



Environment & Society Portal

Suggested citation: Butler, Tom, ed., *Wild Earth* 10, no. 4 (Winter 2000/01).
Republished by the Environment & Society Portal, Multimedia Library.
<http://www.environmentandsociety.org/node/6097>.

All rights reserved. The user may download, preserve and print this material only for private, research or nonprofit educational purposes. The user may not alter, transform, or build upon this material.

The Rachel Carson Center's Environment & Society Portal makes archival materials openly accessible for purposes of research and education. Views expressed in these materials do not necessarily reflect the views or positions of the Rachel Carson Center or its partners.

WildEARTH

WINTER 2000/2001

1991

WILD IDEAS FOR A WORLD OUT OF BALANCE

2001



\$6.95 US / \$8.50 Canada



0 74470 81683 6

A Decade of Wild Thinking



IN HIS BOOK *Preserving Nature in the National Parks: A History*, Richard West Sellars describes the mythic origins of the national park idea, when members of the Washburne-Doane expedition, camping by the Madison River in autumn of 1870, decided to forgo the profits to be made by exploiting the Yellowstone country. Rather, they agreed to propose the area for a public park, and communicated this to the highest levels of government. Within a year and a half, Yellowstone became the first national park, and the national park idea spread:

Surely the national park concept deserved a “virgin birth”—under a night sky in the pristine American West, on a riverbank, and around a flaming campfire, as if an evergreen cone had fallen near the fire, then heated and expanded and dropped its seeds to spread around the planet.¹

Sellars goes on to dissect this creation myth and show how the motives of the Yellowstone boosters were not entirely altruistic; the intersection between the early park movement and commercial interests was considerable.

Another creation myth, also set around a wilderness campfire, has Dave Foreman and John Davis conceiving *Wild Earth* journal while camping in New Mexico in late 1990.² In spring 1991, the new periodical melding conservation biology and wilderness activism was launched.

Like the apocryphal virgin birth of the National Park System, *Wild Earth*'s genesis account lacks nuance. It doesn't reflect the central role that John's mother, Mary Byrd Davis, had in making a good idea come to life. (She was a charter board and staff member, and did the bulk of the work setting up *Wild Earth*'s business infrastructure.) Other original board members, most notably David Johns and Reed Noss, attended the birth and have remained central to the organization's success through the years.

Another element missing from the *Wild Earth* creation story is context. A thorough analysis of the American conservation movement in the late 1980s and early 1990s is beyond the scope of this brief reminiscing, but it is useful to recall that era's rancor between grassroots groups with a biocentric orientation and Washington DC-based nationals that tended toward anthropocentrism and political expedience. Tension between radicals (i.e., those focused on root causes) and reformers (political incrementalists) is unavoidable in any social change movement, but the expanded member rolls and concomitant corporatization in management of the national environmental groups in the post-James Watt era had brought tensions to the boiling point. Moreover, within the radical wing of the conservation movement, a rift and eventual split occurred between activists with an urban, social justice orientation and those primarily focused on biodiversity and public lands. *continues on page 2*

About *Wild Earth* and *The Wildlands Project*

Wild Earth and The Wildlands Project are closely allied but independent nonprofit organizations dedicated to the restoration and protection of wilderness and biodiversity. We share a vision of an ecologically healthy North America—with adequate habitat for all native species, containing vibrant natural and human communities.



Through the quarterly journal *Wild Earth*, other publications, and advocacy, **Wild Earth** works to foster a culture of conservation, helping to communicate and shape the latest thinking in conservation science, philosophy, politics, and activism.

- We make the teachings of conservation biology accessible to non-scientists, that citizen advocates may employ them in defense of biodiversity.
- We provide a forum for dialogue within the conservation movement on the scientific, strategic, and spiritual foundations of effective conservation action.
- We highlight the campaigns of biodiversity preservation groups and coalitions across North America, and serve as a networking tool for wilderness activists.
- We serve as the publishing wing of The Wildlands Project.
- We expose threats to habitat and wildlife, and regularly explore the links between human population growth and biodiversity loss.
- We defend wilderness both as *idea* and as *place*.



The Wildlands Project is the organization guiding the design of a continental wilderness recovery strategy. Through advocacy, education, scientific consultation, and cooperation with many regional groups, The Wildlands Project is working to design and implement systems of protected natural areas—wildlands networks—across the continent.

Wild Earth PO Box 455, Richmond, VT 05477; 802-434-4077; fax 802-434-5980
info@wild-earth.org ■ www.wild-earth.org

The Wildlands Project 1955 W. Grant Rd., Suite 145, Tucson, AZ 85745
520-884-0875; fax 520-884-0962
wildlands@twp.org ■ www.twp.org



49, 54, 95

Poetry

96

Book Reviews

98

Announcements

99

Artists This Issue

inside back cover

Species Spotlight

Pinus jeffreyi

cover art

"Chamber," lithograph by
Davis Te Selle (©1996)

A Decade of Wild Thinking

inside front cover Introduction *by Tom Butler*

- 3** Exceptional excerpts from articles and essays by
Dave Foreman ■ Dolores LaChapelle ■ Christopher Manes ■ Chris Maser
George Frazier ■ George Wuerthner ■ Naomi Rachel ■ David Abram
Mollie Matteson ■ Bruce Morgan ■ Mike Seidman ■ Reed Noss ■ Ray Vaughan
Howie Wolke ■ Andy Kerr ■ Mitch Friedman ■ Terry Tempest Williams
Donald Windsor ■ Larry Anderson ■ Virginia Abernethy ■ Hugh Iltis
Kelpie Wilson ■ Doug Tompkins ■ Michael Soulé and Reed Noss
Steve Trombulak ■ John Elder ■ John Terborgh et al. ■ Nina Leopold Bradley

Conservation History

- 44** The Wilderness Legacy of Robert Marshall: Alaska and Beyond... *by Roger Kaye*

Wildlands Philanthropy

- 50** Rewilding Mallory Swamp *by M.C. Davis*

Conservation Strategy

- 55** Congress Designates First Livestock-free Wilderness Area
by Mark Salvo and Andy Kerr
- 56** Does Sustainable Development Help Nature? *by Michael Soulé*

The Wildlands Project

- 65** Update *by Leanne Klyza Linck*
- 66** An Ecological Approach to Wilderness Area Design
by Dave Foreman and Kathy Daly

Biodiversity

- 73** Haunting the Wild Avocado *by Connie Barlow*
- 77** Naturalness and Wildness: The Dilemma and Irony of Ecological Restoration
 in Wilderness *by Peter Landres, Mark Brunson, and Linda Merigliano*
- 83** Would Ecological Restoration Make the Bandelier Wilderness More or Less
 of a Wilderness? *by Charisse Sydoriak, Craig Allen, and Brian Jacobs*

Population Problems

- 91** Sprawl vs. Nature: Saving the West One Wilderness at a Time *by Mike Matz*

Dave Foreman, *Publisher*

Tom Butler, *Editor*

Jennifer Esser, *Managing Editor*

Reed Noss, *Science Editor*

Lina Miller, *Business Manager*

Kevin Cross, *Art Director/Designer*

Joshua Brown, *Assistant Editor*

Heidi Perkins, *Office Manager*

Mary Byrd Davis, *Associate Editor*

Intern Aaron Walsh

Poetry Editors Gary Lawless,
Sheila McGroarty-Klyza

Editorial Advisers David Abram, Michael P. Cohen, John Davis, Bill Devall, Michael Frome, Dolores LaChapelle, Christopher Manes, Bill McKibben, Stephanie Mills, Gary Nabhan, Arne Naess, Roderick Nash, George Sessions, Gary Snyder, Michael Soule, Paul Watson, Terry Tempest Williams

Correspondents Connie Barlow, Rick Bonney, Jasper Carlton, Barb Dugelby, Jim Eaton, Roger Featherstone, Kathleen Fitzgerald, Mitch Friedman, Trudy Frisk, Steve Gatewood, Stephanie Kaza, Robert Leverett, David Johns, Mollie Matteson, Roz McClellan, Rod Mondt, Ned Mudd, R.F. Mueller, Jim Northup, Doug Peacock, Gary Randorf, Jamie Sayen, Ray Vaughan, Howie Wolke, Ken Wu, George Wuertner



WILD EARTH (ISSN 1055-1166) is published quarterly by the Wild Earth Society, Inc., PO Box 455, Richmond, VT 05477. The Wild Earth Society is a nonprofit educational, scientific, and charitable corporation. ■ Wild Earth Society Board: John Davis (CA), Barbara Dean (CA), Dave Foreman (NM), David Johns (OR), Reed Noss (OR). ■ Membership in the Wild Earth Society is open to the public and includes a subscription to *Wild Earth*. Non-membership and institutional subscriptions are also available. Individual memberships \$25; low income memberships \$15. Subscriptions to Canada and Mexico \$30 per year, overseas subscriptions \$45 (air mail). ■ Periodicals postage paid at Richmond, VT and additional offices. ■ POSTMASTER: Send address changes to *Wild Earth*, PO Box 455, Richmond, VT 05477. ■ All editorial and membership correspondence should be sent to Wild Earth, PO Box 455, Richmond, VT 05477. We strongly discourage submissions of unsolicited manuscripts. We welcome submissions of artwork. Artists who want their work returned should include a stamped, self-addressed envelope. *Wild Earth* assumes no responsibility for unsolicited materials. ■ *Wild Earth* accepts limited advertising that is compatible with its policies and goals. For rates/information contact Lina Miller at (802) 434-4077. ■ Copyright ©2000 by Wild Earth Society, Inc. All rights reserved. No part of this periodical may be reproduced without permission. All artwork is the property of the individual artist and is used by permission. Unauthorized reproduction of artwork is unethical and illegal. ■ Permission to photocopy items for personal use, or the internal or personal use of specific clients, is granted by the Wild Earth Society, Inc., provided that the base fee of \$1 per copy of the article is paid directly to the Copyright Clearance Center, 27 Congress St., Salem, MA 01970; this fee may be waived in some circumstances by the publisher. For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. The fee code for users of the Transactional Reporting Service is: 1055-1166/92 \$1.00. ■ *Wild Earth* is available on microfilm from University Microfilms, Inc., 300 North Zeeb Rd., Ann Arbor, Michigan 48106-1346. Statistical abstracting by Pierien Press, PO Box 1808, Ann Arbor, MI 48106. ■ Articles appearing in *Wild Earth* are indexed in *Environment Abstracts*, *Environmental Periodicals Bibliography*, *The Alternative Press Index* and *Wildlife Review Abstracts*.

Wild Earth is printed at Cummings Printing, Hooksett, NH on New Leaf Everest 80# Cover (100% post-consumer), and New Leaf Eco-offset 60# Text (min. 80% post-consumer), all processed chlorine-free.

Member, Independent Press Association

A DECADE OF WILD THINKING *continued*

Out of this roiling tumult *Wild Earth* journal was born, with a clear focus: We hoped to serve as an independent voice for wilderness and wildlife, make conservation biology accessible to non-scientists, and provide a forum for dialogue on conservation strategy and philosophy among professional and citizen activists, scholars, and agency staff.

Wild Earth was, however, just one of dozens of grassroots groups which, like spring wildflowers, sprang up across the continent in those years. Most were regional in focus, some addressed specific issues, but generally all acknowledged the intrinsic value of Nature, and shared a commitment to stress *biodiversity protection* as the overarching goal for our campaigns. In a landmark essay in *Wild Earth's* second issue, Dave Foreman dubbed this explosion of biodiversity-oriented groups the "New Conservation Movement."³

Now a decade has passed. Many of the new organizations founded in that era—the Center for Biological Diversity, Northwest Ecosystem Alliance, Predator Conservation Alliance, Alliance for the Wild Rockies, RESTORE: The North Woods, and others—became major players, helping to drive the conservation agenda both regionally and nationally. While hardly an objective commentator, I'd include Wild Earth and The Wildlands Project among the visionary groups who thrived, and have successfully pushed the broader conservation movement toward bolder, more ecologically informed advocacy.⁴

Today, science-based conservation planning is thoroughly mainstream. Conservationists from all camps now share a common goal of protecting ecosystem health, though sometimes differing on how to achieve it. The cognitive landscape of conservation has dramatically changed. Sites to systems. Islands to networks. Scenery to biodiversity. Bigger and bolder thinking has taken root and blossomed.

Wild Earth and The Wildlands Project have played a key role in this evolution. With this issue, Wild Earth completes ten years of publishing provocative writing and artwork. To celebrate, we've prepared a retrospective in words and images. The brief excerpts that follow in this theme section (chosen from over two million words for wilderness in the *Wild Earth* backlog) suggest the diversity of voices presented and topics addressed.

On behalf of the Wild Earth Society board and staff—and the scientists, scholars, writers, activists, and artists whose work are in sum *Wild Earth*—we thank you for sitting around the campfire with us over the years. We hope you enjoy this look back at a decade of wild thinking.

—TOM BUTLER

NOTES

1. Sellars, Richard West. *Preserving Nature in the National Parks: A History*. 1997. New Haven: Yale University Press. p. 8.
2. Mythic origins notwithstanding, it seems that much of the planning for the new publication actually took place poolside in Tucson, while Foreman recovered from hepatitis.
3. Foreman, Dave. "The New Conservation Movement." *Wild Earth* 1(2), summer 1991, pp. 6-12.
4. In the 1990s, the mainstream largely adopted the New Conservation Movement agenda. Most of the national groups developed or reinvigorated field offices, placed greater emphasis on grassroots organizing, and participated in coalitions with aggressive, regional groups. Finally, even the more conservative nationals could no longer ignore conservation biology—and the science has helped push the entire conservation movement toward stronger positions on the issues.

Dave Foreman

Dreaming Big Wilderness

from Volume 1, Number 1 © Spring 1991

REAL WILDERNESS is far different from that which forms our current National Wilderness Preservation System. Most areas in the system are small enough to cross on foot in a day, and almost all have lost important members of their original fauna. To Aldo Leopold, a wilderness was an area large enough for a two-week packtrip without crossing your own tracks. To grizzly bear cinematographer Doug Peacock, an area is wilderness if it contains something bigger and meaner than you—something that can kill you. Lois Crisler wrote in *Arctic Wild*, “Wilderness without animals is dead—dead scenery. Animals without wilderness are a closed book.”

Thoughtful biologists and conservationists have come to understand in the last twenty-five years that the destruction of Earth's natural diversity is caused not by the mere excesses of industrial civilization but by the inherent attributes of that society—overconsumption, overpopulation, and our notion of mastery over Nature. They now realize that designated wilderness areas and national parks cannot survive as effective sanctuaries if they remain island ecosystems, that habitat islands in a sea of development will lose key species (those that require larger territories to maintain sustainable breeding populations). They have sadly acknowledged that outside impacts, like acid precipitation, other forms of air pollution, and toxic and radioactive contamination, can devastate the natural integrity of protected areas, that no preserve is immune from the fouling of Earth's air, water, and soil by industrialism. And, with horror, they are beginning to recognize that global impacts such as the greenhouse effect and depletion of the atmospheric ozone layer will play havoc with all ecosystems worldwide including those in sanctuaries. Minor reform of our economic system and better stewardship will not safeguard the incredible diversity of life hatched by nearly four billion years of evolution. The long-term protection of natural diversity and the processes that sustain it will require fundamental changes in the role we humans play on our planet.

A vital part of grappling with these formidable problems is to envision and promote a National Wilderness Preservation System in the United States that is truly national, representative, and that preserves native diversity. By clearly stat-

ing a dream of ecological wilderness and campaigning for it in the national arena we would come much closer to safeguarding real wilderness than we would if we continued to fight only for the traditional backpacking parks, open-air zoos, and scenic preserves. Another benefit of such a program is that the very process of proposing and working for ecological wilderness may be the most effective means of redefining the role of humankind in Nature; it may be the best way to bring about the change of consciousness that will, in Aldo Leopold's words, transform “the role of *Homo sapiens* from conqueror of the land-community to plain member and citizen of it.”

Such a reformation of our role would enable us to transform our gluttonous lifestyle which causes acid rain, the greenhouse effect, and depletion of the ozone layer. And if the materialistic society of the United States can find the humility to establish substantial nature preserves, we will at last set an example for other nations, particularly those in tropical regions where native diversity is especially abundant and imperiled. How can we lecture Brazil to cease the destruction of the Amazonian rainforest while we shred the library of ecological richness found in the ancient forests of the Pacific Northwest? How dare we enjoin starving tribespeople of East Africa from slaughtering the great herds, when we cannot find the generosity to give the bison, gray wolf, and grizzly the range they need?

Dolores LaChapelle

Wild Human Wild Earth

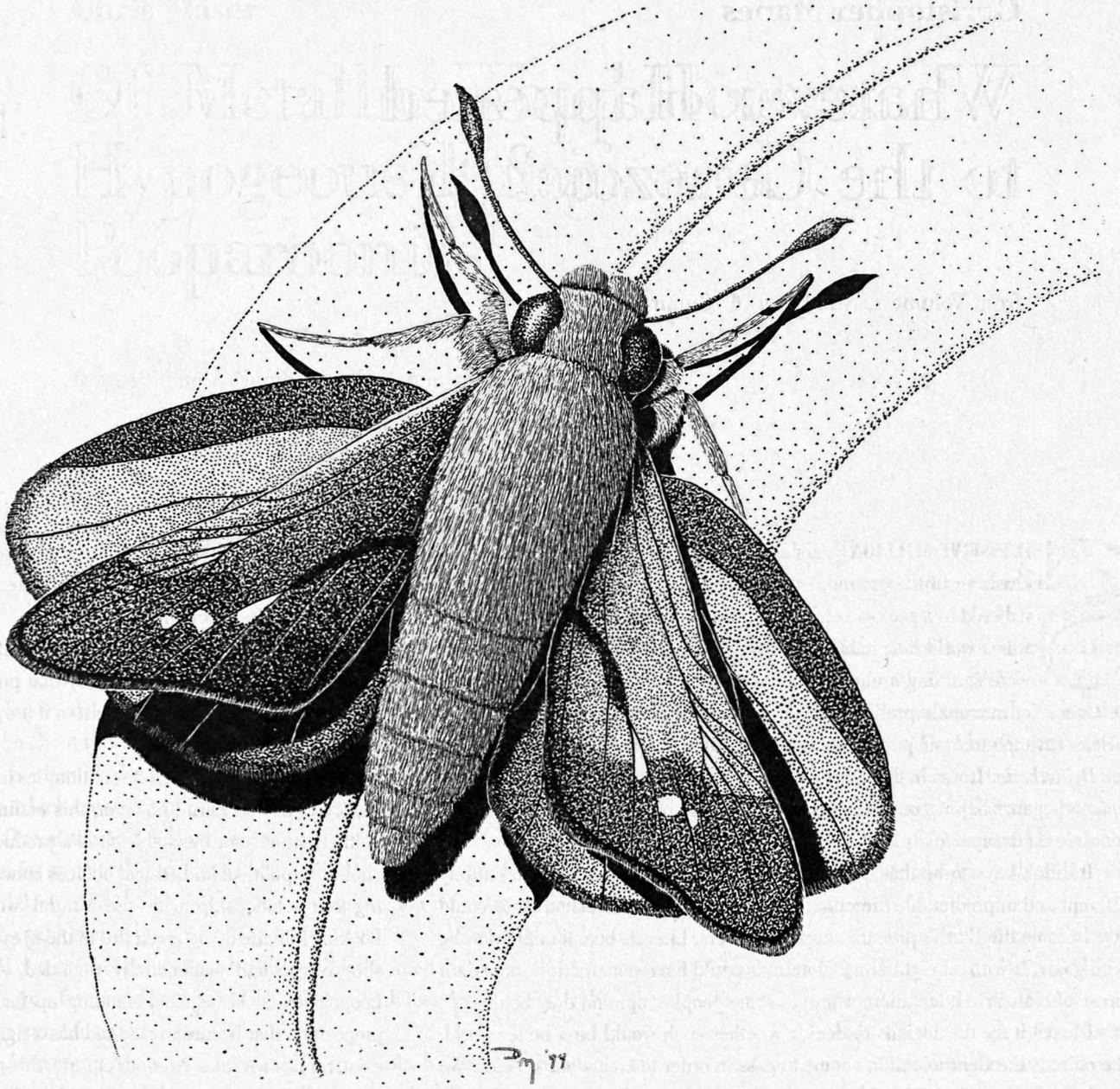
from Volume 1, Number 1 (Spring 1991

THERE'S A SAYING that you can't dig a new hole by going deeper in the old hole. During the past 20 years there has been more beautiful writing, more research, and more planning on matters of the environment than all the years before put together. The result: every aspect of the environment, including wildlife, is worse off than before. It's time to recognize we can't stop the destruction of the environment, the destruction of wild life, by these "rational" means. Gregory Bateson, one of the seminal thinkers of this century, said it well: "The rational part of the mind alone is necessarily pathogenic." That means deadly—not only to human life but to all life. He continued: "Its virulence springs specifically from the circumstance that life depends upon interlocking *circuits* of contingency." The rational purposive brain "can see only such short arcs of such circuits as human purpose may direct."

The nature of the rational hemisphere (the "left brain") is to take things apart to see how they work. But it cannot put anything together again. That's what the other hemisphere and the older brains do. The emotions we humans value most—altruism and empathy—do not come from the neo-cortex but

from the deeper, the so-called animal or limbic, level of the brain. We inherited these emotions from our animal ancestors, and when we operate within this brain we share thinking with the animals. This is done by means of dreams, rituals, dancing, drumming—anything that prevents the rational hemisphere from running the show. So the way out of the present disaster is not by more research or planning but by using the methods our wild human ancestors used for millennia.

The three aspects of life shared by indigenous wild human cultures—rituals, population control, and respect for the non-human—continually intertwined and influenced one another. Practicing ritual is living our connections with the non-human.



Douglas Moore

Dakota skipper butterfly (*Hesperia dakotae*), pen and ink
from Volume 4, Number 2 (Summer 1994

Christopher Manes

Whatever Happened to the Cenozoic?

from Volume 1, Number 2 (Summer 1991

SIXTY-FIVE MILLION years ago, as the grand dinosaur empire came crashing to the ground, evolution took another twist and turn and ushered in a geologic era we call the Cenozoic, *recent life*. The result was a world hospitable to our prosimian ancestors, who at the time were scuttling around their forest home on shrew-like feet. During the Cenozoic, mammals proliferated; the climate became drier; the boundless African savanna took shape with its vast herds of antelope, zebra, and elephantine *Deinotheria*. It was in this flourishing environment that the lineage of *Homo sapiens* began, shaping our very bodies and souls out of the rich soil of the Cenozoic landscape.

It didn't have to be that way. Evolution could have spun off in an entirely different and unpredictable direction. With enough time, horseshoe crabs could have become the Earth's preeminent philosophers. Literate octopi might now be writing novels with all eight arms. Hominids could have remained in some dark corner of biological adaptation, where in some people's opinion they belong.

I leave it for theologians to decide whether such would be a better world. The point is the Cenozoic didn't come to pass in order to create our species. We simply got lucky. Along with the twenty or thirty million other species still alive, we got to go along for the ride.

A scant ten thousand years ago, a few *Homo sapiens* stumbled upon sedentary agriculture, initiating the Neolithic Revolution and the numberless ecological disasters that have defined history ever since. Our society is heir to that costly mistake, which has gone a long way toward producing a biologically unstable

and depauperate biosphere, inhospitable to many, if not most, of the life forms characteristic of the Cenozoic—including ourselves.

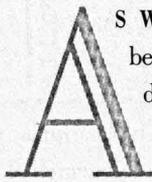
Thus, one way to describe the environmental crisis going on around us, a way that puts it in its geological context, is to christen it the End of the Cenozoic.

Unlike the many other discontinuities in the history of life on Earth, however, this ending is neither natural nor inevitable. It is a product of choice, of political and ethical choices concerning our relationship with the natural world. Looking into the dying green fire in the eyes of a she-wolf he had just mortally wounded, Aldo Leopold made his choice, standing up for the proposition that Nature works, and has a right to exist, for its own sake. Now our culture, this generation, will also have to face Leopold's choice, and decide whether to disavow the control of Nature or continue its ill-conceived attempt to "govern evolution," as Walter Truett Anderson approvingly put it, visions of genetically engineered sugarplums dancing in his head.

Chris Maser

Of Metallic Wood Borers, Hypogeous Fungi, and Pooparoonies

from Volume 1, Number 2 © Summer 1991



AS WOOD LIES ON THE GROUND decomposing, it loses density; it becomes spongy. Residence time is the length of time that trees lie decomposing on the forest floor. In the Northwest, a 400-year-old Douglas-fir usually lasts between 200 and 250 years as a fallen tree before it is recycled, but may last over 400 years. An 800-year-old Douglas-fir takes 400 years or more to decompose and recycle into the system.

So about two-thirds of the tree's useful life is while it is living, and the last third is when it's dead. After death, it serves an entirely different suite of functions, which are necessary to keep the forest going.

One of the mistakes we've made for years in wildlife biology has been to argue for structural diversity without understanding functional diversity. What killed the tree and how it decomposes determines how it functions once it's dead. If we could ever get rid of disease in the forest, it would alter the entire functional dynamics of the system. And if we alter the wood that we produce, by making it grow faster and have larger annual rings with less density, we alter how the entire forest functions.

Among the kinds of decomposition in an old log are brown-cubicle rot, white-pocket rot, and the ever-present beetle galleries. The roots of young western hemlock grow into the down wood and follow the white-pocket rot; this rot separates the annual rings of the wood. The hemlock roots follow the white-pocket rot down these lines of least resistance and absorb the moisture and nutrients in an ideal rooting medium....

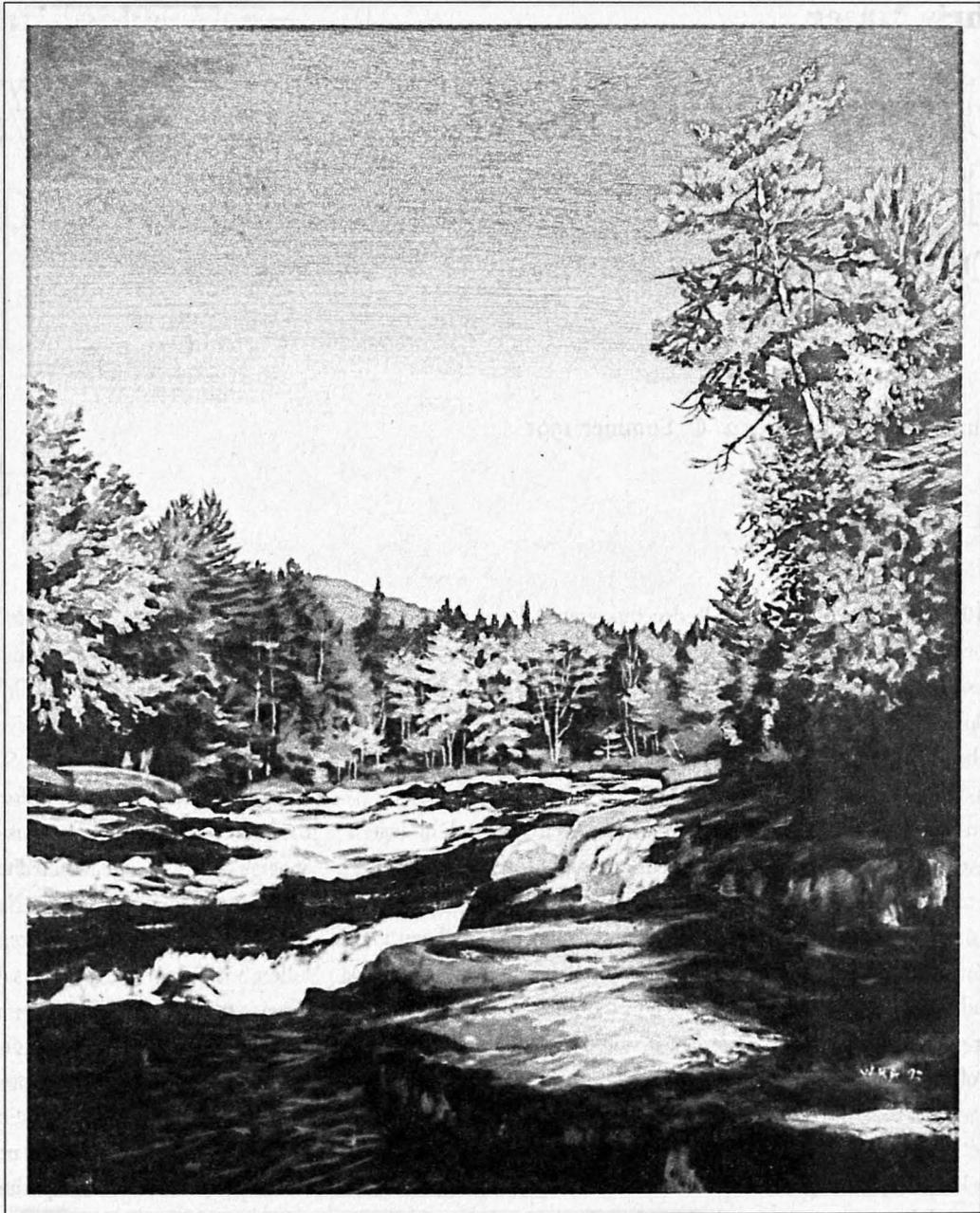
ONE OF THE major groups of mushrooms are the ectomycorrhizal fungi. The prefix *ecto* means outside, *myco* means fungus, and *rhizal* means root. The association—the marriage—between fungi and root tips allows the tree to take up nutrients.

On the drier east side of the Cascades, 66% of this mycorrhizal relationship is in humus, which is the top organic layer, composed largely of rotting wood.

About 21% of the ectomycorrhizal fungi are specialists that grow in decayed wood, and 8% are specialists in charcoal. Only 5% grow in mineral soil. Thus, as we remove the wood from this system, we are affecting 95% of a fungal association that is necessary for the survival of the trees. A healthy Douglas-fir has 30–40 species of these fungi attached to its root system at all times. In Germany, the Norway spruce—which now grows on plantations where all the fallen wood is removed—has only 3–5 such species today.

A mycorrhizal fungus forms a mantle around a root tip. The fungus prolongs the life of the root tip, protects it, and stimulates root tip production. A root tip that is not infected with the fungus cannot take up the nutrients and water necessary for the tree to survive. All of our conifers require these fungi in order to survive.

The little mold-like threads of fungus reach out into the soil, forming a hyphal mat. In effect, the fungus is an extension of the tree's root system, picking up water, phosphorus, and nitrogen from the soil and moving them up into the tree's root tips. From there the nutrients go up into the top of the tree. The tree in turn feeds the fungus sugars from photosynthesis, which go down the tree, out into the roots, and out into the fungus.



Bill Amadon

Adirondack landscape, acrylic
from Volume 5, Number 2 © Summer 1995

George F. Frazier

Sauntering Back the Tallgrass Prairie

from Volume 1, Number 4 © Winter 1991/92

IN WINTER I regularly trek the 14 miles from my house along the south bank of the Kaw River to Lecompton. Lecompton, which had a rich pioneer history as the pro-slavery capital of the state, was once named Bald Eagle, Kansas, due to the large populations of the birds that annually wintered there on the Kaw. My route is not a proper trail but a combined bushwhacked-trespass, deer path, and beaver-chewed obstacle course graciously demanding a slow, sane pace. As I found out long after I started following it, this is the same path used by John C. Fremont when he named Blue Mound, got trapped by a winter storm in the mountains of Colorado, and was forced to eat human flesh to survive. When I'm lucky the Kaw is frozen up enough to make the entire journey on ice; this is the best way to see bald eagles. They perch high in the cottonwoods waiting for dead fish to float down the river and provide an easy meal. These walks also bring me into contact with other winter migrants such as Canada and snow geese, little flitting dark-eyed juncos, and low gliding northern harriers. As it gets colder, I see more eagles on the Kaw, while the deepest freezes bring out the frozen heart itself of my slumbering wilderness. On the coldest of January days I find myself looking for bison and mammoth....

THERE ARE ONLY TWO PATHS we can choose to follow. One leads to the Silicon Prairie, where the heritage of the land finds its last refuge in computer terrariums, where networks of rhizomes, roots, corollas, and biomass—which can grow, mold themselves, mutate, and joyously commingle in the glorious dance of life—are replaced by static information, words, bits, magnetism, seed banks mapped into data banks, the whole legacy of the wild held interminably in an immutable database where the old programs can be examined but the biological software cannot be “run.” Wilderness is not just so much information

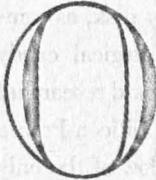
you can download onto a floppy disk, as rainforests are not great pharmacological candy shops existing so that some Harvard researcher can find a cure for cancer. The Silicon Prairie at best can only be a dry shadow of the only acceptable path we can choose, the well-worn deer trail which leads to the organic, rich, wet, dirty, sexy prairie of this old yet eternally new planet each of us woke up to find ourselves on one day not long ago.

So...work for the smallest morsel of wilderness; it is important no matter what its size. Remember, we are saving these fragments of forest, stream, and prairie for a later time, which is a past time, we are holding the door of the present moment open with all our strength. When we are finally united and strong, that door, pushed also on the other side by the bison, grizzly, and ourselves (we're on both sides) will fly open. But it won't come easy; we've done a great deal of damage. Relearning the ancient art of cultivating wilderness and truly taking to heart the mystic teachings of winter may be our penance for the centuries of destruction. Our reward perchance might be a glimpse of the mastodon.

George Wuerthner

Seeing the Grasslands through the Grass

from Volume 2, Number 1 (Spring 1992

 **ONE OF THE GROWING DISPUTES** among environmental groups in the West concerns the issue of livestock grazing reforms. In one camp sits a small minority who feel that no level of livestock production is really acceptable. This group, myself included, sees livestock production at the core of most western environmental issues. The other camp feels livestock production merely needs reform, not termination.

Attempting to correct environmental degradation associated with livestock production by treating the symptoms without dealing with the ultimate cause of the problem is not likely to succeed. Most western environmental problems can be attributed, at least in part, to livestock production—and our attempt to maintain an agricultural system based upon alien animals poorly adapted to the western climate and terrain. Ranchers have been trying to make the West “fit” the cow, and the ecological consequences include dewatering of streams, predator control, extirpation of native species, disruption of natural ecological processes—all to provide food, water, and space to exotic animals owned by a tiny minority of US citizens.

No matter what your concern, be it preservation of biological diversity, protection of watersheds, or even aesthetics, livestock production is frequently the root of the problem. Treating symptoms individually will never bring satisfactory results. Restoring wolves to Yellowstone will be a hollow victory if they are shot immediately upon leaving the park. Fencing cattle from streamside riparian zones has little meaning if livestock use is merely transferred to the uplands where first-order seeps, wetlands, and springs are trampled. Preserving small tracts of wildlife habitat is for naught if ecological processes can no longer function. And as long as we have livestock on our public lands, such hollow victories are the best we can hope to achieve.

I see no reason to accept such a limited vision of what the West can be. I envision a West free of the burden of livestock, ecologically intact enough to support grasslands, not just grass. I see native species restored to something like their former numbers, bison again roaming the valleys and plains; a West where prairie dog towns stretch for miles and house hundreds of black-footed ferrets. I see a landscape stretching to the far horizon without fences, stock ponds, or water pipelines, a place where wolves can roam for miles without radio collars tracking their every move. This will be a landscape big enough for ecological processes like wildfires to roam with equal abandon and freedom from human interference.

Such a vision offers infinitely more public benefits than does providing 2% of the forage consumed annually by livestock in the United States. Private lands can meet all US meat demands. Yet few areas outside of the public lands of the West can provide the large biological preserves necessary if we, as a nation, wish to protect natural ecological processes and biological diversity. “Better livestock management” will only make our public lands better feedlots, not naturally functioning ecosystems.



Bob Ellis

“Starflowers (meditation on rabies) 1995,” watercolor

from Volume 5, Number 3 © Fall 1995

Naomi Rachel

Civil Obedience

from Volume 2, Number 2 (Summer 1992

PAUL WATSON of the Sea Shepherd Conservation Society does not believe that he is practicing civil disobedience when his ship rams and sinks a private vessel. He considers the *Sea Shepherd* a law enforcement vessel. The laws of the International Whaling Commission are not otherwise enforced. Paul Watson is one of the few non-compromising activists without a criminal record. Even when he has demanded to be charged, governments have refused. They know he has a solid case and will publicize their disobedience. Public land activists tend to think that Paul "gets away" with his actions because they occur on the high seas, but I think we need to take the same pro-active, unapologetic offensive approach in the forests.

Malcolm X said "Power recognizes only power, and all who recognize this have made gains." Wherein lies the power of the environmental movement? I believe our power is twofold. First, it is to enforce survival laws for all species, and second, it is to use our bodies as tools of enforcement. In his very complete examination of civil disobedience, *The Politics of Nonviolent Action*, Gene Sharp writes, "Power derives from sources in the society which may be restricted or severed by withdrawal of cooperation by the populace." Ideally, if a logging road were being built, the workers themselves would withdraw their cooperation in the form of their labor and services. Until that day, it is the responsibility and the power of activists to withdraw their cooperation by blocking the road, interfering with the operation, and thereby, in the true sense of the word, being fully *obedient* to the laws requiring preservation of biodiversity.

I feel strongly that, both for moral reasons and to broaden the movement, it is necessary to be powerfully non-violent in these actions. As Thoreau wrote, "Let your life be a counter friction to stop the machine." The friction must be created by a non-violent power. Your opponents may have the sanction for violence, but using non-violence against them is like the techniques of jiu-jitsu. By throwing your opponent off balance politically, their violence can rebound on them....

RECENTLY IN COLORADO, forest activists, arrested at a peaceful occupation of Forest Service offices, appeared in court in shackles and chains. The community had, up to then, declined to be involved in the issue of logging ancient forests, but after the display in court, citizens were angered and have since become supportive and active.

These same activists are being charged with interfering with the forest officers "in their official duties in the protection, improvement and administration of the national forest system." Here is a golden opportunity to be pro-active, to change the defensive stance of civil disobedience to an offensive stance of civil obedience. If the arrestees can put the Forest Service on trial for not protecting the national forests, then the arrestees' interference would be seen as upholding the law. The reverse trial is an effective non-violent strategy. It is similar, again, to Sea Shepherd's tactics. When the two whaling ships were sunk in Iceland, Sea Shepherd claimed credit and Paul Watson demanded to be charged with the deed. When the Icelandic government refused, Paul flew to Iceland and was soon deported. The only legal action is a suit by Paul against the government for illegally deporting him. He was, in a powerful manner, being civilly obedient. Paul had simply been enforcing the laws of the International Whaling Commission.

David Abram

The Mechanical and the Organic

On the Impact of Metaphor in Science

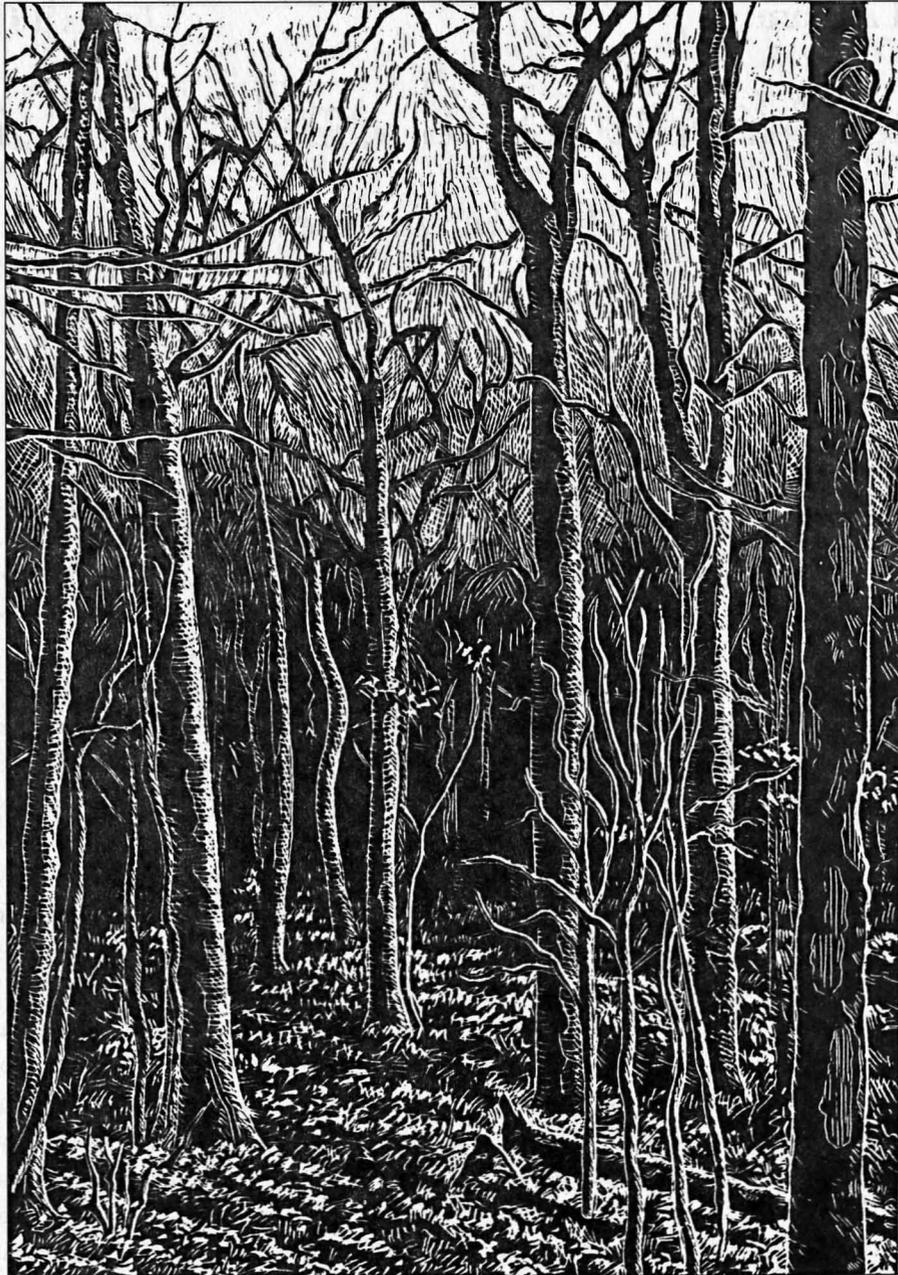
from Volume 2, Number 2 (Summer 1992

THE ONLY TRUE MACHINES of which we have direct experience are those invented by humans. Hence, if the world really functions as a complex machine, then the one who built that machine must be very much like us. There is, in other words, an implied correspondence between humans and the one who built or programmed the vast, complicated machine of the world. We are, after all, made in his image. If the material Earth is a created machine, it falls to us—since we are not just created, but creators in our own right—to figure out how the machine works.

The mechanical metaphor, then, not only makes it rather simple for us to operationalize the world, by presenting Nature as an assemblage of working parts that have no internal relation to each other—a set of parts that can be readily taken apart or put back together without undo damage; it also provides us with a neat justification for any and all such manipulations. The correspondence between the creative human mind and that which created the mechanical universe (between humans and God) ensures that the human researcher has a divine mandate to operate upon or to manipulate earthly Nature in any manner that he or she sees fit. The inertness of matter, the lack of sentience in all that is not human, absolves the researcher of any guilt regarding the apparent pain he or she may happen to inflict upon animals or

ecosystems (such pain, Descartes taught us, is entirely an illusion, for automatons cannot really feel anything).

The mechanical worldview thus implicates us in a relation to the world which is that of an inventor, an operator, or an engineer to his machine. (The very notion of “genetic *engineering*” can have sense only in a culture that maintains a mechanical view of Nature.) When the natural world is conceived as a machine, the human mind necessarily retains a god-like position outside of that world. It is this privileged position, and the license it gives us for the possession, mastery, and control of Nature, that makes us so reluctant to drop the mechanical metaphor today. If mechanism rose to prominence in the 17th century due to its compatibility with the belief in a divine creator, it remains in prominence today largely due to the deification of human powers that it promotes.



Evan Cantor

“Warren Woods,” scratchboard
from Volume 5, Number 4 © Winter 1995/96

Mollie Matteson

The Dignity of Wild Things

from Volume 2, Number 3 (Fall 1992

I WOULD LIKE to recommend that in judging the rightness of our actions toward the natural world, we be guided by a fundamental respect for the *dignity* of wild Nature. Dignity is the intrinsic quality in all beings that we are morally obligated to uphold. If our behavior does not infringe on the dignity of animals, plants, rocks, rivers, and the relationships among them, our actions are proper and sustainable, both ethically and ecologically.

Except for overly romanticized tales of the hunt, with their “dignified” elk, rams, or other majestic quarry, our culture rarely ascribes dignity to creatures of the natural world. Traditionally, dignity has been considered a quality of humans—a quality by which we retain our humanity, and without which we become something less than human. Many popular social movements have as their focus the maintenance of human dignity—for example, the dignity of aboriginal peoples, the terminally ill, the poor, and other persecuted, disenfranchised, or relatively powerless groups. Dignity is a common theme of literature and art. In the face of great suffering and privation, tragic heroes still manage to hold on to their own dignity. Persons of dignity are not, nor will they allow themselves to be, debased. To maintain one’s own dignity is to be true to oneself. The corrupt, the thoroughly downtrodden, and the self-deceiving have given up their dignity, and in so doing have abandoned themselves.

The word dignity derives from the Latin, *dignus*, which means worthy. To keep possession of that which is most worthy, and to honor what is most worthy about others, is to value dignity. To not value, to not respect the dignity of others (including, as I will argue, other species and wild things) is to let go of one’s own dignity. Those who disregard or deny the worthiness of others are shielding or aggrandizing their own egos; they seek power through control and domination of others. Ironically, this is a shallow, flimsy, very often self-destructive sort of “power,” if it can be called that at all. It depends entirely on the submission of the outer world to one’s own desires.

The dignity of wild things should serve as an alternative moral guide, superior to the two major schools of environmental ethics that are widely discussed in our society today. Although professional philosophers and others may disagree with the way I identify and group these ideas, I see on the one hand a philosophy of “rights”—which can range from a very narrow focus on sentient ani-

mals only, to a broad advocacy for the rights of all of Nature. On the other hand, I see a philosophy of “stewardship” which is influenced by utilitarian thinking and characterized by a belief in the superior wisdom and power of humans. While I have serious doubts about both these viewpoints, they do offer ways of behaving ethically toward Nature. The unfortunate truth is that the *modus operandi* in our culture is based on ignorance, indifference, egotism, greed, and most extreme, a fervent belief in the worthlessness of unexploited Nature....

A PHILOSOPHY OF DIGNITY proposes that humans are neither superior nor inferior to any other beings. Instead, when they are true to themselves (maintain their dignity) humans are “wild,” or self-willed, just as are Earth’s other inhabitants. Many if not most humans, however, have given up their wildness, and therefore their dignity. This happens, as it has throughout history, when people attempt to remove or deny the self-willedness of others in a vain (both meanings of the word) effort to aggrandize their own power. Because all once-wild things—including people and natural forces such as fire and floods—will always struggle to return to a self-willed state, the power gained through control over others is tenuous and temporary. To respect the power within oneself and in all others, including the plants, animals, rocks and rivers, is to believe in and maintain the dignity of wild things.

Bruce J. Morgan

Indigo Blues

The Destruction of Gulf Hammock

from Volume 2, Number 4 © Winter 1992/93

IT WAS ONE OF THOSE glorious days when a Floridian couldn't help but rub in the fact that, while his Yankee visitors dwelt for the most part in frigid hell, here all was well. Eighty degrees on a mid-February day was all the excuse I needed to suggest a magical mystery tour in the ruined wilderness of Gulf Hammock to my frozen friends. The omnipresent mosquitoes had been knocked back by a recent frost, and hunting season was over, so we donned flip flops and shorts, grabbed a cooler, and headed for the woods.

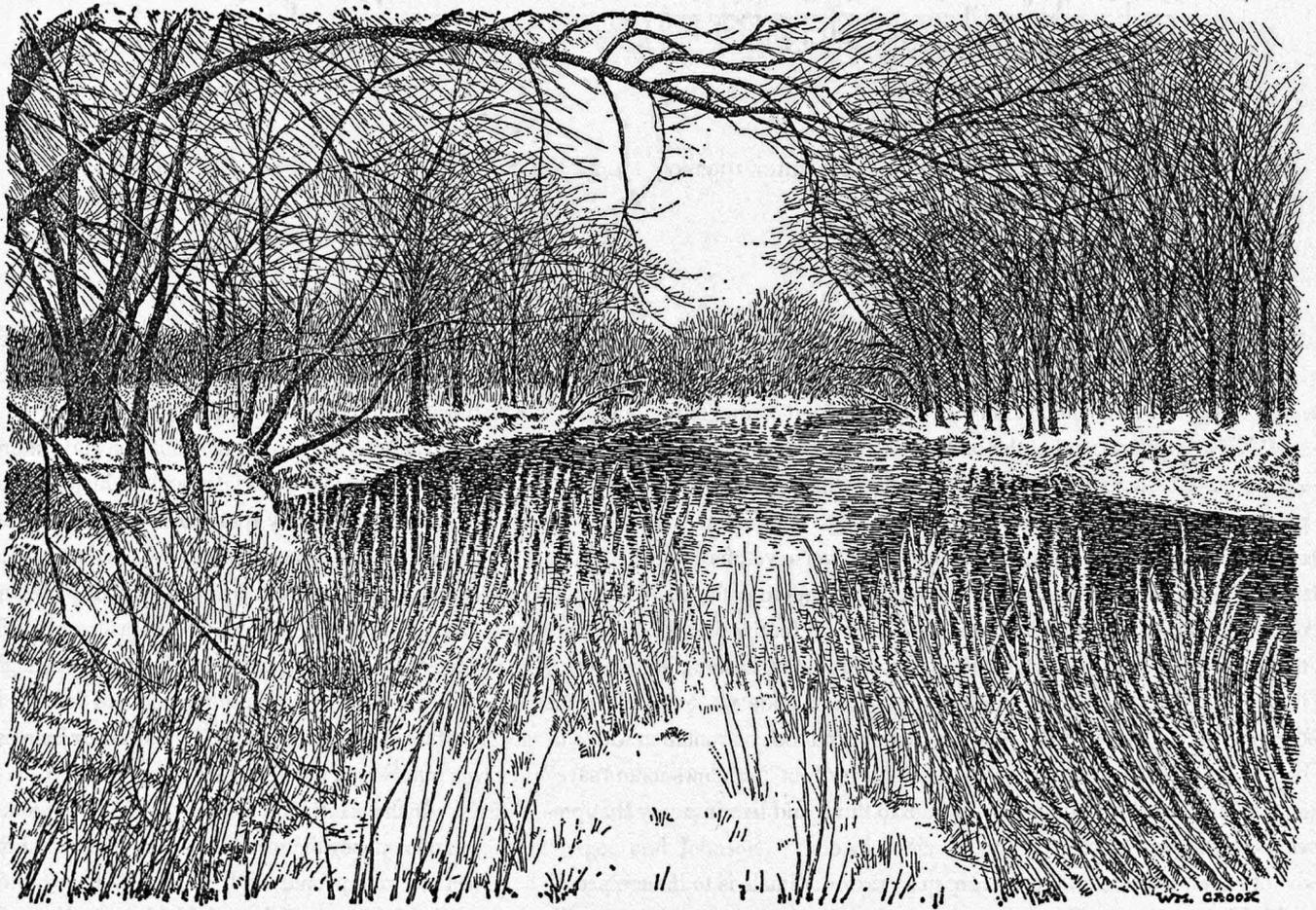
Most people suppose that any large tract without homes constitutes a wilderness. My friends from the cutover woodlands of suburban Maryland can be forgiven for their enthusiasm. "Look, over there, no convenience store!" Wherever I looked, I saw the shattered remnants of what was pristine ancient forest just a few years ago. As I was "in the cups," I began to glumly pontificate upon the sins of man. I was well into my bull when the discourse was rudely interrupted by a thunderous fart. Niki thought that this was meant to punctuate one of my points. I assured her that I would not so brutally assail her sensibilities, and that the sound had come from behind, that is to say, from far behind, in a brush pile. Summoning all of my dignity, I announced, "That, Madam, was the sound of an enormous serpent, perhaps a dinosaur, defecating." I am known and respected for my encyclopedic knowledge of woodcraft, but this bit of information was too arcane to be accepted. I felt much like Professor Drummond, whose pedagogic pronouncements are often considered merely droll by the benighted proles. To prove the point I strolled over to the thicket, and there by a stump was an enormous indigo snake disposing of a winters-worth of shit. The beast was over seven feet long, a relic from the virgin forest, and as close to a dinosaur as one is likely to get.

Three years earlier that stump had been part of a virgin forest growing on a rocky hammock alongside a crystal clear spring-fed run. Venerable magnolias and gnarled oaks thirty feet in circumference grew around the rock rims of sinkholes similar to but smaller than the *cenotes* of the Yucatan peninsula where the Mayans used to throw what few virgins they could find. Ancient cabbage palms

with swollen bases and moss-covered columnar trunks eighty or more feet tall occasionally broke through the main forest canopy. Maple ridges with hickory and ash revealed the limestone of ancient reefs. Below, in the deep shade, the forest floor was clear and open, easy to walk through, with little vegetation other than young palms and rare ferns and moss growing on the exposed limestone. Closer to the coast, cedar and palm gave way to spartina and other marsh grasses which mingled with the horizon at the Gulf of Mexico.

Gulf Hammock was once the heart of an unbroken expanse of hydric hardwood hammock that stretched along the Gulf Coast of Florida from Chassahowitzka, just above Tampa, north and west to St. Marks, just below Tallahassee. Gulf Hammock proper is the land west of the highway, between Cedar Key and the mouth of the Withlacoochee River.

The hammock was once America's only real jungle, a forest of forbidding aspect, deep and dark, home to Florida black bears, Florida panthers, and the famous "wild" hogs that folk singers still sing about. Homesteading came and went. The hammock was spared from settlement by the early pioneers due to a fortuitous combination of environmentally adverse conditions. The place was a real hellhole.



William Crook Jr.

“March Snow, North of Buckhart,” pen and ink
from Volume 5, Number 4 © Winter 1995/96

Mike Seidman

Zoos and the Psychology of Extinction

from Volume 2, Number 4 © Winter 1992/93

AS LONG AS WE FAIL to recognize the deep cause of the extinction crisis—the belief that we are not part of Nature—our idea of conservation education will be shallow and contradictory, our “solutions” part of the problem. Out of touch with the tangled emotions in us that are driving extinction, we mistake the grim purpose of zoos—the subservience of animals to our will, the denial of our animal nature—for harmless entertainment or, worse yet, for education.

Whatever its worth, captive propagation reinforces the idea that only more manipulation (i.e., more of the problem) will fix the problem of extinction. Instead of working on our inner lives to fit reality, to stop the problem at its source, we prefer to manipulate the world outside us, to juggle some “inputs” and “outputs,” to do just enough to put off the confrontation with ourselves. Captive propagation seems to give us an “out”; it allows us to “save” a few animals in zoos while we continue to think and live in a way that prevents those animals from ever being reintroduced.

I have implied that the best zoos can do for animals is to induce people to like them—in zoos. True conservation education must surely aim at instilling in people the sort of love for animals that cannot abide animals in captivity, that can be fulfilled only when animals are living wild in healthy ecosystems. Naturalistic exhibits may actually thwart this admirable goal. If zoo visitors prefer the sanitized, emasculated version of Nature they encounter in zoos to the wild and messy reality, then, as naturalistic exhibits

are perfected over time, people will have even less incentive to protect the habitats upon which those exhibits are modeled.

Rather than serving the cause of wild Nature, these slick and polished facades, on which millions of dollars are casually spent, are really monuments to ourselves. Our real joy in them is in the creation of miniature worlds that we can contemplate and manipulate with the detached pleasure of gods. One day, through genetic engineering, we might even create animals, designing them to “adapt” to our manufactured “habitats” and to satisfy increasing numbers of bored and jaded urbanites.

To the accusation that they are wasting money on frills, money that could be spent on habitat protection, zoo people reply that the money they receive is not money that would otherwise be available for that purpose. I am inclined to agree. Such is the depth of our society’s commitment to conservation—not to mention our love of Nature—that we will gladly donate vast sums to keep animals in elaborate cages but not to let them live wild.

Reed F. Noss

The Wildlands Project Land Conservation Strategy

from Wild Earth Special Issue: The Wildlands Project © 1992

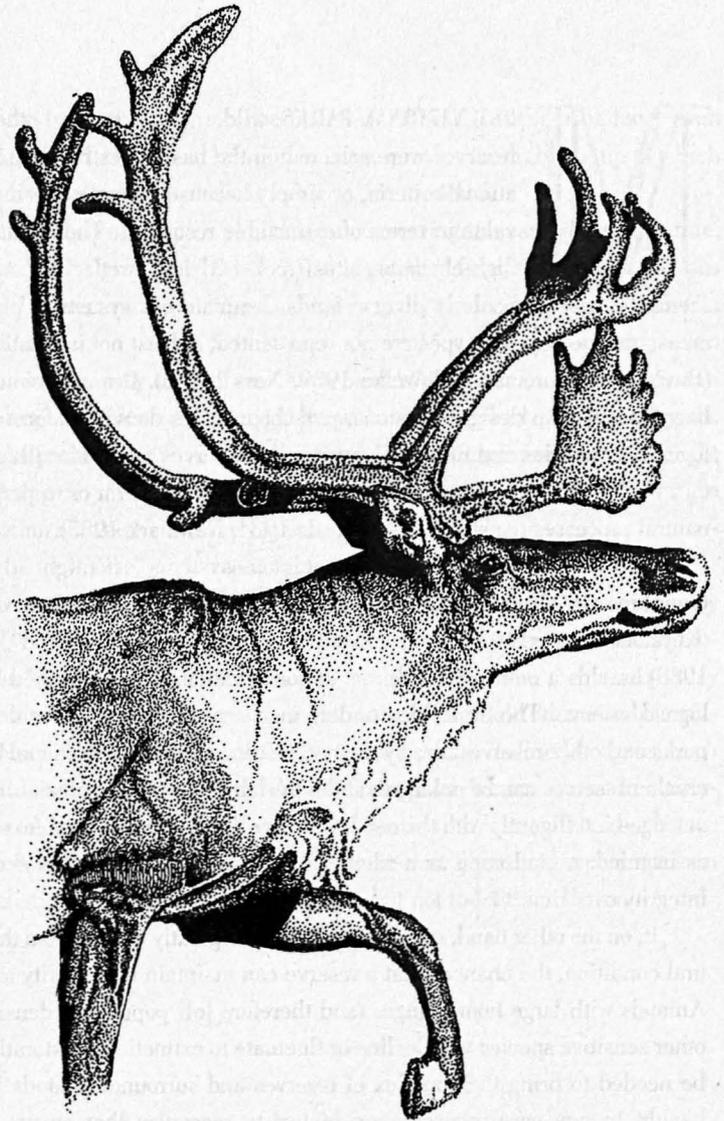
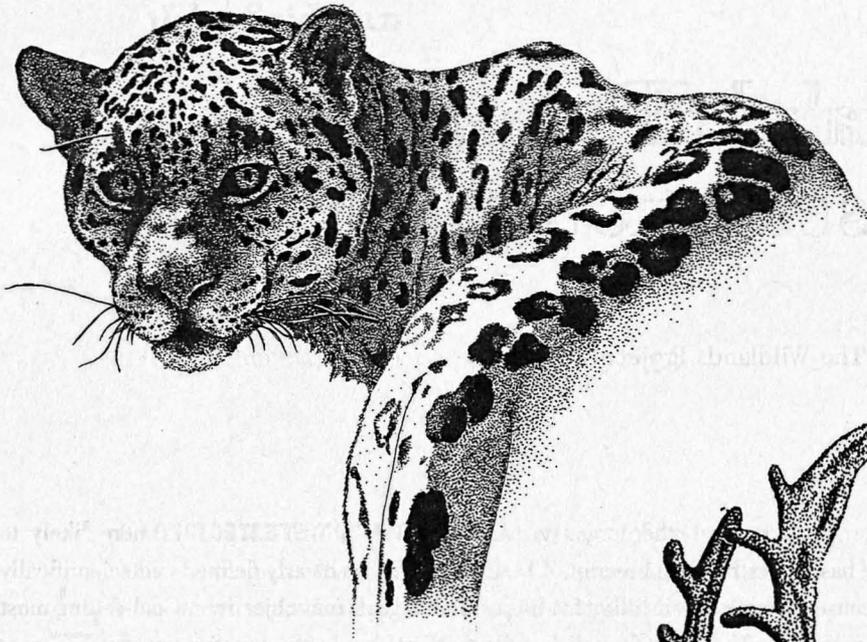
MOST NATIONAL PARKS, wilderness areas, and other large reserves were selected on the basis of esthetic and recreational criteria, or simply because they contained little of value in terms of extractable resources. The result is that high-elevation sites (rock and ice), wetlands, and other scenic but not particularly diverse lands dominate our system of protected areas; many ecosystem types are not represented, at least not in sizable areas (Davis 1988, Foreman and Wolke 1989, Noss 1990a). Because biology has been absent from design decisions, park boundaries do not conform to ecological boundaries and most parks and other reserves are too small to maintain populations of wide-ranging animals over the long term or to perpetuate natural processes (Kushlan 1979, Harris 1984, Newmark 1985).

Increasing discussion of "greater ecosystems" (Craighead 1979, Grumbine 1990), regional landscapes (Noss 1983), regional ecosystems (Keystone Center 1991), and ecosystem management (Agee and Johnson 1988) heralds a new way of looking at conservation, a way informed by ecological science. The basic idea underlying these new concepts is that most parks and other reserves are, by themselves, incomplete ecosystems. If parks or other reserves can be enlarged, and if the lands surrounding these areas are managed intelligently with the needs of native species and ecosystem processes in mind, a landscape as a whole may be able to maintain its ecological integrity over time.

If, on the other hand, surrounding lands are greatly altered from their natural condition, the chances that a reserve can maintain its integrity are slim. Animals with large home ranges (and therefore low population density) and other sensitive species will decline or fluctuate to extinction. Restoration may be needed to bring the complex of reserves and surrounding lands back to health. In any case, conservation biologists recognize that any system of parks, wilderness areas, and the public and private lands that envelop them must be managed as a whole in order to meet the goal of maintaining natural processes and native biodiversity over long spans of time....

A CONSERVATION STRATEGY is more likely to succeed if it has clearly defined and scientifically justifiable goals and objectives. Goal-setting must be the first step in the conservation process, preceding biological, technical, and political questions of how best to design and manage such systems. Primary goals for ecosystem management should be comprehensive and idealistic so that conservation programs have a vision toward which to strive over the decades (Noss 1987a, 1990b). A series of increasingly specific objectives and action plans should follow these goals and be reviewed regularly to assure consistency with primary goals and objectives (Stankey 1982). Four fundamental objectives are consistent with the overarching goal of maintaining the native biodiversity of a region in perpetuity (Noss 1991a,b):

1. Represent, in a system of protected areas, all native ecosystem types and seral stages across their natural range of variation.
2. Maintain viable populations of all native species in natural patterns of abundance and distribution.
3. Maintain ecological and evolutionary processes, such as disturbance regimes, hydrological processes, nutrient cycles, and biotic interactions, including predation.
4. Design and manage the system to be responsive to short-term and long-term environmental change and to maintain the evolutionary potential of lineages.



Sarah Lauterbach

jaguar

from Volume 5, Number 4
Winter 1995/96

caribou

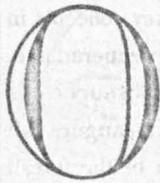
from Volume 6, Number 2
Summer 1996

Ray Vaughan

Beach Mouse Bingo

Litigating with Extinction

from Volume 3, Number 1 © Spring 1993



OF COURSE, logic tells you that if development will harm the [endangered] species, it is best to stop it early, until a decision can be rendered by the courts. Law has no connection to logic or to reality. With a Republican judge assigned to our case and no money to fuel a bitter contest over a preliminary injunction, we decided that the best plan of action was to marshal the facts from the world's expert on the species and present our case so that the judge could make a detailed order that would lay out exactly what needed to be done for many years to come. If the harm caused by the development could be mitigated sufficiently without having to stop the thing, the judge would like us, the press would like us, and a major confrontation between the Endangered Species Act and the Fifth Amendment's prohibition against the taking of private property without just compensation could be avoided. If the harm from the development could not be mitigated, then it would have to be stopped; this would mean an intense confrontation with the developers, the judge, and the whole system.

All this underscored the importance of what Dr. Nicholas Holler would say. He is the world's expert on the Perdido Key Beach Mouse, and our case would basically ask for whatever he said must be done to protect the mouse.... Generally, the opinion of the experts and agency charged with protecting wildlife will prevail in court.

Our problem was that Dr. Holler worked for the defendants; he was a Fish and Wildlife Service employee who taught at Auburn University through a cooperative agreement. He was in the command of the very people we were fighting, and we were not allowed to talk with him. Consequently, we would have to subpoena him to testify at a deposition. We had to trust that Dr. Holler was an honorable man who truly cared about these mice; otherwise, he would just say what the government lawyers told him to say, and we would be out of court....

WHEN APRIL 10 CAME, we got our favorite court reporter, and drove to Auburn. When we arrived at Dr. Holler's office, he pointed to a small, clear plastic box on a table. There it was, a male, not half as big as my pinkie, and incredibly beautiful.

We moved to a conference room and began the deposition....It did not take long to realize exactly what the good doctor's position was: the hotel complex would mean the end of the mouse and nothing could be done to mitigate the damage the development would cause. Dr. Holler bluntly stated that the entire area was critical habitat for the mouse and should be protected from any and all development. Although he was visibly nervous, Dr. Holler maintained his integrity and laid his career on the line for the Perdido Key Beach Mouse. Basically, he handed us our case. Dr. Holler was emphatic, and our case was now clearly defined: nothing less than total protection for the land north of the highway would suffice. Indeed, Dr. Holler stated that with so much of the key already under development, even total protection for this last remaining portion of habitat would not recover the species; the Perdido Key Beach Mouse would be endangered forever, and everything possible must be done to hold even the status quo. As Dr. Holler stated, "A development at this particular point is the worst place in my view that we could have a development."

Howie Wolke

Forest Service Euphemisms and Obfuscatory Language

from Volume 3, Number 3 (Fall 1993

THE ENTIRE SPECTRUM of public land resource management is based upon a strategy designed to hide in a cloak of absurd euphemisms the ugly reality of abusive land exploitation....

WHEN I LOOK at the hacked up landscape [of the Bitterroot National Forest], I see ugly damage. But beauty, and it seems reality, is in the eye of the beholder. A typical forest **ranger** sees something quite different, something like this:

Capital improvements (new roads) **access decadent and overmature timber** (old growth), characterized by dead and dying trees falling to the ground and going to waste (structural and functional diversity). Erosion from log skidding and **roading** is a temporary problem that can be **mitigated** by restricting log hauling and other activities during spring breakup when the ground is saturated by snowmelt. If the erosion continues, the **service** has machines, which resemble big vacuum cleaners, to suck silt out of streambeds to restore fish habitat. Again, anything can be **mitigated**.

Clearcuts are designed to create a chunk of forest in which all of the trees are about the same age and size and usually the same species. Clearcutting is the key to **even-aged management**, and about 70 or 80 years after the cut, the trees can all be **harvested** again. That's quick, convenient, and economical. (For the timber company, that is. Most national forest sales are below cost; that is, they lose money because the Forest Service pays more for roads, "reforestation," administration, "pre-commercial thinnings," and other forms of management than it receives for the timber.)

It's important to remember that loggers **harvest** trees; they don't "clearcut" them. They **harvest** entire stands in **even-aged silviculture systems**. For the **service**, trees are a crop; the forest is a **tree farm**.

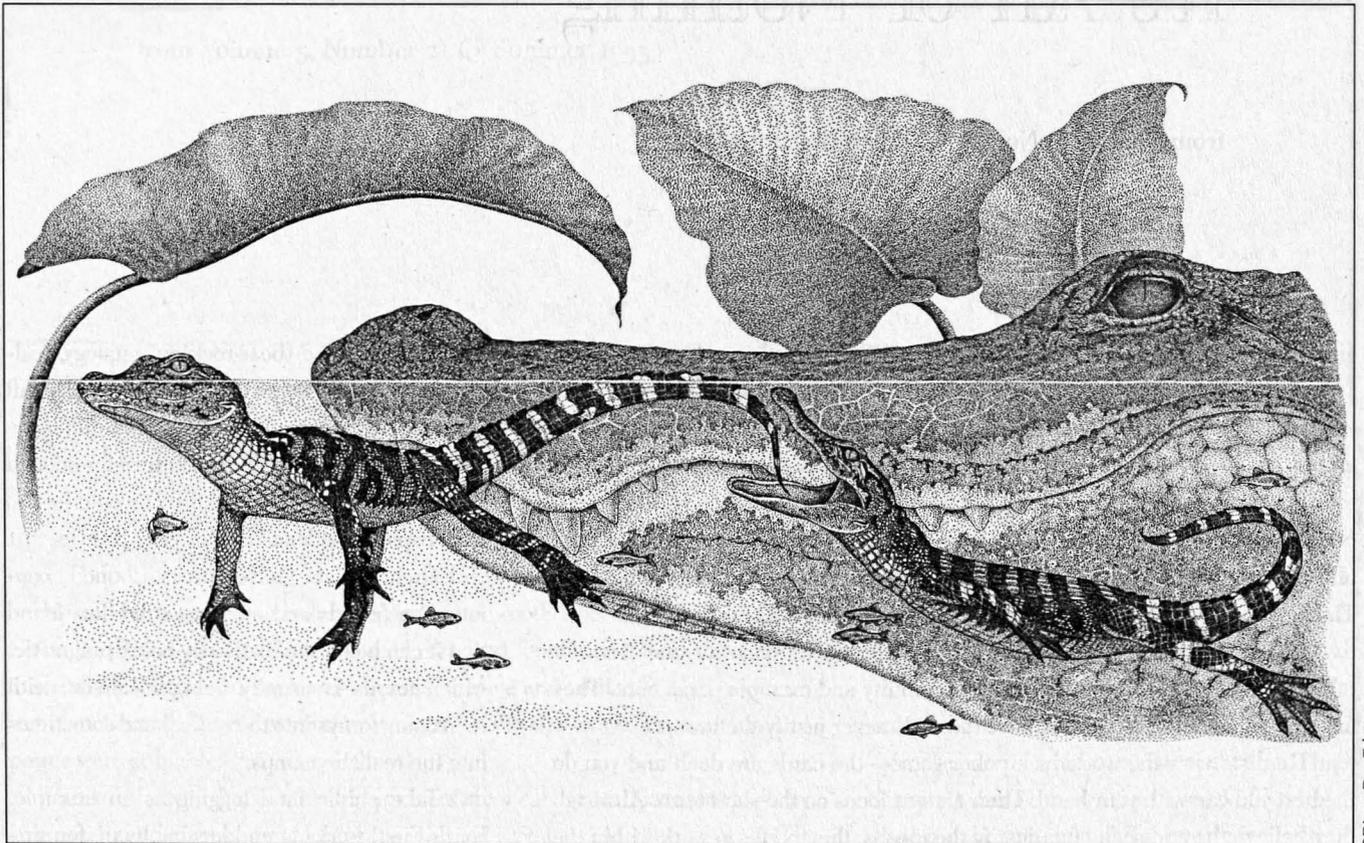
In the eyes of the forest **ranger**, the new landscape is one of order; it produces goodies for consumers. The entire landscape is available for a wide array of **multiple uses**, like firewood gathering, mountain biking, picnicking (in the **leave strips** of standing forest between the clearcuts), dirt biking, snowmobiling, road "hunting," and poaching. Moreover, not just the timber, but the land itself is a **resource** that

does us little good if un-**managed**....

There are just a few more key concepts in the language of forest bureaucradome. **Management of renewable resources** is carefully designed to achieve what **rangers** call the **desired future condition** of the forest. Whose desire, you ask? Theirs. And it's there in black and white. The management of every national forest is guided by a **land management plan** that delineates, among many other things, the **desired future condition** for the various parts of the forest....

The **desired future condition** of the forest, though, isn't decided without the obligatory public controversy. Many individuals and **interest groups** comment on the draft planning documents; in fact, the Forest Service always gives interested "**publics**" the opportunity to participate **in the process**....

As a result, forest **rangers** often brag, usually, *nobody* likes what they do. The timber industry complains that **mitigation** is expensive and whines that every patch of woods should be available for **harvest**; environmental groups complain that every **integrated resource project**, every **capital improvement** results in a further net loss of wild habitat. That, according to Forest Service wisdom, signals success. The Forest Service defines success as its ability to get everybody **pissed off**. That's no euphemism. That's one hell of an approach to managing the last of the unprotected American wilderness.



©Diana Dee Tyler

D.D. Tyler

American alligator (*Alligator mississippiensis*), pen and ink
from Volume 6, Number 3 (Fall 1996

Andy Kerr

It's Not Either/Or, It's All or Nothing

from Volume 5, Number 1 • Spring 1995

THE ENVIRONMENTAL MOVEMENT is made up of *radicals*, *idealists*, and *realists*.^{*} Let's briefly examine each type:

Radicals seek fundamental change of the system. They believe environmental goals cannot be realized without deep socioeconomic and political changes, and thus tend to be anti-corporate. Winning individual short-term battles is less important to them than changing the world in the long term. Many feel that the ends justify the means. The best radicals suppress emotion to implement their strategy.

Idealists are usually altruistic. They view the world from a very moral and/or ethical perspective, with individual responsibility and example paramount. They are emotionally involved and believe the ends never justify the means.

Realists view the world as a poker game—the cards are dealt and you do the best you can with your hand. Their actions focus on the short term. Although they believe the ends can often justify the means, they prefer to work within the system. They can live with trade-offs and do not seek radical change, if for no other reason than they see it as unobtainable.

Some examples may help to clarify these categories. Earth First! was founded by radicals and is now dominated by idealists. The Sierra Club has a membership of idealists and a staff of realists. Greenpeace is idealistic with some radical tendencies but not to the extent of the Sea Shepherd Conservation Society.

To stretch the “boat-rocking” analogy, realists want to help steer the boat, however small the change of course; idealists would rather the boat not move at all if it doesn't turn far enough in the right direction; and radicals would just as soon capsize the boat.

Oregon Natural Resources Council, confounding friends and enemies alike, has found that it can be most effective by being pragmatic, which for us is usually being idealistic, with increasing forays into the radical and sometimes into the realistic camps.

Take public land logging as an example. Earth First! works to end logging by performing civil disobedience. Greenpeace appeals to our sense of the “right thing to do.” The Wilderness Society fights logging one timber sale at a time. Who's right and who's wrong? They all are both. No one approach to conserve and restore biological diversity will work exclusively. It's not either/or; it's all or nothing.

^{*} I am greatly indebted to Ronald A. Duchin, senior vice president of Mongoven, Biscoe & Duchin, Inc., a research and analysis firm in Washington, DC. His remarks on “Social Activism in the '90s” at the National Cattleman's Association convention in Dallas in 1991 were most instructive and illuminating. Excerpts were reprinted in the *Cattle Feeder*. A lobbyist for the forces of darkness, Mr. Duchin is an astute observer of the environmental movement. His article is an excellent treatise on how to divide and conquer public interest movements. Never forget: *read the enemy literature*.

Mitch Friedman

Big Logs, Big Fish

from Volume 5, Number 2 © Summer 1995

RECENTLY, ON A DRIVE through British Columbia's southern interior, I was transported back in time by the Columbia River marshes. I was keeping an eye out for mastodon, not to mention moose, along a 100-or-so-mile stretch of BC-95 that parallels the undammed portion of the upper Columbia, between Roosevelt Reservoir and Kinbasket Reservoir. It was a confusing sight, the river channel indiscernible from its lush duck-filled marshes (not just wetlands), eagles and herons roosting in maples and cottonwoods knee-deep in drink. The Columbia River—downstream dammed, dredged, engineered, and barely able to sustain a salmon run anymore—here is as alive and verdant and everywhere wet as a Central American rainforest river. It felt paleolithic. Its wildness and power were palpable.

This is the way that Northwest big rivers are meant to be. Flat reaches slowly meandering between broad banks, saving energy, keeping the path open for later floods. Real rivers with real wetlands providing real ecological and hydrological functions. Real wetlands; not just diked-off moist spots struggling to percolate a pool from last year's flood or to support the last of this or that vegetable. The reason we struggle to protect such seemingly marginal wetlands today is that the good stuff is gone.

Northwest rivers are also supposed to be choked with logs. Big logs, from big trees, tangled together by torn-up roots into massive jams. Before settlers blew them out in the 1870s, two colossal log jams spanned the lower Skagit River between Mt. Vernon and Concrete in northwest Washington. They stretched from bank to bank, one extending upstream for a mile or more, growing every year. Brackish pools between logs stashed salmon.

The jams had been there for so long that giant Douglas-fir trees, four feet or more across and centuries old, grew living from the mossy, rotting bulk. I know this because I read it from a yellowing newspaper article, shellacked and framed

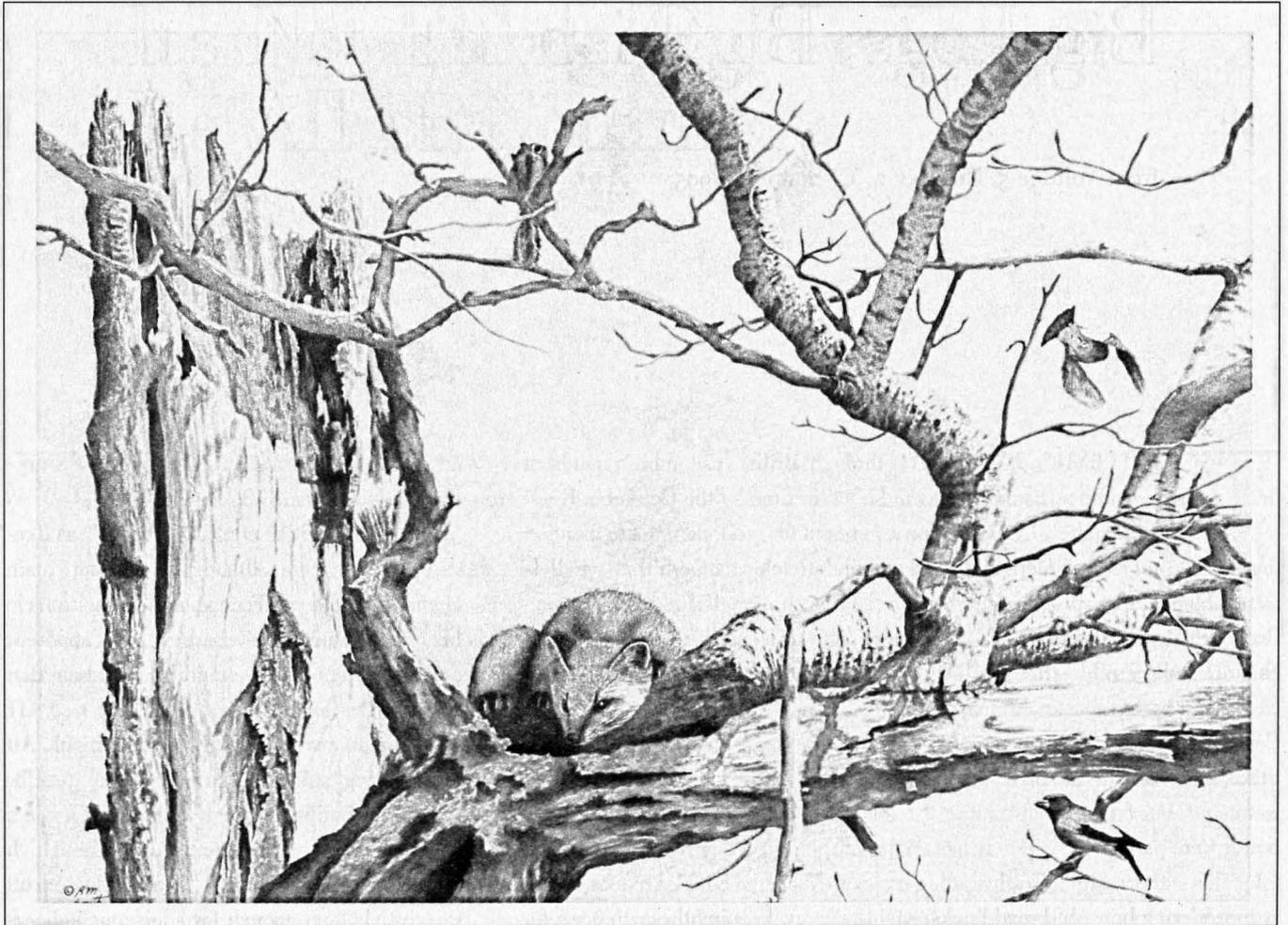
on a wall inside the power house of the Gorge Dam in Newhalem, Washington.

Oregon's Willamette River Valley was likewise a sloppy mess. Although five or more main channels of the pre-European Willamette have been delineated, no channel was apparent among many of the standing marshes that spanned the floodplain.

Salmon are made for these conditions. All that rotting wood is structural habitat for salmon. Swimming through a mile-long log jam became possible during spring and autumn high flows. At these times, the logs would float up off the river bottom enough for squirming squeezing salmon to slide past.

They slid past in droves, these salmon. The Columbia had annual runs of over 19 million in the late nineteenth century. The Nooksack, Skagit, Willamette, and every other Northwest river was loaded with salmon fully capable of navigating an ancient-forested river. Salmon that had to migrate thousands of miles, like Salmon River Spring Chinook, or scale booming torrents, like the Elwha's legendary Tye Chinook, evolved to pack a massive load of muscle, one hundred pounds or more. They found ways to get to their natal streams.

Then they spawned, died, and rotted on site.



Robert Smith

"Spring Drama," watercolor
from Volume 7, Number 1 © Spring 1997

Terry Tempest Williams

Testimony

from Volume 5, Number 4 © Winter 1995/96

WHO CAN SAY HOW MUCH of Nature can be destroyed without consequence? Who can say how much land can be used for extractive purposes until it is rendered barren forever? And who can say what the human spirit will be crying out for one hundred years from now? Two hundred years from now? A few weeks ago, Yosemite National Park had to close their gates and not allow anymore visitors entry. The park was overcrowded. Last week, Yellowstone reported traffic gridlocks in the Lamar Valley, carloads of families with the wish of seeing a wolf. Did our country's lawmakers who held the vision of national parks in the nineteenth century dream of this kind of hunger? In the same vein, can you as our lawmakers today toward the end of the twentieth century imagine what the sanctity of wilderness in Utah might hold for us as a people at the turn of the twenty-first century?

We must act with this kind of vision and concern not just for ourselves, but for our children and our children's children. This is our natural heritage. And we are desperate for visionary leadership.

It's strange how deserts turn us into believers. I believe in walking in a landscape of mirages, because you learn humility. I believe in living in a land of little water, because life is drawn together. And I believe in the gathering of bones as a testament to spirits that have moved on.

If the desert is holy, it is because it is a forgotten place that allows us to remember the sacred. Perhaps that is why every pilgrimage to the desert is a pilgrimage to the self. There is no place to hide and so we are found.

Wilderness courts our souls. When I sat in church throughout my growing years, I listened to teachings about Christ walking in the wilderness for forty days and forty nights, reclaiming his strength, where he was able to say to Satan, "Get thee hence." And when I imagined Joseph Smith kneeling in a grove of trees as he received his vision to create a new religion, I believed their sojourns into Nature were sacred. Are ours any less?

There is a Mormon scripture, from the Doctrine and Covenants section 88:44-47, that I carry with me:

The earth rolls upon her wings, and the sun giveth his light by day, and the moon giveth her light by night, and the stars also give their light, as they roll upon their wings in their glory, in the midst and power of God.

Unto what shall I liken these kingdoms that ye may understand?

Behold all these are kingdoms and any man who hath seen any or the least of these hath seen God moving in his majesty and power.

Without a philosophy of wildness and the recognition of its inherent spiritual value, we will, as E.O. Wilson reminds us, "descend farther from heaven's air if we forget how much the natural world means to us."

For those of us who so love these lands in Utah, who recognize America's Redrock Wilderness as a sanctuary for the preservation of our souls, Senate Bill 884, the Utah Public Lands Management Act of 1995, is the beginning of this forgetting, a forgetting we may never reclaim.

Donald A. Windsor

Endangered Interrelationships

The Ecological Cost of Parasites Lost

from Volume 5, Number 4 © Winter 1995/96

SYMBIOSIS IS A HALLMARK of biodiversity, as can readily be attested by just going outdoors and picking up a specimen of any living organism. Whether a blade of grass, a leaf, an earthworm, a fly, or a squirrel—none of these are only what they appear to be. Each is not just a single organism but an association of several species in symbiosis. When you are walking through a field and a deer pops up, how many species do you see? You may see one, the deer. I see several dozen, from all the bacteria and protozoa in its gut, to the ticks, mites, and flies on its integument, to the fungi on or in its hooves. Also it may suffer from larger helminth parasites, such as brainworm.

The same analysis can apply to other creatures. That oak tree behind it may harbor several mushrooms, mosses, and lichens, as well as insects galore. Whether or not we can see the mushrooms (fungal fruiting bodies), its roots are functioning with the benefits of mycorrhizal fungi. A blade of grass may have insects, protozoa, and mites. Theoretically, if the deer or the oak tree were suddenly rendered invisible, you could still see where they stood because all their symbionts would be disclosed. If every species we look at is really multiple species, then our biosphere is certainly much more complicated than we can imagine. Each species is, in effect, a Noah's ark; forsake it and you may lose the whole boat load. So, when the promulgators of management plans for forests or range lands or wetlands (or even entire ecosystems!) explain how they will manage these areas, they arrogantly ignore that these areas are already being managed, taken care of by the astronomical number of species whose interactions at the moment happen to rule. Fundamental to such self-management are geological and atmospheric forces, predator/prey relationships (including those of carnivore and herbivore), and symbiotic associations (including parasitism).

Since the parasitic aspect is the least commonly recognized, it deserves further explanation. Our typical attitude is that parasitism is an evil, a disease, a situation to be avoided, or once contracted, cured. From the point of view of a hapless host, yes of course. But this is a human attitude, not a Nature-oriented one. Nature abhors a vacuum and an uninfected host is an empty niche opportunity which some other species will exploit. The proof is that every species has other species which parasitize it. A species acclaimed not to have any parasites is a species not adequately studied. Because parasites coevolve with their hosts, they can become extinct with them. Studying Nature without studying parasites is like studying chemistry without studying chemical bonds. Sure, substances can be mixed together and color changes or explosions can be witnessed, but the underlying mechanisms that lead to syntheses and analyses are absent. Yet, this kind of alchemy is brought into ecology by biologists who ignore parasites, and worse yet, by ecosystem managers who condemn them.



Heather Lenz

"American Sycamore—Bark, Leaves, and Fruit," pencil
from Volume 7, Number 1 © Spring 1997

Larry Anderson

Where Paths Cross, A Path Begins

from Volume 6, Number 1 ☾ Spring 1996

MY HIKE WAS an historical pilgrimage, an act of homage to a man who had walked these same woods in the late 1890s and early 1900s. I was following the footsteps of Benton MacKaye, the long-lived (he died in 1975 at the age of 96) forester, regional planner, conservationist, author, and visionary best known for his conception of the Appalachian Trail. I was retracing the first and last legs of a two-week hiking circuit of the White Mountains he completed with several fellow Harvard students in the summer of 1897.

MacKaye's hike through the mountains that summer, he later observed, marked the time "I first saw the true wilderness." The experience changed his life—and changed as well, in subtle but significant ways, the prospects and the uses of America's remaining wild lands. MacKaye's adventures and observations right here, on the slopes and summits of Passaconaway, Whiteface, Trip pyramid, and the surrounding hills, contributed directly to the area's protection as wilderness—indeed, to the protection of wilderness areas around the country. MacKaye was one of that hardy tribe—including the likes of Muir, Marshall, Leopold, the Muries, Zahniser, and Brower—who nurtured the organizations, the spirit, the philosophy, and the laws that preserved the possibility for such modest but meaningful encounters as I had experienced on Sleeper Trail. They saved a space where a fisher and I might cross paths.

In a windowless, climate-controlled archive, I had read MacKaye's original handwritten journal of his 1897 mountain excursion. Though, by his own account, he and his companions endured more than one fierce storm when rain came down like "pitchforks," he had managed to protect his pocket notebook from the elements. Now, years later, the quills he had gathered from a dead porcupine still pierced the journal's pages. His crude sketches yet evoked the stunning mountain vistas that so inspired him.

The hikers completed a loop covering much of the mountain terrain that would later be incorporated into the White Mountain National Forest. From the remote Swift River valley settlement of Albany Intervale, or Passaconaway, near where I had begun my own day hikes, MacKaye and his companions headed

north over such mountains as Tremont, Lowell, Anderson, Washington, and other summits of the southern Presidentials. Following roads south along the Franconia Range, they completed their hike by climbing over Osceola and Trip pyramid—the latter mountain my destination as I followed the Sleeper Trail—to return to their starting place....

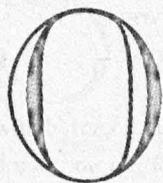
NOW, ALMOST A CENTURY later, a fisher and I cross paths. It is in its element. But where am I? I do not—by law, I cannot—remain. I am a transient here. In America today, the paradoxical landscape I traverse is called "wilderness." For Benton MacKaye, this same terrain inspired the vision of an environment reclaimed, renewed, always evolving. Acting on his vision, he left a legacy that is incalculably significant—whether measured in miles of trail blazed, acres of wilderness designated by law, species of wildlife protected, or numbers of activists inspired. MacKaye's example endows us with hope and optimism in a gloomy time.

Today, almost a hundred years later, a fisher's domain still offers the prospect of new visions, new hopes, and new explorations. A century hence, will this modest spot on a quiet trail in the New Hampshire forest provide similar possibilities and prospects?

Virginia Abernethy

How Population Growth Discourages Environmentally Sound Behavior

from Volume 7, Number 2 © Summer 1997



ONE WANTS TO BELIEVE that the active environmentalist constituency is large, but evidence for that is spotty. Americans' love for birds and some other animals may be the most enduring motive for conservation, and an informal poll suggests that recycling is the most prevalent "green" behavior...

Nevertheless, basic recycling steps, valuable to the community, are variably practiced even when sorting disposables for collection is easy. Asked why recycling sometimes seems neglected, recyclers say it reflects "lack of education"; but even those without the educational excuse, such as most recyclers, do not carpool or use buses. And every donor to a conservation or population stabilization organization learns from the flood of further solicitations that those able and willing to give are few.

It seems clearer that conditional or "delegated" environmentalism is widespread. A majority of citizens (excepting those whose livelihoods or assets are jeopardized) appears to support an end to logging in old-growth forests, the preservation of natural habitat (e.g., the Arctic National Wildlife Refuge), pollution laws such as the Clean Air Act (which primarily regulates business activity), market pricing of ranchers' grazing permits on federal lands, and the legislative or judicial taking of use-rights to private land without compensating the owner for economic loss. Fairness is sometimes treated as beside the point. So long as the costs of conservation are borne by others, especially by business and upscale taxpayers, delegated environmentalism flourishes.

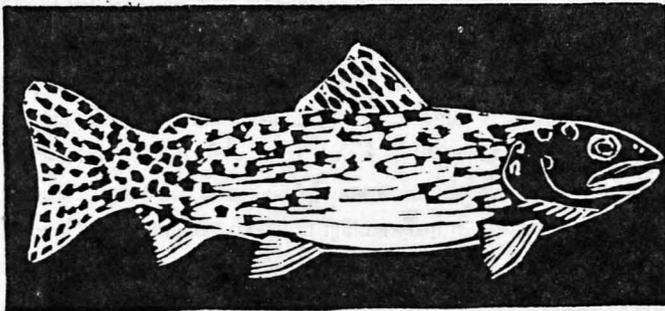
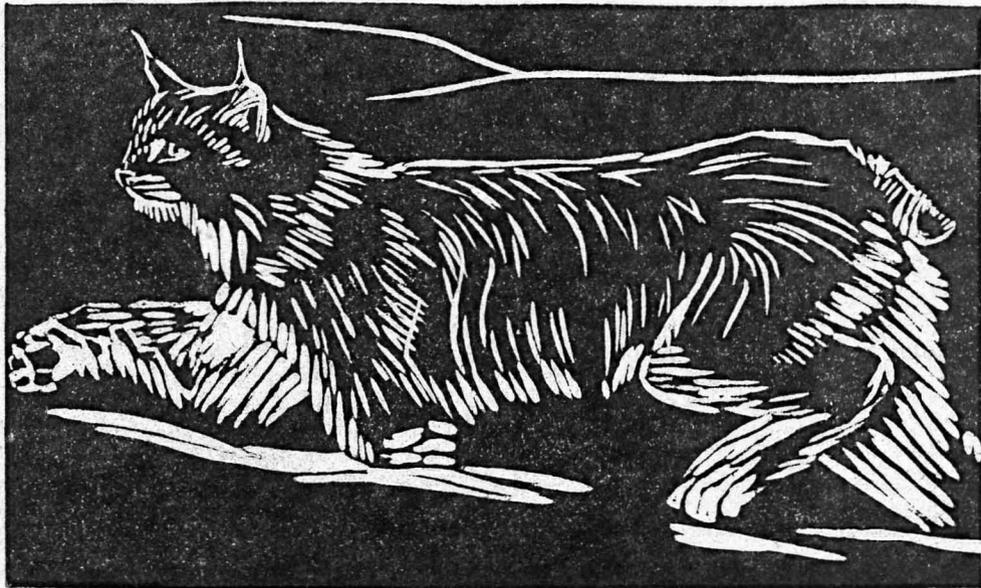
Few sectors avoid every cost of environmental protection. That is, energy would be temporarily cheaper if the Arctic Refuge were exploited, other consumer prices might fall in the absence of regulation on air and water quality. However, the average consumer perceives that his or her cost is small relative to benefits. The constituency for environmental protection shrinks remarkably when individual costs press closely against these individuals' expected gain; much depends upon whose ox is gored. The abiding risk is that people *needing* jobs, *needing* housing, *needing* heating oil, or *needing* whatever—all needs that entail the throughput of more resources—can overwhelm the constituency for protecting the environment. Moreover, human needs are easily transposed into humanitarian claims. Good-

hearted people are persuaded of the gravity of the humanitarian claim and do not reflect that many uses of resources and most new jobs and housing degrade the environment.

Humanitarian claims are compelling. They become more compelling when attached to persons residing within one's own country, but the asserted "right" of economic migrants to move across international borders also counts on good will. Yet, by adding to urban density and swelling the labor force, newcomers drive expansion and transformation of wild and agricultural lands to commercial or residential uses. Each person added to the population results in utilizing one acre of land for urbanization and road building.

It is worth recalling that species diversity outside of zoos depends on adequate natural habitat; and that habitat is altered or destroyed by land transformations, as from wild to agricultural to residential. Such land transformations are significantly related to human encroachment, secondary to population growth.

Population growth makes harder the already excruciating choices between the nation's people and conservation. The ethical dilemma is sharpened by humankind being entrusted with stewardship as an inescapable corollary of having dominion over Nature. As we fail in our responsibility, native species become extinct and the nation's natural life-support systems diminish.



Amy Grogan

lynx, linocut

from Volume 7, Number 3

Fall 1997

Rio Grande Cutthroat and
Mexican spotted owl, linocuts

from Volume 8, Number 2

Summer 1998

Hugh H. Iltis

Whose Is the Fight for Nature?

from Volume 7, Number 2 © Summer 1997 (originally published 1966)

SURELY OUR TECHNOLOGY may keep us rich and abundant; but will it keep us human? Will it satisfy the simple and vast unspoken needs of humanity, the need to keep in touch with its ancestry and the need to live a biologically and culturally meaningful life?

The original landscape as it was before the settlers came is still vitally important to our educational process. We need fenceless wild lands to know how our forebears lived and worked. We need wilderness to know where we, the human species, came from. Yet we are rapidly becoming cultural and evolutionary orphans—a people without a past, a species out of context.

Whether we are concerned with such basic biological or cultural considerations, or show concern for preservation because of some immediate or long-range economic or ethical concerns, the fundamental relationship of humans to Nature must be clearly understood. It should never be forgotten that this is the only living world, the only flora and fauna, that you and I and our children will ever have. It must not be forgotten that we are now being given our *last chance* to preserve even bits and pieces of our biotic environment, the last chance to save our flowers and birds and fish.

BUT WHOSE RESPONSIBILITY is this preservation? Who should take the first step to deflect the technological tide? Some of my scientific friends tell me that botanists are not, as I charge, irresponsible in their lack of concern for preservation, because, they say, such concern is simply not their responsibility! They are scientists, not conservationists. Preservation, they say, is a public and political and moral problem (which is indeed true), and therefore lies in the province of the politician and the voting citizen. It is not, they say, the scientist's (more specifically, the taxonomist's) duty to get involved in preservation as a scientist, but only as a human being. This, I submit, is perniciously false: chemists, phys-

icologists, agriculturists, in fact, most professional biologists generally don't know an *Astragalus* from a *Zinnia*! And neither do they much care. Yet if there is anybody who can provide leadership in the preservation movement, it is the systematic and environmental biologists, you and I.

As citizens and humans, each with individual desires, as trained taxonomists or ecologists, each perhaps wishing to preserve the particular organisms with which he or she works, we are the only ones who know the kinds, the abundance, and the geography of life which cries for preservation. This is a knowledge with vast implications for humankind, and therefore vast responsibilities. When nobody else knows, *we know* where the wild and significant areas are, *we know* what needs to be saved and why, and *we know* what is threatened with extinction. We are responsible, because we know, and because we love. When the Amazonian forests or the world's grasslands have all fallen prey to the gods of economic development and to the devils of human stupidity, we shall all have been guilty! Let us then paraphrase the old Talmudic questions: If not we, who shall speak for the flowers? If not now, when?

Kelpie Wilson

The Lysistrata Strategy in the Postmodern Age

from Volume 7, Number 4 © Winter 1997/98

WHAT IS IT THAT MAKES the overpopulation problem so difficult? The solution is trivial in the mathematical sense: people just need to quit having so many babies. Stopping at one would do the trick, but that can be like trying to eat only one potato chip. It takes willpower. If we had the will, we women could seize control of the situation by simply stopping up our wombs for awhile. With six billion and counting, someone's got to take charge. Could women do it? The only precedent I can think of is a literary one: the classical Greek comedy *Lysistrata*, by Aristophanes.

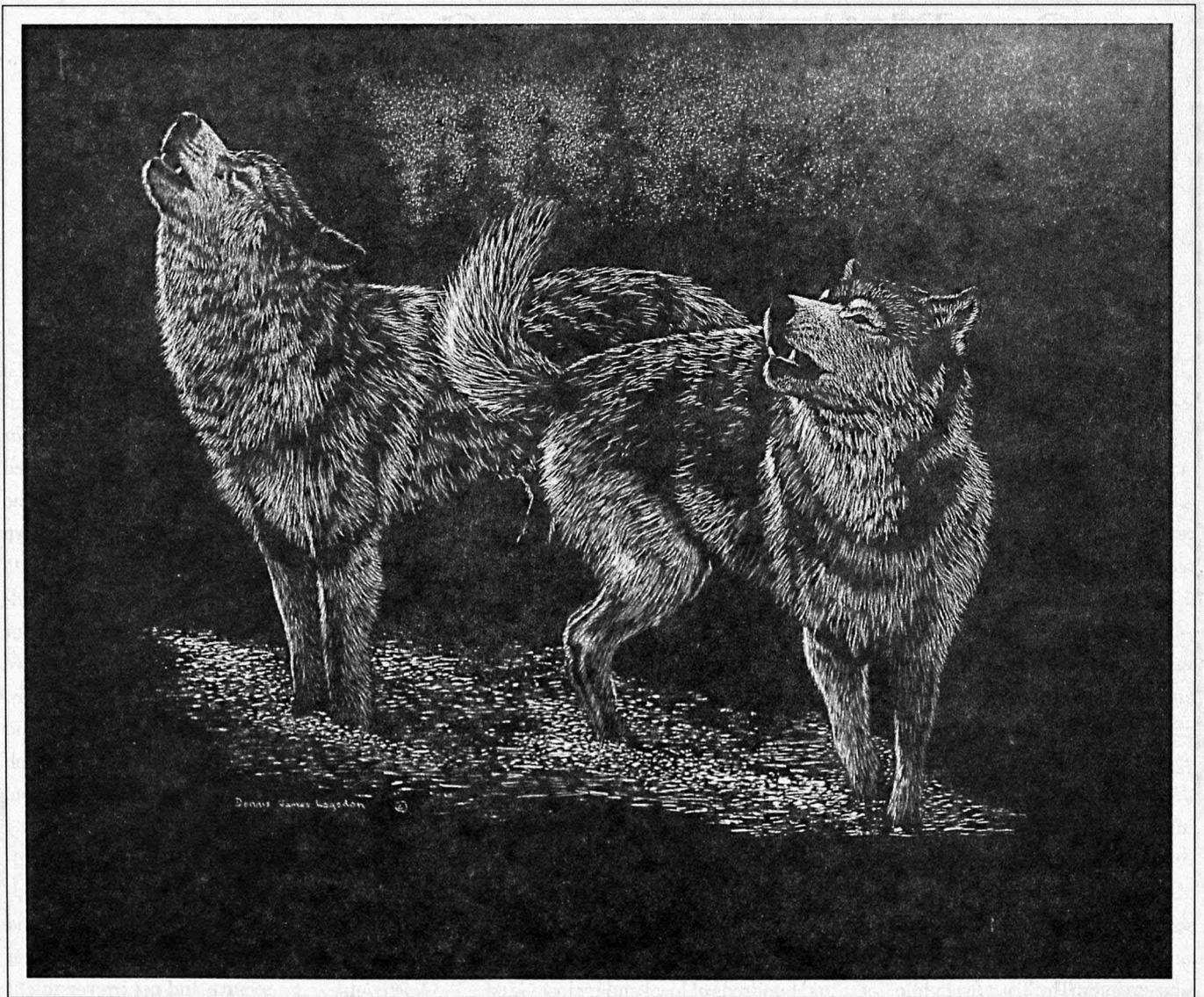
Lysistrata—whose name means “she who disbands armies”—organizes Athenian and Spartan women in a sex strike in order to force their men to abandon war. The women are tired of losing sons and husbands. Lysistrata's bold plan works quickly because the men, befuddled by horniness and tripping over erections, give in and decide they prefer to make love, not war....

WOMEN NEED BASICS such as food, clean water, health care, and access to contraceptives and abortion. The Cairo Conference concluded that providing better reproductive care worldwide would cost \$17 billion annually, which is less than the world currently spends *each week* on armaments. Again, we might follow the example of Lysistrata who knew that a sex strike alone wouldn't be enough—she had her women seize the treasury of Athens as well....

WE COULD HUMANELY REACH an optimum global population in two generations, because exponential growth works both ways. A population can experience decline just as fast as growth. If every woman on Earth had no more than one child, the number of people of reproductive age would halve in one generation. By the second generation, we could achieve what Anne and Paul Ehrlich

estimate is the optimum population for the planet: two billion. Think of what a bright new day it would be for those two billion people and the other species they share the planet with. There would be a chance of stopping the human war against Nature and the ongoing holocaust of species extinction. There would be enough of everything, including clean air, clean water, and wilderness. Imagine what life would be like if everything wasn't always getting more crowded, dirtier, and poorer every day!

What it comes down to on an individual level is this—if you bring two or more children into the world, you are saying that the world is OK exactly the way it is. Growth, pollution, species extinction, racial and class injustice, and continued warfare are something you and your children can live with. If you have only one child (or none) you are casting a vote for a radical new world and a veritable utopia. It's that potato chip thing again. Do we have the will to stop at one? If so, we will survive and even thrive. If not, we'll soon see a greasy, bloated end. That is the message that the postmodern Lysistrata needs to take to the women of the polity.



Dennis Logsdon

wolves, clay engraving

from Volume 8, Number 3 © Fall 1998

Doug Tompkins

On Philanthropy, Cultural Decadence, and Wild Nature

from Volume 8, Number 2 © Summer 1998

IT SEEMS THAT there's now a name for that hopeful trend—wildlands philanthropy—a new name for a venerable but little appreciated tradition in American conservation history. That catchy moniker may well legitimize in the eyes of the philanthropic community the realm of charity sorely needed today in the face of the ever-accelerating fragmentation and diminution of wild habitats (and even domesticated habitats), and attendant loss of biodiversity.

I am no authority on conservation history but recognize that in the last 125 years in North America there have been astonishing gestures on the part of private individuals and family trusts to buy and preserve wildlands, in tracts large and small, and endangered habitats. Conservation biologists tell us that these efforts are valuable, necessary, and never large enough. Leading thinkers, ecologists, activists, and our common sense tell us that this will be only one of the thousand fronts we must fight on if we wish to stem the rising tide of techno-industrial society that has already severely compromised wild Nature. The ruthless and pernicious superstition of progress, especially if the bio-technologists have their way, will all but eliminate wild Nature in the next century—the so-called “Century of Biology.”

Despite a non-activist stance, organizations such as The Nature Conservancy, The Trust for Public Land, and hundreds of local and regional land trusts have done wonders in drafting conservation easements and placing millions of acres under various forms of protection. The idea seems to be catching on. My staunchly conservative parents and their friends have been coming around to ecological conservatism as well, and putting their farms and other land holdings into a wide array of conservation easements.

For persons who care to gauge this trend on the political spectrum, it's interesting to note that liberals have the poorest record of land philanthropy, a seemingly paradoxical fact. If one looks carefully, most of the credit for private land conservation initiatives goes to Republicans and right-wingers. Personally, I'm interested to see what Ross Perot will do to pay his rent for living on the planet—maybe a few million acres of Texas prairie for preservation?...

WILDLANDS PHILANTHROPISTS can at least see something positive for their efforts essentially immediately—they can see a *particular place*, maybe a place they know and love, saved from destruction. And such efforts, if for no other reason than they may alleviate our own sorrows over the extinction crisis, give reason to feel hopeful. It may be a sorry excuse for socially righteous gestures to redress the ills of our culture, but that shows us truly how far we have fallen. Perhaps, human culture may someday, by chance or by force of disaster, come around to a new way of viewing the world in which abundance and diversity, love and compassion, equity and reverence for all life become the guiding principles of human society and evolution may flourish again; then our efforts in wildlands philanthropy will have been prescient and valuable. It seems like it's a smart enough and safe course, conservative and not irreversible. I hope this growth in wildlands philanthropy will increase—let's encourage it at every turn.

Michael Soulé and Reed Noss

Rewilding and Biodiversity

Complementary Goals for Continental Conservation

from Volume 8, Number 3 (Fall 1998

THE FOURTH CURRENT in the modern conservation movement is the idea of *rewilding*—the scientific argument for restoring big wilderness based on the regulatory roles of large predators. Until the mid-1980s, the justification for big wilderness was mostly aesthetic and moral (see, e.g., *Earth First! Journal* 1981–1988, Foreman and Wolke 1989, Fox 1981, Nash 1982). The scientific foundation for wilderness protection was yet to be established.

We recognize three independent features that characterize contemporary rewilding:

- Large, strictly protected, core reserves (the wild)
- Connectivity
- Keystone species

In simplified shorthand, these have been referred to as the three C's: Cores, Corridors, and Carnivores (Soulé, in prep.). A large scientific literature supports the need for big, interconnected reserves (Frankel and Soulé 1981, Soulé 1986, Noss and Cooperrider 1994, Noss and Csuti 1997). Keystone species are those whose influence on ecosystem function and diversity are disproportionate to their numerical abundance (Paine 1980, Gilbert 1986, Terborgh 1988, Mills et al. 1993, Power et al. 1996)....The critical role of keystone species is gaining acceptance (Terborgh et al. 1999). Conservatively, though, the role of keystones might still be categorized as a hypothesis, its validity depending on the ecological context and the degree to which large carnivores and herbivores persist in the particular ecosystem. In any case, the keystone species hypothesis is central to the rewilding argument.

Keystone species enrich ecosystem function in unique and significant ways. Although all species interact, the interactions of some species are more profound and far-reaching than others, such that their elimination from an ecosystem often triggers cascades of direct and indirect changes on more than a single trophic level, leading eventually to losses of habitats and extirpation of other species in the food web. "Keystone species" is an inelegant but convenient way to refer to these strong interactors (Mills et al. 1993). Top carnivores are

often keystones, but so are species that provide critical resources or that transform landscapes or waterscapes, such as sea otters, beavers, prairie dogs, elephants, gopher tortoises, and cavity-excavating birds. In North America it is most often the large carnivores that are missing or severely depleted.

Three major scientific arguments constitute the rewilding argument and justify the emphasis on large predators. First, the structure, resilience, and diversity of ecosystems is often maintained by "top-down" ecological (trophic) interactions that are initiated by top predators (Terborgh 1988, Terborgh et al. 1999). Second, wide-ranging predators usually require large cores of protected landscape for secure foraging, seasonal movement, and other needs; they justify bigness. Third, connectivity is also required because core reserves are typically not large enough in most regions; they must be linked to insure long-term viability of wide-ranging species. (Note, however, that "frontier" regions like Canada, north of the 50th parallel, are exceptions because of very low human population density.) In addition to large predators, migratory species such as caribou and anadromous fishes also justify connectivity in a system of nature reserves. In short, the rewilding argument posits that large predators are often instrumental in maintaining the integrity of ecosystems; in turn, the large predators require extensive space and connectivity.



Eva-Lena Rehnmark

watercolor from Volume 9, Number 3 (Fall 1999

Steve Trombulak

Wild Forests Are Working Forests

Some Thoughts on the Language of Despoilment

from Volume 8, Number 3 © Fall 1998

A S A BIOLOGIST IT PAINS ME to admit that I believe our ability to gain meaningful victories on behalf of wild Nature—such as the establishment of ecological reserves and the closing of ecologically destructive roads—hinges to a great extent on a) our ability to develop language that captures the hearts and minds of the public, and b) our ability to counter the catch-phrases used by those that would rather trash the planet and every living thing on it.

A new and troublesome catch-phrase intended to shape the enviropolitical landscape is the phrase “the working forest.” I have been to enough forest-policy hearings over the past few years to have a clear idea that anti-conservation and property-rights interest groups like how “the working forest” plays with the public. I also have a sense of how this phrase increasingly will be used to try to isolate conservationists from the great mass of the public, as well as from each other. I have been asked point-blank during hearings, and have heard politicians asked, “Are you for or against the working forest: yes or no?” Imagine the potential moral quandary. If a person admits to being against “the working forest,” then he or she can be cast as being against all the decent, hardworking people (read: the people from whom conservation activists must often gain support for wildlands protection) who make their living working in the forest. Presumably, if you’re against “the working forest,” you’re against paper, log homes, wooden toys, and decorated trees for the winter holidays. You probably even hate mom and apple pie!...

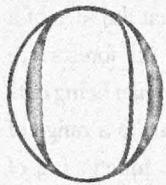
LET’S CLEARLY ARTICULATE that the idea of a “working forest” is redundant. All forests are “working” whether or not some human being cuts down the trees therein. Forests make a range of contributions to the homeostatic functioning of the biosphere (which, obviously, includes and benefits humans); these facts have been so well documented that we should stand on the tallest soapbox we can find, and shout it so loud and so long that this theme is the basis from which all other discussions begin. Forests—especially unmanaged, uncut, and unharvested forests—provide basic ecosystem services without which life on Earth would be very different, and thoroughly inhospitable to the human race. These services include sequestering atmospheric carbon dioxide, producing atmospheric oxygen, stabilizing soil, controlling flooding, and providing habitat for the countless other creatures we share this planet with. And as my forester friend David Brynn says, “The premier forest product of the 21st century will be high-quality water.”

Forests are also “put to work” when they provide non-timber products (e.g., mushrooms, wildflowers, berries), recreational opportunities, and spiritual nourishment for humans. We should not let go unchallenged the notion that a “working forest” is only one where trees are cut by people to make money. Let’s call this what it really is: the exploited forest.

John Elder

A Conversation at the Edge of Wilderness

from Volume 8, Number 4 © Winter 1998/99

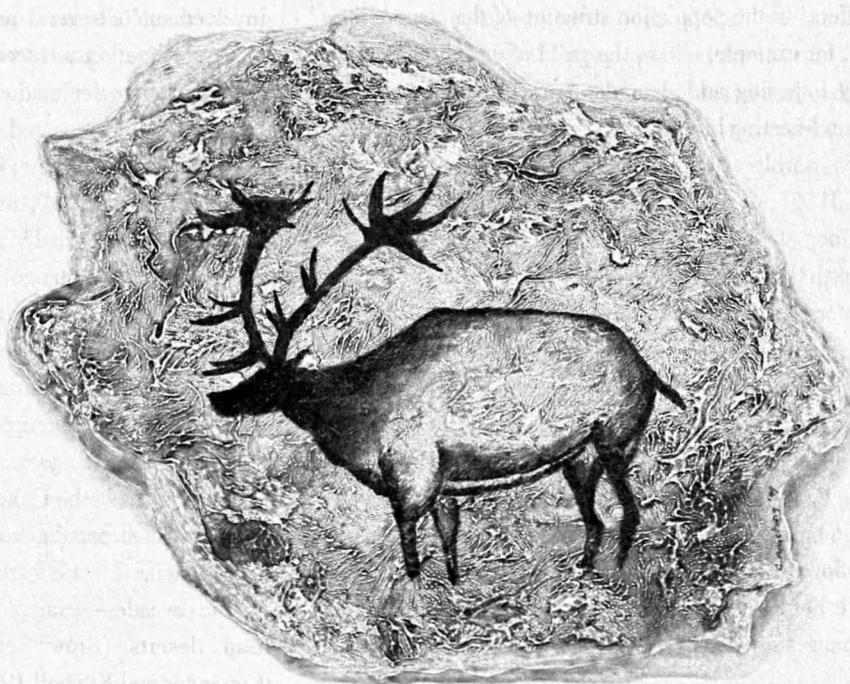


OUR SIX WILDERNESS AREAS within the Green Mountain National Forest range from less than 4000 acres in Bristol Cliffs to almost 22,000 at Bread Loaf. Gates of the Arctic they're not. Stone walls break through the ferns and jewelweed of these slopes, broken choker cables lie half buried beside trails that were logging roads not so long ago, and cellar holes collect and compost leaves in the thick woods far from any trail. These tracts of third-growth forest were not included under the original 1964 Wilderness Act, being neither "primeval" nor "untrammelled." Only after passage of the 1975 Eastern Wilderness [Areas] Act, which Vermont's George Aiken helped move through the Senate, were the lands protected because of their beauty and their biological significance. They were allowed, in effect, as afterthoughts—honorary wildernesses.

Such Vermont woodlands may have seemed marginal when added to the National Wilderness Preservation System in 1975 and in 1984. I believe, however, that they and the other wilderness areas of the Northeast are now emerging as central to our national conversation about Nature and culture. I don't mean this in a spirit of regional competitiveness. The great wildernesses of the West and Alaska are incomparably magnificent. I will always be grateful for the protection those holy sites have received and for the opportunity to travel to them on pilgrimage. But we do seem to have arrived at a moment—in our nation's ongoing dialogue about how human society will accommodate wildness—when a place like Vermont might have a helpful word to say. Our modest wilderness areas here offer an ecological edge, or ecotone, between both landscapes and perspectives that might earlier have seemed to be distinct, or even opposed.... They define a boundary zone where the wilderness ethic may engage with recent developments in the field of environmental history, and where the ideal of preservation transcending a narrow utilitarianism may engage with the tradition of stewardship. We need to move beyond polemic in our discussion of these important matters. Vermont's wilderness offers one promising landscape within which to reframe the conversation....

THE IRONY OF EASTERN WILDERNESS is that, while it may have seemed to receive that title as a courtesy, the vector of wildness may actually be more remarkable here than anywhere in the West. Not just the trees but also the animals have returned to a dramatic extent. When Zadock Thompson wrote his *Natural History of Vermont* in 1854, he described an ecological wasteland in which most of the larger wild mammals, including deer and beavers, were effectively extinct. Today, not only do we have those two particular species in bewildering abundance, but we also have rapidly increasing populations of moose and substantial numbers of such animals as bobcats, fishers, and black bears. Sightings of catamounts too are reported with increasing frequency. And current proposals to reintroduce wolves into the Adirondacks and Maine hold out the possibility that we may some day see those predators in at least the northern portions of Vermont, as well.

"Recovering wilderness" would perhaps have seemed an oxymoron just a few years ago. But that concept reflects an intriguing convergence between the environmental history of Vermont and the current emphasis upon "rewilding" within The Wildlands Project.



Cynthia Armstrong

mixed media

from Volume 9, Number 1 ☾ Spring 1999

**John Terborgh, James Estes, Paul Paquet, Katherine Ralls,
Diane Boyd-Heger, Brian Miller, and Reed Noss**

The Role of Top Carnivores in Regulating Terrestrial Ecosystems

from Volume 9, Number 2 ☾ Summer 1999

IN MANY PARTS OF NORTH AMERICA, extirpation of dominant predators has resulted in a phenomenon known as “mesopredator release” in areas supporting small to midsized predators such as foxes, skunks, raccoons, opossums, and feral and domestic housecats (Soulé et al. 1988, Palomares et al. 1995). In such areas, mesopredators act by default as surrogate top predators. This has resulted in modified niche exploitation, altered diversity, and other ripple effects in the population structure of the community. Local elimination of coyotes, for example, allows the guild of mesopredators to increase in number, thereby imposing added predator pressure on the prey. Widespread reduction of ground-nesting birds, such as quail, pheasants, grouse, ducks, nightjars, and certain warblers, has been attributed to mesopredator release (Côté and Sutherland 1997). Mesopredator release has also been blamed for the decline or disappearance of gamebirds, songbirds, and other small vertebrates from a number of North American terrestrial ecosystems....

Extirpation of top predators has released herbivore populations in parts of the United States with consequences that are just beginning to come to light. Overbrowsing by white-tailed deer is decisively altering the pattern of tree regeneration in some eastern forests and is threatening certain endangered plants with extinction (Alverson et al. 1988, 1994, Miller et al. 1992, McShea et al. 1997, Rooney and Dress 1997). Elsewhere in North America, introduced ungulates, especially Eurasian boar (*Sus scrofa*), have increased to such a degree that they are destroying wildflower beds and altering tree regeneration patterns in forests (Abramson 1992). It hardly needs to be emphasized that rapid, large-scale, and unpredictable changes in forest composition represent a chilling threat to biodiversity.

For another case, let us return to Lago Guri in Venezuela, where recently created islands in a hydroelectric impoundment are experiencing cataclysmic biological change. In a predator-free environment, three generalist herbivores have each increased in abundance by more than an order of magnitude....

Ongoing studies of forest regeneration on these islands reveal little successful reproduction of canopy trees. On some islands fewer than five species

are represented by saplings in the understory, despite the presence of sixty to seventy species in the canopy. The mechanisms by which tree reproduction on these islands is being suppressed are currently under investigation. Preliminary results suggest the simultaneous involvement of several mechanisms: deficiencies of pollination and seed dispersal; excessive seed predation; decimation of seedlings by leaf-cutter ants; and repeated defoliation of canopy trees by howler monkeys, iguanas, and leaf-cutter ants (Terborgh et al., unpublished results). In the absence of “normal” biological interactions, the remnant ecosystems of these islands have spun out of control. It seems inevitable that most of the plant and animal species that survived the initial contraction in area will be extirpated within one or two tree replacement cycles.

Vegetation change in the Lago Guri islands and in portions of the United States occupied by hyperabundant populations of white-tailed deer and Eurasian boar offer startling examples of trophic cascades—examples that mirror findings from deserts (Brown et al. 1986), lakes (Carpenter and Kitchell 1993), and Pacific kelp forests (Estes et al. 1989). To prevent ecosystems all over North America from experiencing similar convulsions brought about by trophic cascades, the full spectrum of ecological processes that operates to perpetuate biodiversity—especially predation—must be widely maintained.

Nina Leopold Bradley

Aldo Leopold

On the Path Toward Unity of Knowledge

from Volume 9, Number 3 (Fall 1999

ALDO LEOPOLD HAD A REMARKABLE PERCEPTION for unraveling and dramatizing natural events. He articulated the concept of land health and the relationships between economics, biology, and aesthetics—a tangled web of relationships: “A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise.”

As Leopold’s voice emerged, “Marshland Elegy” was a breakthrough essay in terms of conservation writing. It introduced a sense of drama and poetry into ecological imagery:

A dawn wind stirs on the great marsh. With almost imperceptible slowness it rolls a bank of fog across the wide morass. Like the white ghost of a glacier the mists advance, riding over phalanxes of tamarack, sliding across bog-meadows heavy with dew. A single silence hangs from horizon to horizon.

In a splendid essay reviewing “Marshland Elegy,” Curt Meine noted that “This was not the language of science, or policy, or pedagogy, or philosophy, although strong undertones of these hummed in, and in between, the lines. Rather, this voice carried a ‘certitude’ not unlike that of the cranes of which he wrote.” In my father’s essays we hear an emotional thread of *consilience*. He brought together Nature and culture, emotion and intellect, philosophy and science, ethics and aesthetics.

The renewed sense of interconnectedness with Nature and the willingness of individuals to act on that basis may be the core of the new environmentalism. Conservation issues are no longer narrow and vague. They are as broad as human population growth, climate change, and the global extinction crisis—and as personal as pollution in our backyards and chemical residues in our food. We know that environmentalism is more than a problem of chemistry, biology, or economics.

Progress toward more integrated learning may expand our ability to recognize and act upon our moral responsibility to the future. In 1947, Aldo Leopold defined the necessity for the integration of a wide span of knowledge, leading to humanity’s ethical relation to the land. In the subsequent 50 years, others have refined such statements and have helped to reinforce the need for a unity of knowledge.

But we are only just beginning.

ALASKA

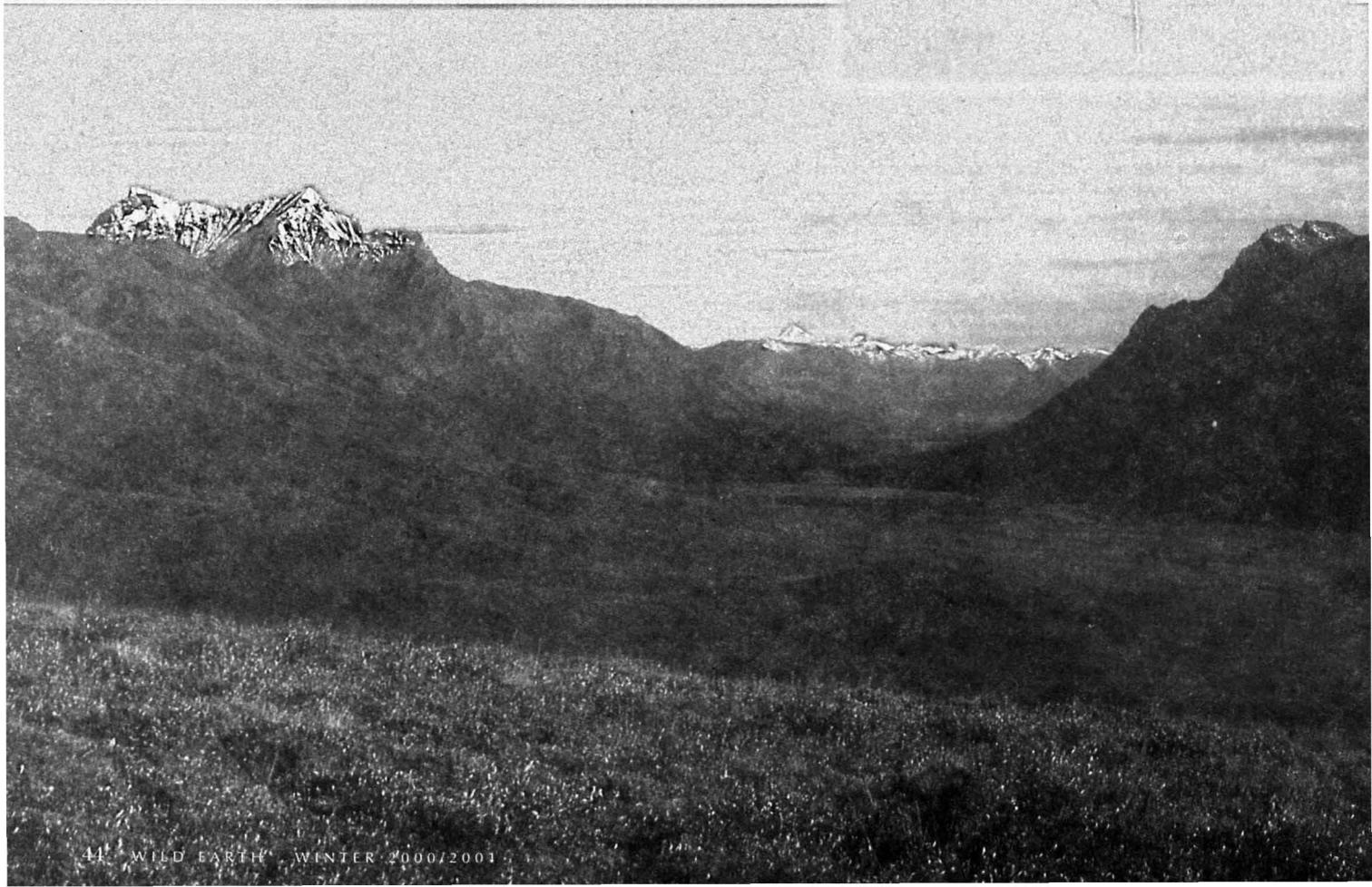
The Wilderness Legacy

AND

of Robert Marshall

BEYOND...

by Roger Kaye



The coming of an aeroplane was always a prominent event at Wiseman, an isolated frontier mining camp nestled amid the nameless mountains and unmapped rivers of the Central Brooks Range. In the warm afternoon of July 22, 1929, a group of Inupiaq Eskimos and white prospectors gathered at the north end of the settlement's narrow dirt airstrip to watch pioneer bush pilot Noel Wein unload his Hamilton monoplane.

Among the onlookers was an inquisitive 24-year-old Inupiaq Eskimo woman named Tishu Ulen. More than 60 years later, just before her death, she still remembered the tall, broadly smiling passenger who stepped down from the cabin. As his outfit was off-loaded, she recalls noticing cameras, tripods, and "a lot of stuff we never seen before," but none of the usual implements of a gold seeker. This white man was unlike any that had come before.

ROBERT MARSHALL, OR OOMIK—THE BEARDED ONE—as the Eskimos would soon affectionately call him, arrived in zealous pursuit of a quest. But his search, unlike those of his predecessors, was not driven by gold, furs, or souls of the unconverted. He came seeking inspiration: "the joy of exploration in untraveled lands...the elation of days spent in the little explored, uninhabited world of the arctic wilderness."

History would too soon document the extraordinary life and premature death (at age 38) of Robert Marshall. By the time of his death, a decade after his first of four trips to Wiseman, he was nationally recognized as a founder and leading spirit of the nation's growing wilderness preservation movement. Despite a brief life, he left a legacy of achievement—as a conservationist, scientist, forester, frontier sociologist, best-selling author, and social reformer.

In Alaska, the Harvard educated visionary has been credited, and blamed, for first bringing to a head the state's continuing preservation versus development conflict. And prominent among the many wilderness areas established largely as a result of Marshall's inspiration is the reminiscing Eskimo woman's homeland, now the Gates of the Arctic National Park.

Robert Marshall was born in 1901 in the heart of New York City. His father, Louis Marshall, was a pre-eminent constitutional lawyer, widely known for his controversial defense of civil

liberties for Indian, Jewish, and Black Americans. Childhood placed Marshall among the most liberal, intellectual, and influential of his society, a background that would prepare him well for a lifetime of championing causes ahead of their time.

He once told Ulen during a Wiseman visit that his attraction to wild places and their inhabitants originated with a children's book on the explorations of Lewis and Clark. As a teenager, his wealthy family's summer home in the Adirondacks became a base for marathon hiking and mountain climbing trips, his "greatest joy in life." That early passion for exploration and arduous trips would never wane. By the end of his last Brooks Range expedition in 1938, he had taken more than 200 thirty-mile day hikes, and 51 of at least forty miles.

In high school, Marshall made an unusual career choice for a boy of his social class. He would become a forester. Before graduating from Syracuse University's College of Forestry in 1924, he wrote a forceful paper arguing for protection of the remaining virgin Adirondack forests and their aesthetic and inspirational values. It espoused the basics of a wilderness philosophy that would come to dominate his life.

The Forest Service of the 1920s was far from ready for Marshall's idealism when he entered the agency as a forest researcher in Montana and Idaho. In two published articles, "Forest Devastation Must Stop" and "A Proposed Remedy for Our Forest Illness," he advocated radical reform of the timber industry for its "decimation of the forest's productivity...and the ruination of the forest beauty." He doggedly urged resistant bureaucrats to set aside some of the agency's remaining roadless areas as wilderness, "before some damn fool chamber of commerce or some nonsensical organizer of unemployed demands a useless highway to provide work and a market for hotdogs and gasoline."

Indeed, prevailing opinion of the emerging motor car era saw roads and hotels in the national forests and parks as a proper application of the utilitarian doctrine of providing the greatest good for the greatest number (of the present generation). Thus Marshall found himself arguing with Forest Service officials who opposed wilderness based on the view that the majority of the population benefited from development.

In 1928, he responded in a Forest Service publication with the first of his celebrated expositions of wilderness philosophy, "Wilderness as a Minority Right." Its premise was that a democratic society should also accommodate the preferences of the few, such as those whose "most splendid moments come in the opportunity to enjoy undefiled nature." He supported construction of roads and facilities for the majority who preferred them, but not where they would "be molesting the few remaining vestiges of the primeval."

Looking north at Boreal Peak and Frigid Crags from the North Fork of the Koyukuk River. Robert Marshall (inset) called these peaks the "Gates of the Arctic."

Marshall's yearning to experience an adventure like that of his boyhood heroes, Lewis and Clark, led him in 1929 to the ultimate wilderness of Ulen's Koyukuk country. Searching an atlas of Alaska, the vast blank spot north of Wiseman held promise for what he craved: "something glorious in traveling beyond the ends of the earth, in living in a different world which men have not discovered, in cutting loose from the bonds of world wide civilization."

The scientific justification for his journey—to research the northern limits of tree growth—proved secondary to his fascination with the wilderness. Marshall spent a month exploring, mountain climbing, and mapping the upper Koyukuk River. His journal, published posthumously as *Alaska Wilderness*, reveals a man overwhelmed by scenic grandeur and the stimulation of "venturing beyond the bounds of normal aptitude, stretching oneself to the limit of capacity and occasionally facing peril."

"He came back to Wiseman crazy in love with the country," recalls Ulen. "He kept talking about keeping it the way it is...without roads or buildings...so it would always be like nobody been there before. He said it shouldn't be like where he came from."

But the worldview of Ulen and her people could provide them no understanding of Marshall's alien perspective. For a culture that had traveled the unchanged landscape for millennia, wilderness was an abstraction; Marshall's emerging insight—that if civilization extinguished wilderness, something of ourselves will be lost as well—was unfathomable.

In spite of his odd views, Marshall "fit right in with us," according to Ulen. "He visited around for a month and did things with people...he wanted to learn about us." His novel personality and outgoing sense of humor made him immediately popular with the Eskimo women. "We showed him how to dance and took turns being his partner to see how long he could go—boy he was full of fun!"

While dancing with Marshall one evening, Ulen's aunt Nakukluk told Marshall what she thought of his strange ideas. He included a translation of her thoughts in a letter to his family: "What you say fills me with a sort of amused wonder...I refuse to pass judgement on whether you are crazy, or whether nature has brought together strange circumstances which entirely transcend any experiences which have thus far given me my ideas of...the possible and impossible."

From Wiseman, Marshall returned with renewed ambition to graduate school at Johns Hopkins University. Over the next year he completed his doctorate in plant physiology, advocated social reform, and continued to challenge entrenched forestry officials.

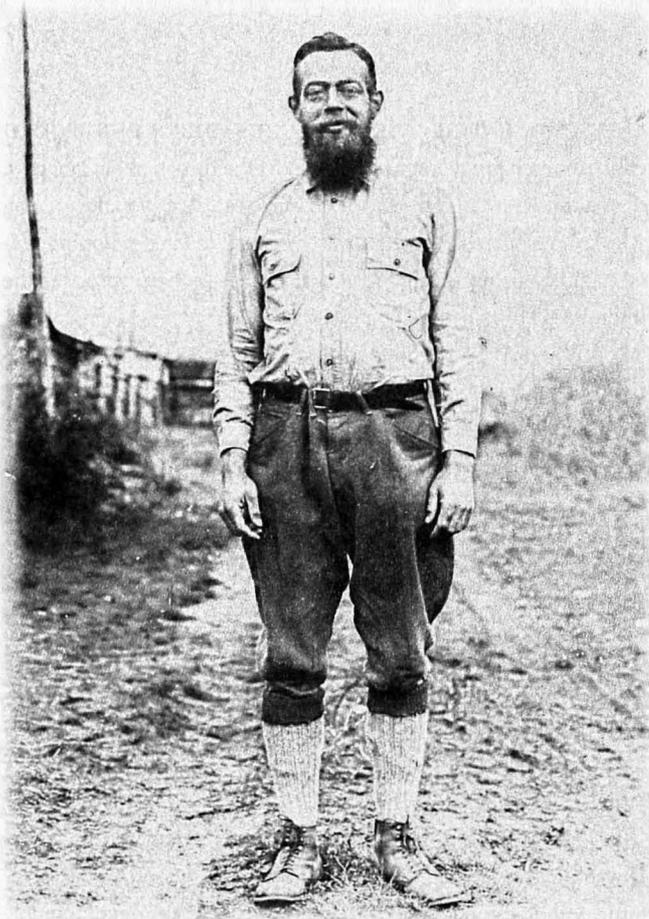
Most importantly, he wrote "The Problem of Wilderness," a penetrating article later called the "Magna Charta" of America's fledgling wilderness preservation movement. The article reveals Marshall's use of the emerging science of psychology to understand the restorative, inspirational, and self-enhancing benefits of wilderness that the transcendentalists and romantic naturalists acclaimed. Drawing upon Freudian theory, he reasoned that the norms and roles modern society imposed, and the pressure for conformity, suppressed some basic human urges and desires. Civilization restrained the natural impulse to think creatively and independently. Marshall found that, "One of the greatest advantages of the wilderness is its incentive to independent cogitation." The physical and psychological distance wilderness provided from the "repressive" influences and "contaminating notions" of society was conducive to mental freedom. A contributing factor was the aesthetic effect of wilderness, more stimulating than art, music, or poetry, Marshall reasoned, because immersion in wilderness engages all the senses; one is "encompassed by his experience."

Further, Marshall argued that wilderness was a fundamental influence in molding American character. Beyond adventure, he said, "is the character of physical independence which can be nurtured only away from the coddling of civilization...As long as we prize individuality and competence it is imperative to provide the opportunity for complete self-sufficiency."

The article's concluding call for action foreshadowed formation of the Wilderness Society, for which the author would become the charismatic organizer, benefactor, and driving force: "It is exigent that all friends of the wilderness ideal should unite....There is just one hope of repulsing the tyrannical ambition of civilization to conquer every niche on the whole earth. That hope is the organization of spirited people who will fight for the freedom of the wilderness."

TWO THINGS DREW MARSHALL BACK TO ALASKA THE following summer. One was a restlessness to experience more of the country. More important was his fascination with Wiseman's 100-some Eskimos and sourdoughs of the remnant frontier and how wilderness contributed to their being "the happiest folk under the sun."

During a 13-month residence, between expeditions with local companions, he embarked on a detailed sociological study of Wiseman. He explored attitudes and behavior, and documented the practical and deeply personal aspects of life "two hundred miles beyond the edge of the Twentieth Century." Subsistence and mining activities, Eskimo-White relations, philosophies and religious beliefs, personal histories, quarrels, gossip, sex life—no



subject escaped his 5,016 minutes of recorded conversation, statistical description, and revealing anecdotes.

The Eskimos couldn't guess his motivation. "He never told us he was writing a book," Ulen said. "We wondered about his strange questions and why he was always writing in his notebook or on his hand."

One day Ulen and four other curious girls plotted to snatch Marshall's notes. "We made for him, but he got away.... We decided to get even with him." The next day they invited him over to make taffy. When he arrived—without his notebook—"We grabbed 'im and wrestled 'im to the floor...and rubbed sticky taffy all over into his hair and beard. We got him good alright...but he never put that into his book!"

Arctic Village was published in 1933, a year and a half after Marshall's return to the Forest Service from "the most glorious year of my life." Its concluding statement reflects his admiration for a way of life immersed and in harmony with Nature: "A person misses many things by living in the isolation of the Koyukuk, but he gains a life filled with an amount of freedom, beauty and contentment such as few human beings are ever fortunate enough to achieve."

Ulen thought it was a good book. But like other observers, she felt perhaps the idealistic author missed the extent of hardship, the growing alcoholism, and stress of cultural change. In

spite of its romantic portrayal, the book was appealing to a nation in the midst of depression, questioning, like Marshall, what part of our humanity had been lost to industrial civilization. Quickly it became a best seller and a Literary Guild selection.

That same year Marshall's controversial book on forest policy, *The People's Forests*, was published. Advocating radical reform in forest management, its daring indictment of the powerful timber industry is revealed by Marshall's proposed title, rejected by the publisher: *Those Bastards, The Lumbermen*.

Marshall quit the Forest Service that year for the Indian Service (today the Bureau of Indian Affairs) where he became responsible for reforming federal policy which had resulted in the abuse and loss of Indian lands. His belief that preserving Indian culture was inextricably linked to preserving undeveloped land led to designation of almost five million acres of reservation land as roadless and wild.

Much of Marshall's spare time during this period was devoted to opposing the National Park Service's program of expanding roads, hotels, concessions, and other conveniences in parks. He criticized the agency for "the inexcusable fake Hopi watch tower at the brink of the Grand Canyon, the luxurious developments on the floor of Yosemite Valley which have ruined all primitive effect...and the general artificiality everywhere." Unsuccessfully, he urged Interior Secretary Harold Ickes to create a Wilderness Planning Board, "free of stuffed shirts," to select some areas to be set aside as real wilderness, not as make-believe.

The injustice of discrimination, with which his Jewish heritage had provided personal experience, was also capturing Marshall's energy. His involvement with social reform, minority groups, and chairmanship of the Washington branch of the American Civil Liberties Union caused him to be denounced on the floor of the House of Representatives. Participation in a demonstration led to an arrest, furthering his reputation as a radical.

In 1937, Marshall returned to the Forest Service as its Chief of the Division of Recreation and Lands. There, he launched controversial projects to end discrimination against minorities in campgrounds and resorts within national forests, and tirelessly advocated for wilderness protection. He was more successful in the latter effort. His efforts contributed to the expansion of the Forest Service's system of "primitive" areas by more than five million acres. And the agency adopted regulations to prohibit logging, road building, resorts, and other developments in wilderness areas.

By the time Marshall returned to Wiseman in 1938, every adult resident had received a copy of *Arctic Village*, and a check for \$18—their share of Marshall's fifty-fifty split of the royalties with the community.

The book's frank portrayal of intimate personal details and uncensored quotations, Ulen recalled, had caused an uproar. "The day the books came on the mailplane, everybody was sayin', 'How come you told him that about me?' and 'I never thought he would put all that in a book!' I just laughed my sides out."

But in spite of their embarrassment over the book, most villagers welcomed Marshall's return. "We had great fun wise-cracking at him," Ulen recalled, "and joking about all the arguments his book started."

Tishu Ulen was born to a traditional nomadic Inupiac Eskimo family, but the family had settled by the time Robert Marshall arrived in 1929. Ulen, at right, with lynx and wolf pelts in the 1940s, below, in the 1980s; both photos in Wiseman.



ONE YEAR LATER, THE BUSY CRUSADER'S PEN WOULD cause a much greater stir in Alaska. At the direction of Congress, a committee was formed to organize a plan for developing Alaska's resources. Marshall was responsible for developing recommendations regarding recreation, but his section, reflecting the influence of his Koyukuk experience, was far more encompassing.

"When Alaska recreation is viewed from a national standpoint, it becomes at once obvious that its highest value lies in the pioneer conditions yet prevailing," he wrote. "These pioneer values have been largely destroyed in the continental United States. In Alaska alone can the emotional values of the frontier be preserved."

He suggested a sweeping proposal: "Because the unique recreational value of Alaska lies in its frontier character, it would seem desirable to establish a really sizeable area, free from roads and industries, where frontier conditions will be preserved." He went on to recommend that "In the name of a balanced use of America's resources, let's keep northern Alaska largely a wilderness."

The final report, "Alaska—Its Resources and Development," aroused a storm of protest. The territorial legislature condemned its cautious approach to development. Newspaper editors joined promoters, sparing no criticism. The Fairbanks newspaper, after roundly castigating Marshall, went on to say that if wilderness was wanted anywhere, it should be in the dust bowl or sub-marginal lands of the Lower 48.

Marshall's provocative concept—a permanent American frontier—inspired angry charges of "federal lockup" and "strangle-hold on progress," rhetoric that would be aimed at wilderness proponents for decades to come. But so too, it inspired the emerging preservation movement, opening minds to a fuller range of recreational, cultural, and spiritual values that Alaska's wilderness offered future generations.

The travails of Robert Marshall ended November 10, 1939, shortly after his fourth visit to Wiseman. Heart failure was suspected, although it is known that in his last years he suffered critical medical problems he kept hidden. Ulen recalled that he had a violent seizure during his last attempt to climb Mt. Doonerak—an occurrence his companions pledged to secrecy.

Some thought the deepening sense of urgency with which he worked meant he knew he was fatally ill. Perhaps his body was just no longer equal to the demands his spirit was placing on it. His death revealed how completely Robert Marshall was motivated by ideals, not material wealth. He died with few possessions, never having owned a home or even a car, but left a bequest in excess of \$1.5 million to the causes of civil liberties and wilderness preservation.

A FEW YEARS AGO, ULEN AND I WERE WANDERING through Wiseman, pausing at sites that stirred her memory. The all-but-abandoned settlement looked very different than it had decades earlier. Tall aspen trees grew where Marshall's cabin once hosted late-night discussions about life in the wilderness. To the east was the Alaska Pipeline and Dalton Highway, bisecting the wholeness of the Brooks Range and replacing the Koyukuk Valley's timeless silence with the rumble of semi-trucks bound for the Prudhoe Bay oil fields.

But, just to the west, Marshall's adventuring ground is now preserved by an eight-million-acre national park wilderness, named for his description of two mountain sentinels—the Gates of the Arctic. His talk about the future need for lines on paper and regulations had seemed so strange to the villagers in 1929, Ulen told me, but now she understood.

We talked about his explorations. "No, he wasn't the first to travel any of the country," Ulen said, "I think he just imagined he was."

She was right, of course. Marshall's *terra incognita* was, really, the wilderness within. In a short essay published posthumously, Marshall extolled the recreational, restorative, and aesthetic values of wilderness. But he concluded that "they are blended with the dominant value of being part of an immensity so great that the human being who looks upon it vanishes into utter insignificance."

Humility, Marshall discovered, was the initial experience that opens one to the implicit message of wilderness—known intuitively to Ulen—that humankind remains embedded within an entity greater, more universal, and more lasting than modern society, and its inventions and conventions.

In the overwhelming presence of a landscape "with its entire freedom from the manifestations of human will," he felt primacy of the self give way to a sense of being part of a larger whole. In having "forgotten his own soul," Marshall found the "perfect objectivity" to transcend the narrow confines of self-concern and boundaries that society places on one's thinking, feeling, and imagining.

In this "freedom of the wilderness," Bob Marshall experienced the ancient resonance between wild nature and human nature. He thus found the wellspring from which the greatest benefits of wilderness flow—as we discover our relatedness to the world outside ourselves, we recover what we have lost within ourselves. ☾

Roger Kaye (rkaye@mosquitonet.com) is a wilderness specialist and pilot with the US Fish and Wildlife Service and teaches wilderness management at the University of Alaska.

Coda

If you were to shed your shoes
peel off your socks
to let your toes sink deep
into the sand of each dune or gravel bar
you knew well while still a child

It would not be hard at all
to close your eyes, cross your heart
firmly pledge allegiance once again
to what you've cared for longest in life

Those elderly women who held your hand
against their breasts and let you moan
the sky that stuns you every time
you've ever looked up on any night

Fresh-smelling bodies after baths
the pleasures of towels, tickles, laughs
the taste of ripe fruit, the juice
dripping down around your mouth

The tightening, relaxing of your groin
when stroking tells your body "here I am"
where it has always been: within
this world, brilliant light exploding all around you

To such an earth as this
its very particles clinging to your toes
you've remained faithful from the start.
Promiscuity? Other worlds?
Who needs more, more than this?

—Gary Nabhan

Rewilding Mallory Swamp

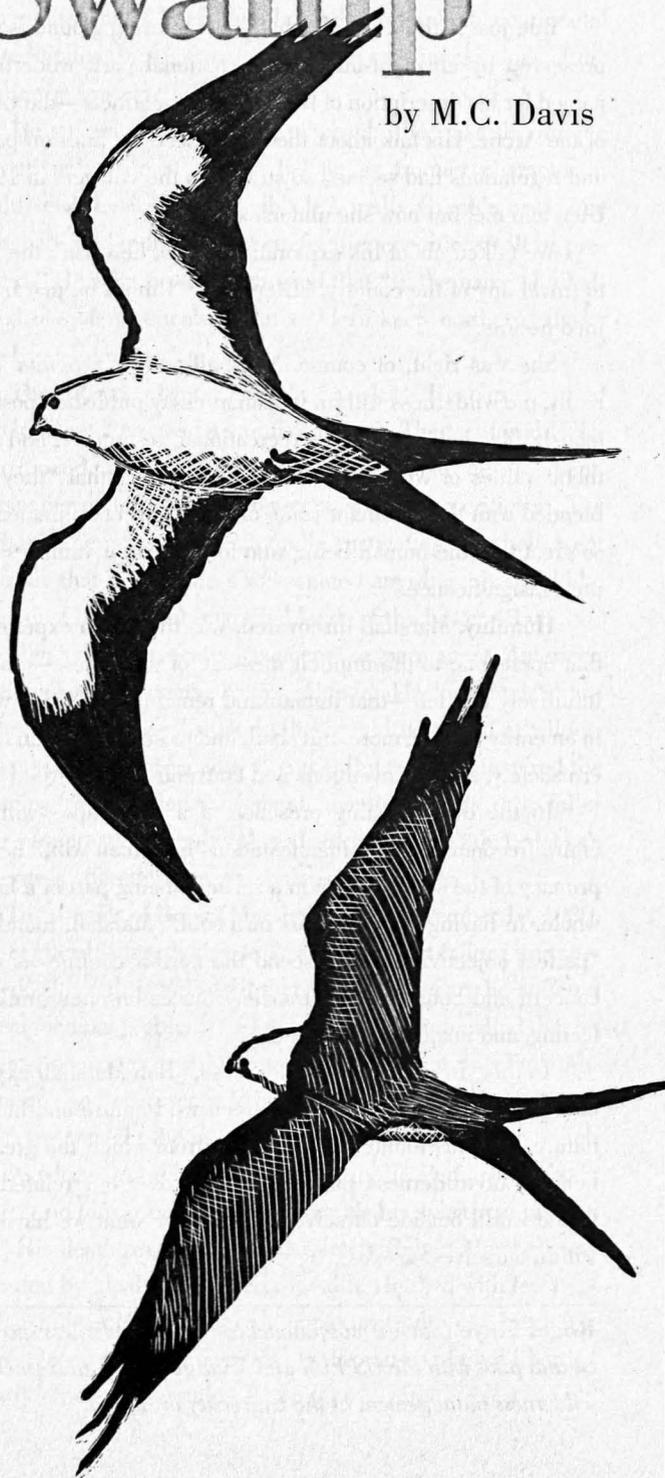
by M.C. Davis

The Mallory Swamp Restoration Project is the largest privately owned and funded wetland protection and restoration effort on the continent and the largest private restoration of any type east of the Mississippi River. Comprised of 30,000 acres of forested wetland, the project area is located in Lafayette County, Florida, 45 miles west by northwest of Gainesville. Many of the remaining large tracts of wildland in Florida are within this part of the state, known as the Big Bend. Not surprisingly, the region is also home to great diversity and an abundance of plant and animal species, including remarkable creatures such as the Florida black bear, swallow-tailed kite, bobcat, short-tailed hawk, and eastern indigo snake. The swamp also encompasses about 20 percent of the foraging habitat available to five long-standing wading bird colonies that contain such imperiled species as the wood stork, white ibis, little blue heron, and snowy egret.

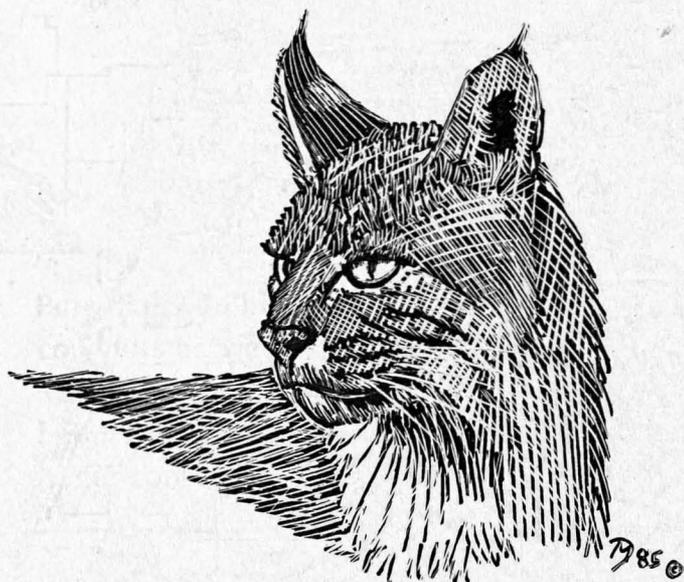
It is particularly exciting to consider the potential of Mallory Swamp as a *landscape scale conservation project*, a hub for connecting several other, larger protected areas. As Reed Noss remarked, "The coastline of the Big Bend region of Florida is the largest undeveloped coastline in the United States outside of Alaska. Successful rewilding is possible, because viable core linkages to necessary habitat exist" (Mallory Swamp Restoration Project website).

I formed the concept for this project in 1994 after starting to explore the literature of conservation—and coming to realize the need and potential for private wildlands philanthropy. I began purchasing acreage in 1995. The lands were chosen for a variety of reasons, including their large-scale potential, their availability and affordability (prices in Florida's Big Bend region are still relatively low, \$400 to \$600 per acre), and because they were identified by the State of Florida as a strategic habitat conservation area. Portions of the land are considered hotspots of diversity, with habitat conditions appropriate for rare wildlife species.

When I initiated the project, I did not know much about conservation, but I knew that whatever I did should be large. At that time, I considered 10,000 acres to be "large," and that is the amount of land originally purchased. I immediately began to study the works of the past masters, such as Leopold, Carson, and Muir, which led me to the works of current practitioners, such as E.O. Wilson, Reed Noss, and Michael Soulé. From these



swallow-tailed kites and bobcat by David Maehr



studies, it soon became evident that for many wide-ranging species “large” was not 10,000 acres (e.g., scientists believe that black bear sub-populations need a minimum of 500,000 acres or more to sustain a genetically healthy reproducing population 200 years into the future)—nor was it enough for many broad ecosystem processes to unfold (e.g., natural water flow regimes). After further study, it became apparent that if our project was to have long-term importance for biodiversity, it should be a major contribution to an entire landscape effort. I then asked, “How does one conserve on a landscape level where all of the lands needed are not contiguous and possibly not available?” A potential answer was found in the works of various landscape ecologists who suggested that in such a situation, the core lands should be connected by corridors and that all should be buffered. The best illustration of this hypothesis is found in *Saving Nature's Legacy* (Noss and Cooperrider 1994), and this text has been our pattern for expansion.

In order to accomplish this landscape-scale goal, it was obvious that the project would need partners who had more power and money than I did. The effort was greatly enhanced when Sam Shine and the Suwannee River Water Management District (SRWMD) joined as joint venture partners. Shine is a devout conservationist and a noted wildlands philanthropist. The SRWMD is an aggressive, well-funded group of passionate conservationists that is unbelievably effective—especially noteworthy within the bureaucratic confines of a governmental agency.

The rewilding began in earnest after Shine purchased an adjoining 20,000 acres and placed them in the Mallory Project, and the SRWMD purchased a conservation easement on the two combined parcels. With this public funding, the expansion and overall effort was accelerated and magnified; it underlines the

value of private seed money attracting governmental support and the need for ongoing public/private partnerships.

The project's continued expansion is going well. The SRWMD buffered the south boundary of Mallory Swamp by purchasing an 18,000-acre conservation easement and is negotiating with landowners to the east and west for easements. The Mallory Swamp Project is negotiating for additional land purchases and conservation easements that are contiguous to the core. Also, the water district and Mallory Swamp are jointly pursuing a connection to California Swamp, another 30,000-acre wildlands swamp located 16 miles to the south.

Our near-term goals are to connect—via wildlife corridors at least one mile wide—to the Suwannee River, which is three miles to the east; to the 18,000-acre Steinhatchee River Preserve, located nine miles to the west; and to the California Swamp referenced above. The long-term goals are to connect these core protected areas to additional conservation lands, such as St. Mark's National Refuge, Chassahowitzka National Wildlife Refuge, and Osceola National Forest. If all of the proposed cores and corridors are established, the total of all connected lands and buffers would be approximately one million acres.

As we bring more acreage into conservation status, we also seek to reestablish natural ecosystem dynamics. In this rewilding effort, we are sticking to the basics, because we agree with many noted biologists who believe that an ecosystem is so dynamic and complicated that a total understanding of its workings exceeds the present knowledge of human beings. We also adhere to Edwards Deming's advice when he cautions, “Don't spend much time on trying to know the unknowable” (Deming 1982). The *basics* are: 1) restoring hydrology where possible and practical, 2) prescribed burning, and 3) replanting of key flora species. Because the areas to be conserved are so large, Nature will be in charge of the rewilding (other than the basics). We believe that the vast majority of our resources should be spent on expansion and only essential restoration actions should be taken in the near term.

The entire project area has no paved or public roads, no utility lines, and limited access to the public. Consequently, it has virtually no exotic species. Nevertheless, the area has been harmed by decades of commercial timber operations, so some crucial restoration actions are warranted. In the recent past, timber companies cut long, deep ditches to drain swamplands and make the site favorable for fast-growing pine trees. Therefore, for example, the Mallory Swamp Restoration Team restored hydrology to 4,000 acres by placing ditch blocks, closing water control structures, and filling in some ditches. These efforts will benefit scores of rare wading birds that nest within a short distance of the property and reg-

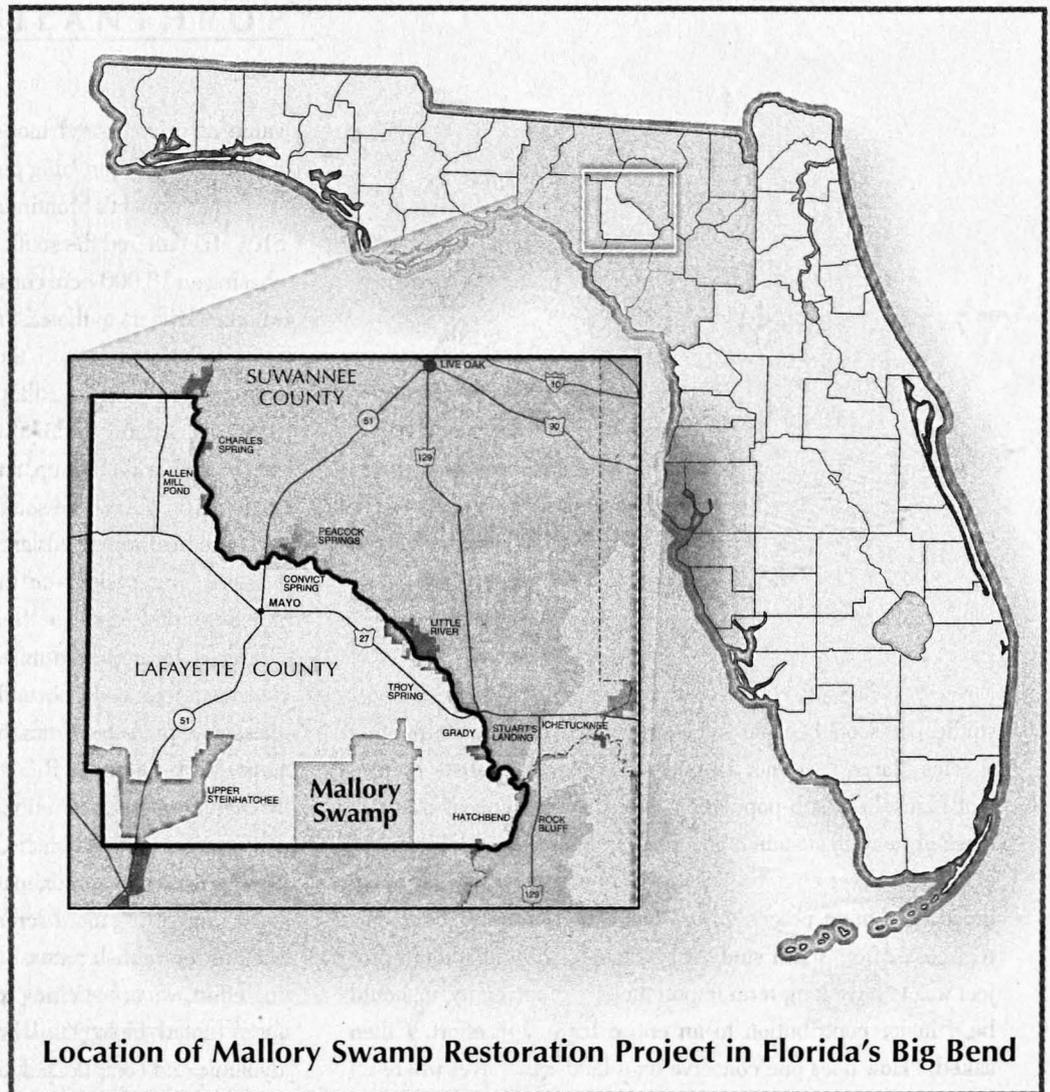
ularly use Mallory Swamp. In addition, because Mallory Swamp forms the headwaters of the Steinhatchee River, hydrologic restoration will help revive natural flow regimens to this slow-moving water body. On a wider scale, water quality in the Mallory Swamp advances the health of salt marshes and seagrass beds along the Gulf of Mexico that support marine fisheries.

Timber companies and others also suppressed fires—the natural force that maintains plant communities in the swamp as it does throughout the Southeast. Periodically in the past, forest fires, ignited by lightning from summer thunderstorms, raced through Florida. These fires often burned vast areas encompassing several counties, and were extinguished only by rain or a water barrier like a lake, river, or swamp. The fires, although frequent, were usually not intense and killed few large trees. These fires cleared the forest floor, recycling nutrients and encouraging a diversity of plant growth, and the flowering and fruiting of plants such as saw palmetto and gallberry, which provide food for insects, birds, and a variety of mammals including deer, raccoon, opossum, and bear. Although the ancient swamps and forests survived thousands of years of fire, they have not fared well since European settlement. Fire suppression, both direct and indirect (from firebreaks such as roads, development, and clearcuts), has led to artificially dense vegetation and poor-quality habitat for wildlife. Therefore prescribed burning, which mimics the natural frequency of lightning-caused fires, is an essential step toward rewilding Mallory Swamp.

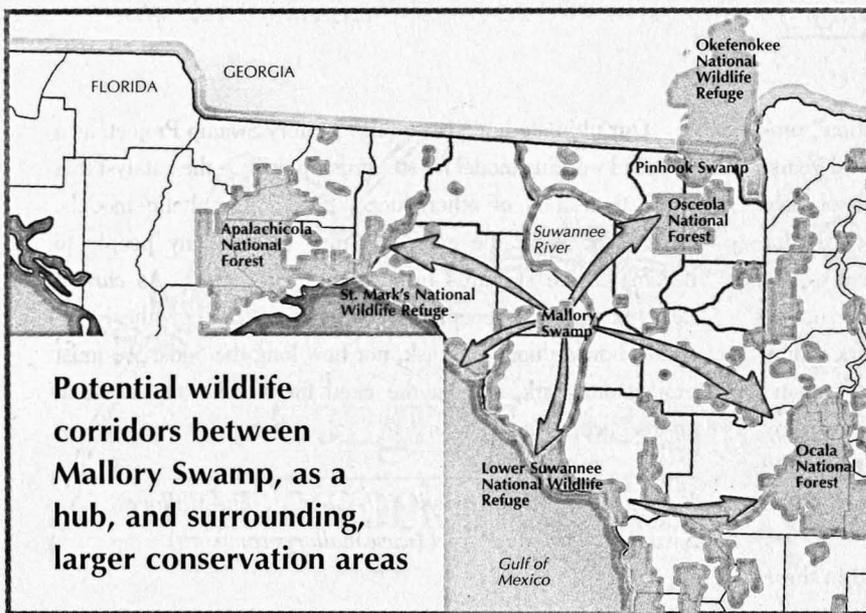
STEWARDSHIP HAS BEEN THE DRIVING FORCE FOR OUR efforts. What is stewardship? At its most basic, it simply means *administering to the affairs of others*. Of course, in the world of conservation it has a somewhat broader meaning. To many conservationists, a steward is one who actively tries to conserve and preserve the environment for the benefit of all species. Under this

definition, which stewards are recognized by the public? Many who I talk to believe that our stewards are various service agencies of government (e.g., the Environmental Protection Agency and water districts), followed by national nonprofit organizations such as The Nature Conservancy, Audubon, and Defenders of Wildlife. When requested to name any individuals who are examples of stewards of the environment, the public will often name Ted Turner and Doug Tompkins on a national and international scale, while people such as Sam Shine and myself might be named in our region. All of the preceding examples are stewards for biodiversity; however, they may not be the most effective or successful stewards—they are merely the most recognizable.

For a vital conservation agenda to continue, governmental agencies cannot be relied upon as the *only* long-term environmental stewards. While the current behavior of some agencies shows real progress from earlier decades, many of them were founded with mandates that led to the destruction of ecological health. Even currently, they operate in such an equivocal manner that, while they can play a valuable role, they must constantly be tempered and balanced by the efforts of conservationists.



Location of Mallory Swamp Restoration Project in Florida's Big Bend



For example, the water districts in Florida were created during the mid-1800s for the sole purpose of destroying wetlands. They accomplished this to an unparalleled extent through the tenacious use (misuse) of governmental power and money. Currently, they are rightfully recognized as being among the very finest of conservationists. Nevertheless, the water districts' past programs have been dreadfully wrong, causing a huge magnitude of direct destruction of wetlands and indirect destruction of transitional lands and uplands. Likewise, while the Environmental Protection Agency has done some good, this agency formed many of its policies to assuage the fear of the public after the sensational exposure of Rachel Carson's *Silent Spring*, and in the meantime, business continues as usual. From this perspective, can we ever be secure in relying upon government agencies as our only stewards of wildlands and wildlife? It may not be too much to say that private conservation activism is the necessary watchdog of the governmental watchdogs!

Although I am an active member and financial supporter of many nonprofits dedicated to conservation, I also know that they operate quite similarly to other large businesses. They raise huge amounts of money and are sometimes led by egomaniacs who make significant compromises when challenged, have insatiable appetites for growth, are grossly inefficient, and often lose their focus. Should the nonprofits be the last line of ecological defense?

An analysis of the third group of stewards—wealthy individuals—requires a definition of wealth. *Nature's wealth* is the only true wealth. All of those who acquire wealth have been exceptionally skilled at taking advantage of the various processes of extraction and conversion of natural capital. It follows then, that one who is wealthy is someone who is in control of a large amount of Nature's wealth (as represented through money). This person has produced no wealth, but has merely benefited from the *extraction, conversion, and alteration of Nature's wealth into human wealth.*

While many appreciate the conservation efforts of a Ted Turner or Doug Tompkins, the results of such efforts (under the most favorable conditions) are only a partial recycling of human wealth back to Nature—an inefficient process at best. Surely, they cannot be the best examples of stewards.

If not any of the preceding, then *who* are the purest stewards? They are those who dedicate a major portion of their lives to conservation and intentionally limit their impact on other species. This calling may take the path of an educator, biologist, ecologist, naturalist, activist, etc. They are people at the field and project level who have such a passion for their work and find the rewards so

satisfying that, for the most part, they have rejected a life focused on material gain. (I respectfully submit that many of the readers of this essay are the finest examples of this kind of land steward.)

The constituency for biodiversity protection will remain limited, so long as there is not a broad recognition of the social and economic gain from conservation. The public will not consistently support a long-term goal that calls for continuous deprivation. While polls show that the vast majority of Americans have concerns about the quality of our environment and are at least *somewhat* in favor of conservation, their resolve weakens when they perceive such action to be in direct conflict with their accumulation of wealth. This misperception can be changed only by bringing new knowledge into their lives. Today's land stewards, in their various forms, should all deliver this knowledge. David Ehrenfeld gives us direction in declaring,

The business of prophecy is not foretelling the future; rather it is describing the present with exceptional truthfulness and accuracy. Once this is done—and it is an overwhelmingly difficult task—then it can be seen that certain broad aspects of the future have become self-evident, while other features, including many of the details, remain shrouded in mystery. (Ehrenfeld 1993)

In our effort to rewild Mallory Swamp, we have attempted to follow the principles of conservation biology as described by Reed Noss and others, as well as the principles of a true conservation education as expressed by Senegalese poet Baba Dioum: "In the end, we conserve only what we love. We will love only what we understand. We will understand only what we are taught." We also concur with the hypothesis of David Ehrenfeld, who stated that conservationists could through "prophecy" change the behavior of people.

These values direct the outreach and “bioeducation” programs that are an integral part of our efforts. For several years, once a week, science classes from a nearby high school have made their pilgrimage to the swamp. As the staff biologist for this project, Christine Small, always says, “scientifically, they were getting their feet wet.” Literally, their feet, legs, torso, and if there’s a slip, head and hair all get a dose of the dark waters that feed the Suwannee. Small is known as the “swamp woman” of Lafayette County. The curious moniker has been given her by hundreds of high-school and junior-high students who, over the years, have watched in disbelief as she plunges waist deep into the murky brown waters of Mallory Swamp.

Small and these students are out mucking around in these waters in order to monitor the restoration of Mallory Swamp. According to Small, “The students have participated in a unique program to preserve Florida’s biological diversity, an initiative that strives to engage students in conservation and restoration by providing an outdoor laboratory” (Mallory Swamp Restoration Project website). As an entrance into the ecological processes at work, students get involved in water quality sampling, dip netting, and seining area waters. Instilled with a sense and knowledge of place, these future community leaders have the critical environmental experience to make them better stewards of the land and wildlife.

Our ultimate hope is that the Mallory Swamp Project, as a powerful working model for stewardship, will be the catalyst that spurs thousands of other successful and prophetic models. These models in the aggregate may cause many people to become active stewards for wildlands protection. As *current stewards* we must accept the challenge of this hypothesis, no matter how arduous the task, nor how long the odds. We must project our work, so that the need for massive conservation efforts becomes self-evident. ☺

Businessman M.C. Davis is a co-founder of the Mallory Swamp Restoration Project (www.malloryswamp.org).

SOURCES

- Blake, Nelson Manfred. 1980. *Land Into Water/Water Into Land: A History of Water Management in Florida*. Tallahassee: University Press of Florida.
- Deming, W. Edwards. 1982. *Out of the Crisis*. Cambridge: Massachusetts Institute of Technology.
- Ehrenfeld, David. 1993. *Beginning Again*. New York: Oxford University Press. p. 9.
- Mallory Swamp Restoration Project website: www.malloryswamp.org; Christine Small, primary author.
- Noss, Reed F. and Allen Y. Cooperrider. 1994. *Saving Nature's Legacy*. Covelo, California: Island Press.
- Soulé, Michael and John Terborgh. 1999. *Continental Conservation: Scientific Foundations of Regional Reserve Networks*. Covelo, California: Island Press.
- Wilson, Edward O. 1992. *The Diversity of Life*. New York: Norton.

POETRY

the good news

Roads disappear, and the caribou wander through.
The beaver gets tired of it, reaches
through the ice, grabs
the trapper's feet,
pulls him down.
Wolves come back on their own,
circle the state house, howl at the sportswriters,
piss on the ATVs.
Trees grow everywhere.
The machines stop,
and the air is full of birdsong.

—Gary Lawless

Originally published in First Sight of Land, by Gary Lawless, 1990, Nobleboro, ME: Blackberry Books. For this or other books of his poetry, call Gulf of Maine Bookstore, 207-729-5083.



Congress Designates First Livestock-free Wilderness Area

by Mark Salvo
and Andy Kerr

In October, the United States Congress passed two bills that will add acreage to the National Wilderness Preservation System; the new units are in Colorado and Oregon.¹ Although both bills were debated and presented to the President only one week apart, they treat livestock grazing in the new wilderness areas very differently. In the Oregon case, conservationists made grazing in wilderness an issue. For the Colorado legislation, it was not.

The Colorado Canyons National Conservation Area and Black Ridge Canyons Wilderness Act² established a new conservation area (reserved chiefly for recreation purposes) and the new Black Ridge Canyons Wilderness Area of approximately 75,550 acres in western Colorado. Local conservation interests did not challenge wilderness grazing in the drafting of the bill. Not surprisingly, the Colorado legislation followed the trend of retaining grazing in Black Ridge Canyons—like every wilderness bill before it.

In Oregon, however, the Steens Mountain Cooperative Management and Protection Act³ set a new direction—it created the nation's first federal wilderness area that *explicitly excludes* domestic livestock grazing. Despite the express reservation of grazing in wilderness by the Wilderness Act and subsequent pro-grazing legislation and congressional reports,⁴ the Steens Mountain legislation zoned 99,859 acres as livestock-free in the new 174,744-acre Steens Mountain Wilderness Area.

Oregon conservationists were adamant that livestock be prohibited from grazing the fragile mountain meadows and federally designated “wild and scenic” rivers that descend from three sides of Steens Mountain. Major factors that helped force the legislation through Congress were:

1. Secretary of the Interior Bruce Babbitt threatened to recommend that President Clinton proclaim Steens Mountain as a national monument;

2. Ongoing litigation concerning livestock grazing in the Donner und Blitzen Wild and Scenic River corridor; and
3. A primarily urban congressional delegation.

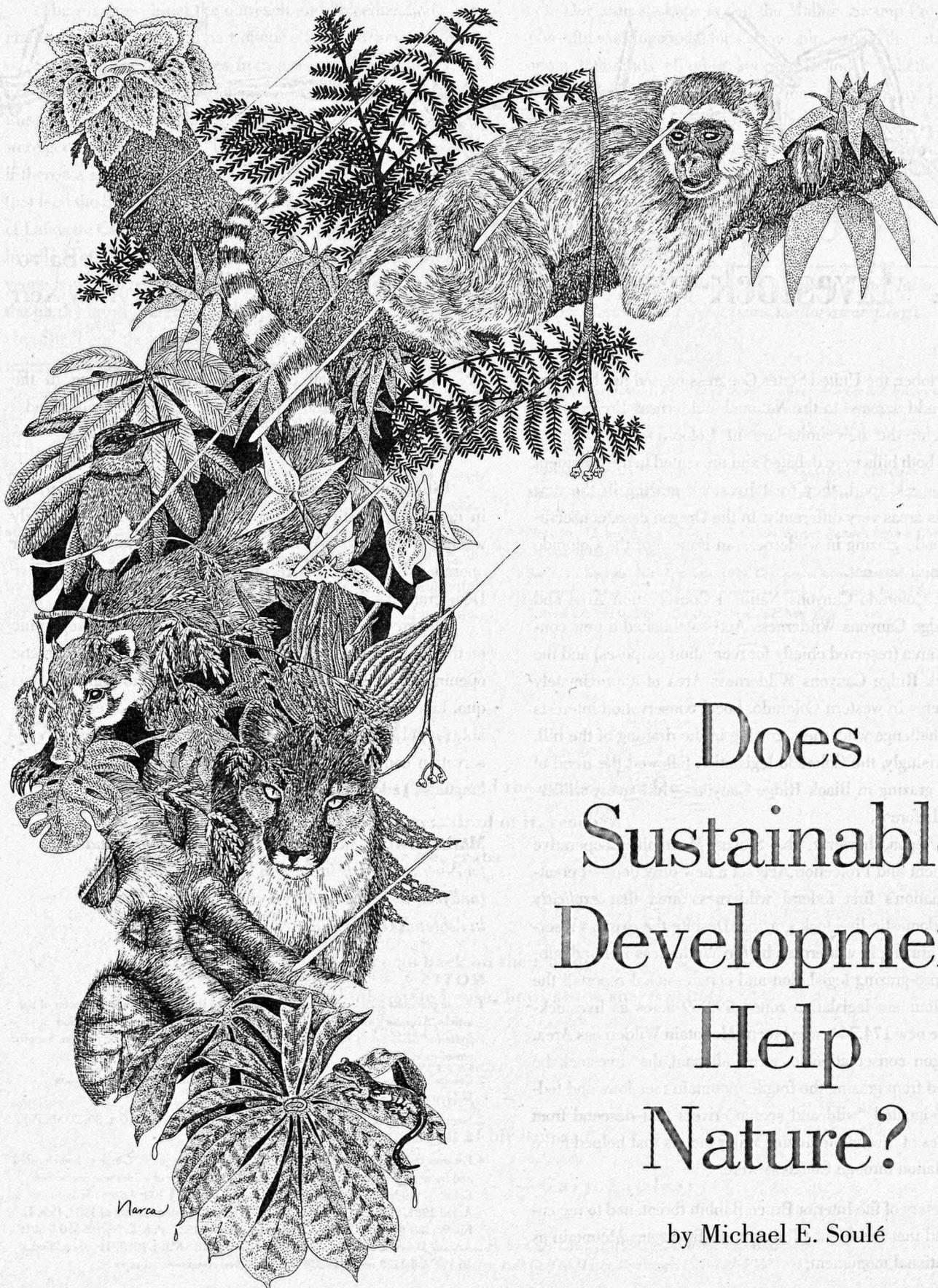
Ultimately, conservationists won livestock-free wilderness in negotiations with local livestock interests who desperately wanted some private-public land exchanges to solidify their operations. The entire Oregon congressional delegation (five Democrats, two Republicans) supported the bill.

The great news is that Congress has become schizophrenic on the subject of grazing in wilderness; this presents a dramatic opening for conservationists to change the pro-grazing status quo. Livestock-free wilderness is the strongest protection available for public lands. The challenge and opportunity for the conservation community is to get no-grazing provisions (“Oregon language”) adopted in future wilderness legislation. ☺

Mark Salvo (mark@sagegrouse.org) is grasslands advocate for *American Lands* in Portland, Oregon. **Andy Kerr** (andykerr@andykerr.net) is czar of *The Larch Company* in Ashland, Oregon.

NOTES

1. These pieces of legislation passed subsequent to the publication last summer of our article “Livestock Grazing in the National Park and Wilderness Preservation Systems,” *Wild Earth* 10(2): 45–52, making some of the information therein, happily, out-of-date.
2. Colorado Canyons National Conservation Area and the Black Ridge Canyons Wilderness (Oct. 24, 2000); Pub. L. 106-353.
3. Steens Mountain Cooperative Management and Protection Act (Oct. 30, 2000); Pub. L. 106-399.
4. For over twenty years, in both legislative and report language, Congress has clarified and buttressed its intent that grazing is a permanent use of wilderness areas. See Colorado Wilderness Act of 1980, Pub. L. No. 96-560 § 108; Arizona Wilderness Act of 1984, Pub. L. No. 98-428 § 101(f)(1); Utah Wilderness Act of 1984, Pub. L. No. 98-428 § 301(a); Wyoming Wilderness Act of 1984, Pub. L. No. 98-550 § 501; Arizona Desert Wilderness Act of 1990, Pub. L. 101-628 § 101(f)(1) (all codified at 16 USCA § 1133 notes [1998]) and associated congressional reports.



Does Sustainable Development Help Nature?

by Michael E. Soulé

We are midway into an unprecedented global extinction of terrestrial plant and animal species. Major extinction events have occurred before, of course; the last one was at the end of the Cretaceous when the dinosaurs, ammonoids, and many other life forms were wiped out suddenly by the nuclear winter-like consequences of an asteroid impact. The problem addressed in this article is the response of conservation organizations to the current situation: I contend that conservationists have lost precious time due to a strategic miscalculation made 20 years ago.

The principle driving force behind the contemporary wave of habitat destruction and species loss is planetary human hegemony. The crisis is impelled by three interacting human agencies: (1) a large and rapidly growing *population*, (2) accelerating *technological innovation* (e.g., mechanized deforestation, industrial agriculture, high-tech fisheries, automobiles, firearms, computers, petroleum-based industrialization), and (3) the *globalization of commerce*, all of which multiply manifold the easily stoked fires of human ambition and materialism.

These three driving forces are causing massive habitat destruction everywhere, but particularly in the species-rich tropics, where the push of growing local populations combined with the pull of Northern appetites for forest, agricultural and aquacultural commodities, fossil fuels, and minerals are replacing forests and other ecosystems with plantations, farms, fire-prone secondary growth, short-lived, polluting coastal aquaculture, and contaminated soils. Adding to the frenzy of biotic cleansing in the tropics is the combination of the North's economic advantages, cheap labor in the South, corruption, refrigerated transport of perishables, and the rise of international financial institutions and corporations lacking any social purpose but short-term profits.

THEORIES OF SUSTAINABILITY AND EFFECTIVE CONSERVATION

How have national and global institutions responded to the ecological debacle? The creation of national parks grew rapidly in the sixties and reached a crescendo in the eighties. Starting about 1980, however, a reaction set in that apparently suspended this phase of worldwide conservation. The creation of nation-

al parks has dropped from about 260 per year in the mid-eighties to about 36 per year in the mid-nineties (Terborgh 1999). The reasons, I believe, for this dramatic decline in the popularity of parks was a growing sense that strict nature protection was misanthropic, therefore politically incorrect, and that protected areas had to pay for themselves economically, just like farming or commercial fishing.

Governments, the United Nations, the IUCN (World Conservation Union), and other conservation organizations, encouraged by traditional economists and the development community, decided during the early 1980s that societies can develop their way out of environmental and biodiversity degradation—that economic prosperity outside of parks will lead to responsible stewardship of nature (e.g., IUCN et al. 1980, IUCN et al. 1991; for a critique, see Brandon 1997, Brandon et al. 1998) in the spirit of sustainable development. There were even suggestions that strict protection of nature be abandoned altogether in favor of various degrees of exploitation (e.g., Janzen 1994, Chimire and Pimbert 1997). Proponents of this view convinced the major funders of foreign assistance programs that nature protection is unrealistic unless coupled with material benefits for poor nations. For example, World Conservation Union spokesperson Jeffrey McNeely (1989) emphasized the necessity of economic development and the need to link parks with “human needs [to] support ecologically sound development,” and Reid (1996) suggested we should no longer view conservation as an alternative to development, but as “a component of development.”

Thus, it has become fashionable within the international conservation and foreign aid communities to view parks as just another development tool, and this has led to a range of strategies that combine elements of conservation with economic development projects (Brandon et al. 1998). The following sections briefly review a sequence of these alternatives to strict protection, presented in order from the most anthropocentric to the least.

SUSTAINABLE DEVELOPMENT

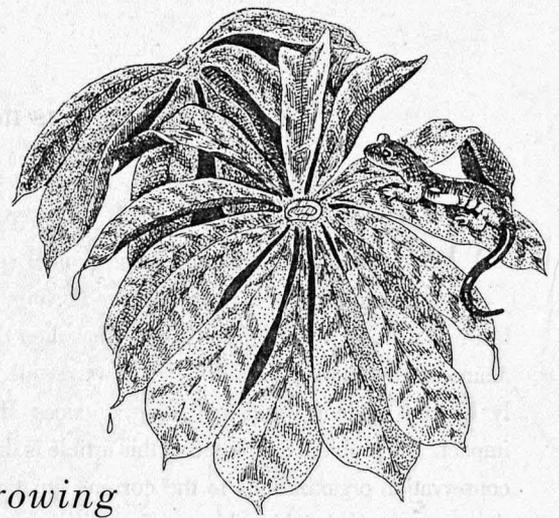
The economic development bandwagon produced a rapid shift from modest programs supporting protected areas to much more costly economic development projects outside of parks, referred

to as “sustainable development” because they may include a conservation or environmental element. An untested premise of sustainable development is that people won’t be motivated to maintain ecosystem services or protect the natural world until their standard of living approaches that of the wealthier nations. The stated objective—to harmonize human economic needs and ambition with long-term social and economic stability—is commendable, but has the sustainable development strategy succeeded in protecting biodiversity?

A growing chorus of critics now believes that the popular “sustainable development paradigm” has done more harm to nature than good, having set back conservation by a decade or more, particularly in rainforest areas of the tropics. By viewing economic development as an alternative to strict nature protection, conservation organizations have benefited from multi-million-dollar grants from the World Bank and other lenders, but it appears doubtful that nature has similarly profited. It is more likely that the good (for nature) has become the hostage of the expedient. The ascendance of sustainable development, in combination with expensive, ineffective, and misguided aid programs, has slowed efforts to protect existing nature reserves, particularly in the tropics. Simultaneously there has been a drastic decline in the creation of new parks, while many others have ceased to exist in practice (Terborgh 1999, Oates 1999). Moreover, retrospective evaluations of sustainable development projects show that most have achieved neither sustainability nor conservation (Redford and Sanderson 1992, Wells and Brandon 1992, Robinson 1993, Kramer et al. 1997, Sanjayan et al. 1997, Wells et al. 1999, Bowles et al. 1998).

In part, this is because effective means of instituting large-scale sustainable exploitation and agriculture are incompatible with capitalism and market globalization in their current manifestations (e.g., Ludwig et al. 1993, French 1999). Another reason is that any improvement in a region’s social infrastructure (schools, health care facilities and staffing, job training, employment opportunities, agricultural support services) and standard of living is likely to attract large numbers of people from surrounding areas—the “demographic magnet effect.” As documented by Oates (1999), massive injections of money for sustainable development projects are generally harmful to both human and biological communities. Simply put, nature conservation loses when coupled to expensive regional economic development projects.

While improved economic conditions may ultimately reduce the size of families, this benefit comes too late to save nature locally or regionally, and is more than offset by the increase in gross and per capita consumption of local resources



A growing chorus of critics now believes that the popular “sustainable development paradigm” has done more harm to nature than good, having set back conservation by a decade or more, particularly in rainforest areas of the tropics.

such as bush meat, timber, and other wildlands products. Moreover, it appears that the degradation of tropical forests can cause edge effects such as the failure of canopy tree reproduction as much as ten kilometers or more inside of adjacent, undisturbed forests as a result of the displacement of seed predators (from insects to orangutans) from logged forests in the region (Laurance 2000).

An inevitable concomitant of capital-intensive economic development—sustainable or not—is the proliferation of roads, access being required for efficient commercial agriculture and efficient exploitation of natural resources, legal or not. And roads are always the beginning of the end for nature protection, providing entry points for weeds, invasive exotics, fires, poachers of trees and bush meat (Forman and Alexander 1988, Trombulak and Frissell 2000, Findlay and Bourdages 2000), and most damaging of all, settlers who must destroy the very forests that the project was supposed to save (Brandon 1996,

Terborgh 1999). It is hardly an exaggeration to say that roads are daggers in the heart of nature.

No compassionate person is opposed to the *ideal* of sustainable development. And even if it is a shibboleth, and an oxymoron at this point in history, something like it is essential. As John Terborgh says, "The alternative [to sustainable development] is exhaustion of natural resources, crushing poverty, and social anarchy." He then identifies the obstacles: "Given the expanding human population, the competitive nature of the global economy, and our collective obsession with maximizing economic growth, sustainable development is currently unattainable" (Terborgh 1999).

Like other noble goals, sustainable development cannot be achieved without a long and difficult struggle tantamount to a social and economic revolution (see Daly and Cobb 1994). In other words, economic sustainability is a vision for the middle or late twenty-first century. By then, perhaps, the demographic, economic, and ethical conditions for sustainability will be achieved. The time scale for effective nature protection, however, is shorter—less than two or three decades. This means that extraction of resources and food from the earth, on the one hand, and true protection of biodiversity and wildness, on the other, are faces on different coins, requiring different visions and different programs. Put another way, there is no empirical justification for the theory that the achievement of sustainable and equitable economies at some time in the distant future can substitute for strict protection of biodiversity today.

SUSTAINABLE USE OR EXPLOITATION

A subset of the sustainable development idea is referred to as sustainable exploitation—the category of activities that generate local income by prudently exploiting renewable natural resources. This includes safari hunting, wildlife viewing, the production by local artisans of value-added wood products, or the harvesting of natural products such as Brazil nuts (*Bertholletia excelsa*), chicle (*Achras zapota*), or rattan (various genera of climbing palms) for export. Ideally, such activities do not compromise biodiversity values (Salafsky et al. 1993).

Several difficult conditions must be satisfied to achieve sustainable use. First, the human communities exploiting the resources must practice restraint so that the commodities can be harvested by them indefinitely (McNeely 1988). In practice, this usually requires adherence to traditional practices and eschewing modern machinery and technologies. Second, sustainable use assumes that people will continue to live in harmony with their ecosystems. Rarely do enthusiasts for sustainable use explain how harmony is possible in a world swept up in a rising

flood of people and rampant economic change, including the siren song of Western-style consumerism and consumption. But unless these conditions are met, the results are nearly always grim for the diversity and integrity of both natural systems and human cultures (Dugelby and Libby 1998, Terborgh 1999).

Third, sustainable exploitation assumes that markets don't change and that there will continue to be commercial uses for the harvested resources, an assumption that is overly sanguine in a globalizing econosphere with increasing competition, and where cheaper, plantation-produced commodities are constantly replacing traditional or wild ones. In short, the necessary conditions for sustainable exploitation of nature and sustainable marketing of natural resources are formidable, if not unachievable, in most places.

There are local exceptions, however. Most of these depend on non-commercial uses of wildlife such as ecotourism. One example is safari hunting in parts of eastern and southern Africa, where it is a highly lucrative enterprise due to the extraordinary productivity, standing biomass, and diversity of large herbivores and carnivores (Child in press). On the other hand, profitable, non-market (therefore sustainable) uses of mammals are unlikely to exist in the more humid parts of the tropics (rainforests) where the standing biomass of mammals is about five percent of that in the African savanna (Robinson and Bennett 2000). The safari hunting option simply does not exist in most other less developed nations, not only because of the difference in large mammal biomass and diversity, but also for socio-political reasons including the requirement that tourism venues be comfortable, safe, and relatively disease-free.

Costa Rica, another exception, is one of the small number of tropical nations that is safe and relatively disease-free. Costa Rica is unique in other ways among tropical nations in that it has no standing army and no guerillas, is democratic, and has universal education and universal health care. Few tropical places are as benign as Costa Rica, which may explain its popularity with Europeans and North Americans. Even so, its rate of deforestation was the highest in Central and South America (with the exception of Haiti) from 1981 to 1990 (The World Resources Institute et al. 1996) though it has slowed in recent years.

Sadly, most tourists in the tropics don't know (and may not care) about the difference between real (relatively natural) or artificial (dominated by exotic species) venues. The vast majority seek only the tropical ambiance, good food, and comfort. For example, the average tourist to the Hawaiian Islands never sees a native terrestrial bird or plant unless they venture to the highest elevations. Therefore, as noteworthy as the southern Africa and Costa Rica cases may be, they are the exceptions to the rule

that profitable, non-destructive sustainable exploitation of species has not been, and probably won't be, a viable economic strategy in most tropical countries in time to help nature on a scale large enough to benefit biodiversity.

Anticipating the notion of sustainable use, land management agencies in the United States and some other Western nations have long embraced the policy of multiple-use management. This is a "something for everyone," cornucopian land-use doctrine that typically ignores the inherent conflict between resource use and nature conservation. Like sustainability, the success of multiple use of wildlands depends on the institutionalization of certain safeguards, particularly the segregation or zoning of incompatible activities and the monitoring and mitigation of cumulative impacts. Sadly, the implementation of these safeguards is rare, even in industrialized countries and so-called buffer zones (Groom et al. 1999).

The multiple-use concept has been adopted in some countries under the rubric of "biosphere reserves"; Brandon (1998) argues that these cannot succeed in their mission unless all users agree to (1) different use levels in different zones, and (2) the enforcement of sanctions against those breaking the rules—conditions which are difficult to achieve. Zoning of land uses is essential because multiple use fails where conflicting uses are ignored. For example, motorized access and relatively high road densities are essential for logging, mining, ranching, and industrial recreation, but are inimical to the viability of large carnivores (e.g., Green et al. 1997) and to nature conservation in general (Brandon et al. 1998). The mixing of incompatible components is not a salutary alchemy; unfortunately, though, it is the default option of both policy-makers in their never-ending quest for pseudo-consensus and some conservationists seeking to find a middle ground (see Yaffee 1999).

RUSTIC ISOLATION

Both the proponents and opponents of the sustainable development or the sustainable use approach to nature protection agree on one point: without the support of local people, protected areas cannot survive where the populations are dense, poor, and hungry. The question is how to engender and sustain an attitude of stewardship among people who must struggle for survival. The issue is not whether development is good or bad, sustainable or not sustainable; rather, it is whether local communities (indigenous or not) will want to adhere to their pre-industrial, pre-globalization population density and their traditional ways of living, including the protection of wildlands from over-hunting and over-harvesting. Halffter (1996), Gomez-Pompa et al. (1993), and others propose that conservationists encourage traditional,

low-technology economic practices. But as Halffter points out, "rustic usage" or "traditional uses can be distorted by contact with a consumer society." Indeed; people cannot be immunized against the appeal of the global consumer economy. Furthermore, such approaches can be viewed as paternalistic (depriving people of their right to choose), naive (Redford 1996), and even misanthropic, condemning them to harder labor and to health risks (Hill and Tikaurangi 1996).

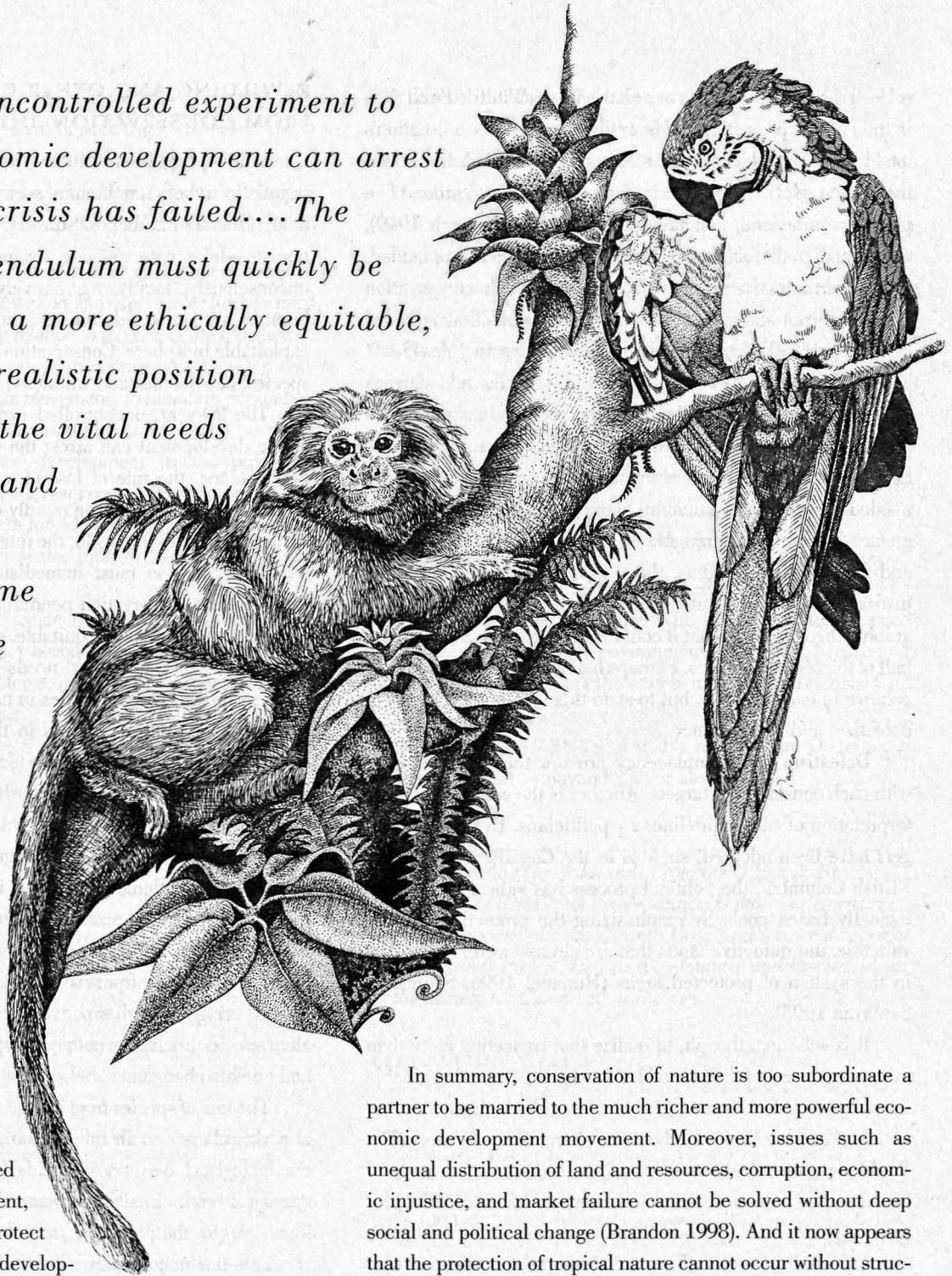
Population growth and global market forces are causing a universal shift from traditional, subsistence agriculture to extensive and intensive agriculture. In the short term, only government-provided financial incentives—such as those that currently exist in rural areas of the United States, Sweden, and Switzerland for livestock growers—can slow this trend. Tropical nations lack the resources to freeze rural communities in splendid, bucolic isolation.

COMMUNITY-SUPPORTED WILDLANDS PROTECTION

There is one common sense tactic for saving nature in places where the survival of a protected natural area would be doubtful without the participation of local people; it is to ensure that the human communities share in both the management and benefits of the protected wildlands (e.g., McDonnell and Vacariu 2000). But there must be sufficient incentives (whether in the form of economic assistance, the use of resources from the park, or tourism) to sustain community support of local wildlife and wildlands. As suggested above, however, if there is too much money, the community can (1) become a magnet for entrepreneurs and settlement by outsiders, (2) become infected by corruption and graft from inside, and (3) be subject to egregious "taxation" from more powerful government entities. External assistance and tourism income are like chemotherapy: just the right amount can sustain health; more than that is lethal.

The notion of a *conservation-based community* is not just another way of linking nature protection with socially popular concepts like economic development. First, the focus is on conservation and on incentives that support nature, rather than on economic development. It is a process that encourages the participation of people in conservation. Second, unlike "community-based conservation," it is not a multi-stakeholder, consensus-based approach that seeks "win-win" development-friendly solutions. In the context of conservation-based community, development (such as ecotourism and sustainable extraction) should be a means to the end of conservation. Third, it encourages pride in nature protection and a sense of ownership by local people in the protected area or project. And it discourages forms

The 20-year, uncontrolled experiment to show that economic development can arrest the extinction crisis has failed....The conservation pendulum must quickly be pushed back to a more ethically equitable, sociologically realistic position that addresses the vital needs both of nature and of local people who must become allies in nature protection.



of exploitation that are incompatible with biodiversity values.

This idea is motivated by the failure of the current, 20-year experiment to protect nature with sustainable development. A recent example of this failure is the support by many NGOs and governments for the settlement of indigenous and other people within tropical national parks. As politically attractive as this trend may be, it is a disaster for nature. This is because people—even indigenous people—will inevitably increase in numbers and become Westernized, adopting powerful, Western technologies for the exploitation and commercialization of plants and animals for the global market (Terborgh 1999).

In summary, conservation of nature is too subordinate a partner to be married to the much richer and more powerful economic development movement. Moreover, issues such as unequal distribution of land and resources, corruption, economic injustice, and market failure cannot be solved without deep social and political change (Brandon 1998). And it now appears that the protection of tropical nature cannot occur without structural changes within the large institutions that fund and implement international nature conservation.

CONSERVATION TARGETS

Partly in response to the gathering reaction against the inappropriate use of economic development to achieve nature conservation objectives, some international conservation organizations are promoting the use of target percentages for relatively strict ecosystem protection by nations. For instance, a guideline

endorsed by organizations such as the World Wildlife Fund (US) is the call for protecting ten or twelve percent of each nation's total land area so that all ecosystems are represented. Given that the current, global stock of strictly protected areas is around five percent of the land, and probably declining (Terborgh 1999), any campaign that might achieve a doubling is to be applauded.

Nevertheless, we must recognize that such conservation targets are not scientific. The ten percent guideline is based more on political expediency than on scientific principles (Soulé and Sanjayan 1998). I worry that policy-makers and citizens might be lulled into the belief that ten percent for nature (and 90 percent for humanity) will suffice to prevent the predicted mass extinction, when, in fact, estimates of the amount of territory needed for the prevention of extinctions are usually much greater—ranging from roughly 30 percent to 70 percent (Soulé and Sanjayan 1998). Thus, the ten percent guideline may be justifiable politically, but if not applied scrupulously, biogeographic theory tells us that it could mean the extinction of about half of the region's species. Perhaps half a loaf is the best we can achieve in many regions, but to state this is to enter a vortex of defeatism and complacency.

Defeatism and complacency are not the only problems with such conservation targets. Another is the conscious misinterpretation of such guidelines by politicians. Even where targets have been adopted, such as in the Canadian province of British Columbia, the political process has subverted the biologically based goals by emphasizing the protection of less-valuable, unproductive lands that are already well represented in the system of protected areas (Hummel 1996, Soulé and Sanjayan 1998).

It is sobering, though, to realize that protecting more than even one percent of the natural habitat is virtually unimaginable in many nations. Mexico, one the most biologically diverse nations, has protected only about one percent of its territory (The World Resources Institute et al. 1996). India, too, has secured less than one percent of the land under some form of strict protection (Karanth 1999). Thus, 99 percent of Mexico's and India's territory is already, or will soon be, subject to intensive use, meaning the extirpation of most of its life forms. But even 99 percent for human economic development is not enough according to some urban critics of national parks and wilderness protection. For example, Guha (1997) and Sarkar (1999) object vehemently to the subordination of the welfare of human beings anywhere to that of non-human nature; for them strict nature protection is tacit proof of social injustice, racism, and elitism. Others, however, consider such opinions as extreme examples of anthropocentric hubris (Johns 1990).

REWILDING AND OTHER GUIDELINES FROM CONSERVATION BIOLOGY

One side—people—has all the power and momentum in the negotiations between human society and the rest of nature, though a small number of “subversive” humans—the conservationists—take nature's side against others who unwillingly, unconsciously, tacitly, aggressively, or greedily support the human project to dominate and domesticate the entire exploitable biosphere. Conservationists argue that destruction of species, ecosystems, and wildness is neither prudent nor moral.

The 20-year, uncontrolled experiment to show that economic development can arrest the extinction crisis has failed. For instance, the rate of loss of tropical forests is increasing (Terborgh 1999). Given the rapidly deteriorating state of nature in most regions of the world, the international development/conservation coalition must immediately abandon its disastrous policies. The conservation pendulum must quickly be pushed back to a more ethically equitable, sociologically realistic position that addresses the vital needs both of nature and of local people who must become allies in nature protection.

Assisting conservationists in this task of resurrecting an effective conservation policy are conservation biologists and a large body of scientific research showing that, worldwide, the most damaging consequence of human hegemony is habitat destruction, fragmentation, and degradation. Its causes include agriculture, resettlement of people, industrial forestry, livestock grazing, mining, urbanization, water projects, recreation (such as golf courses and ski areas), industrial tourism, extraction of natural resources from wildlands, and road construction. Exacerbating these dissipative forces are the introduction of alien species (including pathogens), pollution, over-exploitation, and climate change.

The loss of species from habitat remnants (including national parks) obeys certain rules (Newmark 1995). Many conservation biologists have proposed guidelines that minimize the loss of species diversity in such remnants. The newest of these guidelines calls for the protection or reintroduction of large keystone species—the major element of “rewilding” (Soulé and Noss 1998). There is increasing evidence that many ecosystems are regulated from the “top-down” by large carnivores and that ecosystems often undergo rapid loss of diversity without them (Terborgh et al. 1999, Soulé and Terborgh 1999b, Crooks and Soulé 1999). The central goal of rewilding is to maintain or restore ecologically effective populations of large carnivores and other keystone species (Soulé and Terborgh 1999a). An explicit requirement, therefore, is large core areas connected regionally to allow for migration and dispersal of vulnerable, wide-ranging

species such as carnivores (Soulé and Noss 1998). Though audacious, I believe that nothing short of such a science-based vision will significantly change the current trends. There is still time to achieve such a network of protected wildlands in critical regions like the Amazon and Congo. Other ecological guidelines include:

- Maximize the size of habitat remnants, including reserves, in part because management effort and expense per hectare must be intensified in inverse relation to the size of the remnant;
- Create or restore, and maintain connectivity between core reserves to allow wildlife movements to maintain population viability, species interactions, and ecosystem processes;
- Minimize infrastructure development (roads, pipelines, etc.) in or adjacent to core reserves and corridors;
- Identify and compensate for edge effects;
- Maintain the optimum scale, intensity, and frequency of natural disturbances;
- Search out and destroy accidentally introduced alien species and pathogens before they become invasive and destructive;
- Restore natural ecosystems, including their ecological and evolutionary processes.

Finally, unless the vital needs of peoples living within and close to protected area networks are considered, no amount of attention to the science of design and management will lead to a happy ending.

CONCLUSIONS

Nature protection is a human problem. And the social sciences have taught conservationists that developing a sense of ownership among—and providing incentives to—the human neighbors of protected areas, if not *sine qua non* for success, are powerful conservation tools. This knowledge must not be dismissed. But it is not sufficient.

In addition, we need a compelling vision that inspires people to protect wildness, ecological diversity, and species richness within their homelands. The major enemies in the campaign to save nature are negative, defeatist patterns of thought that poison optimism: despair about the fate of nature; fatalism about the potential for individuals to alter the heading of civilization.

The Wildlands Project is one example of such a vision. Based on a marriage of science and ethics, The Wildlands Project challenges conservationists to create a positive alternative to business as usual. It proposes that they use scientific principles and the tools of geography, economics, law, and sociology to create an alternative land-use agenda (Noss 1992, Soulé 1992, Soulé 1995, Foreman 1999). Such a vision must satisfy several conditions:

- It must be honest, adhering to the best science of the day, and incorporating traditional knowledge.
- It must be realistic, in the sense that the economic, political, and spiritual concerns of human beings must be understood.
- It must be flexible and recognize that unforeseen opportunities often arise, including, for example, localized decreases in population, changes in agricultural markets, and abandonment of farmlands and forests in regions of low productivity.
- It must be courageous, challenging the land-use practices of the day, challenging the popular view that economic growth and development will lead to utopia, and challenging planners and politicians to articulate their values concerning nature (or creation) and encouraging them to adopt ecological and genetic principles in their practice and statements.
- It must be substantive and achievable.

Above all, it must be optimistic because hope is a necessary condition for constructive change. Only hope can animate a generation inured to incessant environmental crises. “Where there is no vision,” people are not the only beings who will perish. ☾

ACKNOWLEDGMENTS I thank K. Brandon, D. Johns, B. Dugelby, and M. Sanjayan for their assistance.

Michael Soulé (*The Wildlands Project*, PO Box 2010, Hotchkiss, CO 81419; soule@co.tds.net) is professor emeritus at the University of California, Santa Cruz, and science director of *The Wildlands Project*. He was a co-founder and first president of the Society for Conservation Biology.

LITERATURE CITED

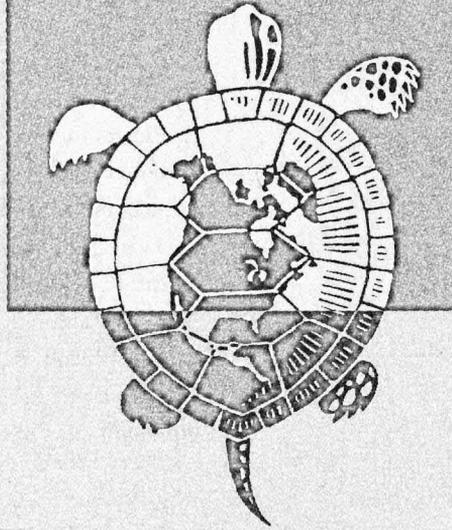
- Bowles, I.A., R.E. Rice, R.A. Mittermeier, and G.A. da Fonseca. 1998. Logging and tropical forest conservation. *Science* 280:1899–1900.
- Brandon, K. 1996. Traditional peoples, nontraditional times: Social change and the implications for biodiversity conservation. Pp. 219–236 in K. Redford and J. Mansour, eds., *Traditional Peoples and Biodiversity Conservation in Large Tropical Landscapes*. Rosslyn, Virginia: The Nature Conservancy.
- Brandon, K. 1997. Policy and practical considerations in land-use strategies for biodiversity conservation. Pp. 90–114 in R. Kramer, C. van Schaik, and J. Johnson, eds., *Last Stand: Protected Areas and the Defense of Tropical Biodiversity*. New York: Oxford University Press.
- Brandon, K. 1998. Perils to parks: The social context of threats. Pp. 415–439 in K. Brandon, K.H. Redford, and S. Sanderson, eds., *Parks in Peril: People, Politics, and Protected Areas*. Covelo, California and Washington, DC: Island Press.
- Brandon, K., K.H. Redford, and S.E. Sanderson. 1998. Introduction. Pp. 1–23 in K. Brandon, K.H. Redford, and S. Sanderson, eds., *Parks in Peril: People, Politics, and Protected Areas*. Covelo, California and Washington, DC: Island Press.
- Child, G. In press. Managing wildlife in Africa sustainably. In R. Field, R.J. Warren, H. Okarma, and P.R. Sievert, eds., *Wildlife Land and People: Priorities for the 21st Century*. Proceedings of the 2nd International Wildlife Management Congress. Bethesda, Maryland: The Wildlife Society.
- Crooks, K.R., and M.E. Soulé. 1999. Mesopredator release and avifaunal extinctions in a fragmented system. *Nature* 400:563–566.

- Daly, H., and J.B. Cobb, Jr. 1994 (2nd edition). *For the Common Good: Redirecting the Economy Toward Community, the Environment and a Sustainable Future*. Boston: Beacon Press.
- Dugelby, B., and M. Libby. 1998. Analyzing the social context at PiP sites. Pp. 63–78 in Brandon, K., K.H. Redford, and S. Sanderson, eds., *Parks in Peril: People, Politics, and Protected Areas*. Covelo, California and Washington, DC: Island Press.
- Findlay, C.S., and J. Bourdages. 2000. Response time of wetland biodiversity to road construction on adjacent lands. *Conservation Biology* 14:86–94.
- Forman, R.T.T., and L.E. Alexander. 1998. Roads and their major ecological effects. *Annual Review of Ecology and Systematics* 29:207–231.
- Foreman, D. 1999. The Wildlands Project and the rewilding of North America. *Kent Law Review* 76(2):535–553.
- French, H. 1999. Trade vs. the environment. *Defenders* Winter 1999/2000:36–42.
- Ghimire, K.B., and M.P. Pimbert, eds. 1997. *Social Change and Conservation: Environmental Politics and Impacts of National Parks and Protected Areas*. London: Earthscan Press.
- Gomez-Pompa, A., A. Kaus, J. Jimenez-Osornio, J. Bainbridge, and V.M. Rorive. 1993. Pp. 483–548 in *Sustainable Agriculture and the Environment in the Humid Tropics*. Washington, DC: National Academy Press. [Note: no eds.]
- Green, J.I., D.J. Mattson, and J.M. Peek. 1997. Spring feeding on ungulate carcasses by grizzly bears in Yellowstone National Park. *Journal of Wildlife Management* 61:1040–55.
- Groom, M., D.B. Jensen, R.L. Knight, S. Gatewood, L. Mills, D. Boyd-Heger, L.S. Mills, and M.E. Soulé. 1999. Buffer zones: Benefits and dangers of compatible stewardship. Pp. 171–198 in M.E. Soulé and J. Terborgh, eds., *Continental Conservation: Scientific Foundations for Regional Conservation Networks*. Covelo, California and Washington, DC: Island Press.
- Guha, R. 1997. The authoritarian biologist and the arrogance of anti-humanism: Wildlife conservation in the Third World. *The Ecologist* 27:14–20.
- Halffter, G. 1996. Biodiversity conservation and protected areas in tropical countries. Pp. 212–224 in F. di Castri and T. Younes, eds., *Biodiversity, Science and Development Toward a New Partnership*. Wallingford, Oxon, UK: CAB International Publications in association with the Int. Union of Biol. Sciences.
- Hill, K., with T. Tikuarangi. 1996. The Mbaracayu Reserve and the Ache of Paraguay. Pp. 159–195 in K. Redford and J. Mansour, eds., *Traditional Peoples and Biodiversity Conservation in Large Tropical Landscapes*. Rosslyn, Virginia: The Nature Conservancy.
- Hummel, M., ed. 1996. *Protecting Canada's Endangered Spaces: An Owner's Manual*. Toronto: Key Porter Books.
- IUCN, UNEP, and WWF [World Conservation Union, United Nations Environment Programme, and World Wildlife Fund]. 1980. World conservation strategy: Living resource conservation for sustainable development. Gland, Switzerland: IUCN, UNEP, and WWF.
- IUCN, UNEP, and WWF [World Conservation Union, United Nations Environment Programme, and World Wildlife Fund]. 1991. Caring for the earth: A strategy for sustainable living. Gland, Switzerland: IUCN, UNEP, and WWF.
- Janzen, D.H. 1994. Wildland biodiversity management in the tropics: Where are we now and where are we going? *Vida Silvestre Neotropical* 3:3–15.
- Johns, D. 1990. The relevance of deep ecology to the Third World: Some preliminary comments. *Environmental Ethics* 12:233–252.
- Karanth, K.U. 1999. Nagarahole: Shrine or market in the global village? Pp. 25–31 in K.H. Redford, ed., *Culturally Conflicting Views of Nature*. Gainesville, FL: Conservation and Development Forum.
- Kramer, R., C. van Schaik, and J. Johnson. 1997. *Last Stand: Protected Areas and the Defense of Tropical Biodiversity*. New York: Oxford University Press.
- Laurance, W.F. 2000. Do edge effects occur over large spatial scales? *Trends in Ecology and Evolution* 15:134–136.
- Ludwig, D., R. Hilborn, and C. Walters. 1993. Uncertainty, resource exploitation, and conservation: Lessons from history. *Science* 260:17, 36.
- McDonnell, A., and K. Vacariu. 2000. Ejido Cebadillas, imperiled parrots, and an historic conservation partnership. *Wild Earth* 10(1):55–56.
- McNeely, J.A. 1988. Economics and biological diversity: Developing and using economic incentives to conserve biological diversity. Gland, Switzerland: World Conservation Union.
- McNeely, J.A. 1989. Protected areas and human ecology: How national parks can contribute to sustaining societies to the twenty-first century. Pp. 150–57 in D. Western and M. Pearl, eds., *Conservation for the Twenty-first Century*. New York: Oxford University Press.
- Newmark, W.D. 1995. Extinction of mammal populations in western North American national parks. *Conservation Biology* 9:512–526.
- Noss, R.F. 1992. The Wildlands Project land conservation strategy. *Wild Earth* (special issue):10–25.
- Oates, J.F. 1999. *Myth and Reality in the Rainforest: How Conservation Strategies are Failing in West Africa*. Berkeley: University of California Press.
- Redford, K.H. 1996. Getting to conservation. Pp. 252–265 in K. Redford and J. Mansour, eds., *Traditional Peoples and Biodiversity Conservation in Large Tropical Landscapes*. Rosslyn, Virginia: The Nature Conservancy.
- Redford, K.H., and S.E. Sanderson. 1992. The brief, barren marriage of biodiversity and sustainability? *Bulletin of the Ecological Society of America* 73:36–39.
- Reid, W.V. 1996. Beyond protected areas: Changing perceptions of ecological management objectives. Pp. 442–453 in R.C. Szaro and D.W. Johnston, eds., *Biodiversity in Managed Landscapes: Theory and Practice*. New York: Oxford University Press.
- Robinson, J.G. 1993. The limits to caring: Sustainable living and the loss of biodiversity. *Conservation Biology* 7:20–28.
- Robinson, J.G., and E.L. Bennett. 2000. Carrying capacity limits to sustainable hunting in tropical forests. Pp. 13–30 in *Hunting for Sustainability in Tropical Forests*. New York: Columbia University Press.
- Salafsky, N., B.L. Dugelby, and J.W. Terborgh. 1993. Can extractive reserves save the rain forest? An ecological and socioeconomic comparison of nontimber forest product extraction systems in Petén, Guatemala, and West Kalimantan, Indonesia. *Conservation Biology* 7:39–52.
- Sanjayan, M.A., S. Shen, and M. Jansen. 1997. Experiences with integrated conservation development projects in Asia. World Bank Technical Paper No. 388. Washington, DC.
- Sarkar, S. 1999. Wilderness preservation and biodiversity conservation—keeping divergent goals distinct. *BioScience* 48:405–412.
- Soulé, M.E. 1992. A vision for the meantime. *Wild Earth* (special issue):7–8.
- Soulé, M.E. 1995. An unflinching vision: Networks of people defending networks of lands. Pp. 1–8 in D. Saunders, J.L. Craig, and E.M. Mattiske, eds., *Nature Conservation 4: The Role of Networks*. Sydney: Surrey Beatty, Inc.
- Soulé, M.E., and R.F. Noss. 1998. Rewilding and biodiversity: Complementary goals for continental conservation. *Wild Earth* 8(3):18–28.
- Soulé, M.E., and M.A. Sanjayan. 1998. Conservation targets: Do they help? *Science* 279: 2060–2061.
- Soulé, M.E., and J. Terborgh, eds. 1999a. *Continental Conservation: Scientific Foundations of Regional Reserve Networks*. Covelo, California and Washington, DC: Island Press.
- Soulé, M.E., and J. Terborgh. 1999b. Protecting nature at regional and continental scales: A conservation biology program for the New Millennium. *BioScience* 49:809–817.
- The World Resources Institute, The United Nations Environment Programme, The United Nations Development Programme, The World Bank. 1996. *World Resources 1996–97*. New York: Oxford University Press.
- Terborgh, J. 1999. *Requiem for Nature*. Covelo, California and Washington, DC: Island Press.
- Terborgh, J., J.A. Estes, P.C. Paquet, K. Ralls, D. Boyd-Heger, B. Miller, R. Noss. 1999. Role of top carnivores in regulating terrestrial ecosystems. Pp. 39–64 in M.E. Soulé and J. Terborgh, eds., *Continental Conservation: Scientific Foundations for Regional Conservation Networks*. Covelo, California and Washington, DC: Island Press.
- Trombulak, S.C., and C.A. Frissell. 2000. The ecological effects of roads on terrestrial and aquatic communities: A review. *Conservation Biology* 14:18–30.
- Wells, M., and K. Brandon. 1992. *People and Parks: Linking Protected Area Management with Local Communities*. Washington, DC: World Bank, World Wildlife Fund, and US Agency for International Development.
- Wells, M., S. Guggenheim, A. Khan, W. Wardojo, and P. Jepson. 1999. *Investing in biodiversity: A review of Indonesia's integrated conservation and development projects*. Washington, DC: World Bank.
- Yaffee, S.L. 1999. Three faces of ecosystem management. *Conservation Biology* 13:713–725.

The Wildlands Project

Update

BY LEANNE KLYZA LINCK



IN 1991, not too many conservationists or policy makers had a clue how the three C's—cores, connectivity, and carnivores—could guide their efforts. Outside the small circle of scientists working in landscape ecology and conservation biology, few people were talking about the need for regional conservation planning. Ten years later, the language of conservation biology has made its way into the mainstream of the conservation movement, thanks in large part to *Wild Earth* journal.

In 1991, at the founding meeting of The Wildlands Project, the assembled scientists and activists agreed that to fully protect biodiversity, land conservation would need to be practiced on a much more ambitious scale. But no one was quite sure what elements would comprise a wildlands network conservation plan, or the precise methodology to design one. With the release of the Sky Islands Wildlands Network Conservation Plan, now we know. Ten years ago, wilderness proposals usually weren't designed with ecological boundaries. Now many are. A decade ago, rewilding wasn't even a concept. Now it is. A lot has happened in ten years. And as we gear up for the next phase of wildlands work we will do it with our old partners at Wild Earth, but in a new way. The Wildlands Project and the Wild Earth Society are merging.

The merger is a logical step for two organizations with complementary missions that have been closely linked since their founding (and which many people already assume to be one). The combined organization will meld TWP's expertise in

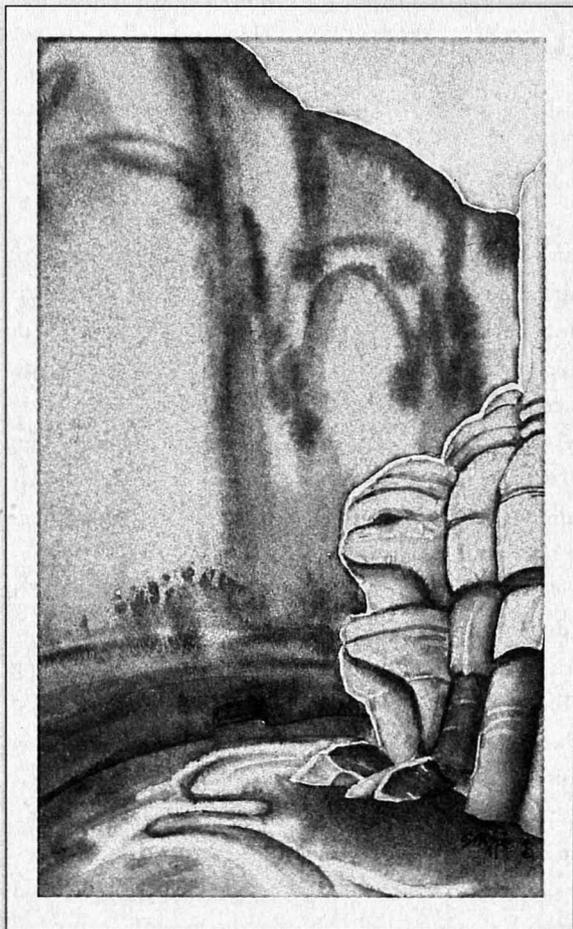
science and advocacy with Wild Earth's expertise in publishing and communications. The Wildlands Project and Wild Earth will consolidate business functions and operate from Wild Earth's Vermont office. The "new" Wildlands Project will have field offices in Arizona, Colorado, New Mexico, Texas, North Carolina, and Mexico, and assume responsibility for publishing *Wild Earth* journal. *Wild Earth's* commitment to exploring the latest thinking in conservation science, policy, philosophy, and activism will continue.

As we enter the second decade of our work together, The Wildlands Project and Wild Earth will face many challenges. Studies this year suggest that the extinction crisis is accelerating; here in Tucson, the increasing pressure that development is placing on the landscape is painfully obvious. In the years ahead, conservationists will need to be more effective in countering threats to wildlands and wildlife, and restoring healthy ecosystems.

Our merger with Wild Earth will do just that, giving a boost to our implementation efforts as we strive to make wildlands network designs a reality on the ground. This work will require many of the time-tested tools of campaign advocacy as well as innovation and a fresh, optimistic perspective. Wild Earth is just the partner to help us craft our message and develop effective materials vital to moving our vision forward. We are confident that wild Nature will benefit from this strategic union. ♻️

Leanne Klyza Linck is executive director of The Wildlands Project.

An Ecological Approach to Wilderness Area Design



by **Dave Foreman**
and **Kathy Daly**

DURING THE TWENTIETH CENTURY, two pathways for selecting and designing conservation areas evolved. The first path was followed by government agencies and private conservation groups to select and configure candidate National Parks, Wilderness Areas, and other traditional conservation areas. This approach was based primarily on landscape beauty and outdoor recreational value (and all too often on the lack of commercial value). The second path was blazed by scientists to select and configure ecologically important areas for protection and restoration. The Sky Islands Wildlands Network explicitly blends these two paths. In this article we focus on using ecologically designed Wilderness Areas as cores—the central building blocks of wildlands networks.

Core, Linkage, and Compatible-Use Areas

The now widely accepted model for conservation area design (CAD) is described by Noss (1992):

A regional reserve system consists of three basic ingredients: core reserves, multiple-use (buffer) zones, and corridors. Select your core reserves first, then interconnect and buffer them across the landscape. For many species, properly managed multiple-use zones will function as corridors. An archipelago of core reserves in a matrix with low road density and low-intensity human activities will function well for most native species. Multiple-use zones at a landscape scale can be corridors at a regional scale. Whenever possible, however, significant core reserves should be linked by corridors containing roadless interiors.

In 1985, Reed Noss used this model to propose a statewide network for Florida.

The Sky Islands Wildlands Network (SIWN) builds on the original Noss prescription. SIWN uses four classes of core reserves, three classes of linkages (originally called corridors by Noss), and four classes of compatible-use areas (called multiple-use zones or buffers by Noss). Because so-called multiple-use as practiced by the United States Forest Service and Bureau of Land Management has not resulted in responsible land management, SIWN uses the term “compatible-use area” instead of “multiple-use zone.”

This article is adapted from the *Sky Islands Wildlands Network Conservation Plan*, a 220-page document produced by The Wildlands Project, Sky Island Alliance, Naturalia, New Mexico Wilderness Alliance, and Southwest Forest Alliance. Copies of the plan are available for \$35 from The Wildlands Project (1955 W. Grant Rd., Suite 145, Tucson, AZ 85745; 520-884-0875; wildlands@twp.org; www.twp.org).

General Conservation Area Design Principles

In the 1970s, the principles for scientific conservation area design were first proposed (Terborgh 1974, Diamond 1975, Wilson and Willis 1975, Diamond and May 1976). Noss and Cooperrider (1994) write:

Later incorporated into the World Conservation Strategy (IUCN 1980), the rules state that, all else being equal,

1. *Large reserves are better than small reserves.*
2. *A single large reserve is better than a group of small ones of equivalent total area.*
3. *Reserves close together are better than reserves far apart.*
4. *Round reserves are better than long, thin ones.*
5. *Reserves clustered compactly are better than reserves in a line.*
6. *Reserves connected by corridors are better than unconnected reserves.*

A general scientific consensus about conservation area design has emerged over the last decade. In 1990, in the Forest Service's conservation strategy for the northern spotted owl, Jack Ward Thomas (later Chief of the Forest Service) offered five reserve design principles "widely accepted among specialists in the fields of ecology and conservation biology" (Thomas et al. 1990). Reed Noss later updated those five and added an important sixth principle (Noss and Cooperrider 1994):

1. *Species well distributed across their native range are less susceptible to extinction than species confined to small portions of their range.*
2. *Large blocks of habitat, containing large populations of a target species, are superior to small blocks of habitat containing small populations.*
3. *Blocks of habitat close together are better than blocks far apart.*
4. *Habitat in contiguous blocks is better than fragmented habitat.*
5. *Interconnected blocks of habitat are better than isolated blocks; corridors or linkages function better when habitat within them resembles that preferred by target species.*
6. *Blocks of habitat that are roadless or otherwise inaccessible to humans are better than roaded and accessible habitat blocks.*

Based on their studies of faunal extinctions in fragmented chaparral habitats in San Diego County, California, Michael Soulé et al. (1988) summarized conservation area design as follows:

- A. *Bigger is better.*
- B. *Single large is usually better than several small.*
- C. *Large native carnivores are better than none.*
- D. *Intact habitat is better than artificially disturbed.*
- E. *Connected habitat is usually better than fragmented.*

Note that these more recent guidelines are not much different from those proposed twenty years earlier by Diamond and others.

Noss (1995) suggested several other fundamental principles to consider in conservation area design:

- *Ecosystems are not only more complex than we think, but more complex than we can think (Egler 1977).*
- *The less data or more uncertainty involved, the more conservative a conservation plan must be (i.e., the more protection it must offer).*
- *Natural is not an absolute, but a relative concept.*
- *In order to be comprehensive, biodiversity conservation must be concerned with multiple levels of biological organization and with many different spatial and temporal scales.*
- *Conservation biology is interdisciplinary, but biology must determine the bottom line (for instance, where conflicts with socio-economic objectives occur).*
- *Conservation strategy must not treat all species as equal but must focus on species and habitats threatened by human activities (Diamond 1976).*
- *Ecosystem boundaries should be determined by reference to ecology, not politics.*
- *Because conservation value varies across a regional landscape, zoning is a useful approach to land-use planning and reserve network design.*
- *Ecosystem health and integrity depend on the maintenance of ecological processes.*
- *Human disturbances that mimic or simulate natural disturbances are less likely to threaten ecological integrity than are disturbances radically different from the natural regime.*
- *Ecosystem management requires cooperation among agencies and landowners and coordination of inventory, research, monitoring, and management activities.*
- *Management must be adaptive.*
- *Natural areas have a critical role to play as benchmarks or control areas for management experiments, and as refugia from which areas being restored can be recolonized by native species.*

Large core areas are essential for the long-term survival of many wide-ranging species. Newmark (1987) found that even the largest national parks—which have become islands of natural habitat in a sea of degraded lands—are unable to retain their native biota. He found a strong inverse relationship between park size and extinction: the smallest parks had up to seven mammalian species disappear since legal protection of the parks; larger parks were losing species also, but less quickly.

Large cores of natural habitat and connectivity between these cores may also temper the extinctions that will most likely occur with climate change. Global warming and associated effects such as changes in precipitation patterns, soil conditions, and sea levels will make a great deal of habitat unsuitable for existing species.

Maximization of the number and size of protected areas will increase the likelihood of species survival. Connection of protected areas through linkage zones, especially north-south oriented or high-low elevation corridors, would allow movement of species in response to changing conditions (Meffe and Carroll 1997).

Physical and biotic edge effects can be serious problems for small reserves with high perimeter/area ratios (Noss 1983). Among forest communities, deleterious edge effects are best documented for closed canopy forest types. Forest interior species may be sensitive to a variety of edge-related environmental changes. Increased blow-down potential may extend at least two tree-heights into a stand (Harris 1984, Franklin and Forman 1987). Some kinds of external influences, such as invasions of weedy species, penetrate much farther—perhaps five kilometers or more into a forest (Janzen 1986). Increased rates of bird nest predation may extend hundreds of meters from forest edges (Wilcove et al. 1986).

Core wildlands, if designed according to the criteria discussed previously, will generally be large enough that edge effects from their boundaries should not be a significant problem. Edge effects from internal fragmentation, such as those caused by road-building and clearcutting, will be a threat until artificially disturbed habitats are restored.

There is wide agreement among conservation biologists that existing Wilderness Areas, National Parks, and other federal and state protected areas are the building blocks for an ecologically based network. The Alliance for the Wild Rockies applied conservation biology principles in the US Northern Rockies as early as 1990, reasoning that if Yellowstone National Park is not large enough to maintain viable populations of grizzlies and wolverines, then it needs to be linked with the big Wilderness Areas of central Idaho, the Glacier National Park/Bob Marshall Wilderness complex in northern Montana, and on into Canada to the Banff/Jasper National Park complex. Maintaining metapopulations of wide-ranging species means that landscape connectivity must be protected throughout the entire Northern Rockies. The Alliance proposed the Northern Rockies Ecosystem Protection Act (NREPA), which would designate 20 million acres of new Wilderness Areas in the United States and protect corridors between areas (Bader 2000). (NREPA had over 100 cosponsors in the US House of Representatives in 2000.) Inspired by NREPA, scientists and conservationists in Canada and the United States proposed a visionary Yellowstone to Yukon conservation network (Locke 1996).

In November of 1997, Michael Soulé and John Terborgh of The Wildlands Project convened a workshop of 30 biological experts to discuss the foundational science of conservation area design (now called wildlands network design by The Wildlands Project). The workshop resulted in a volume edited by Soulé and Terborgh, *Continental Conservation*, which presents the state-of-the-art guidelines for regional conservation planning (Soulé and Terborgh 1999). The

Sky Islands Wildlands Network is based on these scientific principles. SIWN is also part of the continental vision of The Wildlands Project and its many partners, which includes NREPA and the Yellowstone to Yukon Conservation Initiative.

Justification of Areas

An important part of science-based wildlands network design is justification of the areas and boundaries selected. The following are some general considerations used in SIWN to justify selection and configuration of units (Soulé and Terborgh 1999).

- Protection of roadless areas on federal lands as Wilderness Areas is its own justification.

- Large carnivores, many other species, keystone processes (like natural fire), and natural vegetation need large core areas. Size is important.

- Shape of core areas is also important. More rounded boundaries, without intrusions and cherrystem roads, protect against fragmentation and edge effects.

- Natural vegetation, such as old-growth forests, riparian forests, and healthy grasslands, deserves protection to retain and restore its ecological integrity.

- Connectivity between core areas for large carnivores and other wide-ranging species and along streams for aquatic and riparian-dependent species is important.

Wilderness Areas as Cores

In *Continental Conservation*, Noss et al. (1999a) report, "Experience on every continent has shown that only in strictly protected areas are the full fauna and flora of a region likely to persist for a long period of time." What are these strictly protected areas? "A distinguishing characteristic of core areas is limited human access—that is, low road density or, ideally, roadlessness."

SIWN is based on a core system of Wilderness Areas. Despite weaknesses and inconsistencies in the 1964 Wilderness Act and ecologically degrading federal agency management, the National Wilderness Preservation System (and state wilderness systems, such as New York's) has proven to be the most effective means of protecting large natural areas in the United States (Foreman 1995). Designated and proposed Wilderness Areas comprise a large part of the federal lands in the SIWN region.

Anticonservationists, resource managers, and postmodern deconstructionist academics have confused the meaning of wilderness (it literally means "self-willed land" [Vest 1985]). Even many conservationists are unclear about the mandates of the Wilderness Act. In using Wilderness Area designation as the cornerstone for a wildlands network, some basics about the Wilderness Act need to be understood (Foreman 2000).

First, Wilderness Areas are not human exclusion zones. A wide range of non-motorized recreational activity is permitted, including hunting and fishing. However, Wilderness Areas are not solely recreational areas. In the various definitions of Wilderness in the act, both experiential and ecological values are prominent and considered compatible.

The Wilderness Act has different criteria for candidate Wilderness Areas than for management of Wilderness Areas after designation. For example, there is no requirement that an area must be pristine or even roadless to be designated as Wilderness. "Pristine," which is an ultimate word like "unique," does not appear in the Wilderness Act. However, after designation, there may be no permanent roads or use of mechanized equipment (except for certain administrative needs, usually of the emergency kind) (Foreman 1998).

Section 2(c) of the 1964 Wilderness Act clearly states:

A wilderness, in contrast with those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which 1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; 2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; 3) has at least five thousand acres or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and 4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value. (The Wilderness Society 1998)

Note that this definition uses the phrases "earth and its community of life" and "protected and managed to preserve its natural condition" before the phrase "has outstanding opportunities for solitude or a primitive and unconfined type of recreation." Ecological concerns were clearly on the minds of the drafters of the Wilderness Act. Furthermore, the wording "which generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable" clearly shows that Congress did not believe that candidate areas had to be pristine.

Designation of an area as Wilderness does not prevent future management to restore natural ecological conditions, such as reintroduction of wolves or beavers, restoration of natural fire, control of exotic species, or ecological restoration such as planting willow and cottonwood wands along degraded streams. Some Wilderness

designation legislation has specifically called for restoration measures. In the 1999 Dugger Mountain (Alabama) Wilderness Act, for example, the Forest Service is directed to use equipment and an existing road to remove a fire tower. After removal, the road is to be permanently closed. In other cases, areas have been designated as Potential Wilderness Additions to allow ecological restoration and removal of nonconforming structures or uses. After restoration, the area automatically becomes Wilderness with roads closed and mechanized equipment banned.

Conservationists should not be shy about proposing less-than-pristine areas for Wilderness designation so long as they acknowledge the intrusions (Soulé 1992). These include areas with roads, past logging, and other unnatural disturbances. Ecological and experiential (both recreational and aesthetic) justifications need to be made for proposing such areas, however. In the Sky Islands Wildlands Network, areas in prime wolf or jaguar habitat with minor roads are proposed for Wilderness designation in order to protect these vulnerable species from road-borne harassment and poaching. The goal of Wilderness designation is not only to prevent destruction of untrammelled places, but also to help ecosystems become self-regulated (self-willed, untrammelled) again.

In a state-of-the-art scientific study and preliminary reserve design for the Klamath-Siskiyou region on the California-Oregon coast, Reed Noss writes, "Somewhat to our surprise, roadless areas on public lands turned out to function well as the basic 'building blocks' of our reserve design" (Noss 1999). Elsewhere, Noss and his co-authors (1999b) write, "A surprisingly large number of conservation goals for the [Klamath-Siskiyou] region can be met through protecting and linking key roadless areas with high biological values... Important habitats and other natural features not represented in roadless areas can be protected through conservation actions on a relatively small area of additional public and private lands."

Wilderness Area designation is the tried and true way to protect roadless areas. A wildlands network without Wilderness Areas is incomplete. *Continental Conservation* puts it this way:

Conservation strategies that lack meaningful core areas are naive, arrogant, and dangerous. Such approaches assume a level of ecological knowledge and understanding—and a level of generosity and goodwill among those who use and manage public lands—that are simply unfounded. (Noss et al. 1999a)

Guidelines for Ecological Design of Wilderness and Other Protected Areas

TRADITIONAL SELECTION CRITERIA

Both conservation groups and land managing agencies have traditionally used standards of quality and purity to select candidate areas for protection and for drawing boundaries around such areas.

For example, candidate National Parks have had to be of “National Park quality”—possessing world-class scenery or natural wonders. Candidate Wilderness Areas have needed to be of “wilderness quality”—scenic and inviting for non-mechanized recreation. Boundary selection has often carved out scenically “lower quality” portions of such areas. Often these “lower quality” areas were of greater ecological importance than the areas protected.

Federal agencies have used the standard of purity ostensibly to limit protection of areas to only those that appear to be without human impact. Purity has also been used as a subterfuge by the agencies to eliminate areas with timber, minerals, or other exploitable resources. Both the Forest Service and BLM have set standards of wilderness purity not required by the Wilderness Act (Cutler 1977). For example, in the Forest Service’s roadless area review and evaluation (RARE) 1971–1972, the Southwest Regional Forester decreed that areas had to be truly roadless. Consequently, tire tracks that remained visible into the next season excluded thousands of acres from being identified as roadless. In 1972, the Forest Service proposed to remove several thousand acres of the Gila Primitive Area from protection because of the faint sign of a long-abandoned airstrip.

In the early 1970s, the Forest Service stridently opposed designating Wilderness Areas in the East because of their purity dogma. Members of Congress, including the champions of the 1964 Wilderness Act, made it clear that purity had not been their intent. Senator Frank Church, the floor manager of the Wilderness Act, said that the Forest Service:

would have us believe that no lands ever subject to past human impact can qualify as wilderness, now or ever. Nothing could be more contrary to the meaning and intent of the Wilderness Act. The effect of such an interpretation would be to automatically disqualify almost everything, for few if any lands on this continent—or any other—have escaped man’s imprint to some degree.

This is one of the great promises of the Wilderness Act. We can dedicate formerly abused areas where the primeval scene can be restored by natural forces. (Church 1973)

Senator Henry Jackson agreed with Church, saying, “It is my hope to correct this false so-called ‘purity theory’ which threatens the strength and broad application of the Wilderness Act” (Jackson 1973).

Republican Senator James Buckley (brother of William F. Buckley and now a federal judge) quoted Aldo Leopold, who wrote, “In any practical program the unit areas to be preserved must vary greatly in size and degree of wildness.” Buckley then said, “The distortion of this approach by efforts to straitjacket the Wilderness Act into some kind of ‘purer-than-driven-snow’ standard has no merit at all” (Buckley 1973). Republican Congressman John Saylor, the

prime sponsor of the Wilderness Act in the House, said, “The act, they [the Forest Service] tell us, is too narrow, too rigid, and too pure in its qualifying standards. Very frankly, those who take this position are wrong” (Saylor 1973).

There are many examples of less-than-pure areas being designated as Wilderness. In New Mexico, several miles of constructed dirt roads were closed and incorporated into the Sandia and Manzano Wilderness Areas in 1978. A section of the Gila Primitive Area with two gas-powered water wells and over 1,000 acres of juniper chaining was added to the Gila Wilderness in 1980.

Even conservation groups sometimes have fallen into a purist view on what qualifies for Wilderness, largely due to ignorance about the meaning and history of the Wilderness Act. In the past, conservation groups have used “wilderness quality” to identify areas proposed as Wilderness and have then used human intrusions (particularly roads and vehicle tracks) to determine proposed boundaries (Foreman 1976). Today, many conservation groups still use the same standards and process (Utah Wilderness Coalition 1997, California Wilderness Coalition 1998). For example, the Colorado Environmental Coalition (n.d. [late 1990s]) instructs its field volunteers that, under the criteria of the 1964 Wilderness Act, a qualifying area “must be at least 5,000 contiguous roadless acres.” This statement is in error. The Wilderness Act does not require candidate areas to be roadless. Under this gross misinterpretation, development of a Wilderness Area proposal can become a technical exercise of determining if a vehicle route is a “road” or a “way,” even though the 1964 Wilderness Act does not require an area to be without roads or free of past human impacts to be designated as Wilderness (Dickerman 1973, Foreman 1998). Under federal definitions, a “road” has been constructed and maintained, while a “way” has been created merely by the passage of motor vehicles.

ECOLOGICAL SELECTION CRITERIA

During the last 20 years, ecological values have begun to supersede scenery and recreation as the fundamental goals for Wilderness Area selection. Protecting an area for its ecological value, rather than its scenic or recreational opportunities, requires looking at a completely different set of characteristics and examining how an area fits into the context of the larger natural landscape.

Inspiring scenery, high-country lakes, splendid campsites, interesting trails, good fishing—all these have historically been desired qualities of candidate Wilderness Areas. Qualities more important today are habitat for sensitive species (including large carnivores), unusual plant communities, plant communities not well represented in protected areas, winter range and migration routes of animal species, and hotspots of biodiversity.

In the past, the *appearance* of naturalness was more important than naturalness. Signs of an abandoned airstrip were thought a

greater intrusion on the wilderness character of an area than were sheet and gully erosion from livestock grazing or doghair thickets of pine resulting from fire suppression. A highly engineered, constructed pack trail did not detract from the purity of an area, but a fading Jeep trail did.

Emphasizing ecological values has led the Sky Islands Wildlands Network to select and design protected areas, including Wilderness Areas, with somewhat different standards from those of quality and purity used in the past. The following specific standards used in boundary selection by SIWN groups, including the New Mexico Wilderness Alliance and the Sky Island Alliance, are based on the general conservation area design principles earlier discussed.

Human intrusions. Human intrusions, including constructed roads and unconstructed vehicle ways, grazing facilities, logged areas, power lines, and old mines, should be inventoried and carefully mapped and described. If intrusions are little used or substantially unnoticeable, they should be included within a Wilderness Area proposal. If an intrusion is noticeable or currently in use, its visual impact, level of use, purpose, and importance should be weighed against the ecological values that would be protected or restored by closing or mitigating the intrusion and including it in a Wilderness Area or other protective classification.

Size. The larger an area, the better. Size helps to buffer the interior of natural areas from edge effects and road impacts, provides greater habitat, protects a more diverse area, and allows an area to be returned to a natural disturbance regime. A small, isolated area requires more human intervention for a longer time to maintain natural processes of disturbance, top-down regulation, and so forth. The relationship between the size of an area and the number of species it supports was a key generalization in the development of the theory of island biogeography (MacArthur and Wilson 1967).

Rounded boundaries. For the same reasons that size is important, so are rounded boundaries. A long, narrow area has little interior habitat and is poorly buffered from road effects, poachers, and edge effects. An amoeba-shaped area with many lobes is also compromised because of the relative narrowness of the lobes.

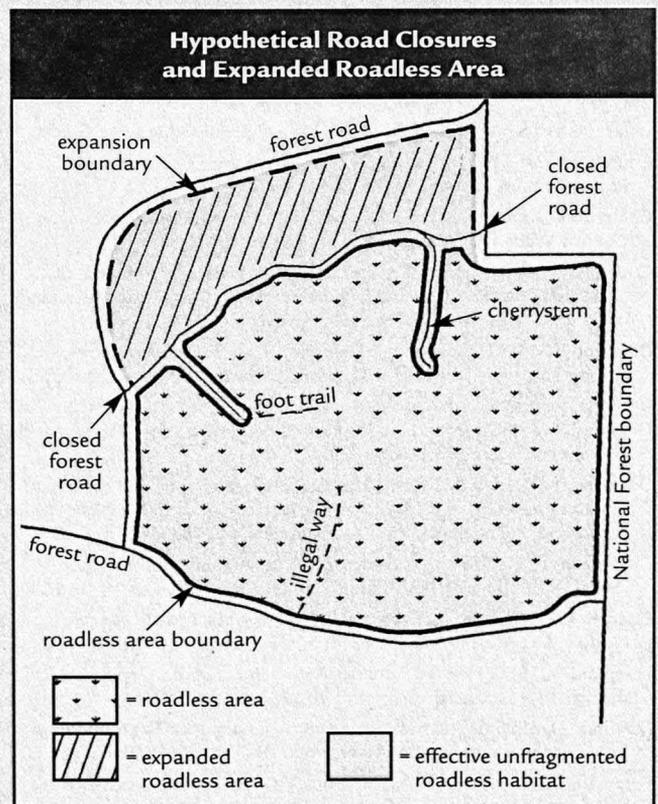
Cherry systems. Both agencies and conservation groups have proposed many Wilderness Areas that have long, narrow exclusions for roads up canyon bottoms or along ridges. These "cherry systems" severely compromise the protection of an area and effectively reduce its size, with all of the consequences discussed above.

Landscape context. Agencies (and often conservation groups) have treated Wilderness Areas, National Parks, and other protected areas as stand-alone units (islands) without regard to their landscape context. For protection of ecological values, context is highly important. Are other potential Wilderness Areas

nearby? If so, boundary proposals should reduce the gap between them to reduce fragmentation. Even if past human intrusions (e.g., logging) or roads separate the areas, Wilderness boundaries should be brought as close together as possible. It is often desirable to propose closing a road to join two formerly separated Wilderness Areas.

Habitat. In many cases, existing Wilderness Areas or roadless areas are restricted to mountains or low-productivity habitats. Habitat that is more ecologically valuable, despite the fact that it has dirt roads, Jeep trails, or other intrusions, may lie outside the boundary. Such areas should be considered for Wilderness recommendation from the standpoint of the ecological requirements of focal species. For SIWN, proposed Wilderness boundaries would close some dirt roads and ways up canyon bottoms because such areas are important habitat for the jaguar and riparian-dependent birds, mammals, fish, and reptiles that are vulnerable to road-borne poaching or disruption. Similarly, prime wolf habitat that may have dirt roads or other intrusions, such as high montane grasslands in the Gila National Forest or rolling Madrean woodland in the Coronado National Forest, are proposed for inclusion in Wilderness Areas. Montane forests that have had some logging are proposed as Wilderness Areas because of their value as habitat for species such as Mexican spotted owl and thick-billed parrot.

Riparian. In arid landscapes, riparian areas and available water are extremely important to a wide range of species. Skagen et al. (1998) recommend that all riparian areas, no matter how



small, be preserved for migrating birds. Wherever possible, therefore, the Sky Islands Wildlands Network includes riparian areas in proposed Wilderness Areas, Wild & Scenic Rivers, linkages, and other protected areas, even if they have suffered from some human impact.

Conclusion

The marriage of traditional wilderness advocacy and science-based conservation network design can be a happy one for wild Nature. By embracing and applying these ecological principles for design and boundary selection of Wilderness Areas, conservation groups can make their campaigns to expand the National Wilderness Preservation System contribute more effectively to regional wildlands networks—and to the overarching goal of protecting the full range of native biodiversity and halting the extinction crisis.

Dave Foreman is chairman of *The Wildlands Project* (1955 W. Grant Rd., Suite 145, Tucson, AZ 85745) and publisher of *Wild Earth*. **Kathy Daly** is wildlands coordinator for *The Wildlands Project*.

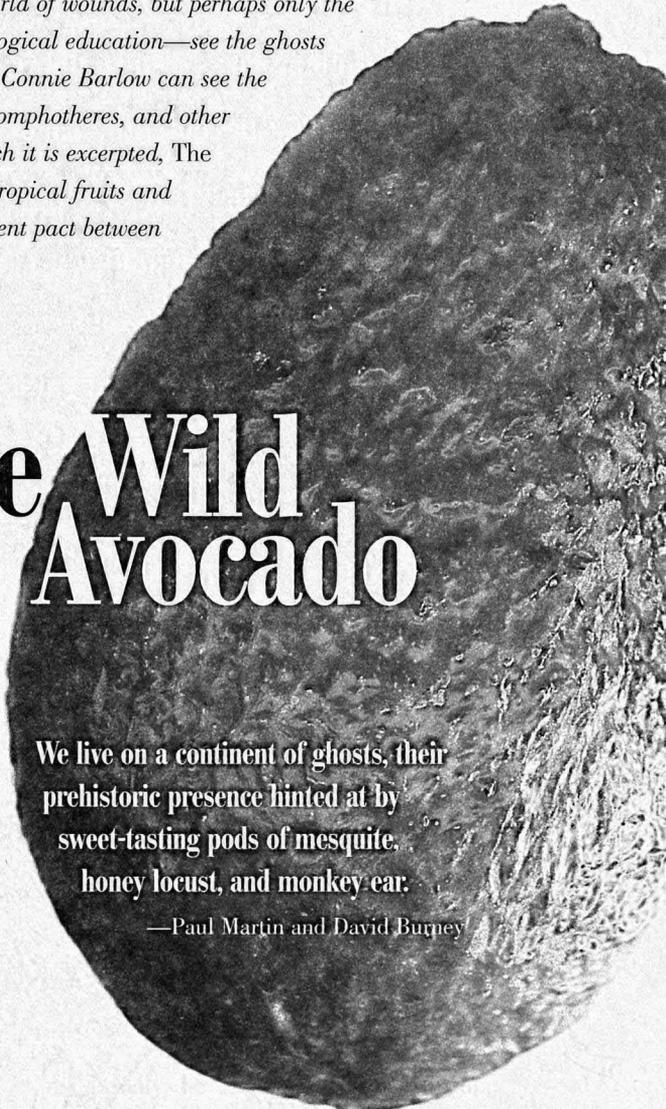
Literature Cited

- Bader, M. 2000. Wilderness-based ecosystem protection in the US Northern Rockies. In David N. Cole and Stephen F. McCool, *Proceedings: Wilderness Science in a Time of Change*. Proc. RMRS-P-000. Ogden, UT: US Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Buckley, J. 1973. Eastern Wilderness Areas Act. *Congressional Record* (Senate). January 11, 1973.
- California Wilderness Coalition. 1998. Wildlands 2000 Mapping Guide.
- Church, F. 1973. The Wilderness Act Applies to the East. *Congressional Record* (Senate). January 16, 1973.
- Colorado Environmental Coalition. n.d. [late 1990s]. Colorado Canyon Country Wilderness Mapping Project.
- Cutler, R. 1977. Memo: "Policy for Evaluating Wilderness Potential of National Forest Roadless and Undeveloped Areas," Assistant Secretary of Agriculture to Chief, Forest Service, November 2, 1977.
- Diamond, J.M. 1975. The island dilemma: Lessons of modern biogeographic studies for the design of natural preserves. *Biological Conservation* 7:1027-1029.
- Diamond, J.M. 1976. Island biogeography and conservation: Strategy and limitations. *Science* 193:1027-1029.
- Diamond, J.M. and R.M. May. 1976. Island biogeography and the design of natural reserves. In R.M. May, ed., *Theoretical Ecology: Principles and Applications*. Philadelphia, PA: W.B. Saunders. pp. 163-186.
- Dickerman, E. 1973. Eastern Wilderness Areas Act. *Congressional Record* (Senate). February 21, 1973. pp. 44-54.
- Egler, F. 1977. *The Nature of Vegetation: Its Management and Mismanagement*. Norfolk, CT: Aton Forest.
- Foreman, D. 1976. How To Conduct A Wilderness Study. Unpublished memo.
- Foreman, D. 1995. Wilderness areas and national parks: The foundation for an ecological nature reserve network. *Wild Earth* 5(4):60-63.
- Foreman, D. 1998. Around the campfire: The ever-robust wilderness idea and Ernie Dickerman. *Wild Earth* 8(3):1-4.
- Foreman, D. 2000. The real wilderness idea. In David N. Cole and Stephen McCool, *Proceedings: Wilderness Science in a Time of Change*. Proc. RMRS-P-000. Ogden, UT: US Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Franklin, J.F. and R.T.T. Forman. 1987. Creating landscape patterns by forest cutting: Ecological consequences and principles. *Landscape Ecology* 1:5-18.
- Harris, L.D. 1984. *The Fragmented Forest: Island Biogeography Theory and the Preservation of Biotic Diversity*. Chicago: University of Chicago Press.
- International Union for the Conservation of Nature and Natural Resources (IUCN). 1980. *World Conservation Strategy*. Gland, Switzerland.
- Jackson, H. 1973. Eastern Wilderness Areas Act. *Congressional Record* (Senate). January 11, 1973.
- Janzen, D.H. 1986. The eternal external threat. In M.E. Soulé, ed., *Conservation Biology: The Science of Scarcity and Diversity*. Sunderland, MA: Sinauer Associates. pp. 286-303.
- Locke, H. 1996. Yellowstone to Yukon. *Wildlife Conservation* 10/96:25-30.
- MacArthur, R.H. and E.O. Wilson. 1967. *The Theory of Island Biogeography*. Princeton, NJ: Princeton University Press.
- Meffe, G.K. and C.R. Carroll. 1997. *Principles of Conservation Biology*. 2nd ed. Sunderland, MA: Sinauer Associates.
- Newmark, W.D. 1987. A land-bridge island perspective on mammalian extinctions in western North American parks. *Nature* 325:430-432.
- Noss, R.F. 1983. A regional landscape approach to maintain diversity. *BioScience* 33:700-706.
- Noss, R.F. 1985. Wilderness recovery and ecological restoration: An example for Florida. *Earth First!* 5(8):18-19.
- Noss, R.F. 1992. The Wildlands Project Land Conservation Strategy. *Wild Earth* Special Issue:10-25.
- Noss, R.F. 1995. *Maintaining Ecological Integrity in Representative Reserve Networks*. World Wildlife Fund Canada/United States.
- Noss, R.F. 1999. A Reserve Design for the Klamath-Siskiyou Ecoregion. *Wild Earth* 9(4):71-76.
- Noss, R.F. and A.Y. Cooperrider. 1994. *Saving Nature's Legacy: Protecting and Restoring Biodiversity*. Washington, DC: Island Press.
- Noss, R.F., E. Dinerstein, B. Gilbert, M. Gilpin, B. J. Miller, J. Terborgh, and S. Trombulak. 1999a. Core areas: Where nature reigns. In M.E. Soulé and J. Terborgh, eds., *Continental Conservation*. Washington, DC: Island Press.
- Noss, R.F., J.R. Strittholt, K. Vance-Borland, C. Carroll, and P. Frost. 1999b. A conservation plan for the Klamath-Siskiyou Ecoregion. *Natural Areas Journal* 19(4):392-410.
- Saylor, J. 1973. Legislation to Save Eastern Wilderness. *Congressional Record* (House of Representatives). January 11, 1973.
- Skagen, S.K., C.P. Melcher, W.H. Howe, and F.I. Knopf. 1998. Comparative use of riparian corridors and oases by migrating birds in southeast Arizona. *Conservation Biology* 12:896-909.
- Soulé, M.E. 1992. A vision for the meantime. *Wild Earth* Special Issue:7-8.
- Soulé, M.E., D.T. Bolger, A.C. Alberts, R. Sauvajot, J. Wright, M. Soric, and S. Hill. 1988. Reconstructed dynamics of rapid extinctions of chaparral-requiring birds in urban habitat islands. *Conservation Biology* 2:75-92.
- Soulé, M.E. and J. Terborgh. 1999. The policy and science of regional conservation. In M.E. Soulé and J. Terborgh, eds., *Continental Conservation: Scientific Foundations of Regional Reserve Networks*. Washington, DC: Island Press.
- Terborgh, J. 1974. Preservation of natural diversity: The problem of extinction prone species. *BioScience* 24:715-722.
- Thomas, J.W., E.D. Forsman, J.B. Lint, E.C. Meslow, B.R. Noon, and J. Verner. 1990. A Conservation Strategy for the Northern Spotted Owl. USDA Forest Service, USDI Bureau of Land Management, USDI Fish and Wildlife Service, and USDI National Park Service, Portland, OR.
- Utah Wilderness Coalition. 1997. Wilderness Boundary Review.
- Vest, J.H. 1985. Will of the Land. *Environmental Review* Winter 1985:321-329.
- Wilcove, D.S., C.H. McLellan, and A.P. Dobson. 1986. Habitat fragmentation in the temperate zone. In M.E. Soulé, ed., *Conservation Biology: The Science of Scarcity and Diversity*. Sunderland, MA: Sinauer Associates. pp. 237-256.
- The Wilderness Society. 1998. *The Wilderness Act Handbook*. Washington, DC: The Wilderness Society.
- Wilson, E.O. and E.O. Willis. 1975. Applied biogeography. In M.L. Cody and J.M. Diamond, eds., *Ecology and Evolution of Communities*. Cambridge, MA: Belknap Press of Harvard University Press. pp. 522-534.

EDITOR'S INTRODUCTION Conservationists by nature look out upon a world of wounds, but perhaps only the most astute among us—those who have suffered the deepest penalty of an ecological education—see the ghosts that inhabit the land. Like the protagonist in the recent film *The Sixth Sense*, Connie Barlow can see the dead; not the ghosts of people, however, but giant ground sloths, mastodons, gomphotheres, and other now extinct megafauna. In this article, and the wonderful new book from which it is excerpted, *The Ghosts of Evolution*, she considers the fascinating relationship between large tropical fruits and the megaherbivores with which they coevolved, and mourns the loss of an ancient pact between certain plants and the animals who helped disperse their seeds. —TB

Haunting the Wild Avocado

by Connie Barlow



We live on a continent of ghosts, their prehistoric presence hinted at by sweet-tasting pods of mesquite, honey locust, and monkey ear.

—Paul Martin and David Burney



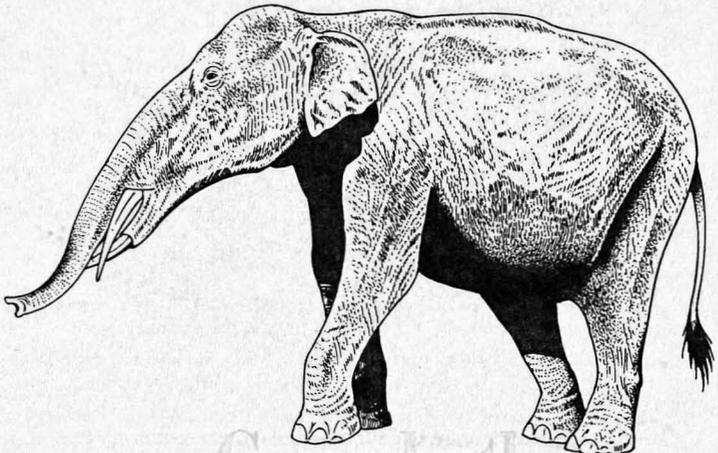
Grocery stores are excellent places to encounter ghosts. They lurk in the fruit section, feasting on ecological anachronisms. Paul Martin thinks he's spotted ghosts among the bins of apples and pears. Martin is a paleoecologist at the University of Arizona, and he likes to dwell in the Pleistocene. He has been honing his occult skills for a quarter century. I'm a neophyte, so I head straight for the tropical fruits, where ghosts are easier to conjure.

For thirteen thousand years, since the extinction of the massive at the end of the Pleistocene, papaya has been haunted by spectacular ghosts (Janzen and Martin 1982). Most impressive are the gomphotheres and ground sloths, with gapes large enough to take in the soft fruit whole. Originating in Mexico, *Carica papaya* had evolved its fruit form to attract great herbivores. But soon after humans arrived in the New

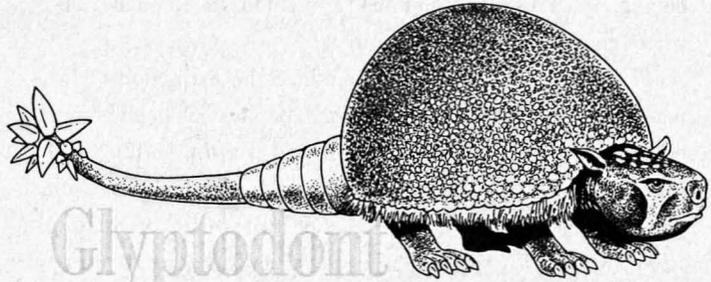
This essay is adapted from Connie Barlow's forthcoming book, The Ghosts of Evolution: Nonsensical Fruits, Missing Partners, and Other Ecological Anachronisms (© 2001 by Connie Barlow; all rights reserved), and is used with kind permission of Basic Books.



Ground Sloth



Gomphothere



Glyptodont

World, that strategy for reproduction came to an end. The holocaust of megafaunal extinction deprived papaya of its best seed dispersers.

The avocado bin attracts ghosts of glyptodonts and toxodons as well as gomphotheres and ground sloths. Because almost all fifty species of genus *Persea* are native to the tropics and subtropics of the Americas, one can surmise that the avocado genus developed its single-seeded form in the Western Hemisphere. Not all *Persea* species evolved with megafauna in mind, however. The kind that thrives along the Gulf Coast of the United States bears fruit not much bigger than blueberries.

Like papaya, the species of avocado found in grocery stores (smooth and rough-skinned varieties of *Persea americana*) has been haunted for thirteen thousand years. Many living frugivores, omnivores, and even carnivores are attracted to the oily pulp, but only an animal with a massive gullet will swallow the huge seed along with the flesh. The cultivated varieties of *Persea americana* have far thicker pulps surrounding the seed than does the ancestral stock, but the seed itself is virtually unchanged in girth (Cook 1982). From a functional and evolutionary perspective, avocado *intends* its fruits to be swallowed whole. That's how the species disperses its seed. The oily flesh is simply the lure. A parent tree could wish for no more desirable fate for its offspring than to have its seeds plopped into the world within steaming heaps of dung.

Whether growing in commercial orchards of southern California or forest fragments of the neotropics, domestic and wild avocado trees still expect giant mammals to stop by for the harvest. Wave upon wave of Cenozoic megafauna faithfully harvested avocado fruits, season upon season, for tens of millions of years. The identities of the dispersers shifted every few million years, but from an avocado's perspective, a big mouth is a big mouth and a friendly gut is a friendly gut. The passage of a trifling thirteen thousand years is too soon to exhaust the patience of genus *Persea*. The genes that shape fruits ideal for megafauna retain a powerful memory of an extraordinary mutualistic relationship. Embellished by our own scientific understanding, that memory would look something like this.

THE SCENE IS A TROPICAL FOREST IN CENTRAL AMERICA fifteen thousand years ago, and a giant has just arrived. Perhaps attracted by the scent of ripe pulp, a three-ton mother and her bear-size toddler approach a tree that shed its fruit crop a few days before. The visitors are ground sloths, whose closest living relatives are South American tree sloths,

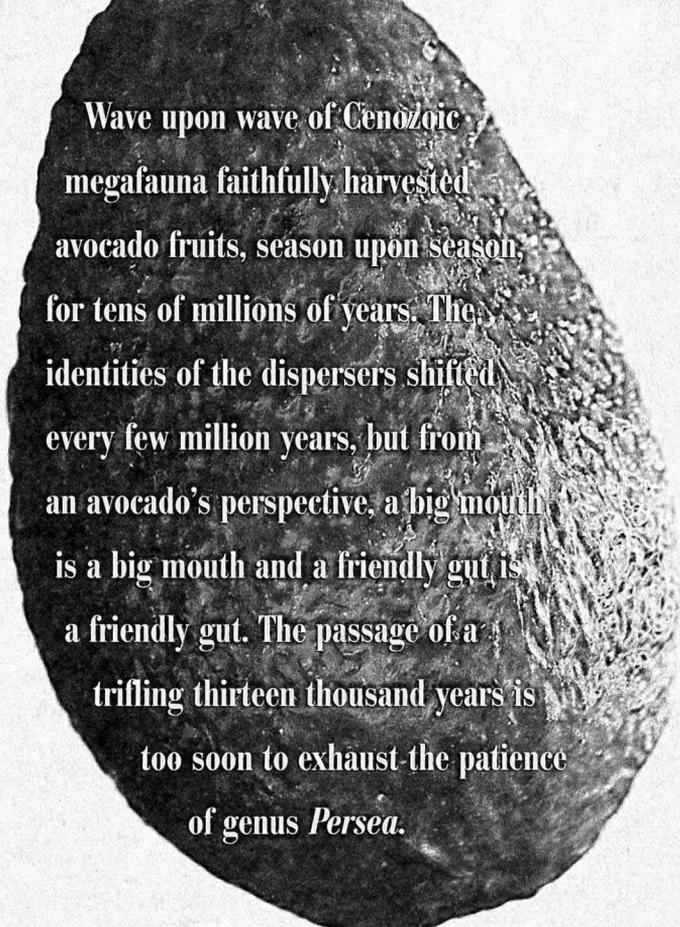
anteaters, and armadillos. *Eremotherium* looks like nothing alive today. Think of a bear crossed with a prairie dog or marmot and endowed with the bulk of an elephant. The adult sloth begins to sniff the carpet of fruits for the ripest specimens. Her agile offspring climbs a nearby tree for safety and also because, at this age, climbing is not only possible but irresistible. In a few years, the young sloth's tree climbing days will be over. By then, an enormous bulk and powerful clawed forelimbs will suffice to ward off all but the most determined predators.

The mother finds a fruit that smells acceptable and tests it for softness between frontally toothless jaws. The whole fruit is then mashed between tongue and palate. The slippery seed slides easily down the animal's gullet, along with the nutritious pulp. Laxatives in the pulp ensure that the seed will complete its dark journey before digestive juices do it harm.

Other seeds follow. Before she is satiated, the sloth and her young depart. The adult sloth will balance the oily meal with leafy browse, thus keeping microbes happy in the vast fermentation vat of her gut. Tomorrow the pair will return to the same tree, dispersing seeds enroute. Or perhaps *Eremotherium* will choose a papaya tree instead. To feed on papaya, the great sloth will sit up on her haunches, using her sturdy tail for a third point of balance. She will choose the ripest pendulous fruit—all of which are borne on the trunk of the small tree. Her reach may exceed four or even five meters.

The sloth's limbs still bear signs of arboreal ancestry. In shuffling from plant to plant, *Eremotherium* walks on the sides of her paws. The awkward gait may owe to phylogenetic inertia—an inability to evolve away from an established form. Perhaps, too, it owes to the survival advantage of in-turned paws. An enhanced ability to climb when young should more than offset an inability to run later on. Or perhaps the anatomical quirk is necessary for the sloth to walk at all. *Eremotherium*'s front feet bear exceptionally long claws, as do the front feet of a relative that will survive the end-Pleistocene extinction: South America's giant anteater. The anteater walks on its knuckles, claws behind and curled skyward.

Meanwhile, in another part of the forest, one that is especially rich in avocado trees, a small herd of gomphotheres (genus *Cuvieronius*) approaches on an ancient trail. The herd has traveled tens of miles in the past three days, munching greenery along the way. The matriarch remembers the route. She remembers this avocado-rich valley and others throughout a vast region, as well as good places and times to find papaya, chirimoya, sapote, *Cassia grandis*, and many other treats. She learned these sites while following the lead of her mother, the former matriarch.



Wave upon wave of Cenozoic megafauna faithfully harvested avocado fruits, season upon season, for tens of millions of years. The identities of the dispersers shifted every few million years, but from an avocado's perspective, a big mouth is a big mouth and a friendly gut is a friendly gut. The passage of a trifling thirteen thousand years is too soon to exhaust the patience of genus *Persea*.

The gomphotheres arrive at the avocado grove when the fruits are near their prime. A half dozen elephantine trunks probe the carpet of green-brown fruits. This is the first avocado experience for the youngest member of the clan. The pulp tastes as good as it smells, but the seed is too big to be swallowed. Much pulp is lost as the young proboscidean works the seed out and over the edge of his mouth. Then he picks up another fruit, and another. Finally, he manages to crush a slippery seed between cusped molars. The mash is hastily rejected. The bitter toxins are the plant's way of ensuring that dispersers do not become seed predators. Seeds are to be swallowed, not chewed.

Giving up, the young gomphothere nudges a cousin into play while the adults continue to eat. The avocados are soon gone, and the matriarch leads the herd to a forest clearing where browse is abundant. In a day or two, the gomphotheres will begin to deposit in fertile mounds the avocado seeds, along with many smaller seeds of other fruiting species ingested around the same time. Many of the seeds that survived the intestinal voyage will fall prey to seed-eating rodents or parrots, especially after dung beetles have carved the heap into fragments, rolling away the rich matrix to feed their young. Perhaps one seed will become a tree.

Ten years pass. A young avocado tree bears fruit for the first time. The gomphotheres discover it easily and add its location to clan memory. By no coincidence, the tree is near an ancient, well-worn path.

FIFTEEN THOUSAND YEARS PASS. *PERSEA AMERICANA* STILL grows in Central American forests not yet turned into pasture. But the extent and density of the species does not match its former glory. A menagerie of small pulp thieves and seed predators raid the fallen fruits. Those who plunder the pulp leave behind seeds destined to compete with the parent. Seed predators may wait for the molecular transformations of germination to subdue the toxins, or they may gnaw into seeds to extract just the embryos. Now that the migrators are gone, the sheer mass of fruit overwhelms the appetites of locally based thieves and predators. Molds attack the pulp of many overripe fruits. Fungal hyphae work their way into the seeds.

If a tree is very lucky, a jaguar may happen by. The avocado's oily flesh is attractive to this otherwise strict carnivore (Cook 1982). Because jaguar teeth are designed for tearing flesh—not grinding seeds—and because its gullet is adapted for swallowing great chunks of meat, a jaguar is a helpful seed disperser for avocado. But large carnivores were never abundant and are less so today. The avocado lineage may have been saved from extinction by the rare jaguar who takes advantage of an easy meal, and perhaps by agouti rodents that gather and bury avocado seeds just as squirrels gather and bury acorns (Hallwachs 1980). The occasional pulp thief who scampers off with a fruit in its mouth, in order to strip off the pulp in a safer location, has surely helped the lineage as well. Nevertheless, the fruit of avocado was not shaped by millions of years of selection for these underabundant, ill-fitted, or fickle dispersal agents.

Nor was it shaped by the food preferences of bipedal apes, who invaded avocado territory just before the gomphotheres and ground sloths disappeared. Those apes are now doing a better job dispersing one species of the genus than any animal has done before. The dominant habitat for avocado today is in villages and orchards—and its range now wraps around the world.

Fortuitously, avocado was superbly built to attract the new mutualists. Nevertheless, it was not built to the specifications of apes. Rather, the fruit of the avocado (like that of mango, grapefruit, and pomegranate in the Eastern Hemisphere) was the plant kingdom's ingenious response to the pageant of beasts grown big throughout the Cenozoic and throughout the world. The beasts did not become giants in order to consume avocados. Their gigantism owes to millions of years of adaptive change to deter predators, to store energy for lean times, and to overpower rivals in mating jousts. In contrast, the avocado lineage did indeed evolve big-seeded, big fruits with the big beasts in mind. The bigger the seed, the better provisioned the embryo. Big-seeded plants have an advantage over small-seeded plants in mature forests, where sunlight penetrates to the ground only in

patches and for maybe an hour or two each day. Big-seeded fruits of the tropical forests can grow for a year entirely on the energy sequestered in the seed. Perhaps during that pivotal year a tree will topple, allowing a shaft of light to penetrate. Or perhaps the seedling itself will reach a height where photosynthesis can begin in earnest.

Avocado's strategy for propagation made a great deal of sense throughout the long life of this lineage—until the present moment. Even after thirteen thousand years, avocado is clueless that the great mammals are gone. For the avocado, gomphotheres and ground sloths are still real possibilities. Pulp thieves like us reap the benefits. *Homo sapiens* will continue to mold the traits of the few species of genus *Persea* it prefers. Ultimately, however, wild breeds will devolve less grandiose fruits, or else follow their animal partners into extinction.

An avocado sitting in a bin at the grocery store is thus biology in a time warp. So too is papaya and cherimoya, sapote and countless other fleshy fruits of the neotropics. In temperate regions of North America, fruits that remember mastodons and mammoths include the long, spiraling pod of honey locust and the great green ball of the osage orange. These reproductive strategies are all suited for a by-gone world. The fruits are ecological anachronisms. Their missing partners are the ghosts of evolution.

These Pleistocene anachronisms are vivid reminders of a time not long ago when the New World megafauna rivaled that of the Old. The avocado is the American version of the elephant and rhino-alluring mango of Asian forests. Many American anachronisms have already suffered range contractions and become patchy or rare in the wild. As tapirs and monkeys in the West and elephants and rhinos in the East dwindle, more and more fruits will be pushed over the brink, joining the ranks of the ill-suited and sadly bereft. ☾

Connie Barlow, a science writer and conservation activist, is a founding member of the *Epic of Evolution Society*. Her books include *From Gaia to Selfish Genes*; *Evolution Extended*; and *Green Space, Green Time: The Way of Science*. She divides her time between New York City and the Gila country of New Mexico.

LITERATURE CITED

- Cook, Robert E. 1982. Attractions of the Flesh. *Natural History* January: 20–24.
- Hallwachs, W. 1980. Agoutis: The Inheritors of Guapinol. In A. Estrada and T.H. Fleming, eds. *Frugivores and Seed Dispersal*. Dordrecht: Junk. pp. 286–304.
- Janzen, Daniel H., and Paul S. Martin. 1982. Neotropical anachronisms: The fruits the gomphotheres ate. *Science* 215:19–27.
- Martin, Paul S., and Burney, David A. 1999. Bring Back the Elephants! *Wild Earth* 9(1): 57–64.



Naturalness and Wildness

The Dilemma and Irony of Ecological Restoration in Wilderness

by Peter Landres, Mark W. Brunson, and Linda Merigiano

The fires throughout the western United States in the summer of 2000 raise a difficult question about all wildlands and especially federally designated wilderness: should fuels accumulated from decades of fire suppression be removed to restore more natural ecological conditions? More generally, when and how do wilderness managers decide to take actions to restore natural conditions in wilderness? What is gained and what is lost by such actions? Here we explore the dilemma and irony surrounding two concepts, naturalness and wildness, that arises over proposals to restore natural ecological conditions in designated wilderness. We assert that the right course of action is not simply doing what is necessary to restore natural conditions because the goal in wilderness is to restore and support *both* naturalness and wildness.

An earlier version of this article originally appeared in: Cole, David N., Stephen F. McCool, William T. Borrie, and Jennifer O'Loughlin (compilers). 2000. Wilderness science in a time of change conference, Volume 5: Wilderness ecosystems, threats, and management. USDA Forest Service Proceedings RMRS-P-15-VOL-5, Rocky Mountain Research Station, Ogden, UT.

TERMS AND CONCEPTS

The Wilderness Act of 1964 designated lands "...where the earth and its community of life are untrammelled by man" and defined wilderness as land "retaining its primeval character and influence...which is protected and managed so as to preserve its natural conditions." The meanings and implications of these words have been discussed and debated for decades (McCloskey 1966, Callicott and Nelson 1998, Aplet 1999). In the context of wilderness management, two key words from the Wilderness Act are *untrammelled* and *natural*. Dictionary synonyms for untrammelled include unimpeded, unhampered, uncontrolled, self-willed, and free. In one of the first and clearest explanations of the word untrammelled, Howard Zahniser (1956) wrote "...there is in our planning a need also to secure the preservation of some areas that are so managed as to be left unmanaged—areas that are undeveloped by man's mechanical tools and in every way unmodified by his civilization." In a 1959 letter, Zahniser also wrote that the idea within the word untrammelled was of "not being subjected to human controls and manipulations that hamper the free play of natural forces" (Scott forthcoming). The word *wildness* strongly connotes this sense of an area free from human control or manipulation. Use of wildness in this way is also supported by Zahniser's statement before a committee of the New York state legislature in 1953 that "We must remember always that the essential quality of the wilderness is its wildness" (Zahniser 1992).

Wildness confers social and biological benefits. Numerous authors (e.g., Dawson et al. 1998) have described the personal, spiritual, and therapeutic benefits of primitive and unconfined recreation, and the larger societal benefit of humility and sense of restraint that we gain from lands that are relatively free from human control. Arguably, the greatest biological benefit of wild landscapes is the protection of landscape-scale disturbance regimes and the movement of organisms, ultimately allowing the process of evolution to be relatively unfettered by human manipulation (Landres 1992).

There has been considerable debate about the definition of the word *natural* in the context of wilderness management (Landres et al. 1998), but from a biological perspective natural may simply be defined as the native biological species composition, spatial and temporal patterns, and processes of an area (Noss and Cooperrider 1994). Synonyms for natural include native, aboriginal, indigenous, and endemic, and we suggest that the term *naturalness* captures this biological sense of wilderness.

These concepts of wildness and naturalness strongly influence, directly and indirectly, virtually all of the decisions and actions taken in wilderness management. While the concepts of

wildness and naturalness differ from one another, both are essential to wilderness (Worf 1997, Barry 1998, Aplet 1999) and are highly valued in our society (Manning and Valliere 1996, Cordell et al. 1998). Wilderness is the idea and place where the concepts of wildness and naturalness reach their highest and fullest expression.

AN EMERGING DILEMMA AND IRONY

In many cases, such as campsite and trail restoration, there is little controversy or conflict between wildness and naturalness. In other cases, wilderness managers today face problems likely unforeseen by those who wrote and debated the 1964 Wilderness Act (Brunson 1995). For example, decades of fire suppression throughout the United States have increased fuel loads and allowed dense undergrowth of trees in areas where frequent, low-intensity fires were common, placing old-growth trees at risk. Typically, proposed solutions include mechanical reduction of fuels, the use of management-ignited fire, or both to restore the natural fire regime. The widespread occurrence of exotic plants alters native plant and animal communities in wilderness, and in the Frank Church River of No Return Wilderness in Idaho the use of herbicides is proposed to eliminate spotted knapweed and rush skeleton weed as the first step in restoring native plant communities. Acid deposition throughout the eastern United States and in certain areas of the West has significantly altered aquatic systems in several wilderness areas. Liming rivers in the Saint Mary's Wilderness in Virginia was proposed to counter this acidity and restore the aquatic system.

In each of these cases, the naturalness of the area has been compromised by unintended consequences of management actions or broad-scale human threats, and some form of manipulation of the environment is proposed to restore naturalness. This situation raises the crucial management dilemma of whether large-scale manipulation in wilderness, however undesirable, should be used to restore natural conditions, thereby sacrificing wildness for naturalness (Cole 1996, 2000). In situations where human-caused impacts have caused wholesale changes to naturalness, we *can* manipulate wilderness to restore naturalness, but *should* we?

Either manipulating wilderness to restore naturalness, or not manipulating wilderness to support wildness, compromises one value or the other. The management goal is to protect wildness *and* naturalness, so managers struggle with this irony of having to weigh one value of wilderness against another. Different people hold strong views on this issue. Those who support naturalness note that the Wilderness Act defines wilderness as "land retaining its primeval character and influence...which



is protected and managed so as to preserve its natural conditions and...appears to have been affected primarily by the forces of nature." This is held up as a clear mandate for restoring natural conditions to overcome a myriad of human-caused insults. Indeed, restoration is often expressed in terms of a moral responsibility to correct these insults (Windhager 1998) and take all possible actions to restore naturalness. Proponents of this view acknowledge that, while not all of the desired information is available, there is sufficient information to take action now, and that such actions are better than doing nothing and watching wilderness ecosystems continue to degrade.

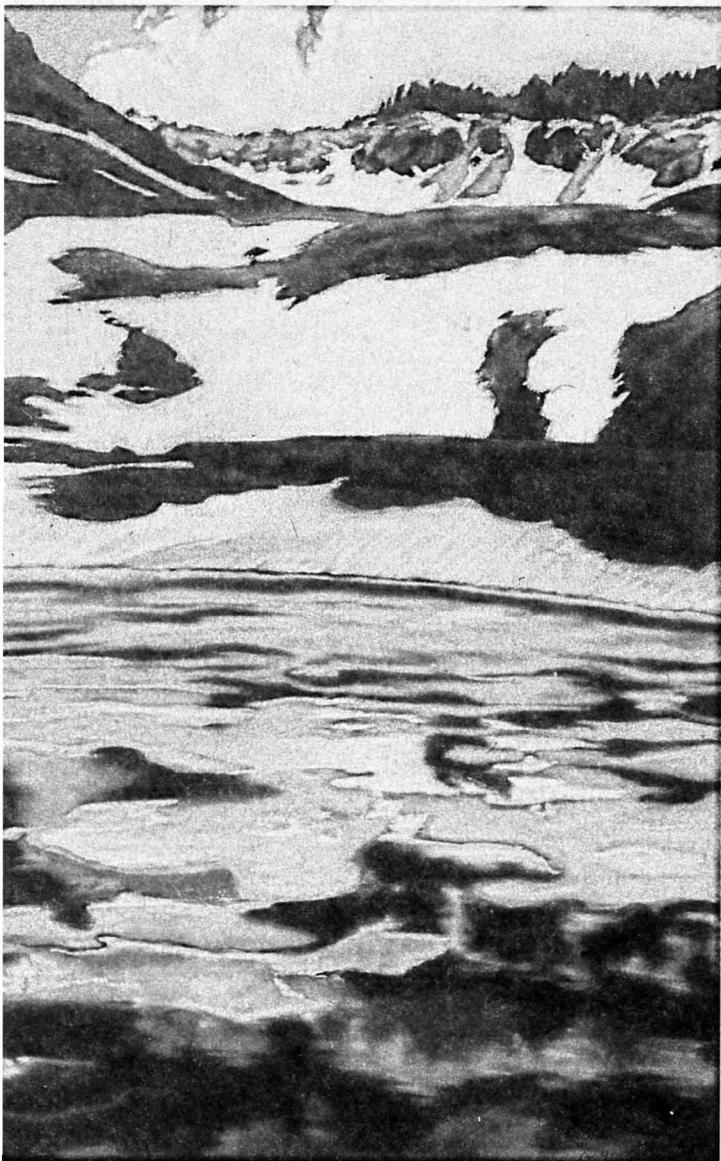
Others, citing from the Wilderness Act that wilderness is "an area where the earth and its community of life are untrammeled by man," claim that the fundamental character of wilderness is to be free of human manipulation (Worf 1997, Foreman 1999, Kaye 1999). Here, wilderness is the only place on our ever more crowded planet that is left free from manipulation, and these areas yield vital benefits to society because they are untrammeled and wild. This view acknowledges the ecological problems in wilderness but advocates that, if any intervention is warranted, only the minimum management activity (concentrating on the use of simple, non-mechanized tools) be used to counter these problems. Further, although it is widely recognized that wilderness ecosystems are now compromised—based on our understanding of historical conditions—we have the opportunity to keep these areas as wild as possible from this point on. Proponents of this view assert that the first rule of wilderness management is to do no harm, and there is a long history of negative consequences from even the best of intended

actions. Scientific uncertainty about reference conditions and the long-term effects of restoration actions compound this risk, potentially making the results of taking action worse than the results of not taking action. George Nickas (1998) argues that "the burden of proof should always be on those who propose to manipulate Wilderness."

THE CENTRAL DILEMMA OF WILDERNESS RESTORATION: WHEN TO TAKE ACTION?

This dynamic tension between the desire to restore natural conditions and the desire to protect core values of wildness and non-intervention is the central dilemma of wilderness restoration. Before approving a restoration proposal, wilderness managers must reach some kind of conclusion about the consequences and risks of taking action versus not taking action. They must weigh the ecological value of naturalness against the social value of wildness. They must determine how much trampling is necessary or tolerable in wilderness, and for how long such actions will be needed. More basically, they must agree that it is even appropriate to define a target for desired future ecological conditions in wilderness. And they must be willing to face the possibility that, as suggested by Janzen (1998), they have reluctantly accepted the human "gardenification" of wilderness and compromised values fundamental to the National Wilderness Preservation System.

While these concerns are particularly crucial for managers who have legal responsibility for protecting wilderness values on behalf of all Americans, they must be resolved through dialogue with a full range of wilderness stakeholders.



Public input is required under the National Environmental Policy Act before any action is taken that could transform wilderness conditions. More importantly, the issues raised by the restoration dilemma are ones that require assent from the citizens for whom wilderness is managed and whose social values managers strive to protect.

Separating the concepts of wildness from naturalness helps clarify and partially resolve this management dilemma of when to take action. Some proposed actions, such as manipulating habitat to increase a wildlife species' density, decrease both wildness and naturalness and are not appropriate in wilderness. Conversely, proposed actions that support wildness, or at least do not reduce it, and increase naturalness should be pursued. Closing and restoring a campsite, for example, doesn't manipu-

late the land in a way that impedes wildness on a large scale, and restoring native plants increases naturalness.

Management dilemma and irony arises when either wildness or naturalness must be compromised to enhance the other. For example, in forests where fire suppression has created fuel loads beyond what occurred historically, a decision not to manipulate fuels through mechanical treatments or management-ignited fire supports wildness, but may increase the susceptibility of the forest to larger-scale and more intense fires than occurred historically, potentially decreasing naturalness, at least in the short term.

The appropriate course of action in this case is not clear. The chosen course should be based on the spatial and temporal scale of the proposed actions and their effects, how well-defined the target conditions are, and the quality of information about restoration actions and their effects. If the degraded area and restoration actions are localized, if the actions taken today will allow managers to reduce their interference with the "will of the land" in the future, if there are good reference sites to know what the undisturbed condition is, if the short- and long-term effects of restoration actions (as well as the likely consequences of not taking actions) are known with reasonable certainty, manipulative actions may be justified. In contrast, if restoration actions are being considered over a large area and there is uncertainty about the effects of these actions or about the target conditions, much more caution and scrutiny is warranted. Each of these criteria—spatial scale, temporal scale, understanding of undisturbed conditions, and understanding the effects of taking or not taking restoration actions—span from small (for example, a small area, a short time frame, and a small amount of understanding) to large. A pressing task for wilderness managers is forging guidelines about how to weigh these criteria in choosing whether to take action.

Understanding the differences between wildness and naturalness doesn't solve this dilemma of wilderness management. But making these concepts explicit starts to create a rough frame for restoration guidelines by clarifying when proposed actions are clearly inappropriate and when they are acceptable. Furthermore, they clarify what issues need to be discussed and weighed in determining whether proposed restoration actions should be taken.

UNDERSTANDING AND RECONCILING THE SOCIAL IRONY

Wilderness was established by Congress to uphold both wildness and naturalness. As discussed above, wilderness managers now often find themselves in the ironic situation of choosing

between wildness and naturalness. What are the social origins and implications of this irony?

Fine (1997) identified three overarching philosophical views of the relationship between Nature and culture that have predominated over the course of human history. The first view is the “utilitarian” perspective, wherein Nature is seen primarily as a storehouse of goods that can meet human needs. In this view, often associated with western societies in the Industrial Revolution and colonial expansion era (Nash 1967), Nature and culture are seen as two separate entities, with Nature existing primarily for the benefit of culture.

The second view, the “preservation” perspective associated with many environmental advocacy groups, also holds Nature and culture to be separate. But in this view, Nature is seen to exist *in spite of* culture, and the best role for Nature is to be protected from the influences of humanity (Fine 1997).

The third view is the “organic” perspective. Fine (1997) points out that this is both the oldest and newest orientation toward Nature—characteristic of many pre-industrial cultures, as well as the modern sustainable development movement, among others—in which the natural world and human world are integrated and even inseparable.

The Wilderness Act, passed at the beginnings of the modern American environmental movement when our society was just beginning to recognize the full extent of ecological degradation caused by modern industrial expansion, is legislation born of dichotomy between Nature and culture. The preservationist view is seen clearly in its description of wilderness as a place “where man himself is a visitor who does not remain.” Wilderness management has solidified this dichotomous perspective, as required by the language of the act itself, by distinguishing between natural and human-caused influences. Thus, for example, lightning-ignited fires typically are allowed to burn, but human-ignited fires are not, even if their ecological benefits to wilderness ecosystems would be identical. Or bare ground may be mitigated if attributed to humans or domestic livestock but not wild ungulates.

Since passage of the Wilderness Act, however, other movements have begun to try to close the gap between Nature and culture, even to inject culture into Nature to redress some of the failures of culture. The dilemma over management action in wilderness today is born of our recognition of these later movements, which represent a re-emergence of the ancient holism seen in some pre-industrial views of humans in Nature.

The first of these movements is ecosystem management, which acknowledges human dependence on biotic integrity and seeks to blur the boundaries between social and biotic systems

(Yaffee 1999). The second movement is that of ecological restoration, which represents recognition of society’s ethical responsibility to try to make things right in our relationship with Nature (Gobster and Hull 1999). Some thinkers such as Jordan (1985) have tried to create a “participatory ideal,” in which restoration is best when it meets a wide range of human needs. Restoration is *not* simply fixing things and then leaving them alone, but rather a continued community action. The convergent view of Nature/culture relationships is also reflected in Limits of Acceptable Change (LAC) type planning processes (McCool and Cole 1997) used by many wilderness managers. These public involvement processes can help frame the right questions when managers are faced with conflicting but equally valid societal goals. Brunson (2000) suggested that these tools provide a useful framework for societal dialogue about restoration activities both in and outside of designated wilderness.

The dilemma we face—whether to side with wildness by stressing the Nature/culture dichotomy, or to side with naturalness by restoring Nature whenever possible—is rooted in the ongoing ambiguity of a wilderness policy and other environmental policies that arise from both the preservationist and organic views of Nature and culture. Where we fall on the spectrum from dichotomy to holism is often intertwined with our view of risk and uncertainty: Do we dare trust science? Do we dare not? If we trust scientists to make wise, informed judgments about what “Nature” would be without human intervention, we are more likely to approve of manipulations intended to produce those conditions. Alternatively, if we’re concerned about the possibility of restoration going awry, we may be too risk-averse to allow restoration in wilderness.

Seen another way, if we believe that wild Nature is doomed, we may be more likely to want to restrict further manipulation in order to save whatever’s left in the least “damaged” condition possible. Alternatively, we may believe that leaving things alone will only make matters worse, as may be the case in systems

A matrix showing suggested outcomes when proposed restoration actions support or decrease wildness and increase or decrease naturalness.

		WILDNESS	
		Decrease	Support
NATURALNESS	Decrease	No Action	Dilemma & Irony
	Increase	Dilemma & Irony	Action

we've simplified through fire suppression, so that the only justifiable action is to try to reverse the trends.

There are questions of trust not only about science, however, but also the people who apply it: scientists and land managers. When people oppose manipulative restoration, is it the science they distrust or is it managers and the agencies they represent? These are questions that we need to confront if we are to make reasoned decisions about whether to allow restoration of naturalness or protect wildness at all costs.

CONCLUSIONS

Large-scale wilderness restoration based on manipulating the environment will often cause a dilemma and may entail the irony of balancing wildness against naturalness. In one way, this dilemma is good because it forces us to carefully consider our actions and their consequences. Doing the right thing for wilderness may come down to sometimes making a choice between wildness and naturalness—but we should always strive for a solution that allows for both. Not surprisingly, individuals and organizations may differ, sometimes strongly, in their opinions about what is right for wilderness. One of the biggest hurdles facing wilderness policy-makers, managers, and advocates today is how to reconcile these views and manage wilderness for both wildness and naturalness. Managers who assume there is but one definition of the problem and but one course of action will be resisted by those with different views about what is appropriate for wilderness. Protecting and preserving wilderness that is wild and natural requires approaching decisions with humility, giving equal consideration to wildness and naturalness, understanding what we gain and what we lose with our decisions and actions, and open, vigorous discussion among people with different views about what is right and respectful in wilderness. ☺

ACKNOWLEDGEMENTS We thank Greg Aplet, Josh Brown, David Cole, Tim Hogan, Marion Hourdequin, Roger Kaye, George Nickas, David Parsons, and Chris Ryan for their comments and discussion which helped clarify and focus our thoughts in this paper.

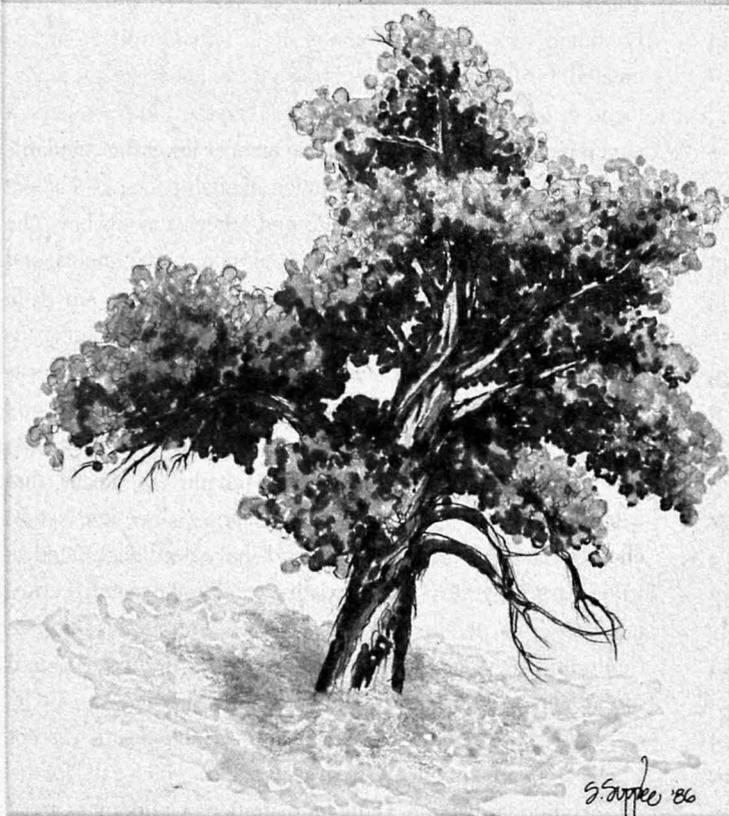
Peter Landres is research ecologist at the Aldo Leopold Wilderness Research Institute (PO Box 8089, Missoula, MT 59807). **Mark W. Brunson** is associate professor in the Department of Forest Resources, Utah State University (Logan, UT 84322). **Linda Merigliano** is natural resource specialist in the Bridger-Teton National Forest (PO Box 1888, Jackson, WY 83001).

LITERATURE CITED

- Aplet, G.H. 1999. On the nature of wildness: exploring what wilderness really protects. *Denver University Law Review* 76:347–367.
- Barry, D. 1998. Toward reconciling the cultures of wilderness and restoration. *Restoration & Management Notes* 16:125–127.
- Brunson, M.W. 1995. The changing role of wilderness in ecosystem management. *International Journal of Wilderness* 1(1):12–16.
- Brunson, M.W. 2000. Managing naturalness as a continuum: Setting limits of acceptable change. In Gobster P., R.B. Hull, eds. *Restoring Nature*. Washington, DC: Island Press.
- Callicott, J.B., and M.P. Nelson, eds. 1998. *The Great New Wilderness Debate*. Athens, GA: University of Georgia Press.
- Cole, D.N. 1996. Ecological manipulation in wilderness: An emerging management dilemma. *International Journal of Wilderness* 2(1):15–19.
- Cole, D.N. 2000. Paradox of the primeval: Ecological restoration in wilderness. *Ecological Restoration* 18:77–86.
- Cordell, H.K., M.A. Tarrant, B.L. McDonald, and J.C. Bergstrom. 1998. How the public views wilderness. *International Journal of Wilderness* 4(3):28–31.
- Dawson, C.P., J. Tanger-Foster, G.T. Friese, and J. Carpenter. 1998. Defining characteristics of USA wilderness experience programs. *International Journal of Wilderness* 4(3):22–27.
- Fine, G.A. 1997. Naturework and the taming of the wild: The problem of “overpick” in the culture of mushroomers. *Social Problems* 44:68–88.
- Foreman, D. 1999. Will-of-the-land. *Wild Earth* 9(2):1–4.
- Gobster, P., and R.B. Hull. 1999. The restoration and management of nature. *Ecological Restoration* 17:44–51.
- Janzen, D. 1998. Gardenification of wildland nature and the human footprint. *Science* 279:1312–1313.
- Jordan, W.R. 1985. On the imitation of nature. *Restoration & Management Notes* 3:2–3.
- Kaye, R.W. 1999. The Arctic National Wildlife Refuge. *Wild Earth* 9(4):92–101.
- Landres, P.B. 1992. Temporal scale perspectives in managing biological diversity. *Transactions of the North American Wildlife and Natural Resources Conference* 57:292–307.
- Landres, P.B., P.S. White, G. Aplet, and A. Zimmermann. 1998. Naturalness and natural variability: definitions, concepts, and strategies for wilderness management. In D.L. Kulhavy, M.H. Legg, eds. *Wilderness & Natural Areas in Eastern North America: Research, Management and Planning*. Nacogoches, TX: Center for Applied Studies, College of Forestry, Stephen F. Austin University.
- Manning, R.E., and W.A. Valliere. 1996. Environmental values, environmental ethics, and wilderness management. *International Journal of Wilderness* 2(2):27–32.
- McCool, S.F., and D.N. Cole, compilers. 1997. *Proceedings—Limits of Acceptable Change and related planning processes: Progress and future directions*. USDA Forest Service General Technical Report INT-CTR-371, Intermountain Research Station, Ogden, UT.
- McCloskey, M. 1966. The Wilderness Act: its background and meaning. *Oregon Law Review* 45(4):288–321.
- Nash, R. 1967. *Wilderness and the American Mind*. New Haven, CT: Yale University Press.
- Nickas, G. 1998. Wilderness fire. *Wilderness Watcher* 10(1):3–5.
- Noss, R.F., and A.Y. Cooperrider. 1994. *Saving Nature's Legacy*. Washington, DC: Island Press.
- Scott, D. 2001. The meaning of the word “untrammled” in the Wilderness Act of 1964. *Wild Earth*, forthcoming.
- Windhager, S. 1998. Biotic citizenship: A response to Barry. *Restoration & Management Notes* 16:128.
- Worf, B. 1997. Response to “Ecological manipulation in wilderness” by Dr. David Cole. *International Journal of Wilderness* 3(2):30–31.
- Yaffee, S.L. 1999. Three faces of ecosystem management. *Conservation Biology* 13:713–725.
- Zahniser, E. 1992. *Where Wilderness Preservation Began: Adirondack Writings of Howard Zahniser*. Utica, NY: North Country Books.
- Zahniser, H. 1956. The need for wilderness areas. *The Living Wilderness* Winter-Spring(1956–57):37–43.



by Charisse A. Sydoriak, Craig D. Allen
and Brian F. Jacobs



*Would Ecological Landscape Restoration Make the **Bandelier** Wilderness More or Less of a Wilderness?*

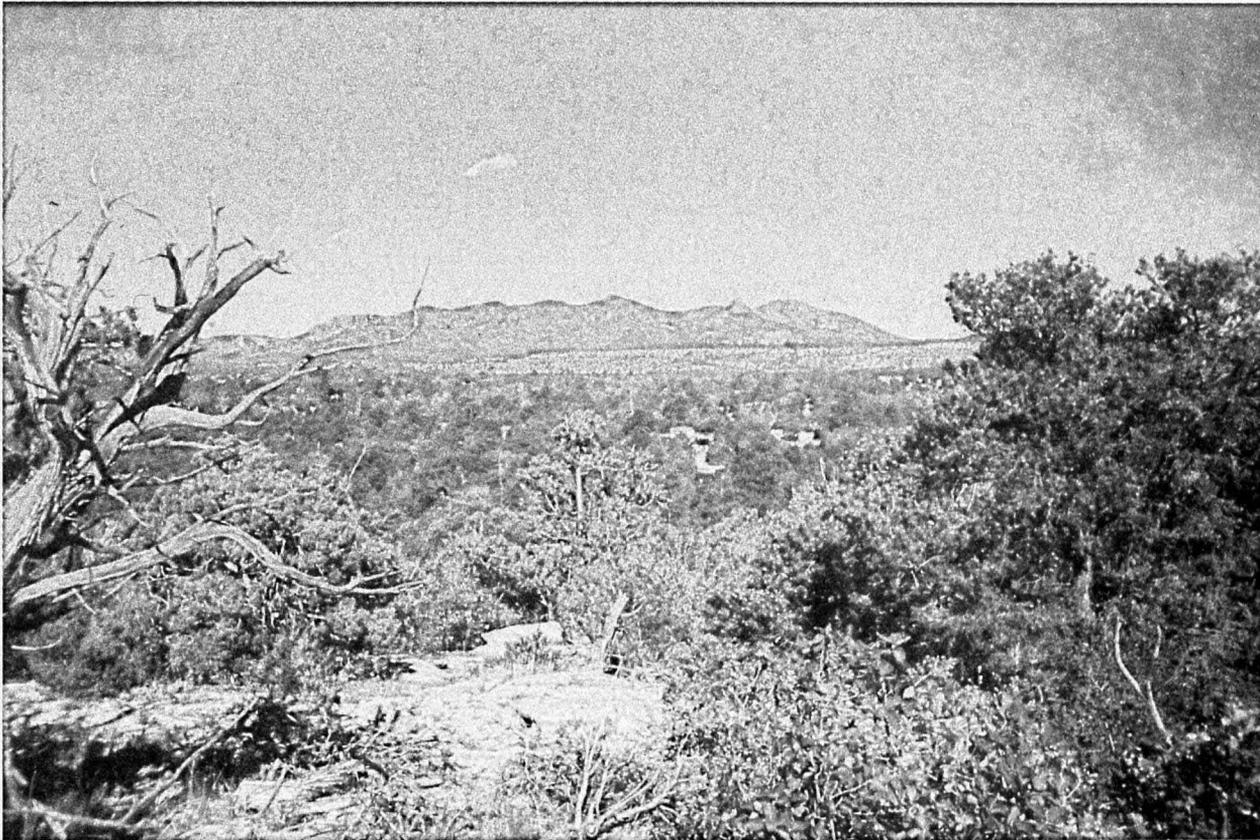
Is it appropriate to intervene in designated wilderness areas that have been “trammed by man” and, as a result, no longer retain their “primeval character and influence” as called for in the 1964 Wilderness Act? We explore this wilderness management dilemma—whether we can or should actively manage wilderness conditions to restore and protect wilderness and other values—by asking a series of questions relating to a wilderness area that is no longer “natural.”¹ Debate on this issue is not new, but is intensifying, since most wilderness areas in the continental United States are not pristine and ecosystem research has shown that conditions in many are deteriorating. Our case-study

An earlier version of this article originally appeared in: Cole, David N., Stephen F. McCool, William T. Borrie, and Jennifer O’Loughlin (compilers). 2000. Wilderness science in a time of change conference, Volume 5: Wilderness ecosystems, threats, and management. USDA Forest Service Proceedings RMRS-P-15-VOL-5, Rocky Mountain Research Station, Ogden, UT.

1. For the purposes of this discussion, “natural” is defined by words and phrases used in the 1964 Wilderness Act: “a community of life untrammed by man”; “land retaining its primeval character and influence”; or existing in an “unimpaired condition.”

Looking south
across the
Bandelier
Wilderness,
New Mexico

Right: Ponderosa
pine, Jemez
Mountains,
Bandelier
National
Monument,
New Mexico



is a proposed large-scale project to restore piñon-juniper woodlands in the Bandelier Wilderness, which comprises more than 23,000 acres in Bandelier National Monument, New Mexico.

Many ecosystems in this wilderness exhibit human-caused damage and unsustainable trends because of a land-use history that includes federally sanctioned overgrazing and fire suppression over the past century. This situation has caused park managers and wilderness advocates to ask several important philosophical and practical questions; questions that—while daunting and requiring extensive public dialogue—have moved us cautiously toward advocating ecological restoration in the Bandelier Wilderness.

Does a park's enabling legislation (or the National Park Service Organic Act) reign supreme and, if so, at what cost to other resource values, including wilderness values, recognized later in a park's history? The answer to this question is contained within the 1964 Wilderness Act (P.L. 88-577). The act simultaneously limits and permits management action to protect both park and wilderness values (which are arguably the same). In addition, the act makes it clear that wilderness designation does not supercede a park's enabling legislation or the National Park Service (NPS) Organic Act, but is supplemental to it. Section

4(a)(3) states that: "Nothing in this Act shall modify the statutory authority under which units of the national park system are created. Further, the designation of any area of any park, monument, or other unit of the national park system as a wilderness area pursuant to this Act shall in no manner lower the standards evolved for the use and preservation of such park..." The act also makes it clear that the NPS and other agencies have the legal responsibility to meet their mission requirements and other mandates even in *wilderness areas*.

In section 4(b), the act gives the NPS (in this case) responsibility for meeting its mission as well as preserving "wilderness character." Unfortunately, wilderness character is not clearly defined and, thus, a dilemma arises for the wilderness ecosystem manager. To some, "wilderness character" means that wilderness areas should evolve in whatever direction Nature chooses (be free-willed) after the lands have been designated as wilderness, regardless of pre-existing condition or future consequences. This perspective argues that all resource managers (including wilderness/ecosystem restorationists) and researchers should not be permitted to do anything in wilderness using motorized equipment. However, this position is not wholly supported in the act, as in section 2(a), which calls for the preservation, protection, and administration of wilderness areas



“in such a manner as to leave them unimpaired for future use and enjoyment as wilderness....” While section 4(c) of the act gives the wilderness administrator strong direction to accomplish the preservation and protection task without motorized equipment, it also permits its use if there is justifiable need.

The Organic Act dictates that the National Park Service mission is “to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” Bandelier National Monument, as one of the oldest units in the National Park System, was established in 1916 to preserve and protect “prehistoric aboriginal ruins” on the Pajarito Plateau because of their “unusual ethnologic, scientific, and educational” values.

In October 1976, President Gerald Ford signed legislation creating the 23,267-acre Bandelier Wilderness. The NPS was initially opposed to this wilderness designation, in part because of a general concern that cultural resources research and management in a “traditional cultural resource park” could be severely constrained. The Bandelier Wilderness, like most wilderness areas in the National Wilderness Preservation System, was not pristine when it was designated due to a history of harmful Euro-American land-use practices, yet the public felt strongly that the area should be wilderness (McDonald 1987). Additional wilderness-quality lands were added to the park in 1977, so that today approximately 71% of the park is designated wilderness, while more than 90% (about 30,000 acres) is managed as wilderness.

Scientific study in and adjacent to the Bandelier Wilderness since 1987 strongly supports the notion that historic Euro-American use of the area has triggered unprecedented change in most of the park’s ecosystems (Allen 1989, Davenport et al. 1998); similar changes have occurred throughout much of the Southwest (Allen et al. 1998, Bogan et al. 1998). For example, federally sanctioned livestock grazing and fire suppression from 1880 through 1932 catalyzed severe accelerated soil erosion across the park’s extensive mesas that are now dominated by piñon-juniper woodlands (Gottfried et al. 1995, Wilcox et al. 1996a). These old, relatively shallow soils are the physical matrix for thousands of “aboriginal ruins” that Bandelier National Monument was established to protect (Head 1992, Bandelier National Monument unpublished data). The Bandelier Wilderness contains significant portions of these altered ecosystems and “aboriginal ruins.” Over 90% of the park’s 11,730 acres of piñon-juniper woodlands are within designated wilderness—thus, resolution of any resource issues related to this community type necessarily involves wilderness considerations. An estimated 2,500 cultural resource sites located in the Bandelier Wilderness are subject to accelerated erosion-caused damage, or risk of loss, within the next century (Powers and Orcutt 1999).²

In sum, the National Park Service, to accomplish its protection and conservation mandate, must respond to known resource threats within the Bandelier Wilderness—and the authority to control unnatural rates of erosion, even using motorized equipment, appears to be permitted under the provisions of the Wilderness Act.

2. Every rain event reduces the information-yielding potential of the “aboriginal ruins.” For example, in a single storm on June 29, 1995, 1,040 artifacts were transported off-site and captured in a 1m³ sediment trap at the mouth of a 0.1 hectare catchment basin (Bandelier National Monument unpublished data).

Right: Experimental restoration treatments reinvigorate native herbaceous cover. Untreated area in foreground, treated area in background, four years after treatment, Bandelier National Monument, New Mexico. Below: Blue grama grass (*Boutelouca gracilis*) damaged by "pedestaling," where soil around the roots is washed away until the plant dies of exposure or is dislodged.



If one understands wilderness exclusively as the absence of apparent evidence of human management in the short term, then management intervention is not warranted in Bandelier. Unfortunately, the piñon-juniper ecosystems of the Bandelier Wilderness seem unable to heal themselves—which leaves wilderness managers, and the public, with some profoundly difficult choices.



Should federal land managers intervene if wilderness ecosystems are degraded and unsustainable due to the historic activities of motorized societies? Soils in areas now occupied by woodlands likely formed under different vegetation during cooler, moister conditions of the late Pleistocene; in other words, they are over 10,000 years old, and many are over 100,000 years old (McFadden et al. 1996). Changes in climate and vegetation in the early Holocene (8,500–6,000 years ago) led to at least localized episodes of soil erosion on adjoining uplands (Reneau and McDonald 1996, Reneau et al. 1996). During this time, the dominant climatic and associated vegetation patterns of the modern southwestern United States developed, including grasslands, piñon-juniper woodlands, and ponderosa pine savannas (Allen et al. 1998). On the basis of local fire history (Allen 1989, Morino et al. 1998, Touchan et al. 1996), dense piñon-juniper age class (Bandelier National Monument unpublished data, Julius 1999) and soils data (Davenport 1997, Earth Environmental Consultants 1974, McFadden et al. 1996), we believe that many

sites within Bandelier now occupied by piñon-juniper woodlands were formerly more open grassland, woodland, and ponderosa pine savanna communities, with well-developed soils and herbaceous understories that: 1) protected the soil from excessive erosion during intense summer thunderstorm events, and 2) provided a largely continuous fuel matrix, which allowed surface fires to spread and maintain these vegetation types.

Native American effects on local woodlands are thought to have been insignificant or highly localized until the late twelfth century, when the Ancestral Puebloan (also referred to as the Anasazi) population began to intensively occupy and utilize the Bandelier area (Powers and Orcutt 1999). Cutting and burning of piñon and juniper trees for cooking, heating, building, and agricultural activities likely led to significant deforestation of upland mesas from about 1150–1550 AD. Thus, Ancestral Puebloan land-use practices favored herbaceous vegetation. Intensive soil disturbance certainly occurred in farmed areas and around habitations, but there was probably little net change in landscape-wide erosion rates due to the small size and dispersed locations of “fields” and villages.

Euro-American settlement of the adjoining Rio Grande valley and the introduction of domestic livestock grazing began in 1598. It is unlikely, however, that significant livestock grazing (that is, with substantial widespread effects on the herbaceous understory, fire regime, or erosion rates) took place in much of Bandelier until railroads linked the Southwest to commercial markets in the 1880s. Millions of sheep and cattle were placed in the New Mexico landscape at that time. Livestock grazing—and overgrazing—was allowed in Bandelier until 1932, and feral burros were similarly allowed to cause grazing impacts until about 1980 (Allen 1989). Sharp reductions in the herbaceous ground cover and associated organic litter resulted, effectively suppressing previously widespread surface fires (in concert with institutionalized fire suppression initiated by the federal government in the early 1900s). Severe drought during the 1950s contributed to declines in ground cover (Allen and Breshears 1998). Fire-sensitive piñon and juniper trees became established in densities unprecedented for at least the past 800 years (Bandelier National Monument unpublished data, Julius 1999). As these trees grew, they became increasingly effective competitors for water and nutrients. Thus, a positive feedback cycle was initiated that favors tree invasion and decreased herbaceous ground cover in mesa-top settings.

This land-use history has resulted in degraded and unsustainable ecosystem conditions in today's Bandelier Wilderness.

The intercanopy soils of Bandelier's woodlands are apparently eroding at net rates of about one-half inch per decade (Bandelier National Monument unpublished data, Earth Environmental Consultants 1974, Wilcox et al. 1996a,b). Given soil depths averaging only one to two feet in many areas (Davenport 1997, Wilcox et al. 1996a), there will soon be loss of entire soil bodies across extensive areas of the Bandelier Wilderness.

Ecological thresholds have apparently been crossed such that harsh physical processes are now dominant across Bandelier's degraded piñon-juniper woodlands (Davenport et al. 1998). The loss of organic topsoils, decreased plant-available water, extreme soil surface temperatures, and freeze-thaw activity severely impede herbaceous vegetation establishment and productivity (Davenport et al. 1998, Jacobs and Gatewood 1999, Loftin 1999). Reductions in ground cover cause increased runoff from summer thunderstorms (Reid et al. 1999), with associated increases in erosion (Wilcox et al. 1996a,b). Reestablishment of herbaceous ground cover under today's desertified mesa-top conditions may also be difficult due to depleted soil seed banks, highly efficient seed predators, particularly harvester ants (Snyderman and Jacobs 1995), and an unnaturally large elk population (Allen 1996). Herbivore exclosures established in 1975 show that protection from grazing, by itself, fails to promote vegetative recovery in Bandelier's piñon-juniper ecosystems (Chong 1992, Potter 1985). Without management intervention, this human-induced episode of accelerated soil erosion appears to be highly persistent and irreversible (Davenport et al. 1998). To a significant degree, the park's biological productivity and cultural resources are literally washing away.

Do these conditions and their causes justify taking corrective actions? After all: 1) erosion is a ubiquitous geomorphic process; 2) localized, and perhaps regional, episodes of accelerated erosion have occurred naturally in the past (Reneau et al. 1996); and 3) it is impractical to preserve the cultural resource sites at Bandelier in stasis.³ In addition, some wilderness advocates are understandably concerned about a loss of “wildness” if local land managers have too much latitude to manipulate wilderness resources, even to achieve high-minded and defensible goals.

Given this information, there is no question that we must assess the problem and possible solutions cautiously and responsibly. The decision to implement drastic restoration measures must be made with extreme humility. Yet, it is clear that delays in making this decision in the Bandelier Wilderness come at a high and ongoing cost.

3. Further, some Native Americans do not want the NPS manipulating the landscape or archeological sites for any reason, even to stabilize ancestral sites.

While a basic tenet of wilderness is that the "imprint of man's work [is] substantially unnoticeable," human impact on essential ecological patterns and processes is profound in the Bandelier Wilderness. If one understands wilderness exclusively as the absence of apparent evidence of human management in the short term, then management intervention is not warranted in Bandelier. Unfortunately, the piñon-juniper ecosystems of the Bandelier Wilderness seem unable to heal themselves—which leaves wilderness managers, and the public, with some profoundly difficult choices.

Can we restore the "natural range of variability" and will it be sustainable? The answer to this question lies in scientific study to define the natural range of variability, and experimentation to address and test sustainability. Let us look again at the Bandelier woodlands to see what has been discovered.

Since most of the soils of the park's piñon-juniper woodlands are over 100,000 years old (McFadden et al. 1996), we can be sure that the natural range of variability in these ecosystems generally allowed for soil development and stability, rather than the high rates of degradational erosion observed in recent decades. From this fact of long-term soil persistence we can infer that some type of vegetation was protecting the soils from excessive erosion over time, including the last 8000 years of the Holocene during which a modern climatic regime prevailed. We believe that an effective herbaceous ground cover must have been the now-missing glue which held soils in place, given that there is no evidence of formerly closed-canopy woodlands (indeed, the ages of local piñon and juniper trees are largely quite young) (Bandelier National Monument unpublished data, Julius 1999), and since fire-scar studies show a history of recurrent surface fires that could not have occurred without herbaceous vegetation.

Controlled, progressive experiments within and outside of the Bandelier Wilderness since 1992 (Chong 1993, 1994, Jacobs and Gatewood 1999, Snyderman and Jacobs 1995) have shown that undesirable losses of soils, herbaceous vegetation, and cultural resources can be mitigated through active management to thin the smaller trees and leave scattered slash in the form of lopped branches from cut trees. This treatment directly reduces tree competition with herbaceous plants for scarce water and nutrients, and the application of slash residues across the barren interspaces greatly reduces surface water runoff and ameliorates the harsh microclimate at the soil surface, immediately improving water availability for herbaceous plants. This restoration approach has produced a two- to seven-fold increase in total herbaceous cover (at three years post-treatment), relative

to both controls and pretreatment conditions (Jacobs and Gatewood 1999), while also increasing the diversity of herbaceous plants. Recent, ongoing research shows striking decreases in sediment movement on treated hillslopes (Bandelier National Monument unpublished data). This tree thinning and scattered slash treatment method is labor intensive and requires extensive use of chainsaws to limb and flushcut the piñon and juniper, given the hard, dense wood of these species (especially juniper) and the large number of trees that require treatment.

Other treatment methods to restore herbaceous ground cover were tested. Seeding in the absence of tree thinning was ineffective, and seeding combined with a thinning and slash treatment conferred little additional benefit. Alternative tree thinning techniques are unlikely to be effective, safe, or practical, as: surface fire cannot currently carry through the barren understory of Bandelier's piñon-juniper woodlands; girdling and herbicide treatment do not generate the on-the-ground slash necessary for the creation of microclimatic conditions that facilitate vegetation recovery, as dead trees would be left standing; and exclusive use of non-motorized tools would take too long, given the urgency of the situation, and also place too many people in the wilderness environment for extended periods, causing other unacceptable wilderness impacts.

In the Bandelier case-study, through scientific investigation, we are confident that a "range of natural variability" (Landres et al. 1999, Swetnam et al. 1999) is reasonably defined. We have also found a seemingly effective restoration technique, but the long-term outcome will only be known as time progresses. The treated areas, though initially dominated by biannual forbs, are becoming increasingly populated by native perennial grasses, which represent conditions that are more natural and sustainable. Will the restored herbaceous cover be able to reduce erosion rates to natural, sustainable levels? Based on initial data from an ongoing study, it appears likely. However, the substantial quantities and distribution of the woody slash used in this restoration approach could support large, unnaturally intense fires. The potential for widespread fire can be eliminated by limiting the size of treatment blocks and dispersing them across the park landscape. In addition, shallow soil sites with rocky substrate which are considered to be relict woodland areas will not receive restoration treatment. The resulting mosaics of fuels and vegetation will provide a margin for error and mitigate aesthetic concerns. Prescribed fire will be introduced to eliminate excessive woody fuel loads and prepare treated areas for naturally occurring fires once adequate herbaceous cover is successfully restored and capable of surviving fire.

If restoration is possible, what should our goal or target conditions be in wilderness? Achieving agreement on target conditions is the crux of the wilderness restoration dilemma. Ideally, a naturally functioning ecosystem exists when a wilderness area is set aside. However, established wildernesses are generally far from pristine—that is, they do not fully retain their “primeval character and influence....” In the Bandelier Wilderness our vision of target conditions for piñon-juniper woodlands is functional (as opposed to structural or compositional): to reestablish biotic dominance over rates of erosion and enable natural fires to move across the landscape unimpeded.

We do not focus on what the Bandelier Wilderness will *look like* in our description of target conditions. The type of experience a person may have in the wilderness is also not defined. Although wilderness involves scenery and “human experience” management, it is not necessarily or solely defined by them.

Is it appropriate to conduct large-scale ecosystem restoration work in wilderness? The Organic Act and other federal laws mandate protection of park and wilderness resources and values when we know they are threatened. In response to these laws, resource management activities such as exotic plant control, application of prescribed fire, and wildlife reintroduction are routinely and legally accomplished in federal wilderness areas. None of these laws, including the Wilderness Act, specify that a “no action” decision is justifiable based solely on the magnitude or scale of the possible mitigation alternatives. Therefore, National Park Service resource managers are obligated to: 1) consciously decide on a course of action when we detect a threat no matter how large or significant, and 2) make responsible decisions about the type and scale of our response to all kinds of resource threats.

Although the Bandelier Wilderness piñon-juniper woodlands restoration project is considered relatively large-scale (affecting up to 8,000 acres of wilderness), evidence of management intervention (in the form of cut marks on small stumps and scattered slash mulch) superficially disappears within roughly ten years depending on site conditions. Further, we hypothesize that if fire is reintroduced to accelerate woody material decomposition and degrade the flush-cut stumps, the evidence of management intervention will be substantially undetectable in 20 years. (To deal effectively with the threat of a wildfire consuming the woody materials too soon after treatment, we must treat the woodlands in patches, thus creating a mosaic of conditions and appearances.) Perhaps the relatively short duration of the evidence of management intervention matters more than the spatial extent or appearance of that evidence.

If we start manipulating designated wilderness to reach an “unimpaired condition” goal, when and where will management intervention end? This question must be answered if management intervention is to be seriously contemplated. There is justifiable public concern that federal wilderness managers could abuse the wilderness resource in the name of ecosystem health restoration. Management intervention should not be a license to control Nature, harvest resources, or create stasis; it should be a means of facilitating natural healing of motorized societies’ impacts to wilderness ecosystems.

We believe this question can only be addressed through extensive scientific research both to diagnose the sustainability of wilderness ecosystems and to understand the causes and effects of unnatural change. As a starting principle, we suggest that management intervention should end when the natural processes present before industrial-age humans are once again working in formerly dysfunctional or “impaired” ecosystems. In the Bandelier case-study, based on over ten years of on-site research, this end point would be achieved when there is sufficient herbaceous cover to carry naturally occurring fires. The herbaceous cover will reduce soil erosion (and associated cultural resource loss) to natural rates, and fire should maintain the restored herbaceous cover and prevent recurrence of the erosion problem. After restoration, the piñon-juniper wilderness ecosystem will be left alone to evolve, driven by natural processes. We submit that this level of restoration would restore important aspects of wildness or “free-will” to the Bandelier Wilderness, consistent with the definition of wilderness established in the 1964 Wilderness Act.

CONCLUSION

Although there are no simple answers to the wilderness questions presented here, we suggest that a research-based management approach, including identification of a process-oriented goal to achieve an ecologically functional endpoint, sets the stage for making rational decisions about whether and how to intervene when unnatural conditions exist in wilderness areas. We have a choice when we know that the land is “sick.” We can “make believe” (Leopold 1953) that everything will turn out right if Nature is left to take its course in our unhealthy wildernesses, or we can intervene—adaptively and with humility—to facilitate the healing process. ☪

ACKNOWLEDGEMENTS We thank Dorothy Hoard for her long-term efforts to establish and care for the Bandelier Wilderness, as well as for her leadership of the Friends of Bandelier, who have contributed funds on many occasions to

support the research cited in this paper. We also thank Bandelier's Superintendent Roy Weaver for his uncommon vision and commitment to "doing the right thing." Finally, we are indebted to all the staff at Bandelier National Monument from 1990–1999 for their past and present support of the work outlined in this paper.

Charisse A. Sydoriak, former chief of natural and cultural resource management and research at Bandelier National Monument, is a natural resource specialist with the National Park Service (Intermountain Regional Office, Division of Natural Resources, Research, and Technology, 12795 West Alameda Pkwy, Lakewood, CO 80225). **Dr. Craig D. Allen** is a research ecologist with the US Geological Survey, Midcontinent Ecological Science Center, Jemez Mts. Field Station (HCR-1, Box 1, # 15, Los Alamos, NM 87544). **Brian Jacobs** is vegetation specialist at Bandelier National Monument (also at HCR-1, Box 1, # 15, Los Alamos, NM 87544).

LITERATURE CITED

- Allen, C.D. 1989. Changes in the landscape of the Jemez Mountains, New Mexico. Ph.D. dissertation, Department of Forestry and Resource Management, Univ. of California, Berkeley.
- Allen, C.D. 1996. Elk population response to the La Mesa Fire and current status in the Jemez Mountains. In C.D. Allen (tech. ed.), *Fire Effects in Southwestern Forests: Proceedings of the Second La Mesa Fire Symposium*. USDA Forest Service General Technical Report RM-286, Fort Collins, CO. pp. 179–195.
- Allen, C.D., J.L. Betancourt, and T.W. Swetnam. 1998. Landscape changes in the southwestern United States: Techniques, long-term datasets, and trends. In T.D. Sisk (ed.), *Perspectives on the Land Use History of North America: A Context for Understanding our Changing Environment*. US Geological Survey, Biological Science Report USGS/BRD/BSR-1998-0003. pp. 71–84.
- Allen, C.D., and D.D. Breshears. 1998. Drought-induced shift of a forest/woodland ecotone: Rapid landscape response to climate variation. *Proceedings of the National Academy of Sciences of the United States of America* 95:14839–14842.
- Bogan, M.A., C.D. Allen, E.H. Muldavin, S.P. Platania, J.N. Stuart, G.H. Farley, P. Melhop, and J. Belnap. 1998. Southwest. In M.J. Mac, P.A. Opler, and P.D. Doran (eds.), *National Status and Trends Report*. US Geological Survey, Washington, DC. pp. 543–592.
- Bandelier National Monument unpublished data. Unpublished data on file at Park Headquarters, Resource Management Office, Bandelier National Monument, Los Alamos, New Mexico.
- Chong, G.W. 1992. Seventeen years of grazer exclusion on three sites in piñon-juniper woodland at Bandelier National Monument, New Mexico. Unpublished report on file at Bandelier National Monument.
- Chong, G.W. 1993. Revegetation of piñon-juniper woodlands with native grasses. In E. F. Aldon and D.W. Shaw (tech. coord.), *Managing Piñon-Juniper Ecosystems for Sustainability and Social Needs*. USDA For. Serv. Gen. Tech. Rep. RM-236, Fort Collins, CO. pp. 34–41.
- Chong, G.W. 1994. Recommendations to improve revegetation success in a piñon-juniper woodland in New Mexico: A hierarchical approach. M.S. thesis, University of New Mexico, Albuquerque, NM.
- Davenport, D.W. 1997. Soil survey of three watersheds on South Mesa, Bandelier National Monument, New Mexico. Unpublished final report on file at USGS Jemez Mts. Field Station.
- Davenport, D.W., D.D. Breshears, B.P. Wilcox, and C.D. Allen. 1998. Viewpoint: Sustainability of piñon-juniper ecosystems—A unifying perspective of soil erosion thresholds. *J. Range Management* 51(2):229–238.
- Earth Environmental Consultants Incorporated. 1974. Soil survey and survey of range and ecological conditions on a southern part of Bandelier National Monument. Unpublished report on file at Bandelier National Monument.
- Gottfried, G.J., T.W. Swetnam, C.D. Allen, J.L. Betancourt, and A. Chung-MacCoubrey. 1995. Piñon-juniper woodlands. In D.M. Finch and J. A. Tainter (tech. eds.), *Ecology, Diversity, and Sustainability of the Middle Rio Grande Basin*. USDA For. Serv. Gen. Tech. Rep. RM-GTR-268. pp. 95–131.
- Head, G.N. 1992. The Bandelier archeological survey: 1991 preliminary report. Unpublished NPS report on file at Bandelier National Monument.
- Jacobs, B.F., and R.G. Gatewood. 1999. Restoration studies in degraded piñon-juniper woodlands of north-central New Mexico. In S.B. Monsen, R. Stevens, R.J. Tausch, R. Miller and S. Goodrich (eds.), *Proceedings: Ecology and Management of Piñon-Juniper Communities within the Interior West*. USDA Forest Service Proc. RMRS-P-9. Ogden, UT. pp. 294–298.
- Julius, C. 1999. A comparison of vegetation structure on three different soils at Bandelier National Monument, New Mexico, USA. Unpublished report on file at Bandelier National Monument.
- Landres, P., P. Morgan, and F. Swanson. 1999. Evaluating the usefulness of natural variability in managing ecological systems. *Ecological Applications* 9:1179–1188.
- Leopold, L.B. (ed.) 1953. *Round River: From the Journals of Aldo Leopold*. New York: Oxford University Press.
- Loflin, S.R. 1999. Initial response of soil and understory vegetation to a simulated fuelwood cut of a piñon-juniper woodland in the Santa Fe National Forest. In S.B. Monsen, R. Stevens, R.J. Tausch, R. Miller and S. Goodrich (eds.), *Proceedings: Ecology and Management of Piñon-Juniper Communities within the Interior West*. USDA Forest Service Proc. RMRS-P-9. Ogden, UT. pp. 311–314.
- McDonald, C. 1987. *The Dilemma of Wilderness*. Santa Fe, New Mexico: Sunstone Press.
- McFadden, L.D., P.M. Watt, S.L. Reneau, and E.V. McDonald. 1996. General soil-landscape relationships and soil-forming processes in the Pajarito Plateau, Los Alamos National Laboratory area, New Mexico. In F. Goff, B.S. Kues, M.A. Rogers, L.D. McFadden, and J.N. Gardner (eds.), *New Mexico Geological Society Guidebook, 47th Field Conference, Jemez Mountains Region*. pp. 357–366.
- Morino, K., C.H. Baisan, and T.W. Swetnam. 1998. Expanded fire regime studies in the Jemez Mts., New Mexico—final report. Unpublished report on file at USGS Jemez Mts. Field Station.
- Powers, R.P. and J.D. Orcutt (eds). 1999. The Bandelier archeological survey. Intermountain Cultural Resource Management Professional Paper No. 57. National Park Service, Santa Fe, New Mexico.
- Potter, L.D. 1985. Re-evaluation studies of grazing enclosure plots, Bandelier National Monument. Unpublished report on file, Bandelier National Monument.
- Reid, K.D., B.P. Wilcox, D.D. Breshears, and L. MacDonald. 1999. Runoff and erosion in a piñon-juniper woodland: Influence of vegetation patches. *Soil Science Society of America Journal* 63:1869–1879 (in press).
- Reneau, S.L., and E.V. McDonald. 1996. Landscape history and processes on the Pajarito Plateau, Northern New Mexico. Los Alamos National Laboratory Report LA-UR-96-3035. Los Alamos, NM.
- Reneau, S.L., E.V. McDonald, J.N. Gardner, T.R. Kolbe, J.S. Carney, P.M. Watt, and P.A. Longmire. 1996. Erosion and deposition on the Pajarito Plateau, New Mexico: Geomorphic responses to late Quaternary climatic change. In F. Goff, B.S. Kues, M.A. Rogers, L.D. McFadden, and J.N. Gardner (eds.), *New Mexico Geological Society Guidebook, 47th Field Conference, Jemez Mountains Region*. pp. 391–398.
- Snyderman, D., and B.F. Jacobs. 1995. Piñon-juniper restoration studies at Bandelier, 1995. Unpublished report, Bandelier National Monument, Los Alamos, NM.
- Swetnam, T.W., C.D. Allen, and J.L. Betancourt. 1999. Applied historical ecology: Using the past to manage for the future. *Ecological Applications* 9:1189–1206.
- Touchan, R., Allen, C.D., and T.W. Swetnam. 1996. Fire history and climatic patterns in ponderosa pine and mixed-conifer forests of the Jemez Mountains, northern New Mexico. In C.D. Allen (tech. ed.), *Fire Effects in Southwestern Forests: Proceedings of the Second La Mesa Fire Symposium*. USDA Forest Service General Tech. Report RM-286, Fort Collins, CO. pp. 179–195.
- Wilcox, B.P., J. Pitlick, C.D. Allen, and D.W. Davenport. 1996a. Runoff and erosion from a rapidly eroding piñon-juniper hillslope. In M.G. Anderson and S.M. Brooks (eds.), *Advances in Hillslope Processes, Volume 1*. New York: John Wiley & Sons Ltd. pp. 61–77.
- Wilcox, B.P., B.D. Newman, C.D. Allen, K.D. Reid, D. Brandes, J. Pitlick, and D.W. Davenport. 1996b. Runoff and erosion on the Pajarito Plateau: Observations from the field. In F. Goff, B.S. Kues, M.A. Rogers, L.D. McFadden, and J.N. Gardner (eds.), *New Mexico Geological Society Guidebook, 47th Field Conference, Jemez Mountains Region*. pp. 433–439.

This four-lane concrete highway slashed with speeding cars I remember as a narrow, twisting mountain road where the wood teams moved, drawn by steady mules. They signaled their coming with the high, sweet jangle of hame bells. This was a little little town, a general store under a tree and a blacksmith shop and a bench in front of which to sit and listen to the clang of hammer on anvil. Now little houses, each one like the next, particularly since they try to be different, spread for a mile in all directions.

—John Steinbeck, *Travels with Charley*

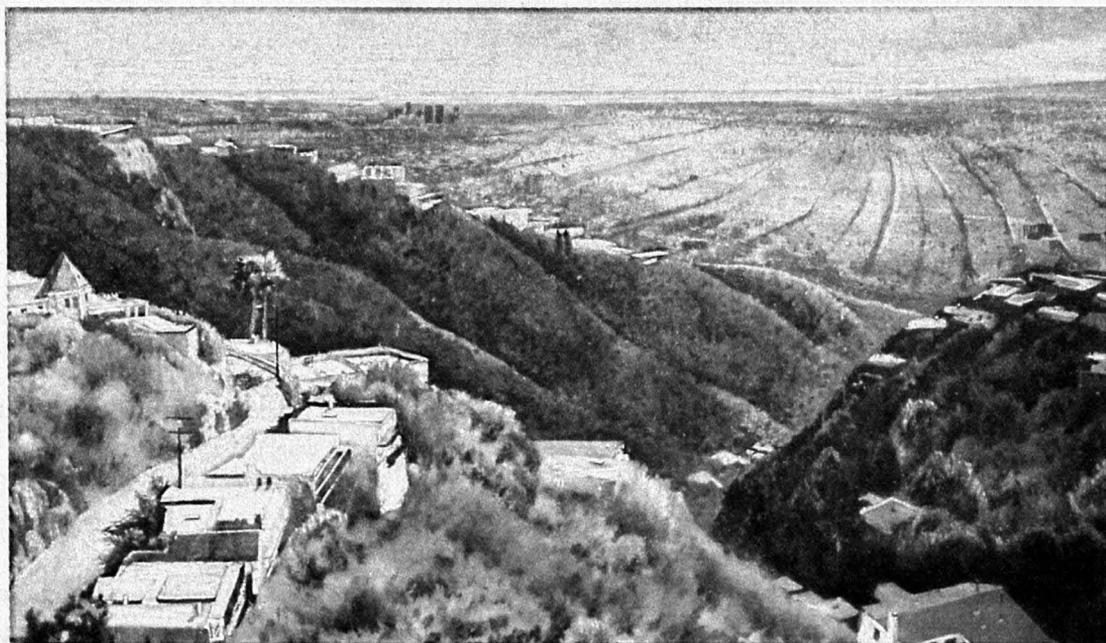
For each newcomer to the West, an acre of land evaporates. It returns as concrete ribbons of roads linking asphalt parking lots, green moats of grass surrounding identical two-story single-family units with double garages, or steel girders bricked and mortared into shopping malls, hospitals, schools, firehouses, office complexes, government buildings, and sewage treatment facilities. Lately we have had quite a few newcomers to the West.

Every nine minutes someone moves to America's fastest growing city: Las Vegas, Nevada. From 1990–1995, Colorado laid claim to ten of the fifty fastest growing counties in the nation, including Douglas County, a suburb of Denver, the fastest draw of them all. Spurred by sprawling Tucson, the population in Pima County, Arizona, lurched from

Sprawl vs. Nature

Saving the West
One Wilderness
at a Time

by Mike Matz



400,000 in the 1970s to 823,000 today. Nevada, Colorado, and Arizona are among the ten fastest growing states in the nation, along with Idaho, Utah, Alaska, Washington, New Mexico, Oregon, and Georgia. Nine of the top ten are western states.

This population increase is not merely due to people moving in from California or the Northeast, although migration is a significant factor. Fully two-thirds of newcomers to Utah result from a net natural increase of four births for every death, giving the state the dubious honor of ranking number one in birth rate. But five other western states also find their birth rates finishing in the top ten nationally.

The West's population in 1945 stood at 16 million. By 1996 it numbered 58 million. Quite simply, we are bursting at our urban waistline and the spare tire causing us to loosen our belt is called suburbia. With a few disciplined exceptions like Boulder, Colorado, or Portland, Oregon, we are not merely content to eat normal portions of land; rather, we gorge ourselves and snack between meals.

Wherever we come from or however we arrive, once here we share similar concerns. We worry about growth. We lament the loss of open space. In an article headlined "State's Changes a Growing Concern For Most Utahns, Both New and Old," the *Salt Lake Tribune* reported on a poll which found that three of four residents placed growth among the top three issues facing Utah. In a 1995 poll, growth was the topic selected more than any other—crime and education and jobs included—as the most important issue facing the state. These same sentiments stretch across the West, everywhere the human footprint sprawls across the land, from the Bitterroot Valley south of Missoula to the Sonoran Desert between Phoenix and Tucson.

THE SPREE OF THE NINETEENTH CENTURY

In an 1890 bulletin, the Superintendent of the Census reported a startling reality—expounded upon three years later by historian Frederick Jackson Turner when he delivered a paper entitled "The Significance of the Frontier in American History." The Superintendent of the Census decreed: "Up to and including 1880 the country had a frontier of settlement, but at present the unsettled area has been so broken into by isolated bodies of settlement that there can hardly be said to be a frontier line." Just over a century ago America's so-called frontier was declared gone, a regrettable milestone but not unintended.

Filling the frontier was the nation's goal in the 90-year span between when Meriwether Lewis and William Clark and their Corps of Discovery ascended the Missouri River to chart land purchased from France and when Frederick Jackson Turner delivered his paper in Chicago. Dispersion of Americans into

this territory was seen as the most practical way of preventing the Spanish from encroaching further up from the Southwest, the English beyond the Pacific Northwest, the French up from the Mississippi Delta and down from Canada. Manifest Destiny became the mantra by which we would strengthen our nation's grip on a territory into which we could grow. Horace Greeley beseeched our hardy and spirited to "Go west, young man." With the help of a benevolent government and its generous policies with the land it had acquired for 6.5 cents an acre, we did.

At first, our new government sold this land on credit for a minimum of \$2 per acre. A law in 1820 changed the system so that a minimum of 80 acres could be bought "cash on the barrelhead" for \$1.25 an acre. Forty-two years later, apparently more concerned with low rates of disposal than with rates of fiscal returns, Congress passed the Homestead Act, which doled out parcels of 160 acres free of charge. Arid conditions in the West shortly prompted Congress to increase the offering to 640 acres at no charge.

As states joined the union, the federal government gave them land to support schools and later as grants for canals and roads (and still does today under Revised Statute 2477). From 1850–1923, the government gave almost 130 million acres of the public domain, mostly located in states west of the Mississippi, to railroad companies. Mining laws in 1866 and 1872 furthered the disposal of public land at bargain rates, and even then swindles were commonplace (and still are today under the 1872 Mining Act).

But no matter how hard the federal government tried, by making acquisitions as easy and cheap as possible, it was unable to dispose of the public domain in western states entirely. Frederick Jackson Turner noted: "Among the centers of [settlement] attraction may be mentioned the following: fertile and favorably sustained soils, salt springs, mines, and army posts."

Mines and army posts in the West we had in abundance, but soils sustained by favorable amounts of water were in short supply. The getting simply was not as good as it was in Iowa and Kansas, where, respectively, 99.1 and 99.2 percent of the land ended up in state and private hands. Such arable parcels as there were in the West were acquired, as were quite a few parched patches. These private lands in the West today are among the most endangered (though certainly not the only embattled) American landscapes.

GOBBLE IT UP, GULP IT DOWN

The West today is, oddly, the most urban region of the country: 86 percent of the population resides in cities like Albuquerque or Boise, compared to 74 percent in states like New Jersey and

New York. Yet that doesn't mean we tightly pack in all the new people; the converse holds true. The number of people per square mile in metropolitan Tucson in 1953 was 5,000. Today the number has dropped to 2,400 per square mile. In the Salt Lake corridor there are six persons per residential acre. If current trends continue that number will fall to five by the year 2020. We tend to spread ourselves thinly across land that we see as cheap in price and inexhaustible in supply.

That we have misgivings about subdivisions sprouting like dandelions in a springtime lawn may be hard to believe because of another bewildering irony. We chart economic prosperity by tabulating the number of residential building permits issued and their construction worth. *Utah Business* magazine

Tucson's average daily temperature has risen nearly four degrees in the last 90 years. Pavement and buildings retain heat far more efficiently, it would appear, than do ocotillo and saguaro.

The spate of development in the West over the course of the last 90 years has led us in a collective sense (not every real estate developer or construction contractor would agree) to the conclusion that we are going about it outlandishly wrong. What's peculiar is that like compulsive gluttons we are unable to stop ourselves.

RHETORIC, NOT RESULTS

Political leaders in the West set a disingenuous tone with high-minded rhetoric about the severity of the problem and the need

to act swiftly, then issue executive orders for toothless open lands committees, private-public partnerships, and growth summits. Local communities left to deal with the dilemma are scarcely equipped to fend off developers, who dangle carrots of tax revenues, fill zoning commissioners' campaign coffers, and hold cities on scant budgets hostile to "takings" lawsuits. State legislatures do not provide local communities with the funding (or the authority to levy their own) to buy open space. Although local communities do have authority to limit the number of building permits, they are likely as not to exercise this option. For every success story, like Boulder or Portland, twenty

other municipalities fail to act in any meaningful manner.

Private organizations occasionally step in when localities cannot (or choose not to) purchase easements or larger greenbelts. With limited resources to pay hefty market rates for real estate, what these groups are able to do in any one locality is like Pat Buchanan's bid for the presidency: \$12.5 million dollars in public financing just won't cut it. Developers never cease prowling for the next swath of land onto which they can heave something euphonically called Cherry Farm Estates or—this is not



proudly extols 21,500 new housing starts, ringing up \$2.1 billion gross value—without noting the disclaimer: Every dollar received in taxes on residential land requires \$1.11 in government services, in contrast to the 31 cents undeveloped land requires for the same tax dollar.

Despite alarming trends and jiggered benefits, we give up between eight and nine square miles of open space each year on average in the West. In some places the rate is almost an acre an hour. Perhaps a more obscure but not trivial tidbit is this:

made up—the Wilderness & Open Space Community. All we can realistically do to combat sprawl on a micro-level, says one Tucson activist who has been on the front lines for 30 years, “is to keep things from getting a lot worse.”

Laissez faire is a tough habit to kick.

THE BEST TOOL IN THE TOOLBOX

Take the City of Spokane’s definition of open space, the most comprehensive one available:

any land area, the preservation of which in its present use would:

- *conserve or enhance natural, cultural or scenic resources*
- *protect streams, stream corridors, wetlands, natural aquifers*
- *protect soil resource and unique or critical wildlife and native habitat*
- *promote conservation principles by example or by offering educational opportunities*
- *enhance the value to the public of abutting or neighboring parks, forests, wildlife preserves, nature reservations or sanctuaries or other open space*
- *enhance recreational opportunities, or preserve historic and/or archeological sites*
- *affect any other factors relevant in weighing benefits to the general welfare of preserving the current use of the property.*

The definition mentions nothing about private or public ownership nor minimum or maximum size when describing open space, though connecting all eight points underscores a theme of retaining land the way it is. Open space reserves a front row seat for natural character, and nowhere are such seats more readily available than on public land.

We are pretty darn fortunate in the West. When we draw a vertical line along the eastern border of the State of Colorado to bisect the United States, we find that east of that line no state has more than 15 percent of its land mass held in trust on our behalf by the federal government, while west of the line only one state, Washington, has less than 30 percent of its land mass sequestered in public ownership. Our largest supply of open space is the public domain.

For a disturbing picture, take a look at a map of the area surrounding Tucson. In the not-so-distant future, development will butt up against Saguaro National Monument on either side of Tucson and eventually extend to Pusch Ridge and Rincon

Mountain Wilderness Areas. Such a picture shows in theory that development has its limits at the boundaries of public lands. The stark question we must confront is: Do we have the fortitude and foresight to protect this public land?

To do so, we must first hang onto it like a precious heirloom. The fervent anti-federal crowd froths about the taint of socialism inherent in land on which you and somebody from Alabama you’ve never met share the deed, though that same crowd has supported the government appropriating taxes from someone in Alabama or Michigan or Vermont to plumb the West for cheap irrigated land; to build roads in national forests to allow private logging companies to profit from cutting public forests; and to oblige the cattle and sheep industry with grazing rights and below-market forage fees. Some delude themselves into thinking they won the West solely on rugged individualism—it ain’t so.

Nonetheless, this way of thinking runs obtusely through the minds of some members of Congress. Rejuvenating the spree of the nineteenth century with laws dishing out public land seems to be a career preoccupation for a few of them. Representative Jim Hansen (R-UT) introduced in the 104th Congress a bill “to transfer the lands administered by the Bureau of Land Management to the State in which the lands are located.” Senator Frank Murkowski (R-AK) sponsored a measure to convey “certain public lands” to the State of Alaska in the 105th Congress. For the most part these barefaced attempts to discard what remains of the public domain have been rebuffed because the majority of Americans believe public land is an asset we should not squander.

We are not unarmed in this quest. Good laws are on the books. The 1906 Antiquities Act permitted the protection of the Kaiparowits Plateau from a foreign-owned company with designs on mining coal to ship overseas. The 1916 Organic Act creating the National Park System gave us another option, exercised in California where Congress established Death Valley National Park.

But the best tool we have is one whose contemporary purpose, stated in its opening line, captures precisely what we are aiming at:

In order to assure that an increasing population, accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States and its possessions, leaving no lands designated for preservation and protection in their natural condition, it is hereby declared to be the policy of the Congress to secure for the American people of present and future generations the benefits of an enduring resource of wilderness.

The Wilderness Act of 1964 is the paramount means to protect sufficient open space for sustaining the way of life all westerners, the ranchers and the brokers, hope to retain. The Wilderness Act of 1964 is an entirely appropriate method to protect habitat adequate for grizzlies, cougars, and many other species. By adding as much of the public domain as qualifies into the National Wilderness Preservation System we are assured of arresting the metastasis of development that is currently occurring throughout the West.

People have been drawn to the West by the stunning vistas sweeping to the horizon, quick access to an afternoon of fishing or kayaking on cold streams tumbling clear and free from mountain greenery, the utter stillness as one sits on an elk hunt watching pink and purple hues of a sunset underneath a bank of clouds, and, if not the sight of, then at least the knowledge that big critters inhabit that open space. But as more and more people descend upon the West, those very attributes and opportunities are diminished. Some say we need not worry, that the influx will never overrun our public land. However, as former Senator Dale Bumpers (D-AR) notes: When someone says there's no need to worry that's good reason to believe there is.

Charles Wilkinson writes in *Atlas of the New West*:

Almost before anyone knew it, between 1955 and 1975...the Colorado Plateau was laced with dams and reservoirs up to 200 miles long, power plants with stacks 70 stories tall, 500- and 345-KV powerlines spanning hundreds of miles, and uranium mines, mills, and waste dumps.

What we have been given is assuredly finite, and we are using it up quickly. Gaze into a crystal ball, and our metamorphosis is blurry; no clairvoyant, no tarot card reader, can tell us what we want to know. No one but ourselves can steer the current changes in a direction that creates the kind of West all Americans can be proud of: big, wild, and ecologically healthy. Wilderness designation is one of the surest ways to help us accomplish our aspiration. ☺

Mike Matz is executive director of the newly established *Pew Wilderness Center* (www.pewwildernesscenter.org) which has offices in Boulder, Colorado; Seattle, Washington; Kelly, Wyoming; and Washington, DC. Matz works mostly from the Boulder office at 2260 Baseline Road, Suite 212, Boulder, CO 80302.

New Mexico Treasure Hunt

We knew we had to find it,
we heard there was a cave
far back in the foothills
"inaccessible to livestock" on the old range map.
We entered a hurting landscape,
4-wheel rough ride
through stubby pinyon and juniper,
ground chewed down to cactus and crystal dust.
Left the truck at the end of the road
where ranchers had gouged a spring
from a seep to a sump,
a jumble-rock pit of nasty water.
Walked on through the fecal dirt
of a hundred hapless beasts
turned loose on a land that cannot feed them.
Walked higher to the steep and rocky part,
grass beginning to show,
no cows here, no barbed wire.
Then, up above: the cave, an overturned smile,
big & forgiving with grass flowing out,
tall and tawny green,
a hillside soft and full with it.

We sat for hours and listened
to what the cave had to say:
the sound of wind
through thigh-high grass
where the cows haven't been.

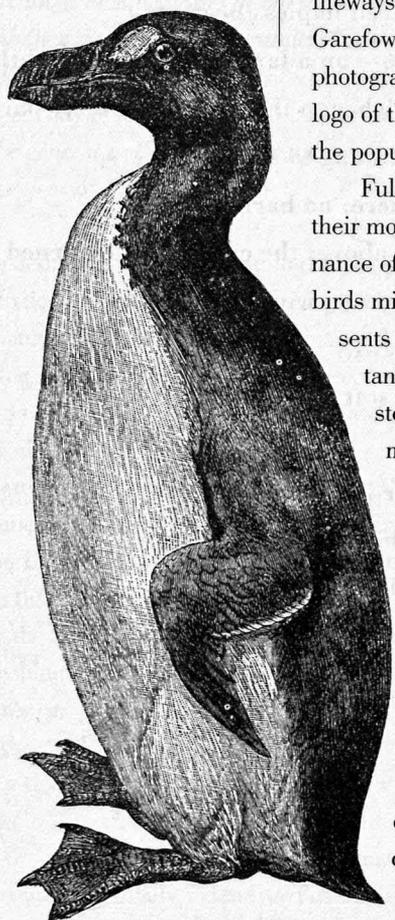
—Suzanne Freeman

Book Reviews



Reviewed
in this issue

The Great Auk
Taking Care



The Great Auk

by Errol Fuller

A Peter N. Nevraumont Book/Harry N. Abrams, 1999 ■ 448 pages, \$75 hardcover

Like the Dodo and the Passenger Pigeon, the Great Auk is one of a select few extinct Lavian species that has so gripped the human imagination that it has spawned a cult following, a kind of “dead bird society.”

A flightless bird of the northern Atlantic, unrelated to the penguins of the southern oceans, the Great Auk (*Alca impennis*) bred by necessity on low shelves of rocky islets and islands. Its marvelous speed and power on and under the water could not help the bird on land, where the fat black-and-white alcid awkwardly waddled. Indigenous cultures and, most especially, west-sailing European mariners found the auks an easy source of food, fat, oil, and feathers. Perhaps the most famous Great Auk breeding colony was Funk Island, where sailors dispatched—in horrible ways—countless of these magnificent birds.

British painter and naturalist Errol Fuller has written a monumental, lavishly illustrated volume that may well become, like A.W. Schorger's *The Passenger Pigeon*, a classic work in the literature of extinction. Fuller's book includes a detailed natural history of the species but also exhaustively documents the deep and strange human fascination with this bird. In this regard, Fuller's work is indispensable. The volume details many of the stories associated with the Great Auk, including the imprisonment of one luckless bird as a witch and the killing of the famous last known pair on Eldey, Iceland, in 1844. So while Fuller's chapters on the bird's lifeways and its extinction are substantial, it is the story of “Auks and Men—The Cult of the Carefowl” that I find most startling. In that chapter and others, Fuller offers anecdotes and photographs that document such oddities as Great Auk Cigarettes and the auk-emblazoned logo of the Association of Women Clerks and Secretaries. “Great Auks,” he notes, “...caught the popular imagination in a way that was hardly predictable.”

Fuller delves into the world of natural historians and collectors—providing insights into their motivations and interactions—as well as thoroughly documents the background or provenance of each known Great Auk specimen. “A detailed list,” Fuller writes, “of 80 or so stuffed birds might seem excessive. The reason for it is simple. Each of these preserved Auks represents a little tragedy all of its own. They, along with the eggs and the bones, are our only tangible contact with the Great Auk, and each of their histories—together with the few stories we have of specific, individual birds—are all that prevent *Alca impennis* from merely being a statistic.” One of the stories revolves around the fate of the last two known specimens, a curious mystery that Fuller's assiduous research helps unpuzzle.

This is a book of staggering detail and profound physical beauty (the volume has more than 400 illustrations, half in color). Fuller includes page after page of photographs of Great Auk specimens, skeletons, and eggs, as well as a dizzying myriad of renderings of the species across time, including a prehistoric cave painting from Grotte Cosquer and even an illustration of an auk in the tropics, far outside its native range. There are photos of the hunters and collectors, and fine contemporary paintings, including some of Fuller's own.

To do justice to the drawings, engravings, paintings, and photographs, this is a coffee table-sized book. The heft suggests that this is not a volume to be read cover-to-cover, unless perhaps for research purposes. The sheer accumulation of detail would overwhelm. This work is best encountered over time in smaller portions; in this way,

the arcana and particulars can obsess the reader as they obsessed the author.

The Great Auk imparts a documentation of loss that is both heart-breaking and motivating. In seeing his love of this creature and its histories through to this publication, Errol Fuller has created a remarkable book.

Reviewed by **CHRISTOPHER COKINOS**, author of *Hope Is the Thing with Feathers: A Personal Chronicle of Vanished Birds* (Tarcher/Putnam, 2000)

Taking Care: Thoughts on Storytelling and Belief

by William Kittredge
Milkweed Editions: Credo Series
1999 ■ 130 pages; \$12 paperback

“**W**hat is the real story of the American West?” has been a nearly endless refrain among historians and other culture-watchers in the last decade. It is a question with its own hoary history—contested before Kit Carson rose up into our mythology in the 1840s; shifting constantly since Frederick Jackson Turner posed his now-battered thesis that the frontier closed in 1890; echoing loudly in the twentieth century lament for America’s lost wild places. It is a question that pervades William Kittredge’s seventy-nine-page essay, *Taking Care: Thoughts on Storytelling and Belief*. Not surprisingly, he has no easy answer.

But Kittredge does know how to tell his own story of living in this contested terrain, growing up on a ranch in Montana’s Great Basin. Here, he shows a landscape transformed. A swamp purchased by his grandfather in 1936 is drained and plowed. The life of his

father and grandfather, unfolding against a backdrop of field and marsh, mountains and water birds—in which their deepest care was for the quiet conjunction of farmer and work horse—is swept aside for a dream of efficiency and profit through industrial agriculture.

William Kittredge, the grandson, unexpectedly took control of the ranch in 1959 and tried to live in this new dream. From the vast new acreage under tillage and the wholly redirected water flows came the bustling satisfaction of towers full of grain and boxcars full of beef. But dangling from the underside of this vision also came life-shortening malathion and 2-D-ethyl; decimated coyotes; evaporated habitats for muskrats and redheads and green-winged teal; ruined, saline soils; rural communities frayed and angry.

Taking Care is the self-portrait of a Montana rancher who awoke to the realization that his own narrative was “pretty much, irrevocably dead.” It is also the credo of a writer and conservationist who sees that new stories—of self and place—create a fresh view of what is happening. A new, truly wild tale of the West, which acknowledges that the setting is “a partway plundered world” and makes room for the “sacred beasts,” may have the power to change the politics that have led to our ecological impasse.

“A story really isn’t good,” Flannery O’Connor has remarked, “unless it resists paraphrase, unless it hangs on and expands in the mind.” This observation illuminates both the power of *Taking Care* and its weakness. Kittredge’s recollections—such as his memory of his grandfather’s cold fury as the old man systematically caught and shot magpies, explaining “they’re mine”—capture the futility and ecological stupidity of a western

mythology based on raw human domination and absolute ownership. His stories are deceptively plain, not unlike those of his early hero Hemingway; they hang on and expand in the mind.

However, in this book, Kittredge is quick to leave his experience in the interest of explaining it. Sometimes the result is searing self-analysis. But at other times he presents an aphoristic grab-bag that erodes the very subtlety and paraphrase-defying quality that give his stories power. It would be a better book with more tales. I was moved by his drunk Uncle Hank placing his false teeth on the table at Thanksgiving “inextricably tangled with long strings of bright green spinach”—an ambiguous, flawed role model at best, but one who at least “refused to join the scramble to fence the world.”

Kittredge seems at ease in the work clothes of the western storyteller—even as he pointedly, sadly, seek a new mythology to replace the failed agricultural pastoral ideal and drive the feedlot cattle from his boyhood valley which “should be given back to the birds.” Indeed his stories are so good—understated and burning—that I wasn’t much put off by the paragraphs when he seems to have donned a more awkward garb of evolutionary spirituality. Remarks like, “paradise...is unending immersion in the evolving processes of a world where my kind of creature feels both comfortable and meaningful,” have a tinny ring. Perhaps, though, when a person is mourning the loss of his first love and is looking for a way to “embrace [his] responsibility for the wearing out” it just bears listening.

Reviewed by **JOSHUA BROWN**,
Wild Earth assistant editor

Nature Lover's Library

Recently published books that may
be of interest to conservationists

Jaguar Totem: The Woodswoman Explores New Wildlands and Wildlife by Anne LaBastille. 1999. West of the Wind Publications, Westport, NY. 269 pp. \$16 paper.

The Adirondack Park: A Wildlands Quilt by Barbara McMartin. 1999. Syracuse University Press, Syracuse, NY. 96 pp. \$24.95 paper.

Shaping the Sierra: Nature, Culture, and Conflict in the Changing West by Timothy P. Duane. 1999. University of California Press, Berkeley. 595 pp. \$50 cloth.

Carnivores in Ecosystems: The Yellowstone Experience edited by Tim W. Clark et al. 1999. Yale University Press, New Haven, CT. 429 pp. \$40 cloth.

Shadow Cat: Encountering the American Mountain Lion edited by Susan Ewing and Elizabeth Grossman. 1999. Sasquatch Books, Seattle, WA. 225 pp. \$15.95 paper.

The New Earth Reader: The Best of TERRA NOVA edited by David Rothenberg and Marta Ulvaeus. 1999. MIT Press, Cambridge, MA. 238 pp. \$24.95 cloth.

Forest Fragmentation in the Southern Rocky Mountains edited by Richard L. Knight et al. 2000. University Press of Colorado, Boulder. 488 pp. \$59.95 cloth.

Invasive Species in a Changing World edited by Harold A. Mooney and Richard J. Hobbs. 2000. Island Press, Washington, DC. 457 pp. \$55 cloth, \$30 paper.

Trogons and Quetzals of the World by Paul A. Johnsgard. 2000. Smithsonian Institution Press, Washington, DC. 223 pp. \$49.95 cloth.

National Parks and Rural Development: Practice and Policy in the United States edited by Gary E. Machlis and Donald R. Field. 2000. Island Press, Washington, DC. 323 pp. \$55 cloth, \$27.50 paper.

Tupai: A Field Study of Bornean Treeshrews by Louise H. Emmons. 2000. University of California Press, Berkeley. 287 pp. \$50 cloth, \$19.95 paper.

Stinging Trees and Wait-a-Whiles: Confessions of a Rainforest Biologist by William Laurance. 2000. University of Chicago Press, Chicago. 196 pp. \$25 cloth.

A Symbol of Wilderness: Echo Park and the American Conservation Movement by Mark W.T. Harvey. 1994, reprinted 2000. University of Washington Press, Seattle, WA. 368 pp. \$19.95 paper.

ANNOUNCEMENTS

Ecological Farming Conference "Farming as if Nature Mattered: Reconnecting Food Systems with Ecosystems" is the theme for the Northeast Organic Farming Association of Vermont's annual winter conference, co-organized by the Wild Farm Alliance, February 17, 2001, Vermont Technical College, Randolph, VT. Contact NOFA-VT, 802-434-4122, nofavt@together.net.

Forest Activist Training The Wilderness Society is hosting an advanced training for national forest activists, February 23–25, 2001, Hulbert Outdoor Center, Fairlee, VT. Sessions include: arguments for land protection, wilderness campaigns, forest planning, and scoping and appeals. Contact Heather Dowey or Julie Wormser at 617-350-8866.

Environmental Law Conference Land Air Water, an environmental research project at the University of Oregon School of Law, is sponsoring their Annual Public Interest Environmental Law Conference, March 1–4, 2001, Eugene, OR. Keynote speakers include Ward Churchill, Terry Tempest Williams, David Korten, and Captain Paul Watson. Visit www.pielc.uoregon.edu.

Riparian Habitat Conference The Wildlife Society and the Riparian Habitat Joint Venture offer a conference exploring California's riparian and floodplain areas—and related research, conservation, partnerships, education, and policy—March 12–15, 2001, Radisson Hotel, Sacramento, CA. For more information: www.tws-west.org/riparian or contact Diana Craig, 707-562-8930, dcraig01@fs.fed.us.

Forestry Symposium "Forestry Issues in the New Millennium," a symposium offered by *Res Communes*, a publication of the Vermont Law School, will be held March 23–24, 2001, South Royalton, VT. Clearcut laws, forest certification, roadless policy, fire management, new wilderness designation, national forest planning, and other topics are on the agenda. Visit www.vje.org.

Environmental History Meeting "Making Environmental History Relevant in the 21st Century" is the first annual joint meeting of the American Society of Environmental History and the Forest History Society, March 28–April 1, 2001, at the Durham Marriott, Durham, NC. For more information on this scholarly gathering contact www.lib.duke.edu/forest/jtconf.html.

Literature Conference The Association for the Study of Literature and Environment's fourth biennial conference will be held June 19–23, 2001, at Northern Arizona University, Flagstaff, AZ. Presentations will explore sense of place, language and landscape, wilderness parks and more. Contact Professor Gioia Woods, Gioia.Woods@NAU.edu, or Connie Bowles, program coordinator, Connie.Bowles@NAU.edu, 520-523-0499.



Cynthia Armstrong
249 W. Hilton Dr.
Boulder Creek, CA
95006
831/338-7829
carmstro@cruzio.com



Sarah Lauterbach
1923 Apex Ave.
Los Angeles, CA
90039



Claus Sievert
16524 Auburn Rd.
Grass Valley, CA
95949
530/273-0237

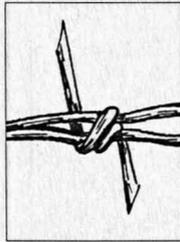
Evan Cantor
910 Miami Way
Boulder, CO
80305
303/499-1829
evan.cantor@colorado.edu



Heather Lenz
17 Bear Mt. Rd.
Wendell Depot,
MA 01380
978/544-2399
inthisplace@earthlink.net



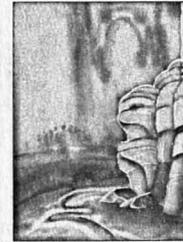
Robert Smith
Box 29, Site 1
Callander, ON
POH 1H0
Canada
705/752-4432
robdeb@onlink.net



Valerie Cohen
2215 Lindley Way
Reno, NV 89509
775/828-4283
vpcohen@earthlink.net



Dennis Logsdon
280 Lakeshore Dr.
Marlborough, MA
01752
508/481-6365
logied@mediaone.net



Serena Supplee
PO Box 579
Moab, UT 84532
435/259-7630

William Crook, Jr.
945 South First St.
Springfield, IL
62704
217/522-3372



Douglas Moore
6840 North
Featherstone Trail
Tucson, AZ 85743
520/682-0459



Todd Telander
800 2nd Ave.
Trinidad, CA
95570
707/677-3548
telander@humboldt1.com



Bob Ellis
Millers River
Watershed
Wendell, MA
01379
413/659-3512



Narca Moore-Craig
PO Box 16361
Portal, AZ 85632
520/558-2220
narca@vtc.net



Davis Te Selle
30 Convent Sq.
Burlington, VT
05401
802/651-9345
dteselle@zoo.uvm.edu

Amy Grogan
PO Box 361
Silverton, CO
81433
970/387-0243



Barrie Mottishaw
8012 Waring Ave.
Los Angeles, CA
90046
323/655-2704
barrie@nibs.com



D.D. Tyler
PO Box 243
Augusta, ME
04332
207/622-7379
tylerpub@aol.com



CONTRIBUTING ARTISTS Bill Amadon, Cynthia Armstrong, Darren Burkey, Evan Cantor, William Crook Jr., Libby Davidson, Suzanne DeJohn, Patrick Dengate, Gus diZerega, Gary Eldred, Bob Ellis, Amy Grogan, John Jonik, Mary Elder Jacobsen, L.J. Kopf, Sarah Lauterbach, Heather Lenz, Peggy Sue McRae, Rob Messick, Douglas Moore, Martin Ring, Nancy Roy, Claus Sievert, Robert Smith, Todd Telander, Davis Te Selle, D.D. Tyler, Lezle Williams, Tim Yearington

Wild Reading



By Dave Foreman

The Lobo Outback Funeral Home is a novel about commitment—or, rather, the consequences of shirking commitment. Earth First! founder Dave Foreman unfolds the story of disillusioned Sierra Club lobbyist Jack Hunter, who leaves Washington, D.C., for New Mexico's Diablo National Forest. Convinced there is nothing he or anyone else can do to stop humankind's war on nature, he is determined not to become involved again in conservation issues. Nevertheless, he finds himself falling for Dr. MaryAnne McClellan, the leader of the Diablo Wilderness Committee, who tries to draw him into the campaign to protect the Diablo Wilderness Area from Forest Service logging plans. MaryAnne also attempts to involve Jack when a pack of lobos—Mexican wolves—are reintroduced to this wilderness bordering a small ranching community. Hunter refuses to commit to either MaryAnne or the lobos, however, and he is soon caught up in the bloody consequences of his cynicism, discovering the true cost of not taking a stand for what he loves.

\$24.95 Hardcover

By Ken Ross

Environmental Conflict in Alaska presents a detailed yet readable account of the salient environmental controversies of Alaska's statehood period. At statehood, Alaska awaited apportionment among state, federal, and Native claimants. A unique mix of conditions, Ross maintains, precipitated high-stakes, often dramatic battles over whales, wolves, and other wildlife as well as the lands and waters where they roamed. The conflicts helped shape the national environmental agenda and generated a vibrant environmental community in Alaska. They doomed some destructive projects, mitigated others, and gave birth to more open, interdisciplinary, and international models of natural resource management. Includes 80 b&w photographs.

\$59.95 Hardcover • \$29.95 Paperback



Riverwalk Explorations Along the Cache la Poudre River



photographs by William Wylie
with a foreword by Merrill Gilfillan

By William Wylie

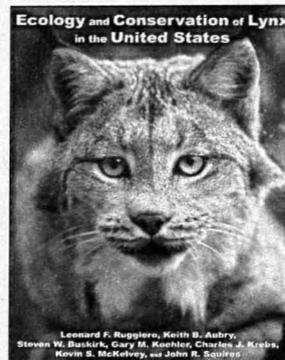
Merrill Gilfillan's poetic introduction sets the stage for the incredibly detailed and subtly reproduced observations recorded in *Riverwalk: Explorations Along the Cache la Poudre River*, a collection of photographs of the last undammed river on the Front Range in Colorado. William Wylie walked 150 miles from the mouth of the Poudre River on the eastern plains of Colorado to its headwaters at the Continental Divide in Rocky Mountain National Park. Wylie gives us 49 stunning duotone photos that convey the beauty and sense of possibility inherent in the Cache la Poudre River.

\$49.00 Hardcover

**By Leonard F. Ruggiero, Keith B. Aubry, Steven W. Buskirk, Gary M. Koehler,
Charles J. Krebs, Kevin S. McKelvey, and John R. Squires**

Once found throughout the Rocky Mountains and forests of the northern states, the lynx now is found only in pockets of its former habitat. In Colorado, a reintroduction project has come under fire, while the United States Fish and Wildlife Service recently listed the lynx as a threatened species under the Endangered Species Act. *Ecology and Conservation of Lynx in the United States* reviews the newest scientific knowledge of this unique cat's history, distribution, and ecology. This compilation is a welcome addition to current scientific and public debate regarding the fate of the lynx in the United States and will be of interest to wildlife managers, students, scientists, or anyone else desiring an in-depth look at the lynx. Includes a large color map designating lynx occurrences.

\$59.95 Hardcover • \$29.95 Paperback



University Press of Colorado

Orders c/o 4100 28th Ave. NW • Norman, OK 73069-8218

Ph: (800) 627-7377, (405) 325-2000 • Fax: (800) 735-0476, (405) 364-5798

All other inquiries, phone (720) 406-8849

DISCOVER

Resurgence

MAGAZINE
New Paradigm Thinking



Deep Ecology • Biodiversity
Spirituality • Sustainability
Art and Culture and more...

**Introductory offer: subscriptions
(6 issues) \$50 airmail, \$40 surface**

Send payment to: Resurgence/US (WE),
PO Box 404 Freeland, WA 98249

Email: subs.resurge@virgin.net
Website: <http://www.resurgence.org>



Coyote at Large

Humor in American Nature Writing

Katrina Schimmoeller Peiffer

"A book that will lead you back to writers you already know, or guide you towards new and wonderful encounters."

—Bill McKibben, author of
The End of Nature

Paper \$19.95



THE UNIVERSITY
OF Utah PRESS

(800) 773-6672 www.upress.utah.edu

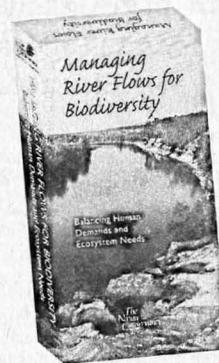
NEW

VIDEO

ON

RIVER

FLOWS!



Learn about the challenges of trying to meet both human demands and ecosystem needs for water, efforts to find a balance between these needs, and tools to help achieve the balance. This 25-minute video features case studies of the Apalachicola River in Florida and the San Pedro River in Arizona, and interviews with lawyers, water managers, and scientists.

ORDER YOUR FREE COPY of *Managing River Flows for Biodiversity* through the National Service Center for Environmental Publications by calling 1-800-490-9198 or faxing 513-489-8695. Please provide the title of the video and EPA document number EPA 841-V-00-001 when placing your order.



Conservation Biology *in Practice*

STAY IN TOUCH

with new conservation research, innovative case studies, practical tools and techniques, and state-of-the-art conservation biology

\$30*
Subscribe Today!

A new magazine from the Society for Conservation Biology that bridges the gap between conservation science, practice, and policy

For more information, visit our web site:
www.cbinpractice.org

Editorial office: 206/685-4724
*other rates apply for institutional and overseas subscriptions

**IS YOUR FAVORITE
MAGAZINE WRECKING
THE ENVIRONMENT?**

- ▶ Over 25 million trees are cut each year to print magazines.
- ▶ 90% of all magazines are discarded within one year of being printed.



**URGE YOUR FAVORITE
MAGAZINES TO CONVERT TO
ENVIRONMENTAL PAPERS!**

The **PAPER Project** is a collaboration between the Independent Press Association 415-643-4401 Conservatree 415-721-4230 and Coop America 1-800-58GREEN

www.EcoPaperAction.org



art: Pat Denigate

**Support Adirondack
CONSERVATION**

through **Wild Earth's Buy Back The Dacks**, a people's fund to protect biological diversity and wild habitat. The fund will be used to purchase imperiled wildlands within the Adirondack Park. For information or to contribute, contact: Buy Back The Dacks, Wild Earth, PO Box 455, Richmond, VT 05477; 802/434-4077.

**Parks are supposed
to be forever.
There's only one way
to make it that long.**

If parks and other protected areas are to preserve biodiversity in perpetuity, they must be managed according to the best practices that cutting-edge science can produce. The George Wright Society is a nonprofit professional association of researchers and resource managers who work in parks. We promote the scientific and heritage values of protected areas the world over. Call or write for a free sample of our journal and more information.

The George Wright Society
P.O. Box 65
Hancock, Michigan 49930-0065 USA
1-906-487-9722; fax 1-906-487-9405
info@georgewright.org
www.georgewright.org

**Call for
WildEARTH**

That's right! Every call you make supports *Wild Earth*. Affinity Corp., our long-distance fundraising partner, will return 5% of your long-distance calls to our savings fund.

Three Competitive Plans

Select 9.9 Plan A flat 9.9¢/min. on out-of-state calls 24 hours/day, 7 days/week. \$3 minimum usage requirement.

Select 5 Plan 5¢/minute 7pm-7am and all weekend on out-of-state calls; 15¢/min. Monday-Friday 7am-7pm. \$5.95 monthly fee.

Select 15 Plan A flat rate of 15¢/min. on out-of-state calls.

**Intrastate, IntraLATA, and International rates vary. Rates subject to change.*

call 800-670-0008

Be sure to give the operator *Wild Earth's* group number: 511119-000/100-0007-80



**WILD THINKING
ONLINE**



Cynthia Armstrong

www.wild-earth.org

A lasting voice...

With a bequest to *Wild Earth*, you'll help ensure that we continue to reach ever greater numbers with the inspired message of wildlands recovery and protection.

Please consider including *Wild Earth* in your will. For more information on this or other giving options, please contact your estate planner or call us at 802/434-4077.



©Diana Dee-Tyler

Statement of Ownership, Management, and Circulation (Required by 39 USC 3685)

Publication: Wild Earth
Publication No.: 1055-1166
Date of Filing: 9/21/2000
Frequency: Quarterly
No. of issues published annually: 4
Annual subscription price: \$25
Mailing address of publication: PO Box 455, Richmond, VT 05477
Editor: Tom Butler
Owner: Wild Earth Society, Inc. (a non-profit corporation)
Bondholders and Mortgages: none
The purpose, non-profit status, and exempt status for Federal income tax purposes has not changed in the preceding 12 months.
Avg. preceding yr./Actual no. nearest filing
Total No. copies: 12,667/10,000
Paid and/or Requested Circulation: (1) Sales through Dealers and Carriers, Street Vendors, and Counter Sales: 3182/3021 (2) Paid or Requested Mail Subscriptions: 3440/3546
Total Paid and/or Requested Circulation: 6622/6567
Free Distribution by Mail: 596/604
Free Distribution Outside Mail: 5449/2829
Total Free Distribution: 6045/3433
Total Distribution: 12,667/10,000
Copies Not Distributed (1) Office Use, Leftovers, Spoiled: 0; (2) Returns from Agents: 0 (unsold issues are destroyed)
Total: 12,667/10,000
Percent Paid and/or Requested Circulation: 52%/66%

We list here only each issue's major articles, by partial title or subject. For a more complete listing, request a comprehensive Back Issues List (see form, next page).

Note: (✳) = issue is sold out, but photocopies of articles available.

BACK ISSUES

1/Spring 1991 • Ecological Foundations for Big Wilderness, Howie Wolke on The Impoverished Landscape, Reed Noss on Florida Ecosystem Restoration, Biodiversity & Corridors in Klamath Mtns., Earth First! Wilderness Preserve System, GYE Marshall Plan, Dolores LaChapelle on Wild Humans, Dave Foreman "Around the Campfire," and Bill McCormick's Is Population Control Genocide?

2/Summer 1991 • Dave Foreman on the New Conservation Movement, Ancient Forests: The Perpetual Crisis, Wolke on The Wild Rockies, Grizzly Hunting in Montana, Noss on What Wilderness Can Do for Biodiversity, Mendocino NF Reserve Proposal, Christopher Manes on the Cenozoic Era, and Part 2 of McCormick's Is Population Control Genocide?

3/Fall 1991 • (✳) The New Conservation Movement continued. Farley Mowat on James Bay, George Washington National Forest, the Red Wolf, George Wuertner on the Yellowstone Elk Controversy, The Problems of Post Modern Wilderness by Michael P. Cohen and Part 3 of McCormick's Is Population Control Genocide?

4/Winter 1991/92 • Devastation in the North, Rod Nash on Island Civilization, North American Wilderness Recovery Strategy, Wilderness in Canada, Canadian National Parks, Hidden Costs of Natural Gas Development, A View of James Bay from Quebec, Noss on Biologists and Biophiles, BLM Wilderness in AZ, Wilderness Around the Finger Lakes: A Vision, National ORV Task Force

5/Spring 1992 • Foreman on ranching, Ecological Costs of Livestock, Wuertner on Gunning Down Bison, Mollie Matteson on Devotion to Trout and Habitat, Walden, The Northeast Kingdom, Southern Rockies Ecosystem Protection, Conservation is Good Work by Wendell Berry, Representing the Lives of Plants and Animals by Gary Paul Nabhan, and The Reinvention of the American Frontier by Frank and Deborah Popper

6/Summer 1992 • The Need for Politically Active Biologists, US Endangered Species Crisis Primer, Wuertner on Forest Health, Ancient Forest Legislation Dialogue, Toward Realistic Appeals and Lawsuits, Naomi Rachel on Civil Disobedience, Victor Rozek on The Cost of Compromise, The Practical Relevance of Deep Ecology, and An Ecofeminist's Quandary

7/Fall 1992 • How to Save the Nationals, The Backlash Against the ESA, Saving Grandfather Mountain, Conserving Diversity in the 20th Century, Southern California Biodiversity, Old Growth in the Adirondacks, Practicing Bioregionalism, Biodiversity Conservation Areas in AZ and NM, Big Bend Ecosystem Proposal, George Sessions on Radical Environmentalism in the 90s, Max Oelschlaeger on Mountains that Walk, and Mollie Matteson on The Dignity of Wild Things

8/Winter 1992/93 • Critique of Patriarchal Management, Mary O'Brien's Risk Assessment in the Northern Rockies, Is it Un-Biocentric to Manage?, Reef Ecosystems and Resources, Grassroots Resistance in Developing Nations, Wuertner's Greater Desert Wildlands Proposal, Wolke on Bad Science, Homo Carcinomicus, Natural Law and Human Population Growth, Excerpts from *Tracking & the Art of Seeing and Ghost Bears*

Wildlands Project Special Issue #1 • TWP (North American Wilderness Recovery Strategy) Mission Statement, Noss's Wildlands Conservation Strategy, Foreman on Developing a Regional Wilderness Recovery Plan, Primeval Adirondacks, Southern Appalachians Proposal, National Roadless Area Map, NREPA, Gary Snyder's Coming into the Watershed, Regenerating Scotland's Caledonian Forest, Geographic Information Systems

9/Spring 1993 • The Unpredictable as a Source of Hope, Why Glenn Parton is a Primitivist, Hydro-Quebec Construction Continues, RESTORE: The North Woods, Temperate

Forest Networks, The Mitigation Scam, Bill McKibben's Proposal for a Park Without Fences, Arne Naess on the Breadth and Limits of the Deep Ecology Movement, Mary de La Valette says Malthus Was Right, Noss's Preliminary Biodiversity Plan for the Oregon Coast, Eco-Porn and the Manipulation of Desire

10/Summer 1993 • Greg McNamee questions Arizona's Floating Desert, Foreman on Eastern Forest Recovery, Is Ozone Affecting our Forests?, Wolke on the Greater Salmon/Selway Project, Deep Ecology in the Former Soviet Union, Topophilia, Ray Vaughan and Nedd Mudd advocate Alabama Wildlands, Incorporating Bear, The Presence of the Absence of Nature, Facing the Immigration Issue

11/Fall 1993 • Crawling by Gary Snyder, Dave Willis challenges handicapped access developments, Biodiversity in the Selkirk Mtns., Monocultures Worth Preserving, Partial Solutions to Road Impacts, Kittatinny Raptor Corridor, Changing State Forestry Laws, Wild & Scenic Rivers Act, Wuertner Envisions Wildland Restoration, Toward [Population] Policy That Does Least Harm, Dolores LaChappelle's Rhizome Connection

12/Winter 1993/94 • A Plea for Biological Honesty, A Plea for Political Honesty, Endangered Invertebrates and How to Worry About Them, Faith Thompson Campbell on Exotic Pests of American Forests, Mitch Lansky on The Northern Forest, Human Fear Diminishes Diversity in Rocky Mtn. Forests, Gonzo Law #2: The Freedom of Information Act, Foreman on NREPA and the Evolving Wilderness Area Model, Rocky Mtn. Nat. Park Reserve Proposal, Harvey Locke on Yellowstone to Yukon campaign

13/Spring 1994 • Ed Abbey posthumously decries The Enemy, David Clarke Burks's Place of the Wild, Ecosystem Mismanagement in Southern Appalachia, Mohawk Park Proposal, RESTORE vs. Whole-Tree Logging, Noss & Cooperrider on Saving Aquatic Biodiversity, Atlantic Canada Regional Report, Paul Watson on Neptune's Navy, The Restoration Alternative, Intercontinental Forest Defense, Failures of Babbitt and Clinton, Chris McGrory-Klyza outlines Lessons from Vermont Wilderness

14/Summer 1994 • Bil Alverson's Habitat Island of Dr. Moreau, Bob Leverett's Eastern Old Growth Definitional Dilemma, Wolke against Butchering the Big Wild, FWS Experiments on Endangered Species, Serpentine Biodiversity, Andy Kerr promotes Hemp to Save the Forests, Mapping the Terrain of Hope, A Walk Down Camp Branch by Wendell Berry, Carrying Capacity and the Death of a Culture by William Catton Jr., Industrial Culture vs. Trout

15/Fall 1994 • BC Raincoast Wilderness, Algoma Highlands, Helping Protect Canada's Forests, Central Appalachian Forests Activist Guide, Reconsidering Fish Stocking of High Wilderness Lakes, Using General Land Office Survey Notes in Ecosystem Mapping, Gonzo Law #4: Finding Your Own Lawyer, The Role of Radio in Spreading the Biodiversity Message, Jamie Sayen and Rudy Engholm's Thoreau Wilderness Proposal

16/Winter 1994/95 • Ecosystem Management Cannot Work, Great Lakes Biodiversity, Peregrine Falcons in Urban Environments, State Complicity in Wildlife Losses, How to Burn Your Favorite Forest, ROAD-RIPort #2, Recovery of the Common Lands, A Critique and Defenses of the Wilderness Idea by J. Baird Callicott, Dave Foreman, and Reed Noss

17/Spring 1995 • Christopher Manes pits Free Marketeers vs. Traditional Environmentalists, Last Chance for the Prairie Dog, interview with tracker Susan Morse, Befriending a Central Hardwood Forest part 1, Economics for the Community of Life: Part 1, Minnesota Biosphere Recovery, Michael Frome insists Wilderness Does Work, Dave Foreman looks at electoral politics, Wilderness or Biosphere Reserve: Is That a Question?, Deep Grammar by J. Baird Callicott

18/Summer 1995 • (✳) Wolke on Loss of Place, Dick Carter on Utah Wilderness: The First Decade, WE Reader Survey Results, Ecological Differences Between Logging and Wild-fire, Bernd Heinrich on Bumblebee Ecology, Michael Soule on the Health Implications of Global Warming, Peter Brusard on Nevada Biodiversity Initiative, Preliminary Columbia Mtns. Conservation Plan, Foreman on advocacy politics, Environmental Consequences of Having a Baby in the US

19/Fall 1995 • (✳) Wendell Berry on Private Property and the Common Wealth, Eastside Forest Restoration, Global Warming and The Wildlands Project, Paul J. Kalisz on Sustainable Silviculture in Eastern Hardwood Forests, Old Growth in the Catskills and Adirondacks, Threatened Eastern Old Growth, Andy Kerr on Cow Cops, Dave Foreman on libertarianism, Fending of SLAPPS, Using Conservation Easements to save wildlands, David Orton on Wilderness and First Nations

20/Winter 1995/96 • TWP Special Issue #2. Testimony from Terry Tempest Williams, Foreman's Wilderness: From Scenery to Strategy, Noss on Science Grounding Strategy and The Role of Endangered Ecosystems in TWP, Roz McClellan explains how Mapping Reserves Wins Commitments, Second Chance for the Northern Forest: Headwaters Proposal, Klamath/Siskiyou Biodiversity Conservation Plan, Wilderness Areas and National Parks in Wildland Proposal, ROAD-RIP and TWP, Steve Trombulak, Jim Stritholt, and Reed Noss confront Obstacles to Implementing TWP Vision

21/Spring 1996 • (✳) Bill McKibben on Finding Common Ground with Conservatives, Public Naturalization Projects, the Complexities of Zero-cut, Curt Steger on Ecological Condition of Adirondack Lakes, Acid Rain in the Adirondacks, Bob Mueller on Central Appalachian Plant Distribution, Brian Tokar on Biotechnology vs. Biodiversity, Stephanie Mills on Leopold's Shack, Soule asks Are Ecosystem Processes Enough?, Poems for the Wild Earth, Limitations of Conservation Easements, Kerr on Environmental Groups and Political Organization

22/Summer 1996 • McKibben on Text, Civility, Conservation and Community, Eastside Forest Restoration Forum, Grazing and Forest Health, debut of Landscape Stories department, Friends of the Boundary Waters Wilderness, Foreman on Public Lands Conservation, Private Lands in Ecological Reserves, Public Institutions Twisting the Ear of Congress, Laura Westra's Ecosystem Integrity and the Fish Wars, Caribou Commons Wilderness Proposal for Manitoba

23/Fall 1996 Religion and Biodiversity, Eastern Old Growth: Big Tree Update, Gary Nabhan on Pollinators and Predators, South African Biodiversity, Dave Foreman praises Paul Shepard, NPS Prescribed Fires in the Post-Yellowstone Era, Alaska: the Wildlands Model, Mad Cows and Montanans, Humans as Cancer, Wildlands Recovery in Pennsylvania

24/Winter 1996/97 • (✳) Opposing Wilderness Deconstruction: Gary Snyder, Dave Foreman, George Sessions, Don Waller, Michael McCloskey respond to attacks on wilderness. The Aldo Leopold Foundation, Grand Fir Mosaic, eastern old-growth report, environmental leadership. Andy Robinson on grassroots fundraising, Edward Grumbine on Using Biodiversity as a Justification for Nature Protection, Rick Bass on the Yaak Valley, Bill McCormick on Reproductive Sanity, and portrait of a Blunt-nosed Leopard Lizard

25/Spring 1997 • (✳) Perceiving the Diversity of Life: David Abram's Returning to Our Animal Senses, Stephanie Kaza on Shedding Stereotypes, Jerry Mander on Technologies of Globalization, Christopher Manes's Contact and the Solid Earth, Connie Barlow Re-Stories Biodiversity by Way of Science, Imperiled Freshwater Clams, WildWaters Project, eastern old-growth report, American Sycamore, Kathleen Dean Moore's Traveling the Logging Road, Mollie Matteson's Wolf Re-story-ation, Maxine McCloskey on Protected Areas on the High Seas

26/Summer 1997 • (✱) Doug Peacock on the Yellowstone Bison Slaughter, Reed Noss on Endangered Major Ecosystems of the United States, Dave Foreman challenges abiologists, Hugh Iltis challenges biologists, Virginia Abernethy explains How Population Growth Discourages Environmentally Sound Behavior. Gaian Ecology and Environmentalism, The Bottom Line on Option Nine, Eastern Old Growth Report, How Government Tax Subsidies Destroy Habitat, Geology in Reserve Design, part 2 of NPS Prescribed Fires in the Post-Yellowstone Era

27/Fall 1997 • (✱) Bill McKibben discusses Job and Wilderness, Anne LaBastille values Silence, Allen Cooperrider and David Johnston discuss Changes in the Desert, Donald Worster on The Wilderness of History, Nancy Smith on Forever Wild Easements in New England, Foreman explores fear and loathing of wilderness, George Wuerthner on Subdivisions and Extractive Industries, More Threatened Eastern Old Growth, part 2, the Precautionary Principle, North and South Carolina's Jocassee Gorges, Effects of Climate Change on Butterflies, the Northern Right Whale, Integrating Conservation and Community in the San Juan Mtns., Las Vegas Leopard Frog

28/Winter 1997/98 • *Overpopulation Issue* explores the factors of the I=PAT model: Gretchen Daily & Paul Ehrlich on Population Extinction and the Biodiversity Crisis, Stephanie Mills revisits nulliparity, Alexandra Morton on the impacts of salmon farming, Sandy Irvine punctures pronatalist myths, William Catton Jr. on carrying capacity, Virginia Abernethy considers premonition population planning, Stephanie Kaza on affluence and the costs of consumption, Kirkpatrick Sale criticizes the Technological Imperative, McKibben addresses overpopulation One (Child) Family at a Time, Foreman on left-wing comucopianism Interview with Stuart Pimm, Resources for Population Publications & Overpopulation Action, Spotlight on Ebola Virus

29/Spring 1998 • (✱) Interview with David Brower, Anthony Ricciardi on the Exotic Species Problem and Freshwater Conservation, George Wuerthner explores the Myths We Live By, Dave Foreman critique of "environment," forum on ballot initiatives, John Clark & Alexis Lathem consider Electric Restructuring, Paul Faulstich on Geophilia, critiques of motorized wreckreation, Mitch Friedman's Earth in the Balance Sheet, Anne Woiodode on Pittman Robinson, Peter Friederici's Tracks, Eastern Old Growth, Connie Barlow's Abstainers

30/Summer 1998 • *Wildlands Philanthropy* tradition discussed by Robin Winks, John Davis on Private Wealth Protecting Public Values, Doug Tompkins on Philanthropy, Cultural Decadence, & Wild Nature, Sweet Water Trust saves wildlands in New England, A Time Line of Land Protection in the US, Rupert Cutler on Land Trusts and Wildlands Protection, profiles of conservation heroes Howard Zahniser, Ernie Dickerman, & Mardy Murie, Michael Frome recollects the wilderness wars, David Carle explores early conservation activism and National Parks, and Barry Lopez on The Language of Animals

31/Fall 1998 • *Agriculture & Biodiversity* (✱) examined by Paul Shepard, Catherine Badgley, Wes Jackson, and Frieda

Knobloch, Scott Russell Sanders on Landscape and Imagination, Amy Seidl addresses exotics, Steve Trombulak on the Language of Despoilment, George Wuerthner & Andy Kerr on livestock grazing, *Rewilding* paper by Michael Soule & Reed Noss, Gary Nabhan critiques the Terminals of Seduction, Noss asks whether conservation biology needs natural history, Y2Y part 2, profile of Dan Luten

32/Winter 1998/99 • *A Wilderness Revival* perspectives from Bill Meadows on the American Heart, Juri Peepre on Canada, Jamie Sayen on the Northern Appalachians, and John Elder on the edge of wilderness, Louisa Willcox on grizzlies, politics from Carl Pope, Ken Rait's Heritage Forests, Jim Jontz's Big Wilderness Legislative Strategy, Debbie Sease & Melanie Griffin's stormy political forecast, Dave Foreman on the River Wild as metaphor, Mike Matz's Domino Theory, Wilderness campaign updates from Oregon, California, Nevada, Grand Canyon, New Mexico, Colorado, and Utah, NREPA, focal species paper by Brian Miller et al.

33/Spring 1999 • *Coming Home to the Wild* Flo Shepard, Paul Rezendes, Glendon Brunk, and Kelpie Wilson imagine rewilding ourselves, Paul Martin and David Burney suggest we Bring Back the Elephants! and Connie Barlow discusses Rewilding for Evolution, Freeman House on restoring salmon, John Davis on Anchoring the Millennial Ark, Chris Genovali exposes risks to Canada's Great Bear Rainforest, Madsen and Peepre on saving Yukon's rivers, Bryan Bird on roads and snags, George Wuerthner on population growth, Brock Evans uses wild language, Dave Foreman studies the word wilderness, and John Terborgh and Michael Soule's "Why We Need Megareserves: Large-scale Networks and How to Design Them"

34/Summer 1999 • *Carnivore Ecology and Recovery* "The Role of Top Carnivores in Regulating Terrestrial Ecosystems" by Terborgh et al., Todd Wilkinson on the Yellowstone Grizzlies Delisting Dilemma, Wolves for Oregon, Carnivores Rewilding Texas, fire ecologist Tim Ingalsbee suggests we Learn from the Burn, David Orr continues the Not-So-Great Wilderness Debate, Tom Fleischner on Revitalizing Natural History, Jim Northrup remembers Wildlands Philanthropist Joseph Battell, the Continuing Story of the American Chestnut

35/Fall 1999 • Nina Leopold Bradley, David Ehrenfeld, Terry Tempest Williams, and Curt Meine celebrate Leopold's legacy, wildlands philanthropy saves forests in Washington & California, Thomas Vale dispels the Myth of the Humanized Landscape, articles on Indigenous Knowledge and Conservation Policy in Papua New Guinea and threats to northwest Siberia's cultural & biological diversity, Janisse Ray takes us to the Land of the Longleaf, Robert Hunter Jones critiques NPS fire policy at Crater Lake, State of the Southern Rockies and the Grand Canyon Ecoregions, Sizing Up Sprawl

36/Winter 1999/2000 • *Vision* Jamie Sayen compares abolitionism and preservationism, Winona LaDuke rethinks the Constitution, Donella Meadows on shaping our future, Deborah & Frank Popper explore the Buffalo Commons, and Michael Soule on networks of people and wildlands; Dave Foreman puts our extinction crisis in a 40,000-year context,

Gary Paul Nabhan update on monarch butterflies and transgenic corn, David Maehr on South Florida carnivores, Michael Robinson discusses politics of jaguars and wolves in the Southwest, Reed Noss reserve design for the Klamath-Siskiyou, Andy Kerr's Big Wild legislative strategy, George Wuerthner on local control, Roger Kaye explores the Arctic National Wildlife Refuge

37/Spring 2000 • *The Wildlands Project Special Issue* E.O. Wilson offers a personal brief for TWP, Harvey Locke suggests a balanced approach to sharing North America. Sky Islands (AZ, NM) section: 4 articles on the Sky Islands Wildlands Network by Dave Foreman et al. address the elements of a conservation plan, healing the wounds, and implementation, color map of the draft proposal, Wildlands Project efforts in Mexico's Sierra Madre Occidental, David Petersen's "Baboquivari!", Leopold's legacy in New Mexico. Wildlands networks proposals for the Central Coast of British Columbia by M.A. Sanjayan et al. & the Wild San Juans of Colorado by Mark Pearson. Mike Phillips on conserving biodiversity on & beyond the Turner lands, the economy of Y2Y, roadless area protection by Jim Jontz

38/Summer 2000 • *American Parks and Protected Areas* Foreman on resourcism vs. will-of-the-land, historical perspectives from John Muir and Gifford Pinchot, Richard West Sellars reflects on the history of national park management, American environmentalism 1890-1920, David Carle calls for expanding national parks by shrinking national forests, Andy Kerr and Mark Salvo describe problems with livestock grazing in parks and wilderness, Sonoran Desert National Park proposal, David Rothenberg and Michael Kellett debate on Maine Woods National Park, wildlands proposals for Maine and connectivity between Algonquin and Adirondack parks, Brad Meiklejohn retires cows' from Great Basin, southwest New Hampshire wildlands, a Maine land trust, viewpoints on biodiversity conservation and "nature as amusement park," Thomas Berry interview

39/Fall 2000 • *Little Things* Resurrection Ecology by Robert Michael Pyle, Tom Eisner interview, Microcosmos, Return of the American Burying Beetle, Forgotten Pollinators, Laurie Garrett on the Coming Plague, Tom Watkins tribute by Terry Tempest Williams, Hunting & Nature Conservation in the Neotropics, Rockefeller's Philanthropy and the Struggle for Jackson Hole, critique of land exchanges, A Wilder Vision for the Texas Hill Country, Central Texas Forest Restoration, Fiction Folio: Dave Foreman's Lobo Outback Funeral Home

Additional Wild Earth Publications

Old Growth in the East: A Survey
by Mary Byrd Davis

Special Paper #1: *How to Design an Ecological Reserve System* by Stephen C. Trombulak

Special Paper #2: *While Mapping Wildlands, Don't Forget the Aliens* by Faith T. Campbell

Special Paper #3: *A Citizen's Guide to Ecosystem Management* by Reed Noss

BACK ISSUES ORDER FORM

Please complete form and return with payment in enclosed envelope. Back issues are \$8/ea. for WE subscribers, \$10/ea. for nonmembers, postpaid in US. (■ denotes issue is sold out)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Spring	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Summer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fall	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Winter	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

_____ back issues (@ \$8 or \$10) \$ _____
 # _____ photocopied articles (\$3/each) \$ _____
TOTAL \$ _____

photocopied articles:

issue #	title

comprehensive Back Issues List (free)

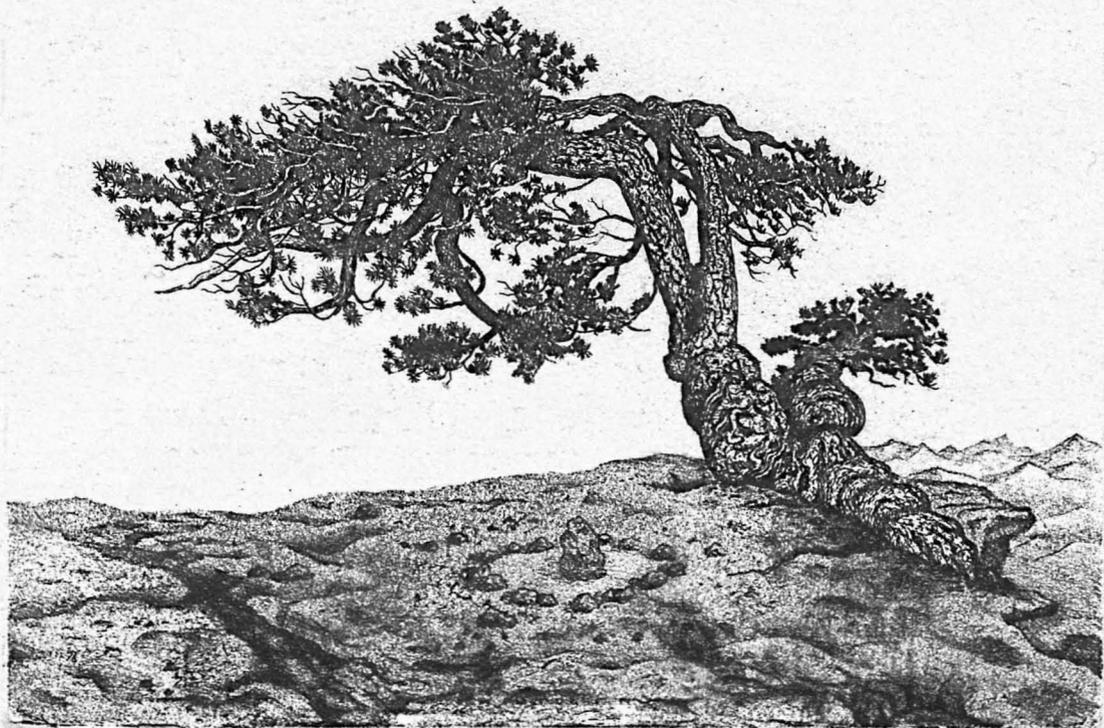
By pressing one's nose into the furrowed bark of the Jeffrey pine, any variety of fruity scents might be recalled: vanilla, lemons, pineapple, violets, or apples. The sweet smell of the bark and crushed twigs is one of the characteristics that delineates Jeffrey pine from the closely related ponderosa pine. *Pinus jeffreyi* can also be distinguished by its more reddish bark and larger, less-prickly cones. Both evergreens are draped with long blue-green needles in bundles of three.

Jeffrey pine grows in high, dry montane forests—mostly at elevations above ponderosa pine—from southwest Oregon to the Baja peninsula; the center of distribution for the species is the Sierra Nevada, especially the eastern slope. Because of its wide tolerance for climate and soil conditions, *Pinus jeffreyi* may occur on moist or dry sites, serpentine soils, and even rocky outcrops. The tree can grow to a height of 170 feet on deep, well-drained soils, but its form is stunted in exposed, poor environments.

Such is the case with the sculpted specimen—found at the top of Sentinel Dome in Yosemite Valley—depicted here. Made famous by Ansel Adams, who photographed his widely known image of the tree in 1940, this pine is now dead (possibly due to drought). Yet the wizened, woody trunk is still a place of pilgrimage, beckoning artists and other wayfarers. Illustrator Claus Sievert once spent a night gazing up through the sinewy branches of this gnarled elder, perhaps lulled to sleep by the faint scent of butterscotch bark. ☾

—JENNIFER ESSER

Jeffrey pine



Trees, particularly unique specimens like this Jeffrey pine, have been the major inspiration for California artist **Claus Sievert** in creating many a magnificent image. He hand-colors many of his prints, adding depth and warmth to the painstaking detail of the etching.

There is just one hope of repulsing
the tyrannical ambition of civilization
to conquer every niche on the whole
earth. That hope is the organization
of spirited people who will fight for
the freedom of the wilderness.

—ROBERT MARSHALL

Prairie dandelion, pen and ink by Gary Eldred; Wild Earth Volume 5, Number 2 cover art



Wild Earth

PO BOX 455
RICHMOND, VT 05477

