INTERNATIONAL

Journal of Wilderness

In This Issue

- Adapting wilderness stewardship to global change
- Diversity of wilderness ecosystems
- Wilderness Land Trust
- Wilderness network conservation in northern Spain

AUGUST 2012 VOLUME 18, NUMBER 2

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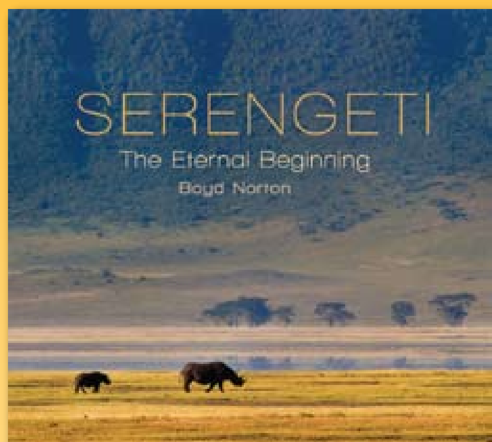

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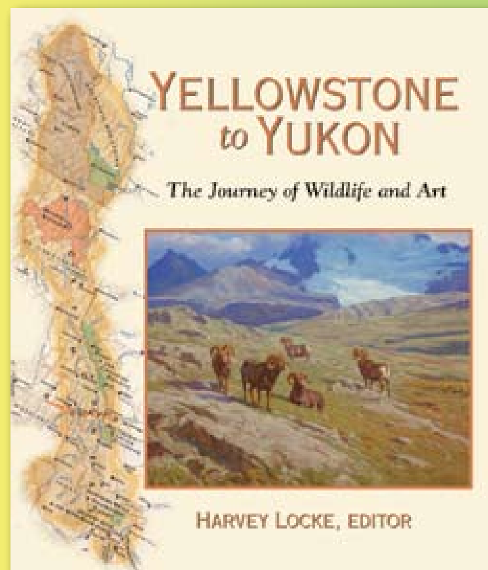
The Journey of Wildlife and Art



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AUGUST 2012 VOLUME 18, NUMBER 2

FEATURES

EDITORIAL PERSPECTIVES

3 *Celebrate Wilderness*
BY CHAD P. DAWSON

SOUL OF THE WILDERNESS

4 *Ernest Oberholtzer's Wilderness Legacy*
BY JAMES M. GLOVER

STEWARDSHIP

9 *Beyond Naturalness*
Adapting Wilderness Stewardship to an Era of Rapid Global Change
BY DAVID N. COLE

15 *The Diversity of Wilderness Ecosystems Represented in the U.S. National Wilderness Preservation System*
BY H. KEN CORDELL

21 *Traditional Wisdom and Climate Change*
Contribution of Wilderness Stories to Adaptation and Survival
BY ALAN WATSON, LINDA MOON STUMPFF, and JENNIFER MEIDINGER

26 *Wilderness Land Trust*
Two Decades Keeping Wilderness Wild
BY PAUL F. TORRENCE

SCIENCE & RESEARCH

31 *Wilderness Network Conservation in the Cantabrian Region of Northern Spain*
BY FERNANDO ALLENDE, MANUEL FROCHOSO, RAQUEL GONZÁLEZ, and NIEVES LÓPEZ

EDUCATION & COMMUNICATION

37 *One Half Century of Wilderness Stewardship*
America's 50th Anniversary Wilderness Celebration
BY GREGORY HANSEN and VICKY HOOVER

39 *Forever Wild, Forever Free*
Bob Marshall's Legacy
BY ANN O'RYAN SPEHAR

WILDERNESS DIGEST

44 *Announcements*

47 *Book Reviews*

47 ***Authenticity in Nature: Making Choices about the Naturalness of Ecosystems***
BY NIGEL DUDLEY
Reviewed by Bill Borrie

47 ***Rachel Carson – A Biography***
BY ARLENE R. QUARATIELLO
Reviewed by Anna Thompson

On the Cover

Main image: Katmai Wilderness (Alaska) is 3.4 million acre (1.37 million ha). In August, its famous grizzly bears gather on the rivers for sockeye salmon, while anglers **(inset)** work the same waters for world-class rainbow trout that cruise below the spawning salmon, feeding on the eggs. Photos © Vance G. Martin.

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

International Journal of Wilderness

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EDITORIAL PERSPECTIVES

Celebrate Wilderness

BY CHAD P. DAWSON

After decades of wilderness advocacy and stewardship, we are poised to begin the celebration of several landmark events in our collective wilderness legacy. Like the hikes, paddles, climbs, and travels in wild places we all enjoy, there are times to pause and take a look at the vista before us. In those reflective moments at an alpine lake, desert canyon, ocean beach, or trail overlook, we can appreciate the landscape and humbly see our place in the wider expanse of an ecosystem. Rather than it being an experience that diminishes our self, it is a liberating and cathartic experience because we are swept along within a much larger reality, and we glimpse how our small part contributes to and arises from that which is all around us. Then recharged, we go back to playing our part and living our life with enthusiasm as a contribution to something that transcends us and helps define us and energizes us.

Two celebrations that are in the planning and development phases have been recently announced:

- The 10th World Wilderness Congress (WWC), WILD10, will be held on October 4–10, 2013, in Salamanca, Spain. The first WWC was held in 1977 in South Africa and then in six different countries around the world with eight other WWC events; the most recent was WILD9 in Mexico in 2009. For more information on WILD10 and the history of the WWC, go to www.wild.org and www.wild.org/main/world-wilderness-congress.
- The 50th Anniversary National Wilderness Conference, Wilderness50, will be held on October 15–17, 2014, in Albuquerque, New Mexico. The Wilderness50 celebration is in honor of the 1964 Wilderness Act in the United States. Although celebrations have been held at 5- and 10-year intervals since 1964, this celebration will include many events during 2014 and lead up to the Wilderness50 conference. For more information, go to www.wilderness.net/50th. Also see the article by Gregory Hansen and Vicky Hoover in this issue of *IJW* to learn how to become involved.

In addition to putting these dates on your calendar, get actively involved with these landmark celebrations by sponsoring a supporting event, joining a planning committee, proposing a talk at the conference, holding a local outdoor event to educate about wilderness, and by representing your organization's wilderness interests at the WILD10 and Wilderness50 conferences.

This issue of *IJW* includes four articles on wilderness stewardship. Cole outlines another way of thinking about naturalness and wilderness stewardship during a time of global environmental change. Cordell reports on the amount of different ecosystem types represented in the U.S. National Wilderness Preservation System. Watson, Stumpff, and Meidinger share their perspective on how traditional wisdom can contribute to planning for wilderness stewardship that adapts to global climate change. In anticipation of WILD10 in Spain in 2014, Allende and co-authors summarize some of their research on the wilderness network conservation in northern Spain.

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SOUL OF THE WILDERNESS

Ernest Oberholtzer's Wilderness Legacy

BY JAMES M. GLOVER

Ernest Oberholtzer (1884–1977) may be the most underappreciated wilderness advocate in the brief history of preservation in the United States. I suspect that's mainly because he was not a great writer in the fashion of Henry David Thoreau, Aldo Leopold, Rachel Carson, or Ed Abbey. We tend to venerate most those whose published words inspired us most. Oberholtzer could and did write well. But he spent so much time as a practical preservationist that he never published the kind of essays and books the above-mentioned icons did.

He's worthy of our admiration for at least two things, though. First, he was one of the earliest (and greatest) avocational wilderness explorers – those whose main motivation was the sheer joy and adventure of it. And second, as one of the first professional full-time wilderness advocates, his work was extraordinary in both its volume and its effectiveness. His legacy from that effort is one of the largest roadless complexes in North America, known popularly as the Quetico-Superior country of northeast Minnesota and southern Ontario.

A portrait of the violinist as a young man

There's not a lot in Oberholtzer's young life to predict he'd become an intrepid wilderness traveler and relentless wilderness advocate. He was born in Davenport, Iowa, and grew up there. He later said that he was fascinated as a child by logs coming down the Mississippi River from the "mysterious North." He enjoyed the rural and semi-wild landscape just outside of Davenport, and he had something of an outdoor mentor in the form of a gravedigger named Tom Burke. Burke, a family friend and fan of English literature, took Oberholtzer on some hikes and encouraged his interest in birds, plants, and animals.

Young Oberholtzer seems, however, to have been at least as interested in academics and the violin and as in tramping around the outdoors. He began to pursue the violin at the age of six, eventually became an accomplished classical violinist, and continued to play throughout his life. His academic skills got him into Harvard, where he made a point to take courses from, and spend time with, several of the Western world's most elite intellectuals. These included Willy Hess, the concertmaster of the Boston Symphony, and the philosophers William James and George Santana. His two best student friends were a young scholar named Sam Morrison, who would later achieve renown as a military historian, and Conrad Aiken, who was to become a noted novelist and poet.

He Tries a Little Exploration

In the summer of 1906, following his senior year at Harvard, Oberholtzer made a short trip to northern Minnesota and took a brief canoe journey into the Boundary Waters near Ely. Again, there is little in the record to indicate that he might be inclined to take such a trip. There's no evidence he'd even been in a canoe before this, and it's a fairly safe guess that he came to Minnesota alone because none of his Harvard friends had any interest in the hardships of northwoods wilderness travel.

And yet, three years later, following a year of graduate school studying landscape architecture at Harvard, Oberholtzer returned to northern Minnesota. He now proceeded to make one of his two very remarkable achievements as a wilderness canoe paddler. That summer and into the fall he "traveled continuously by canoe." He ended up, as he later said, "travers[ing] all the major waterways of the Rainy Lake Watershed." In that one season, he went through six different guides and paddled possibly as much as 3,000 miles (4,800 km). Much of this was in the future Boundary Waters Canoe Area and Quetico Provincial Park. Only the

freezing of the lake waters and bitter cold temperatures stopped him. He finished out the year by solo paddling part of the Rainy River. "By that time," he later said, "it was so fearfully cold that you just couldn't stay out there."

He Takes a Historic Voyage

Oberholtzer's second (and even more) remarkable wilderness foray came three years later. This was a two-man expedition with the ambiguous initial goal of canoeing "in the uncertain direction of the magnetic Pole." It became a rather epic journey to Hudson Bay and back, involving some 133 days of canoe travel through a largely unmapped labyrinth of water he and his partner had never seen before.

That partner was his favorite guide from 1906, Billy Magee, an Ojibwa trapper who would turn 51 that year (see fig. 1). Starting at The Pas (northwest of Lake Winnipeg), they did indeed travel generally north for 73 grueling days, until they found themselves, on the morning of September 6, in a large spot of bother. They were shivering around a tiny, sputtering campfire in a cold pouring rain on the Thlewiaza River, some 180 miles (290 km) west of Hudson Bay. They were cold, hungry, and both feeling "rheumatic." They were way "behind schedule" and making just five miles a day. "The prospects for reaching home or even Churchill before winter look very dark," Oberholtzer wrote in his journal, "but I am resolved to make a desperate try."

They did survive, of course, or you would not be reading an article that's mainly about what Oberholtzer later accomplished. Very briefly, here is how they got through.

A week after the journal entry above, they ran into a lone Inuit in a kayak, whose name was roughly pronounced "Bite." Bite took them in, fed

Figure 1 – Ernest Oberholtzer with his friend and guide Billy Magee in 1912. Photo courtesy of the Ernest Oberholtzer Foundation.

them, and warmed them up. He then taxied them down to Fort Churchill in his family's sailboat.

At that point, however, they were still only about halfway home. Somewhat recuperated, they proceeded to paddle another 160 miles (258 km) farther south down the western shore of Hudson Bay in very harsh conditions; then paddle, portage, and line their canoe for 400 miles (645 km) against the powerful current of the Hays River, finally reaching the north end of Lake Winnipeg on October 19; and 260 more miles (419 km) down the length of Lake Winnipeg, that final section taking 18 days, including 6 that were too windy to travel and several when they paddled in snowstorms.

That expedition has been considered so noteworthy that several excellent sources are available to anyone seeking more details. One is the definitive biography of Oberholtzer by Joe Paddock , called *Keeper of the Wild*. There's also David F. Pelly's *The Old Way North: Following the Oberholtzer-Magee Expedition*, which provides a detailed cultural context of the land they traveled through. There's a coffee table–style book from the Oberholtzer Foundation, titled *Toward Magnetic North*, featuring Oberholtzer's photos from the trip, passages from his trip journal, and several short essays by some of his friends and protégés. Finally, there's a detailed analysis of the trip in the Canadian historical journal *The Beaver*, titled "Voyage to Nutheltin" by Robert H. Cockburn, who calls it "one of the most commendable canoe voyages in history" (p. 5).

Wilderness Keeper

In the years following the Hudson Bay trip, Oberholtzer began living on an island on Rainy Lake and pursuing a variety of occupational endeavors, none of which made him much of a living. They included writing adventure stories for children, photographing wildlife, lecturing on wildlife and adventure, studying the Ojibwa culture, and sheep ranching (see fig. 2).

Then, in 1925, his life changed abruptly. That year a timber and paper tycoon named Edward Backus proposed what Oberholtzer would later call "the most ambitious project for hydroelectric development ever launched in America." Specifically, Backus wanted to build seven large

Figure 2 – Ernest Oberholtzer photograph of Bob Readman, Quetico's first backcountry ranger, in 1909. Photo courtesy of the Ernest Oberholtzer Foundation.

dams that would back water up over some 14,000 acres (5,668 ha) – about the size of four Yellowstone National Parks – in the Rainey Lake watershed.

A hearing on Backus's proposal was held on September 28, 1925, in International Falls, Minnesota. Oberholtzer showed up and testified against it, along with a surprisingly large number of other local residents and a few "outsiders." The latter, Oberholtzer later recalled,

> were concerned about the preservation of the very remarkable – in fact unique – wilderness character of the entire watershed. There were men like myself who had traveled year after year in and out of these waterways who knew that this was one of the great [wilderness] areas of the world. (Paddock, p. 161)

Afterward, Oberholtzer tried to get a transcript of the hearing. Even this, however, became an ordeal that seems emblematic of the battle he was up against. He ended up having to raise $478 among fellow wilderness advocates to pay for a printing of the bulky document.

Meanwhile, the "outsiders" – consisting largely of business and professional men from Minneapolis and Chicago – formed a group they named the Quetico-Superior Council. They asked Oberholtzer to be its executive director, and he agreed to do so for an annual salary of $5,000 a year.

In that role, Oberholtzer began to work on a counter-proposal to Backus's scheme. He came up with a management plan for the region that R. Newell Searle, in *Saving Quetico Superior: A Land Set Apart*, calls "truly a prophetic vision, a plan with few known precedents" (p. 66). It called for three zones to be established. A large core wilderness zone would include today's Quetico Provincial Park in Ontario, the Boundary Waters Canoe Area Wilderness and Voyagers National Park in Minnesota, and several other established canoe routes, mostly on the Canadian side. A second zone surrounding the wilderness core would allow summer camps to be offered and cabins to be leased, but would be accessible only by foot trails and water routes. Finally, the outer zone would allow sustained-yield forestry, private home ownership, and some other economic activities.

Students of U.S. wilderness history may recall that Arthur Carhart, an early U.S. Forest Service landscape architect, had earlier proposed something similar for the Boundary Waters portion. But Carhart's proposal, in fact, was not really a wilderness plan as that term has come to be defined. As David Backes (1991) has pointed out, Carhart mainly envisioned the Minnesota Boundary Waters as a motorboat highway into the more remote Quetico country on the Canadian side. To accomplish this, he proposed several small dams to back water up over key streams and shallow spots, and, obviously, unlimited motorboat use. He also proposed that a large number of rustic hotels and "chalets" be scattered along what are today key canoeing routes. The routes would also be noticeably marked to make it "impossible for a reasoning person to become lost." The hotels and chalets, meanwhile, would, as Carhart said, "eliminate the necessity for people going into this territory carrying a tent, cooking utensils, tools, etc" (Backes 1991).

Carhart's plan did call for the boundary lakes to remain roadless, but otherwise his idea of a wilderness was rather different from Oberholtzer's.

In any case, Oberholtzer devoted the next several years to converting his plan into public policy. He testified at hearings, wrote hundreds of letters to government officials, helped write legislation, and appeared on radio shows. As might be expected, his plan – or "the program," as he affectionately called it – was never fully adopted. But slowly, over the next several decades, at least some of it was. The first big breakthrough was the passage of a U.S. federal bill called the Shipstead-Nolan Act, in 1930. It prohibited the use of

dams to alter water levels on the Forest Service lands of the Minnesota Boundary Waters, and also banned logging within 400 feet (122 m) of shorelines there. Although the bill did not specifically use the word *wilderness*, it was, in effect, one of the first acts of U.S. law to recognize preservation on federal lands as a public good (Shipstead-Nolan Act, 1930).

Important as Shipstead-Nolan was, it was only a first step for Oberholtzer and his fellow wilderness advocates. For 25 more years, Oberholtzer kept pushing for an international management plan with a large wilderness core at the heart of it. After World War II, he proposed that Canada and the United States sign a treaty designating the region an International Peace Park (an idea he borrowed from the Waterton-Glacier park system in the northern Rockies).

Figure 3 – A moose photograph taken by Ernest Oberholtzer while on a trip with Billy Magee in 1910. Photo courtesy of the Ernest Oberholtzer Foundation.

Figure 4 – A typical camping setup by Ernest Oberholtzer and Billy Magee. Photo courtesy of the Ernest Oberholtzer Foundation.

The International Peace Park never fully materialized, nor was anywhere near the amount of the Rainy Lake Watershed preserved as Oberholtzer wanted. His efforts, however, contributed directly to the eventual protection of the 2.4-million-acre (972,000 ha) wilderness complex mentioned in the first paragraph, known most popularly as the Quetico-Superior. It consists specifically of three different units. These are the Boundary Waters Canoe Area Wilderness, managed by the U.S. Forest Service; Voyageurs National Park, managed by the U.S. National Park Service; and Ontario's Quetico Provincial Park. The biggest management difference is that motorboats and snowmobiles are permitted throughout Voyageurs National Park, which is not the case in Quetico and the Boundary Waters, where canoe or snowshoe travel is largely required.

Although that complex, as mentioned, is Oberholtzer's single greatest legacy, one other wilderness unit deserves mention. This is the White Otter-Turtle River Provincial Park of Ontario. It is a 12,000-acre (4,858 ha) string of nine lakes that, by virtue of its remoteness and almost complete lack of facilities, has perhaps as much, if not more, of that elusive "wilderness character" than many much larger units. Its corridor was traveled numerous times by Oberholtzer, and it was the spot to which Billy Magee took him in 1910 when Oberholtzer wanted to concentrate on photographing moose (see fig. 3). It, too, was among the waterways that Oberholtzer felt deserved preservation. Beyond that, it is not clear what his exact role was in its protection, but he should be credited for, at the very least, being the first to espouse its wilderness value.

No Straddler

When Bob Marshall spearheaded the formation of the Wilderness Society in 1935, he somewhat famously declared, "We want no straddlers, for in the past they have surrendered too much good wilderness … that should never have been lost" (Glover 1986, p. 159). It's apt, then, that Marshall asked Oberholtzer to be among the seven founding members of the society (Oberholtzer accepted). Indeed, Oberholtzer was such a non-compromiser that he strained his relations with some of his most sincere fellow wilderness advocates. For example, he had a bit of a falling out in 1951 with the noted wilderness essayist and activist Sigurd Olson. Olson wrote up a plan of his own that for practical reasons concentrated on just the Boundary Waters and Quetico Provincial Park – an area only about one-fifth of the entire Rainy Lake Watershed that Oberholtzer's plan had addressed.

Oberholtzer seems to have felt betrayed by this. He wrote Olson that his (Olson's) proposal "violates the whole U.S. program as fostered these many years" (Backes 1999, 212). Olson's biographer, David Backes, writes that Oberholtzer was "hurt to see his lifelong dream slowly whittled away, and he nursed a growing distance between himself and Olson" (Backes 1999, p. 212). From the practical point of view, Olson was correct. There was never enough support for the amount of preservation Oberholtzer's plan called for to make it come true. On the other hand, from a negotiator's point of view, Oberholtzer's plan, and even his rather solitary stubbornness, had a practical value. His position – "extreme" perhaps, but well-articulated – made Olson's and others' seem a lot more reasonable to their opponents and to lawmakers. It's a dilemma, of course, that is very familiar to wilderness advocates today.

A Reluctant Summary

It is difficult to briefly sum up Ernest Oberholtzer, but here's a swing at it. He was a notable explorer by canoe of a large chunk of North American wilderness between northern Minnesota and Hudson Bay (see fig. 4). He was, albeit briefly, a pioneering wildlife photographer, especially of moose and caribou. He was a very accomplished violin player and book collector. He was an important – although technically "amateur" – student of the Ojibwa culture (earning the nickname among his Ojibwa friends of "Atisokon," or "legend," because of his great interest in their stories). He was an innovative regional landscape planner, coming up with what might be considered the first-of-its-kind plan for a wilderness-centered ecoregion.

His legacy ... is one of the largest roadless complexes in North America ... the Quetico-Superior country of northeast Minnesota and southern Ontario.

As mentioned, he's less famous than some of the best wilderness writers, so he has probably had less direct influence on the way wilderness advocates frame their arguments. But his marathon canoe trips are still greatly admired by students of exploration. And the tens of thousands of visitors to the Quetico-Superior region – one of the great wild places left in North America – owe him a lot of thanks (see fig. 5).

Figure 5 – Ernest Oberholtzer. Photo courtesy of the Ernest Oberholtzer Foundation.

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Beyond Naturalness

Adapting Wilderness Stewardship to an Era of Rapid Global Change

BY DAVID N. COLE

Climate change and its effects are writ large across wilderness landscapes. They always have been and always will be (see Figure 1). But contemporary change is different. For the first time, the pace and direction of climate change appear to be driven significantly by human activities (IPCC 2007), and this change is playing out across landscapes already affected by other anthropogenic stressors – pollution, invasive species, altered disturbance regimes, and land fragmentation (Cole, Millar, and Stephenson 2010). This raises serious questions about how wilderness stewards should respond to climate change and other anthropogenic stressors.

Much has been written about the nature of climate change and its current and likely effects (IPCC 2007), including effects on parks and wilderness (Saunders et al. 2007). The importance of wilderness and large-scale conservation to both climate change mitigation and adaptation has been asserted (Locke and Mackey 2009). This article explores the need for change in traditional notions about appropriate wilderness stewardship, one of many profound implications of climate change. The article is most directly relevant to wilderness and national parks in the United States and other places where the concept of maintaining naturalness is central to stewardship goals. But many of the recommended adaptations are relevant to protected areas with other stewardship goals.

Naturalness and Wilderness

There have been several phases in the evolution of wilderness areas in the United States and how they are managed. The first phase involved defining wilderness, articulating its purposes and values, and establishing a national system of wilderness areas. From the start, the concept of naturalness has been central to the mission of wilderness, and it is relied on heavily to this day as a guide for wilderness management. The first sentence of The Wilderness Act (Public Law 88-577) states that its purpose is to ensure that some lands are designated "for preservation and protection in their natural condition."

David Cole. Photo by Liese Dean.

For the purpose of establishing wilderness areas and communicating their values, the concept of naturalness worked well (see Figure 2). The concept is consistent with characterizations of nature being apart from humans and a black-and-white contrast between human-dominated lands and places where nature dominated. The goal of wilderness is to ensure that some lands are protected from human domination – in a natural state. Naturalness has also been helpful in clarifying some of the most fundamental aspects of wilderness management, identifying things we do not want to allow, such as commodity extraction and excessive development. It provides a clear rationale for why preference is given to native species over nonnative ones, and why external threats, such as air pollution and invasive species, should be guarded against.

But today's stewardship dilemmas are much more nuanced. No longer black and white, current dilemmas come in shades of gray. Should we perpetually dump lime into bodies of water to compensate for high pH due to acid precipitation, as is being done in the Saint Mary's Wilderness? Should we cut down, pile, and burn trees to bring back a more

Figure 1 – Wilderness landscapes have been forged by past climate change. Glacial features in the Sawtooth Wilderness, Idaho. Photo by Liese Dean.

complete groundcover – one capable of carrying more frequent fire and deterring soil erosion, as has been proposed in the Bandelier Wilderness (Sydoriak et al. 2001)? Should we plant tree seedlings bred for resistance to nonnative pathogens to replace decimated forests, as is one possible intervention strategy for much of the northern Rocky Mountains (Schoettle and Sniezko 2007)? Should we help species move in response to climate change (Schwartz et al. 2009)? The concept of naturalness is much less helpful in making these sorts of decisions and, consequently, policy manuals provide little guidance regarding how such decisions should be made. Preserving the natural is a great rallying cry for why wilderness is important, but it is a poor basis for making difficult decisions about how to actually go about the business of preservation.

Problems with Naturalness

One problem with *natural* is that it has multiple meanings (Cole and Yung 2010). Different people use the term in different ways, often without being conscious that others using the same term might mean something quite different. One meaning of natural is a **lack of human effect**. Places with little apparent human impact have sometimes been referred to as pristine. The goal here is to preserve places where the imprint of human activities is low to nonexistent. A related – but decidedly different – meaning is **freedom from intentional human control**. Where nature is not intentionally controlled it is self-willed, a concept that is often captured in the terms *wildness* and *untrammeled*. Managing for self-willed nature involves human restraint, in that it requires hands-off management and the absence of human manipulation of ecosystems (Cole 2000). Finally, naturalness also implies **historical fidelity** – the idea that natural ecosystems should be preserved in states similar to those that existed in the past, with similar species composition and ecological processes (Higgs 2003). The goal here is to retain the basic ecosystem features valued when the area was designated as a protected area.

For much of the 20th century, it was assumed that these three meanings were congruent, that ecosystems could be preserved in a pristine state without intentionally manipulating them (at least not much), and that maintaining the pristine was the same as maintaining historical fidelity. But now, given what we have learned about the dynamism of ecosystems (Pickett and Ostfield 1995) and the prevalence of human impact and directional climate change (Vitousek et al. 2000), we know that these meanings are not congruent. We must choose between them.

A second problem with the naturalness concept results from wilderness areas being set aside for diverse reasons. Some of the more important purposes include the protection of

- certain valued species – charismatic, representative, and endangered species,
- nostalgic landscapes,
- all biological diversity,
- scenery,
- ecosystem services, and
- autonomous nature (self-willed, wild nature, not controlled or manipulated by humans).

For much of the 20th century, it was assumed that, by protecting natural conditions, all of these purposes could simultaneously be met. But the same advances in knowledge that revealed conflict among the meanings of naturalness have made it clear that these purposes are also not congruent. Trade-offs must be made among these varied purposes. Management approaches that maximize the protection of biological diversity might do a poor job of protecting a particular species or a nostalgic landscape. Interventions either to protect biodiversity

or to preserve cherished species and landscapes come at a cost to autonomous nature (Cole 2000). In short, wilderness stewards will need to match management approaches to particular park and wilderness purposes.

Beyond Naturalness

Instead of the single goal of naturalness, multiple goals are needed to match the different wilderness purposes just outlined. It is time to discard some of the baggage inherent to the concept of naturalness, such as its rooting in the untenable view of nature apart from rather than inclusive of humans (Cronon 1995). In addition, it is time to move from a focus on cause to a focus on effect. Decisions about whether an impact is so onerous that it requires management intervention should turn less on whether it was caused by humans – as naturalness implies – as on characteristics of the resultant ecosystems. Managers should base decisions on careful consideration of whether the impact significantly diminishes wilderness values, reduces ecological integrity, or ecosystem resilience.

Society needs to debate and decide what these multiple goals should be. However, some can already be suggested. Although there may be others, four different approaches to park and wilderness stewardship are prominent (Cole and Yung 2010). One approach is to **respect nature's autonomy** by not intervening in ecosystem processes for any purpose – even to compensate for human impact. Other approaches involve intervention for different purposes. So a second approach is to intervene in order to emphasize **historical fidelity** – ensuring that future ecosystems are composed, structured, and look much as they did in the past. A third approach is to intervene in order to emphasize **ecological integrity** – ensuring that future ecosystems are sound and complete, with functions intact. A fourth approach is to intervene in order to emphasize **resilience** – the ability of future ecosystems to absorb change and still persist without undergoing a fundamental loss of character.

Each of these approaches is an effective means of protecting one or more of the purposes of wilderness, but not all of them. Some of them overlap and are similar in some ways; others are in direct conflict. Used together, in ways that complement each other, this suite of approaches can optimize the preservation of wilderness values, achieving much of what was intended with the more simplistic and vague notion of preserving naturalness (Cole et al. 2008). Of particular importance, each of these approaches can be clearly operationalized. Each can be defined in such a way that it is clear when intervention is appropriate and, where it is, what actions should be taken. Outcomes of interventions can be specified that are measurable, attainable, and desirable.

Figure 2 – Naturalness, like wilderness, embraces many values, including scenery, nostalgia, autonomous nature, and biodiversity conservation. Foxtail pine forest in Sequoia-Kings Canyon National Park. Photo by David Cole.

A Way Forward

To meet the stewardship challenges of the 21st century and beyond, a number of changes in park and wilderness policy and practice are needed. First, as noted above, the concept of naturalness needs to be supplemented by defining in as specific terms as possible **multiple goals** related to the varied purposes of parks and wilderness (see Figure 3). More societal debate is needed regarding which of these purposes, goals, and objectives (and possibly others) are appropriate and where. Recognition of conflict between goals and the need for trade-offs among them should be surfaced and confronted rather than obscured, as they have been with the concept of naturalness. Clear statements of purpose should help stewards make better decisions about whether to intervene in response to anthropogenic impacts and, if they do intervene, whether to emphasize restoration of historical fidelity, maintenance of ecological integrity, enhancement of resilience, or some other attribute.

Other necessary changes reflect the fact that profound and directional global changes are leading to an unprecedented future for park and wilderness ecosystems – a future for which there are no analogs, now or from the past (Williams and Jackson

Figure 3 – Extensive wilderness landscapes provide opportunities to manage wilderness for diverse goals and purposes, using varied management strategies. Looking across a portion of the Sequoia-Kings Canyon Wilderness, California, from near the top of Mt. Whitney. Photo by David Cole.

2007). And in addition to being unprecedented, the future will also be largely unpredictable, full of uncertainty and surprise (Baron et al. 2009; Millar et al. 2007).

The risks associated with uncertainty are best managed through carefully **planned diversity and redundancy**. Diversity amounts to not placing all of one's eggs in a single basket, decreasing the risk of failure and maximizing future options by employing multiple management strategies. If one approach proves unsuccessful, perhaps another will succeed (Millar et al. 2007). Diversity is also important given the varied goals of parks and wilderness (Cole 2011). The equally important complement to diversity is redundancy. Diverse approaches need to be replicated in various environments and across the landscape in different protected areas in order to spread risk (Joyce et al. 2009; Mawdsley et al. 2009). If a particular approach fails in one place, either due to a poor match to environmental conditions or just chance, perhaps that approach will be successful elsewhere.

Diversity and redundancy need to be planned for at multiple scales. They can be applied within individual protected areas by pursuing different strategies in different parts of a single park or wilderness. More uncommon, more challenging, and even more important is **planning for diversity and redundancy at a larger scale**, among protected areas – ensuring that individual place-specific decisions are made in the context of larger-scale regional strategies. Managers of protected areas within the same bioregion need to come together to develop regional plans for conserving biodiversity and responding to threats, such as invasive species and climate change. These plans would "distribute" goals and strategies among individual protected areas in such a manner that when implemented locally they collectively provide optimal diversity and redundancy at the regional scale. Ideally, different public agencies would collaborate across their jurisdictional boundaries and extend the process to include private lands (Hansen and DeFries 2007; White et al. 2010).

Barriers to Change

There are at least four major barriers limiting our ability to move forward. The first barrier is allegiance, in the United States at least, to the concept of naturalness. The notion of naturalness, if appropriately defined, can continue to have iconic value and serve as a touchstone – an expression of what parks are and why they were designated. But as a guide for stewardship, for deciding whether and how we should intervene in wilderness and park ecosystems, it is time to move to goals and objectives beyond naturalness.

A huge barrier to planned diversity and redundancy is the decentralized decision-making tradition of public land management agencies in the United States. The distribution of power is at a scale that is too small for individual decision makers to either recognize the nature of problems resulting from global change or to develop the large-scale strategies needed to effectively deal with them. In this decentralized tradition, diversity is more the result of personal preference and available resources than a planned and deliberate strategy to minimize risk by hedging bets. Where goals conflict, similar compromises tend to be fashioned everywhere. Case by case, area by area, decision making causes the system to gravitate toward homogeneity and mediocrity (McCool and Cole 2001). Planned diversity means retaining the flexibility to match solutions to situational specifics while ensuring that managerial discretion is directed such that local decisions contribute to regional goals and objectives. Key to success is constraining local decision space while also maintaining the empowerment that results from widely shared power. This might be accomplished through some version of networked governance (Jones et al. 1997).

A related barrier is the lack of institutions that facilitate large-scale planning. Even within agencies, institutions do not encourage regional planning. National policy tends to be extremely broad, perhaps reflecting too much deference to the need for flexibility. There are even more institutional barriers to interagency planning and cooperation between public and private land management. What we need instead is what Karkkainen (2002) calls collaborative ecosystem governance, which emphasizes locally tailored solutions within larger-scale structures of public accountability, recognizing the need for experimentation and dynamic adjustment in response to new learning.

Although it was once thought that managing for naturalness would serve to protect all wilderness values and purposes, we know now that this is not the case.

The final barrier lies with current planning processes that are not flexible and adaptable enough to deal effectively with climate change. Current planning frameworks – such as that articulated in the U.S. National Environmental Policy Act (Public Law 91-190) – were largely built around concepts of dynamic equilibrium and stationarity (Milly et al. 2008; Thrower 2006). Now it is abundantly clear that the most fundamental prerequisite for equilibrium, a stable climate, is no longer met (Baron et al. 2009). These frameworks presume certainty of impacts and outcomes, when uncertainty is the most predictable future state (Millar et al. 2007). They specify desired future conditions, in considerable detail and for long time frames, something that may be completely unrealistic given rapid and unpredictable change. Planning frameworks will have to develop more capacity to operate at multiple spatial and temporal scales and to embrace uncertainty. They must be able to rapidly and flexibly respond to surprise and to more regularly revisit objectives and management decisions, changing them as knowledge advances and uncertainty retreats.

Stewardship Tools

Two important tools to apply to management planning for parks and wilderness – tools that are more amenable to what we know now about the world of the 21st century and the way ecosystems operate – are **scenario planning** and **adaptive management**. Scenario planning, particularly useful when the future is both uncertain and largely uncontrollable (Baron et al. 2009), is a process of exploring and articulating a set of alternative futures (Biggs et al. 2010). Scenarios can help managers start planning and be more prepared for the future, despite high uncertainty. Scenario planning can help identify trade-offs and conflicts between goals and in establishing priorities. Adaptive management, more useful when the future is more controllable (Baron et al. 2009), is a process for incorporating learning into management practice. Actions are taken, despite uncertain outcomes. Results are carefully monitored, which leads to learning, adjustment, and refinement of management.

Wilderness stewards should always err on the side of restraint, recognizing that human interventions have a history of backfiring even when done for noble reasons. Caution and restraint are particularly important in wilderness. Nevertheless, boldness will at times be necessary and the onslaught of global change will increasingly force stewards to consider intervention (Lemieux et al. 2011). Cole et al. (2010) provide a list of actions that might be considered. Near-term actions managers of individual areas might take include:

- mitigating threats to resources;
- maintaining natural disturbance dynamics;
- reducing landscape synchrony;
- making heroic but thoughtfully prioritized efforts to rescue highly sensitive species;
- realigning conditions with current, expected, or a range of possible future conditions;
- relaxing genetic guidelines, where risk is low and adaptive management can be implemented;
- conserving refugia;
- allowing and/or actively assisting migration;
- cautiously considering the use of nonnative species where they are the best option for maintaining critical ecosystem functions; and
- protecting highly endangered species *ex situ*.

Longer-term, larger-scale actions include:

- promoting landscape connectivity;
- managing the matrix;
- promoting diversity and redundancy;
- articulating new goals;
- incorporating uncertainty and the likelihood of surprise into planning and management;
- prioritizing and practicing triage;
- increasing interagency cooperation; and
- enhancing flexibility and the capacity to adapt through learning.

Conclusions

In the past half century we have learned that park and wilderness ecosystems are highly dynamic and that human impact on them is ubiquitous, with unprecedented and uncertain consequences. Although it was once thought that managing for naturalness would serve to protect all wilderness values and purposes, we know now that this is not the case. What is needed is a richer articulation of goals and purposes, using concepts that describe desirable attributes of ecosystems in terms other than the absence of human impact. Policies and institutions need to be developed that allow for more adaptability in planning and that promote large-scale, regional planning of diversity and redundancy. This may mean augmenting a decentralized management tradition with policies and institutions that constrain managerial discretion such that local decisions more effectively contribute to larger-scale strategies.

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Many of the ideas in this article first surfaced or were more fully explored in two workshops that led to the book I coedited with Laurie Yung (Cole and Yung 2010).

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The Diversity of Wilderness

Ecosystems Represented in the U.S. National Wilderness Preservation System

BY H. KEN CORDELL

Nature has fascinated me since childhood. Many a Sunday afternoon would find several of us boys headed for the woods to explore and … be boys. The beginnings of the mountains of western North Carolina were at our back doors – out and up we would go. In deciding where to go to college and what to study, I followed this interest in nature into early adulthood. I selected North Carolina State University and majored in forestry. My senior paper was on wilderness, whereas most of the papers by classmates were about timber and growing pines faster. Later, while comajoring in forestry and economics, I did my dissertation on urban open land, including, of course, public parks. Throughout my career, I have observed and valued the public lands of this country, and have come to appreciate their importance more and more. My research has always had some wilderness content, as well as content about other protected public lands. One of my ongoing studies looked at Americans' values toward wilderness (designated wilderness), and there it became clear that others value protected lands as well.

H. Ken Cordell. Photo by Babs McDonald.

Thus, it is not surprising that my current research, including my most recent venture, includes some aspect of wilderness. I am one of a national team of Forest Service scientists that has just completed a broad-scale assessment of the status and future of forest, range, and other natural resources. This is the Forest Service's Renewable Resources Planning Act Assessment of Forest and Range Lands (RPA). Working with this national RPA team, my assignment has been to look at trends and futures for recreation, protected lands, and associated population trends and futures. My research group, in Athens, Georgia, examined the degree to which ecosystems are represented within some of the most protected of U.S. federal lands. The focus was on national parks, national wildlife refuges, and the National Wilderness Preservation System (NWPS). The results of this research are being published by the Forest Service (Cordell et al., forthcoming). Presented in this article are just the results for the NWPS. It is important to step back now and then to examine various indicators of the importance of wilderness, including ecosystem representation from swamps (see Figure 1) to highest snow-covered peaks.

Figure 1 – Okefenokee Swamp National Wildlife Refuge and Wilderness Area in the Subtropical Division, Georgia and Florida. Photograph by Ken Cordell.

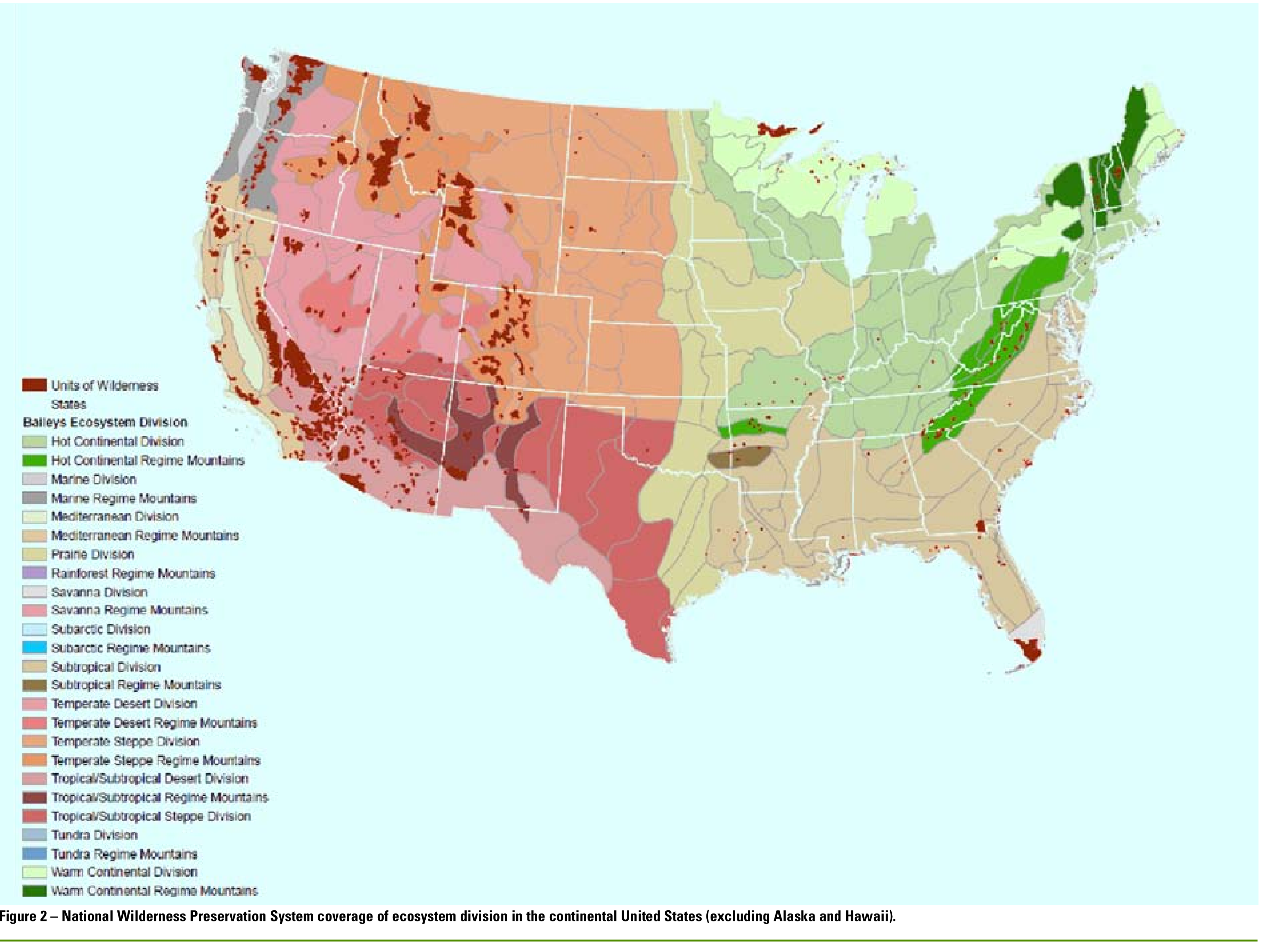


Figure 2 – National Wilderness Preservation System coverage of ecosystem division in the continental United States (excluding Alaska and Hawaii).

Some Previous Ecosystem Representation Research

Consideration of ecosystem representation as a criterion for designating federal lands as wilderness dates back to the Forest Service's second Roadless Area Review and Evaluation (RARE II) in 1978. Attention was given to evaluating the adequacy of ecosystem diversity of roadless areas using the Bailey-Kuchler ecosystem classification (USDA Forest Service 1978). For purposes of proposing roadless additions to the NWPS, sufficient representation was defined as there being a minimum of two separate areas (at least 400 ha/988 acres large) representing a particular type of ecosystem. In the 1980s, Davis (1989) undertook a review across the 261 major U.S. terrestrial ecosystems and found that 104 ecosystem types were not protected in the NWPS. He recommended that a representative sample of each major ecosystem should be included within the NWPS. Noss (1994, p. 235) reinforced this suggestion by stating that the first of four objectives under the heading of Ecological Goals is "to have represented all native ecosystem types across their natural range of variation in a system of protected areas." Underscoring the importance of protecting the diversity of ecosystems in the United States, the Nature Conservancy estimated that 85 to 90% of all plant and animal species in a region can be protected by ensuring ecosystem representation (Widen 2010).

A follow-up evaluation of ecosystem representation within the NWPS was reported by Loomis and Echohawk (1999; see also Loomis et al. 1999) in the late 1990s. Their analysis, done for the Forest Service 2000 RPA Assessment (Cordell et al. 1999), was one of the early studies to rely on GIS to overlay NWPS areas with Bailey's ecoregion boundary data to determine which ecoregions are represented. In their evaluation, an "ecoregion" was considered synonymous with the province class within the hierarchy of domains and divisions as defined by Bailey (1995). They found that 23 of the 35 provinces in the 48 coterminous states have less than 1% of their land area protected as wilderness. They also found that 7 of the 35 provinces had no land at all protected through wilderness designation.

There are varying degrees of ecosystem representation in the NWPS.

Much of that unprotected land was (and still is) privately owned, particularly in the Midwest and Southeast. However, a surprisingly large amount of the unprotected land was federal land in the Intermountain states of Nevada and Utah. Significant acreages of this land have now been added to the NWPS (Wilderness Institute 2009). A nationwide ecosystem gap analysis based on a national vegetation cover map that depicted the degree of representation of ecosystem analysis units (a precursor of ecosystem types) indicated that just 4% of the land area in 554 of the ecosystem units was conserved in the top two GAP protection classes (Dietz and Czech 2005). Cordell et al. (forthcoming) have followed up with a similar ecosystem representation study at the Bailey's Division level as part of the U.S. Forest Service 2010 RPA Assessment. This *IJW* feature article summarizes the more recent 2010 RPA Assessment.

Trends

By comparing the 1999 and forthcoming RPA studies, it is estimated that ecosystem protection in the NWPS in the 48 contiguous states has improved through the addition of several million acres since 1994 (Loomis and Echohawk 1999; Cordell et al. forthcoming), a total area increase of 18%. Across ecosystems, the Temperate Desert Division showed the largest increase as a proportion of the total NWPS land area, rising from 2 to more than 7% of the system between 1994 and 2009. However, trends reported here are approximate and not completely comparable because of differing data sources and GIS technologies. Mountainous areas in the Temperate Desert Division experienced the second largest increase in percentage representation in the NWPS (among the contiguous states), more than doubling from 1.1% in 1994 to 2.3% in 2009. The Temperate Desert Mountains Division also more than doubled its share of total land area in wilderness, growing from less than 2% to more than 4%. Other divisions posting more than a 1% gain were the Mediterranean Mountains, Temperate Desert, and Tropical/Subtropical Desert.

The Data and the Analysis

In this recent look at ecosystem representation in wilderness (Cordell et al. forthcoming), a GIS analysis was applied using digital boundary data for estimating land area in different ecosystem types (at division level [Bailey 2009]). The resulting map showing how lands in the NWPS overlay ecosystem boundaries is presented as Figure 2 and depicts the spatial relationships between wilderness and ecosystems across the contiguous 48 states. Including Alaska and Hawaii, we estimated that 24 ecosystem divisions across the United States are represented in the Wilderness System. Eleven of these are mountain divisions. To conserve map scale, Alaska and Hawaii are not shown in Figure 2,

but the ecosystem divisions and wilderness in these two states are included in the nationwide estimates in Table 1.

Table 1 reports the degree to which different ecosystem types are protected by their inclusion in the NWPS. The estimated ecosystem acreages within wilderness boundaries by Bailey's Division are national and, unlike Figure 2, do include Alaska and Hawaii. To add perspective, not only are estimates of each represented division's acreages shown (second column of numbers), also shown are total surface areas across the United States by division, percentage of the NWPS in each Bailey Division, and percentage of each division within wilderness boundaries.

Because wilderness areas are designated from already existing federal lands, the NWPS table and map in the source RPA publication (Cordell et al. forthcoming) somewhat overlap with maps and tables covering the National Park and National Wildlife Refuge Systems. Wilderness also includes designated national forest and Bureau of Land Management lands. The designated wilderness lands of all four agencies are included in the NWPS table.

As defined in the National Atlas (www.nationalatlas.gov), ecoregions are large-scale areas that share common climatic and vegetation characteristics. The four-level hierarchy shown in the National Atlas originated from (Bailey 1976) and continues to be refined by Robert Bailey (2009). The broadest

Table 1 – Acreage of U.S. surface area by ecosystem division, acres of the National Wilderness Preservation System in each division, percentage of division protected by wilderness areas, and percentage of the National Wilderness Preservation System area in each division.

Domain and Ecosystem Division	Total surface millions of acres in ecosystem division	National Wilderness Area millions of acres	Percentage of division in Wilderness Areas	Percentage of National Wilderness acres in division
DRY DOMAIN				
Temperate Desert Division	172.2	3.8	2.23	3.51
Temperate Desert Regime Mountains	27.9	1.2	4.23	1.08
Temperate Steppe Division	272.1	0.5	0.20	0.49
Temperate Steppe Regime Mountains	144.6	15.3	10.59	14.02
Tropical/Subtropical Desert Division	110.6	11.3	10.19	10.32
Tropical/Subtropical Regime Mountains	32.1	1.3	4.07	1.20
Tropical/Subtropical Steppe Division	163.0	1.4	0.84	1.25
HUMID TEMPERATE DOMAIN				
Hot Continental Division	239.1	0.2	0.08	0.18
Hot Continental Regime Mountains	47.7	0.6	1.35	0.59
Marine Division	9.3	0.05	0.57	0.05
Marine Regime Mountains	73.4	18.8	25.69	17.26
Mediterranean Division	21.7	0.3	1.43	0.28
Mediterranean Regime Mountains	59.8	7.4	12.38	6.77
Prairie Division	191.0	0.002	<0.01	<0.01
Subtropical Division	263.0	0.7	0.26	0.63
Subtropical Regime Mountains	5.6	0.05	0.85	0.04
Warm Continental Division	93.9	1.4	1.49	1.28
Warm Continental Regime Mountains	28.0	0.2	0.88	0.23
HUMID TROPICAL DOMAIN				
Rainforest Regime Mountains	4.0	0.2	3.91	0.14
Savanna Division	5.0	0.8	15.24	0.70
POLAR DOMAIN				
Subarctic Division	53.8	2.0	3.74	1.84
Subarctic Regime Mountains	118.5	12.4	10.44	11.33
Tundra Division	55.7	2.5	4.51	2.30
Tundra Regime Mountains	99.9	26.8	26.80	24.50
National Totals	2,292.0	109.2	——	100.00

Source: Ecosystem divisions based on Robert G. Bailey, 1995. Description of the ecoregions of the United States. 2nd ed., rev. and expanded. Misc. Publ. No. 1391, Washington DC: USDA Forest Service.

classification is the domain, which Bailey has described as a grouping of landscapes with similar climates, but that are differentiated by precipitation and temperature. There are four ecosystem domains across the landmass of the United States: polar, humid temperate, dry, and humid tropical. Domains are made up of divisions (the level of this article's analysis) that differentiate climates within domains that have varying precipitation levels and temperature profiles. Divisions are subdivided into provinces based on vegetation or other natural land covers. Mountainous provinces are differentiated by elevation, which is one of the primary determinants of vegetation and other natural cover (see Figure 3). The finest-grained level of ecosystem classification is a section, which is a subdivision of provinces and is based primarily on terrain.

The data and spatial analysis for generating the ecosystem maps, acreages, and percentages of area relied on both wilderness and Bailey's division level boundary data. Decimal degree boundary data for Bailey's Ecosystem Divisions (BED) (Bailey 1995) were downloaded from the U.S. Geological Survey website at nationalatlas.gov/atlasftp.html#ecoregp. ESRI ArcMap 9.2 was used to calculate the total land area in decimal-degree units covered by each division. The general approach was to calculate total decimal degrees of land area for each county in the United States. Next, the ESRI tool, Intersect Analysis, was used to find the BED decimal degree area for each BED within each county. Intersect computes the geometric intersection of features or portions of features. The proportion of land area within each BED represented in each respective county was then multiplied by the square-mile total land area provided by ESRI for each county. This product (square miles of ecoregion division) was multiplied by 640 (acres per square mile) to derive acres of BED within each county. For Table 1, acres were then summed across counties for each division and then across divisions for a national total.

Figure 3 –The Raggeds Wilderness in Colorado in the Temperate Steppe Regime Mountains Division. Photograph by Ken Cordell.

Wilderness boundary data were downloaded from www.wilderness.net/index.cfm?fuse=NWPS&sec=geography. The ESRI tool, Intersect, was again used, this time to lay wilderness area boundaries over BED boundaries for each county. This enabled computation of proportions of wilderness within each BED by county. Next, the ESRI tool, Calculate, was used to find the decimal degree area of wilderness within the BED by county. Transferring these decimal degree data to an Excel spreadsheet, the proportion of total county area in designated wilderness was multiplied by county total acreage to estimate number of acres of wilderness in each BED. Acres were then summed nationally.

Wilderness Acres by Bailey's Ecosystem Division

Figure 2 and Table 1 report ecosystem representation (at BED level) across the National Wilderness Preservation System. As we know, the NWPS is found mostly in the western regions of the United States, particularly in Alaska. Alaska alone contains more than 52% of the NWPS, most of which is under the management of the National Park Service and U.S. Fish and Wildlife Service. Including Alaska, about 96% of the NWPS is located in the West. Without Alaska, the proportion drops only slightly to 92%.

In terms of percentage of the National Wilderness Preservation System among BEDs (Table 1), the greatest portions are Tundra Regime and Subarctic Mountains in Alaska; Marine Regime Mountains in Washington, Oregon, and southeast Alaska; and Temperate Steppe Mountains, mostly in Montana, Idaho, Wyoming, and Utah. Also represented is the Tropical/Subtropical

Figure 4 – Southernmost part of the United States, the south reaches of the Big Island, Hawaii, at sunset in the Humid Tropical Domain. Photograph by Ken Cordell.

Desert Division of the Southwest. In terms of the percentage of BEDs designated as wilderness, Alaskan Tundra and Subarctic Divisions, Marine Mountains, Temperate Steppe Mountains and Tropical Desert are among the highest. As a percentage of BEDs, significant percentages of the Savanna of southern Florida and the Mediterranean Mountains of California can be seen (Figure 2). Some of the divisions not well represented include the Temperate Steppe, Tropical/Subtropical Steppe, Hot Continental, Marine (non-mountainous), Prairie, Subtropical, and Warm Continental Divisions.

Observations

Preserving and even restoring naturally functioning ecosystems is important, if not indispensible. A diversity of natural ecosystems is valuable in many ways. Many wildlife species require a diversity of habitat, whereas others are restricted to very specific habitats. Plants also require varying degrees of diversity, and are largely responsible for habitat diversity in the first place.

The broad diversity of ecosystems that exists also makes up the diversity of natural scenery of the United States (and world). It is this scenery and the recreational opportunities it represents that draw many people to set up residence near, or within natural areas. As more people set up such residences, the natural areas being settled soon cease to be natural and evolve into developed land (residential, transportation, commercial, industrial, etc.). Herein lies a significant challenge.

From the swamplands of the Okefenokee on the U.S. East Coast, to the southernmost extremes of Hawaii (see Figure 4), the challenge of ecosystem protection is huge, if not daunting. The sheer magnitude of housing development alone across the U.S. landscape over the past few decades, especially the last two, is a clear indicator of the challenge to protecting nature.

Designating federal land as wilderness has been a much-employed tool for natural land protection. For all who have used and viewed and read about wilderness, it is quite clear how special area designation is. But the dilemma with wilderness is that it is a designation of federal lands that already have varying levels of protection. There are many more millions of acres of private lands without protection than there are federal, or federal plus state lands with protection. The current recession has slowed the pace of land development, residential development especially. But for how long?

As Figure 2 and Table 1 have shown, there are varying degrees of ecosystem representation in the NWPS. In fact, some ecosystem types are not represented at all. Although wilderness designation is not the only means of protecting natural land, it is one of the more important ones. Unless federal law is changed, the NWPS, National Park System, and National Wildlife Refuge System provide the best protection and stand a good chance of being sustained.

In the future, not only land development, but also climate change threatens wilderness and other natural areas (Cole 2008). Climate change can exacerbate threats to the natural functioning of areas, such as the threats from invasive species and habitat fragmentation. As Cole (2008) notes, wilderness provides many ecosystem services, such as cleaner air, wildlife, and water. But these services are highly vulnerable to climate change. And because biological composition of ecosystems is in large part determined by climate, it is possible that some ecosystems may disappear entirely, whether or not land development occurs.

On the hopeful side, there has been growing interest in protection of both public and private land and water

Continued on page 25

Traditional Wisdom and Climate Change

Contribution of Wilderness Stories to Adaptation and Survival

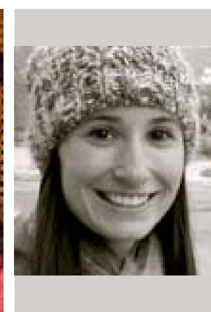
BY ALAN WATSON, LINDA MOON STUMPFF, and JENNIFER MEIDINGER

Our Wilderness Act in the United States, passed in 1964, provides a fairly distinct definition of wilderness for the part of society that was successful in parlaying their values, recreation motivations, and political influence into an extremely effective, world-recognized conservation program. But relationships with our National Wilderness Preservation System extend well beyond the typical recreation visitor we might encounter in these areas. For example, due to growing recognition of the downstream importance of protected headwaters of important rivers, and the need for climate change adaptive planning to protect the flow of benefits to humans from protected nature, wilderness science takes on new meaning to our society. In other words, not all relational aspects between wild places and some segments of U.S. society (particularly indigenous peoples) are described well in the 1964 Wilderness Act. To some degree, Alaskan wilderness areas do take into account rural peoples' rights and way of life under ANILCA, the Alaska National Interest Lands Conservation Act of 1980. However, recent research efforts toward understanding past and future relationships between humans and wilderness (e.g., Watson 2011) have included efforts to articulate perspectives of American Indians (Watson et al. 2011) and Alaska Native (Whiting 2004) people on their evolving relationships with large, relatively intact wild landscapes. This knowledge sheds light on an ancient cultural orientation toward North American wilderness, one different from that described in the 1964 Wilderness Act.

Knowledge is transferred to wisdom among traditional populations through interpreting storytelling into actions. Watson et al. (2003), Watson et al. (2011), and Turner and Clifton (2009) have emphasized the kincentric ecological

Alan Watson.

Linda Moon Stumpff.


Jennifer Meidinger.

principles described by Salmon (2000) that suggest indigenous people have traditionally most likely experienced the environment as a whole, that all the parts of the system are interrelated. Traditional knowledge can be seen as the quantitative information about these interrelationships that has accumulated across generations of people. In describing this knowledge, however, Turner et al. (2000) suggested that it is not easily subject to fragmentation, as we most commonly do in Western science approaches, including descriptions of wilderness attributes. Turner et al. (2000) proposed that traditional wisdom is acquired and demonstrated through understanding and maintenance of relationships with complex natural systems, such as wilderness, and that these systems are dependent on traditional knowledge to fully understand forces of change and likely response of the system. The dominant American cultural perspective on wilderness does not provide a universal, cross-cultural concept of conservation (Berkes 2008).

Tribal Nations have unique relationships with federal wilderness management agencies. Due to status conferred through sovereignty, time-honored legal, cultural, and

historical connections and federal trust responsibility, engagement with American Indians and Alaska Native peoples require federal government-to-tribal government consultation during public lands decision making. President Barack Obama's Executive Memorandum on Tribal Consultation of November 5, 2009 (Obama 2009), confirmed the U.S. government's unique legal and political relationship with Indian tribal governments and directed heads of all executive departments to develop and implement tribal consultation plans on a strict time schedule. Hearings were held broadly in 2009 and 2010 to obtain input from the nation's 564 federally recognized tribes on new consultation policies. This recognition has important implications for efforts to protect relationships indigenous people have with public lands, including wilderness.

The purpose of this article is to emphasize to wilderness managers and planners the importance of recognizing how traditional knowledge about the environment is passed across generations of North American people and how the wisdom of applying this knowledge can help society in the overwhelming task of decision making to protect wilderness in the face of uncertainty, including the need to increase resiliency in the face of climate change.

Storytelling

Although one must be cautious about generalizing to all indigenous communities in North America, Bruchac (2003) suggested that stories have always been at the heart of all our Native cultures. Watson et al. (2011) contrasted tribal (storied) and nontribal (empty) perceptions of wilderness landscapes of the Mission Mountains Tribal Wilderness in Montana. Bruchac (2003)

We must integrate the long-term knowledge of indigenous people into climate change adaptive planning, intervention, and mitigation efforts.

emphasized that Native stories about nature are not just myths or legends, as Western science might describe them. They are powerful tools for teaching cultural ethics. Stories open eyes to "a world of animals and plants, of earth and water and sky" (p. 35).

Although each indigenous nation or language group may have its different stories, there are commonalities that guide us in understanding past and current relationships with nature, and therefore appropriate future response to changes in natural forces such as climate change. In many traditional North American indigenous stories, for example of the Salish (McDonald 1973), the Shoshoni-Bannock (Heady 1973), the Penobscot (Edmonds and Clark 2003), the Cheyenne (Edmonds and Clark 2003), the Wintun (Lake-Thon 1997), the Seneca (Caduto and Bruchac 1997), and the Acoma (Edmonds and Clark 2003), Native people, or animal people on their behalf, have intervened to change difficult climatic conditions. Stories about the origin of summer and winter, water famines and floods, rivers, fire, medicine, and the sun and moon all involve one or more individuals traveling to the east, or up into the sky, to the south, or to another community to intervene on behalf of the people. Arrival of the seasons, creating river flows, fire, and even the sun and moon are attributable to intervention by those threatened by changes in natural forces. More important than the specific character who intervened on behalf of the people and animals, or the source of whatever it was that was created or stolen, is the fact that these stories convey a very different relationship with nature from that described in the U.S. Wilderness Act. In the act, there is advocacy for untrammeled natural forces. These indigenous stories all strongly support and teach human intervention *with respect* (Watson et al. 2003: Clarke and Slocombe 2009: Watson et al. 2011). Managers and planners must realize that although past dominant societal forces have influenced the landscape on adjacent Native Reservations and on homelands within parks and wilderness, both trammeled and untrammeled landscapes are different from those advocated through these traditional stories. Human intervention is a large part of the lesson, but so is respect for nature and its historical relationship with people (see fig. 1).

Climate Change and Indigenous People

There have been many studies, mostly since 2000 and in the extreme north where the effects have been felt strongest, of the impacts of climate change on Native people (Berkes 2008). Although traditional knowledge, or indigenous knowledge, played a very small role in development of the Intergovernmental Panel on Climate Change (IPCC) report, Berkes (2008) celebrates more recent climate change assessments such as the Millennium Ecosystem Assessment and the Arctic Climate Impact Assessment as based on scientific and indigenous epistemologies. Somewhat similar to recent efforts within the wilderness science community to emphasize the values of place-based research (i.e., science to identify unique experiences,

attributes, relationships, and threats to specific protected places for specific stakeholders), Berkes (2008) emphasizes the importance of place-based research to understand traditional knowledge contributions to climate change adaptation (e.g., Watson et al. 2007; Watson 2004; Glaspell et al. 2003; Patterson et al. 1998) .

Traditional Phenological Knowledge as described by Turner and Clifton (2009) refers to accumulated knowledge about seasonal timing of growth, development, reproduction, and migration of organisms, which generally occurs in a predictable sequence based on temperature thresholds, length of daylight, moisture, or other environmental determinants. Climate change uncertainties are likely to interfere with this knowledge, as described by Turner and Clifton (2009). In this case study, indigenous people's dependence on anticipated seasonal abundance of a specific resource and, in turn, its dependency on predictable climatic factors is illustrated through the impacts on harvesting edible seaweed and fish by indigenous people of British Columbia, Canada. Indigenous communities have adjusted to climate-induced impacts in the past by relocating settlements, temporarily or permanently; developing and imposing restraints on harvesting certain resources; sharing resources from family to family or across communities; seeking alternative resources; developing and using new technologies; and developing economic and social alliances – all strategies reflecting resilience and acceptance of both change and the need for intervention. These Native communities have dealt with changes in climate factors previously, and feel they need to be heard, their knowledge incorporated into intervention strategies, and that democratic approaches to policy decisions is their sovereign right (Grossman 2008).

Figure 1 – Dominant U.S. societal values prescribed intervention in fire management programs during the 20th century, but the important element of respect may have been overlooked and is now being restored in many landscapes. To restore the natural role of fire in wilderness may require intervention in many cases. Other intervention, in the face of climate change, may also be championed by indigenous peoples, but with respect. U.S. Forest Service photo.

Conclusions

Research has found that Earth's climate is changing, and that these changes are caused or increased by human activities (Leiserowitz 2010). Most people do not dread climate change (Weber 2006). The threats are slow, intangible, uncertain, and statistically documented but the changes mostly lie in the future, for most people, and are not caused by a hostile agent (Weber 2006). Among indigenous people, however, particularly in the northern lands, climate change is having profound effects on lifestyles, relationships with the land, and the meanings they attach to activities in natural landscapes (Whiting 2004). Dramatic changes are occurring. For example, many Alaskan Native villages face imminent threats from sea level rise. Although Native people do not necessarily have prior or "traditional" knowledge of specific climate changes, they do have sensitivity to critical signs and signals from the environment that unusual events and changes are happening (Berkes 2008).

Indigenous people have passed down stories about how they reacted in the past when this sensitivity to critical signs and signals from the environment suggested unusual events and changes. In these past cases, they, or significant symbolic animal-people, intervened to improve chances of survival and maintain crucial connections with the land on which they depended. Place-based research and local observations have a crucial role to play in research on environmental change (Berkes 2008). Berkes suggests an approach to understanding the effects of climate change that is not model driven, but is culture specific, historically informed, and geographically rooted.

Indigenous communities are increasingly realizing that survival of some aspects of their relationships with nature, and therefore their identity, rests in their ability to obtain power, exercise treaty and sovereign rights, and force democratic participatory approaches that allow them opportunity to intervene to build adaptive capacity in the face of uncertainty

connected to climate change (Grossman 2008). Clarke and Slocombe (2009) identified the goal of qualitative application of this knowledge as ecosystem resilience. Freeman (1999) identified respect and reciprocity as important elements in all indigenous resource management systems.

Park and wilderness managers are increasingly faced with participation in climate change vulnerability assessments on public lands and for communities dependent on public-lands resources. Climate change social vulnerability is a function of sensitivity to climate-related risks and the adaptive capacity to deal with those risks. Exposure sensitivity refers to susceptibility of a system to climatic conditions that represent risks. Adaptive capacity refers to the ability of individuals, households, communities, institutions, and so forth to address, plan for, or adapt to these risks (Ford and Pearce 2010). American Indians and Alaska Natives have unique exposure sensitivity, adaptive capacity, and resilience knowledge that can benefit adaptive planning. Wildcat (2009) describes the impact of climate change as the "fourth removal" of North American first peoples (i.e., indigenous people) and calls for immediate convergence of cultures to address climate change vulnerability issues.

In our rush to determine and invest in increasing adaptive capacity of our communities, we must not overlook the importance of connecting with indigenous communities and facilitating self-study to determine climate change exposure sensitivity that will drive adaptive capacity building. Whereas some human intervention is likely to be supported by most American Indians and Alaska Natives, the key element of respect must be considered. This raises uncertainty about how members of these sovereign nations will view adaptive planning by federal governments that includes genetic manipulation, large-scale restoration activities, or changes in agency policies toward fire, recreation, and access. For example, adaptation to climate change sometimes entails federal government proposals for introduction of new, disease- or drought-resistant genetic material and could involve other intervention aimed purely at sensitivity to climate change–induced or –aided change. Although in general human intervention to assure survival in the natural environment is acceptable to indigenous peoples, tribal members' knowledge about likely impacts of these interventions on traditional values or other ecosystem components have implications for respect, and must be considered in decisions. Federal government-to-tribal government consultation is likely to become a growing part of the wilderness planning process, and we must prepare agency planners to engage and plot a science direction (i.e., applying appropriate methodologies including place-based, traditional knowledge capture) to provide the knowledge needed for sound, adaptive plans.

Corbyn (2011) advocates respect for both scientific and traditional knowledge by expanding tribal research capacities to help protect traditional values while forging a new future. This approach has been described as "an act of resistance" by tribal colleges (quote by Luana Ross, President of Salish Kootenai College in Montana, in Corbyn 2011). Native people are taking control of the research process on matters that affect them, as it should be. Greater engagement of Native people in climate change sensitivity assessment and adaptive capacity building for all U.S. wilderness is essential. Ultimately, climate change impacts and imposed mitigation activities on indigenous people in the United States can be considered an environmental violation of treaty rights in many cases (Grossman 2008). For both ethical and applied reasons, we must integrate the long-term knowledge of indigenous people into climate change adaptive planning, intervention, and mitigation efforts (Magzul 2009; Krupnik and Ray 2007).

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Continued from THE DIVERSITY OF WILDERNESS, page 20

resources. To provide an inventory of these resources, the Protected Areas Database program for the United States is being improved to help in describing ownership and protection status across the country. This effort is important because the United States is losing about 2 million acres (809,715 ha) of forest, farm, and other open space each year. Pushing against this tide of open land loss, there is a rise in the nongovernmental land trust movement and the land protection that results. In addition, between 1998 and 2005, state governments conserved 8.6 million acres (3.48 million ha) of land and spent $13 billion for its protection (Cordell et al. forthcoming). The ecosystem protection challenge is large, but perhaps some of this rising interest in protection of natural lands will be increasingly effective. Perhaps we will see continued support for more wilderness designation. I, for one, am hopeful this will be the case.

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Continued on page 38

Wilderness Land Trust

Two Decades Keeping Wilderness Wild

BY PAUL F. TORRENCE

The U.S. National Wilderness Preservation System (NWPS) includes more than 110 million acres (44.5 million ha) – an area greater than that of Denmark, Switzerland, or the state of California (Anon 2011a; 2011b). Many more lands deserve protection under the Wilderness Act, thus wilderness advocates understandably focus on these. But conservationists must recall that wilderness designation by Congress does not mean that wilderness will remain wilderness forever (Hendee and Dawson 2001). The grand architect of the Wilderness Act, Howard Zahniser, understood that the forces that destroy wildness must be constantly confronted and resisted (Zahniser 1969).

There is one specific menace that can almost instantly undermine the ecological fabric of a wilderness and erode the values embraced by the 1964 U.S. Wilderness Act: inholdings – once federal or private lands that are now relics from past mining and timber claims, homestead acts, and railroad grants (Tanner 2002).

The NWPS is perforated by some 400,000 acres (161,943 ha) of private lands that are termed "inholdings." In the vast majority of cases, the owners are content to allow their lands to coexist in the matrix of wilderness. Nonetheless, these inholdings can be ticking time bombs that can have a negative impact on wilderness characteristics and values (Acalady 2000; Binkly 2003; McMillion 1999; Peterson 2010; Quillen 2010; Simon et al. 1998; Staff 1995; Steubner 1998; Zaitz 2010).

Figure 1 – James Peak Wilderness, Colorado, Arapaho and Roosevelt National Forests. Photo by WLT staff.

Wilderness Degradation Perils

Wilderness intrusions that degrade viewsheds, introduce noise or water pollution, shut down trails, generally erode wilderness solitude, or diminish spiritual, scientific, or recreational attributes are understood by most observers. Nevertheless, wilderness advocates and conservationists may not always be fully cognizant of the biological ramifications of even a small human modification within a wildland matrix.

Edge effects (Leopold 1933), the outcomes on an ecosystem of juxtaposing two different environments, are a common result of human development in wildlands. Although edge effects often result in a local biodiversity increase, their pervasiveness in fragmented ecosystems of the modern world usually work to decrease overall biodiversity (Murcia 1995; Ries et al. 2004; Woodroffe and Ginsburg 1998; Lovejoy et al. 1989).

An arresting example of edge effects comes from a study of preserved redwoods on the northern California coast (Russell, McBride, and Carnell 2000). Industrial logging operations clear-cut the forest right up to the border of these state and federal government preserves. Abiotic factors such as wind and temperature changes in turn precipitated biotic changes in vegetation and wildlife up to 219 yards (200 m) into the uncut forest. This invasion resulted in dramatic losses of core forests. For instance, a grove of 2,449 acres (991 ha) in Del Norte Redwood State Park had 1,525 acres (617 ha) affected by edge, so that remaining core forest was just 924 acres (374 ha), a reduction of 62%. Even a much larger 12,822-acre (5,189 ha) grove in Redwood Creek North retained just 65% of core forest after edge effects were taken into account.

Edge effects can possess even greater invasiveness. A recent study (Ewers and Didham 2008) found a detrimental

effect on beetle populations at a distance of 1 kilometer (0.62 mile) from the edge.

Edges and habitat fragmentation (Soulé, Alberts, and Bolger 1992) are a bonanza for mesopredators (middle predators) such as rats, skunks, raccoons, opossums, foxes, gulls, ravens, crows, feral cats, and feral dogs. Edge habitat creation thus aids and abets mesopredator release, which may already be highly problematical where apex predators (cougars, wolves) have been removed, diminished, or had their predatory behaviors altered by human disturbances (Soulé 2010). Moreover, many human developments provide energy subsidies to the mesopredators, corvids, and raptors. Tipping of the ecological balance like this spells trouble or doom for many interior forest species: victims include reptiles, amphibians, beneficial insects, small mammals, waterfowl, as well as nestling and juvenile birds (Crooks and Soulé 1999; Terborgh and Estes 2010).

Wherever inholdings persist, the consequences of edge effects, mesopredator release, disproportionate energetic subsidies, and the like increase the vulnerability of the "untrammeled" quality of wilderness.

Speculation Fuels the Problem

In some hands, private inholdings within designated wilderness areas have spawned a growing number of real estate speculations and proposed developments. These threats create a consuming task for public lands managers, constitute an intolerable drain on the meager budget available for agency land purchases, and reveal the fragile protection of far too many wilderness areas. Controversial and potentially highly damaging development schemes have been advanced in an array of landscapes such as Colorado's West Elk Wilderness, Montana's Absaroka Beartooth Wilderness, Arizona's Arrastra Mountain Wilderness, Oregon's Kalmiopsis Wilderness, and even Colorado's Black Canyon of the Gunnison National Park (Acalady 2000; Binkly 2003; McMillion 1999; Peterson 2010; Quillen 2010; Simon et al. 1998; Staff 1995; Steubner 1998; Zaitz 2010).

A Real Estate Agent for Wilderness Preservation

Fortunately, the U.S. Wilderness Act provides that any private inholdings purchased by or donated to the U.S. government may be incorporated into a wilderness area without an additional act of Congress. Funds for such federal acquisitions generally come from the Land and Water Conservation Fund or Federal Land Transfer Facilitation Act (FLTFA).

There is just one nonprofit organization that focuses only on acquisition of wilderness inholdings from willing sellers and their transfer to the United States: the Wilderness Land Trust (WLT). The WLT fulfills a crucial role in the process of securing a "Wilderness Forever Future" because it can often act when federal funding is not immediately available. Moreover, government agencies have a lot of issues on their plates, often making it difficult to prioritize acquisition of inholdings. Many inholding transactions involve challenging questions about access or mining activity. Some properties require restoration of human uses and structures back to wildland. Owners wary of the federal government and bureaucratic time lines gain great benefit from the

Figure 2 – Wild Sky Wilderness, Washington, Mount Baker-Snoqualmie National Forest. Photo by Bill Pope.

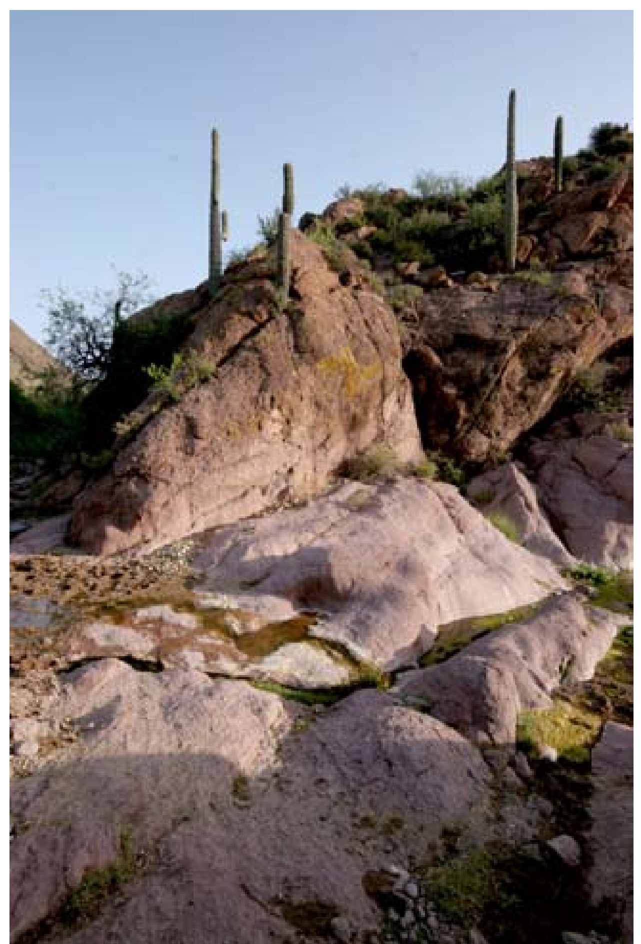

Figure 3 – Hells Canyon Wilderness, Hells Canyon National Recreation Area, Oregon and Idaho. Photo by Mike Stoklos.

businesslike approach to real estate deals by a private nonprofit such as the WLT. The WLT strives to make deals simple and timely for landowners, and then takes on the responsibility of transferring the property to the federal government for permanent wilderness protection. Moreover, because WLT deals exclusively with wilderness inholding real estate, the staff has a specific, in-depth knowledge of the issues and concerns that this special group of property owners face. Since its inception 20 years ago, WLT has completed 378 real estate transactions, protecting more than 36,652 acres (14,839 ha) in 82 designated and proposed wilderness areas in Arizona, California, Colorado, Idaho, New Mexico, Montana, Nevada, and Washington.

Figure 6 – Mokelumne Wilderness, Eldorado National Forest, California. Photo by Jeff Davis.

Figure 4 – King Range Wilderness, Lost Coast, California, King Range National Conservation Area. Photo by WLT staff.

Early Days

The WLT was the brainchild of Coloradan Jon Mulford in reaction to a specific threat to Colorado wilderness lands posed by real estate developer Tom Chapman (Simon et al. 1998; Staff 1995). Beginning in 1992, WLT was much like a local land trust. Over the next decade, it expanded beyond Colorado to other western states in the United States. In 2003 the mission of the WLT was modified to include the acquisition of inholdings within proposed wilderness, as well as designated wilderness, strengthening relationships with a broader constituency and allowing for completion of acquisitions before they became problematic in the wilderness designation process.

WLT's financial model consists of strong relationships with foundations, large donors, and the profits from periodic sales of lands to the federal government. It has pursued as a target a split of 60% of revenues from annual giving and 40% from land sales. In 2010 WLT initiated a Wilderness Opportunity Fund that seeks to build a $3 million revolving asset base, available for unexpected and/or emergency acquisitions. WLT's successes have been greatly dependent on a small, exceptionally gifted, and effective staff that is dedicated to its mission.

How Are Wilderness Inholdings Prioritized?

Given the vast acreage and number of inholdings in so many wilderness areas, how can an organization with restricted assets decide which lands to purchase? An algorithm was devised to accomplish that (Pearson and Wallace 1994). This methodology assigns a numerical score to wilderness inholding parcels on the basis of development, ecological, and social factors. A total of 17 criteria are evaluated and assigned scores of 1, 2, or 3, with 1 being less of a threat and 3 being more of a threat. The sum of scores for each parcel provides a priority ranking with the highest priority property achieving the largest total. This tool is now nationally known and is widely accepted as the standard for evaluating and prioritizing the acquisition of wilderness inholdings.

Landscape Diversity

WLT endeavors have safeguarded ecosystems ranging from the hottest and driest landscape in North America, Mohave Desert's Death Valley, to Washington State's Glacier Wilderness, where unimaginable snowfall occurs. The shores of the Pacific Ocean have benefited from the stewardship efforts of the WLT, as have high altitude meadows of the distant Rocky Mountains.

Volcanic Legacies – In New Mexico's El Malpais (badlands) National Monument Wilderness Study Area, where jagged lava flows dominate the land, the WLT acquired an old 320-acre (130 ha) homestead called Hoya de Cibola, with its own collapsed lava

tube. Hundreds of miles farther north, in the Lassen Volcanic National Park, WLT collaborated with the Nature Conservancy to acquire and then donate to the National Park Service a rare high altitude fen within Lassen Volcanic Wilderness. Known as Spencer Meadows, this land is part of the Mill Creek watershed that possesses the highest levels of biotic integrity of the 100 major watersheds in the Sierra Nevada. This parcel was rescued by WLT from sale for conversion to a commercial campground. It now remains wild as part of one of the most biodiverse areas of California, with more than 700 flowering plant species and 259 vertebrate species.

From Coastal to Montane Ecosystems – WLT activities have encompassed terrain from Pacific Ocean surf to the literally breathtaking high altitudes of the Rocky Mountains. Thus, acquisition of inholdings in the King Range Wilderness on the northern California coast added key additional protection to the "Lost Coast," the longest stretch of undeveloped coastline in the United States outside Alaska. In Colorado's Rocky Mountains, WLT teamed up with the National Park Trust to procure a 10-acre (4 ha) patented mining claim perched on a lofty ridge within the Maroon Bells-Snowmass Wilderness, one of the most spectacular vistas in the United States. Also part of the High Elk Corridor conservation effort, this tract is no longer vulnerable to development. Similarly, in collaboration with the Colorado Conservation Trust, WLT purchased a 320-acre (130 ha) private inholding in the James Peak Wilderness, thereby protecting the entirety of Echo Lake, key riparian areas, and establishing legal access to the wilderness's extensive trail system. Indeed, WLT's acquisitions have resulted in the protection of widely loved icons of splendid Colorado wilderness such as Spanish Peaks, Sangre de Cristo, Raggeds, Hunter-Fryingpan, Holy Cross, Weminuche, Mount Sneffels, Lizard Head, Mount Massive, Indian Peaks, Flat Tops, and Eagles Nest.

Figure 5 – North Fork Owyhee River Wilderness, Idaho. Photo by John McCarthy.

Wilderness Expansion

WLT has been able to expand existing designated wilderness through the Section Six process of the 1964 Wilderness Act, which allows the secretary of the interior to accept donated land adjacent to designated wilderness and add the land to the already designated wilderness without further legislation. In a particularly outstanding example, the Trust donated to the Bureau of Land Management a 2,430-acre (984 ha) ranch west of Ridgecrest, California, thereby expanding the Sacatar Trail Wilderness and connecting it to the Domeland Wilderness. Thus, a single acquisition served two far-reaching ends: wilderness expansion and wildlands connectivity (Soulé 2010).

The Environmental Group That Bought a Gold Mine

Sometimes, the WLT finds itself in unexpected situations. This was the case when it became the temporary owner of the Big Horn Mine, a gold mine not far from the heart of Los Angeles. Located in the Sheep Mountain Wilderness of the Angeles National Forest, the mine has long been a favorite easy day-hike destination because of its historical and cultural values as well as impressive views. However, the rapidly escalating price of gold assured that the mine would be reopened, creating huge compatibility issues with the surrounding wilderness as well as a shutdown of public access and the possible conversion into a recreational resort. WLT was able to acquire the mine and its estimated 262,000 ounces (7428 kg) of gold in 2007 when the price of the lustrous metal was $350 an ounce, a fifth of what it is selling for now. Installation of a gate to prevent human entry but allow entry of the healthy bat populations enabled the 277-acre (112 ha) property to be transferred in 2011 to the United States as part of the Sheep Mountain Wilderness.

Death Valley Chemicals and a Corporate Merger for Wilderness

In another atypical transaction, WLT employed a complex corporate merger strategy to acquire Avawatz Salt and Gypsum Mine, once known as Death Valley Chemicals. The Kerckhoff family, one of the founders of Beverly Hills, had bought the 2,450-acre (992 ha) property in 1912 and planned to mine gypsum and transport it to the building boom taking place in Los Angeles. Herman Kerckhoff had sold stock in the family's Avawatz Salt and Gypsum Company in which the mine was the chief asset. The proposed Amargosa Railway for delivery of gypsum to Los Angeles never materialized. Thus, no large-scale disturbance of the land ever took place.

WLT's success in adding more than 57 square miles to the NWPS in the past 20 years testifies to the viability of the organization and its mission.

Fast forward now to the 21st century when the Avawatz Mine property was surrounded by BLM lands that were in the Death Valley Wilderness Study Area and part of U.S. senator Diane Feinstein's (D-CA) proposed Desert Protection Act. When approached by the WLT, the Kerckhoff family was willing to sell the mine property, but only if it were sold together with the Avawatz Salt and Gypsum Company. Acquisition of the latter company by WLT then presented the thorny issue of deceased stockholders or those of unknown whereabouts who could not be contacted. The creative answer to this conundrum was for WLT to set up a separate entity, Avawatz Acquisition Corporation, wherein WLT was the majority shareholder. The purchase was completed with a grant from the Resources Legacy Foundation's Preserve Wild California Program. The former mine property was then donated to BLM for inclusion in the Death Valley Wilderness Study Area.

The happy result was win-win all around. The U.S. taxpayers got nearly 4 square miles of wildlands at no cost, the Kerckhoff family added to their historic legacy, and a valuable piece of wild California, containing verdant Sheep Creek Springs and its population of endemic toads and water source for bighorn sheep, was protected.

A Square Mile of California Wildlands Protected

A recent WLT acquisition illustrates benefits to species and ecosystems that would be adversely affected by existing and proposed development. Most of the 181,000-acre (73,279 ha) Yolla Bolly Middle Eel Wilderness lies within the Mendocino National Forest, north of Sacramento, California, in the eastern California Coast Range. WLT has acquired there a 1-square-mile (640 acres/259 ha) tract that will be transferred to the U.S. Forest Service for inclusion in the NWPS. Situated on Leech Lake Mountain, headwaters of several streams feeding the designated Wild and Scenic Middle Fork of the Eel River provide critical habitat and summer cold waters for steelhead trout and chinook and coho salmon, the latter labeled as threatened under the Endangered Species Act.

WLT's purchase also protects regionally sensitive species including marten, fisher, goshawk, and spotted owl. Globally rare plant communities are supported by serpentine soils that host the unique foxtail pine and Pacific fuzzwort, and are good foraging grounds for bald eagles and deer.

The diverse habitats of carbon-sequestering mixed conifer and red fir forests, in addition to scrub white oak and riparian areas, will now be secured from the looming threat of logging and the incursion of off-road vehicles. This area served as species refugia during the climate changes of the last ice age, and so will remain as a buffer for species during the present anthropozoic-induced climate alterations. Added bonuses are enhanced protection of nearby paleontological resources and important deer summer range.

This private parcel, for sale as a hunting camp with a house and outbuildings, had been accessed by a 4-mile (6.4 km) road through the designated wilderness and also included an additional 11 miles (18 km) of internal roads. Artificial ponds and water distribution systems increased the remote parcel's attractiveness for illegal marijuana farming, which is responsible for increasing widespread degradation of our public lands. WLT is currently seeking funds for closure and restoration of these roads and structures so that these lands can be transferred to the federal government.

The Trail Ahead

WLT's mission remains daunting; nonetheless, its success in adding more than 57 square miles (148 sq. km) to the NWPS in the past 20 years testifies to the viability of the organization and its mission. The increasing pressures of forces such as population growth, development, and climate change demand that we insulate our remaining wildlands as well as possible and as quickly as we can. This effort will require an expanded cadre of committed individuals and organizations that understand Aldo Leopold's admonition (1925): "For unnumbered centuries of human history the wilderness has given way … we must now challenge that dogma, or do without our wilderness."

Acknowledgments

The author is indebted to Mark Trautwein for his contribution to historical aspects of the WLT. The efforts and support of the WLT staff, including Reid Haughy, Karin Evans, David Kirk, and Aimee Rutledge, are also gratefully acknowledged. Added thanks go to Charles Wellander for editorial help.

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Continued on page 43

Wilderness Network Conservation in the Cantabrian Region of Northern Spain

BY FERNANDO ALLENDE, MANUEL FROCHOSO, RAQUEL GONZÁLEZ, and NIEVES LÓPEZ

Abstract: Natura 2000 is a pan-European network whose principal aim is to conserve the European spaces of greatest natural interest. Its effectiveness is analyzed in a specific sector in Spain, namely the Atlantic Region, through an exhaustive division and assessment by area. This article considers questions related to the impact on the spaces included within the network, providing specific examples associated with the fauna, flora, and the territorial agroecostructures. Alternatives and communication possibilities are suggested for those spaces excluded from the network, but which have a key role as nodes for interchange and connection of biodiversity.

Introduction

The Directive 79/409/EEC of 1979, related to wildfowl conservation, established for the first time in Europe the normative basis for conservation of wildlife and nature. From then on, the efforts to form a pan-European network of protected areas intensified, which has the aim of maintaining the integrity of ecosystems in the nine biogeographic regions of Europe (Schutyser and Condé 2009). The Council Directive 92/43/EEC of 21 May 1992 (ECD92) finally established the creation of Natura 2000 and its proposal of Sites of Community Importance (SCIs). A Site of Community Importance is a site that, in the biogeographical region or regions to which it belongs, contributes significantly to the maintenance of or restoration to a favorable conservation status of a natural habitat type in Annex I, or of a species in Annex II. It may also contribute significantly to the coherence of Natura 2000 referred to in Article 3, and/or contributes significantly to the maintenance of biological diversity within the biogeographic region or regions concerned. For animal species ranging over wide areas, Sites of Community Importance correspond to the places within the natural range of such species that present the physical or biological factors essential to their life and reproduction (Directive 92/43/EEC [art. 1 k]).

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Natura 2000 was created to ensure the conservation of habitats and species of special interest in each European region. The biological and anthropogenic factors that have an influence in Natura 2000 management are analyzed. Analysis of the spatial distribution of these factors enables the evaluation of the degree of interconnection on a detailed scale, evaluating the strengths and weaknesses of the system not only in terms of the richness of the variables but also in terms of the management systems involved.

Objectives and Methods

In this article, an analysis has been carried out on a medium scale, selecting a sector in the Spanish Atlantic Region: the Cantabrian coast (Bay of Biscay) and mountains (see fig. 1). Initially, sectors that have a certain degree of homogeneity were defined. In the ecological approach, methodologies were

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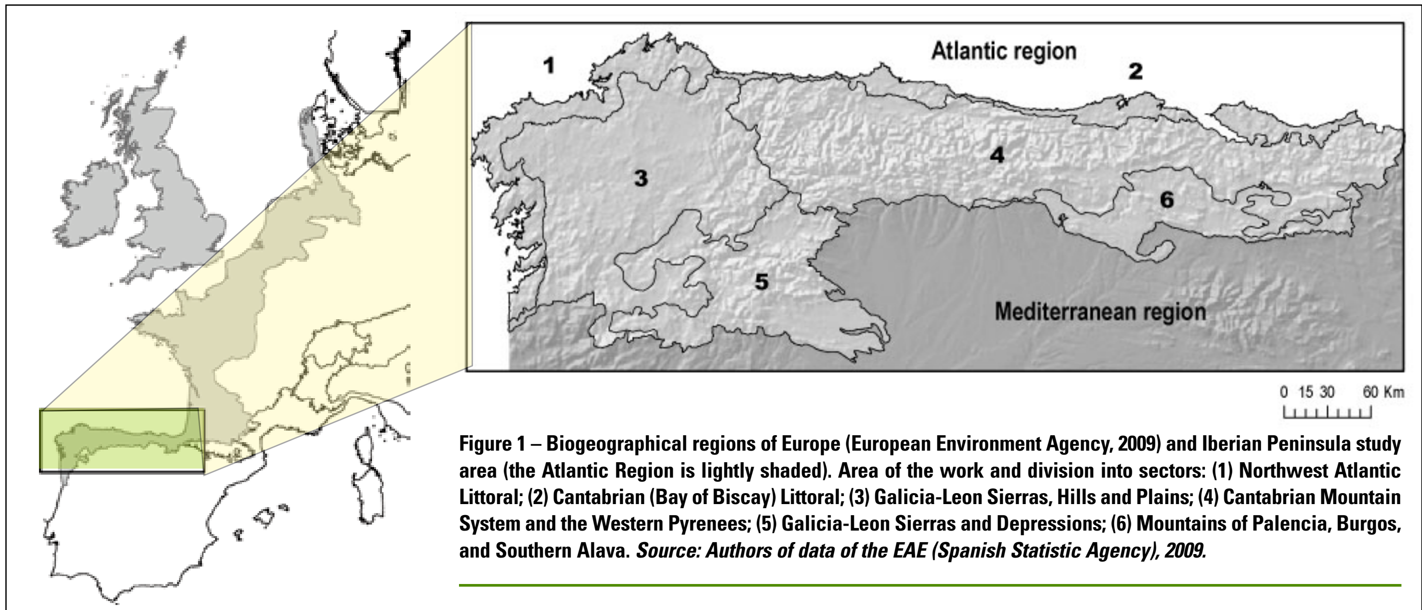

Figure 1 – Biogeographical regions of Europe (European Environment Agency, 2009) and Iberian Peninsula study area (the Atlantic Region is lightly shaded). Area of the work and division into sectors: (1) Northwest Atlantic Littoral; (2) Cantabrian (Bay of Biscay) Littoral; (3) Galicia-Leon Sierras, Hills and Plains; (4) Cantabrian Mountain System and the Western Pyrenees; (5) Galicia-Leon Sierras and Depressions; (6) Mountains of Palencia, Burgos, and Southern Alava. ***Source: Authors of data of the EAE (Spanish Statistic Agency), 2009.***

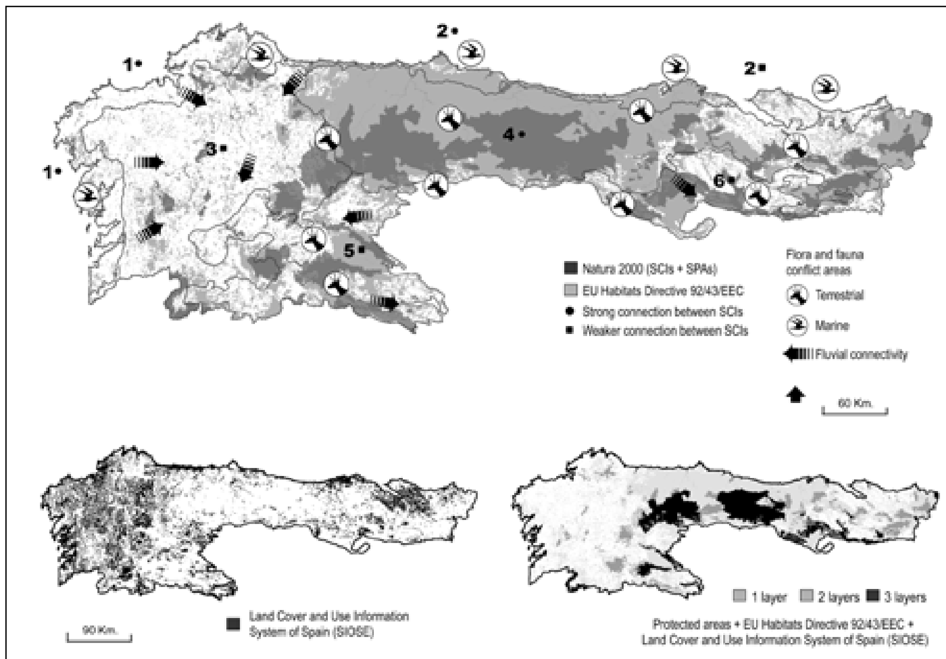

Figure 2 – Connectivity relationship and flora and fauna conflict areas in Spanish Atlantic regions. Sites of Community Importance (SCIs) and Special Protection Areas for Bird (SPAs) (A). Fragmentation surfaces – urban and intensive agriculture land use (B). Results of combining protection figures and traditional land uses areas (C).

used that pertain to the ecology of the landscape in terms of fragmentation (Smith et al. 2009; Ricketts 2001; Burel and Baudry 2003), connectivity (Murphy and Lovett-Doust 2004), and ecogeography (Foster 2002). For the territorial ones, our study is based on the geographical-type methodological contributions (Bertrand and Bertrand 2002; Martínez de Pisón, 1990).

The article takes advantage of basic information available in a digital format, which was compatible with a Geographical Information System (shapefile, coverage), providing delimitation based on ecogeographical criteria (Mata et al. 2004) and data available in the Biodiversity Database of The Ministry of the Environment (www.mma.es/portal/secciones/biodiversidad/). Using different merging and overlaying techniques, this information was simplified in six sectors (see fig. 1), which were validated topologically in ArcGIS. The choice of the variables followed the guidelines applied to Natura 2000 by Rodríguez et al. (2008), both for discrimination and in the search for "sensitive areas." GIS was used for multicriteria evaluation (see fig. 2) and the results allowed us to assess the degree of conservation and location of areas or points of interest that may act as connectors in accordance with the recommendations of Kettunen et al. (2007).

Results and Discussion

In each of the differentiated sectors, a general approximation is made along with a more specific one that refers to more localized examples. In the text it has been considered that the nuclear areas are those that pertain to the Natura 2000 network and those peripheral areas that, although included in ECD92, were not considered in the SCI proposal. In most cases, there is considerable coincidence between Natura 2000 and the protected spaces at regional or national level (regional park, natural park, and even national park such as the Picos de Europa) where these entities act as an effective management element.

This protection varies in intensity and quality, being especially effective in the mountainous areas in the central sector. However, there are problems of lack of protection in those sectors where there is no continuity among the protected spaces (western-end Galicia and eastern-end Cantabria and Basque country). This problematic situation is exacerbated in the potential corridors that, under good conditions, would provide excellent connectors among metapopulations of flora and fauna.

Figure 3 – Coastal cliffs in Tapia de Casariego (Asturias). Photo by Fernando Allende.

The Northwest Atlantic Littoral and Bay of Biscay Littoral

(See figure 2, areas 1 and 2)

The Northwest Atlantic and Bay of Biscay Littorals are the Atlantic Regions with the greatest connectivity in the Natura 2000 network. In the two zones there are extensive discontinuities that are only linked via fluvial corridors (see fig. 3). This provokes a degree of disconnection and extensive spaces without structure that are, however, well represented in ECD92.

The effects caused by extensive urbanization processes on the Galician coast (Costa da Morte, Costa da Vela, among others) are especially significant on the Cantabrian coast (Santander and Santona Bays) and the Basque coast. Their longitudinal character leads to the concentration of infrastructures as well as a dispersed but dense network of population centers. In the westernmost area, the hydrographic layout articulates the network to a large degree, although this is not an impediment to the existence of grave effects related to the general alteration of the hydrological system and bogland drainage. In the center and east, the mouths of the large rivers cause hiatus of maritime-territorial disconnection due to the existence of industrial and port concentrations (Eo, Navia, Nalón, Bidasoa) with important consequences for the resident wildfowl (Arcos et al. 2009) and migratory ichthyofauna, such as Atlantic salmon. In the whole sector, the pressure exerted by the cultivated forests of pine and blue gum eucalyptus should be highlighted as it disconnects patches of autochthonous forest and endemic metapopulations of amphibians such as the gold-striped salamander (*Chioglossa lusitanica*) (Pleguezuelos et al. 2002).

Galicia-Leon Sierras, Hills and Plains

(See figure 2, area 3)

The geomorphological complexity should be highlighted with outstanding elements in Spain such as minerotrophic peat bogs or fenland, morphologies derived from glacial activity, and extensively eroded or modeled surfaces over intrusive lithologies. Galicia-Leon is the sector with the least surface area included in the network and has large empty spaces among nuclear areas. The areas that occupy the greatest surface area are distributed in the mountain ranges and periphery massifs and in enclaves of the central Galician ridge. The fluvial corridors (Mandeo, head of the Miño, Eo, Masma, Ulla, Lérez, Alén, etc.) are the real connecting nodes.

The main threats are concentrated in the autochthonous forests, often surrounded by repopulated sectors where abusive logging takes place (Spanish Department for Conservation of Nature [DGCN] 2003). The elimination of the riverside and marshy vegetation in the mid-low fluvial stretches has generated accentuated eutrophication processes. It is frequent to find desiccation associated with processes of land consolidation that provoke the disappearance of some valuable wetlands in the interior of Galicia such as Antela (Martínez 2007) or the destruction of alkaline boggy complexes (García-Rodeja and Fraga 2009).

The Cantabrian Mountain System and the Western Pyrenees

(See figure 2, area 4)

These mountains have the principal feature of functioning as a transverse connector providing a link with the other large mountain system in the north of the peninsula, the Pyrenees.

The highest mountain ridge coincides with the divisor of the Duero watershed, and it is largely included in the Natura 2000 network. This area benefits from diverse regional and national protection mechanisms (see fig. 4). The fragmentation provoked by large roads is especially significant in the central mountains, which has negative impacts on the largest populations of brown bear (*Ursus arctos*) in the peninsula (McLellan et al. 2008). Discontinuities associated with opencast mining are common, especially in

Figure 4 – Northern limit of the Sierra de Urbasa (Navarra). Photo by Manuel Frochoso.

Figure 5 – The southern Alava Mountains (Sierra de Cantabria). Photo by Manuel Frochoso.

the central-southern sector of Asturias-Leon, threatening endemic species such as cappercaillie (*Tetrao urogallus cantabricus*) (Robles et al. 2006) and broom hare (*Lepus castroviejoi*) (Ballesteros and Palacios 2009). Where it borders on the Western Pyrenees, the progressive densification of the network of settlements and infrastructures (Oviedo, Torrelavega, Durango, etc.) accentuates the fragmentation.

Galicia-Leon Sierras and Depressions

(See figure 2, area 5)

Galicia-Leon is important because it provides a transversal corridor to the Cantabrian Mountain System and a link between the northern mountains and the southern foothills. Moreover, it is an ecotonal sector between the Atlantic biogeographical region and the Mediterranean. It has a good connection with the transversal mountains (Trevinca-San Mamede, Cabrera, Ancares), but it also has large discontinuities on the northern slopes of the Eixe-Cabrera and Teleno or between Ancares-Caurel and Ancares-Gistredo. In some zones the Natura 2000 network is exclusively supported on fluvial corridors (Támega, Tera, Sil). It is enormously threatened by mining, abandonment of the traditional land uses, and by wind farms, with an especially grave impact on Iberian endemic species such as the gray partridge (*Perdix perdix hispaniensis*) (Onrubia et. al. 2004).

Mountains of Palencia, Burgos, and Southern Alava

(See figure 2, area 6)

As in the preceding case, these mountains make up an ecotonal set in which there are corridors favoring linear biodiversity east–west (Cantabrian-Pyrenean Range) and south–north (Cantabrian/Pyrenean-Duero/Ebro) (see fig. 5). Its exo- and endokarstic nature should be highlighted, as well as its extensive and varied hanging synclines, whose platform landscape is under threat from the installation of large wind farms. It has some of the most interesting aquatic and riverine communities, with the greatest genetic purity, including white-clawed crayfish (*Austropotamobius pallipes*), brown trout (*Salmo trutta fario*), and European mink (*Mustela lutreola*), which are gravely threatened by the modifications in the fluvial media and the introduction of foreign species (Gil Sánchez and Alba Tercedor 2007; Blanco and González 2001; Lecis et al. 2008).

Analysis of the disconnections, the lack of consolidation, or good connectivity among areas included in Natura 2000 was done with comprehensive knowledge of the territory and its problems. Table 1 shows the most important threats for each ecogeographical sector. These summarize the threats included in the data sheets prepared before the designation of SCIs (www.marm.es/), records consulted in the catalog of IBAs from SEO Birdlife (Important Birdlife Areas, Spanish Ornithological Society, www.seo.org/ibas.cfm), and field data collection. They include the effects that have a significant surface representation, 5% or more of the affected ecogeographical sector .

Table 2 shows the overlap and existing levels of protection in each sector for different protection levels (European, bilateral, or regional). For each sector the overall percentage covered by the different types of protection was estimated. The objective is to analyze what extension and type of regulation the areas of the network have. A percentage analysis was performed of the values that had significance in relation to the total area of each sector. The percentages considered were the surface area included in the network, the surface area occupied by the SCIs and SPAs, those that include some type of management system, and finally, the surface area that coincides with

Table 1 – Summary of threats in the different sectors:
(1) Northwest Atlantic Littoral; (2) Cantabrian (Bay of Biscay) Littoral; (3) Galicia-Leon Sierras, Hills and Plains; (4) Cantabrian Mountain System and Western Pyrenees; (5) Galicia-Leon Sierras and Depressions; (6) Mountains of Palencia, Burgos, and southern Alava.

Threats	**Sectors**					
	1	**2**	**3**	**4**	**5**	**6**
Extensive littoral urbanization	X	X				
Dispersed urbanization	X	X				X
Concentration of infrastructures	X	X		X		X
General alteration of hydrological systems	X	X	X			X
Forestry repopulations	X	X	X			X
Land consolidation			X			
Desiccation and alteration of wetland ecosystems			X			
Mining				X	X	
Abandonment of traditional uses					X	
Wind generators					X	X

X indicates the threats that exist in each regional sector (1 to 6).

protected sites that are established by state or regional norms.

The percentage covered by Natura 2000 is relatively low, with extreme values in the Northwest Atlantic Littoral (7.3%) and the Cantabrian Littoral (7.8%). Of these, 9.2% and 33.6% have some legal mechanism for territorial planning mainly coinciding with spaces included in the regional norms (96.5%). On the other hand, the connection of the coastal nuclear areas is well established, constituting a nearly continuous protected area. Important discontinuities have been identified in the fluvial-estuarine and nearby land sites as well as among the fragments of autochthonous forest.

One of the areas with greatest weakness in connectivity relations is the Galicia-Leon Sierras, Hills and Plains, which are articulated by a fragile protection web established on periphery ranges and narrow fluvial corridors. Overall, 13.2% of the unit is included in the network, 12.6% has management plans, and 98.5% coincides with protected spaces. Therefore, the question arises: "Is this an extension of the protected land or just a consolidation of what already existed?" Despite the efforts, valuable bogland vegetation, forest, and marsh communities included in ECD92 are outside the protected areas.

The Galicia-Leon Sierras and Lowlands area constitutes 21.2%, but in contrast only 2.7% of it has a management plan and 46.5% coincides with protected mechanisms. In this case the desire for conservation is at loggerheads with the interests that paralyze the planning in traditional hunting areas that have species as singular as gray partridge. In this sector, the Natura 2000 network unintentionally consolidates the connection, thanks to extensive unpopulated sectors in plateaus and small sierras.

The central axis of the Cantabrian Range has the greatest surface area in this network. One-half of the area has management plans, but this area was already a protected zone (69.6%). The neighboring peripheral sierras in the southern sector do not have effective protection, and they are optimal sectors for the expansion of valuable species such as the gray partridge. In the central sector, and especially in the east, the problems of connection are accentuated as there are extensive discontinuities among the medium-height mountains and the limestone sierras of Cantabria and the Basque Country.

The mountains of Palencia, Burgos, and southern Alava have an extensive percentage included in the network (34.3%). Only 25.7% of the area has a management plan, and of this, 28.8% coincides with protected spaces. In this case, we could say that there is a positive balance, favored by human depopulation, given that wide interstitial spaces have been gained that are now unproductive and that are key to the movement of species.

Conclusions

It is important to know whether the ecotonal relations among high, medium, and low lands will ever be considered in the areas of longitudinal migration among ranges or whether the extensive sequential scrubland formations will be considered as connection nodes. As for the management of some species, the Natura 2000 network may lead to the

Table 2 – Significant category percentages by territorial sectors:
(1) Northwest Atlantic Littoral; (2) Cantabrian (Bay of Biscay) Littoral; (3) Galicia-Leon Sierras, Hills and Plains; (4) Cantabrian Mountain System and Western Pyrenees; (5) Galicia-Leon Sierras and Depressions; (6) Mountains of Palencia, Burgos, and southern Alava.

Significant categories	**1**	**2**	**3**	**4**	**5**	**6**
% covered by the Natura 2000 network with respect to the total surface area of the sector	7.3	7.8	13.2	21.2	39.0	**34.3**
% occupied by SCIs	7.2	6.7	13.2	20.3	**38.2**	32.1
% occupied by SPAs	1.8	3.8	4.0	8.2	25.1	**29.9**
% that have a territorial planning system in place (PORN, PRUG)	9.2	33.6	12.6	2.7	**48.7**	25.7
% coinciding with the Protected Spaces existing in the Natura 2000 network	96.5	62.7	**98.5**	46.5	69.6	28.8

consolidation of management and treatment of species with wide areas of dispersion, such as the Iberian gray wolf (*Canis lupus signatus*) to the north of the Duero, or for the development of a more wide-ranging strategy that reinforces the treatment of fluvial media as a genetic reservoir of autochthonous Iberian ecotypes, including the brown trout and the white-clawed crayfish.

Finally, a decision must be made about whether, in the current territorial management context, Natura 2000 is only effective when there are state and regional protection mechanisms that help support it or whether the regulation of those habitats considered by ECD92 as priorities, but not included in Natura 2000, has been achieved. On the other hand, the approach to interregional management of these spaces, once they are consolidated as Areas of Special Conservation Interest (ASCIs), must be considered a challenge, it being obvious that this network will be useful. Nevertheless, although there are partial attempts at the regional level, there is still a lack of regulation of the nodal spaces using specific state-protection mechanisms. Of course, this does not exclude the existence of interesting international initiatives for connecting the mountains of southwest Europe, such as the proposal made in the conference at Durban in 2003 of a Great Ecological Connector linking the Cantabrian mountain range, the Pyrenees, the Massif Central, and the Western Alps.

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One Half Century of Wilderness Stewardship

America's 50th Anniversary Wilderness Celebration

BY GREGORY HANSEN and VICKY HOOVER

On September 3, 1964, one of the most passionate and controversial pieces of public land legislation ever penned was signed into law – the 1964 Wilderness Act. After 66 rewrites and more than 8 years of blood, sweat, and tears in preparing and fighting for the integrity of its content, this important bill was passed by a nearly unanimous vote.

In 2014, the concept of protecting wildlands, and the establishment of the National Wilderness Preservation System (NWPS), will be celebrated by our national and international wilderness-supporting nongovernmental organizations (NGO) and by our dedicated U.S. federal land managing agencies. We also cordially invite ordinary citizens as well as wilderness advocates to join in the most significant celebration of wilderness since the inception of America's NWPS in 1964.

The True Legacy of Wilderness

Signed into law by President Lyndon B. Johnson, the historic 1964 Wilderness Act set aside an initial 9.1 million acres (3.68 million ha) of wildlands for the use, benefit, and enjoyment of the American people. According to the act, wilderness areas were to be places "where the earth and its community of life are left substantially unchanged and where the primary forces of nature are in control." These natural areas obviously provide vital social benefits to the public, but also lend quintessential nonrecreational values such as ecological, geological, scientific, philosophical, educational, scenic, and historic benefits as well. A few examples of these nonrecreational gains are the clean air and water that wilderness supports and the use of wilderness as a natural living laboratory for conducting baseline scientific research.

Areas within the NWPS are managed by all four federal land agencies: the Bureau of Land Management, Fish and Wildlife Service, Forest Service, and National Park Service. Closely allied with these stewardship agencies are the many dedicated NGOs that work to designate and protect wilderness. This long-standing public-land partnership gives the United States a solid framework for conducting an exciting 50th anniversary celebration that will serve to honor the true American legacy of wildlands management!

Figure 1 – Logo for the 50th anniversary Wilderness Act celebration.

50th Anniversary Celebration Planning Efforts

To coordinate planning efforts, the Wilderness Act Celebration's National Planning Team (Wilderness50) is composed of representatives of all nationally focused wilderness organizations plus the four federal wilderness managing agencies. Wilderness50 is directing national-level activity and event planning and is helping groups around the country organize and plan local and regional 50th anniversary celebration events to be held throughout 2014 (see fig. 1).

Wilderness50's goals are to

1. engage the public to better understand and appreciate the benefits and values of wilderness, ultimately resulting in more people supporting responsible wildlands stewardship;
2. bring the wilderness community (NGOs/agencies/international advocates) together to efficiently and consistently steward wilderness for the use, enjoyment, and benefit of the American people; and
3. connect with today's youth and with nonwilderness using groups to find the thread that ties their lives to wild places so they can more directly relate to, understand, and value wilderness.

By providing guidance and resources, Wilderness50 promotes consistency, cooperation, and partnership and eliminates duplication in 50th anniversary planning and programming. As a result, 2014 will feature creative, highly participatory, and diverse events, including (but not limited to) community walks for wilderness; stewardship projects; classroom and public wilderness educational programs; concerts; fairs; art and photography contests; lectures; new books and magazine articles; museum, airport, and visitor center exhibits; television and movie productions; a national 50th anniversary website; and many other ways to learn about wilderness and the anniversary online.

Special attention is being placed on engaging youth and nonwilderness organizations and communities who care about nature, but have not been previously involved in wilderness advocacy or use. Wilderness50 is also communicating with the international wilderness community in an effort to simultaneously honor the many successes that have been achieved abroad in wildlands designation and stewardship.

Getting Involved in the 50th Celebration

Readers who desire formal involvement should consider participating in planning efforts. Wilderness50 still seeks to recruit participants of various planning committees to help plan nationwide activities in 2014. Readers interested in national-level planning should contact the authors for more information on how to join a 50th working committee. Those interested in local or state-specific celebration planning can contact the authors to be connected with existing coalitions or people who are already organizing events at local levels. For Wilderness50's "50th Anniversary Toolbox," which provides resources and ideas for local events and resources for planning and implementing 50th programming and activities, go to www.wilderness.net/50th/.

Conclusion

The 1964 Wilderness Act represented a fundamental cultural shift from a need to conquer nature to the need to preserve it, and it is a modern philosophical expression of the human need to find in nature spiritual solace and refuge from daily-life stress. Over the past 50 years, and as a result of America's continuing support for wilderness, Congress has added nearly 100 million acres (over 40 million ha) to this unique land preservation system. The remarkable 50-year achievement of wilderness stewardship will be celebrated during 2014 throughout the United States and we – and the entire Wilderness50 team – invite each and every reader to join us in this milestone event!

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Continued from pg 25

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Forever Wild, Forever Free

Bob Marshall's Legacy

BY ANN O'RYAN SPEHAR

Wilderness in the early spring occasions a spirited stirring in the heart comingled with an anticipation of a quiet landscape arousing and awakening to life. To sense the soil against the soles of our shoes and to bask in the miraculous spring sunshine with 45-degree temperatures fills all Montanans with vigor that only a Montana spring could.

Our plan was to head into the midst of the wild Montana Rockies somewhere between Glacier and Yellowstone National Parks – somewhere in the Bob Marshall Wilderness Complex, or "The Bob" as it is known in Montana. To those familiar with The Bob, it is a respite that renews and rejuvenates while restoring the bonds of the heart and soul. It had been a hard winter. And now spring offered to provide winter-weary Montanans a chance to shed subzero winter temperatures and weighted snowpacks that had for so long separated us from our land. Off-season travel in The Bob is likely to be completely devoid of fellow hikers, backpackers, and even the horseback rider – just the kind of wilderness that can unhinge the spirit.

Such untrammeled primeval expanse demands a hardened traveler who is self-sufficient, resourceful, and seeks comfort in doing without. The wild terrain requires hard work, endurance, stamina, ingenuity, and quick thinking to face the challenges of the indifferent – often severe and relentless – conditions of this fiercely beautiful expanse. The wilderness of The Bob is a place to loosen the grip of the pilgrim soul and stand as a pioneer in the heart of this untamed wild terrain.

That we have such an unencumbered wilderness to rekindle and stretch the sinews of the pioneer spirit is a testament to the brilliance and hard work of the forefathers of the conservation movement – Ralph Waldo Emerson, Henry David Thoreau, John Muir, Aldo Leopold to name a few. But the namesake of this great land that we intended to enter was given to the conservationist Bob Marshall.

A land this eminent demands a name that is equal in stature and grandeur. Lending the names of any of our conservation forefathers would have done this land justice. Yet the spirit of a less well-known environmentalist was given steward over this immense primeval landscape. To understand why, one would need to appreciate this vast territory and this man's legacy. That Bob Marshall's name is rarely mentioned as an elder to the conservation movement is perhaps an injustice – that his name graces this landscape is not.

Ann O'Ryan Spehar with dogs Buddy and Montana entering the Bob Marshall Wilderness Complex. Photo by Alex Spehar.

Bob Marshall Wilderness Area

A portion of this wilderness was originally set aside in 1941 as the South Fork, Pentagon, and Sun River Primitive Areas and named the Bob Marshall Wilderness Area. The 1964 Wilderness Act designated it as wilderness. In 1972, The U.S. Congress added 239,936 acres (97,140 ha) of the Scapegoat Wilderness to the southern border. This is the border that contains the spectacular towering 18-mile-long (29 km) and 1,000-foot-high (3,048 m) escarpment known as the Chinese Wall. In 1978, an additional 286,700 acres (116,073 ha) of the Great Bear Wilderness was added to the northern border. These three wilderness areas are called The Bob Marshall

Wilderness Complex, or just "The Bob," and encompass more than 1.5 million acres (607,287 ha). It is the second largest wilderness in the lower 48 states, second only to the Frank Church-River of No Return Wilderness in Idaho. The 1,856 miles (2,994 km) of trails in The Bob are open only to foot and stock use. No motorized or mechanical equipment is allowed.

The Bob contains significant megafauna. Together with Glacier National Park just across U.S. 2 to the north of the Great Bear, this pristine, untamed, vast wilderness provides an unencumbered wildlife corridor that bestows a powerful homeland to the grizzlies, gray wolf, mountain goat, mountain sheep, wolverine, and lynx, not to mention the abundant deer, elk, moose, and black bear. This magnificent land is a bountiful home even for fish flowing in the 14 lakes and 89 miles (144 km) of streams in the Scapegoats and is a vast expanse for the eagles that soar off the high cliffs of their homes on the Chinese Wall and the trumpeter swans that grace its lakes.

Wilderness Travel

We were finally on the trail in the high country of Montana, in The Bob, and a day ahead of the Forest Service work crew who were heading in to open up the backcountry patrol cabins. We stepped off the trail to let them by while I shifted my backpack, sympathizing with the 10 laden horses that carried the Forest Service gear and equipment. We nodded our heads with a smile as they passed, while the border collies made the appropriate acquaintances distinctive of their own species.

After several hours of hiking from the Gibson Reservoir Trailhead we reached the entrance to the Bob Marshall Wilderness. We then followed the North Fork of the Sun River. Although long in the tooth, we were well-seasoned backpackers. Nonetheless, early spring backpacking in the high country has its unique challenges. My husband and I, along with our two border collies, bravely faced our first night out. The four of us shared the meager provisions of warmth huddled in a pile of fur and sleeping bags. Old Man Winter had lost his grip on the day but he still owned the night. The melt of the snow-clogged peaks and early spring streams combine to make The Bob "wet country." Snowmelt can last even until July in many areas of this high wilderness. The problem, of course, is that cold seems even colder when it's wet. Early spring nights that dip into the teens can leave the early spring traveler in extended negotiations with Old Man Winter.

The basic 75-mile (120 km) loop that follows the spectacular scenery along the Continental Divide had to be adjusted due to lack of snowmelt. But, the plentiful network of trails throughout The Bob allowed us to quickly adapt our trip. Intent on separating ourselves from all technology, we were without a Global Positioning System (GPS). But, we had backpacked for years before such technology had even been available. Without a GPS it is wise to refresh your map and compass skills.

For hours on end, we worked the trails, shifting our heavy pack onto less tender parts of the body, pounding the snow, dirt, and mud with our sore feet. Both day and night we shared the trail with many a fellow traveler. As evidenced from the prints and scat – all of them wild.

The grizzlies, wolves, and bighorn sheep are not the only souls who are free to roam about in these rugged sawtooth ridges, gentle alpine meadows, and densely forested waterways. For those hearty enough and with the skills and ability to abide in its code of conduct and discomfort with equanimity may gain passageway and even a temporary reprieve from the confines of the urban prison that restricts our soul.

Reaching the top of a pass, standing in the expanse of a mountain meadow so far from all civilization, gazing on a distant hillside sprinkled with feeding elk framed by the white peaks, shatters all illusions of the awakened winter spirit even while weighted down by a heavy pack and sore feet. The sanctity lifts one far beyond the walls of what civilization demands and fills the spirit with a simple unencumbered understanding of happiness.

My throat tightens over such beauty as I marvel at the lunacy of what we believe we need to gain peace. The struggle against the constant onslaught of urban living and its meaningless demands slowly trickles away like snowmelt on a warm spring afternoon, leaving in its wake simple small white avalanche lilies.

Marshall's Legacy

Bob Marshall understood that for many the wilderness was indispensable for happiness:

> For me, and for thousands with similar inclinations, the most important passion of life is the overpowering desire to escape periodically from the clutches of a mechanistic civilization. To us the enjoyment of solitude, complete independence, and the beauty of undefiled panoramas is absolutely essential to happiness. (Marshall 1951, p. 481).

He was outspoken when it came to protecting wildlands, driven by the belief that the wilderness was the soul's raison d'être, its inspiration and its very sustenance. This moved Bob Marshall to action. He was not one to

be content to speak eloquently and poetically following in the footsteps of John Muir, Ralph Emerson, or Henry Thoreau. Nor was he content to explain the science behind a grand "Evolutionary-Ecological Land Ethic" and follow in the footsteps of Aldo Leopold. Instead, he was moved to action to preserve land through law that was essential to preserving the American heart, soul, and spirit. He was the only one in his time who was effective at changing the wilderness laws and providing the mechanism to withstand the powerful drive for over exploitation of our natural resources.

Leopold was the first to propose large wilderness areas be set aside for hunting, fishing, and backpacking, and was even the first in the world to be successful at doing so. Yet, it was the pragmatic and passionate Bob Marshall who would become known for his successful efforts at defining the laws themselves that would protect land in perpetuity, or as Marshall's father would have said, "forever wild."

Bob Marshall was not just an adventurer, prolific writer, and scientist with his PhD from John Hopkins, he was more importantly an effective bureaucrat and lobbyist, traits rarely found among conservationists. Bob spent four years as chief forester for the Bureau of Indian Affairs and two years as chief of recreation at the Forest Service, before his untimely death at 39. He was instrumental in defining a stable wilderness policy within the Forest Service by defining the "U" regulations that strictly identified the guidelines of how wilderness would be defined and maintained. These regulations replaced the vague and flexible "L-20 Regulations" for primitive areas. The "U" regulations gave greater protection and banned road construction, timber sales, motorboats, and aircraft.

In addition to the "U" regulations, Bob Marshall is also known for writing the forest recreation sections of the Copeland Report – a national Forest Service plan ordered by the U.S. Senate in 1933. In it he recommended that 22.5 million acres be set aside in "Superlative, Primeval and Wilderness" areas and went on to define America's recreational-use philosophy, dogmatically as well as eloquently.

Figure 1 – Alex and Montana sniffing out the trail. Photo by Ann O'Ryan Spehar.

As co-founder of The Wilderness Society, he left behind a strong and well-supplied advocate. A son of a multimillionaire civil liberties lawyer, Bob used his inheritance to support The Wilderness Society (Glover 1986).

Bob did more than any other one person to establish wilderness in America. He was an agitator, a pike who went after government officials with dogged determination – truly the wilderness's best friend. Both John Muir's and Aldo Leopold's writings profess adoration and love toward nature that is more often given to God. Bob Marshall's writing was no exception. A prolific and powerful writer in his own right, he was propelled by a passion to preserve the very resource that had built the unique American character; a character born and shaped in previous generations by confrontation with the wild frontier – the pioneer character, defined by self-determination, self-sufficiency, resilience, independence, resourcefulness, endurance, and the spirit of adventure.

With dogged determination that bordered on a crusade, Bob Marshall believed that to preserve the wilderness was akin to preserving the raw materials required to rekindle the hardened, spirited, and independent American pioneer.

> Toting a fifty-pound pack over an abominable trail, snowshoeing across a blizzard-swept plateau or scaling some jagged pinnacle which juts far above timber all develop a body distinguished by a soundness, stamina and élan unknown amid normal surroundings.... As long as we prize individuality and competence it is imperative to provide the opportunity for complete self-sufficiency. This is inconceivable under the effete superstructure of urbanity; it demands the harsh environment of untrammeled expanses. (Marshall 1930, p. 142)

Figure 2 – Forest Service heading into The Bob to open up backcountry cabins. Photo by Ann O'Ryan Spehar.

This land is a fitting tribute to one who established the wilderness laws and recreational philosophy for America and who ensured that they remained "forever wild." Bob helped to develop laws that protect into perpetuity pristine wildlands and thereby ensured that our children, too, have the opportunity to renew their American spirit; an opportunity that is only possible in a wild frontier.

It is also a fitting tribute to the writer of the seminal call to arms to all conservationists that asks that we never cease to protect that very resource so critical to the American spirit.

Marshall proclaimed the wilderness developed the American character because it satiates the

> longing for physical exploration which bursts through all the chains with which society fetters it. Thus we find Lindbergh, Amundsen, Byrd gaily daring the unknown, partly to increase knowledge, but largely to satisfy the craving for adventure. Adventure, whether physical or mental, implies breaking into unpenetrated ground, venturing beyond the boundary of normal aptitude, extending oneself to the limit of capacity, courageously facing peril. (Marshall 1930, p. 143)

And Marshall noted it develops

> the American spirit because it breeds original ideas ... an objectivity and perspective seldom possible in the distracting propinquity of one's fellow men and required of most virile minds, including Thomas Jefferson, Henry Thoreau, Louis Agassiz, Herman Melville, Mark Twain, John Muir and William James, who have felt the compulsion of periodical retirements into the solitudes. (Marshall 1930, p. 143)

Shortly after his untimely death in 1939, the U.S. secretary of agriculture in 1941 set aside 950,000 acres (384,615 ha) of the South Fork of the Sun River, and the Pentagon and called it the Bob Marshall Wilderness Area. Bob would surely have smiled when the Great Bear and Scapegoats were designated wilderness in the 1960s and 1970s and appended to the Bob Marshall Wilderness.

Gift of Wilderness

John Muir built in us a need for wilderness, Aldo Leopold built the ecological theory for wilderness, whereas Bob Marshall mapped out the territory and staked the claim "forever wild." Their legacies continue to provide inspiration and guidance for the contemporary conservation movement. Marshall's legacy ensured that humankind will always have the pristine wilderness with which to reunite, and this is the greatest of legacies a forefather could provide. For this gift allows his followers to experience the wilderness for themselves and all it offers. He left not just poetry and inspiration but the very wilderness itself with all its capacity to mend, heal, and strengthen any soul.

As we found in our trip through The Bob, the vast primeval land there strips away all vestiges of otherness that we bring into the wilderness and resets our compass. By setting aside "opportunities for solitude and primitive recreation," the 1964 Wilderness Act did much more than bestow a homeland to the grizzlies, wolverines, and bighorn sheep. It bestowed a homeland for the American heart to roam. It purges the darkness, discontent, and hunger from our soul and rekindles the pioneer spirit as only a wild frontier can. When we breathe in this primitive untamed expanse of the Marshall Wilderness, the harshness of its beauty strengthens the sinews of our America

Figure 3. Ann, Buddy, and Montana following the North Fork of the Sun River. Photo by Alex O'Ryan Spehar.

spirit where our real wealth is found. While making us more resilient to our own time- and weather-worn paths, this untrammeled, unfettered land teaches discipline, self-sufficiency, and resilience to face new trails and produces courage and character to not just believe in but to forge our future. In "The Bob" we found the freedom of the wilderness that is part of the wealth that Americans still call home.

The vast primeval land of "The Bob" strips away all vestiges of otherness that we bring into the wilderness and resets our compass.

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Continued from WILDERNESS LAND TRUST, page 30

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Continued on page 48

Announcements

COMPILED BY GREG KROLL

Pan Parks's Annual Conference to Convene in Finland in September

Pan Parks's annual conference, Europe's Wilderness Days, is the oldest event focused on protecting Europe's wilderness and has proven to be a highly successful way to network with professionals addressing wilderness issues. The conference, co-hosted by Archipelago National Park, will convene September 26–28, 2012, in Nagu, Finland.

This year's focus will be how to involve wider constituencies in wilderness protection and will look at the role of protected areas, NGOs, and the tourism sector in engaging the public and professionals in protecting Europe's wilderness. A goal of the conference is the development of a European wilderness campaign. A field trip to Archipelago National Park will be part of the event. The draft program is available at www.panparks.org/sites/default/files/docs/ewd2012/ewd2012_draft_programme.pdf

Albuquerque Selected as Wilderness50 Venue

Albuquerque, New Mexico, USA, has been chosen to host the National Wilderness Conference (Wilderness50), according to Mark Conley of the conference steering committee (*IJW* Digest, April 2012). To be convened October 15–17, 2014, the conference will commemorate the 50th anniversary of the Wilderness Act.

Eight potential venues were considered. Albuquerque was chosen for its excellent conference facilities and the city's exceptional opportunities for diversity outreach with Native Americans, Hispanics, African Americans, and academic communities. Albuquerque has excellent field trip prospects as well as a long history associated with influential wilderness leaders, such as Aldo Leopold. Steve Capra, executive director of the New Mexico Wilderness Alliance, will serve as co-chair of the national conference committee, representing NGOs. (Source: www.wilderness.net/50th)

Jamie Williams Named New Wilderness Society President

The Wilderness Society has chosen Jamie Williams to replace retiring president Bill Meadows. Williams most recently served as director of the Landscape Conservation for North America Program for The Nature Conservancy (TNC). Over the past 20 years, he has also served TNC as Northern Rockies Initiative director and Montana State director. He has been recognized for his outstanding work with awards from the Land Trust Alliance and the U.S. Fish and Wildlife Service, among many other organizations.

Williams holds a BS in American studies from Yale University and a masters of environmental studies from the Yale School of Forestry. He is a founder of the Montana Association of Land Trusts, a founder of the Heart of the Rockies Initiative, and has served on the board of the Colorado Coalition of Land Trusts and as co-chair of the Yampa River System Legacy Project. "I am a strong believer in a collaborative, community-based approach to conservation, and that's one of the many areas where The Wilderness Society has been a true innovator," he said. (Source: wilderness.org)

Court Finds Reconstruction of Wilderness Lookout Illegal

U.S. District Judge John Coughenour in Seattle ordered the U.S. Forest Service (USFS) to remove its reconstructed lookout from Green Mountain in the Glacier Peak Wilderness of Washington's Mount Baker-Snoqualmie National Forest. In 2010, Wilderness Watch filed the lawsuit alleging the USFS had violated the Wilderness Act and the National Environmental Policy Act (NEPA) by reconstructing the abandoned lookout, built by the Civilian Conservation Corps in 1933, and by using helicopters to haul out the old building and haul in a new one. The project was done without public notice or environmental review, as required by NEPA. In his 25-page ruling, Judge Coughenour wrote, "The record here established that the presence of the Green Mountain lookout detrimentally impacts on the wilderness

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character of the Glacier Peak Wilderness.... In addition to finding that the Forest Service violated the substantive provisions of the Wilderness Act, the Court further finds that the Forest Service violated NEPA's procedural requirements."

One of the key issues involved in this case was the historic preservation of the lookout versus the Wilderness Act's mandate to preserve wilderness character. Judge Coughenour, citing numerous legal precedents and the clear language of the act, repudiated the USFS claim that directives for the preservation of historic structures under the National Historic Preservation Act require it to ignore the Wilderness Act's mandate. The USFS has maintained that the lookout, which is on the national and state registers of historic places, was restored, not reconstructed. The judge also ruled that the USFS had failed to make a finding that the reconstructed lookout was "necessary to meet the minimum requirements for the administration of the area as wilderness." (Sources: www.wildernesswatch.org; *Everett Herald*, March 29, 2012)

Russia OK's Ski Resort in Caucasus World Heritage Site

The Russian government is preparing to allow construction of tourist infrastructure in protected areas that were formerly off-limits to development or restricted by Russian federal environmental laws. A cluster of ski resorts and roads in the Caucasus region will alter one of Europe's few untouched mountain wilderness areas. The development will impact two biosphere nature reserves, two national parks, wildlife sanctuaries, and a World Heritage Site.

The project has been named Altitude 5642, for the height of Elbrus, the highest mountain in the Caucasus. The five planned ski resorts will have 600 miles (1,000 km) of ski runs and 214 ski lifts. The hotels will accommodate 83,000 guests, and it is calculated that 150,000 people will visit the resorts each day during ski season. The $15 billion project will be financed by a public-private partnership.

The Western Caucasus World Heritage Site is at the far western end of the Greater Caucasus Mountains within Krasnodar Kray and the republics of Adygea and Karachevo-Cherkessia, and is 15 miles (25 km) from Sochi, the Black Sea coastal city that will host the 2014 Winter Olympics. Inscribed on the World Heritage List in 1999, UNESCO describes "a remarkable diversity of geology, ecosystems and species. It is of global significance as a center of plant diversity … containing extensive tracts of undisturbed mountain forests unique on the European scale." The site is inhabited by 60 mammal species, including wolf, bear, lynx, wild boar, Caucasian deer, tur, chamois, and reintroduced European bison, which are globally endangered. Signs of the globally endangered snow leopard have also been seen. Of the 246 bird species, 24 are nationally threatened and 24 are globally threatened. (Source: Environment News Service, February 3, 2012)

Grand Canyon Adopts Noise Abatement Plan

After 25 years of wrangling among federal administrators and a variety of user groups, Grand Canyon National Park, Arizona, will soon adopt a plan to restrict noise from tourist aircraft. The plan limits the number of flights, hours, and routes that tour operators can fly over the 277-mile-long (450 km) park. The canyon has up to 57,000 air tour flights annually, ferrying upwards of 800,000 people each year. The new plan caps the number of annual air tour flights at 65,000, 14% more than the record high. But hours around sunrise and sunset will be off-limits, and planes and helicopters will be required to have noise-abating technology.

According to Alan Stephen, vice president of corporate affairs for Papillon, the largest air tour operator at the park, "We will have some restrictions that are pretty hard to follow from an economic standpoint." He claims the Park Service plan could cost jobs and reduce the $104 million annual revenue of the top three companies flying over the canyon by $18.4 million. But Grand Canyon National Park superintendent David Uberuaga says this overstates the plan's impact. In fact, Uberuaga said, "[this] is the best plan the Park Service could get given the conditions we have to deal with," referring to opposition from tour operators and what he called the Federal Aviation Administration's attempts to delay and sidetrack the plan. "It is not," he said, "enough to restore natural quiet to one of the world's natural wonders." (Source: *The Salt Lake Tribune*, March 19, 2012)

Tribes Seek to Halt Mine in Cabinet Mountains Wilderness

As plans advance for the development of the Rock Creek copper and silver mine beneath Montana's Cabinet Mountains Wilderness (*IJW* Digest, August 2006 and April 2007), members of the Confederated Salish and Kootenai Tribes are trying to halt the project by adding a sacred peak in the area to the National Register of Historic Places. Francis Auld, cultural preservation officer for the Kootenai Tribe, said efforts are under way to recognize Chicago Peak under the National Historic Preservation Act as a traditional cultural property.

The peak has long been associated with the cultural practices and spiritual beliefs of the Kootenai Tribe. "Chicago Peak is a very sacred site with many stories," Auld said. "It is a place of sustenance and it is one of the last untouched places where the Kootenai can visit and reconnect with our cultural history. We don't want to end up with a hollowed-out mountain." Designation as a traditional cultural property does not necessarily preclude a project like the Rock Creek mine or even add any restrictions. It does, however, force landowners and agencies to identify and consider cultural values and thresholds.

The mine entrance would be located outside the wilderness boundary, but shafts would tunnel into the wilderness approximately 1,000 feet (300 m) below the mountain. The project has an estimated 35-year lifespan and would entail the construction of roads, rail stations, pipelines, power lines, a tailings treatment plant, and other industrial infrastructure. (Source: *Missoulian*, March 25, 2012)

Ecuador Vows to Proceed with Yasuni NP Protection Plan

Ecuador is committed to pressing ahead with a plan to shield Yasuni National Park in the Amazon jungle from oil development after international donors pledged more than $100 million in exchange for the government prohibiting oil exploration (*IJW* Digest, April 2010). Ecuador is highly dependent on oil exports for economic growth, and President Rafael Correa has warned donors (governments, individuals, and foundations) that unless they contributed at least $100 million by the end of 2011 to protect Yasuni, his cash-strapped government would draw up plans for oil extraction. The target was met, but Ecuador needs to continue raising money to meet its $3.6 billion target by 2024. Ivonne Baki, the head of the Yasuni project, said, "We know there is a global economic crisis, but with the environmental crisis, unless we do something right now it will be too late and it will be much worse than the economic crisis." (Source: Reuters, December 30, 2011)

Big Bend National Park Has the Darkest Skies

The International Dark-Sky Association says that Big Bend National Park, Texas, has the darkest measured skies in the lower 48 states, and is the largest park in the world with the International Dark Sky Park designation. Strict ordinances in Alpine, Van Horn, and other towns and communities in the region limit unnecessary night light and curb West Texas light pollution. Only four other U.S. parks and one in Scotland share the "gold tier" level, which means the area skies are free from all but minimal light pollution. Six other parks, with slightly less dark skies, have the "silver tier" rank. (Source: Associated Press, February 7, 2012)

UNESCO Loses U.S. Funding

UNESCO, the United Nations Educational, Scientific and Cultural Organization, has lost one-quarter of its annual budget due to U.S. federal legislation dating from 1990 and 1994 that mandates a complete cutoff of American financing to any United Nations agency that accepts Palestine as a full member. UNESCO's full membership voted in October 2011 to accept Palestine as its 195th member by a vote of 107 to 14, with 52 abstentions. As a result, UNESCO has lost America's $70 million annual contribution, as well as Israel's 3% contribution. U.S. State Department lawyers say there is no leeway in the legislation and no possibility of a waiver.

Best known for designating World Heritage Sites, UNESCO is a major global development agency whose missions include promoting literacy, science, clean water, and education, and championing equal treatment for girls and young women. After boycotting UNESCO in 1984 over charges that the organization then was corrupt, anti-Israel, and anti-Western, the United States rejoined the agency in 2003. The United States had also claimed that UNESCO wanted to regulate the international news media.

The American ambassador to UNESCO, David T. Killion, repeatedly called the Palestinian vote "premature" and said the United States would seek other means to support the agency, although he did not offer specifics, according to *The New York Times*. Irina Bokova, UNESCO's director general, said she was concerned about immediate financial problems for her agency, hoping they would be temporary, and said that she was worried that "the universality and financial stability" of UNESCO would be jeopardized. (Source: *The New York Times*, October 31, 2011)

"Protected Planet" Takes You to 150,000 of the Earth's Protected Areas

The United Nations Environment Programme (UNEP) has joined forces with the International Union for Conservation of Nature (IUCN) to create an interactive, social media–based website that provides in-depth information on 150,000 of Earth's protected areas. Using the latest satellite images, users can pinpoint individual preserves – such as national parks or marine

Continued on page 48

Book Reviews

Authenticity in Nature: Making Choices about the Naturalness of Ecosystems

By Nigel Dudley. 2011. Earthscan. 244 pages. $35.00 (hardback).

Naturalness is frequently an explicit or implied objective of wilderness and other protected areas. But pinning down exactly what naturalness is has proved to be difficult. Nigel Dudley, ecologist and author of numerous IUCN and WWF reports, steps into this breach by showing current definitions to be insufficient and proposing another – authenticity – that encapsulates "the values of naturalness in an increasingly unnatural world" (p. 148).

Much like Emma Marris's very readable call for active management of nature (*Rambunctious Garden*), Dudley begins with a criticism of the strict preservation of nature. These aren't new arguments and were a frequent response to managing parks as "a vignette of primitive America." (The Leopold Report in 1964 recommended that, for U.S. National Parks, "the biotic associations within each park be maintained, or where necessary recreated, as nearly as possible in the condition that prevailed when the area was first visited by the white man.") Dudley points out the inherent racism of imagining an original, pristine, or virgin land when indigenous cultures often had a presence, and perhaps an active role, in the landscape for many generations.

Building on a review of global assessments of naturalness, *Authenticity in Nature* incorporates important concepts of change; ecological function, structure, and process; as well as biological and ecological integrity into his definition of authenticity: "A resilient ecosystem with a level of biodiversity and range of ecological interactions that can be predicted as a result of the combination of historic, geographic and climatic conditions in a particular location" (p. 155).

Although critical of the motivations, distractions, and expense of restoration, Dudley still seems to embrace the appropriateness of active management for some locations. What effect these introduced/removed species, manipulations, and changing human priorities and practices might have on ecological composition, structure and process is, as Dudley admits, largely unknown. Further, perhaps reflecting his European perspective, by focusing on the importance of near-natural habitats, Dudley essentially downplays the importance of wilderness. Lastly, although there are hat-tips to the benefits of building a constituency for nature, outdoor education, spiritual relief, and mental and physical health, *Authenticity in Nature* doesn't investigate the definition and role of authentic experiences in nature. In a world that is increasingly constructed, homogenized, and commercialized, protected areas are vital and necessary opportunities for different relationships with nature.

Although largely written before publication of some important criticisms of naturalness, *Authenticity in Nature* is a thoughtful, well-read discussion of naturalness and the need for a "massive increase in commitment to protecting and restoring natural habitats" (p. 195).

Reviewed by BILL BORRIE, professor of park and recreation management, College of Forestry and Conservation, University of Montana, Missoula; email: bill.borrie@umontana.edu.

Rachel Carson – A Biography

by Arlene R. Quaratiello. 2010. Prometheus Books. 163 pages. $18.00 (paperback).

Rachel Carson became a household name in North America in the mid-1950s with the publication of *The Edge of the Sea* and internationally renowned in 1962 with *Silent Spring*. There is undoubtedly a lack of biographies and autobiographies that tell the story behind the lives of women scientists, and being a longtime admirer of Carson's books I was thrilled to access this biography as a reviewer. This book is well written and its 12 very informative chapters focused on her studies, work life, and publications are meticulously researched. The author's detailed account of Rachel Carson's personal and professional life will satisfy most readers inquisitive about one of the 20th century's most influential environmentalists. What I did find surprising is that there is limited content regarding her experiences of the outdoors. In fact I was quite saddened by how office bound (or laboratory bound) Carson was; however, her love of the Maine coastline is apparent. It was interesting (from an academic

perspective) to read the accounts of Rachel's own experiences of writing (chapter 9, "The Struggle to write *Silent Spring*") and being published. For instance, how Rachel was affected by the very slow and limited sales of *Under the Sea Wind* (1941) in chapter 6 compared to the acclaim for *Silent Spring* in chapter 11. I was particularly struck by Quaratiello's account of Carson's experiences of pursuing a career at a time when women were not commonly employed as biologists. Rachel Carson's family circumstances, her friendships, her successes, and her non-successes are discussed delicately but with depth by Quaratiello.

A useful time line of significant events in Carson's life and career includes relevant occurrences since her death in 1964. Although the book's focus is on Rachel Carson's own experiences, there are references to other influential people in her life, and one cannot help but reflect on the changing circumstances of women in the 20th century generally. In many ways, Quaratiello's book captures Rachel's groundbreaking achievements as a student, scientist, and researcher pursuing a career in what was usually a masculine domain. My one sadness is that there were no attempts to include interviews with people who knew or worked alongside Rachel Carson. Nor did Rachel Carson appear to have left any diaries or personal letters that the author could access – one presumes Quaratiello accessed archival material but this is not clear in the book. I was rather disappointed by the cover photography of an elderly Carson chosen for the book (it will not entice a youthful audience); however, the 12 black-and-white photographs of Rachel within the text provide personalized insights into her character. To her credit, as a researcher Quaratiello provides an extensive bibliography of primary and secondary sources and a useful index (often lacking in such texts). This book will interest both academic and lay audiences and will undoubtedly suit those with particular interests in the environmental movement and science generally.

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Continued from ANNOUNCEMENTS, page 46

sanctuaries – and zoom in for information on endangered species, native plant life, and types of terrain. Protectedplanet.net also offers visitors the opportunity to upload photographs of their trips to protected areas, write travelogues of what they saw and experienced for Wikipedia, and recommend places of interest nearby.

"Protectedplanet.net is about harnessing technology for biodiversity conservation. It showcases the beauty of protected areas and motivates anyone who discovers it to help, from a tourist to a government official," says Craig Mills, Protected Planet's project manager. "There is a huge network of people interested in protected areas out there that we haven't been tapping into." Protectedplanet.net brings together information from throughout the Internet, including species data from the Global Biodiversity Information Facility (GBIF), protected area descriptions from Wikipedia, photos from Panoramio and Flickr, and Google maps. The website also expands on the World Database on Protected Areas currently managed by UNEP. For more information, go to www.protectedplanet.net/about.

Italy Inaugurates New Wilderness Area

Franco Zunino, secretary general of the Italian Wilderness Society (AIW), has announced the creation of a new 4,500-acre (1,800 ha) wilderness area in the Lazio region of central Italy. The AIW is now working to pass new wilderness legislation through the Regional Parliament.

Continued from WILDERNESS LAND TRUST, page 43

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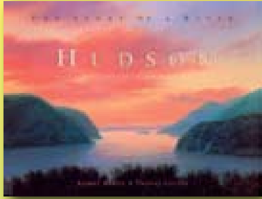

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The Story of a River
Thomas Locker and Robert C. Baron

Rachel Carson
Preserving a Sense of Wonder
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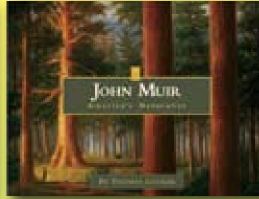

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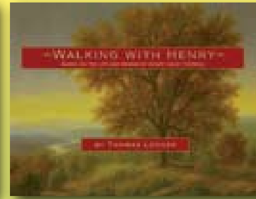

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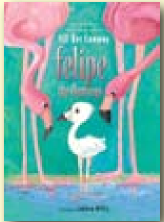

Felipe the Flamingo

Jill Ker Conway,Illustrated by Lokken Millis

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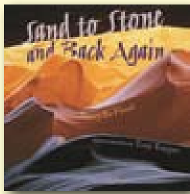

Sand to Stone

and Back Again
Nancy Bo Flood
Photos by Tony Kuyper

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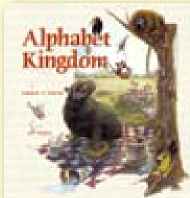

Alphabet Kingdom

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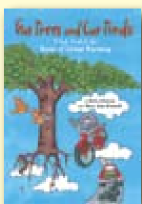

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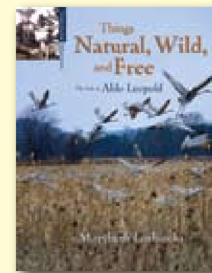

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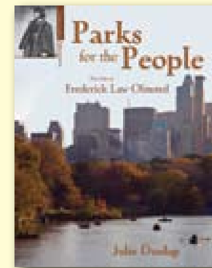

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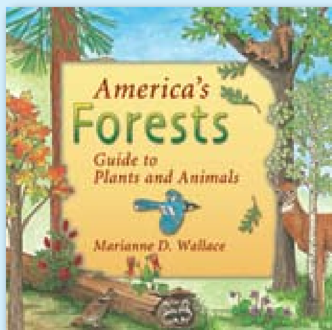
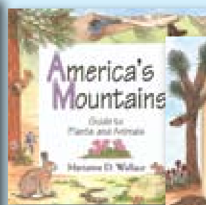
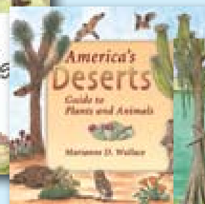
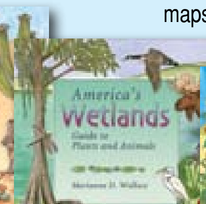
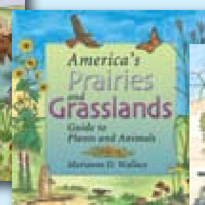
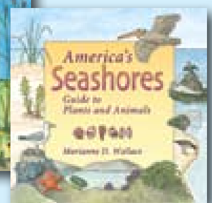

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