLM then prepares an environmental assessment to accompany the proposal, and these procedures follow the requirements of the National Environmental Protection Act, which specify a number of factors that must be considered and with opportunities for public input. A decision is then rendered that may (a) deny the application, (b) grant permission as it was sought, or (c) permit the construction subject to a number of specified conditions. These constraints might include, among various possibilities, that an environmental compliance officer be appointed by the BLM to oversee construction, and that subsequent inspections of the guzzlers should be carried out on foot.

Figure 2—Indian Tank guzzler. Photo by Craig Deutsche.

Some Proposed Conditions for Guzzler Permits

I propose here some conditions I believe should be met before a permit for guzzler construction is granted. These conditions would need to be met for *each* guzzler considered. There would be no programmatic permits issued that would cover multiple guzzlers in multiple areas. An application for construction of two guzzlers within the Indian Pass Wilderness Area in southern California has been submitted by the CDFG. I use this application to illustrate the issue, and what I think is a reasonable resolution.

The CDFG acknowledges the presence of nine natural water sources in this wilderness and these are indicated with dark circles and names in figure 1. These are not springs, but instead are depressions in rocks, sometimes called tanks, that hold water

Figure 3—A desert wash where the CDFG proposes to construct the Horseshoe guzzler in the Indian Pass wilderness. Photo by Craig Deutsche.

after rains. It is the contention of CDFG that these sources are unreliable during the dry summer months. The mountains within the wilderness have been historic range for bighorn, but have been artificially isolated from other nearby ranges by roads and other development. The CDFG believes that by providing additional water, the resident bighorn will be able to better utilize available forage within the wilderness, and that an increase in the local herd may allow the translocation of some sheep to other ranges to increase the genetic diversity of these and other groups. If correct, these are all valid and important arguments supporting guzzlers in those situations.

Between February and August 2007, I visited all nine of these sites. Five were completely dry—it had been a dry winter with little rain. One natural "tank" had only a very small quantity of water; a second held perhaps five gallons; and a third, which was called the "Indian" tank, had enough water in March that it might perhaps last through the summer. This tank (unlike the others) had barriers to exclude burros. The ninth tank, called Noel, was a virtual lake, although this observation was made exactly two weeks after a torrential rain. Burros, and their tracks and droppings, were found at many of the sites. One bighorn ram was sighted near the Indian Tank (see figure 2), and another immediately west of the wilderness.

The Indian Pass Wilderness map (see figure 1) indicates the sites (marked by crosses on the map) proposed by CDFG for guzzler construction (see figure 3). Reasonably these are located within washes where rain could be impounded conveniently and stored. The construction would necessarily preclude the availability of water farther down the drainages, and one might be concerned about that and the attraction that guzzlers could have for the distribution of other animal species, including various predators. Fresh burro tracks were found near the northern Sheep Track proposed site, even at the end of the long summer drought, casting some doubt upon the actual need of an artificial water source at this location (see figure 4). The map also indicates, with large solid ovals, several alternative guzzler sites *outside* the wilderness. These alternatives are not ideal in terms of their ability to impound water after a rain, but they are outside wilderness along designated roads where the delivery of water by truck would be a reasonable option when needed. Although a biologist from CDFG has asserted that the western alternative site is beyond the normal range of the bighorn herd, I encountered a full-curl ram even farther west on one exploratory trip.

All of this information suggests that without detailed data on natural water availability, wildlife distributions and range, and potential downstream impacts, it is simply not possible to evaluate the need for new guzzler constructions within wilderness, much

less to compare them with alternative sites outside wilderness.

The process proposed here follows the precautionary principal: intervention is only permitted when the need is clearly demonstrated. The alternative view, that intervention is acceptable as long as no damage is expected, is explicitly rejected. This evaluation process is expensive and time consuming. If wilderness preservation were easy and cheap, then there would be no need for protective legislation in the first place. Preservation of wilderness and wildlife naturalness is too important to be resolved casually.

To summarize, programmatic approvals for construction of multiple new artificial water sources are not appropriate. Because each new guzzler might change the historic and natural distribution and perhaps abundance of wildlife, and introduce mechanized disturbance in wilderness for its maintenance, each must be evaluated on a case-by-case basis. There needs to be complete data on natural water availability, likely wildlife abundance and distribution effects of new, artificial water, and serious consideration of alternative guzzler locations outside wilderness. These recommendations for careful analysis with detailed information represent minimum conditions to be met before managing wildlife within wilderness by introducing artificial water sources. **IJW**

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Figure 4—A natural tank near the proposed Sheep Track guzzler; in drier times this source may become unavailable. Photo by Craig Deutsche.

A Relatively Nonrestrictive Approach to Reducing Campsite Impact

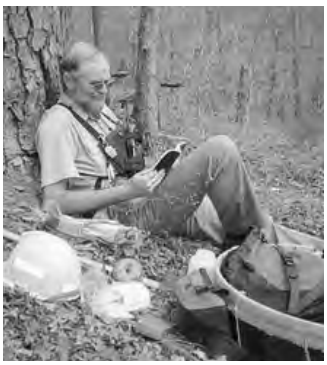
Caney Creek Wilderness, Arkansas

BY DAVID N. COLE AND THOMAS E. FERGUSON

Abstract: An excessive number of highly impacted campsites led managers of the Caney Creek Wilderness to attempt to reduce campsite impacts with a program of trail relocation, education, closure of selected campsites, and site restoration. The strategy involved increasing the concentration of use somewhat, without resorting to the restrictiveness of a designated campsite policy. To assess success, all campsites in the wilderness were inventoried in 1994 and their condition was assessed. A subsequent reassessment of campsites, in 2007, indicated the management program was highly successful. The total number of campsites was reduced by 40% and the number of highly impacted campsites declined substantially.

Introduction

Camping activities can cause substantial disturbance of soil and vegetation in wilderness. Common effects include vegetation loss, change in species composition, damage to standing trees, compaction of soils and truncation of soil profiles (Hammitt and Cole 1998; Leung and Marion 2000). Although such impacts are localized, most studies of trends in campsite impact have reported that impacts are increasing—more often as a result of site proliferation than the deterioration of long-established sites (Cole 1993; Cole and Hall 1992). This finding of substantial and increasing campsite impact suggests that a laissez-faire approach to campsite management is problematic. To avoid ever-increasing campsite impact, active management strategies are needed. Common active strategies include Leave-No-Trace education, concentration of camping on selected campsites, closure and restoration of other campsites, and confinement of activities within campsites (Cole 1981; Marion and Farrell 2002).



David N. Cole (left) photo by Linda Henderson. Thomas E. Ferguson (right) reading USFS book in the Caney Creek Wilderness. Photo by John Wesson.

Despite these suggestions and implementation of campsite management strategies in many parks and wilderness areas, only a few studies have assessed the effectiveness of these strategies. In a portion of the Selway-Bitterroot Wilderness, Montana, managers attempted to reduce disturbance on highly impacted campsites by temporarily closing them, diverting use to adjacent undisturbed sites. Cole and Ranz (1983) found that this action was counterproductive; it resulted in increased impact. They concluded that closures should be permanent rather than temporary and that success would be furthered by education and active restoration (unless sites are unusually resilient).

PEER REVIEWED

Permanent campsite closure was successfully implemented elsewhere in the Selway-Bitterroot Wilderness. In the Seven Lakes basin, 12 of 18 campsites with substantial stock-related impact were closed to stock and actively restored. Campers with stock were only allowed on the remaining six sites; backpackers were allowed to camp anywhere other than on four closed campsites. This effort resulted in a 37% decrease in the total area of campsite disturbance over a five-year period (Spildie et al. 2000). A more restrictive confinement strategy was implemented in a portion of Shenandoah Wilderness, Virginia, with 73 campsites. Managers decided to only allow camping on 41 of these sites. Within three years, without active restoration, the total area disturbed by camping was reduced by about 50% (Reid and Marion 2004). Confinement was equally effective on canoe-accessed campsites in the Delaware Water Gap National Recreation Area, Pennsylvania-New Jersey, where managers decided to only allow camping on 81 of 179 existing campsites, plus six new campsites. They also concentrated camping on-site by installing anchored fire grates. Five years later, the total area disturbed by camping was reduced by 50%, without active restoration (Marion 1995).

Less successful—but not counterproductive—were two campsite confinement programs in the western United States. Around five lakes in the Three Sisters and Mt. Jefferson Wildernesses, Oregon, managers closed about one-half of the existing campsites and required all campers to use designated sites. Four years later, campsite proliferation had been halted but the number of campsites and the total area of disturbance remained unchanged, largely because closed sites did not recover much (Hall 2001). At Grand Canyon National Park, managers only allowed camping on designated campsites so popular that they were used most nights of the primary use season. Here the number of campsites and area of disturbance has increased, due to substantial use of illegal campsites (Cole et al. 2008), but not at the rate it likely would have in the absence of a designated campsite policy. In each of these cases, despite the fact that ecosystems were much less resilient than those at Shenandoah and Delaware Water Gap, there was no attempt to actively restore campsites. With restoration, more improvement might have occurred.

Given these divergent results, from different parts of the United States, it seemed worthwhile to conduct further research on the efficacy of campsite management strategies. In this article, we report on the effectiveness of a campsite management program, implemented in the Caney Creek Wilderness, Arkansas, that sought to reduce the extent of campsite impact without the restrictiveness of a designated campsite policy. Specifically, we report on change in the number and condition of campsites following an effort to reduce campsite impact through education, trail relocation, permanent closure of a few selected campsites, and site restoration.

Caney Creek Campsite Management

Caney Creek Wilderness covers 14,460 acres (5830 ha) of the Ouachita Mountains of west-central Arkansas (see figure 1). Vegetation is a dense cover of oak-hickory-pine forest. Topography is dominated by two parallel creeks, Caney Creek and Short Creek, separated by long ridges with local relief of more than 1,000 feet (300 m). Although there are about 20 miles (32 km) of trail in the wilderness, most use occurs along the 9-mile (14.4-km) trail that follows Caney Creek. Most of the Short Creek drainage is trailless, but not difficult to traverse. Use is quite heavy in the wilderness, estimated at more than 12,000 visitor days in the early 1990s.

Figure 1—Overview of the Caney Creek Wilderness from the Tall Peak trail. Photo by Thomas Ferguson.

The campsite management program implemented in Caney Creek Wilderness has been effective in reducing campsite impact.

Although measures of use are lacking, long-term ranger observations suggest relatively stable use levels over the past few decades.

In 1994, campsites were inventoried across the entire wilderness—on and off trail. A total of 91 campsites were located, many of which were highly disturbed. Local managers decided that this number of campsites and degree of impact was excessive. So they developed a management strategy to reduce the number of campsites and, thereby, the magnitude of camping impact. Trail relocation, education, campsite closure, and site restoration were all employed.

More than 2 miles (3.2 km) of creek-bottom trail were rerouted. This reduced the number of trail-accessible desirable places to camp. For example, the original Caney Creek Trail, east of Katy Creek, had 11 creek crossings in about 3 miles and was in the creek for substantial distances in several places. The relocated trail crossed in four places and the trail was up the side slope away from the creek most of the time. Trail relocation meant that many former campsites were no longer visible from the trail.

In addition, between 1994 and 1996, 16 well-established campsites were closed to use and restored. Soil was scarified and planted with seed and locally collected transplants. Large rocks were buried in tent pads to make the site less conducive to camping (see figure 2). Plantings were watered and mulched. Ribbon was tied between trees to cordon off the site, and a "No Camping" sign was posted. In addition, fire rings and fire remains were scattered at 26 lightly impacted sites.

Figure 2—Student Conservation Association crew planting transplants among buried rocks on a closed campsite. Photo by Thomas Ferguson.

Education programs emphasized camping at already-impacted sites and staying off closed sites. Although camping on closed sites was prohibited, camping on existing sites was not mandatory (as in a designated campsite program).

Most of the closed campsites did not require ongoing work. However, two of the 16 closed sites required additional work every year for five years, and another two required ongoing work 10 years after closure. "No Camping" signs have been left at six of the campsites.

Methods

As noted above, there were 91 campsites in the Caney Creek Wilderness in 1994. On 48 of these sites, the primary impact was campfire remains, with or without a fire ring. There was little if any long-term disturbance. The only information collected on these "trace sites" was their location. On the 43 well-established campsites, we rapidly assessed different types of impact on every campsite, and we took detailed measurements on a sample of 12 sites. The rapid assessment, which took fewer than 10 minutes per site, quantified nine parameters: campsite area, devegetated area, vegetation loss, increase in mineral soil exposure, damage to tree trunks, exposure of tree roots, social trails, developments, and cleanliness (McEwen et al. 1996). For each parameter, a rating of 1, 2, or 3 was assigned to the site, depending on the level of impact. These ratings were summed to obtain the overall impact index.

In addition, we assigned each site a modified Frissell (1978) condition class rating. Condition classes, ranging from 1 to 4, were (1) minimal impact (assigned to trace sites as well), (2) vegetation loss confined to the central portion of the site, (3) vegetation lost

over most of the site but little mineral soil exposure, and (4) vegetation lost and mineral soil exposed over most of the campsite. Where it was difficult to decide between adjacent condition classes, midpoints were used. For consistency, the same individual evaluated all sites each year. Although formal evaluations of precision have not been made, the ratings of trained evaluators seldom differ by more than 0.5.

On the 12 campsites evaluated more precisely, we buried nails that could be relocated and we established permanent plots. We spent an hour or more on each site, taking careful measurements of campsite area, ground cover conditions, and tree damage, using techniques first used in the Eagle Cap Wilderness, Oregon (Cole 1982).

Campsite measurements were repeated in 2007. We searched for campsites in the entire wilderness. Rapid assessment procedures were done on all campsites, except the trace sites. Detailed measures were taken on six of the 12 sites studied in detail in 1994. Permanent markers could not be found on two of the original 12 sites, and the other four sites were closed, restored, and, therefore, no longer recognizable as campsites. This sample of six long-established campsites is small and results should be treated cautiously. However, when expressed as a proportion of the population of long-established sites, the sample size seems less limiting. The six campsites in the sample represent 38% of the 16 campsites that were well established (i.e., not trace sites) in both time periods. Moreover, results are consistent with studies of long-term trends with larger sample sizes (e.g., Cole and Hall 1992).

Results

Between 1994 and 2007, the number of campsites declined 40%, from 91 in 1994 to 54 in 2007 (see table 1). Both trace and well-impacted sites decreased in number, but the largest decrease was in the number of highly impacted campsites. The number of sites with a condition class rating of 3.5 or 4.0 (sites that had experienced widespread loss of vegetation and organic litter cover) decreased from 15 to 3 (see table 1). Based on the impact index ratings, the number of sites in the highest impact index class (22–27) decreased from 7 to 0 (see table 2), and the mean impact index decreased from 13 to 12.

Table 3 can be used to describe the fate of individual sites in the period between 1994 and 2007. Read down columns to determine the condition in 2007 of all campsites of a given impact index class in 1994. For example, of the 15 campsites in the 10–15 impact index class in 1994, 10 disappeared (index = 0), four improved to become trace sites (index = 9), and one deteriorated (index = 16–21). No sites in this class were stable. From this table we can conclude that between 1994 and 2007:

- 16 campsites improved, but were still campsites;
- 58 campsites improved so much that they were no longer recognizable campsites;
- 14 campsites were unchanged in condition;
- 3 campsites deteriorated; and
- 21 new campsites were created.

Of the new campsites, 16 were minimally impacted trace sites, but five were more substantially disturbed.

Most of the sites that improved or disappeared were in places that were no longer readily accessible once the

Table 1—Condition class of Caney Creek campsites in 1994 and 2007

Condition Class[a]	1994	2007
	—campsites—	
1.0	48	29
1.5–2.0	11	13
2.5–3.0	17	9
3.5–4.0	15	3
Total	91	54

[a]Modified Frissell condition class (refer to text for definitions).

Table 2—Impact index of Caney Creek campsites in 1994 and 2007

Impact Index[a]	1994	2007
	—campsites—	
9	48	31
10–15	15	13
16–21	21	10
22–27	7	0
Total	91	54

[a]Sum of ratings for 9 parameters (refer to text for details).

Table 3—The number of Caney Creek campsites in each impact index class in 1994 and 2007[a]

		1994 impact index					
		0	9	10–15	16–21	22–27	Total
2007 impact index	0		37	10	7	4	58
	9	16	9	4	2	0	31
	10–15	4	2	0	7	0	13
	16–21	1	0	1	5	3	10
	22–27	0	0	0	0	0	0
	Total	21	48	15	21	7	112

[a]Campsites with an impact index of 0 in 1994 are new sites in 2007, whereas those with an index of 0 in 2007 disappeared. Sites above the shaded boxes improved, and those below the shaded boxes deteriorated.

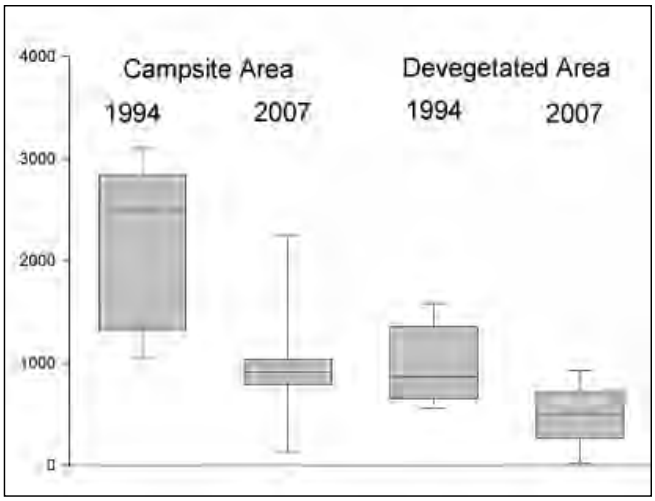


Figure 3—Change in campsite and devegetated area, 1994 to 2007; box plots show the median campsite, as well as the 5th, 25th, 75th, and 95th percentiles.

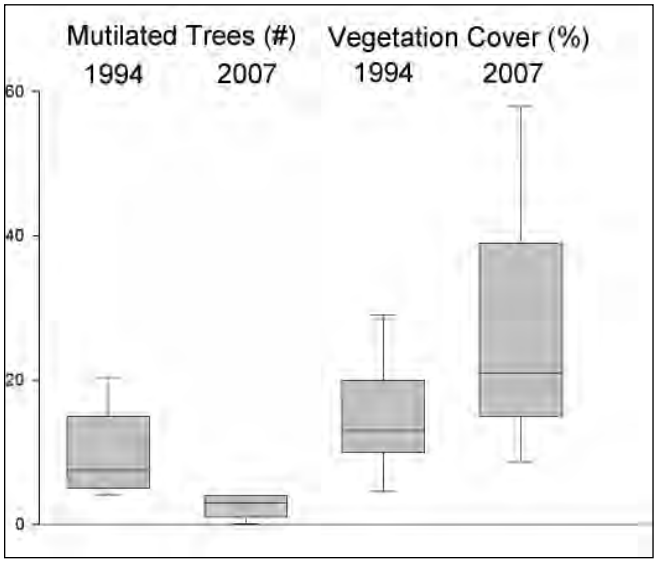


Figure 4—Change in number of mutilated trees and percent vegetation cover on campsites, 1994 to 2007; box plots show the median campsite, as well as the 5th, 25th, 75th, and 95th percentiles.

trail was rerouted or were sites that had been closed and restored. None of the sites that deteriorated were in the more popular destinations along Caney Creek. Two were located on the Buckeye Mountain trail, which had been recently improved. The 21 new campsites were widely distributed throughout the wilderness, but they were particularly abundant along trailless Short Creek. However, the new campsites that developed in more popular places along Caney Creek generally were more highly impacted than those along Short Creek.

Although limited in quantity, the data from detailed measures on the sample of sites also suggest a dramatic decrease in campsite impact. Disregarding the two sites that could not be remeasured, four of the remaining 10 campsites had recovered so substantially that we did not remeasure them. On the remaining six sites, median area of campsite disturbance decreased from 2,500 feet^2 (232 m^2) in 1994 to 915 feet^2 (85 m^2) in 2007 (see figure 3). This difference is statistically significant (Wilcoxon signed ranks test, $Z = 2.2$, $p = 0.03$). Devegetated area decreased significantly from a median of 866 feet^2 (80 m^2) in 1994 to 506 feet^2 (47 m^2) in 2007 ($Z = 2.0$, $p = 0.05$). These declines would be even greater if we included data from the four campsites that almost completely disappeared. The number of mutilated trees decreased significantly from a median of 7.5 to 3.0 ($Z = 2.0$, $p = 0.04$), and vegetation cover increased significantly from a median of 13% in 1994 to 21% in 2007 ($Z = 2.0$, $p = 0.04$) (see figure 4).

Discussion and Conclusions

Clearly, the campsite management program implemented in Caney Creek Wilderness has been effective in reducing campsite impact. The number of campsites has decreased greatly (see figure 5), as has the magnitude of impact on the most severely disturbed campsites in the wilderness. Most of the work that contributed to success was accomplished over a period of four years. A Student Conservation Association crew (six members plus crew leader) worked four weeks a year—for three years on the trail rerouting and one year on the site closure and restoration. Cost was approximately $18,000 per year, along with about 1.5 months per year provided by Forest Service or other volunteer personnel, for visitor contact and education. The program is being maintained with an ongoing investment of about one-half month of work per year.

Earlier studies of stricter and more restrictive confinement strategies (where camping is only allowed on designated sites) suggest that this strategy can be successful in limiting campsite impacts (e.g., Marion 1995; Reid and Marion 2004). At Caney Creek, impacts were reduced not by implementing restrictions requiring the use of designated campsites. Rather, the strategy involved reducing the number of places where visitors are likely or allowed to camp. This was accomplished using multiple approaches. Trail relocation, education, permanent closure of selected campsites and assisted site restoration all contributed to success. It was particularly important to ensure that staff was available for education and monitoring during the times when most visitors were in the wilderness. The high resilience of these sites (i.e., they can recover rapidly) was an important factor, as was the decision not to close so many sites that people had a hard time finding an open campsite.

The fact that 21 new campsites developed over the study period suggests that a designated site policy might

Figure 5—Highly impacted campsite (a) in 1993, one year before closure and (b) in 1999, five years after closure. Photographs by Thomas Ferguson.

be even more effective in limiting campsite impact. Although that is possible, recent research at Grand Canyon National Park shows that new campsites are often created even in places with designated campsite policies (Cole et al. 2008). Moreover, a large proportion of the new campsites at Caney Creek were in trailless areas, where campsites are few and far between. Future success might be most dependent on the ability to persuade visitors to use established sites in popular places and to eliminate all trace of their camping activities when they visit trailless places. **IJW**

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Climbers' Attitudes toward Recreation Resource Impacts in the Adirondack Park's Giant Mountain Wilderness

BY CHRISTOPHER A. MONZ

Abstract: Climbers arriving at trailheads to popular climbing areas in the Giant Mountain Wilderness in Adirondack Park, New York, were surveyed as to the types of resource impacts they found to be offensive. Climbers were asked about their degree of concern regarding crowding, noise, and management of climbing areas. Some resource impacts, such as damage to trees as a result of poor climbing practices, were found to be offensive to climbers, whereas other resource impacts common to climbing areas were less of a concern. Crowding was reported by the majority of climbers as an important concern, but noise, such as that generated by nearby vehicle traffic, was less of an issue. No significant differences in responses to either resource impact or social concepts were observed based on climbers' experience level or preference for traditional or sport climbing styles.

Introduction

Managers of parks and protected areas continue to face challenges in maintaining a balance between visitor use and the protection of natural resources. To address these challenges, considerable research has examined both the biophysical and social conditions in wildlands (Hammitt and Cole 1998; Manning 1999) in an effort to manage areas sustainably. A component of this research—visitors' subjective perception of wildland conditions—is particularly helpful in providing guidance for the formation of management strategies and policies.

A growing body of research has begun to investigate visitor perceptions of environmental conditions and recreation impacts. Recent reviews of this literature (White et al. 2008) suggest that two seemingly contradictory conclusions can be drawn from the findings thus far. One line of thinking suggests that visitors perceive impacts, such as vegetation loss and soil erosion, and that their experience is affected by these impacts, and consequently, they formulate acceptability judgments of resource conditions (Shelby et al. 1988; Roggenbuck et al. 1993; Lynn and Brown 2003). A related line of research has applied norm theory and developed empirical approaches for determining thresholds of acceptability of ecological conditions (Manning et al. 2004).

Christopher A. Monz. Photo by Wyatt Lutsk.

A second line of thinking suggests that visitors' experience may not be significantly affected by ecological impacts, except for those clearly resulting from inappropriate behaviors such as litter or vandalism. Early studies (c. 1970s) examining the perceptions of recreational impacts, found visitors rarely reported unacceptable recreation site conditions in backcountry settings. For example, a study in the Boundary Waters Canoe Area found no correlation between visitor ratings of

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site conditions and expert ratings of environmental impacts (Merriam and Smith 1974). Other studies conducted during this time period (such as Downing and Clark 1979; Helgath 1975; Moeller et al. 1974) support these findings, even in situations where the impacts visitors experienced were deemed severe by researchers. More recent research largely supports these conclusions (White et al. 2001; Farrell et al. 2001) and in addition also supports the assertion of previous work by Knudson and Curry (1981) that suggests that visitors deem certain impacts, such as vegetation loss on campsites desirable, due to the increased camping amenity value of sites with bare soil.

The literature is suggestive of some possible contemporary trends in visitor perceptions of environmental conditions. First, Manning (2004) suggests that contemporary visitors may be more perceptive to resource impacts than the early work in this field reported. This possibility is supported by several studies that indicate that visitors have normative standards for impacts such as trail erosion (Manning et al. 1996) and campsite conditions (Newman et al. 2001). Second, recent research suggests that some subjective factors such as place attachment (Kyle et al. 2004) and experience-use history (White et al. 2008) may influence visitor sensitivity to recreation impact.

In the spirit of contributing to this continuing line of inquiry, this study examined the attitudes of rock climbers toward specific resource impacts that might be encountered in a climbing setting. From a resource perspective, climbing is a unique wildland visitor activity in that many climbers often pursue well-known, popular climbs in areas away from designated hiking trails. As such, climbers concentrate their activities on a few visitor-created trails and at the base and tops of cliffs, sometimes resulting in vegetation loss and erosion in these areas (McMillan and Larson 2002). In addition, some climbing practices such as the use of fixed anchors including permanent bolts and fixed slings are controversial to managers and often perceived as undesirable impacts when seen by other visitors (Jones and Hollenhorst 2002). Moreover, it is unclear whether impacts not directly related to the activity of climbing such as soil and vegetation disturbance near cliffs, represent a concern for climbers or whether their perceptions of important resource impacts are limited to those directly affecting the cliff environment. Climbers may evaluate some resource disturbances, such as vegetation loss at the base of cliffs, as desirable from an amenity perspective as has been found with campers in the aforementioned literature.

To date, few studies have addressed climbers' attitudes toward associated resource impacts commonplace in climbing areas. Waldrup and McEwen (1994) examined climbers' attitudes toward wilderness and climbing impacts, their motivations in choosing a place to climb, and their preferences for management regulation. The resource impacts examined in this study were limited to impacts to the cliff face such as the placement of bolts, use of chalk, and creating holds by chipping and gluing. Although some differences were observed based on the type of climber (determined by the style of climbing preferred), most climbers were not offended by the placement of fixed anchors on the cliff face or the use of chalk—two resource impacts often cited by managers and other visitors as problematic. Crowding at the climbing site and alterations of the rock face by chipping and gluing of holds were rated at least moderately offensive by the vast majority of climbers surveyed. Similar results were reported on climbers' attitudes toward bolts and fixed anchors in a study conducted across 13 popular U.S. climbing areas (Schuster et al. 2001). In a study at Joshua Tree National Park, Trench and Wallace (1994) reported an increased sensitivity to various resource impacts by climbers who preferred wilderness to mid- and front-country settings.

The goal of this case study was to collect information on climbers' attitudes toward specific resource impacts, crowding, and the management of climbing at the most popular climbing areas in the Adirondack Park. The study assessed attitudes toward impacts to soils and vegetation at the climbing site due to trampling from climbing activities. In addition, the study examined both the influence of climbers' experience level and the style of climbing they preferred on perceptions of resource conditions.

Study Approach

Climbers were surveyed at entry points to climbing areas in the Giant Mountain Wilderness of the Adirondack Park in northern New York State, USA, near the town of Keene Valley (see figure 1). The

Fig. 1. Rock climbing in the Giant Mountain Wilderness in the Adirondack Park. Photo by David Hough.

Table 1—Frequency of reported resource impacts as reported in an open-ended interview question (n=105)

Impact type	Frequency
Litter	45
General erosion	34
Impacts to trees	20
Cigarette butts	16
Noise	15
Crowding	12
Cell phones	9
Visitor-created trails	9
Impacts to the rock face	6
Large groups	1
Visitor-created campsites	1

Adirondack Park is an internationally known climbing destination and is particularly popular with climbers looking for a more wilderness-based climbing experience (Mellor 1995; Lawyer and Haas 2008). Surveys were administered at the three primary climbing entry points in the area on a total of seven randomly selected days during the popular fall climbing season. All three trailheads were sampled each day. Each of three weekdays and four weekend days were selected randomly during September and October, and climbing parties were randomly intercepted and asked to voluntarily participate.

The survey instrument assessed climbers' experience level (in years), their preference for climbing style (traditional or sport), attitudes toward environmental impacts, importance of wilderness, and attitudes toward the management of climbing areas, including allowance for the placement of fixed anchors and bolts. The questionnaire consisted mainly of quantitative questions using five-point Likert-type scales. Climbers were asked to list the type of resource impacts they found most offensive in an initial interview style question, before they were given the survey. It was stressed to participants that this survey addressed the range of potential impacts that could be found at climbing sites, but was not intended as an evaluation of conditions at any particular area. Attitudes toward various environmental impacts were measured on a scale adapted from Waldrup and McEwen (1994) that asked respondents to rate each impact as to the degree of offensiveness (1 = not offensive to 5 = extremely offensive). Wilderness values (i.e., solitude, remoteness, etc.) and attitudes toward management were measured by asking participants to rate their response to statements (1 = strongly disagree to 5 = strongly agree). Concepts for each of these categories of questions were developed based on a preliminary study (Monz et al. 2006) and tested for reliability with current data. Scales for each of the concepts were calculated from the multiple items, and these scales became the dependent variables in the analysis. All statistical tests were conducted using standard procedures with SPSS version 15.

Results

A total of 105 usable surveys were collected. Voluntary participation in the study was high, with only four individuals declining to participate. Responses to the initial open-ended question regarding the impacts climbers found most offensive were categorized and summarized in table 1, and total frequencies exceed a total of 100% due to visitors reporting multiple impact issues of equal importance. Among the most frequently reported was the appearance of litter (45%), general erosion around the site (34%), impacts to trees from climbing practices or erosion around the roots (20%), and cigarette butts around the climbing area (16%). Other impacts such as crowding, noise, and cell phone use were reported less frequently (9% to 15%). The impacts least reported as offensive were multiple trails and impacts to the rock face at 9% and 6%, respectively, and large groups and visitor-created campsites at 1%.

A total of six resource impact concepts (see table 2), three social impacts, and two managerial concepts (see table 3) were found to be reliable measures (Cronbach's alpha ≥ 0.6).

Frequency analysis of these concepts suggests that the majority of climbers report that most resource impacts are at least "somewhat offensive" at climbing sites (see table 4). One important exception is bare soil at the climbing site, which is less of a concern. Of the impacts surveyed, damaged trees (81%), trampled vegetation (72%), and top of cliff impact (71%) were reported at least somewhat offensive most frequently. Erosion and multiple trails were reported as offensive by the majority of climbers (64% and 69%, respectively). Conversely, a sizable number of climbers were not offended by impacts such as bare soil at the climbing site (44%), erosion (36%), and multiple trails (31%).

Of the social concepts examined (see table 5), crowding was reported as affecting the experience by a majority of participants (66%), whereas human-made noise was less of, though still a significant concern (58%). The majority of climbers report that they were aware of the wilderness designation of areas in which they climb (57%), and an overwhelming majority felt that wilderness was worthwhile and important (87%). Participants were more likely to be either opposed or neutral to official agency management of climbing areas, including fixed anchor management (70%).

Table 2—Reliability analysis of environmental impact concepts measured in survey questions

Concept and variable identification	Item total correlation	Alpha if item deleted	Cronbach's alpha
Attitudes toward erosion at site			.87
Erosion at the base of the cliff	.64	.87	
Erosion around trees, exposing the roots	.71	.84	
Erosion at/near climbing site	.73	.83	
Erosion at the top of the cliff	.81	.79	
Attitudes toward multiple trail impacts at site			.61
Erosion at/near cliff	.44	NA	
Multiple trails from cliff to parking area	.44	NA	
Attitudes toward dead/damaged trees at site			.83
Dead/damaged trees at the base of the cliff	.65	.79	
Dead/damaged trees at the top of the cliff due to anchors	.67	.78	
Dead/damaged trees at the top of the cliff from rappelling	.73	.72	
Attitudes toward trampled vegetation at the cliff			.75
Trampled vegetation at the base of the cliff	.59		
Trampled vegetation at the top of the cliff	.59		
Attitudes toward bare soil at site			.78
Bare soil at the base of the cliff	.64		
Bare soil at the top of the cliff	.64		
Attitude towards impact at the top of the cliff			.89
Erosion at the top of the cliff	.80	.85	
Bare soil at the top of the cliff	.77	.86	
Trampled vegetation at the top of the cliff	.70	.87	
Dead/damaged trees at the top of the cliff due to top-rope anchors	.71	.87	
Dead/damaged trees at the top of the cliff from rappelling	.68	.88	

Examination of groups organized by experience level within the climbing population surveyed did not reveal significant differences. Climbers were categorized into three groups: climbers with fewer than two years, climbers with three to five years, and climbers with greater than six years of experience. No significant differences were found among the groups for the resource, social, and management concepts examined (see tables 6 and 7). Comparisons of climbers' style preference (traditional or sport climbing) also did not reveal significant differences within the population surveyed (see tables 8 and 9), with the exception that sport climbers found damage to trees more offensive than did traditional climbers.

Discussion

Understanding visitor attitudes toward resource impacts has several implications for the sustainable management of recreation areas. First, knowledge of what resource impacts visitors report as problematic provides some direction for management actions on impact mitigation. Minimizing these impacts may enhance the visitor experience and would likely be well received by participants. Second, examining the disparity between what visitors report as impact problems and management priorities regarding impacts helps managers direct visitor education to specific important issues. Last, examining a broad range of resource and social impact issues in terms of relative importance is suggestive of indicators of quality of recreation experiences. Subsequent investigations as to visitors' thresholds of tolerance for these indicators can provide important information in a Limits of Acceptable Change or related planning process.

The results presented here provide some insight on climbers' attitudes toward resource impacts associated with rock climbing. Previous related studies primarily examined impacts occurring on the rock face (chalk marks and chipping holds) or the use and proliferation of fixed anchors (Waldrup and McEwen 1994; Schuster et al. 2001). Although these resource issues are clearly important, this study assessed attitudes toward impacts in locations other than the cliff face in more detail than previously reported (Trench and Wallace 1994). These

Table 3—Reliability analysis of wilderness and management concepts measured in survey questions

Concept and variable identification	Item total correlation	Alpha if item deleted	Cronbach's alpha
Attitudes toward crowding at climbing site			.65
Seeing a large party reduces the feeling that I am out in the wilderness.	.39	.64	
Crowding at a climbing site affects my wilderness experience.	.41	.61	
Solitude is important in choosing a climb.	.58	.36	
Attitudes toward noise at climbing site			.67
Human-made noise inside the wilderness area reduces the feeling that I am out in the wilderness.	.50		
Quiet is an important factor in choosing a place to climb.	.50		
Wilderness awareness[1]			N/A
I am aware of the wilderness system in the areas I climb.			
Wilderness importance			.76
Wilderness preservation is a worthwhile use of the land.	.68	.70	
More land should be preserved as wilderness.	.67	.72	
Wilderness areas are important/valuable to me personally.	.64	.77	
Attitudes toward management of climbing areas			.78
Official agency management of climbing areas is necessary.	.53	.79	
There should be official regulations concerning where, when, and how bolts should be used.	.63	.68	
There should be official regulations concerning where, when, and how fixed anchors should be used.	.69	.62	

[1]Single item indicator

Table 4—Frequencies of responses and mean response for resource impact concepts

	Frequency (%)			Mean ± SE
Concept[1]	Not/slightly offensive	Somewhat offensive	Moderately/extremely offensive	
Erosion	36	40	24	3.14 ± 0.09
Multiple trails	31	40	29	3.28 ± 0.09
Damaged trees	19	41	40	3.59 ± 0.10
Trampled vegetation	28	38	34	3.32 ± 0.10
Bare soil	44	37	19	2.84 ± 0.10
Top of cliff impact	29	44	27	3.33 ± 0.19

[1]Concepts are measured using scales calculated from multiple items (table 2).

Table 5—Frequencies of responses and mean response for social and management concepts

	Frequency (%)			Mean ± SE
Concept[1]	Strongly disagree/ disagree	Neutral	Agree/ strongly agree	
Crowding	3	30	66	4.05 ± 0.08
Noise	11	31	58	3.85 ± 0.08
Wilderness awareness	23	19	57	3.37 ± 0.14
Wilderness importance	5	8	87	4.45 ± 0.08
Management	29	44	27	3.18 ± 0.12

[1]Concepts are measured using scales calculated from multiple items (table 3).

adjacent impacts are commonplace in popular climbing areas and can be of significant management concern.

Results suggest that the majority of climbers visiting the Adirondacks are perceptive of certain resource impacts such as erosion, multiple training, and damage to trees (see table 4). Results were similar for an open question format (see table 1), suggesting that climbers freely offered these resource impacts as concerns independent of any direction by the survey questions.

In scaled responses, tree damage appears to be an overriding concern, with the highest mean score reported, whereas bare soil is the least offensive, with the lowest mean score (see table 4). Although not addressed by quantitative measures, litter is also a primary concern, appearing most frequently (45%) in open responses (see table 1). These results suggest that climbers may be more accepting of impacts that are unavoidable in the context of pursuing the activity, such as soil exposure at the base of a climb where climbers congregate, and less accepting of impacts deemed avoidable with proper climbing minimum impact practices (e.g., damage to trees). Similar findings have been reported in research with wilderness campers (White et al. 2001; Knudson and Curry 1981), where bare soil was seen to enhance the desirability of campsites. These findings suggest that perhaps some vegetation loss at the base of climbing areas is acceptable and provides amenity value, and that areas should be managed so that vegetation loss is minimized, but not eliminated. In contrast, climbers are sensitive to tree damage at the climbing site and these results suggest that management strategies that seek to reduce or eliminate this impact would likely be successful and well received by climbers.

> Climbers in the Adirondack Park reported that common resource impacts including litter, damage to trees, erosion, and crowding were a concern.

Mellor (1995) proposed that climbing in the Adirondack Park is markedly different than other climbing centers in the United States, largely due to the wilderness character of the area and the ethics adopted by the climbing community. These results support this proposition, with the overwhelming majority of climbers (87%) agreeing on the importance of wilderness (see table 5). Other setting attributes associated with wilderness, such as solitude and small party size (crowding concept), are also important to the majority (66%) of climbers (see table 5). Human-made noise is somewhat of an exception to this trend, which is less important to most climbers; perhaps climbers are more accepting of this condition as many popular crags are within sound of main roads.

Adirondack climbers were not strongly in support of more management of climbing areas, including official management of fixed anchors, with 73% of those surveyed either disagreeing or neutral in responses to the management questions (see table 5). These results are similar to those reported by Schuster et al. (2001), where climbers felt that managers did not adequately understand the activity and that climbing was not treated fairly in the management process. This has important implications for managers, as perhaps most management strategies need to be developed in close collaboration with climbers' groups in order to be successful.

Unlike previous studies, little difference in responses among climbing subpopulations was found. This study examined subpopulations based on

Table 6—A comparison of resource impact attitudes (mean values) by climber experience levels

	Experience level				
Concept[1]	**≤ 2 years**	**3–5 years**	**> 6 years**	**f-value**	**p-value**
Erosion	3.24	3.02	3.15	.37	.69
Multiple trails	3.11	3.39	3.31	.68	.51
Damaged trees	3.65	3.70	3.50	.45	.69
Trampled vegetation	3.36	3.35	3.30	.03	.97
Bare soil	3.23	2.65	2.89	.83	.44
Top of cliff impact	3.39	3.32	3.31	.06	.94

[1]Concepts are measured with a five point scale from 1 = "not offensive" to 5 = "extremely offensive."

Table 7—A comparison of social and management attitudes (mean values) by climber experience levels

	Experience level				
Concept[1]	**≤ 2 years**	**3–5 years**	**> 6 years**	**f-value**	**p-value**
Crowding	4.10	3.98	4.19	1.27	.28
Noise	3.86	3.73	3.87	.33	.72
Wilderness awareness	3.23	3.54	3.54	.68	.51
Wilderness importance	4.42	4.44	4.41	.01	.97
Management	3.35	2.96	3.22	1.20	.29

[1]Concepts are measured with a five point scale from 1 = "strongly disagree" to 5 = "strongly agree."

experience level in years (see tables 6 and 7) and on preference for traditional or sport climbing (see tables 8 and 9). The one exception was tree damage, which was reported as more offensive by sport climbers than traditional climbers. Sport climbing is characterized by an abundance of fixed anchors, and climbers who prefer this style of climbing may be less tolerant of using trees as anchors and more tolerant of the use of permanent anchors deemed controversial by traditional climbers. Conversely, traditional climbers may be more tolerant of some damage to trees in order to avoid the placement of permanent fixed anchors in the rock surface. These results contrast somewhat with recent examinations of experience-use history as an important predictor of participant sensitivity resource impacts (White et al. 2008). A possible explanation is that what was measured in this study—years of experience with an activity—may not be as sensitive a measure as years of experience with a place, as assessed in White et al. (2008). Although the observed uniformity of the climbing community on all other resource impact attitudes examined is somewhat surprising, it is suggestive of the uniqueness of the Adirondack settings in attracting certain climbers seeking broader wilderness experience aspects.

Table 8—A comparison of resource impact attitudes (mean values) by climber style preferences

	Climbing style			
Concept[1]	**Traditional**	**Sport**	**T-value**	**P-value**
Erosion	3.12	3.02	-.28	.78
Multiple trails	3.27	3.39	-.28	.78
Damaged trees	3.45	3.70	-2.1	.04
Trampled vegetation	3.26	3.35	-.92	.36
Bare soil	2.77	2.65	-.98	.32
Top of cliff impact	3.22	3.51	-1.58	.12

[1]Concepts are measured with a five point scale from 1 = "not offensive" to 5 = "extremely offensive."

Table 9—A comparison of social and management attitudes (mean values) by climber style preferences

	Climbing style			
Concept[1]	**Traditional**	**Sport**	**T-value**	**P-value**
Crowding	4.13	4.07	.47	.63
Noise	3.89	3.77	.87	.38
Wilderness awareness	3.57	3.31	1.13	.26
Wilderness importance	4.40	4.42	-1.29	.89
Management	3.11	3.25	-.68	.49

[1]Concepts are measured with a five point scale from 1 = "not offensive" to 5 = "extremely offensive."

Management Implications

Climbers in the Adirondack Park reported that common resource impacts including litter, damage to trees, erosion, and crowding were a concern. Other common resource impacts are less of a concern and still others, such as bare soil at the base of cliffs, may be perceived as beneficial. Although this information is helpful in informing management, it also points to larger discussions that are currently ongoing in wilderness and park management—namely, to what extent do we allow visitor information, particularly from one visitor group, to guide the formulation of indicators and standards? Although the results imply that from a climber's perspective, some meaningful indicators of quality at climbing sites would be damage to trees, erosion, and crowding, the perspectives of nonclimbers and managers need to be assessed to proceed with a full development of indicators and standards of quality in the context of a management

planning effort and agency policies for resource protection and stewardship.

An interesting paradox suggested by the study findings is climbers' self-reported strong support of wilderness, but lack of support for increased management of climbing areas and activities. Although the complexities of this issue are beyond the scope of this paper, the findings support what wilderness managers have known for some time—managing climbers and climbing in many wilderness settings is difficult. The results presented in this work suggest that certain resource and social conditions are important to climbers, and perhaps including climbers' perspectives in the development of standards for these concerns would encourage more involvement in planning processes. **IJW**

Acknowledgments

The author thanks the Environmental Studies Department at St. Lawrence University and the Utah State Agricultural Experiment Station for providing support for this research, and Katie Smith, Leah Knickerbocker, Rich Wilson, and Matthew Way for contributing numerous hours in field sampling.

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PERSPECTIVES FROM THE
ALDO LEOPOLD WILDERNESS RESEARCH INSTITUTE

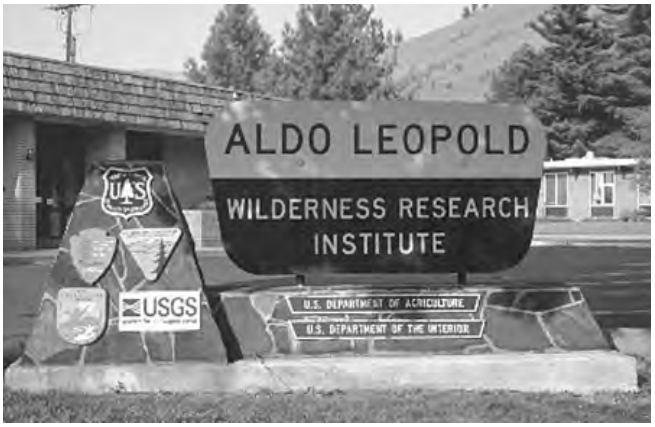
Learning From Wilderness

The Social Dimension of Fire Management

BY ANNE E. BLACK

In 2008, the U.S. Forest Service (USFS) began piloting a "new" concept in fire management: managing "fire as fire" on the landscape; no more black-and-white distinctions between "good" fire and "bad" fire. Instead, under the new direction, the USFS manages the fire based on what the land, the long-term objectives, the land management plan, the social-political situation, and the weather suggest. For example, the USFS staff may attack a flank of the fire that has a high probability of moving aggressively into a housing subdivision, but may only monitor the flank of a fire moving through public lands (wilderness or nonwilderness) that are ecologically in need of a fire. Interestingly, this intuitively straightforward way to manage fire represents a profound shift in organizational structure and culture, with implications for how to receive and allocate budgets that manage natural ignitions, how to coordinate and communicate with internal and external partners, how to understand and predict fire behavior, and how to weigh competing priorities and objectives in the decision-making process. Success hinges on the ability of a manager to safely, effectively, and efficiently manage a dynamic, high-stakes fire situation. The shift takes the fire manager out of the safe terrain of heroic figure doing battle with nature's forces to the trickier territory of shepherding a complex system.

Where does the knowledge to guide us come from? One place is wilderness, both ecological knowledge (e.g., fire processes, return intervals, and resulting pattern) and social knowledge (e.g., how to organize and manage a long-duration event successfully). As managers and researchers, we gained experience in the art of fire management through the courage and passion of managers willing to push unconventional ideas about fire management—their



laboratory: wilderness and prescribed fire. Now, Aldo Leopold Wilderness Research Institute (ALWRI) staff are capturing, grounding, and extending that knowledge through an ongoing series of applied research projects among a community of academics, researchers, managers, and contractors.

Since 2000, staff at the ALWRI have been working to understand how to integrate the potential benefits of fire and lessons from the 30 years of federal experience and expertise in wilderness fire into all fire decision making. The idea is to capture the general issues and patterns and use these consistently to identify how, when, and where we can most effectively use fire to meet ecological and management goals. However, this knowledge tends to be distributed and anecdotal. Although there is a wealth of knowledge gained from expertise and experience in many places, those lessons tend to be shared only with others close by. Because of this, the keys to the most significant barriers and facilitators to fire management were not readily available to the entire system. With the assistance of two master's students, the ALWRI obtained an initial

objective understanding of key influences (Black et al. 2008; Doane et al. 2006). These key influences range from national policies and planning documents that do or do not allow fire use, to the presence or absence of agreements between adjacent land managers that provide for the natural scale of fire and to the critical working relationship between local line officers and their fire staff. Based on ALWRI research experience, the fundamental issues of individual and group dynamics were identified as the levels of trust, comfort level with fire, and experience with fire and local political realities.

Over the same time period, the fire use management community began seeking to build skills in organizational learning and a "high reliability" organization because of their acknowledgment that management disasters and organizational errors can kill people and jeopardize fire-use programs. Organizational learning (e.g., Garvin 2000) focuses on the behavioral and structural processes necessary to identify, capture, and transmit lessons and adapt behavior as a consequence of those lessons. High reliability theory (e.g., Weick and Sutcliffe 2007) was developed to explain why certain organizations are able to operate in unpredictable, high stakes environments with minimal errors, such as air traffic control and nuclear aircraft carrier operation. These concepts and those of other researchers trying to understand how organizations can better detect, manage, and bounce back from error (e.g., Dekker 2007; Reason 1997) form the foundation for current applied research efforts.

The Wildland Fire Lessons Learned Center in partnership with the USFS Rocky Mountain Research Station, the four U.S. federal land management agencies, and The Nature Conservancy sponsored four annual workshops on high reliability theory for the management community. This has led to smaller regional and local workshops to help fire managers become better risk managers by paying more attention to small failures and to differences between what was planned and what actually happened, listening for subtle changes in environment on the fire line, and quickly reassessing and responding to these changes. As with concepts of organizational learning, these management actions require a leadership and group culture that does not simply accept diverse perspectives and views, but requires them. The speed and complexity of any fire environment cannot be known, seen, or understood completely by any one person—thus, the key to safe and effective operations is cultivating a group climate in which partial knowledge and competing explanations can be respectfully voiced and integrated into group understanding. Because wilderness fires often do not pose immediate threats to property, the tempo on managed wilderness fires is often slower and the stakes lower. These seem to be one of the best places in which to develop and practice new skills.

Few things dampen a fire-use program like unwanted outcomes; for example, think of the national attention on post-1988 fires in places such as Yellowstone National Park. Improvement depends on learning; however, if the end result is finding someone to blame, few will be willing to speak up, and fewer yet will be willing to look objectively at their own actions (Lewis 2008). As recent reviews of unwanted fire outcomes indicate (Nasiatka et al. 2008; Dether and Black 2006), there are unique circumstances to every event, but there are also few new patterns. Despite our best intentions, we may underestimate weather or fire behavior, fail to notice or act on accumulating deviations from our plan, or communications were less than desired. Are these individual errors?

Fire use, most notably in wilderness, requires a quite different mind-set, one in which success means choosing *not* to do everything possible.

Organizational research, such as referenced in this article, suggests that the actions *causing* the patterns in the outcomes are likely institutional as opposed to individual. That is, although individuals make decisions and take action, they do so from within institutional and cultural frameworks and rationales that direct their attention and guide how they weigh the information received. To produce *different* outcomes, we must be able to see this system in action—in ourselves, in our groups, in our organizations—and understand the rationale for the existing frameworks. For example, we need to be able to clearly see and critically discuss:

- what our intentions and behaviors are,
- what we notice and pay attention to in our environment,
- what we consider in our deliberations of what actions to take,
- what constitutes appropriate action, and

- what would need to change in order to allow for a different path to develop.

In a sense, our individual experiences are a window into organizational structure and culture.

> The USFS manages the fire based on what the land, the long-term objectives, the land management plan, the social-political situation, and the weather suggest.

The ALWRI, in collaboration with the research and management community, is engaged in several projects designed to build a system perspective and extend our understanding of effective practices. One project is a national survey of high reliability practices in the federal fire community that asks questions such as: How broadly and how deeply have these concepts spread, and are they having an impact on performance? Another project is working on development of a "key decision log" to capture the decision-making process during fires to build an understanding of organization-wide patterns and contribute to organizational learning. A third project is working on a series of preseason "dialogue simulations" to assist line officers and fire managers in becoming more aware of critical organizational dynamics and how they contribute to performance and outcomes. Within each project is the awareness that success in the new fire management era means understanding and integrating different organizational cultures of suppression and fire use.

In most places, the United States included, humans seek to dominate fire—fight it, suppress it. Success has been defined as persevering even in the face of overwhelming odds. Fire use, most notably in wilderness, requires a quite different mind-set, one in which success means choosing *not* to do everything possible. Learning to manage "fire as fire" requires understanding: what it takes to refrain from doing everything possible, how to transition between aggressive action and monitoring, how to communicate intent, what to pay attention to, and how to determine appropriate action in each landscape. Combining fire management practice with structured reflection, such as through the ALWRI collaborative applied and action research projects, offers a powerful way to learn. **IJW**

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The Carpathian Mountains

The Wild Heart of Europe

BY MICHAEL C. BALTZER, DAVID STROBEL, and VLADO VANCURA

***Editor's Note**: This is the final of two articles featuring the Carpathian ecoregion, the largest area of wilderness in mainland Europe. See the December 2008 issue of IJW for an article (Stanciu 2008) that focuses on the Romanian Carpathians.*

A plaque in the Carpathian Biosphere Reserve in Ukraine, situated in the central axis of the Carpathian Mountains, celebrates the exact geographical center of Europe as calculated by Austrian-Hungarian geographers in 1887. Although there are almost as many claims for the center of Europe as there are countries, it is still incredible today that there is a remarkable wild area such as the Carpathian Mountains in the center of this overcrowded continent with its long history of human endeavor.

Spanning seven countries (Czech Republic, Hungary, Poland, Romania, Serbia, Slovakia, and Ukraine) between the Czech Republic in the northwest to Serbia (across the Danube River) in the southeast of the range, the Carpathian Mountains cover an area more than 200,000 kilometers^2 (77,220 sq. mi.) and more than 1,500 kilometers (930 mi.) long, which is far bigger than the Alps, the other great mountain chain in Europe. However the average altitude of the Carpathians is much lower (850 m; 2,788 ft.) and does not have the high-peak, permanent snow cover and glaciers that characterize the Alps. The Carpathian Mountains are not a single uninterrupted range, but are represented by a number of distinct geographical groupings that gives the range a high degree of diversity.

Vlado Vancura, David Strobel, and Michael Baltzer (left to right). Photo by Toby Aykroyd.

Wilderness in the Carpathians

In *A Sand County Almanac*, Aldo Leopold wrote that "in Europe … wilderness is relegated to the Carpathians and Siberia" (1949, p. 200). However, it is difficult in some sense to equate the wilderness of the Carpathians with the other great wildernesses of the world, such as Antarctica or the Gobi desert. The Carpathians have had a long and intimate relationship with humans, and there are few, if any, places in the mountains that have not been influenced or touched by human activity. Even in the most remote, pristine natural areas, local people have collected mushrooms and other forest products, grazed sheep, or regularly hunted. In many ways, the Carpathians are characterized by this close relationship between humans and nature.

However, despite this long, close interrelationship, the Carpathians do have areas where you can walk for days without seeing another person or any signs of human interventions. There are many places where it is possible to feel the total dominance of nature and the long natural history of these beautiful mountains. For these reasons, the Carpathians are characteristic of wilderness in Europe and an inspiration to many. The Carpathians have been the setting for many tales and folklore in Europe when a vision of wilderness and ancient wild Europe is required.

Protected Areas and Wilderness

There are 39 national parks in the Carpathians. Most of these were created to provide protection for the best of the

Figure 1—River through fir-tree forest, Retezat National Park, Carpathian Mountains, southeast Romania. Photo courtesy of Michel Gunther, World Wildlife Fund–Canon.

Carpathian wilderness and many of the wildest areas of the Carpathians are found in these parks. The biggest park is the Lower Tatras National Park with 74,000 hectares (182,780 acres), but those parks with the largest amount of wilderness are found in the Romanian and Ukrainian Carpathians. One example is the Carpathian Biosphere Reserve. Covering 53,630 hectares (132,466 acres) and with an altitudinal range of 200 to 2,060 meters (656 to 6,758 ft.), this reserve comprises large areas of wilderness mixed with rich natural habitat managed by humans for more than a thousand years, and it is a wonderful flagship for the entire Carpathian Mountain chain. Many other examples in Romania were featured in the December 2008 edition of *IJW*.

An initiative aimed to find sustainable solutions for wilderness in Europe called Pan Parks (www.panparks.org) has identified all areas of wilderness in Europe over 10,000 hectares (24,700 acres) and is slowly certifying the best managed as an incentive for conservation and for tourism and sustainable development (Vancura et al. 2008). More than eight potential sites have been identified in the Carpathians, and two of them are now certified Pan Parks. This marks the Carpathians as one of the best regions for wilderness in Europe.

Bieszczady (pronounced "bay-ash-tchade") National Park (BNP) in Poland was the first Pan Park, and Retezat National Park in Romania was the second. BNP is a magical place and, as Poland's third largest national park, is located in the extreme southeast corner of the country on the border of Slovakia and Ukraine. After BNP's creation in 1973, when it covered approximately 60 square kilometers (23 sq. mi.), it was enlarged four times, spanning today more than 292 square kilometers (113 sq. mi.). BNP belongs, together with adjacent protected areas in Slovakia and Ukraine, the trilateral UNESCO East Carpathian Biosphere Reserve, forming an exceptional transboundary protected area of 2,132 square kilometers (823 sq. mi.) in size. About 80% of the national parks are covered with forests, and some of them have preserved their pristine character. The use of trails in the BNP is restricted, with about 70% of the area under strict protection.

> The Carpathians do have areas where you can walk for days without seeing another person or any signs of human interventions.

Perhaps the most outstanding habitat of the Carpathians is its ancient beech forests. In 2007, UNESCO declared 10 sites of old-growth beech forests as World Heritage Sites. The sites stretch over 185 kilometers (115 mi.) of mountain landscapes in the border area between Slovakia and Ukraine. These rare forest habitats are among only a few other UNESCO nature sites in eastern Europe, exhibiting the most comprehensive ecological patterns and processes of pure stands of European beech. These Beech forests represent an outstanding example of undisturbed temperate forests and reflect the ongoing recolonization of terrestrial ecosystems after the last ice age.

Land of the Large Mammals of Europe

The Carpathian Mountains are often heralded as the land of carnivores, and are one of the last places that substantial populations of gray wolves (*Canis lupus*), brown bears (*Ursus arctos*), and the Eurasian lynx (*Lynx lynx*) are found. The approximate population of large carnivores in the Carpathians is composed of 4,000 to 5,000 wolves, 7,000 to 8,000 brown bears, and 2,400 lynx. Romania harbors more than a half of the overall number of bears and wolves in the Carpathians and about 40% of the lynx population, with the other part of the populations being found mainly in Poland, Slovakia, and Ukraine. Moreover, the Carpathian Mountain region is the last stronghold of the European bison (*Bison bonasus*). This species almost went extinct, and the population in central Europe is restricted to the eastern part of Poland (Bialowieza National Park in Poland; see Bobiec 2002) with about 160 bison, and the western part of Ukraine with about 220 bison. Other bison populations exist farther east in Belarus, Lithuania, and Russia. Bison reintroduction projects have been initialized, including one in the Romanian Vanatori Neamt Nature Park. One of the great dreams of many is to see the European bison truly restored in the Carpathians. This would be a great symbol for the wilderness of the Carpathians.

A Special Type of Wilderness

Although the Carpathians do have many areas of true wilderness, when people think of the Carpathians as wilderness, they often mean something more than these few areas. Why is it that some people—including wilderness giants such as Aldo Leopold—have considered the Carpathians as one of the last bastions of wilderness in Europe, when most its "wild areas" are clearly woven with human activities, and generally are far removed from their natural state?

> The relationship between humans and the Carpathian Mountains has not been totally balanced.

Perhaps the best answer to this question is the way that the human society in the Carpathians has evolved there. There are many theories about why the Carpathian region has remained more intact than other mountain regions, especially in Europe. Many of these reasons stem from the fact that the Industrial Revolution was never as intense in this region as it was in other parts of Europe. A few powerful landowners controlled much of the forest and animals and, therefore, endowed it with protection from mass removal longer than many areas in other parts of Europe. But, whatever the reasons are, the mountains have remained relatively untamed and the local inhabitants have learned how to live as part of the hill and mountain ecosystems, matching their practices to the seasons and the natural systems of the mountains.

For hundreds of years shepherds have grazed their sheep, cattle, and horses across the mountains in the summer, protecting them from the large carnivores using dogs rather than guns, and other lethal methods. Extensive fences were never built to secure grazing land, but complicated grazing rights were created by the local people, and understood by the shepherds, to ensure sustainable management of the grazing resources. The impact of this grazing has been to open up some of the forest glades, creating, in many places, mosaics of forests and extensive areas of rich grasslands. There is a debate about the past makeup of this mosaic landscape, with many arguing that it was once completely forested, and with some arguing that the large herbivores, such as the European bison (*Bison bonasus*) and auroch (*Bos taurus primigenius*) (an ancient cattle now extinct), maintained large open areas. The domestic grazers have simply replaced the natural ones, so that today's landscape may even look more similar to the past landscape than one would immediately expect.

Ironically, these grasslands may disappear soon due to the lack of human intervention. The shepherds and hill farmers that act as surrogates for the lost large herbivore populations are leaving the hard mountain life and abandoning the land. The grassland is succeeding to forests, and the rich biodiversity and beautiful landscapes are becoming lost. Perhaps the answer and the opportunity now is to bring the herbivores back?

The loss of the large herbivores and the maintenance of the grasslands through farming mean the mountains cannot be considered a true *wilderness* in the strict sense of the word. However, it is still a landscape where one feels nature truly is in control, and humans an intricate part of the wilderness. This is not a wilderness where humans are rare visitors or, on the contrary, a landscape dominated by humans. The Carpathians are a wilderness where people are a welcome part of the natural system.

A Region in Transition

The relationship between humans and the Carpathian Mountains has not

Figure 2—Hiker looking across a grassland in Retezat National Park, Carpathian Mountains, Romania. Photo courtesy of Michel Gunther, World Wildlife Fund–Canon.

Figure 3—European bison. Photo courtesy of SANCHEZ and LOPE/World Wildlife Fund–Canon.

been totally balanced. The expansion of grazing areas into the most wild and remote areas has meant that the wilderness portions of the Carpathians have been somewhat reduced in quality as places of exclusion from human intervention. If one accepts this grazing as part of the system, then this is minor disturbance compared to some of the other intrusions, such as large dams or forestry activities that have reduced the quality of the Carpathian wilderness. Large-scale socialist plans did have their impact in the mountains, but the impact was often localized and not extensive. The time of the greatest threat to the wilderness of the Carpathians is now. Until 20 years ago, the Carpathian countries were all under communist governments. Once the iron curtain fell in 1989, the region became exposed to larger, global scale economic and social forces. At the same time, five of the countries have become members of the European Union, adding further opportunities for economic and social expansion into these areas. Although this is an important chance for improving the prosperity of the region, without regulation and guidance these influences are presently a threat for the wilderness conditions in the mountains.

Possibly the greatest threat to the wilderness of the Carpathians is the growth of the skiing industry. Skiing has never been a major attraction in the Carpathians, but in the last few years with the opening up of the economies and the access to easy capital, ski resorts have been developed in many places in the mountains. As these mountains are much lower than the Alps, there are fewer places suitable for extensive skiing resorts. Ski-area developers seek the most remote and highest peaks of the Carpathians, and many of these resorts are not small. In the center of the Ukrainian Carpathians at Bukovel, developers are constructing Europe's largest resort. New developers are not familiar with the concept of sustainable skiing, if that is even feasible in these days of global warming.

Ensuring the Future

In 1998, as part of its global adoption of large-scale, ecoregion conservation approaches, the World Wildlife Fund launched a cooperative project between conservation NGOs and academic institutions across the region to create a strategy and action plan for the conservation of the Carpathian Mountain region. This was the first regional approach to protect the Carpathians, and this cooperation led to the creation of the Carpathian Ecoregion Initiative (www.carpates.org), and then the Framework Convention for the Conservation and Sustainable Development of the Carpathian Mountains. The Framework Convention came into force in May 2003. In June 2008, the convention held its second Conference of the Parties in Bucharest, Romania. At this conference, the signatory countries agreed upon a Biodiversity and Landscape Protocol. This protocol aims to protect the rich and diverse natural heritage of the Carpathians. Although there is no specific mention of wilderness in the protocol, a number of articles contribute to the protection of wilderness, such as the protection of extensive habitat for large carnivores and the encouragement of transboundary protected areas.

Two related Carpathian-specific initiatives are underway to help protect wilderness. The first is the Carpathian Network of Protected Areas, an initiative sparked by the Carpathian Convention. The network aims to coordinate its efforts to ensure that there is a strong system of protected areas throughout the Carpathians and to ensure effective management. In addition, scientists across the region are designing an ecological network that aims to ensure extensive areas of natural habitat connect across the Carpathians. Wilderness is one of the many criterion being used to design the framework for this ecological network.

More broadly, a new initiative called the Wild Europe Initiative is being started across Europe with the goal of protecting the remaining wilderness in Europe as well as proactively exploring ways to restore and create new areas of wilderness, where possible. The Carpathian Mountain region is one of the flagship regions for the initiative. In May 2009, the Wild Europe Initiative will hold its first meeting to discuss the way forward for wilderness in Europe.

The Future of Wilderness in the Carpathians

The threats mentioned above linked to unplanned and unsustainable

infrastructure development and the loss of local protection mechanisms seem daunting, and, without direct concerted action, the Carpathian Mountains will lose their value as the wild heart of Europe. However, there are two significant opportunities that can help to save these wild areas, and both require proactive and careful action.

Modern economies have encouraged many mountain and rural area people to leave their land and head for the towns and cities in search of more comfortable living standards and more reliable ways to ensure them. The Carpathians are no exception to this. Shepherds and local livestock owners who traditionally made their living from meat, cheese, wool, and milk, and provided the central pillar for many of the local mountain economies, are fewer and fewer. The tough rural life and the attraction of regular income and more attractive jobs in the valleys and towns have drawn away many people, particularly young farmers. The vast areas of grazed fields and hay meadows maintained for winter fodder are increasingly being abandoned. This has serious implications from a biodiversity point of view, as these meadows support a rich and rare habitat lost throughout most of Europe due to the intensification of agriculture. However, it provides an opportunity in many locations to increase the natural forest areas and, in turn, create even larger wilderness areas. If the ski resorts and second homes can be minimized, then a rare chance to increase wilderness, even in Europe, exists in the Carpathians. It is crucial to maintain extensive tracks of productive meadows, but in many strategic places it may be best to leave them abandoned and allow some areas to return to forest. This process cannot be left to its own natural devices, as abandoned farmland in overcrowded Europe is never left abandoned for long. However, with direct intervention and an ambitious vision, this process could be turned into an opportunity for wilderness and protected area stewardship.

There are two significant opportunities that can help to save these wild areas, and both require proactive and careful action.

In addition, not everybody wants to leave the mountains, and so new economies must be found to provide employment for and to support life in the villages. In fact, without some sort of new economy (whether it is from private enterprise and/or government support), wilderness is likely to disappear as alternative profitable ventures replace them, unless there is strong political support for wilderness. The combination of the need to create new economies to provide new jobs, and the need to find methods to protect wilderness, especially in view of mitigating and adapting to climate change, could be a powerful political force to protect the Carpathian Mountains, if a vision and enough energy can be directed to find future solutions for the people, nature, and wilderness.

No discussion about future scenarios for wilderness in the Carpathians can be held without acknowledging the role that climate change will play. A mountain range the size of the Carpathians will undergo significant changes. However, because many of the large-scale processes are still intact, the impacts on the whole may be less. The present onslaught of threats in the mountains is progressively dismantling these natural systems and processes, and the mountains are becoming increasingly less environmentally robust. The natural stronghold of the Carpathians against the impacts of climate change is being weakened just at a time when it will be needed. The arguments for wilderness conservation in the Carpathians have never been stronger.

Although the future is uncertain, the Carpathians remain a bastion of wilderness on an otherwise overcrowded continent. It is remarkable that despite thousands of years of human history, the Carpathians still held on to some wild areas. Let us hope that the Carpathian Mountains will remain the "wild heart of Europe" for many centuries to come. **IJW**

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Announcements

Compiled by Greg Kroll

IJW Welcomes New Editorial Board Member Lisa Eidson

Lisa A. K. Eidson.

The editorial board for *IJW* welcomes a new board member, Lisa A. K. Eidson, who brings with her experience in website development and information management. She is the website manager and wilderness information specialist for www.wilderness.net, one of the most comprehensive public sources for wilderness information that is supported by a partnership with the Wilderness Institute in the College of Forestry and Conservation at the University of Montana, Aldo Leopold Wilderness Research Institute, and the Arthur Carhart National Wilderness Training Center. Lisa Eidson was awarded the University of Montana's 2006–07 Outstanding Service to the External Community Staff Award for her continued enhancement of www.wilderness.net to serve wilderness managers. We welcome Lisa Eidson to *IJW* and look forward to her contributions to the board and the journal.

IJW Thanks Outgoing Editorial Board Member Troy Hall

Dr. Troy Hall has assumed comanaging editor responsibilities with *Society and Natural Resources: An International Journal*. She is an associate professor of protected area visitor studies in the Department of Conservation Social Sciences and College of Natural Resources at the University of Idaho, Moscow. Dr. Hall has served on the *IJW* editorial board for two years, and we wish her well in her new responsibilities.

U.S. Fish and Wildlife Service Wilderness Stewardship Policy

The U.S. Fish and Wildlife Service (FWS) released on November 17, 2008, an updated Wilderness Stewardship Policy, the first revision since the original policy was issued in 1986. Congress has designated more than 20 million acres (8.1 million ha) on 63 national wildlife refuges as wilderness, comprising nearly 20% of National Wilderness Preservation System lands. Provisions within the revised wilderness policy include the following:

- Affirmation that the Refuge System generally will not modify wilderness ecosystems, such as creating new impoundments or modifying natural process, unless doing so maintains or restores biological integrity, diversity, or environmental health that has been degraded, or is necessary to protect or recover threatened or endangered species.
- Guidance in determining whether a proposed refuge management activity constitutes the minimum requirement for managing a refuge as wilderness.
- Permitting of appropriate recreational uses in wilderness areas if such wildlife-dependent recreational activities (hunting, fishing, wildlife observation, etc.) are nonmotorized, non-mechanized, and compatible with the refuge purpose and mission.
- First-ever guidance on wilderness review of Refuge System lands to help determine whether those lands should be recommended for wilderness designation.

The new Wilderness Stewardship Policy has not received universal acclaim, however; in the opinion of The Wilderness Society (TWS), the revision suffers from serious shortcomings. According to TWS, there is nothing in the new policy about managing refuge wilderness to protect habitat, species, and migration corridors in a time of climate change. "This is a serious omission when Refuge System lands will be among the first to be impacted by the

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

temperature changes associated with global warming." In addition, TWS expresses concern that all refuge lands in Alaska (comprising more than 80% of FWS refuge acreage) are exempt from the new wilderness review requirements. Finally, TWS regrets that the document was released without any opportunity for public comment. (Sources: www.fws.gov/refuges/news/wildernessPressRelease.html; www.fws.gov/refuges/whm/pdfs/wildernessPolicy_102808.pdf; wilderness.org/print/479)

Andrew Muir Receives Rolex Award

South African Andrew Muir, executive director of the Wilderness Foundation Africa and leader of the Umzi Wethu program, was honored for his innovative vision and outstanding leadership in harnessing the healing power of nature in the multifaceted Umzi Wethu program. Mr. Muir received the Rolex Award, which is bestowed upon those who "demonstrate a spirit of enterprise and address pressing needs around the world," on November 18, 2008, in Dubai. The award was accompanied by US $100,000 to provide for the expansion of Umzi Wethu.

Umzi Wethu ("our home" in Xhosa) is a holistic approach to conservation and job creation, enabling social, economic, and spiritual transformation of young South Africans who are currently experiencing endemic poverty, orphanhood, and high vulnerability, often as a consequence of the HIV/AIDS pandemic affecting southern Africa. Umzi Wethu selects and qualifies youth for ecotourism jobs through training scholarships and effective partnerships with game reserves and parks through certified hospitality training, internships, and mentoring. Umzi Wethu is empowered by an environmental ethic, and employs the healing qualities of nature to support long-term health, self-esteem, employability, and personal growth.

Graduates are guaranteed jobs, and every Umzi learner—regardless of his/her specialty training—goes "on trail" for five days every two months, spending almost 15% of the training time in a wilderness setting. The first group of hospitality students all qualified as either junior chefs or food and beverage coordinators. The current group of learners, from townships and rural villages throughout South Africa's Eastern Cape, are training to be game rangers. Umzi Wethu's motto is "Nature, Nurture, Future." (Sources: www.wild.org/field-projects/umzi-%e2%80%93-aids-orphans-nature/; and www.rolexawards.com)

National Park Service Wilderness Stewardship Awards

The Wes Henry National Excellence in Wilderness Stewardship Award is conferred by the U.S. National Park Service to recognize both individuals and groups from within the agency for significant contributions to wilderness preservation. A ceremony was held in Port Angeles, Washington, in October 2008, to present the 2006 and 2007 awards to the following recipients:

- Jan van Wagtendonk, Yosemite National Park (2006 Individual Award) in recognition of his many achievements in studying and modeling ecological and social impacts of recreational use in wilderness.
- Judy Alderson, Alaska Regional Office (2007 Individual Award) for serving as a role model in wilderness stewardship and her unwavering spirit of service over several decades.
- Paul Anderson, superintendent, Denali National Park and Preserve (2006 Group Award) for working with other agencies, organizations, and the public in developing the park's Backcountry Management Plan.
- Gregg Fauth, wilderness manager, Sequoia and Kings Canyon National Parks (2007 Group Award) for facilitating the reduction of low-level military overflights and developing a

NPS Award recipients from left to right: Gregg Fauth, Paul Anderson, Jan van Wagtendonk, and Judy Alderson.

long-term program of overflight management and education.

(Source: National Park Service, Wilderness Stewardship and Recreation Management Office)

Forest Service Wilderness Awards Presented

On October 17, 2008, the U.S. Forest Service (USFS) chief Gail Kimbell, deputy chief Joel Holtrop, and director Chris Brown presented the 2008 National Wilderness Awards. The six awards were made to individuals, teams, or organizations who supported the stewardship of the wilderness system on national forest lands.

- *Aldo Leopold Award for Overall Wilderness Stewardship Program,* **Brad Hunter**, wilderness and recreation manager, Petersburg Ranger District, Tongass National Forest Service.
- *Bob Marshall Award for Individual Champion of Wilderness Stewardship*, **Rob Mason,** wilderness manager, High Sierra District, Sierra National Forest Service.
- *Bob Marshal Group Champion of Wilderness Stewardship*, **Friends of Nevada Wilderness.**
- *Wilderness Education Leadership Award,* **Kearstin Edwards,** wilderness ranger, Powell and Lochsa Ranger Districts, Clearwater National Forest Service.
- *Traditional Skills and Minimum Tool Leadership Award*, **Hidden Springs Ranger District Wilderness Trail Crew,** Shawnee National Forest Service.
- *Line Officer Wilderness Leadership Award,* **Kathleen McAllister**, deputy regional forester, Northern Region.

The Excellence in Wilderness Stewardship Research Award was jointly awarded by the USFS and the *International Journal of Wilderness* to Dr. Joseph Roggenbuck, an emeritus professor of natural resource recreation at Virginia Tech University for his lifelong contributions to research that supported management of wilderness visitors and resources.

USFS deputy chief Joel Holtrop presents 2008 wilderness awards. Photo courtesy of the USFS.

(Source: www.fs.fed.us/fstoday/081017/NATIONAL_NEWS/wilderness.html)

IUCN Honors Outstanding Conservationists with the Fred Packard Award

The International Union for Conservation of Nature (IUCN) honored seven outstanding individuals at the World Conservation Congress, held in Barcelona in October 2008. The Fred Packard Award is bestowed by the IUCN's World Commission on Protected Areas to recognize globally outstanding service to protected lands.

Ernesto Enkerlin, senior advisor to WILD9 (the 9th World Wilderness Congress), is an inspiring leader whose vision has helped shape conservation policy in Mexico. Ernesto's work as head of the National Commission for Natural Protected Areas (CONANP) has substantially elevated the profile of conservation in the national political agenda. He has worked with and engaged local communities and indigenous peoples living in and around protected areas in Mexico, and has participated actively in various NGOs dedicated to conservation. Ernesto has also made major contributions globally to protected areas through his involvement with the World Protected Areas Leadership Forum, which includes the CEOs of the world's major wildlands management agencies.

George Wallace, a professor at Colorado State University in the United States, has devoted his career to capacity building for protected areas through his teaching, research, training, graduate students, and by personal example. His work has improved the efficacy of hundreds, if not thousands, of protected area professionals in the Americas. George is

one of the founders of the Consortium for International Protected Area Management, which has supported capacity building for land managers in many countries.

Moses Mapesa is the executive director of the Uganda Wildlife Authority, one of the most professional protected areas agencies in Africa. He is a founding member of the Leadership for Conservation in Africa forum, which brings conservationists and business leaders together to support conservation-led development.

Maria Tereza Jorde Padua is director of the Brazilian Institute of Forest Development's National Parks, having created 20 million acres (8 million ha) of national parks and biological reserves. She also helped create the first Private Natural Heritage Reserves in Brazil.

Henri Blaffart, a true conservation warrior for Conservation International Pacific, recently drowned while crossing the Tiendanite in New Caledonia. He single-handedly engaged 20 tribes and clans of the area to work for nature conservation and successfully battled against the establishment of four hydroelectric dams in the Mont Panié reserve.

Rober Cartagena, the president of CIDOB, the national organization of indigenous people in Bolivia, has worked tirelessly for two decades to save one of the most important forest areas on the planet, while increasing the participation of and respect for indigenous people within the protected areas.

Muslih Al-Juaid, of Saudi Arabia, has shown exemplary dedication in conserving desert ecosystems and in the reintroduction of several species. In 2007, he was shot and severely wounded by suspected poachers while attempting to detain them. He is now recovered and is back at work, setting an example of valor and responsibility to fellow staff members.

(Source: www.iucn.org/about/union/commissions/wcpa/wcpa_focus/index.cfm?uNewsID=1664)

Ecuador Gives Environment Legal Rights

On September 28, 2008, Ecuadorean voters approved a new constitution, the 20th since independence, by a majority of 64%. Ecuador is the first nation ever to codify a new system of environmental protection based on rights. The following clauses are included in the constitution:

- Nature, or Pachamama, where life is reproduced and exists, has the right to exist, persist, maintain and regenerate its vital cycles, structure, functions and processes in evolution. Every person, people, community or nationality may demand the recognition of rights of nature before [the courts and government agencies].
- Nature has the right to an integral restoration… . In the cases of severe or permanent environmental impact, including those caused by the exploitation of nonrenewable natural resources, the State will establish the most efficient mechanisms for restoration, and will adopt adequate measures to eliminate or mitigate harmful environmental consequences.
- The State … will promote respect towards all elements that form an ecosystem.
- The State will apply precaution and restrictive measures in all activities that can lead to the extinction of species, the destruction of ecosystems or the permanent alteration of natural cycles. The introduction of organisms and organic and inorganic material that can alter in a definitive way the national genetic patrimony is prohibited.
- Persons, people, communities and nationalities will have the right to benefit from the environment and from the natural wealth that promotes wellbeing. Environmental services cannot be appropriated; its production, provision, use and exploitation will be regulated by the State.

(Sources: www.globalexchange.org/campaigns/greenrights/rightsofnature.html.pf; stuffedandstarved.org/drupal/node/369; *The Economist,* October 2, 2008)

New Wilderness Communication Gadget Debuts

As if personal locator beacons have not already sufficiently compromised the wilderness experience, there is now a new handheld satellite communication and safety device on the market: SPOT Satellite Messenger. Under the trademarked tagline of "Live to Tell About It," SPOT can alert emergency responders, allow the user to check in at home, and track the user's whereabouts.

According to SPOT's website, "Hiking is adventure travel at its purest. Just you, the trail and a new experience around every bend. But it's important to stay connected and let those at home know you're OK. Now, there is an easy way to provide that peace of mind without interrupting the hike. With the push of a button, SPOT's 'check-in' function sends a message with your exact coordinates to people of your choice. Need some help? Ask your contacts or fellow hikers for assistance with the 'Ask for help' button. If real trouble comes your way, hit 'Alert 911' to bring emergency help right away. You can even share your journey with friends and

family with the 24 hour tracking function. It allows them to follow your trail online in real time with vivid detail on Google Maps … all while you're out living life."

The "Alert 911" function sends exact GPS coordinates, along with a distress message, to a GEOS International Emergency Response Center every five minutes until canceled. The Emergency Response Center then notifies the appropriate emergency responders based on the user's location and personal information—which may include local police, highway patrol, the Coast Guard, America's embassy or consulates overseas, or search-and-rescue teams. "Alert 911" also notifies the user's emergency contact person about the receipt of a distress signal. (Source: www.findmespot.com/en/)

Mountain Bikers Help Kill State Wilderness Bill

On September 27, 2008, California governor Arnold Schwarzenegger vetoed legislation that would have directed assessments of selected state lands in Lake, Mendocino, Napa, Santa Clara, and Sonoma counties for possible wilderness designation under California law. The International Mountain Bicycling Association (IMBA) opposed the law, sponsored by the California Wilderness Coalition, and enlisted members of California's bicycle industry to add their voices to successfully kill the bill. (Source: imba.com/news/news_releases/10_08/10_02_wilderness_veto.html)

Book Reviews

Arthur Carhart: Wilderness Prophet

By Tom Wolf. 2008. University of Colorado Press.
304 pages. $34.95 (cloth).

Tom Wolf begins his biography of Arthur Carhart with several provocative statements. He suggests that Carhart's populist ideas of wilderness—a stance that differentiated him from other environmentalists of his time—provide a useful guide to the future direction of wilderness management in the United States. Further, not only did "obscurity and ostracism [become] Carhart's 'rewards' for questioning the environmental orthodoxy of his times" (p. 3), but "anonymity and suspicion have been Carhart's posthumous 'reward' for a lifetime of conservation advocacy" (p. 4), even though this work made him "America's most widely read conservation writer in the mid-twentieth century" (p. 7). This image of Carhart as a populist outsider who never got the respect he deserved pervades this biography.

Reflecting Carhart's Republican status, Wolf suggests that Carhart maintained a considerable distrust of government's role in wilderness and resource management, and was most concerned by the bureaucracies' propensity to serve their own need over that of the public or wilderness. Certainly, his early status as the first landscape architect in the USDA Forest Service (in 1919), and his subsequent resignation in 1922 seemed to generate a lifelong suspicion about the misplaced priorities of American resource management and wilderness agencies. Throughout his lifetime, Carhart was never shy about questioning the actions of these agencies (or special interest groups such as ranchers or the forest industry). This led to his populist view of wilderness and resource management: he strongly felt local residents and communities were the best arbiters of decision-making in these realms. His lack of support for the Wilderness Act (he felt it pandered to special interests) proved to be a particular thorn in the side of many fellow environmentalists and government officials.

After his brief stint in the Forest Service, Carhart first turned to the private sector (as a partner in a landscape architect firm) and then juggled consulting (often for the very agencies he criticized) and writing for his career. His writing was a mixture of pulp fiction—often portraying outsiders living in the Western wilderness—and a growing number of freelance publications dealing with a variety of outdoor recreation and resource management issues. His fiction, then, often reflected his own views of himself: "a non-conformist, totally; an old buck always off the reservation and hunting lonely" (p. 250).

Although his self-imposed outsider status may have ultimately limited his impacts on mid-century conservation thought and action, Wolf persuasively argues that Carhart's populist and critical voice provided a valuable alternative perspective to other conservationists' thinking at this time. However, much as Carhart's vision of resource and wilderness management never quite came to fruition, Wolf's provocative statements as to Carhart's importance in conservationist history in America are perhaps not ever definitively proven. But it is clear that Wolf has provided a scholarly, sympathetic analysis of the life and works of this complicated curmudgeon, an important and influential figure in the 20th-century U.S. conservation movement.

Review by JOHN SHULTIS, *IJW* book editor; email: shultis@unbc.ca.

A Wild Life: Adventures of an Accidental Conservationist in Africa

By Dick Pitman. 2008. The Lyons Press.
302 pages. $16.95 (paperback).

Befitting his British background, Pitman describes himself in a self-depreciating manner as an "accidental conservationist," introduced to the African wilderness via an army experience soon after his arrival in Zimbabwe (then Rhodesia) in 1977. Despite the civil war, Pitman managed to convince the parks branch to allow him to write a book on the country's wildlife and park system. Although it was literally a world away from his old London life, Pitman immediately felt like it was home, describing the trip as a "strangely surreal combination of wartime constraint and glimpses of extraordinary beauty" (p. 27). The landscape was "a wild and

endlessly fascinating entity, of incredible loveliness and terrifying fragility" (p. 56). These early experiences in the African wilderness gave his life a direction it had previously lacked.

After a brief stint working for the government parks department, a disillusioned Pitman turned to freelance writing and photography for his living. A trip down the Zambezi River, amid threats to dam the river, led to the creation of the Zambezi Society (ZS) in 1982; Pitman became the founder-chairman of this society. After the dam plans were put on hold, the ZS tackled many other issues, including the protection of the black rhinoceros, translocating cheetahs, visitor planning at Victoria Falls, elephant conservation, and various community-based conservation (CBC) efforts.

It is Pitman's attitudes toward international CBC activities that particularly caught my attention. Pitman launches a rather devastating attack on CBC in Zimbabwe. He suggests that conservation NGOs "sprung up like weeds when they found just how much money there was in turning elephants into useful members of village society" through CBC (p. 114). And despite the "community" moniker, Pitman suggests that rural communities are rarely involved in decision making in a meaningful way, and that the commnities involved do not match the view of western agencies: "The rapidly growing donor aid industry had re-branded them as a rural community—a pre-packaged bundle of stakeholders who supposedly think alike, act alike, love each other to pieces, and produce unanimously constructive answers when consulted. That's the mythology, anyway" (p. 221). Pitman also expresses the concern that "the parks had become tourist playgrounds, but all the money was being gobbled up by tour operators and high level government officials" (p. 155).

This book mainly provides a humorous account of the author's experiences in visiting the Zimbabwe wilderness over the last 25 years, focusing on his exciting and dangerous escapades with the wildlife and attempts to conserve these animals. Beneath the lighthearted tales of his exploits, however, is a personal indictment of the move to rural development through CBC efforts. This makes the book a little more uncomfortable to read, but it provides a singular first-hand, critical perspective by one expatriot conservationist on the move to CBC in Zimbabwe.

Review by JOHN SHULTIS, *IJW* book editor; email: shultis@unbc.ca.

State of the Wild 2008-2009: A Global Portrait of Wildlife, Wildlands and Oceans

By Wildlife Conservation Society. 2008. Washington, DC: Island Press. 312 pages. $29.95 (paperback)

State of the Wild is a biennial series produced by the Wildlife Conservation Society (WCS) that attempts to inform and inspire the public on key issues facing global wildlife and wildlands. The purpose of the series is to highlight critical issues facing wildlife, promote solutions to these issues, present global conservation highlights, and influence global policy. Each volume also has a unique focus: this 2008–2009 edition discusses the links between ecological and human health.

The content of the series is primarily short chapters based on scientific information, but personal essays and poetry are also present; both WCS-related and other authors provide material. Reflecting WCS objectives, the focus of the material tends to slightly emphasize wildlife over wildlands.

There are three sections to the book. Part I, State of the Wild, provides global conservation wins and losses, identifies new species, identifies those closest to extinction, and updates the previous issues' focus.

Part II, Focus on the Wild, provides eight chapters which address the links between the health of wildlands and human health. Several chapters highlight recent findings that suggest that ecosystem health may decrease the spread of infectious diseases such as Lyme disease or malaria. This relationship may provide a new, powerful reason to preserve wilderness: "The goal is healthy ecosystems, within which a richness of species, including native pathogens, have their roles" (p. 81). Without this biodiversity, the continued destruction of wildlands will intensify disease outbreaks.

Emerging Issues in the Wild (Part III) identifies several threats and discusses the relationship between society and conservation. A wide variety of topics are included, from conservation psychology to climate change. The extreme range of topics in the 16 chapters is a little disconcerting at times, but certainly identifies the wide range of issues affecting global conservation and the integration of social and natural systems.

The same is true for the series as a whole: while the disparate topics and approaches don't always integrate perfectly, *State of the Wild* certainly provides a wide-ranging, passionate review of the state of the world's wildlife and wildlands and the need to work harder to protect them. It condenses a great deal of information and illuminates many of the key issues facing our planet and species.

Review by JOHN SHULTIS, *IJW* book editor; email: shultis@unbc.ca.