Wild EARTH

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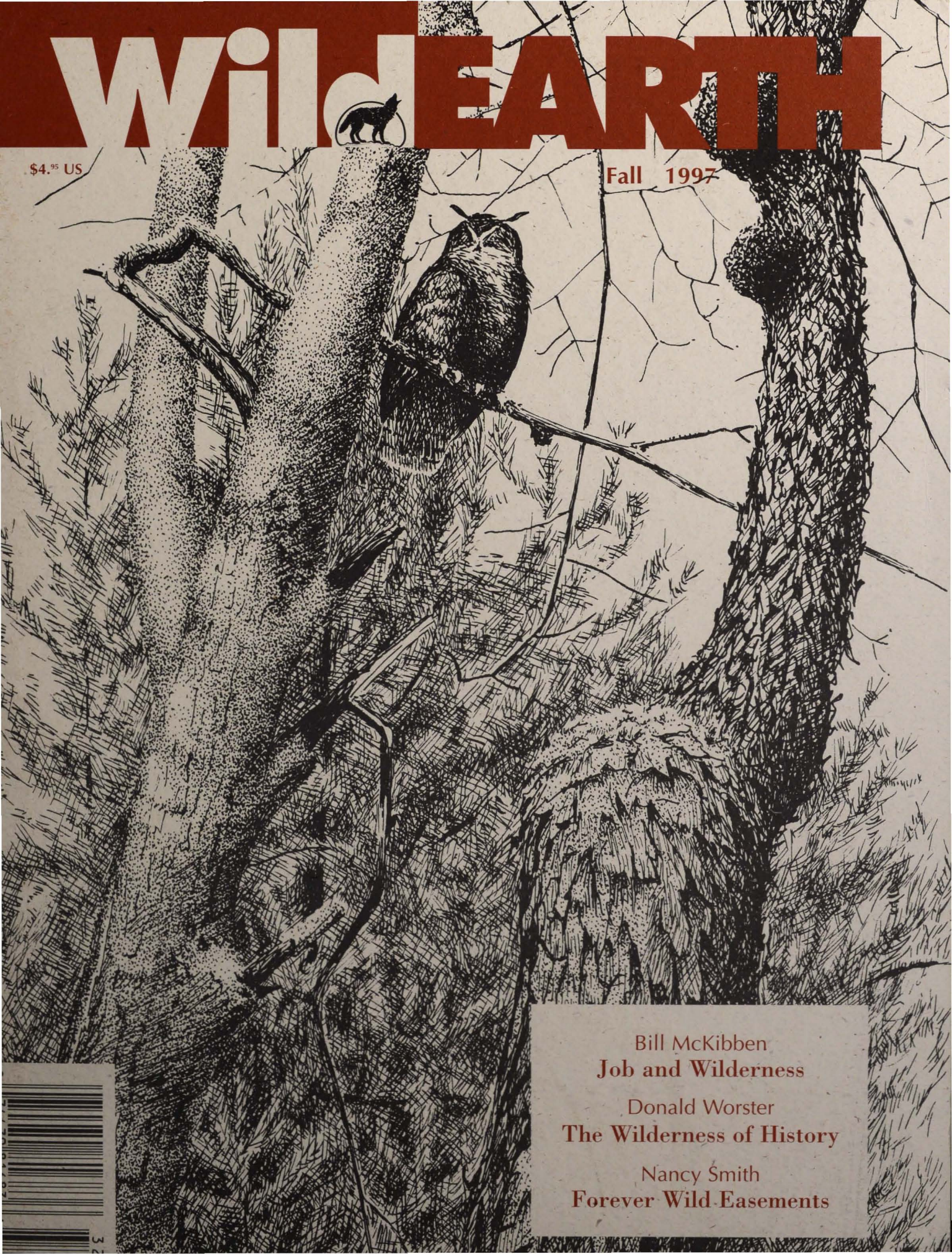
Fall 1997



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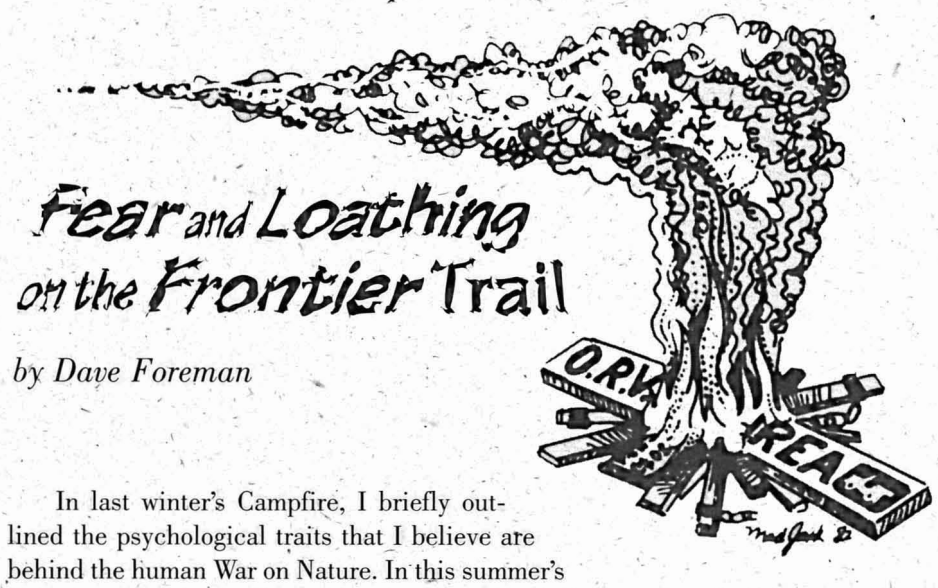

Fear and Loathing on the Frontier Trail

by Dave Foreman

In last winter's Campfire, I briefly outlined the psychological traits that I believe are behind the human War on Nature. In this summer's Campfire, I wrote more about two of those traits: Abiologism and Immaturity. Here, I'd like to look more at the fear and loathing anti-conservationists have for wilderness—indeed, for the natural world.

As I wrote last winter, the word *wilderness* comes from the Old English *Wildeor-ness*, defined by historian Roderick Nash as "place of wild beasts"[1] and by philosopher Jay Hansford Vest as "self-willed land."[2] Either way wilderness means land beyond human control. Land beyond human control is a slap in the face to the arrogance of humanism; it is also something to be feared. That fear, growing into loathing, has been with us at least since the beginning of European colonialism, and it remains with us today.

In his widely acclaimed 1967 book, *Wilderness and the American Mind*, Roderick Nash writes, "When William Bradford stepped off the *Mayflower* into a 'hideous and desolate wilderness' he started a tradition of repugnance."[3]

Bradford's tradition of repugnance, the general frontier fear of wilderness, was fleshed out by the Puritans, who came to see the howling wilderness as Satan's Kingdom on Earth. In 1662, Michael Wigglesworth sketched out in verse:

> *a waste and howling wilderness,*
> *Where none inhabited*
> *but hellish fiends, and brutish men*
> *That Devils worshipped*

Wigglesworth concluded that "the dark and dismal Western woods" were "the Devil's Den." Fear was becoming loathing.

Cotton Mather, the Puritan divine famous for fanning the Salem witch hysteria, crafted the irrational fears of superstitious settlers into a theology that saw North America as Satan's stronghold and the natives as "not merely heathens but active disciples of the Devil."[4] The Puritans also pulled North American wildlife into this Hell-spawned pantheon, both real—wolves and snakes—and imaginary—dragons and "fiery flying serpents."[5] This bogeyman view of the wildwood is a mark of immaturity—akin to a child's imagining of monsters under the bed. (Think of the Puritans as Gary Larson's fat little kid overhearing monsters under his bed.) Listen to Cotton Mather in 1707: "the *Evening Wolves*, the rabid and howling *Wolves of the Wilderness* [which] would make…Havock among you, *and not leave the Bones till the morning.*"[6] Never mind that there is no case of wolves

continued on p.2

About Wild Earth and The Wildlands Project

Wild Earth *(POB 455, Richmond, VT 05477; 802-434-4077) is a quarterly journal melding conservation biology and wildlands activism. Our efforts to strengthen the conservation movement involve the following:*

- We serve as the publishing wing of The Wildlands Project.
- We provide a forum for the many effective but little-known regional wilderness groups and coalitions in North America, and serve as a networking tool for wilderness activists.
- We make the teachings of conservation biology accessible to non-scientists, that activists may employ them in defense of biodiversity.
- We expose threats to habitat and wildlife.
- We facilitate discussion on ways to end and reverse the human population explosion.
- We defend wilderness both as concept and as place.

Wild Earth ***and The Wildlands Project*** *are closely allied but independent non-profit 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 human and natural communities.*

The Wildlands Project *(1955 W Grant Rd., Suite 148A, Tucson, AZ 85745; 520-884-0875) 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 drafting a blueprint for an interconnected, continental-scale system of protected wildlands linked by habitat corridors.*

WILD EARTH

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cover art: Red Maple, Horned Owl, Cherry Tree *by Bob Ellis*

continued from inside front cover

killing any New England settlers or, for that matter, no reliable reports of healthy, wild wolves killing anyone in North America, period. (Peter Matthiessen reports that in 1630, "the Massachusetts Bay Company established the first New World bounty system" on the wolf.) Overwrought fear of satanic wilderness beasts and fear of village witches both came from a fear of things beyond human control, and both were products of immature, childish minds. The Salem witch trials were as much about fear and loathing of wilderness as they were about witchcraft.

With this fearful view of the North American wilderness, the colonists launched into the conquest of the wild with all the fervor their religion could muster. Nash quotes Edward Johnson in 1654, saying that "the admirable Acts of Christ" had transformed Boston from "hideous Thickets" where "Wolfes and Beares nurst up their young" into "streets full of Girles and Boys sporting up and downe."[7]

Mather's theology justified—no, it demanded—the reduction of the new continent and the slaughter of its native humans and predatory animals. This theology inspired a religious crusade to conquer the wilderness, to wrest it out of the hands of Satan and deliver it into the fold of the godly. Puritan fear and loathing ultimately led to Manifest Destiny's juggernaut against the wilderness.

This fear of the wild and the religious mission to bring it under the hand of Man still runs strong in Forest Service engineers who believe it is their duty to open up the backcountry and bring human management to wild forests. It still runs strong in dam builders around the world who see free-flowing water as sinful. It still runs strong in the Western he-man who vows to shoot any wolf who trespasses on his private property.

We constantly see outbursts of fear and loathing for other species in conservation debates. In 1996, some residents of southern Utah opposed reintroduction of the California Condor, an Endangered species, to the Vermilion Cliffs in northern Arizona. "The condor is not a majestic bird but a common buzzard which lives on road kill," Janice and Larry Esplin of Orderville, Utah, sniffed during a public comment period on the plan. "If you think we or any tourist would be excited to see these birds gnawing away on a dead animal carcass along the road you are very mistaken."

And Robert Sparks of Rio Rancho, New Mexico, foamed at the mouth over efforts to protect the Endangered Shortnosed Sucker in the Lost River of Oregon, "The people who shut down irrigation water from Lost River to protect a useless, bony, greasy, no good sucker should be made to pay the farmers that lost their farms and income from this dumb act."[8] (Mr. Sparks, in his dudgeon, exaggerated a wee bit. No one lost their farm from efforts to protect the Shortnosed Sucker.)

But among the bullyboys of the wise use/militia movement, fear of the wild comes through in an even more hostile relationship to Nature. Letter-writing and testifying be damned. Men are made manly by taking on the wilderness Grendel (wolves, Golden-cheeked Warblers, or two-thousand-year-old redwoods) and killing it.

Montana State University English professor Greg Keeler, whose songs and poems are sharp little knives aimed at our arrogance, sings:

We're men among men and manly men, yes manly men are we
We're men among manly, men among manly
Manly men are we

We'll sail up north and cross the ice
And cross the barren snowfields
You gotta be tough and you gotta be a man
To club the baby harp seal
To club the baby harp seal [9]

There are many degrees of fear and loathing, of course, and various levels at which they are played out. It is often the most ignorant, immature, and insecure part of society that hates and fears most deeply and attacks the hated object most viciously. For example, while the white culture of the South in general feared and hated blacks, it was the poor white trash who were the lynchers. So it is with modern society's attitude toward Nature. We find the lynchers of wild things among the most ignorant, immature, and insecure parts of society—whether it is the Newfie sealer who skins a baby Harp Seal alive, the New Mexico farmers who deliberately dewatered the Rio Grande to try to cause the extinction of the Rio Grande Silvery Minnow, or the Florida crackers who burn and rape a woman fighting pollution.

Fear and loathing of wilderness and other species translate into the political agenda of the anti-conservation movement and their allies in Congress. There are always politicians who will play to the yahoos. One of the more cerebral members of Congress, Sonny Bono (Cher's once-upon-a-time bell-bottomed, beaded backup man), says we should give all Endangered species "a designated area and then blow it up."[10] But Alaska's Don Young, chair of the House Resources Committee, does not just pander to the wildwood-hating yahoos. He is one. The mighty big-game hunter said about the Endangered Fresno Kangaroo Rat, "It's a pest. It's a nothing. It has no value."[11] During one memorable hearing, he wagged a walrus penis bone at Fish & Wildlife Service Director Mollie Beatty. He thought he was showing off as a manly hunter of dangerous beasts, but he really was exposing himself as a frightened little boy, looking under his civilized bed for Mather's fiery flying serpents of the wilderness—whether they're kangaroo rats or well-hung walruses.

Now before some, who have a rosier view of human nature than I do, take me to the woodshed for being unkind to the anti-conservationists, let me acknowledge that we writers love to create perfect little cubbyholes in which to neatly stuff groups in American society. Like Nature, though, society is too complex to neatly sort. The map we draw is never the territory. It is, at best, a sketch that makes the greatest sense to its creator. I think that most of the anti-conservationists are people who, on varying levels, fear and loathe self-willed land. But some foes of Wilderness Areas or of the Endangered Species Act seem to care about Nature. These folks, whether lumberjacks out in the woods with six-foot-long chain saws, Forest Service engineers surveying new logging roads into a virgin forest, or avant-garde academics deconstructing Wilderness as merely a mental concept, oppose conservationists because they do not understand the biological consequences of what they do, or because they do not understand the conservation movement and are therefore criticizing a straw-philosophy and a straw-movement that do not exist in the real world.

If I've hurt any of their feelings, I apologize.

Wild Earth magazine, of course, brings another view—that of wonder and love for the wild biological world. Over its six-year life, dozens of the leading conservationists have shaped and made it the "thinking conservationist's magazine." More than anyone else, though, John Davis has shaped *Wild Earth*. Indeed, I do not overdo in saying that *Wild Earth* has been John Davis's magazine. Now he is leaving the editorship of *Wild Earth* to work with the Foundation for Deep Ecology, where he will continue to shape and define and guide the Nature protection movement. While *Wild Earth* will not be the same without John's hand at the tiller, I am confident it will flourish with Tom Butler and Erin O'Donnell as editor and managing editor, respectively. I do not say good-bye to John or welcome to Tom and Erin, because I will continue to work closely with them as I have over the past years. The community of lovers of wild things and sunsets transcends fleeting organizational affiliations.

—Dave Foreman
Apache Kid Wilderness

1 Nash, Roderick *Wilderness and the American Mind* (Yale University Press, New Haven, CT 1967) pg. 2. Now in its third edition, *Wilderness and the American Mind* is still the best analysis of American attitudes toward wilderness.
2 Vest, Jay Hansford C. "Will of the Land," *Environmental Review* (Winter 1985) pg. 321-329.
3 *Wilderness and the American Mind* p. 23-24.
4 Ibid. p 36
5 Ibid. p 29.
6 Ibid. p. 29.
7 Matthiessen, Peter *Wildlife in America* (Viking, NY, NY 1987) p. 57. *Wildlife in America* is the best overview of the destruction of wildlife in the United States.
8 *Wilderness and the American Mind* p. 37.
9 *Desert Skies* (Tucson, AZ Fall 1996).
10 Letters to the Editor, *Albuquerque Journal* December 4, 1996.
11 ©1988 Greg Keeler
12 Rauber, Paul *Sierra* January/February 1996, p. 31.
13 *The Denver Post* March 19, 1995, p. 1.

illustration by Gary Bentrup

Wild Earth Update

GOOD NEWS FROM THE OUTGOING EDITOR

By the time you read this, *Wild Earth* will have a new editor. I will have leaped 3000 miles west with a tremendous opportunity to do good work on behalf of wildlands and wildlife for the leading biocentric grant-making institution, the Foundation for Deep Ecology. Tom Butler, *Wild Earth*'s graphic designer since issue #3 and managing editor for the last two years (and my closest friend since we were 12), will have assumed the role of editor. I shall be FDE's biodiversity program officer.

Some of you have already heard my reasons for making this jump. They are positive and encouraging reasons, including these:

1) A fresh approach to editing *Wild Earth* will help us reach and inspire more people. Tom has the ideas and energy to lead *WE* to some loftier heights, while remaining true to our mission.

2) I shall be able to better serve wilderness and wildlife at FDE, where I'll be working closely with groups defending biodiversity all over North America. The Foundation—which is greatly strengthening its biodiversity program—will benefit from adding another wildlands veteran to its formidable team.

3) By entering the foundation world, I should be able to work effectively to encourage the venerable practice of wildlands philanthropy, and to help right the imbalance between financial support for the relatively flush mainstream environmental groups and the ever-struggling yet absolutely essential grassroots wilderness groups.

4) Assuming the remaining Wild Earthlings invite my opinions, I'll be able to review articles, offer editorial advice, write for the magazine, and promote it from a strong position. (Henceforth, any writings I attempt will be submitted to a kinder editor, who might, unlike his predecessor, occasionally accept some of them.)

5) Given that *WE* is the leading voice for wildlands protection and recovery in North America, and that FDE is the leading benefactor of these causes, a Wild Earthling helping oversee FDE's biodiversity giving promises continued—and growing—support for the many effective but under-funded wildland groups in this country.

I also hasten to assure you that *Wild Earth*'s mission will remain the same: helping to protect and restore wildlife and wildlands throughout North America, and to encourage similar wildlands efforts worldwide. *Wild Earth* magazine itself and our various special campaigns—in particular, the wildlife corridor in the eastern Adirondacks we've been working to protect—will carry on uninterrupted; indeed, with more fervor. I shall remain as involved with *Wild Earth* (in advisory and other capacities) as time permits, and as involved with the Adirondack work as my finances permit.

○

It is gratifying to be able to offer several pieces of tentative but great news in my last update. Most exciting is the news that the government of Chile has decided to support the effort of FDE founder Doug Tompkins and his wife Kris McDivitt to establish a quarter-million-hectare Pumalin Park astride the narrowest part of the country. Thanks to the hard work of Doug and Kris and many Chilean environmental groups, there is reason to hope that Chilean leaders will realize in time that a bright future for the gracile nation lies not in Trillium Corporation's proposed clearcutting operations, or dams on the Biobio River, or gas pipelines, or salmon farms... but rather in large protected wild areas open around the fringes to continued small-scale farming and new opportunities for environmentally-sensitive tourism. On paper at least, Chile could raise the proportion of its lands protected in parks or refuges to about 20%—still not enough, but roughly five times the international average—with the gazetting of Parque Pumalin. The newly protected areas will consist mostly of lands that Doug has purchased over the last six years, and which he is generously donating for the park. The terrain is rich and varied—with fjords, volcanoes, hot springs, thick Alerce forests, and snow capped peaks—and most of it remains truly wild and intact, original.

Conservationists worldwide should be urging their own governments, as well as the Chilean government, to press ahead with such large-scale collaborative wildland protection projects. Individuals worldwide of substantial financial resources should take inspiration from Doug's conservation buying success, and likewise purchase imperiled privately-owned wildlands for protection as ecological reserves. All who can afford it should at least tithe toward purchase and preservation of unprotected wildlands.

Which plea brings me to a second bit of good news. The wildlife & walking corridor in the eastern Adirondacks that *WE* has been supporting has moved another step toward completion. A large, mostly forested tract amid the proposed corridor has been purchased for protection. Next, conservationists will focus on a smaller, adjacent forest tract. Again, donations to *Wild Earth*'s Buy Back The Dacks fund will help enable Adirondack conservationists to protect a key habitat link for Black Bear, River Otter, Bobcat, Timber Rattlesnake, and other wild denizens. (Please send donations to BBTD, c/o *Wild Earth*, POB 455, Richmond, VT 05477.)

Yet another glad tiding is that Captain Paul Watson has been released from Dutch prison and the threat of extradition to Norwegian prison—where whaling industry proponents likely would have had him dispatched. His release leaves Paul free to redouble his courageous efforts to uphold international conservation laws, such as the whaling moratorium, on the high seas. To congratulate Paul and support Sea Shepherd Conservation Society, write Sea Shepherd, 3107A Washington Blvd., Marina Del Ray, CA 90292.

In closing, I wish to thank all the activists, scientists, writers, readers, and other friends who have helped *Wild Earth* become a clear, vigorous, and influential voice for wildlife and wilderness. I look forward to continuing to work with all of you, from a new position, on behalf of North (and South!) American wilderness protection and recovery; and I trust that all of us will strongly support the *WE* staff as they venture onto ever wilder paths in the coming years. ❙

—John Davis, July 1997, Hemlock Rock Wildlife Sanctuary, eastern Adirondacks

As we celebrate the change of seasons, we sometimes also lament their passing. So it is with the current transition at *Wild Earth*, as co-founder and editor John Davis leaves the peaceful, one-stoplight town of Richmond, Vermont for the wilds of sunny San Francisco, California. John's integrity, commitment, and skill have long inspired all those who know him, and thus we are happy to report that he will still be involved in helping guide the future direction of *Wild Earth* as a board member. Enjoy the exploration of the Bay Area flora and fauna, John. We will miss you.

As the business of gathering support for the *Wild Earth* vision continues, please note the announcement in this section that Tide-mark Press has generously dedicated the inside front cover and part of the proceeds of two of its 1998 nature calendars, "Wetlands" (with beautiful photography by *WE* supporter Paul Rezendes) and "New England Wildlife" to *Wild Earth*. They make excellent holiday gifts, and we encourage you to use the enclosed business reply envelope if you are interested in ordering.

We also wanted to take this opportunity to thank those readers who have chosen to switch their long-distance telephone company to Affinity. Affinity will save you money on your long-distance phone bill (they guarantee a 10% savings from your current charges) and help raise money for *Wild Earth* at the same time (they give us 5% of the cost of every long-distance call you make). To switch, call 1-800-670-0008 and give the operator *Wild Earth's* group number 511119-0000/100-000-780.

As some readers already know, the winter 1997/98 issue of *Wild Earth* will be primarily dedicated to the crisis of human overpopulation. Folks who wish to help underwrite this special coverage by making a contribution of $150 will be prominently listed as sponsors in the overpopulation issue. We hope we can count you among those who have chosen to support *Wild Earth*'s most ambitious effort yet to address the devastating impact that our burgeoning population and poor land-use management decisions are having on fragile ecosystems across the continent and globe.

We wish we did not need to make such blatant appeals for financial support. But we persist because we know you support *Wild Earth* as an inspirational voice championing the cause of biodiversity and wildlands protection. We humbly ask for your continued generosity. ❙

—Monique Miller

TWO 1998 NATURE CALENDARS TO FEATURE *WILD EARTH*

Thanks to *Wild Earth* friend Paul Rezendes, (author of the well-regarded *Tracking and the Art of Seeing: How to Read Animal Tracks and Sign* and the recently-released book *Wetlands: The Web of Life*), *Wild Earth* will be featured in two 1998 Nature calendars.

The "Wetlands" 1998 calendar by Paul Rezendes features breathtaking pictures of wetland areas across the United States with biological descriptions of each site.

"New England Wildlife" by Bill Silliker, Jr. contains memorable photos of Bobcat, Harbor Seal, Wood Duck, Black Bear, Atlantic Puffin, Bull Moose, and other natives of that bioregion.

Calendars cost $11.99 each (including s&h) and can be ordered directly from *Wild Earth*, POB 455, Richmond, VT 05477. Those wishing to pay by VISA or Mastercard are welcome to call us at 802-434-4077. Publisher Tide-mark Press has agreed to donate a royalty of 2% of the net sales of each calendar to *Wild Earth*, so we hope that you will consider giving these calendars as holiday gifts to your friends and family. Thank you for your support!

The Wildlands Project Update

by Steve Gatewood

In advancing the mission of The Wildlands Project, a primary role of TWP's staff and board is to work with local and regional cooperators who share the same ideals, goals, and approach. There are numerous opportunities to do this, and I would like to report on several.

Our meeting of representatives from the pilot regions and a few other cooperators was held in May. It was a very successful event and at our board meeting in June, several actions were taken to follow up the things learned there. Planning was initiated for the larger meeting of cooperators in late spring or early summer of 1998. Staff was directed to develop a "Memorandum of Cooperation" to articulate some of the expectations and responsibilities that we have of and for each other in this collaborative venture. And most significantly, the pilot region system was dropped in favor of a larger number of primary cooperators. The pilot model served us well, and we hope that this new approach will be as valuable during the next phase of our evolution.

In working with southeastern, southwestern, and Y2Y (Yellowstone to Yukon Conservation Initiative) wildlands cooperators, the need for a specific report that explores the status of biodiversity, resource protection, threats and opportunities, land use, and other issues in a region has been emphasized. This document helps demonstrate the need for a wildlands reserve design for a region or state. Variously called a *State of the Ecosystem* report, *Natural and Cultural Resource Atlas*, or *Our Natural Areas—What Have We Got to Lose?* report, they typically are prepared on a parallel track with the reserve design process. We can put you in touch with groups developing these reports or provide outlines and examples of some that are underway.

Traditionally we have referred to the components of reserve design as core areas, buffer zones, and corridors. While they will always remain the building blocks of the system, what we call them and how we categorize them will vary from region to region. In Y2Y, buffer zones are called "insulating transition areas." Many regions prefer the name "landscape linkages" to corridors because connectivity is necessary for more than just wildlife movement, such as a functional pathway for detritus and nutrients to move from interior wetlands to estuarine systems. Wildlife movement is just one type of connectivity.

In the Sky Islands region, the concept of "classes" of core areas is being advanced. Class I core reserves may be limited to designated Wilderness Areas in essentially undisturbed condition. Class II cores are potential roadless areas or candidate Wilderness Areas where some roads need to be removed or intensive (possibly mechanical) restoration of plant communities completed. Class III cores may be National Parks or private lands where infrastructure development or management practices preclude a higher class, but the existence of park designation or conservation easements protects basic ecological integrity and native biodiversity.

This classification concept may even be appropriate for the overall reserve design proposals themselves. As we move closer to having regional reserve design plans ready for peer review, it is obvious they offer differing levels of detail and are based on highly variable amounts of data. Whether presented with a conceptual framework proposal, such as might be developed for the Southeast states, or a specific detailed blueprint, such as may come out of the Klamath/Siskyiou project, we should be able to review each proposal based on where it is in the iterative process. In this regard, conceptual, initial, intermediate, and final reserve designs all need thorough documentation reports that clearly describe assumptions, limitations, data analysis methods, and other information that will be used by reviewers to establish an appropriate evaluation procedure.

An excellent new source of information on The Wildlands Project is our web page, located at http://www.wild-lands.org. Here you can find basic information on TWP and *Wild Earth*, along with links to many wildlands cooperators and other organizations. Take a look and let us know what you think.

I want to close with notice of an exciting event happening in association with Y2Y. On 2-5 October at Waterton Lakes National Park in Alberta, Canada, a large grassroots forum is taking place. It is significant for many reasons, but I want to highlight two. First, the title—"Connections." The stated purpose of the event is "Connecting...People to Nature, Fragmented Ecosystems, Local Conservation Efforts to the Larger Y2Y Vision, and Canadian and American Conservation Efforts." Second, the source of funding. The North American Fund for Environmental Cooperation of NAFTA provided the entire $66,000 CDN budget for this event. This shows how far Y2Y has come in focusing its vision and attracting resources. Enough said! ❙

Steve Gatewood is executive director of The Wildlands Project. As always, for more information contact TWP clearinghouse at 1955 West Grant Rd., Suite 148A, Tucson, AZ 85745; 520-884-0875; wildland@waonline.com; http://www.wild-lands.org.

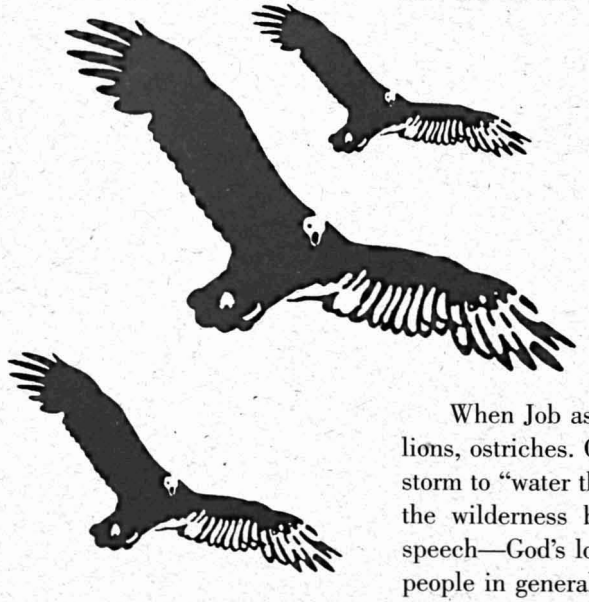
Job and Wilderness

by Bill McKibben

Editor's note: Bill wrote this essay on behalf of Wallingford Pond, one of the largest undeveloped water bodies in Vermont. Green Mountain National Forest managers were planning a large timber sale next to the pond. Green Mountain Forest Watch and conservationists such as Bill McKibben forced the Forest Service to reconsider. Readers interested in helping secure a wild future for Wallingford Pond should contact Green Mountain Forest Watch (48 Elliot St., Brattleboro, VT 05301; 802-257-4878).

The first attempt of which I'm aware to answer the question: why are wild places valuable? comes in the Hebrew Bible, in the book of Job. Job, of course, suffers wretchedly and unfairly; he loses his family and his lands, and is reduced to lying in a dungheap at the edge of town, covered with oozing sores. Knowing that he had behaved justly, and puzzled at his travails, Job demands an audience with God—demands that God justify Himself. His is the first modern voice in the Bible, really in all of literature. And the answer that God, speaking from a whirlwind, gives him is a curious one.

God says nothing about justice, about evenhandedness, about sin, about any of the current metaphysical categories that usually occupy our attention. Instead, He conducts a tour of the physical earth—its tides and storms and forests and waters, its magnificent animals. He speaks sarcastically some of the time, taunting Job with the man's insignificance: Where were you when I laid down the boundaries of the oceans? When I placed the very stars in the heavens? But he also speaks with great tenderness:



Turkey Vultures *by Larry Haataja*

Do you tell the antelope to calve
or ease her when she is in labor?
Do you count the months of her fullness
and know when her time has come?
She kneels; she tightens her womb;
she pants, she presses, gives birth.
Her little ones grow up;
they leave and never return.

When Job asks why he must suffer, God talks about antelopes, vultures, lions, ostriches. God points out that it is He who cuts a path for the thunderstorm to "water the desolate wasteland, the land where no man lives, to make the wilderness blossom." The clear and overpowering implication of his speech—God's longest sustained speech in the whole Bible—is that Job and people in general are but a part of creation, not its central feature. Even our notions of justice fit into something very much larger and less tame.

I recite this story simply to say that one value wilderness has *for us* (clearly subsidiary to the many values it has for other creatures) is that it allows us to remember how big we are. We live, at the end of the twentieth century, in a world designed to constantly make us seem large and important. The television natters at us constantly about the importance of our desires; we can scarcely drive down a road in this country without a sign to flatter and cajole us. The marks of our power are everywhere about us, especially in the ways that we annihilate space and time through our technology.

Yet the marks of our infatuation are everywhere about us too, in a culture of instant gratification that descends easily into selfishness and violence. Wilderness is one of the few places (along with soup kitchens and hospitals and other places that transcendent human love can be practiced) that remind us there are other definitions of what it means to be a man or a woman. Wilderness allows us to entertain the possibility that instead of being constantly at the center of the world, we might be more comfortable as one part among many. In this way, it helps preserve a diversity of human identities just as it helps preserve a diversity of other creatures.

Most of my work deals with the largest environmental problems, forces like global climate change. The data convince me we will be unable to deal with these challenges until we manage to shift, subtly but powerfully, our estimation of how big, how central, how important we should be; until we find other ways of living that suit us better, and that suit the planet better as well. Wilderness, the kind of wilderness that surrounds Vermont's Wallingford Pond, is a crucial schoolhouse for this transformation. A clearcut next to it would be the equivalent of a boombox blaring static in one corner of that schoolhouse. It would keep us from hearing the voice from the whirlwind, the voice from our heart, the voice that says we are a small part of something very wonderful and very right. ▮

Bill McKibben is the author of The End of Nature, The Age of Missing Information, Hope: Human and Wild, *and* The Comforting Whirlwind, *and writes frequently for* Wild Earth. *He lives with his wife and daughter in the central Adirondacks.*

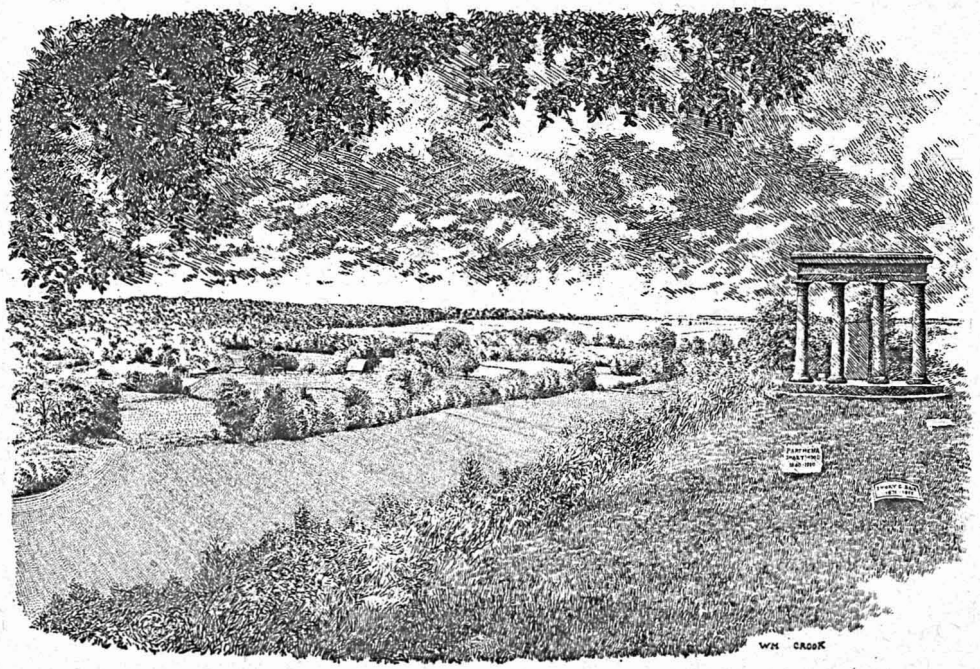
From Mt. Mansfield Looking East *by Libby Davidson*

The Wilderness *of History*

by Donald Worster

I live in a part of America without any wilderness—no large tracts of land existing within hundreds of miles that are free of producing a commodity. This country used to be wild prairie running north all the way to the Saskatchewan; now, we have less than one percent of the original tallgrass prairie left, and much of the shortgrass is gone too.

Last fall, it is true, we finally got a prairie national park. The struggle was long and tough against the Farm Bureau, the cattlemen's association, and former Senator Robert Dole (who balked at spending $10 million for park acquisition but not at $1 billion for National Guard aircraft to beat back our enemies). Even now, with the park a legislative reality, a Texas businessman has his cattle out there, on a lease, and the anti-park forces are insisting that the cattle stay there; they demand it be a monument to the beef industry rather than returning it to bison and pronghorn. Anyway, they say, that land was never wilderness.



from Sangamon River Series by William Crook, Jr.

Such assertions are getting support, unintended though it may be, from some of my colleagues in environmental history, many of whom I fear have not spent enough time among the good folks who claim to "work for a living"—members of the Farm Bureau, for example—and do not sufficiently appreciate how hard it is to get an ethic of environmental restraint and responsibility established among fierce private property and marketplace advocates. Otherwise, my colleagues would be a little more careful about the sensational headlines they encourage, like "Wilderness Is a Bankrupt Idea."

That is not the headline that William Cronon really wanted to see when he wrote his controversial essay, "The Trouble with Wilderness, or Getting Back to the Wrong Nature," published in the book *Uncommon Ground: Toward Reinventing Nature* (1995). What he meant to say, I think, was that sometimes wilderness defenders have hurt their cause by sophomoric rhetoric that alienates thoughtful people and lacks any social compassion. He may be right on that score. The wilderness movement needs more self-scrutiny, needs a larger commitment to social justice—and, above all, needs the patience to read its critics more carefully. On the other hand, Cronon and some of the other authors in *Uncommon Ground* should take a dose of their own medicine. They have at times inflamed the discourse, missed the more profound ethical core of the movement, and made a few weak, shallow arguments of their own—arguments that need critical scrutiny and exposure. Therefore, with hope for a more mutually respectful and probing debate than we have had so far, I examine some of those arguments. Here is my list of major errors being committed about the wilderness by some environmental historians.

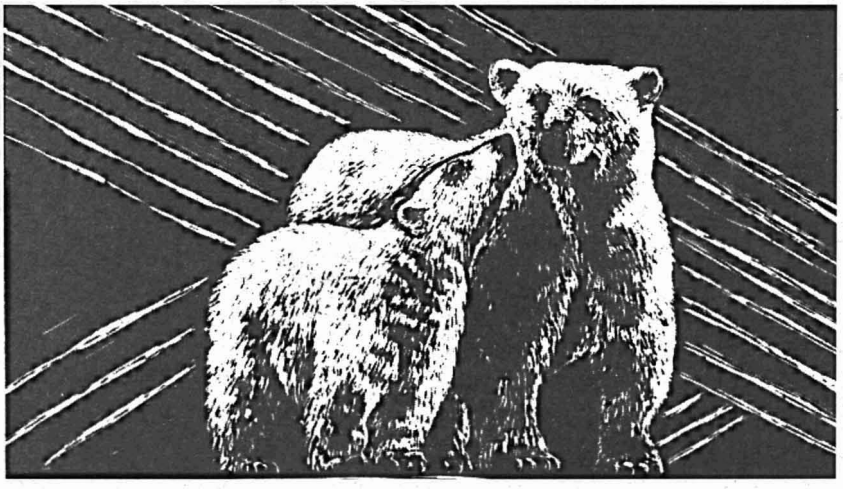


illustration by Lezle Williams

Error #1:

North America (we are told) was never a "wilderness"—not any part of it.

Some revisionist historians now argue that ignorant Europeans, animated by "virgin land" fantasies and racial prejudices, had it all wrong. The continent was not a wilderness; it was a landscape thoroughly domesticated and managed by the native peoples. It was Indians, not low rainfall and high evaporation rates, who created a vast sweep of grassland all the way from the Mississippi River to the Rocky Mountains, and they did so by constant burning. They herded the Bison like domesticates in a big pasture. They cultivated the wild plants and made a garden of the place. All over the continent, they completely civilized the wasteland long before the white man got here.

"Far from being an indefensible obsession, wilderness preservation has been one of our most noble achievements as a people."

I respect native American stewardship and would not take credit away from any of their considerable achievements, but such characterizations by historians are huge extrapolations from limited examples. Two million people spread over what is now Canada and the United States, a people armed with primitive stone tools, simply could not have truly "domesticated" the whole continent.[1] By comparison, 300 million Americans and Canadians today, armed with far more powerful technology, have not wholly domesticated the continent yet; in the US, by a strict standard of evaluation, 100 million acres of virtually pristine wilderness exists under protection while more is without protection, and in Canada areas with no roads, towns, mines, or mills still dominate most of the north.

We are further told by some historians that the Indians were pushed out of their domesticated homeland in order to *create* a wilderness for the white man. There certainly was a massive dispossession, often bloody

1 I am using the cautious but authoritative estimate of Douglas H. Ubelaker of the Smithsonian Institution, in his article "North American Indian Population Size, A.D. 1500 to 1985," American Journal of Physical Anthropology, 77 (1988): 291. He calculates an average density of 11 people per one hundred square kilometers, ranging from a low of 2 or 3 in the Arctic and Subarctic to a high of 75 in California. Much larger and more controversial are the estimates of H. F. Dobyns, Their Numbers Became Thinned (Knoxville: University of Tennessee Press, 1983).

and ruthless. But if our national parks, wilderness areas, and wildlife refuges were once claimed by native Americans, shifting in tribal identity over time, so once were our cities, farms, universities, indeed the very house lots on which we dwell. What are we now to do about that fact? Should we give all national park and wilderness areas back to the native Americans? Or open them for subsistence hunting (by people likely to be armed with modern rifles and snowmobiles) or for agriculture? If we do that, then we are logically bound to permit the same repossession of our campuses, suburbs, and corn fields. I have not heard anyone, however, seriously propose that Los Angeles or Stanford University be returned to their "rightful owners." Why not? Why are parks and wilderness areas viewed as suspect forms of expropriation while the vast portion of the country under modern American economic use is not really questioned? Obviously, Indian land claims is not the real issue here; debunking preservationists is.

A more sensible policy would be to find out whether any of the 100 million acres of currently protected wilderness are in violation of valid treaty rights and, if they are, to settle in court or get the lands returned to their proper owners, as we should be doing with all contested lands. But I haven't seen any historian actually undertake that research project into land claims within the wilderness system. Nor do I see any definite, clear proposal coming from scholars about where and how to alter the size, shape, or rules governing our wilderness areas. Meanwhile, let it be noted that any American citizen, Indian or non-Indian, has free and equal access to the nation's wilderness, which is more than can be said about access to universities or suburbia.

Error #2:

The wilderness is nothing real but is only a cultural construct dreamed up by rich white romantics.

I trace some of that oversimplified thinking to Roderick Nash's book, *Wilderness and the American Mind*, which (for all its many virtues) set up a flawed narrative that environmental historians have cribbed from ever since. The now standard story starts with an ancient, intense Judeo-Christian hostility toward the wild, an anti-wilderness culture of spectacular proportions and longevity. That hostility supposedly reached a crescendo in Puritan New England, where every farmer stepped out of his saltbox scowling at the forest. Then the story moves on to a dramatic reversal of attitudes as affluent, white, educated, secular, urban Americans became sensitive romantic lovers of Nature. Part of the scarcely hidden moral in that story is that ordinary people, without education or income, have been in serious cultural lag and cannot be depended on for any significant environmental change. But a more complicated reading of the past would suggest that the love of wilderness was not simply the "discovery" or "invention" of a few rich men with Harvard or Yale degrees coming at the end of a long dark age.

If you assume that standard account, then it becomes very easy to turn the entire story into a polemic against elitist snobs who seek the sanctuary of wilderness at the expense of peasants, workers, Indians, or the poor of the world. Of course there were and are people like that. If the story didn't have a kernel of truth in it, the revisionists would not get any kind of hearing at all. But it is a small kernel, not the whole complicated truth of what wilderness has meant to people through the ages or of what draws them to protect wilderness today.

Contrary to the established story, the love of Nature (i.e., wilderness) was not merely a "cultural construct" of the Romantic period in Europe. It has much older cultural roots, and it may even have roots in the very structure of human feelings and consciousness going far back into the evolutionary past, transcending any cultural patterns. Historians of late have been far too quick to dismiss as "essentialist" any deep residuum of humanity and to reduce all thought and feeling to shifting tides of "culture." Nineteenth-century Romanticism, with its glorification of the sublime, was indeed a cultural expression, but it also may be understood as an effort to recover and express those deeper feelings which in all sorts of cultures have linked the beauty of the natural world to a sense of wholeness and spirituality. The enthusiasm for wilderness in America was undeniably a cultural fashion, but it also drew on that other-than-cultural hunger for the natural world that persists across time and space. Finally, it drew in the United States on a frontier-nourished spirit of liberty, which itself reflected both cultural and biological needs. Most importantly, that enthusiasm was felt by poor folks as well as rich.

Historians have tended to miss the broad social appeal of the wilderness movement, particularly in the twentieth century. They like to feature that brash, big-game hunting, monied New Yorker, Teddy Roosevelt, especially if they want to do a little lampooning, and ignore all the men and women from more humble origins, before and after him, who played an important role in saving the wilderness. John Muir and Ed Abbey, to be sure, get plenty of attention, though historians have seldom appreciated the fact of their rural, non-elite roots.

Nor do they give much emphasis to the millions of wilderness seekers who do not like to kill big animals or thump their chests or order from Eddie Bauer catalogs. And then, after reading the poorer class of people out of the wilderness "construct," the historians turn around and proclaim: "See, wilderness has been an upper-class fetish all along." Finally, with no little condescension and inconsistency, they set out to correct the "naive," popular, grassroots "misunderstanding" of these matters.

Error #3:

The preservation of wilderness has been a distraction from addressing other, more important environmental problems.

Precisely what are those problems? The protection of less exalted beauty close to home, we are told, not only in the remote, western public lands. The health and well-being of urban people, particularly impoverished minority people, in the neighborhoods where they live. The wise, efficient use of natural resources that furnish our means of living. I grant that all these are important problems for environmentalists to face. They are in many ways linked, and they should not be severed and rigidly compartmentalized one from one another. Actually, I don't know any wilderness advocates who are so single-minded, who deny the existence or importance or interconnectedness of those other environmental problems. There may be some, but I have never met them. But I have met, and will defend, the person, who out of deep moral conviction, believes that the preservation of the world's last wilderness is a higher obligation than cleaning up the Hudson River or preventing soil erosion. Someone who gives his or her life to wilderness issues instead of those other problems is not necessarily misguided or immoral or needing to be "reeducated."

But the main historical issue here is whether the wilderness movement has in fact significantly diminished American interest in other environmental problems. The claim that it has is repeatedly made; outside the carefully hoarded Wilderness Areas, it is charged, the country is a mess and their wilderness "obsession" encourages many environmentalists to do nothing about it. It is sometimes argued that preserving wilderness gave Americans a green light for exploiting other less pristine environments with no compunction. But where is the evidence that this has been so on any important scale? The major reason we abuse land, as Aldo Leopold told us awhile back, is "because we regard it as a commodity belonging to us" rather than "a community to which we belong." Protecting wilderness by itself may not change that situation, but neither is it responsible for it.

Since the Wilderness Act was passed in 1964, the United States has seen an extraordinary increase in the number of people who call themselves environmentalists, and the issues they are working on range from preserving remnant wetlands threatened by shopping malls to stopping toxic dumping on Indian reservations to getting emission controls on smokestacks. The movement has become more and more diverse, inclusive, and pervasive. Far from being a distraction, the example of wilderness activism may even have encouraged the explosion of that diversification of environmental concern occurring across the whole country!

I live in a place where the immediate, compelling, and most practical need is to create an agriculture that is less destructive to soil, water, and biota, along with preventing real-estate developers from turning our towns into cultural and biological deserts. I serve on the board of directors of the Land Institute, which is trying to meet that important environmental need. Yet I can still cherish the thought of large, unmanipulated wilderness on this continent where the processes of evolution can go on more or less as they have for millennia. Does my commitment to saving wilderness in Alaska "alienate" me from the place where I live? Some historians say it must, but people are more complicated than that. Like millions of other Americans, I have a whole spectrum of concerns, near and far. I can support the Library of Congress without losing interest in my local public library.

We do have a legacy of bad land-use all over this country, which has left us with degraded forests, grasslands, and cities, and that legacy requires profound reform along a broad front. Developing an ethic of care and restraint wherever we live and wherever we take our resources—on that 95% of the nation's land area not protected as wilderness—is a clear, important need. How do we address it and move toward intelligent, just, and wise use of the land beyond the wilderness? Our recent history does not suggest that we need to get rid of the wilderness "fetish" in order to do so, or that we need to trash the leading, popular arguments for preserving wilderness, which on the whole have worked pretty well against implacable opposition.

The wilderness has been a symbol of freedom for many people, and it is a primordial as well as cultural sense of freedom that they have sought. Freedom, it must be granted, can become another word for irresponsibility. Yet almost always the preservation of wilderness

freedom in the United States has been interwoven with a counterbalancing principle of moral restraint. In fact, this linkage of freedom and restraint may be the most important feature of the wilderness movement. Those 100 million acres exist not only as a place where evolution can continue on its own terms, where we humans can take refuge from our technological creations, but also as a place where we can learn the virtue of restraint: this far we drive, plow, mine, cut, and no farther.

Old-time religions enforced moral restraint on their followers by the practice of tithing, a practice that has almost completely disappeared under the impact of the market revolution. But the practice of tithing is too good an idea to lose. Without saying so, we have created in the form of wilderness a new, more secular form of the ancient religious tithe. We have set aside a small portion of the country as the part we return to the earth that supports us, the earth that was here before any of us. We are not yet up to a full tithe, but we are still working on it.

A place of restraint as well as a place of freedom for all living things, the wilderness has promoted, I believe, a broader ethic of environmental responsibility all across this nation. Far from being an indefensible obsession, wilderness preservation has been one of our most noble achievements as a people. With no broad claims to American exceptionalism, I will say that here is a model of virtuous action for other societies to study and emulate. This is not to say that historians have been wrong to criticize weaknesses in the wilderness movement. They have only been wrong when they have denigrated the movement as a whole, carelessly encouraged its enemies, and made bad historical arguments. The real danger we face as a nation, we should remember, is not loving wilderness too much but loving our pocketbooks more. ❙

Donald Worster is the Hall Distinguished Professor of American History at the University of Kansas (Lawrence, KS 66045) and author of Rivers of Empire, Nature's Economy, *and other works of environmental scholarship.*

Wondervu Summit *by Evan Cantor*

The Gift of Silence

by Anne LaBastille

Silence is the invisible, intangible, exquisitely fragile natural resource that no one thinks about. No one makes an effort to save it, and no one donates to preserve it. There is no Citizens Group to Save Silence, no Washington lobby to fight for silence, no Coalition to Reduce Loud Manmade Sounds in the Environment.

Silence is an integral part of every climbing, camping or canoeing trip. It is the heart and soul of the wilderness experience. It is the perfect prescription for a good night's sleep, and the oldest Rx for stress. It may be a partial cure for workers subjected to high noise levels in factories, who are prone to increased heart disease and nervous disorders.

Once silence stretched over New York's Adirondack mountains from shore to shore, peak to peak, like a velvet mantle. It was broken by wind soughing through great White Pines, by August thunderstorms and February blizzards. It was disrupted by trout splashing, deer snorting, owls hooting, and coyotes yipping. These sounds melded and molded with silence for 10,000 years and more.

With the invention of gunpowder, steam and electric engines, and gasoline motors, the erosion of silence began. This erosion has accelerated dramatically in the last twenty years.

On a typical Adirondack park summer day, an inhabitant may hear the following: Around 7:00 a.m., sounds of vehicular traffic increase as workers and tourists take to the roads. Then, outboard and inboard motor boats start cruising the lakes. From 9:00 to 10:00, mail trucks and mail boats cover their routes. Sea-planes fly over, carrying fishermen or sightseers. Or an F-16 makes a sonic boom while A-10s roar above the treetops on military training flights. Camp owners engaged in repairs work with electric skill saws and drills. At intervals, commercial jetliners pass overhead. As the day warms, water-skiers and jet-skiers start streaking up and down the lakes. (In winter, it's snowmobilers.) In the afternoon, chainsaws rev up as people cut firewood. By twilight, most man-made noises diminish. A few late cars and boats go by. Finally, night's noises can preside—except for those infernal bug zappers!

Who among us today can say that they have spent a day totally free of sounds generated by motors, engines, and guns? Only the deaf, those in solitary confinement, and dedicated wilderness campers can claim this. The disappearance of silence in the Adirondacks, in America, and in every other First World country has been gradual, invasive, and continual. It will get worse as our materialistic society produces more and more mechanized gadgets.

The Adirondack Park can still offer substantial time blocks of silence. With it come those blessed feelings of solitude, contemplation, and creativity. Silence in the natural world has inspired humans as diverse as the Biblical prophets, famous poets and musicians, and great conservationists such as John Muir, Teddy Roosevelt, Sigurd Olson, and Aldo Leopold.

We need silence. We need it to be reminded of the vastness of the stars and space that surround our tiny planet. Of the awesome beauty of wilderness. Of the implacability of Nature's laws. In short, silence helps put us in our place. It makes humans humble and reverent.

I consider it a gift to spend a summer's night with only the sound of a loon's tremolo on a silent lake. And to walk through the flaming leaves in late September. And to lie for a moment at midnight on an icebound lake, wondering at the aurora borealis, and hear nothing but the trees cracking in the cold.

I fear the gift of silence will become precious and rare as we enter the 21st century. ❙

Anne LaBastille is a wilderness guide, biologist, and author living in the Adirondacks. Her books include Mama Poc, Woodswoman, Beyond Black Bear Lake, *and a just published sequel to the latter two, entitled* Woodswoman III *(available from West of the Wind Publications, Westport, NY 12993). This essay is adapted from* The Wilderness World of Anne LaBastille.

untitled Adirondack landscape, acrylic painting by Bill Amadon

Letters

OVERPOPULATION ROOTS

While I share overpopulation concerns, I find David Wheeler's "Addressing Population and Immigration Bioregionally" to be unpersuasive (*Wild Earth* spring 1997).

Wheeler advocates "The key criterion in making decisions about accepting outside immigration should be the concept of 'carrying capacity.'" Wheeler goes on to say "If an ecosystem is already past its carrying capacity for human habitation, then it should not be called upon to receive additional immigration from other areas. With the *possible* exception of northern tundras, every ecosystem in North America is loaded past its carrying capacity for human beings."

But if every ecosystem in North America (and that includes Mexico, the largest US source of immigrants) is populated past its carrying capacity for humans, then what does it matter how that population shifts around? They will all be overpopulated regardless.

A better approach to the population issue is to address the social and political roots of the problems that drive people to immigrate and to have large families. This means that ecologists have to broaden our concerns to take on hard issues like capitalism, patriarchy, and imperialism. That is the only humane, effective, politically and ecologically defensible solution I know of.

—Bob Brister, 1506 Parker Lane, Austin, TX 78741

GOOD NEWS

At first I thought it was just exhilaration generated by finally organizing my possessions in the home I've inhabited for nine frenetic years. As I sorted the myriad of environmental posters, bumper stickers, buttons, and T-shirts, two facts became obvious. First, an all-purpose T-shirt reading "Save Everything" would have conserved money and closet space. Second, it's astonishing just how much we activists have "saved."

When one has spent decades in battle, surrounded by acrid smoke and lethal flying objects, unable to peer more than a few yards ahead, it's darn difficult to recognize gains. We activists are, mostly, volunteers, forced to become experts on every topic from forestry to toxic waste. At our own expense. In our "spare" time. Look at what we've done.

Twenty-five years ago a few dedicated, desperate folks and a crusty fish boat captain sailed to Alaska to stop nuclear testing. Today, Greenpeace is world renowned, and its more radical offshoot, Sea Shepherd Conservation Society, has largely shut down the Norwegian whaling industry. From international to local, the gains are significant. The Stein, Meares Island, South Moresby, the Tatshenshini are protected.

Twenty-six years ago our all-volunteer recycling co-op was located in a decommissioned munitions bunker. Today, the city maintains neighborhood recycling depots, pre-sorting at all landfills, chipping of yard waste. Recycling isn't a fringe activity now; it's mainstream.

Locally here in southern British Columbia, activists beat back both a toxic waste and bio-medical waste incinerator. Regional environmental organizations halted a coal-fired generating plant. BC's new Forest Practices Code is the result of years of public lobbying for ecological forestry.

Not that things are perfect. Human overpopulation, resource extraction, and greed are decimating ecosystems. Adding impetus are the world's wealthiest corporations, politicians either gullible or complicit, religions teaching that the Earth exists for humans only, and a public deliberately dis-informed, when not apathetic. Our grasping, opposable human thumbs may well put an end to evolution.

But things didn't seem good twenty-five years ago either. Ask any activist. We persevered, although, as George Draffan says, "If we'd known it would take this long, we'd have paced ourselves better!" The results? Surveys show the public trusts us. Not politicians. Not corporate presidents. Us. Against appalling odds, we've altered attitudes and initiated major social change.

Now, having accustomed people to "wilderness" and "environment," we're raising the ante to "ecology," "carrying capacity," "evolution," "limits to growth." Of course we meet incensed, adamant opposition. We're going counter to established economic and religious beliefs; against ingrained, perhaps even hard-wired behavior patterns of millennia.

Nobody pretends it'll be easy; but think what we've already done! "Joy, Ship-mates, Joy!"

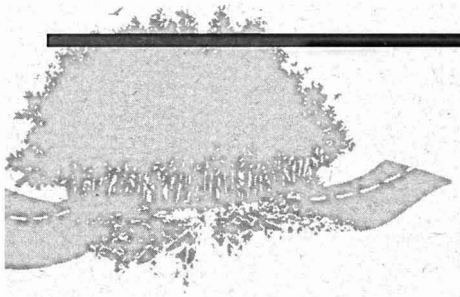
—Trudy Frisk, 6009 Dallas Dr., Kamloops, BC, Canada V2C 529

Erratum

Correction of bibliographical note at the end of H.H. Iltis's article "Whose is the fight for Nature?" (*Wild Earth* summer 1997). The second to last sentence on page 87, central column, should read:

"This discovery initiated, in 1987, the establishment by the Mexican government of the world's first reserve specifically set up to protect *in situ* the germ plasm of a relative or ancestor of an agricultural crop (i.e., of maize), namely the *Reserva Biosfera Sierra de Manantlán* in Western Mexico, a treasure house of over 2800 species of vascular plants, many of which—like the teosinte—are rare and endemic."

Our apologies to Hugh for tripping ourselves with a sesquipedalian sentence.



Road-RIPort #7

by Bethanie Walder

Since the invention of the wheel, humans have developed ever more efficient ways to travel from one place to another, over any type of terrain. Developing new ways to build roads—across, under, or through mountains, wetlands, and water—is considered *progress*. Reducing travel time from one point to another has always been considered *progress*. Americans have progressed so far that we have constructed over 377,000 miles of road through our National Forests; we propose new legislation to ensure our right to build roads across National Parks and other public lands; and we continue to battle for our "right" to motorized access to every square inch of public lands.

But in spring 1997, the American public began to regress. Throughout the country people began to realize that wheels, motorized vehicles, and roads destroy the very things they provide us access to, wild areas. Granted, this was not a new revelation: Aldo Leopold pushed for the strictest Wilderness definition possible to protect wild places from the intrusion of roads and motors, and to fight the proliferation of roads throughout our public lands. Yet we continue replaying our past mistakes. This year, roads have taken center stage in the public land battles being fought in Congress.

In the main ring, we saw the country rally against the "pave the parks" rider that would have allowed the construction of roads over public lands not reserved for other uses. And we won the first round, though it wasn't a knockout. As the dust settled from that challenge, it rose over the question of Congressional funding for new timber road construction in National Forests. Both fiscal responsibility and corporate welfare are at issue here, and as this article was being written, Congress was thick in the fight in ring two. Meanwhile, an insidious roar is rising through our wildlands, and it belongs not to a lion, but to motorized recreational vehicles such as 4-wheel drives and snowmobiles. Ring three finds us fighting reauthorization of the Symms Act, formally called the National Recreational Trails Funds Act, and originally authorized as part two of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. Symms provides a separate funding mechanism for motorized and non-motorized trails on public lands.

To keep from either roading, logging or driving our public land to death, Wildlands CPR is challenging these three Congressional threats. As the pave the parks issue resurfaces this summer and fall, we will continue working with groups such as the Southern Utah Wilderness Alliance to get good legislation passed (see Road-RIPort #6). The Department of Interior is developing legislation that would help clarify the validity of RS 2477 claims, hopefully helping to weed out invalid claims. On the other hand, either the Utah or Alaska delegation is likely to introduce free-standing legislation on RS 2477 to make it easier to get roads open through these claims.

We worked with several groups including Friends of the Earth, Western Ancient Forest Campaign, and others to support the amendment offered by John Porter and Joe Kennedy to stop funding new timber road construction on our National Forests. This amendment was necessary as the proposed budget continued to provide millions of dollars for road construction.

The Porter/Kennedy amendment passed the House by a vote of 246-179. Moments later, Representative Norm Dicks (D-WA) offered a compromise amendment that restored $25 million in purchaser road credits and $37 million in direct appropriations. So after all was said and done, Congress continued to fund road-building as usual. The watered-down version of the amendment was scheduled to be debated in the Senate as this was written. Even if the Porter/Kennedy amendment has passed in the House and the Senate, the impact would be somewhat muted by the ability of the Forest Service to continue to allow temporary road construction and to administer other road construction projects under slush funds, such as the salvage fund.

And finally we are working with a loose coalition of groups around the country including Southern Rockies Ecosystem Project, Montana Wilderness Alliance, The Wildlands Project, and Predator Project to fight Symms reauthorization under ISTEA. Reauthorization is expected this year and motorized users are pushing hard for inclusion of the Symms Act again. Symms was initially authorized as Part B of ISTEA and was written to provide funding for motorized recreation trails and trail maintenance, especially snowmobiles, though non-motorized trails also receive some funding. The non-motorized trail funding has enable motorized users to pull in hiking and biking groups to push for reauthorization, even though

approximately 70% of Symms funding goes to motorized and multiple-use trails. If Symms slides through Congress, we can expect an onslaught of new motorized trails to be developed on our public lands, regardless of their impacts.*

Roads are an increasingly contested issue within the realm of public policy. As we work to protect and restore our public lands, we must consider the impacts of access. For every mile of access we create for people, we remove exponentially more access for wildlife. Wildlands CPR aims to help the American public regress in its attitude toward roads and access, for the true progress of wildland protection and restoration.

To find out more information about any of these legislative issues, or to help fight roads and motorized development on a forest near you, please contact Wildlands CPR at POB 7516, Missoula, MT 59807; 406-543-9551;WildlandsCPR@wildrockies.org; http://www.wildrockies.org/WildCPR. ▮

Bethanie Walder is the director of Wildlands Center for Preventing Roads.

*When discussing Symms, however, it is imperative to consider the impact of all forms of recreation on wildland ecosystems. Though impacts vary from one type of recreation to another, all recreation causes problems. Motorized users are quick to point this out as we challenge their access into public wildlands. As users of wild lands, we must look at our impacts and decide what type of management, however restrictive, is necessary to protect these places and the species they support. Loving the land to death is little better than logging it to death.

Deer Creek Warm Springs:
Autumn Equinox

From the ring of river
rocks—black gleam and
pocked russet matte—
through feathered sweep

of mineral steam
that eddies past this
fern-fringed arch
of alcove, I peer between

the yellowing curtains
of vine maple, across
the current to where
the summer-worn sun

crawls free from the huddle
of spindly dogwood, alder,
and Mackenzie willow,
inching up a rare furrow

in the palisade of cedar
and ancient Douglas fir.
This is the most sun
that I will see until

the adolescent leaves of March
shag this thrumming gorge,
and the knowledge of slipping,
day by day, beneath

another year's shadow
kneels like a wide-eyed penitent
in the deep eaves
of my ribbing.

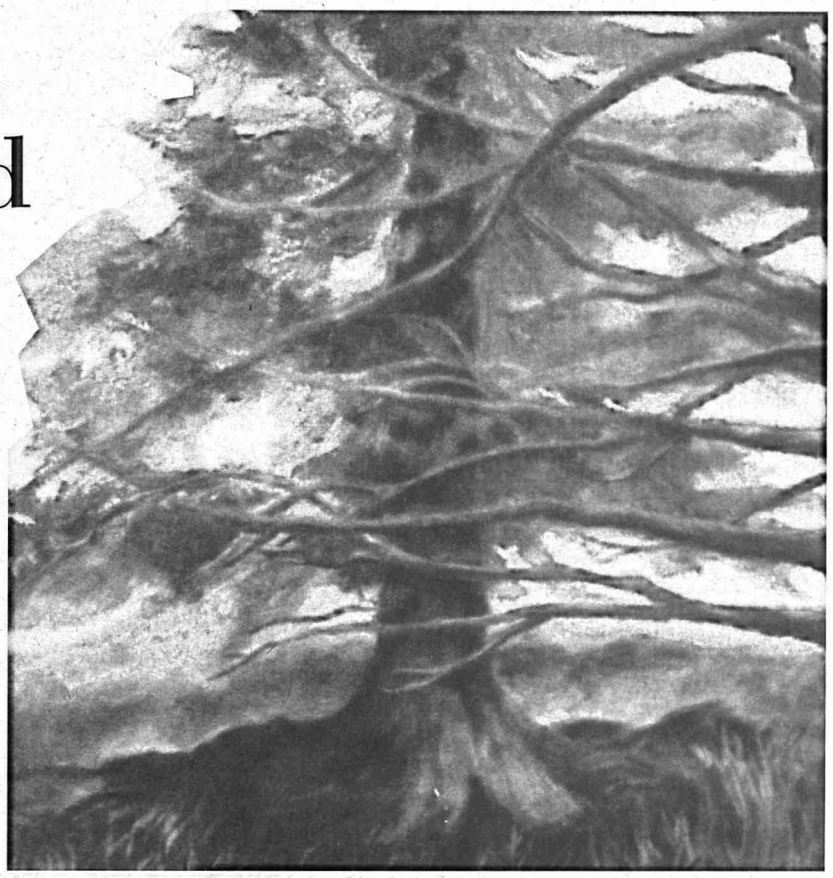
Time to turn, time to turn
in, I sing, while beyond
this smoking ring the jade
river cracks, crumbling

to a blizzard of sudden riffles,
and then it weaves its white
and thrashing strands
back to morning green.

—Laird Christensen

More Threatened Eastern Old Growth

by Mary Byrd Davis



Part 2

Northeastern USA

In Maryland biologists have recently discovered significant, unprotected old-growth stands on the southeastern slope of Big Savage Mountain in Savage River State Forest. The initial find was approximately 80 acres of a Chestnut Oak association. The upper portion appears to be intact; a small area on the lower slope was selectively cut in 1989. Nearby is an old-growth site of some 150 acres of varied oaks. The southeastern slope lies adjacent to two protected areas, the High Rock and Savage Mountain Wildlands. Mark Diehl of the Sierra Club's East Slope Campaign estimates that the three areas total approximately 2000 acres and represent Maryland's largest unfragmented forest containing old-growth sites. The Club is working to obtain state Wildlands status for the southeastern slope.[1]

Midwest

In Michigan's Upper Peninsula several of the privately owned sites listed in *Old Growth in the East* have already been cut. Three of the remaining sites in Marquette County are currently threatened with logging: Clark Creek, which has been traded to a private individual, Stag Lake-Pinnacle Falls, and Big Garlic River. Conservation organizations are interested in buying acreage at Stag Lake-Pinnacle Falls to protect it.

Logging around old-growth sites on public land in the Upper Peninsula is a continuing problem. Ottawa National Forest's Trap Hills area, which adjoins Porcupine Mountain Wilderness State Park and its 30,000 acres of unlogged forest, is now the site of a proposed 4000-5000-acre timber sale. The Forest Service wants to thin the hardwoods. The Trap Hills are rich in rare species and include remnant virgin stands of yet undetermined acreage.[2]

illustration by Jean Cannon

In Wisconsin the Chequamegon and Nicolet National Forests and the Northern Highlands State Forest are revising their management plans. The forests' managers have conducted inventories over the past five years during which numerous high quality areas have been identified, many of them old growth or, more often, "near old growth" with the potential to become recovered old growth. Identified areas in the National Forests received temporary deferrals from logging. The new management plans will determine whether the deferrals become permanent. Forest Service staff do not agree as to how many of the identified areas should be set aside. The situation in the state forest is similar.[3]

The White Pine as a component of natural forests is disappearing in the Upper Midwest, in part due to the logging of old growth. The White Pine Society has produced an excellent video on the tree's plight there and on steps conservationists can take to preserve and restore it.[4]

Southeast

At least two prime old-growth sites on the Clinch Ranger District of the Jefferson National Forest in southwestern Virginia are threatened by logging in the near future: Pick Breeches/Flannery Ridges, and Pickem Mountain. The former support 900 acres of old growth that would have been cut into by a timber sale proposed in 1993, before the old growth had been inventoried. The FS is now planning to develop a new proposal for the area. Logging will doubtless be scaled back due to nearness of an Indiana Bat hibernaculum, the presence of Cerulean Warblers, and the old growth; but logging on any scale could be disastrous.

In North Carolina the FS is in the process of revising its management plans for the Croatan and Uwharrie NFs. Because the Croatan provides habitat for numerous Red-cockaded Woodpeckers, the FS may follow guidelines that were written to afford minimal protection to the woodpeckers but that will not necessarily protect the rest of the ecosystem. The Natural Heritage Program is trying to negotiate Special Interest status for the few patches of old-growth Longleaf Pine in the forest and for a couple of intact, medium-size pocosins still without the protection granted the more extensive pocosins already in Wilderness Areas.[5]

Revision of management plans for the Nantahala and Pisgah National Forests in North Carolina has not yet begun. Among the many old-growth areas in the Pisgah dependent on the plans are the recently discovered sites on the Grandfather District (*Wild Earth* spring 1997). Of immediate concern are a proposed Indian Creek Salvage Sale and a proposed Obadiah Gap Project, both in the scoping stage. They are near the Joyce Kilmer-Slickrock Wilderness in the Cheoah Ranger District of the Nantahala. In fact, the Obadiah Project would cut to the border of the Wilderness. The Project reportedly includes old growth on very steep slopes, but at this writing conservationists do not know the acreage of the old growth.[6]

In Florida various community types provide examples of threatened old growth. Pine rocklands, dominated by South Florida Slash Pine and supporting rare and endemic grasses and herbs, are globally endangered. Less than 2000 apparently never logged acres are scattered through the Florida Keys; and some isolated patches occur in Dade County. (The Everglades protects more than 2000 acres, but the pine rocklands there lack some of the rare species found in the other two locations.) Fire suppression, urban development, and non-native species are the threats. The Nature Conservancy and other organizations are trying to acquire the almost 1000 acres in private ownership.

Mangrove swamps, some possibly approaching old-growth condition, are being damaged by logging and other problems. Passage in 1995 of a bill to allow residents to "trim" the swamps (*Wild Earth* fall 1995) caused such destruction along developed shorelines that the legislature tightened the law, although not sufficiently.[7]

The few known Longleaf Pine/Wiregrass old-growth sites include tracts unprotected or incompletely protected on private land. The same is true of the more numerous logged sites that are valuable because of their intact groundcover. (In a Longleaf/Wiregrass ecosystem the groundlayer—one of the most species rich in the world—is far more difficult to replace than the trees.) Fire suppression and intensive forestry entailing soil scarification destroy groundcover. The Nature Conservancy is working to identify, protect, and restore sites in the Red Hills triangle, from Tallahassee, Florida to Albany, Georgia to Monticello, Florida; the Pinhook Swamp area, connecting the Okefenokee National Wildlife Refuge and Osceola National Forest; and a corridor between Eglin Air Force Base and Blackwater River State Forest.[8]

The Forest Service will publish a notice of intent to revise the management plan for Delta National Forest in Mississippi this year. The results of the revision will be crucial, because the forest is the only delta bottomland hardwood swamp in the National Forest System and because the entire Mississippi Delta, which was once all bottomland hardwood swamp, is now less than 5% forested. Only a few hundred acres of old growth in the National Forest are currently protected. The remainder of the National Forest, which includes perhaps a thousand acres of very lightly cut forest and extensive additional

acreage that is close to being old growth, could be opened to logging. No old growth inventory has been conducted.[9]

Most pine and cypress savannas in Mississippi and Alabama exist within 15 miles of the Gulf Coast, where people like to live; therefore reintroduction of fire is difficult. The largest blocks of remaining savanna are or will be protected in the Sandhill Crane and Grand Bay National Wildlife Refuges, but some other less prominent savannas are not protected and are likely suffering from lack of fire. Also not necessarily protected in these two states, as in Florida and Georgia, are Longleaf Pine ecosystems that may have been logged but that still retain intact groundcover.[10] ▌

Mary Byrd Davis is coordinator of the Eastern Old Growth Clearinghouse, a project of Appalachia—Science in the Public Interest, Ygdrasil Institute (POB 131, Georgetown, KY 40324), and Wild Earth.

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2. Doug Cornett, Northwoods Wilderness Recovery, POB 122, Marquette, MI 49855, Personal Communication.
3. Linda Parker, Ecologist, Chequamegon and Nicolet National Forests, Personal Communication.
4. The video is available for $16.95 plus $2 postage from the society at 145 West Conan Street, Ely, MN 557301; 218-365-4480.
5. Michael P. Schafale, Ecologist, North Carolina Natural Heritage Program, Personal Communication.
6. Rodney Webb, Southern Appalachian Native Forest Network, 704-656-2517, Personal Communication; Matt Dietz, Western North Carolina Alliance, 704-258-8737, Personal Communication; USFS, Initial Scoping Document on the Obadiah Project.
7. Mark Robertson, Key West Office of The Nature Conservancy, Personal Communication.
8. Greg Seamon, Northwest Florida Land Steward, The Nature Conservancy, Personal Communication.
9. Albert Meier, Ecologist, Personal Communication; Brian McPhail, Alabama School of Science and Technology, 1255 Dauphin Street, Mobile, AL 36604, Personal Communication.
10. Brian McPhail, Personal Communication.

Addendum

Part 1 of "More Threatened Eastern Old Growth" (*Wild Earth* summer 1997) contained two minor errors needing correction: The 3500 Red and White Pines in Minnesota's proposed Little Alfie timber sale on the Superior NF are not technically old growth, we have learned, although they are worth preserving. Also, Ohio University, not Ohio State University, owns Dysart Woods, the old-growth site threatened by mining.

So the tree has fallen; a monument in progress over years

Toppled in a second. I step to its side with an ax,

That I dressed with a round stone and raised a silver edge,

And a saw with teeth keen and ready to make wood,

To prompt the tree to start telling tales in a forest of peers.

Chips fly like snow in the air, the hum and rhythm

Of the saw is a metronome counting off the pull

And pull of blade, the beats of our hearts and

The passage of years, the pithy rings that compose this tree.

Look, the tree is nature's own book and almanac, written slowly

Through time, and the trained eye can see droughts and wet years.

Recall the rise of one species and the fall of another.

All of this; and the mighty oak is but one tree.

But one tree. Think of it all: the filled mushroom that sprouts

And dies in a spring, the wolves moving generations across

The same highways, and the mother bear, well-spring of knowledge,

Twenty years in a wilderness. We pass through all this like

A saw through a tree, only forward in mind, and we miss so much.

Stop sometimes, be at rest in this world like the sawyers at their work,

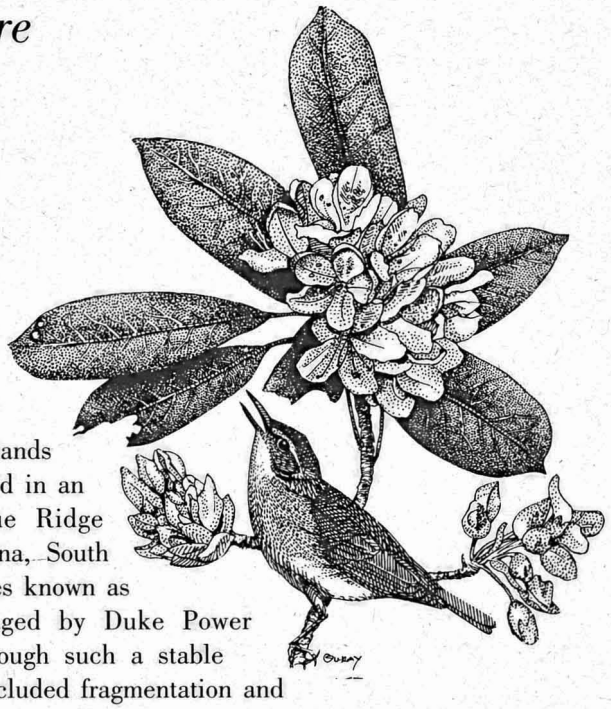
And look closely at the life you can go

But one direction through, and this but once.

—A.J. Kroll

Gems of the Southern Blue Ridge Escarpment

The Jocassee Gorges are ripe for preservation, but threatened by development



by Charles Zartman

One of the most significant wild lands east of the Mississippi is situated in an exceptionally rugged area in the Blue Ridge Mountain tri-state area of North Carolina, South Carolina, and Georgia. Some 50,000 acres known as the Jocassee Gorges have been managed by Duke Power Company since early this century. Although such a stable landownership history has heretofore precluded fragmentation and development in this stunningly beautiful area, its remoteness is now at risk. On 13 November 1996 Duke Power, a hydroelectric company shifting emphasis from power generation to transmission, offered the Jocassee Gorges to North and South Carolina state agencies for approximately $60 million. If these agencies don't come up with the money within the next three years, this wilderness corridor across the southeastern Blue Ridge will most likely be divided piecemeal and sold to the highest bidder. We are thus presented with a single, monumental opportunity to protect a wild area from the hands of unchecked development.

The Blue Ridge Escarpment frames the eastern side of the Blue Ridge Mountains for nearly 800 miles. Roughly extending from Shenandoah National Park in Virginia to the Chattooga Wild and Scenic River along the Georgia-South Carolina boarder (see map), the Escarpment marks the transition between the Southern Appalachian and Piedmont geologic provinces. The precipitous character of the Escarpment is most dramatically represented along its southeastern extension in the Jocassee Gorges area, where six major headwater streams of the Savannah River basin plummet to their confluence in Lake Jocassee. From west to east, the Eastatoe, Toxaway, Bearwallow, Horsepasture, Thompson, and Whitewater Rivers make up the Gorges of the Jocassee area, and the legendary gradients of these streams (average drop of 550 feet per mile; Dumond 1970) give this region its well deserved nickname: "Land of the Waterfalls." The Gorge Region hosts both the highest single cascade in the east, 411 foot Upper Whitewater Falls, and the greatest density of falls in the Southern Appalachians. Fortunately, for waterfall enthusiasts and rare, spray zone restricted plants alike, these cascades are seldom at low water flow. The predominating moist Gulf Coast weather patterns in combination with the Gorges' southerly aspect and rugged topography

With its plunging waterfalls, sheer cliffs, remote cove forests, rare plants and disjunct species, the Jocassee Gorges rank as nationally significant.

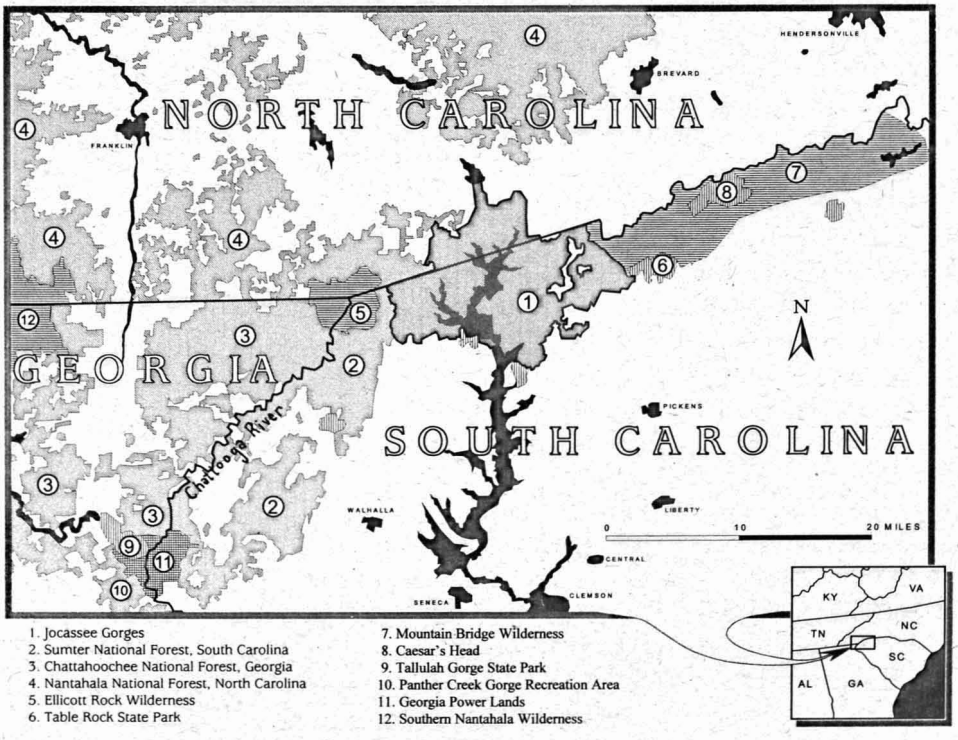
Green Salamander & Swainson's Warbler, illustrations by Churk Ouray

consistently yield annual rainfall rates higher than in any other region east of the Mississippi River (Billings and Anderson 1966). The high rainfall, steep gradients, and complex geologic history of the Jocassee Gorges are the principal features that have shaped this area's present range of forest types and micro-environments. The Gorge Region has been recognized by researchers as a center of diversity for several taxonomic groups, including bryophytes (mosses and liverworts) and Plethodontid (lungless) salamanders (Bruce 1991, Anderson and Zander 1973).

Although Duke Power has systematically lumbered the land for nearly fifty years (the area largely consists of mature second-growth pine-oak and mesophytic forests), this unfragmented, roadless, and remote region is a keystone natural link between existing public preserves. Protecting Jocassee Gorges would help link North Carolina's Southern Nantahala Wilderness, South Carolina's Mountain Bridge Wilderness, and Table Rock, Jones Gap and Ceasers' Head State Parks, two US Forest Service proposed Wild and Scenic Rivers (the Chauga River and Brasstown Creek), Georgia's Tallulah Gorge State Park and Panther Creek Recreation Area, and the renowned Wild and Scenic Chattooga River basin. In total, these public lands amount to nearly 350,000 acres: an area comparable in size to the Great Smoky Mountains National Park.

Since the late 1800s rediscovery of Andre Michaux's lost Oconee Bell Flower *(Shortia galacifolia)*, a rare Blue Ridge Escarpment endemic regarded as the Holy Grail of nineteenth century American botanists (Core 1971), the Jocassee Gorges have been recognized for their biological significance (Cooper and Hardin 1971). The range of environments in this steep and varied landscape is so extreme (elevation changes 1500 feet in two ground miles) that species of circumboreal distribution including the Dwarf Ground Juniper *(Juniperus communis var. depressa)* inhabit the same watershed as species such as the Appalachian Bristly Filmy Fern *(Trichomanes boschianum)* whose closest relatives are found in the tropical Americas (Zartman 1996, Farrar 1989). The plant richness here is astonishing: nearly 300 different kinds of mosses are found along a 2.5 mile stretch of the Whitewater River—more moss species than known from the entire state of California (L.E. Anderson, personal communication). Enigmatic and disjunct species abound here as well. A remarkable example is the Single Sorus Spleenwort *(Asplenium monanthes)*. In North America, this tiny fern is only known from the Jocassee Gorges, a sinkhole in northern Alabama, and the Huachuca Mountains of southeastern Arizona (Morin et al. 1995)! Likewise, the Jocassee Gorges are currently a habitat island for the rare Green Salamander *(Aneides aeneus)* whose presence in the abundant, moist cliff faces marks an eastern disjunction of several hundred miles from its population center in the Cumberland Plateau (Martof et al. 1980). This removed escarpment colony, which resulted from habitat fragmentation during the Pleistocene, has been genetically isolated from its continuous range for over 15,000 years (Bruce 1967).

The relatively recent discovery of the Swainson's Warbler *(Limnothlypis swainsonii)* in the Jocassee Gorges illustrates the land's remote character. This rare songbird, whose most significant breeding grounds in the mountains are rhododendron thickets of the Jocassee Gorges, wasn't even



1. Jocassee Gorges
2. Sumter National Forest, South Carolina
3. Chattahoochee National Forest, Georgia
4. Nantahala National Forest, North Carolina
5. Ellicott Rock Wilderness
6. Table Rock State Park
7. Mountain Bridge Wilderness
8. Caesar's Head
9. Tallulah Gorge State Park
10. Panther Creek Gorge Recreation Area
11. Georgia Power Lands
12. Southern Nantahala Wilderness

map courtesy of Chattooga River Watershed Association

known to nest outside of the dense canebreaks of the Southeastern Coastal Plain (nearly 500 miles distant) until the early 1960s (Simpson 1996). The notably high rainfall in the Jocassee and neighboring southern Nantahala Mountains has made this region a center of Plethodontid salamander diversification (a tribe of salamanders that includes the Green Salamander; Bruce 1991). Along certain creeks here a discerning explorer can find up to five distinct salamander species of the genus *Desmognathus* within ten yards of the stream bed. This community of dusky salamanders is present across the Southeast but reaches its greatest ecological complexity in the Escarpment mountains, where the perpetually damp leaf layer has allowed the group to radiate from strictly aquatic habitats.

The Consequence

With its plunging waterfalls, sheer cliffs, remote cove forests, rare plants and disjunct species, the Jocassee Gorges rank as nationally significant. The Chattooga River Watershed Coalition and other local and regional conservation organizations have been working to keep the Blue Ridge Escarpment safe from unchecked development. Presently, our major objectives are two-fold: (1) to pressure local and state representatives to allocate money to purchase this land, and (2) to release from the power company, through acquisition, an 8000-acre tract of land in the heart of the Gorges that Duke wishes to retain for a potential future pump storage station. Our work includes public education and facilitating communication between Duke Power, state agencies, and conservation organizations. Strong local support and national attention for the Jocassee Gorges can force politicians and power companies to agree on a common sense deal that will benefit both humans and wild creatures.

The Chattooga River Watershed Coalition, a nonprofit 501(c)3 organization, has established a Jocassee Gorges Fund. Donations are greatly appreciated and will be contributed to North and South Carolina state agencies for the purchase of the land from Duke Power. To ensure that the Jocassee Gorges and other wild areas are protected, readers should also contact their local representatives and ask them to restore the depleted Land and Water Conservation Fund.

Charles Zartman received a master's degree in biology from Western Carolina University, Cullowhee, NC researching spray cliff plant communities in the Chattooga River basin. He is currently the staff biologist for the Chattooga River Watershed Coalition where his main projects include characterizing the Chattooga's remaining old growth forests and compiling an identification guide to the trees and shrubs of the southern Blue Ridge Escarpment.

Addresses:
Honorable Senator Ernest Hollings (SC)
125 Russell Office Building
Washington, DC 20510-4002

Honorable Representative Lindsey Graham (SC)
1429 Longworth House Office Building
Washington, DC 20510-4002

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Southeastern Fishes Council Opposes Road Modifications of NC 28

The North Carolina Department of Transportation recently proposed a Transportation Improvement Plan for road modifications of State Highway 28. The portion of NC 28 slated for road improvements lies adjacent to a segment of the Little Tennessee River. The Southeastern Fishes Council—a professional organization composed of over 200 biologists, employees of natural resource agencies, and other scientists concerned with the study, conservation, and management of the fish fauna of the southeastern US—has strongly opposed the proposed plan because of likely negative biological impacts on the Little Tennessee River. The Council further supports the designation of North Carolina Highway 28 as a Scenic Byway.

The proposed roadway modifications involve transforming NC 28 to a major artery by moving erodible and acidic soil and rock. Sedimentation has been identified as the major source of habitat degradation in the Little Tennessee River system, and would be worsened by a project this close to the river. Additional negative impacts could result from increased traffic, storm runoff, and development associated with construction. These impacts could harm the native aquatic organisms of the Little Tennessee River, and further contribute to the decline of Southern Appalachian river systems.

This reach of the Little Tennessee River is one of the largest remaining free-flowing river areas in the Southern Appalachians, and still maintains much of its native freshwater fish fauna. It includes habitat for the Spotfin Chub *(Cyprinella monacha)* and Littlewing Pearlymussel *(Pegias fabula)*, several other listed species of freshwater mussels, and the Hellbender *(Cyrptobranchus alleganiensis)*.

The conversion of NC 28 to a major artery would place pressure on the river from secondary development along the corridor, including increased erosion and pollution. Rapid population growth in the area will likely continue, and neither of the counties affected by the project has any form of regulatory authority to control development along the corridor. ❙

–Southeastern Fishes Council, 7920 NW 71st St., Gainesville, FL 32653; 904-378-8181

What You Can Do:

Send statements opposing road improvements of North Carolina Highway 28 and recommending that the North Carolina Department of Transportation support habitat preservation in the Southern Appalachians.

Mr. Marvin Raper
Representative, Board of Transportation
Box 632
Murphy, NC 28906

Mr. Frank Vick
Planning and Environmental Branch
NC DOT
POB 25201
Raleigh, NC 27611-5201

Macon County Board of Commissioners
Macon County Courthouse
Franklin, NC 28734

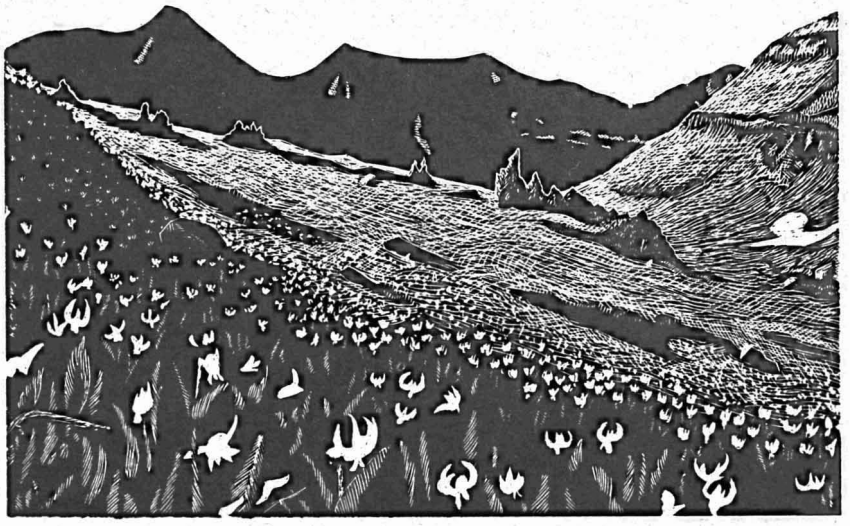
Swain County Board of Commissioners
Administration Building
101 Mitchell St.
Bryson City, NC 28713

illustration by Chuck Ouray

Possible Effects of Climate Change on Butterflies

by Amy L. Seidl

I spend my summers looking for butterflies in Colorado mountains–searching first for cryptic dime-sized caterpillars in tundra meadows, then chasing orange-black and maroon-celled fritillaries over scree slopes and under violet blue skies.



I keep track of the species I find, when they're first seen and their abundance. I see myself as a kind of lepidopteran steward, a soothsayer of butterfly and moth trends, a fanatic record-keeper of charismatic insects.

Field biologists are good at record-keeping, but assessing organism abundance is a kind of numbers game: we capture, mark and release individuals, conduct point censuses, walk transect lines through habitat or even intuitively speculate on how many are here presently versus previous years, how flush or how few. There is a whole collection of people counting butterflies, getting together on the fourth of July and walking prairie reserves in Nebraska looking for skippers, or combing Pacific dunes for a chance sighting of a Coastal Hairstreak. I walk alpine ridges in search of Dingy-Arctic Fritillaries, butterflies that occupy patches of tundra willow and relish cold wet habitats, like those their congeneric cousins inhabit in Alaska and Greenland.

These people are finding that butterfly numbers are on the decline. Widespread use of pesticides, herbicides, and other means of killing "non-beneficials" negatively affects non-target insects. Habitat destruction and fragmentation also diminish lepidopteran abundance by constraining butterfly dispersal distances and limiting populations to patches of insufficiently sized habitat. Possibly the most insidious human impact on insect range and distribution, however, is that of climate change.

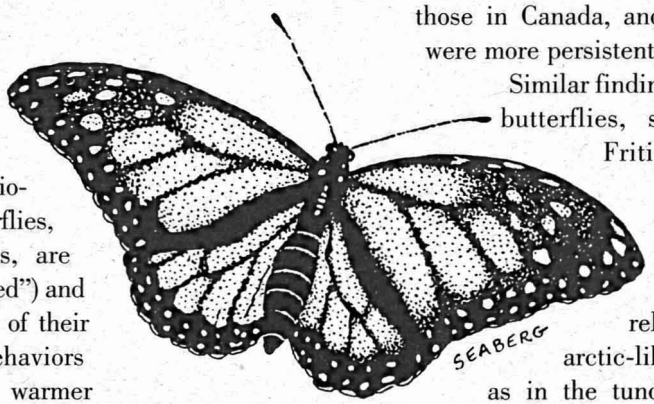
Although the planet and its insect fauna have experienced climate change in the past, never has the change occurred at such a rapid rate. The best indicator of this, as well as the major factor underlying this, is the concentration of carbon dioxide (CO_2) in our atmosphere. Measured in parts per million (ppm), CO_2 concentration has been historically preserved in the polar ice caps. For 60,000 years levels of CO_2 have fluctuated

Ragged Wilderness, Colorado *by Evan Cantor*

around 100 ppm. Today the concentration is above 350 ppm and atmospheric scientists predict a doubling to 700 ppm by the year 2050. The primary causes for this increase are fossil fuel burning and rainforest destruction, neither of which are likely to be curtailed for decades.

Elevated CO_2 in the Earth's atmosphere results in the greenhouse effect. Like panes of glass in a greenhouse, our atmosphere is transparent to short wave solar radiation; the sun's rays pass through the atmosphere and heat the planet. As the planet warms, it re-transmits heat in the form of longer waved infrared rays, which are blocked by CO_2 and effectively bounce back to the Earth's surface warming it still further.

How easily will insects adapt to higher temperatures, to the re-formation of habitat types (as forest ecotypes invade tundra, as grassland species advance into forests) and to changes in host plant distribution? Will higher temperatures actually benefit insects in the short term due to their ectothermic nature, and could we see an increase in abundance initially before predicted negative effects take hold? How will changes in insect numbers affect the pollination of crops and gardens, the prey availability for songbirds and insect predators, the overall complex trophic web in which insect abundance is an integral part?



One direct means by which climate change may affect insect and particularly butterfly numbers is through physiological tolerances. Butterflies, like other invertebrates, are ectothermic ("cold blooded") and take on the temperature of their surroundings. Their behaviors require energy, and a warmer body uses less energy to do sundry butterfly activities such as finding a mate, nectaring, evading predators, and dispersing to new habitat. A warmer body may be active more often, dispersal distances may increase and, within genetic and phylogenetic constraints, so may reproduction. It would follow then that increased temperatures may translate into extended activities and a general increase in population abundance.

Voltinism, or the number of broods a population has in a single year, may also change with climate. Many butterflies are univoltine and are constrained in brood number by the length of their flight season. In alpine habitats, populations are constrained by very short summers and most species of butterfly have an adult lifespan of fewer than ten days. Higher temperatures may extend flight seasons, both early and late, such that offspring from individuals who have reproduced early in the season are themselves able to reproduce. This could significantly increase population size and population growth rates.

An alternative to the hypothesis that butterflies will expand within their present habitats and exploit the benefits of warming, is the prediction that they will advance polewards and upwards in elevation to maintain themselves in thermal habitats to which they are adapted. The basis for this prediction is that the mechanisms enabling insects to adapt to changes in climate are highly conserved: natural selection has finely adjusted the metabolic processes, wing morphology, and the like to suit particular ecotypes. Evolutionarily, it may be more parsimonious to seek out distant but familiar habitats than to remain in places where critical abiotic factors have changed suddenly.

Shifts in butterfly distribution have already been detected in *Euphydryas editha*, a species well distributed from Mexico to Canada. Based on long-term census data, Parmesean (1996) found a significant latitudinal and elevational shift in populations: populations in Mexico were four times more likely to be extirpated than those in Canada, and populations above 2400 meters were more persistent than ones at lower elevation sites.

Similar findings have been made for relict arctic butterflies, species like the Uncompahgre Fritillary, which hasn't adapted to warmer and lower elevations since the last glaciation event 10,000 years ago (Britten et al. 1994). It is hypothesized that because relict arctic species occupy the most arctic-like niches available to them, such as in the tundra meadows of North America's highest peaks, they may become extirpated with a rapidly warming climate.

Yet a species's physiological ecology can only tell us so much; butterflies are parts of complex ecological communities. As larvae, they are intimately tied to and dependent on their host plants. Host plant abundance, phenology, and quality (important measures of which include the amount of deterrent secondary compounds, and the nitrogen and water content, in leaves) are critical factors in butterfly viability. Butterfly populations are in part regulated by the quality of the plants they eat. The inevitable question becomes: How will *plants* respond to climate change? How will elevated carbon levels affect photosynthetic rates? Will plants' response to climate change manifest itself in becoming more or

illustration by Kurt Seaberg

less palatable to their lepidopteran herbivores? More or less nutritious? If we find that the latter is the case, then this may well be the underlying constraint that, in the long term, most negatively affects butterfly populations.

Most people associate climate change with temperature, but its repercussions go beyond warmer climates. Precipitation patterns, rain- and snow-fall, will undoubtedly change, and soils will become dryer in some regions and more prone to drought. Cloud cover may generally increase, again affecting ecosystem dynamics. Basking insects, for instance, may become limited in finding suitable microclimates; temperatures may be higher but direct solar insolation may be lower. Finally, the increase of CO_2 molecules in our atmosphere is expected to have a great effect on plant physiology since plants convert CO_2 into sugars and starch and increased CO_2 may increase photosynthetic rates in plants. This would lead to a "nitrogen dilution effect," essentially a higher carbon to nitrogen ratio in foliage, and perhaps higher growth rates in plants. At the outset this appears good for herbivorous insects such as butterfly larvae, yet nitrogen is *the* limiting factor for insect growth and development. Plant-feeding larvae will have to consume more leaf tissue to get an optimal nitrogen intake. The ramifications are predictable: More time feeding on less nutritious plants translates into higher metabolic costs, slower growth, and increased exposure to predation.

Of equal importance is that with excess carbon, plants can afford to make more secondary defensive compounds, which work to deter herbivores from feeding. Research has shown, for instance, that buckeye butterflies, reared on host plants grown under climate change conditions, experienced three times the mortality of those fed non-elevated CO_2 plants, and larvae had slowed development rates (Fajer et al. 1992). Secondary compounds have also been shown to be demonstrably higher in aspen, maple, and birch grown experimentally under elevated CO_2 (Roth and Lindroth 1994). Here, too, prolonged development due to higher amounts of secondary compounds may result in caterpillars being more prone to natural enemies, including parasitoids and bird predators. Nutrient deficiency and an overload of toxins may also predispose butterfly larvae to internal parasites, as their immune responses become compromised.

Summary

Understanding the effect of climate change on insects, and on butterflies particularly, is largely understanding the basic ecological and evolutionary tenets of insect population dynamics, thermal requirements, and host plant relationships. It's the science of ecology—studying the complexity of infinite variables as they act, interact, and ultimately affect organism persistence.

Three distinct ways that ecologists can empirically study the effects of climate change on butterfly distribution and abundance are these:

(1) monitor populations over the long term to determine whether butterfly ranges are contracting or expanding due to climate change and not due to other processes like habitat fragmentation or human perturbation;

(2) examine the physiological ecology of butterflies to predict their ability to adapt to specific climate changes; and

(3) manipulate host plant quality to predict how plant response to climate change will indirectly, but with potentially great magnitude, affect herbivory and mortality.

The promotion of reserves and corridors that connect them, by *WE* readers and other conservation biologists, will facilitate the success of colonization attempts by butterflies. High altitude reserves will be especially important. Outside of the biological realm, conservation biologists need to work socially as advocates to decrease deforestation and the world's consumption of fossil fuels, and to sponsor legislation that supports a reduction in greenhouse gases nationally and globally.

In the meantime, there's every reason to keep counting, to be aware of changes in insect patterns, prolonged seasons, and local diversity. Watch your gardens, keep lists, speculate on butterfly abundance. ▮

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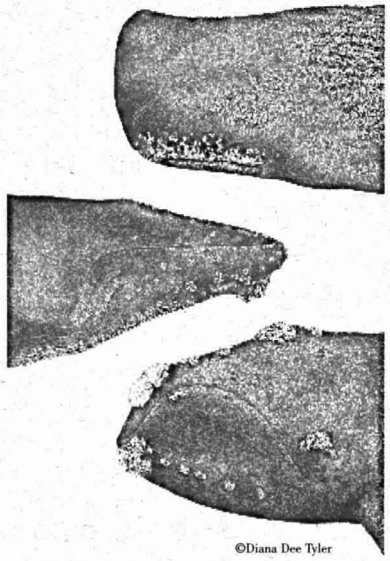
Humans Threaten the Extinction of The Northern Right Whale

by Robert Stevenson



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The whale population is only 3% of its historic level, and the whales occupy only a small fraction of their historical range.

Introduction

The Northern Right Whale *(Eubalaena glacialis)* is the world's most endangered species of large whale. Since 1949, the Northern Right Whale has been protected from commercial hunting by the International Whaling Commission, and it is classified as endangered by CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora). At the national level, both the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA) protect this species in US waters (NMFS 1991), and in Canada, the right whale is covered by Cetacean Protection Regulations (Gaskin 1987). The purpose of this article is to explain why this species has such a precarious status even though (1) it is legally protected, (2) its final recovery plan (NMFS 1991) was published five years ago, and (3) some critical habitat has been designated. Although much basic science has been done and the correct documents filed to comply with ESA, public officials have been slow to implement the recovery plan. Here I review the basic biology of the whale, explain why this species is particularly threatened, provide a new set of priorities for government action, and indicate how your participation is crucial for this whale's survival.

Whale Biology

Taxonomy and Morphology

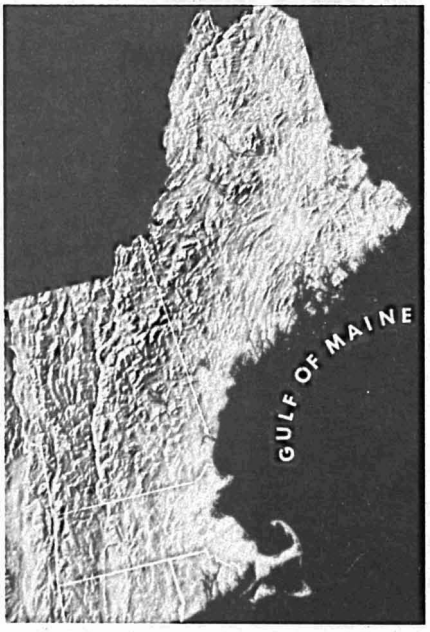
Separate populations of right whales inhabit the Atlantic and Pacific Oceans in the northern hemisphere, but they are currently classified as the same species, *Eubalaena glacialis*. They are large, mainly black baleen whales, growing to between 45 and 55 feet in length and weighing up to 70 tons. The head makes up a quarter or more of the body length. Other distinctive morphological features include a strongly curved lower jaw, a black deeply-notched tail, and the lack of a dorsal fin. Their blow holes are widely separated and produce a species-specific V spout when viewed from the head or tail of the whale. Whale skin is usually soft, but right whales have tough distinct whitish skin patches on the head, called callosities, which allow them to be identified as individuals. A photographic identification catalog is maintained by the New England Aquarium.

In the oceans of the southern hemisphere lives a closely related species, the Southern Right Whale, *Eubalaena australis*. These two species are isolated because right whales do not cross the equator, where the warm tropical waters present a physiological barrier.

Sperm (top), Humpback (middle), Right (bottom) illustration by D. D. Tyler

Populations of Northern Right Whales

Biologists have identified three stocks of Northern Right Whales, two of which are poorly known, probably because the populations contain so few whales. In the Pacific, scientists speculate that there are 100-300 individuals (NMFS 1991); however, only a few sightings have been reported in the last 25 years (Scarff 1991, Carretta et al. 1994). Likewise, in the eastern Atlantic, there is evidence of a few individuals surviving (Brown 1986). Northern Right Whale research has mainly focused on the western Atlantic stock found along the eastern seaboard of the United States, where data taken during the last 30 years have given us many insights into the biology of these cetaceans.



Annual cycles of migration, feeding and reproduction

Calves are born mainly between December and March in the shallow waters of the southeastern US coast, north from Cape Canaveral, Florida, to Savannah, Georgia. Most right whale sightings are of adult females and calves. At this time of year, the location of the rest of the western Atlantic population (80 to 85% of the individuals) is unknown. In late winter and early spring, whales migrate northward along the coast to feeding grounds off Massachusetts and Canada. The vast majority of Massachusetts sightings are in the Great South Channel between outer Cape Cod and George's Bank or in Cape Cod Bay, which together with the Florida-Georgia site comprise the three critical habitats designated in US waters. For the Great South Channel, most whales are seen in clusters of individuals during May where the water depth is between 100 and 200 m (Kenney et al. 1995). Whales are also seen feeding on Stellwagen Bank and Jeffreys Ledge off the Massachusetts coast. Studies of the feeding biology have shown that right whales strain zooplankton (copepods and krill) that occur in patches of very high densities (Kenney et al. 1986). Fish (herring, River Herring, Sand Lance, mackerel, mehhaden, shad and Basking Sharks) and perhaps Sei Whales also compete for the abundant zooplankton, which feed on magnificent blooms of phytoplankton that occur in spring and summer as the waters warm. Generally, these right whales move northward during the summer, presumably following the concentrations of zooplankton. Northern Right Whales migrate across the Gulf of Maine to the lower bay of Fundy between Grand Manan Island and Digby Neck, Nova Scotia, and onto the southern Scotian shelf in the Roseway Basin between Brown and Baccaro Banks, the two critical habitats in Canadian waters. These movement patterns vary seasonally and yearly depending on food concentrations. The distances between known feeding grounds are sufficiently close that whales cruising at 5 knots can easily move between areas. Although whales are often found concentrated in critical habitat, these locations alone will not sustain the species.

Courtship takes place during the spring, summer, and fall while on the feeding grounds. The right whale is famous for its surface courtship behavior in which several males often vie to mate with a female (Kraus 1991). The males have unusually large testicles, weighing almost a ton (though such commitment to reproductive tissue occurs commonly in males of species that compete intensely for females) (Brownell and Ralls 1986). By October, feeding and courtship are usually over and whales migrate south for the winter. The exact migration routes and wintering grounds are unknown.

Population levels

Scientists estimate there are less than 300 Northern Right Whales, of which only about 65 are known to breed (Knowlton, Kraus and Kenney 1994). Three hundred individuals are not enough to sustain a species. There is no single minimum number of individuals that will guarantee survival of a species, but this population is too small by an order of magnitude (Nunney and Campbell 1993). Small populations face risks of extinction associated with (1) random population fluctuations over time (demographic stochasticity), (2) environmental catastrophes (such as a bad oil spill off the southeastern US coast which could kill a significant portion of the population), and (3) inbreeding depression (reduced genetic diversity of small populations makes it difficult to eliminate genetic defects from the population and makes it more likely that harmful alleles will spread within the population; Lande 1988, Schaeft et

map by Chuck Ouray

al. 1991). A population size of 2000 is sometimes considered the minimum necessary to ensure long-term survival of a large mammal species. The National Marine Fisheries Service has set a recovery goal of 7000 animals (NMFS 1991). This is a long-term goal, however, and it would be a wonderful sign of recovery if the population grew by 15 individuals for each of the next ten years.

Data on population growth are not encouraging. Published estimates of birth and death rates for the population yield a yearly growth rate of about 2.5 %, which is one-half to one-third of values for Southern Right Whale populations. On average, 12 calves were born each year between 1987 and 1992, but there were also at least 6 deaths per year of which at least 2 on average are attributable to human causes (Knowlton et al. 1994). Since 1992, birth rates have been slightly lower and death rates may be higher (Kraus and Knowlton, personal communication). It appears that the Northern Right Whale population has not increased in the last four years.

Birth rates of Northern Right Whales are low—only about one-third those of the closely related Southern Right Whale. Not all the mature females are reproducing and the interval between births is longer in Northern than in Southern Right Whales (Knowlton et al. 1994). The underlying causes of infertility are difficult to pinpoint. There could be many contributing factors, as scientists know from studies of fecundity in other species. Poor food supply and environmental stress caused by conflicts with boats or fishing gear over access to feeding grounds are possibilities. Infertility of males or females could be due to environmental contaminants in the food from pollution of the whales' feeding grounds (Colbert et al. 1996).

Human Impacts on Right Whales

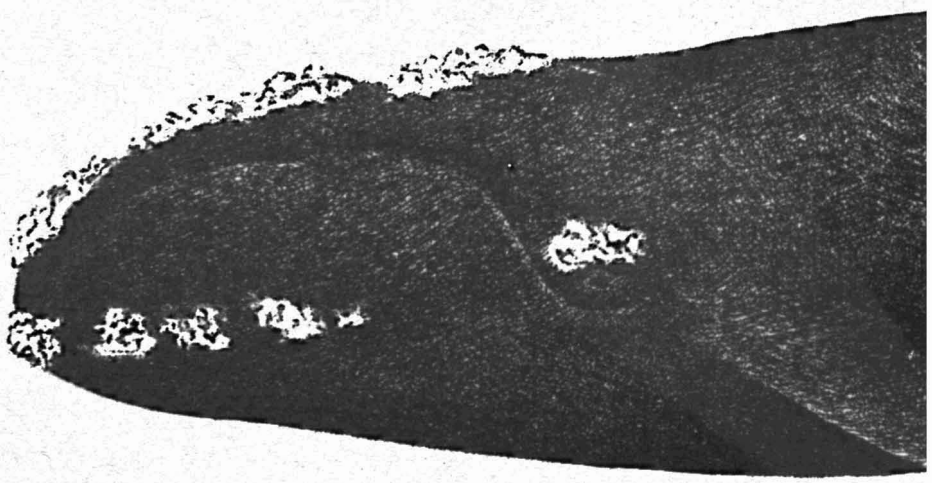
Historical perspective

Right whales have been hunted by humans for over 800 years. The common name derives from the ease and profitability of harvesting *Eubalaena glacialis*—the "right" whale to catch. Their natural history makes them easy prey for humans; these whales frequent inshore waters, rest, feed, and court on the surface, move relatively slowly, and do not sink when harpooned. Whale hunting eliminated the eastern Atlantic stocks by the 1400s. In the early 1500s, Basque whalers came to hunt whales in North America. The western North Atlantic right whale population numbered at least 10,000 individuals then. Right whale hunting proved a profitable business in Delaware Bay in the 1700s. By 1800, right whales were rare (Aguilar 1986, Reeves and Mitchel 1986).

The results of this slaughter are twofold. The whale population is only 3% of its historic level, and the whales occupy only a small fraction of their historical range. The whales are now rarely seen in the Gulf of Mexico, Delaware Bay, Long Island Sound, the Gulf of St. Lawrence, or the Straits of Belle Isle in Newfoundland.

Current issues

The same aspects of right whale biology that made them easy to catch also make them very susceptible to human impacts today. Of the 41 Northern Right Whale necropsies performed from 1970 to 1996, 15 deaths have been attributed directly to collisions with ships. Two were the result of entanglement with fishing gear. The remaining 24 animals died from unknown or natural causes. Thus, at a minimum, 41% of recent whale deaths are

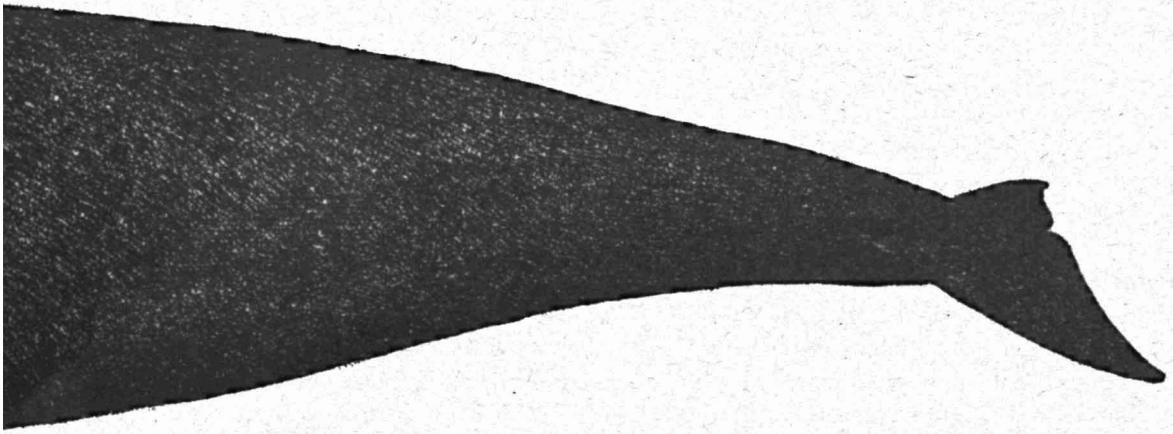


human-related, and the percentage is likely to be higher because some of the unknown deaths are very likely related to human activities. The impact of human activities on whales is further indicated by the scars on living whales: 57% show marks of having been entangled with fishing gear, especially lobster pots, while 12% of the population bear scars indicating that they were injured by collisions with boat hulls or propellers (Kraus 1990).

In 1991 and again in 1993, a Coast Guard vessel struck and killed an adult Northern Right Whale. A suit filed in US District Court by Max Strahan of Greenworld and a review of the issues by the presiding judge forced the Coast Guard to study how their operations impacted right whales. A biological assessment presented by the US Coast Guard (Battelle Ocean Sciences and US Coast Guard 1995), which included a biological opinion written by the NMFS, concluded that Coast Guard activities were not important (FONSI, Finding Of No Significant Impact) and that a few modifications to their present operations would suffice to protect whales. However, the situation has changed. Within months after the assessment was finished, a Coast Guard vessel struck and killed a Humpback Whale, another Endangered species. Then in the spring of 1996, six Northern Right Whales were found dead in and around the Florida-Georgia calving grounds. Evidence suggested that human-related activities were to blame. Subsequently the Coast Guard and NMFS changed their minds about the FONSI and in August of 1996 the Coast Guard filed a final environmental impact statement (FEIS). The government has undertaken several new monitoring and education programs, and NMFS is now discussing new fishing regulations for lobster gear and gill nets.

A major shipping lane passes directly through the Great South Channel critical habitat, suggesting that designated critical habitat is critical habitat in name only. The government has made no effort to alter this route, have commercial vessels reduce their speeds, or monitor whale activity. In their FEIS the Coast Guard notes that their boats account for less than 0.5% of the vessel traffic along the eastern seaboard, suggesting their operations have little impact compared to other vessels. This fact is disheartening, however, when one realizes that in the last six years 2 of the approximately 50 whales (4%) known to have died were killed by Coast Guard boats. The Coast Guard and the NMFS have responsibilities and powers to regulate ship traffic and fishing activities. Clearly, the agencies are not yet exercising these in accordance with the whales' safety.

Whale conservationists should keep in mind at least four other important concerns. First, two common characteristics of large-brained and long-lived mammals are social structure and the cultural transmission of information between generations. Records indicate that right whales no longer visit some habitats along the Atlantic coast that they historically used. Traditional breeding grounds, nurseries, and feeding areas may be abandoned or used ineffectively because of a loss of cultural knowledge, and because of ships and noise pollution. Second, humans have devastated the fisheries off the coast of eastern North America, especially the Gulf of Maine where the whales feed (Dow and Braasch 1996). Initially, one might think that removing fish from the system would tend to increase the food supply for whales since fewer fish would remain to compete for zooplankton. However,



Northern Right Whale *(Eubalaena glacialis) – illustration by D. D. Tyler*

it is just as likely that a restructuring of the food chain could allow a competitor for the whale food to flourish (Knowlton et al. 1994). Third, environmental contaminants in the food may stress whales. Their food items are not high on the food chain, but they frequent inshore waters where concentrations of pollutants are likely to be greater (Dow and Braasch 1996). Colborn et al. (1996) have recently focused attention on the intergenerational effects of artificial chemicals mimicking hormones and disrupting the development of and reproductive organs of offspring. Currently, scientists are documenting a case of environmental contaminants having a major impact on the Beluga Whales of the Gulf of St. Lawrence. Finally, the release of waste water into the ocean has the potential to deliver unknown pathogens to the whales (Dow and Braasch 1996). The new "outfall pipe" of Boston's waste water treatment is an example.

Conservation Recommendations

1 Every year, systematic seasonal surveys of all known right whale habitats should be made; and annual estimates (with confidence intervals) for population size, birth rate, death rate, and growth rate should be reviewed by scientists and widely distributed to the public. Additional analyses of these data could be used to estimate annual scarring rates from boats and lines, as well as from Orcas.

2 A greater effort should be made to find dead whales and perform necropsies. Currently, most whales that die are not found. For those that are, scientists have lumped natural and unknown causes of death, making it impossible to establish the relative importance of man-induced versus natural mortalities.

3 On a seasonal basis, daily aerial surveys of the five designated critical habitats should be made when Northern Right Whales are likely to be using these areas. The results of these surveys should be broadcast over multiple media to inform the public about the movements and concentration of whales. In conjunction with the adoption and enforcement of wider distance rules (100 yards from whales generally and 500 yards for right whales), this effort should reduce the chances of ship strikes.

4 In critical habitats during seasons when the whales are present, vessel speeds should be limited to five knots and fishing methods that are likely to harm whales should be suspended or alternative fishing methods employed that have been proven harmless to whales.

5 NMFS should complete a risk assessment of collisions with boats as has been started for entanglement with fishing gear (Large Whale Take Reduction Team 1997). Conservation biologists should use population models to provide a more informed estimate of the population size needed to greatly increase the long-term survival probability of the right whales (Soulé 1987). These can explicitly examine the effects of birth and death rates on the size of the population, as well as taking into account other demographic parameters such as age structure, sex ratios, and potential fecundity rates. Such analyses are likely to pinpoint significant shortcomings in our knowledge of right whale biology and help build a consensus within the biological community for research direction and indicator variables. Population modeling can help set conservation priorities (Crouse et al. 1987, for an example).

6 NMFS should fund satellite tracking of 5 to 8 whales of different social classes over a 5-year period. This effort would significantly increase our knowledge of whale movements, site fidelity, and migration routes, while helping to identify the additional critical habitats, including an unknown nursery area and the wintering grounds. This recommendation will be controversial because it requires implanting transmitters in the whales, but the use of radio transmitters may be the quickest and most cost effective way of learning about right whales' use of habitat.

The Northern Right Whale recovery plan (NMFS 1991) makes many additional recommendations but research priorities and recovery goals remain vague. The plan called for $9 million to be spent during the last 5 years, but only a small fraction of this planned expenditure was ever provided. Now that another 5-year plan is to be made, better and more explicit research priorities should be established and more funds made available. The already designated critical habitats and the additional missing critical habitats of the Northern Right Whale need to be tied to a system of marine sanctuaries.

How You Can Help

Please keep informed by subscribing to Right Whale Newsletter (Right Whale News, Georgia Environmental Policy Institute, 640 Cobb St., Athens, Georgia 30606; 706-546-7507) and supporting the work of the many NGOs doing right whale research. If you pass this information along to your friends, neighbors, and relatives, elected officials will be more likely to support programs and regulations that protect the whales. Your political

support might result in more money for NMFS to spend on whales. The public is currently not a recognized stakeholder in debates about right whales. Finally, don't lose sight of the goal. Sometimes the focus shifts from the whales to the people trying to defend the whales. For instance, in the past five years Max Strahan of Greenworld has worked to save the Northern Right Whale by bringing lawsuits against state and federal agencies. However, news organizations seem to be as interested in Mr. Strahan's approach and personality ("Mad Max, the Prince of Whales") as they do in the plight of the whales.

Summary

The Northern Right Whale is at a high risk of extinction because of the very small number of individuals, low reproductive rates, high mortality rates caused by ship collisions and entanglement with fishing gear, lack of knowledge about critical habitat, and slow action by government agencies responsible for protecting right whales. Its small population is also vulnerable to genetic inbreeding, loss of cultural information critical to large social mammals, low-level contaminants in the food chain leading to reproductive problems, introduction of pathogens potentially leading to a population epidemic, and reduced growth rates as a result of the declining health and productivity of the Gulf of Maine ecosystem associated with commercial fishing.

The Northern Right Whale is the most endangered large whale in the world. It will serve as a flagship species for the many other endangered whales and for the overexploited ecosystems of the Gulf of Maine. We must favor *Eubalaena glacialis*'s uses of the environment over human uses; otherwise this species will be lost forever. The Northern Right Whale is the right whale to save! ❙

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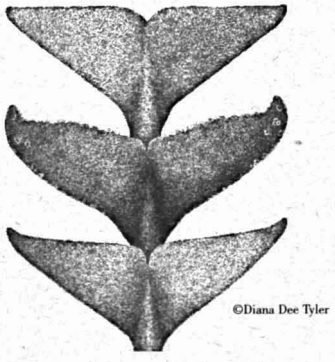

Sperm (top), Humpback (middle), Right (bottom) illustration by D. D. Tyler

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Land of the White Bear Spirit

A Case for the Torngat Mountains National Park

by David Rothenberg

Just 1500 miles from New York is a mountain wilderness as grand and remote as parts of Alaska and the Yukon. The Torngat Mountains near the northern tip of Labrador rise over five thousand feet straight up from the icy sea, in twisted blocks and towers, strange, looming storybook shapes that look as much like myths as mountains. "Torngat" is the Inuit name of a fierce spirit who, appearing in the guise of a giant Polar Bear, guards this place and makes it wild, fearsome, and delicious. The Western tradition saw something more frightening; explorer Jacques Cartier called Labrador "the land of Cain." We know better today—it is the wildest mountain range in eastern North America.

Few of us even realize there is such spectacular country at the narrow northern tip of Labrador—it is blank on most large-scale maps. Hardly anyone enters this little-known wilderness, hardly any of its peaks have names. The region is home to several threatened species, including Harlequin Duck, Peregrine Falcon, and Polar Bear, as well as a unique tundra-dwelling population of Black Bear. Two large Caribou herds sweep through the area. The complexity and uniqueness of the region deserve our full protection.

Labrador has one essential, indubitable, eternal resource that becomes increasingly valuable with time: pristine wilderness.

I was lucky enough to visit these mountains last summer with three other true believers in the North: photographer and Adirondack activist Gary Randorf, Lake Placid physician Josh Schwartzberg, and geologist Karl Walker. We chartered a float plane in Kuujjuaq, Quebec, and were delivered to fjord-like Komaktorvik Lake for nine days of hiking and fishing in the most remote place any of us had ever been.

Nothing could prepare us for the sight of these mountains as we approached from the air. They didn't look like any mountains I had ever seen: their strange shapes seemed wrenched directly out of the Earth, pushed and pulled by huge forces too ancient to imagine. One does not react weakly to these mountains. You are either enthralled by the dark openness, or repelled by the emptiness.

The land seems lonely. The only birds we saw were Peregrines and Harlequins. A few lonely Caribou. A rabbit so perplexed by humanity that it walked right up and sniffed us, before sauntering on its way.

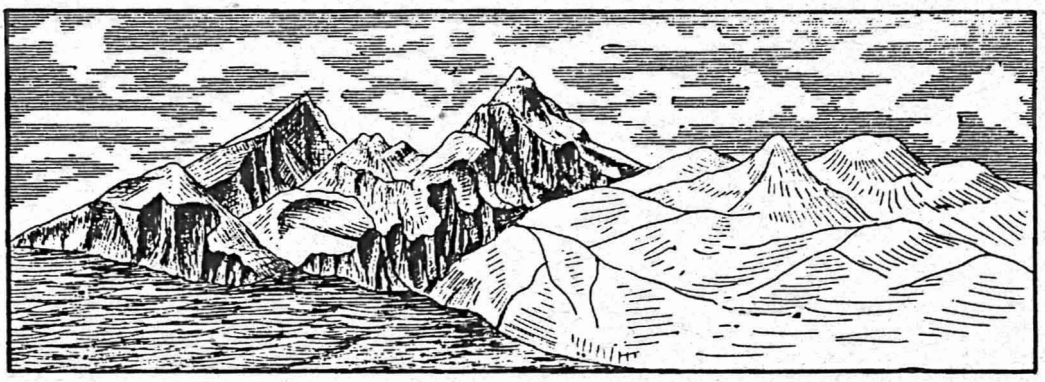


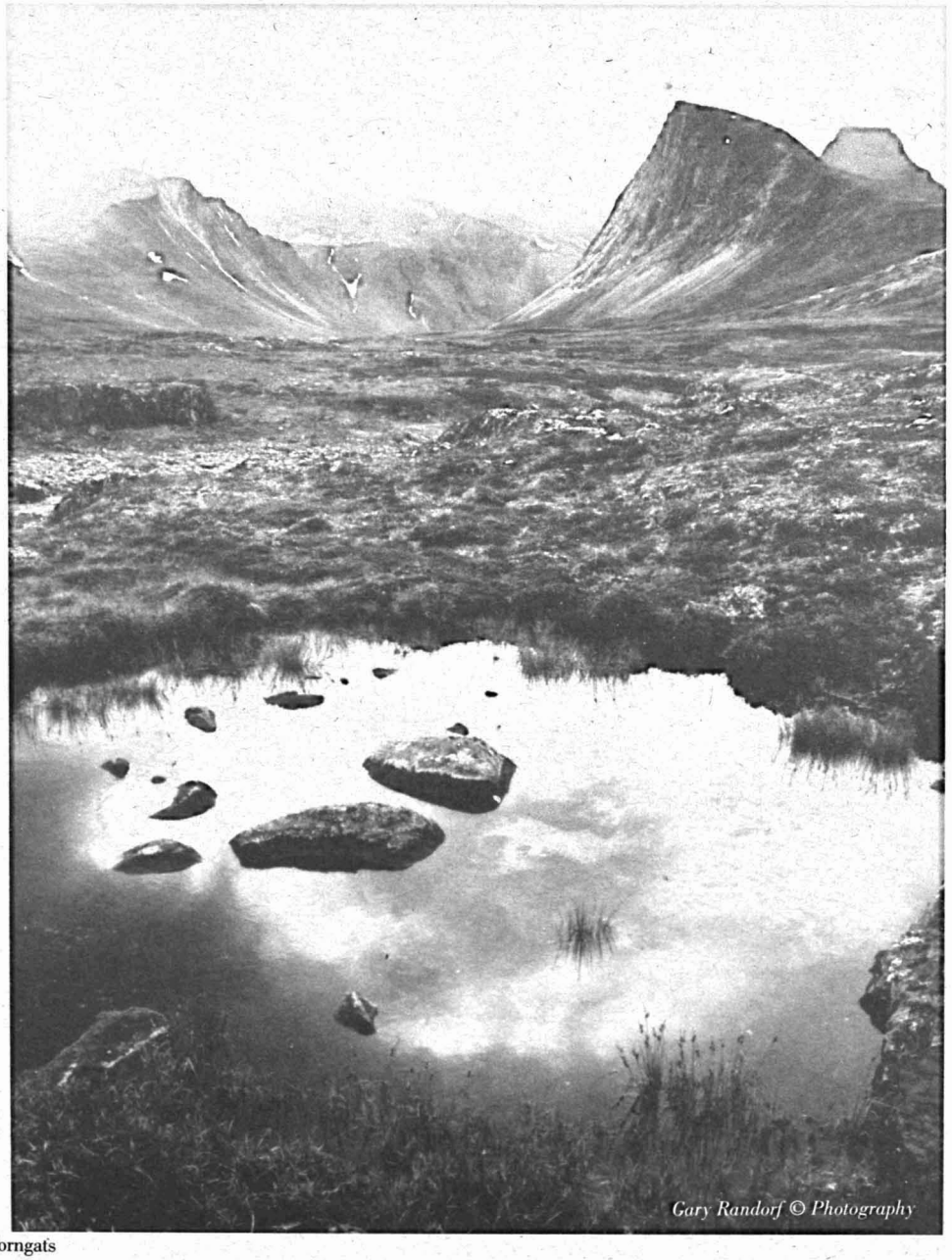
illustration from W.T. Grenfell's 1922 book Labrador: Land and Its People

There are no roads, no scheduled boat or plane services, no permanent human inhabitants for a hundred miles in any direction. Even photographs are scarce, and don't seem to do this strange place justice. The most accurate early guidebook dates from 1922, W.T. Grenfell's *Labrador: Land and Its People*. A doctor and missionary who wrote many volumes on the place, W.T. is far from modest about its charms: "The climate of Labrador is not excelled anywhere in the world for its bracing and invigorating effect." Grenfell had big plans for the area. He thought it could be the Norway of North America, a prosperous yet remote northern outpost. But the good doctor was wise enough even seventy years ago to warn of the land's fragility: "If its wild life is all destroyed, Labrador will lose a great deal of its attractive possibilities."

Not much has changed in the Torngats since Grenfell's day—if anything there are fewer visitors to the area. Our culture moved on to bigger and more crass kinds of resource devastation. But now such threats are poised to come to the Torngats, just as the government of Canada is reviewing plans to declare most of the region a national park.

Labrador is the mainland portion of the Canadian province of Newfoundland. (Pronounce that "NEWfndLAND." That's also the name of the big island to the south, which is the more populous part of the province. Both areas joined Canada only as recently as 1949, before which they were a separate part of the British Commonwealth.) Since there is a moratorium on fishing these days off the island of Newfoundland (due to the collapse of the cod fishery following years of overfishing), the province needs new sources of revenue. Enter the mining companies. A major nickel find in Voisey Bay a few hundred miles south of the Torngats has brought mining fever to Labrador. [See previous *WE* articles on Labrador by Gary Randorf, spring 1996, and Alexis Lathem, winter 1996/97.] Almost 40% of all of Canada's new mining claims are in this small province! The industry doesn't want preservation to stop what they call exploration.

Most of the people of Newfoundland are coming around. They want to save these special mountains. The establishment of a park in the near future seems likely, but it is being held up by debates on two southeastern sections of the area, one desired by the miners and the other claimed by the native people, the Labrador Inuit.



Torngats

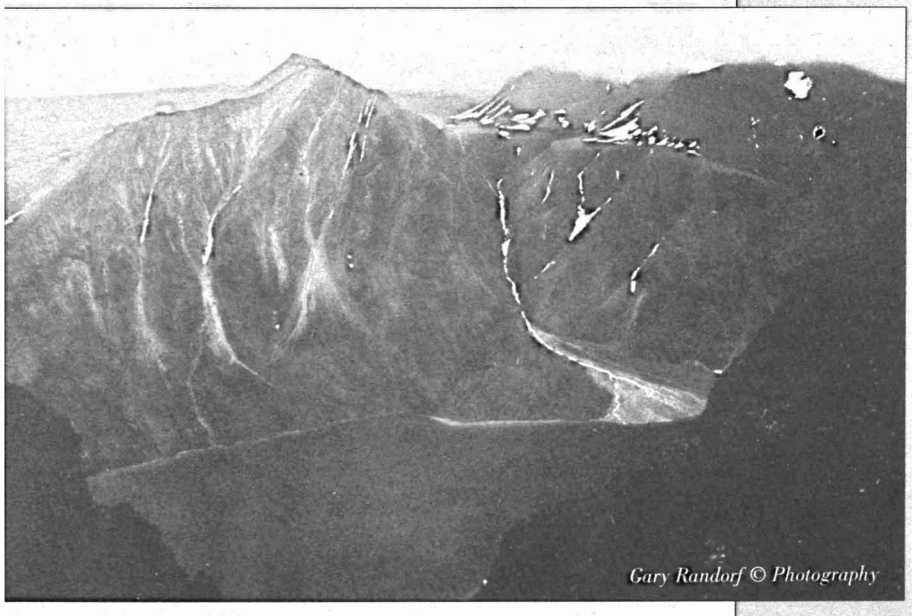
Unfortunately, now the ENTIRE Torngats area is being claimed by the Nunavik (Quebec Inuit) represented by Makiyik Corporation. They want the area for commercial development, not traditional subsistence. If the courts agree to the injunction, this could hold up the park indefinitely.

Both areas deserve protection, and they are essential to the Torngat ecosystem. Here's why.

Labrador's level of wildness is hard to come by, and will remain pristine long after more accessible parks are overrun. But because the area is so far away, some interests feel lawlessness can prevail, since no one will notice. I came across a long, delicate sandy beach on the end of a long thin lake with sheer cliffs rising four thousand feet straight up on either side; on this beach lay twenty rusty canisters left as some kind of cache for refueling. Who left them? Probably mining exploration companies looking desperately for something to hold up the establishment of the park—just a glimmer, a chance that untold riches could lie beneath all this beauty. But the area has been explored unsuccessfully for twenty-five years already. There is nothing worth tearing up the earth for. Minerals are a temporary resource whose removal scars the land. Labrador has one essential, indubitable, eternal resource that becomes increasingly valuable with time: pristine wilderness. And as time goes on, more and more sides to the debate are becoming unified around the need to create the Torngat National Park.

The mining companies have intensified their protest as well, largely because they hope for another mother lode like Voisey Bay. They have been spreading

Komaktorvik Lake & Torngat Mts.



Voisey's Bay Project Under Review

by Alexis Lathem

The environmental assessment of a proposal to develop one of the world's largest industrial complexes in the heart of eastern North America's greatest wilderness is currently underway. The Voisey Bay Nickel Company (owned by Inco) has proposed to extract an estimated 150 million tons of nickel, cobalt, and copper ore from a massive sulfur body located in the fertile, forested valley between Voisey's and Antakalek Bays, in remote northern Labrador.

The first phase of the environmental assessment has concluded. Along the Atlantic seaboard from the lower north shore of Quebec to the northernmost community in Labrador, residents of coastal communities came to the scoping sessions to express their anxieties, anger, bitterness, opposition— but never their approval or consent.

Although opposition to the massive mining operation is nearly unanimous in these communities, they lack confidence in the power of their opposition. Little support has been coming from the international environmental community, even though the ecological consequences of the project are likely to be international in scope.

Inco has proposed to locate its smelter for the ore extracted from Voisey' s Bay in Argentia, Newfoundland, over the Grand Banks, once one of the world's richest fisheries. It would be Inco's—and the world's—largest nickel smelter, larger than Sudbury's, which is the greatest single source of acid rain in the western world. So far, neither the European countries, nor the United States, who would be affected by an exponential increase in acid rain levels, have responded to this serious menace. Any conservationists working for the protection of marine life down-current of the smelter need to be concerned about this new source of acid and heavy-metals pollution.

There has been a sense of inevitability surrounding the Voisey's Bay project since the "Klondike" discovery was announced in 1994. Yet Inco still has to overcome enormous obstacles—technological, political, economic—before it can begin operating in a place locked in ice six months of the year and entirely without infrastructure. If Inco succeeds in developing this intractable wilderness—"the land God gave to Cain"—it will be the first success out of many attempts to do

so. In June, it was announced that the project may be delayed a year if land claims negotiations are not settled (an important political risk insurance for the company). Meanwhile, workers at Inco's Sudbury operations are on strike.

Finally, those of us who simply need to know that there are places in the world untrammeled by human industry—indeed wildlands large enough to encompass the sweeping rhythms of the giant Caribou herds that roam the Quebec-Labrador peninsula as the buffalo once roamed the prairies—will feel the loss, somewhere at the level of the human spirit that connects us to wild Nature, if Labrador goes the way of the rest of this once beautiful continent. ❙

REQUEST FOR TESTIMONY

The company's environmental impact study will be subject to a 75-day public review period once it is submitted to the environmental assessment panel; if the study is judged adequate, public hearings will follow. This process is proceeding *very quickly*, as Inco expects to begin operations in 1999. Your comments (oral or written) are encouraged. Contact:

Brian Torrie, Panel Manager
Canadian Environmental Assessment Agency
200 Sacre-Coeur Blvd.
Fontaine Building, 13th floor
Hull, Quebec K1A 0H3
Canada
819-997-6364 (phone); 819-994-1469 (fax);
torrie@fox.nstn.ca.

Also write to Premier Minister Brian Tobin and demand that Inco respect the environmental assessment process:

Brian Tobin, Premier of NF
POB 8700
Confederation Building
St. John's, Newfoundland A1B 4J6 Canada

Information on the Voisey's Bay environmental assessment, including the transcripts from the hearings, is posted on the Internet (http://www.ceaa.gc.ca/english/panel/voisey/voisey/etransc.html), or contact the Friends of Nitassinan for information: POB 804, Burlington, VT 05402 (ph/fax: 802-425-3820).

Alexis Lathem is co-director of the Friends of Nitassinan, an organization helping to defend the wildlife and indigenous people of the Quebec-Labrador peninsula.

unsubstantiated rumors of gold finds or even diamonds. The fever has spread. The Torngats, they cry, we want the Torngats too.

The debate focuses on the southeast of the proposed park, an area around Ramah Bay that the mining companies and the province's Department of Mines and Energy want excluded from the proposed park. They see this as a compromise solution, while environmentalists have demonstrated that this is no compromise, but an arbitrary line placed on the map to exclude essential parts of a unique ecosystem. Intactness of beauty is impossible to quantify, difficult to demonstrate, but the specifics of species and habitat come much clearer.

The Ramah Bay area includes essential calving grounds for two enormous Caribou herds, the 800,000 animal George River and 10,000 animal Torngat Mountain herds. It encompasses the most northerly known breeding grounds for the Atlantic population of the Harlequin Duck. There are nesting pairs of Peregrine Falcon, and part of the range of the planet's only tundra-dwelling population of Black Bears. For the integrity of the park, this area must be included.

Why the debate? Why is the mining lobby so adamant about carving off a piece of this ecosystem for themselves that has no PROVEN commercial relevance? They want to be listened to. They want some kind of insurance for a distant time when maybe money could be made out of the meager amount of valuable minerals that might be there.

The culture of mining is one of the most difficult industries to change toward a sustainable view. Forestry is renewable, and could begin practising something sustainable. Minerals don't grow back. All we can hope for is that the gold-rush mentality goes away, and that the industry turns more toward efficiency and recycling, along with more careful extraction that does less damage to the area it invades, and careful clean up once the mines have been abandoned.

Meanwhile, fever grips the whole province of Newfoundland. Activists are documenting the messes left by mining explorers. At Komaktorvik Lake last year, we found thirty rusted oil drums left decaying on an otherwise pristine beach. An embarrassment, a crime against our humanity and our naturalness.

The people of Labrador support the creation of the park with near unanimity—they have seen enough mining come and go to know that the extractive, gold-rush mindset does not take the long-term interests of the people to heart. Inuit and white Labradorans alike have come to realize that establishing the park is part of a positive future that builds on the real value of the province,

for the human and the more-than-human world. A section of the proposed park between Hebron and Saglek Fjords has been claimed by the Labrador Inuit, who emphatically don't want large-scale industrial development in the area, but do want the option of future human settlement and commercial use of Char or Caribou. A special category of protection, called "Public Reserve," may be established to allow limited resource development (with mining forbidden) under the native people's control.

But we down south advise the Inuit to be careful: such multi-use designation has wreaked havoc on our own public lands. We hope you can do better. And remember that one native elder, when he heard the amount of eternal protection that a national park guarantees, smiled and said, "Well, why can't we make *all* of Labrador a national park?"

The Torngat Mountains National Park is for both people and Nature. Supporting it to its fullest extent would mean we become a people worthy of being called part of Nature. If we instead go for short-sighted, badly planned extractive industries, we will further close ourselves away from the severe but magical Nature that is both our greatest resource and the greatest intrinsic value, far beyond resource.

If you care about the unique and distant beauty of the fabulous arctic, make the trip to Labrador; see its solemn greatness for yourself. But before you go, insure that you will have many, many years in which to make the journey. Make your views known to Brian Tobin, premier of the province of Newfoundland, and show that concern for biodiversity knows no national borders. ❙

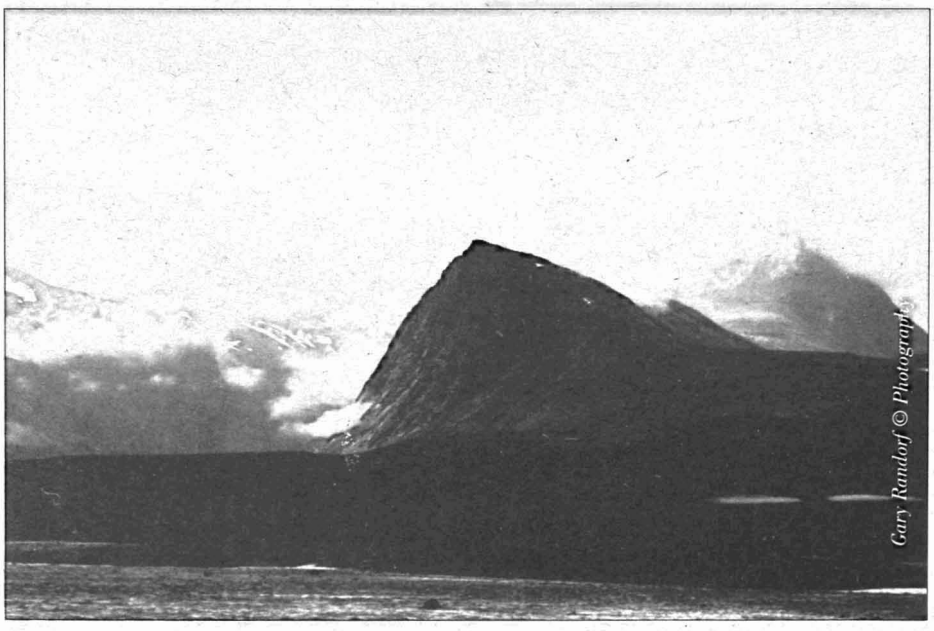
For information on the campaign to establish the Torngat Mountains National Park, contact:

Laura Jackson, director
Protected Areas Association of Newfoundland & Labrador
Box 1027, Station C
St. Johns, Newfoundland
A1C 5M5 CANADA
phone/fax: 709-726-2603
e-mail: paa@web.net

Mary Granskou, executive director
Canadian Parks and Wilderness Society (CPAWS)
401 Richmond St. West, suite 380
Toronto, Ontario
M5V 2A8 CANADA
phone: 416-979-2720
fax: 416-979-3155

To show your support for the immediate establishment of the Torngat Mountains National Park, please write to the premier of Newfoundland explaining why the park should be as large as possible and should include the disputed Ramah Bay sector. Write to:

The Honorable Brian Tobin, premier
POB 8700
St. John's, Newfoundland
A1B 4J6 CANADA
fax: 709-729-5875



Torngats near Komaktorvik Lake

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Budworms and Chaos

Non-linear relationships between spruce budworm and fir trees in the Blue Mountains of northeast Oregon and southeast Washington

by Norm Cimon

Grazing, fire-suppression, commercial timber harvesting, and even seemingly benign activities such as firewood cutting and mushroom picking have had and will have a continuing impact on our forests.

This article presents a discussion of the state of the forests in the Blue Mountains of northeast Oregon and southeast Washington. Stretching from central Oregon eastward to the Hells Canyon country, and intruding northeastward into the rich Palouse soils of eastern Washington, these mountains are both geologically and floristically diverse. On the west they grade into the largest juniper forest on the planet, while to the east, high-elevation grasslands edge the deep canyons which finger down to the Snake River. Elevations range from 3500' to almost 10,000', with extensive montane forests covering the slopes in between where aspect and soils allow. The Blue Mountains provide abundant habitat for species as diverse as Bull Trout, Peregrine Falcon, Rocky Mountain Elk, and Mountain Quail. In the last few decades, having weathered a series of insect outbreaks, they have become the focus of a debate over forest health.

This article was written in response to all the conjecture and debate revolving around possible management alternatives. There is a need to state plainly some of what we know and don't know, and to place it in the context of the ongoing debate on the possible role of non-linear[1] relationships in ecological theory. The changes we have wrought in the last one hundred years are making themselves felt throughout our western ecosystems. Grazing, fire-suppression, commercial timber harvesting, and even seemingly benign activities such as firewood cutting and mushroom picking have had and will have a continuing impact on our forests. Understanding the combined effects of our actions can be complicated at best (Belsky and Blumenthal 1997) and even counter-intuitive, as you will see in this story.

In 1993, the outbreak of Western Spruce Budworm, *Choristoneura occidentalis*, a major defoliator of Douglas-fir and true fir (a hybrid of Grand Fir and White Fir in the mountains of the interior Pacific Northwest), collapsed even more quickly than it had started seven or eight years before. Here "collapse" is used in the quantitative sense: the number of budworm per square meter of foliage over time has dropped to a background level which is below population levels recorded when the outbreak started. In some places the number of insects has been reduced by two orders of magnitude in a few years.

Entomologists have now had their first chance to watch an entire outbreak cycle in this part of the western United States, from beginning to end. The pattern and length of the irruption bear a close resemblance to those of the closely related eastern species of budworm, *Choristoneura fumiferana* (Royama 1985). Western scientists, as their eastern counterparts before them (Tothill 1922), are searching for answers to the dramatic collapse at the end of the outbreak, looking for clues as to why the population irrupted initially, how it was maintained, and why it collapsed.

There is a "mathematical taxonomy" to the budworm's behavior: populations fluctuate in an irregular fashion yet they grow and decline in a few years or less at the beginning and end of the outbreak cycle. The background and outbreak levels are quite distinct and robust. To say it another way, the population exists in one of two mutually distinct states, and is relatively constant in either one. In both states, the population oscillates somewhat randomly, but in a bounded way. At background levels, the population tends to stay at background; at outbreak levels, it tends to stay at outbreak. The transition between these states may be triggered by a non-linear relationship between the budworm and some factor or set of factors in its environment.

[1]Non-linear means that the quantity we're trying to predict, such as an insect population, is affected by variables that can "feedback" to the quantity so as to amplify or damp the change in population level.

The system may be exhibiting what is called chaotic or near-chaotic behavior. The word *chaos* is used to describe systems that are not absolutely predictable in their behavior, and that are capable of changing their course in this abrupt fashion. The relationships that tie the parts of these systems together can be simple yet still result in sudden shifts in behavior. This behavior will also be very sensitive to changes in the starting point of the system. A slight difference in these initial conditions might lead to a very large difference in the state of the system over time. (Crutchfield et al. 1986).

In the case of the budworm, the background and outbreak population levels might be the signatures of these different movements. To verify whether or not this is the case, the recommended procedure is to watch the system for a few hundred cycles and then to create a diagram mapping out these movements in time (Kot and Schaffer 1984). The problem is that it may be 30-40 years or so between outbreak cycles. This rounds out to 3000-8000 years of sampling! Proof will be hard to come by, and may only be arrived at indirectly, through tree coring, pollen records, and other paleobotanical evidence.

Along this line, Boyd Wickman, now retired from the Forestry and Range Sciences Lab in La Grande, Oregon, recently showed the results of years of tree-ring work (Wickman et al. in press). Employing the sophisticated software developed at the University of Arizona's tree-ring laboratory and with old-growth Ponderosa Pine to factor out the effects of climate[2], he has identified what may be a regular cycle of Western Spruce Budworm outbreaks every 40 years or so, in the Wenaha-Tucannon Wilderness of the northern Blue Mountains. There are also clear signs of tussock-moth outbreaks, the two distinguished by their distinct signatures. These signatures are available thanks to careful monitoring of the recent outbreak, and to 24 years of tussock-moth population data gathered by Dr. Richard Mason, also at the La Grande lab. Another scientist at the lab, Dr. Catherine Parks, has done work just as fascinating. In the plantings she did as part of her doctoral research (Parks 1993), she found that dry periods enhanced budworm defoliation. The water-stressed trees that were most susceptible to defoliation were also those that most readily redirected their metabolism into enhanced root storage and development. She also found indications that these young defoliated trees might be the ones best adapted to survive the outbreak, since they offered less of their future metabolic gains for the budworm to take. Those trees that continued to put out green needles, with less of their development going into their root systems, eventually showed the most stress and mortality.

Such evidence suggests that we may be looking at a tightly co-evolved system, with the budworm performing a crucial role by applying evolutionary selection pressure on several major tree species. In turn, this herbivory could be part of a feedback loop which then controls the budworm population.

The idea that simple non-linear relationships could lead to such interesting behavior has stimulated scientists to explore the implications using mathematical models. They've found that model populations with even simple predator-prey relationships can develop complex spatial patterns ranging from regular to chaotic (Hassell 1994)—like what we observe in budworm populations and the populations of other western defoliators as well. Needless to say, some of these ideas are quite controversial and they have sparked a healthy debate about the nature and meaning of fluctuations in insect populations (Logan 1991).

Why would such tight feedback loops evolve? Climate change could certainly be one reason. Recent corings of the Greenland ice sheet reveal a remarkable record of variation in the temperature over the last 100,000 years, with temperature shifts sometimes very rapid (Taylor 1993; Alley 1993). These climatic changes would have to be reflected in plant communities as well.

Our western conifers have been around for a long time. We have to assume that they have the necessary genetic diversity to be able to respond very rapidly to such modifications in climate, moving into sites that have changed to fit their needs. There are arguments about how fast trees can migrate into "open" environments (see for example Gear and Huntley 1991); but there's no doubt that plant communities reorganize themselves in ways that we find difficult to imagine, given what we currently see around us (Spaulding 1984).

What about the trees occupying a site to which they are now less adapted? Fire and insect outbreaks could provide a means by which otherwise long-lived trees of a given species would be removed from an area that had become drier due to climate change, opening the way for better adapted individuals or members of another species.

It is my hypothesis that by removing old-growth Ponderosa Pine and attempting to suppress all fires, we may have sent a false climate signal. In the absence of competition and fires, the Douglas-fir and true fir have occupied the landscape at a density more characteristic of wetter sites or times. The pumping action of thousands of trees per hectare, many now reaching optimum growing age, has induced droughtiness in the soil and a nutrient shortfall. Enter the budworm to return the ecosystem to balance.* Such ideas about the role of insects in forest ecology are now gaining currency (Showalter 1991).

All of this was amply brought home during a visit to a friend's land right as the outbreak ended. He told me of his amazement at the disappearance of the budworm and at how trees that appeared to be dead

[2]Ponderosa Pine is not affected by the insect pests of Douglas-fir and true fir but it would respond to changes in climate along with true fir and Douglas-fir, allowing scientists to distinguish between suppressed growth from climate shifts and insect outbreaks.

* Science Ed. Note: This ecosystem-level resilience might suggest that, if we let Nature take its course without management, then everything would turn out all right. But such a conlusion would ignore the potential loss of dozens or more species that require the open forest structure maintained by fire. Hence the need to consider individual species, as well as ecosystem properties, and to engage in restoration forestry, if we want to retain native floras and faunas.

because of their total defoliation were growing new crops of needles. We walked around the immediate vicinity of his cabin and noticed quite a few 10'-20' trees in the understory that were showing no signs of life. But almost all of the 30'-40' trees had new crops of needles from 1/2 to 3/4 of the way up. A natural thinning appeared to be taking place, and while other insects may eventually cause the death of some of the "survivors," clearly the outbreak was nowhere near as catastrophic as originally conjectured.

Implications of this relationship are that, first and foremost, the budworm is an integral part of the ecosystem and has been evolving along with its tree hosts for a long time. Second, the forests are probably not going to disappear, since they are adapted to respond to insect outbreaks. Finally, without fire, forest insect populations become the primary control on the tree density in fir dominated stands of the Blue Mountains.

The first and last of these can be linked via a mathematical argument. Before the arrival of white settlers with their emphasis on fire suppression, the fire return frequency in the Blue Mountains was about 10-20 years. Of course, this is just the average in a statistical distribution. Some areas would have burned more often, and some less often. It seems natural to assume that generalized organisms, such as the spruce budworm or tussock-moth, would step forward to recycle the nutrients bound up in heavily stocked stands.

This argument makes it clear that economic imperatives have to be tempered by ecological and evolutionary reality. The tenets of industrial forestry are simple. The emphasis is on heavy machinery, uniform harvesting techniques, large expenditures of capital, and maximizing profit through greater efficiencies[3] of scale. Maximum volume increment, a corollary to maximum profit, is seen in all cases and everywhere as a good thing. This logic would lead foresters to select for trees with the ability to continue producing green needles, a sign of growth, during budworm outbreaks. There is only one immutable law in biology, however, the law of survival. The only quantity that is maximized is the probability that an individual will live on to produce more of its kind. This is what makes the argument above quite plausible: the idea that evolution would have directed Douglas-fir and true fir into hedging their ecosystem bets. The husbanding of valuable metabolic resources in below-ground biomass, rather than above-ground tree growth, may signify the genetic diversity necessary to deal with rapidly changing environments. If this is the case, then forest economics should be yoked to these ecosystem realities.

In no way do I intend to minimize the current problems facing forest managers. There are pockets with quite a few dead trees. In such areas, the potential for stand replacement fires does exist. The point is that care should be taken with wide-scale thinning or harvesting regimes. In the immediate aftermath of an outbreak, it can be difficult to tell which trees will make it and which won't, and it's the survivors that provide grist for the evolutionary mill. Given the past history of rapid climate change, we must preserve as much of the naturally occurring genetic diversity as possible in the trees of these forests. ▮

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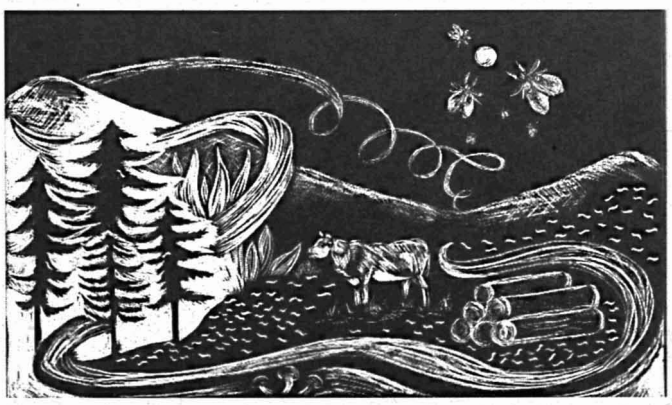
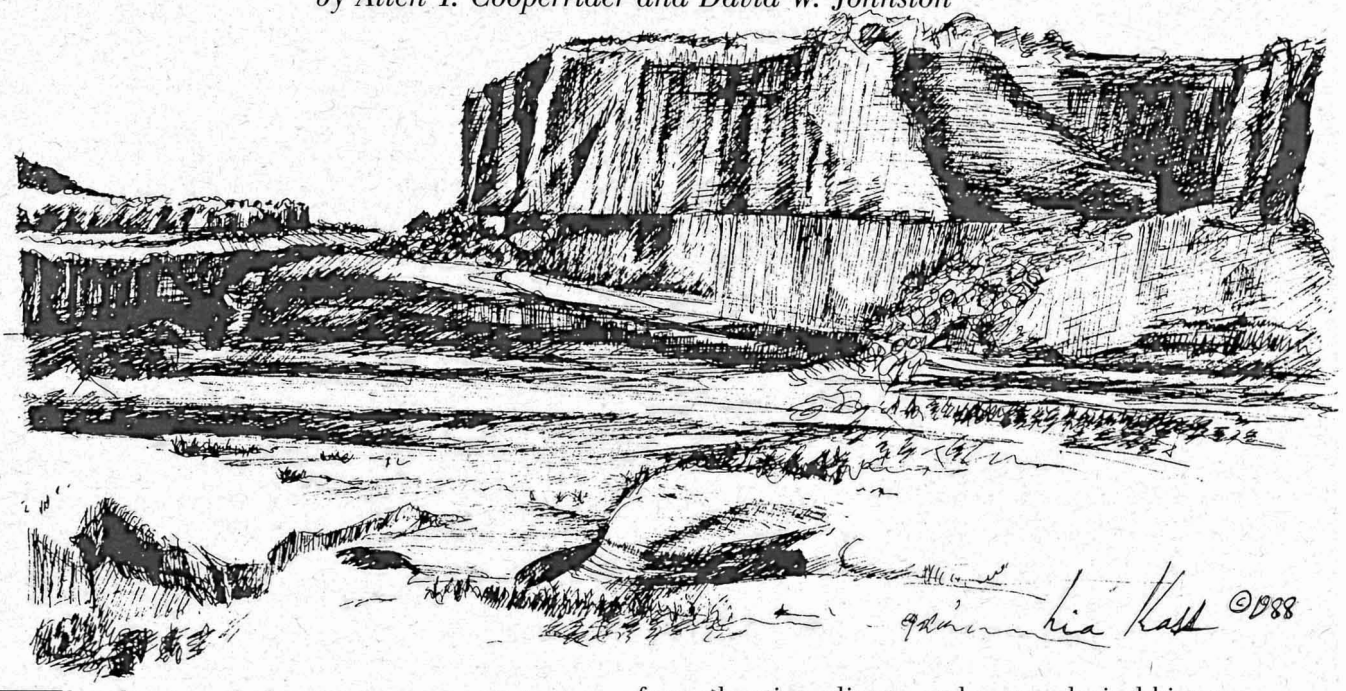


[3]These efficiencies included, until quite recently, fir monocultures as a replacement for the slower growing Ponderosa Pine.

illustration by Mary Elder Jacobsen

Change in the Desert—Geological and Human

by Allen Y. Cooperrider and David W. Johnston



The deserts of the southwestern United States, like all landscapes, have changed over time. Much of this change was slow, occurring over thousands of years in what is termed "geologic time." Today, however, the deserts are changing more rapidly due to human activity. To put human-induced change in perspective we need to understand how biotic communities have changed and developed in the past. This in turn can help us understand the ecological processes that now maintain these communities and how disruption of these processes is contributing to the loss of species and the decline of biodiversity.

The region described here is often called the Basin and Range Province because of its characteristic topography: numerous mountain ranges, typically 10 to 30 miles in length, separated by valleys. The Bureau of Land Management (BLM) lands of the Southwest fall into five desert or semi-desert regions: the Great Basin, Mojave, Sonoran, and Chihuahuan deserts and the Colorado Plateau semi-desert. These deserts and semi-deserts have distinctive plant and animal communities as a result of differences in landform, elevation, climate, and past geological history.

The differences among the deserts are important to understand, because management practices that work in one desert region may be quite destructive in another. In this chapter we outline very briefly a few characteristics of these deserts.

The Great Basin Desert

Named for the expansive basin enclosed by the Sierra Nevada-Cascade ranges on the west and the Rocky Mountains on the east, the Great Basin Desert is the largest, coldest, and northernmost desert in the United States. It covers nearly all of Nevada and extends into western Utah, southern Idaho, eastern Oregon, and southwestern Wyoming.

The Great Basin is arid because it lies in the rain shadow of the Sierra Nevada and southern Cascade mountain ranges. Little moisture is left by the time the eastward-moving air crosses the mountain peaks. Because of its altitude (4000 feet and above) and northerly latitude, winters are generally cold with moderate to heavy snowfall—hence the name "cold" desert. Annual precipitation in the basin ranges from 4

This article is adapted from *Defending the Desert: Conserving Biodiversity on BLM Lands in the Southwest.* Copies of this report can be purchased for $15 from the Environmental Defense Fund, 257 Park Avenue South, New York, NY 10010.

illustration by Lia Kass

to 10 inches, most of which comes as snow. Temperatures are variable, from below freezing to well over 100 degrees F. The combination of low precipitation (most of which falls before the growing season), high evaporation rates, and low relative humidity results in extensive desert areas with sparse vegetation.

The Great Basin contains many conifer-covered mountain ranges from 10,000 to 12,000 feet in elevation (e.g., the Ruby Mountains in central Nevada). These ranges tower 5000 to 6000 feet above valley floors. Working downslope from the crests, one moves first into pinyon-juniper zones and then into shrub-covered basins broken by low-lying, seemingly endless expanses of white alkali flats.

The few rivers and streams draining the mountainsides often have green borders of willows and cottonwoods along their meandering courses. Marshlands where streams enter lakes provide essential cover, food, and nesting habitat for wildlife. The Truckee River, flowing eastward from the Sierra Nevada, empties into Pyramid Lake, a lake of about 200 square miles in size which is home to many species of wildlife, including the rare Lahontan cutthroat trout, the largest cutthroat known, and a colony of American white pelicans. Much of the Great Basin was covered with lakes during the Pleistocene epoch, and Pyramid Lake is a remnant of the ancient Lake Lahontan which once covered over 8000 square miles and was almost 900 feet deep.

Of all deserts in the United States, the Great Basin has the lowest diversity of plant and animal life. Because of the dominance of big sagebrush and closely-related species of sagebrush over millions of acres, ecologists often refer to this region as a "sagebrush desert." However, many other shrub species are present, such as shadscale, winterfat, and Mormon tea. In highly alkaline places, only salt-tolerant plants such as greasewood and glasswort can grow.

The pygmy rabbit and sage grouse are characteristic animals of the Great Basin. Pronghorn antelope were once found throughout the flatter and more open areas of the Great Basin, while mule deer were found on both the valley edges and mountain slopes. Bighorn sheep occupied the more rugged mountainous areas but would make occasional movements across valley floors to other isolated mountain ranges. These are, however, only some of the larger, more prominent wildlife species.

Mojave Desert

Smallest of the North American deserts, the Mojave is one of the three "hot" deserts. It is lower in elevation and warmer than the Great Basin. It occupies some 25,000 square miles in southern Nevada and southeastern California. The region is characterized by low-growing shrubs, cacti, and yuccas.

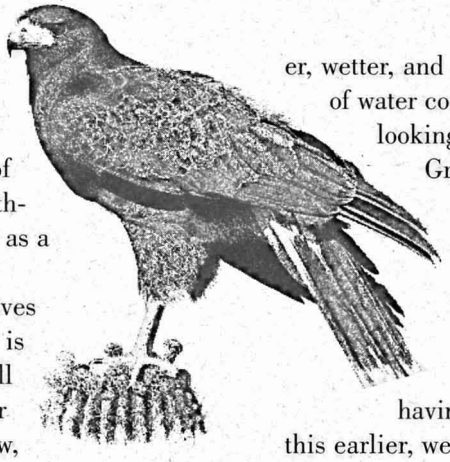
Among the US deserts, the Mojave is the driest and hottest. The highest recorded temperature in US history was in the Mojave (134 degrees F. in the shade in Death Valley). Average annual precipitation in the Mojave is four inches, chiefly in the form of winter and late summer rains. Adaptations to this harsh environment include wide spacing of plants, these often with reduced leaf surfaces and deep root systems. Although the Mojave Desert has the simplest vegetation patterns and low species diversity, nearly 25% of all the Mojave Desert plants are endemics.

Mention of the Mojave conjures up a picture of low-lying Death Valley and Joshua trees, but the terrain is much more diversified than that. Barren mountain ranges slope to seemingly endless plains of creosote bush, home of the desert tortoise. Large sand dunes such as the Kelso Dunes provide the only habitat for the Mojave fringe-toed lizard, which plunges into the sand to escape danger. Pinyon-juniper woodlands on the mountains are home to many species of wildlife, including Gambel's quail. Scattered oases shaded by cottonwoods provide water and cover for wildlife. Evidence of vulcanism can be seen in the widespread, beautifully symmetrical cinder cones, old lava flows, and deposits of volcanic ash.

The Chihuahuan Desert

The Chihuahuan Desert, another hot desert, is named for the large Mexican state where much of it lies. Its US extension is located in southern New Mexico and runs into western Texas. In this desert most rain falls during summer, although there is also some precipitation in winter. The characteristic vegetation includes grasses, yuccas, agaves, and shrubs, especially creosote bush. Mountains rising above 5000 feet overlook rolling grasslands, creosote bush plains, cactus savannas, and agave thickets underlain by volcanic or limestone soils.

The Chihuahuan Desert is most noted for the agave known as lechuguilla. Often it grows in great masses or mats over the arid mesas and limestone hills. However, this species does not extend far into New Mexico, where virtually all the BLM lands in the Chihuahuan Desert are found. The most common vegetation type in the lowland areas is creosote bush—a species found in the other hot deserts as well. Some 400 species of birds have been recorded in this region, including the greater roadrunner, five species of doves, and occasional wandering species from Mexico.



Harris's Hawk on Saguaro *by John Gilardi*

The Sonoran Desert

The third of the hot deserts, the Sonoran, forms a horseshoe-shaped area surrounding the Gulf of California. It lies across much of southern New Mexico and Arizona as well as a portion of southern California.

The Sonoran Desert, which receives both summer and winter rainfall, is subtropical in nature, supporting tall cacti and shrubs as well as lower grass, cacti, and half-shrubs (low, woody plants) typical of the other deserts. Because rain falls both in summer and winter, this desert grows both summer and winter annuals.

With this bimodal precipitation pattern and a greater structural diversity of vegetation, the Sonoran Desert supports the greatest diversity of plant and animal life of any of the US deserts. A characteristic and well-known plant is the tall, columnar saguaro cactus. Nest holes in saguaros are excavated by Gila woodpeckers, a typical bird of the region. Many other animals, including at least five species of birds (among them the elf owl) make use of such cavities for nesting and other functions.

The Colorado Plateau

The Colorado Plateau semi-desert sprawls across the Four Corners region. It includes the southeastern quarter of Utah, the northeastern quarter of Arizona, and portions of southwestern Colorado and northwestern New Mexico. It is considered part of the Great Basin Desert by some, a separate desert system by others, and a semi-desert by yet others. The Colorado Plateau contains some of the most spectacular arid lands of the West, including Arches, Canyonlands, and Capitol Reef National Parks and surrounding BLM lands.

Vegetation resembles that found in the higher elevations of the other deserts, including the typical piny-on-juniper type. Most of the area is over 5000 feet in elevation and has cold winters like the Great Basin Desert. And like the Great Basin, much of this region receives scant rainfall, coming primarily in the form of winter snow.

Geological Change

Biogeography, the study of the distribution of plants and animals, has shown that over long periods of time, plant and animal communities are always changing. The deserts of North America are no exception. As recently as 10,000 years ago, much of the desert region was cooler, wetter, and covered with large lakes. The abundance of water compared to the present can be observed by looking at old shorelines such as those around Great Salt Lake. As these lakes dried up and the climate became warmer, many species of plants and animals became isolated and evolved into distinct forms. For example, over ten species of pupfish (*Cyprinodon* spp.) in the arid Southwest are all closely related, having evolved from a common ancestor during this earlier, wetter period. As the rivers and lakes dried up, populations of pupfish became isolated in individual drainages and, over time, evolved into separate species. In the cases of some species, such as the Devil's Hole pupfish, the drainage has been reduced to a remnant spring.

As the region became more arid, other species survived only on isolated mountaintops, which are cooler and moister than the surrounding lowlands. Thus Clark Mountain, the highest peak in the Mojave Desert at 7929 feet, contains many species and plant communities, such as white fir, that are characteristic of more northerly regions. These "sky islands" are found on the tops of mountains throughout the Southwest and contain many unique, isolated plants and animals.

As the region dried up, many large herbivores were extirpated, including mammoths, mastodons, and giant sloths, as well as smaller animals such as ancestral horses and camels. These extinctions occurred near the end of the Pleistocene epoch, approximately 10,000 to 12,000 years ago. This was also the period when humans were first settling the North American continent. Whether humans, climate change, or some combination of the two was responsible for the demise of these animals is still being debated by scientists. What is not in debate is that for approximately 10,000 years—from the time of the Pleistocene extinctions until the Spaniards first introduced cattle, sheep, and horses into the Southwest less than 500 years ago—the Southwest deserts did not have any large herbivores other than the ones that are still present there. These include mule and white-tailed deer, elk, bighorn sheep, pronghorn antelope, and peccary. A few scattered areas within the current deserts have reintroduced populations of bison, but most evidence suggests that bison have been rare in the Intermountain West since the Pleistocene.

Human-induced Changes

Long-term changes in flora and fauna due to changes in landform and climate need to be distinguished from

short-term (but long-lasting) changes caused by humans. Since the arrival of European settlers beginning about 500 years ago, many plant and animal communities of the desert have been drastically altered by humans.

The invasion of cheatgrass, with the resulting alteration in vegetation and disturbance cycles, provides a good example of a widespread change caused by humans in the last 100 or so years. European settlers in the Great Basin introduced livestock into an area that had not been subjected to grazing by large herbivores for thousands of years. At the same time, these settlers brought to this continent many weedy plant species that subsequently invaded native rangelands. Agricultural practices such as plowing provided an ideal habitat for these invasive, weedy plants to become established. One of these was "cheatgrass," so named because early farmers thought their wheat seed had degenerated into a weed and thus "cheated" them.

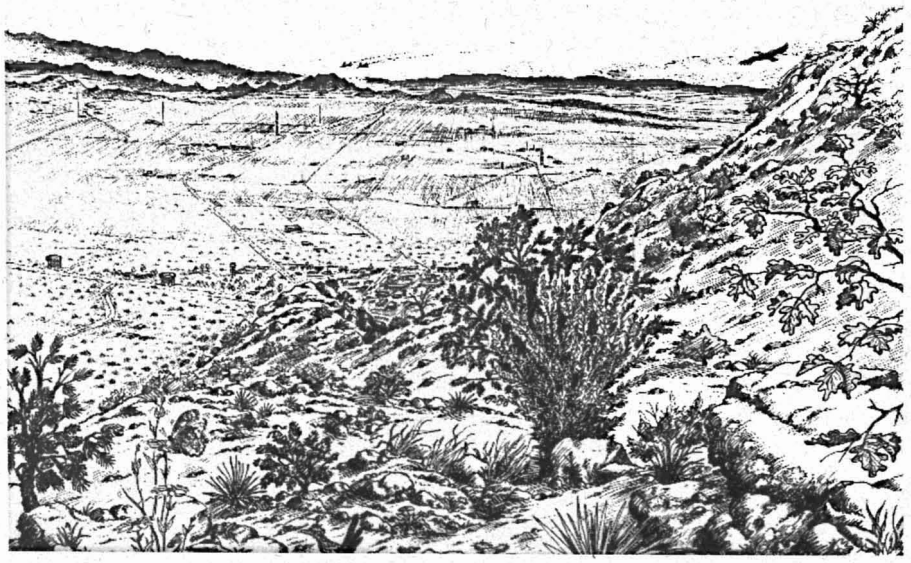
Cheatgrass is an annual grass native to the arid steppes of central Eurasia. It produces lots of easily dispersed seed, which readily invades and grows on disturbed sites; it is often the first grass to green up in the fall or late winter. It dries out quickly, however, forming a mass of litter that makes a site vulnerable to burning from either natural or human-caused fires.

Cheatgrass was first noted in the West in eastern British Columbia and Washington around 1890. It probably arrived as a contaminant with wheat seed. This was an era of rampant and virtually unrestricted grazing by cattle, sheep, and horses in the Intermountain West. Habitat deterioration from overgrazing provided an ideal situation for the invasion of cheatgrass, and by 1930 it had spread throughout virtually the entire Great Basin, displacing many native plant species. Furthermore, once established, cheatgrass proved difficult to eradicate, due at least in part to its tolerance of fire.

Prior to the arrival of Europeans in the Great Basin, fires occurred primarily as infrequent, relatively low-temperature burns. Replacement of the native grasses by cheatgrass produced a landscape with much greater litter production that supported summer fires that were hotter, more frequent, and more widespread than in the past. Cheatgrass, with its early and prolific seed production, is well adapted to such fires, and readily reseeds such areas. Native species are not well adapted to such fires and gradually decrease in the landscape, due not only to grazing but also to their greater susceptibility to fire. Thus cheatgrass has not only invaded vast areas, but it has also altered disturbance cycles in a way that tends to perpetuate cheatgrass at the expense of native species.

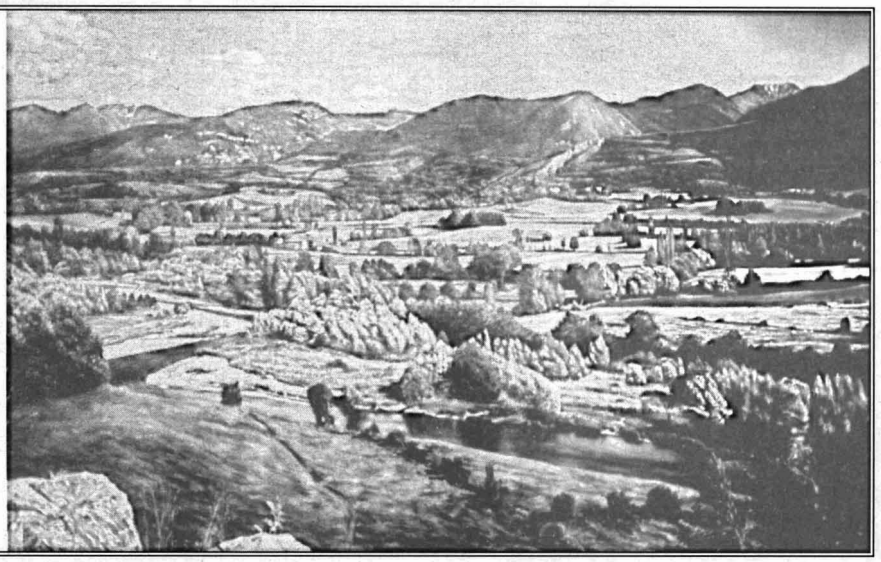
Humans have caused hundreds of other damaging changes to the western landscape—changes both subtle and obvious. These include the diversion of virtually all the natural water from the region for agricultural and urban purposes, the serious overgrazing and deterioration of both riparian areas and upland ranges, the loss of topsoil from overgrazing and off-road vehicles, and the displacement of native animals and plants by introduced species such as Barbary sheep, feral burros, and feral horses.

It is important to keep in mind the enormous difference in time scale between natural changes and human-induced ones. Those seeking to promote or justify activities causing damaging changes on BLM lands will point out that "change is natural," implying that we should not be concerned. But changes due to climate shifts and similar phenomena occurred slowly over thousands of years, whereas human-induced changes are taking place in mere decades, if not years—yet the consequences will be felt for thousands of years. ❙



From the eastern flanks of the Organ Mountains looking down on the White Sands Missile Range across the Tularosa Basin, & on to the Sacramento Mountains... by R. Waldmire

NO Wild Rivers:



Fantasy: artist rendition of the Riu Segre Valley

Comments on a Trip to the Catalonian Region of Spain

by Richard R. Harris

Scientists refer to the plants that occur next to a stream or river and that depend upon it for existence as "riparian vegetation." Riparian vegetation performs important ecological functions as wildlife habitat and protection against water quality degradation. I am an ecologist knowledgeable about Californian riparian vegetation, and that knowledge is my benchmark for comparison with rivers and streams I see in other regions. In 1994, when I left California to visit the Catalonian region of northeastern Spain (located between the Pyrenees and the Mediterranean) I expected to find similarities between the running waters and riparian vegetation of both places because of their comparable Mediterranean climates. What I actually saw in Catalonia startled me into a new appreciation for wild or at least semi-wild rivers and for the laws, ethics, and people that protect them.

The rivers in both places share many riparian plant genera. Catalonian and Californian rivers each have their own species of ash, willow, poplar, elderberry, dogwood, and walnut. The way in which these plant species are assembled into communities and the conditions of those communities, however, are radically different in the two places. In California, we have lost up to 90% of the riparian woodlands to other uses, but we still have rivers or portions of rivers where you can see riparian communities that are close to "natural" (i.e., relatively free from human impact). Catalonia has virtually no rivers where a natural riparian community survives.

California enjoys some regulatory and legal controls that protect rivers, as well as a societal ethic of environmentalism that influences a peoples' behavior around rivers and streams. We may criticize our treatment of rivers in California, and rightly so; but our behavior is benign compared to the way people treat their waterways in northeastern Spain. Catalonia has practically no enforced regulations controlling land uses or water quality impacts on streams, and the conditions of the streams indicate little voluntary respect by Catalonia's residents. In the rivers I saw there, the water is disagreeably green,

gray or otherwise discolored, refuse litters the waters and floodplains, and the flows are tamed. Discoloration is due to direct dumping of effluents and eutrophication. Government-sanctioned taming takes forms varying from channelization and levees to prevent erosion and floods to dams that capture every drop of runoff for human uses. Noxious odors emanate from ancient interconnected storm runoff/sewage drains and from streams themselves. Fish gasp at the surface of stagnant pools. Native near-stream vegetation long ago gave way to a disarray of native and exotic plants, resulting from chance success of establishment rather than ecological pattern.

The condition of Catalonian streams contrasts strongly with my images of streams as gained through extensive studies in California and Oregon and casual observations throughout the United States. Even in California's urban areas, one can find places along streams that are relicts of a more natural setting. California has its share of ruined streams, to be sure, but some places are still relatively intact. In a Catalonian landscape that has been developed for intensive use for millennia, I found no streams that in my perceptual judgment qualify as "healthy." I did not actually measure any indicators of "health," but I did see many streams and rivers and looked closely at two in Catalonia and one in the neighboring province of Aragon.

Noguera Ribagorcana Natural Area

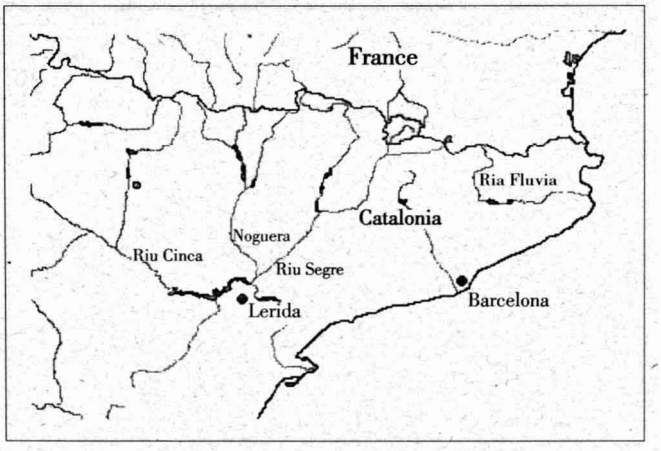
I was invited to Catalonia by the Department of the Environment, Natural Heritage Program. This relatively new program is responsible for implementing a government plan of natural areas to include over 100 designated units representing the "best" of the native vegetation communities of the region. I had been asked by the director of the program's restoration section to assist in developing a plan for the Noguera Ribagorcana riparian natural area, which is about 15 kilometers of that river, tributary to the Segre River, located near Lleida in western Catalonia. The vicinity of Lleida is not unlike the Central Valley and Sierra foothills of California, near Fresno. It is the richest agricultural area in Spain. I spent three weeks evaluating the Noguera Ribagorcana, with the objective of proposing restoration needs.

As have all but one of the rivers in Catalonia, the Noguera Ribagorcana has been dammed in the foothills of the Pyrenees for hydroelectric power generation and irrigation use. Over a period of years, the reservoir behind this dam had been reduced in capacity due to sedimentation. The responsible water authority authorized a flushing of this accumulated sediment in 1988. Altogether, the Noguera Ribagorcana is 40 km long from the dam to the confluence with the Segre River. Prior to the sediment discharge in 1988, the entire 40 km was graded by bulldozers to clear the channel and create enough capacity to convey the massive release that was to occur. In addition to clearing obstructing riparian vegetation, a trapezoidal channel bounded with two levees was built along the entire river. After these preparations, the dam was opened and the equivalent of a massive mudflow ensued. Apparently, this method of reservoir maintenance is standard practice in Catalonia.

Catalonia has practically no enforced regulations controlling land uses or water quality impacts on streams, and the conditions of the streams indicate little voluntary respect by Catalonia's residents.

The Noguera Ribagorcana has variable geomorphology ranging from steep-walled narrow canyons to broad, open floodplains with multiple channels. Within the boundaries of the designated natural area, it once had a broad floodplain, ranging from 400-1200 meters wide, which is now almost completely developed for agriculture. The stream pattern now differs markedly from what it was before dam construction. Controlled flows have defined single channels where before there were many. How the present pattern compares to the pattern before sediment release is a mystery since apparently no pre-project impact assessment was conducted.

I suspect that in the past, before construction of the dam, the Noguera Ribagorcana probably resembled intermittent-perennial streams such as we find in central and



southern California. These are marked by highly variable annual flow cycles, and locally dense and diverse riparian vegetation controlled in structure, composition, and distribution by flood damage, groundwater availability, and other factors. Controlled flows, fine sediment deposits far in excess of the stream's ability to transport them, and artificially constructed channel patterns had changed most of the Noguera Ribagorcana into something more closely resembling a perennial marsh.

Marshes are as beautiful as intermittent floodplains; they are different, however, particularly in the ecological relationships they support. While walking the Noguera Ribagorcana, I observed a great number of cranes, egrets, and other large birds. I saw turtles in the green, sluggish water. There was an abundance of wildlife that would not be present on an intermittent floodplain. On the other hand, some animals, such as otter, had been extirpated from the area. The trout fishery was in decline and had been replaced by an introduced fishery consisting of American Perch, Great Northern Pike, and various rough fish, much to the concern of local fishermen. I can appreciate either wetlands or intermittent systems, but I find it hard to accept the accidental changing of one into the other by the acts of people.

Photo: Richard Harris

Milky stream color caused by sediment releases from dam.

Given the conditions on the Noguera Ribagorcana, I found it difficult to offer recommendations for restoration. Restoration to an intermittent stream with natural riparian woodlands is not an option. That would first require restoration of the natural hydrologic regime, a risky undertaking with uncertain results. The sediment deposits that are now common throughout the system are being rapidly stabilized by vegetation. Modification of the dam operation to permit flushing flows with the objective of scouring sediment would probably be ineffective. Political realities will not permit sacrificing agriculture and other land uses now in the floodplain, or dependent on the reservoir for power or water supply, in the interests of ecological restoration.

The Noguera Ribagorcana now supports ecological conditions that are important to many wildlife species, but they are probably not the same species that originally thrived on the river. The river cannot be restored to its former condition.

Ultimately, my recommendations to the Catalonian government about restoration of the Noguera Ribagorcana consisted of measures to reverse water quality degradation and protect existing values. Even the marsh and riparian woodland remnants are not secure from continuing land use impacts. I also strongly recommended against repeat of the sediment flushing (it is scheduled to be repeated in 30 years). Finally, I recommended that an environmental education program be implemented to get local communities involved in protecting the river.

Esera River, Aragon

The Esera River is located in Aragon, near the western border with Catalonia. It is a tributary to the Cinca River, which flows into the Ebro, the largest river in northeastern Spain. The Esera is dammed for hydroelectricity and irrigation.

I visited the 15 km section of the Esera from its dam to the confluence with the Cinca. For most of this length, the stream courses slowly through a steep box canyon. Near the confluence, it has a broad floodplain with a braided pattern. Because the Esera is relatively inaccessible, it has some interesting conditions that probably resemble natural riparian communities. The stream has been regulated for many years, however, and these conditions are at least in part an artifact of flow regulation.

I visited the Esera with a team of scientists conducting an environmental impact assessment on a reservoir maintenance project similar to the one on the Noguera Ribagorcana: conduits at the base of the dam will be opened to release sediment-laden flows until the reservoir capacity is restored. Sediment is over 27 m deep behind

the dam. In preparation for this release, a suction dredge was being used to pump out sediment obstructing the mouths of the conduits. The slurry of sediment was being directly discharged to the stream, with the result that over one meter of new, very fine silt was now covering the former channel. The sediment deposits just from the suction dredging extended down the stream for several kilometers. The milky plume of suspended sediment reached the Cinca.

The impact assessment team included stream ecologists and foresters who were sampling water quality, aquatic life and riparian vegetation. They were obtaining measurements before the project and would remeasure after the project to determine the effects. There was not the slightest thought that the project would not occur.

Riu Fluvia

After traveling around Catalonia and observing numerous examples of severely degraded streams, I was told about the Riu Fluvia. This was described to me as the only river without a major dam and with relatively good water quality. Although the stream is indeed free of large dams, it has many small dams which divert water into flumes for hydroelectric power to serve small industries. In its mountainous headwaters, the Riu Fluvia traverses the Garrotxa Volcanic Zone Natural Park, located near Olot, a region of cinder cones, dense oak and pine forests, and limited agricultural development. It is a landscape reminiscent of rural Pennsylvania or New York. In its lower reach, the Fluvia crosses the Emporda Marshes Natural Park, one of the most important coastal wetlands on the Mediterranean Sea and second only to the Ebro delta in importance to Catalonia. Birdwatchers come to Emporda Marshes from all over Europe to observe the many waterfowl. The middle reach of the 80 km-long river crosses a rural landscape and passes through some small cities.

I spent several days with local scientists and managers looking at the Riu Fluvia in and around the two parks, discussing the conditions of the river and the needs for protection and management. It should be noted that the designation "park" in Spain does not mean preservation or even protection against land use impacts. Park managers can make recommendations to local municipalities and landowners about river management within park boundaries, but the ultimate authority lies with local decision-makers. In the Emporda Marshes are "core areas" that receive a high level of protection. Core areas are normally acquired and placed in public ownership, but this has not yet occurred at Emporda because of limited funding. Large areas of parks in Spain remain in private ownership and are managed as the private owner sees fit.

A concept is under development to create a continuous corridor of protection for essentially the entire Riu Fluvia. The aim is to ensure connectivity between the two parks for wildlife and fisheries. At present, staff and funding are not available to refine this concept into a proposal, much less to implement it.

In the upper reach of the Riu Fluvia, the 15 km of river I saw is in three states: undeveloped or agricultural, completely urban, and partially urban. All of this is within the boundaries of the Garroxta Natural Park. The undeveloped portion contains some of the best examples of riparian communities that I saw in Catalonia, with relatively high species and structural diversity. Unfortunately, it also contains stands dominated wholly or in part by invasive exotics, most commonly *Robinia psuedoacacia* and clonal poplar planted for pulp. A few diversion dams have been installed in this relatively undeveloped section of the river.

The urban section courses through the small city of Olot. Here the river is subject to the whims of adjacent land users and the city council. The remnant riparian community is dense but dominated by exotics such as the "tree-of-heaven" (*Ailanthus*) so ubiquitous in the California foothills. Vegetation in the floodplain is subject to periodic clearance because of the fear of flooding. Water quality is generally poor due to unauthorized effluent discharges, high nutrient levels in runoff, and sluggish water velocities. The flow is almost totally controlled by successive small dams that divert water for power. So, even if the Riu Fluvia does not have a major dam, it has so many small dams that the net effect is to create a regulated river.

In the mixed use zone, too, small dams are in place, and the floodplain exhibits a combination of relatively "natural" and completely altered or absent riparian communities. In one place within the park boundaries, riparian forest has been removed to allow a scenic vista to a medieval town perched on a lava flow. Urbanization continues, and planners working in the Garroxta Natural Park say they have little influence on treatment of the river within urban or urbanizing zones. They are viewed with suspicion by local residents. They feel that they can take a stand in the undeveloped areas, but that ultimately the only way to secure protection is to acquire properties along the river.

The region in which the lower Riu Fluvia is located, "Costa Brava," is one of Europe's major tourist attractions. Hundreds of thousands of tourists from northern and central Europe come to Costa Brava for summer and

winter holidays. The river feels the effects of this in many ways. Some parts of the river, particularly inaccessible islands and old meanders, have relatively good stands of riparian vegetation and abundant wildlife; but much of the floodplain has been damaged by vegetation clearing, wave erosion from motorboats, agriculture, and recreation. Moreover, the lower 25 km have been cleared, channelized, and rip-rapped at for flood control.

The Riu Fluvia meets the sea just south of the major marshes at Emporda Natural Park. Several of the former outlets of the Riu Fluvia and nearby Riu Muga form lagoons that are within the protected "Integral Natural Reserves" of the park.

Everything is relative. The Riu Fluvia was described to me as the most natural river in Catalonia. Where I looked, I found it to be severely disturbed and highly regulated. Yet, there are remnants of natural riparian vegetation, and the river's high flow regime is not controlled. Planners are identifying values in the lower reaches of the river to protect and restore and are exploring the corridor concept. Unfortunately, most of these planners have limited funding; some are working essentially for free.

Reflections

Back in California I considered what I saw. I have one overwhelming impression: The loss of natural rivers as the cost of human uses in Catalonia is devastating. Probably for hundreds of years, the people of Catalonia have accepted a highly altered environment as "nature" without any basis for comparison. I saw children swimming in green-gray water that I would not set foot in. Certainly there are some beautiful places in Catalonia: the highest altitudes of the Pyrenees, rocky coastlines, and, of course, the cultural heritage of the cathedrals and museums. But there are no wild rivers. This would probably be true for most ecosystems in Catalonia: there are no wild prairies, woodlands, wetlands. There are remnant islands of wildness here and there, bypassed because they are not useful to human purposes. There are thousands upon thousands of hectares of hillsides once covered by cork oak forests, then terraced and planted to grapes and olives, and now almost barren. There are thousands of hectares of planted pine forests. Catalonia is almost entirely a "civilized" landscape.

One could speculate that a religious attitude that places man at the pinnacle of creation is sufficient cause for the present degraded condition of the lands and waters. This attitude is also partly responsible for the preservation of art and buildings; and for that, we should be grateful. It is my feeling, however, that Catalonia's natural heritage has been overlooked, to the people's great loss.

The influence of European, and even specifically Spanish, life styles and behaviors has affected California for only 300 years. The results can already be seen by reading a list of the flora, by looking at the grasslands changing color every summer; yet, perhaps California is too big and too diverse to completely civilize. We are fortunate for the natural heritage that remains. We are fortunate that people are aware of the value of this heritage and advocate its protection.

Many activities that I observed in Catalonia would be restricted in California. In California, direct flushing of accumulated sediments from reservoirs into the downstream river is not an option. Effluent discharge is under fairly strict control, although accidents do happen. Structural flood control solutions are still proposed, but environmental regulations require serious consideration of less damaging alternatives. On the down side, salmon populations are severely depleted, illegally discharged toxins threaten surface water supplies, and land uses near streams are not always considerate. Ever-increasing demands for water threaten remaining wild streams. Many have been so impacted that their restoration is infeasible. In the Sierra Nevada, many of the users have little respect and leave their day's garbage behind. Some rivers are so

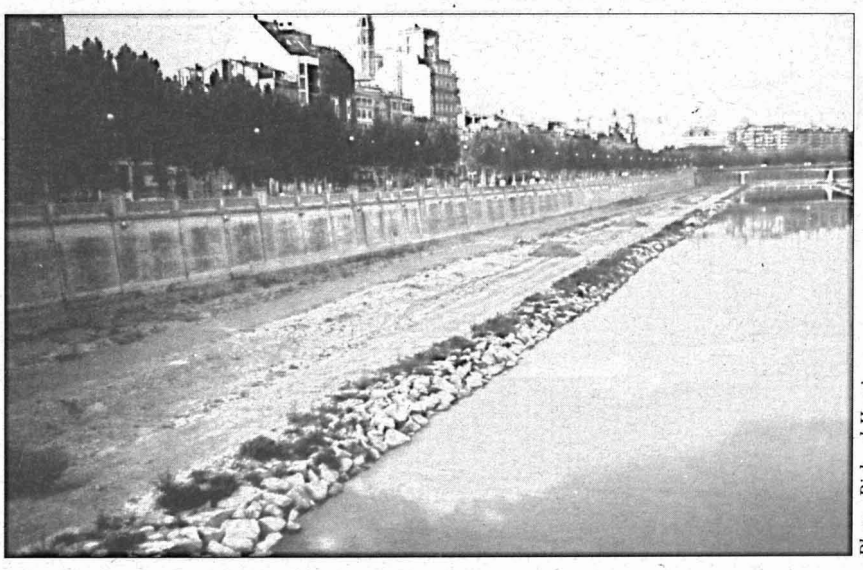


Photo: Richard Harris

Reality: the Riu Segre at Lerida

heavily used that riparian vegetation has been lost and is prevented from regeneration.

My experience in Catalonia leads me to want to know and do more about the protection of California's natural heritage. As an educator and researcher, I have a responsibility to inform and influence others about California's streams. Since my work involves evaluating environmental impacts on riparian communities, I am in a position to have a direct effect. I think we should increase our efforts to educate our residents, especially our growing immigrant population, about the importance of our natural heritage. We should continue efforts to protect and restore naturalness while we still have good models to guide us.

At the risk of sounding patronizing, I also have some thoughts for the Catalonians. I know the current crop of Catalonian children is receiving instruction in environmental issues. College students whom I met are considering careers in biology and environmental sciences. New curricula that emphasize the environment are under development at universities. Environmentalism is being encouraged at all levels of schooling. Hopefully, teachers will inform the children of what remains, what has been lost, and what can be restored. The children as well as the adults need to see for themselves their own environments around their towns and farms. Nature is not only found in remote locations and summer camps.

I would further suggest that the regulatory framework to protect rivers be strengthened. In particular, there should be meaningful consideration of less destructive alternatives for flood control and dam maintenance. Water quality problems appear so severe that drastic changes will be necessary to reverse them. Reversal is possible, however, as we in California and elsewhere in the US have witnessed over the 25 years since the Clean Water Act amendments of 1972 were passed.

A couple of specific suggestions. At present, there is increasing pressure to develop headwater streams in the Pyrenees for hydroelectric power. I spent several years studying the impacts of such projects in California's Sierra Nevada. *Avoid altering the last free-flowing mountain streams.* The ecological losses are not offset by the increased power capacity.

Finally, the *Riu Fluvia as a whole system deserves protection as the last large relatively unregulated river in Catalonia.* Its position as the connecting link between two Natural Parks is sufficient justification. If further justification is needed, it should be protected and restored as the last place where semi-wild riparian forests can be studied. A broad outline of the process to determine protective measures needed would include:

1. Comprehensive evaluation of the entire river corridor from the headwaters to the mouth to classify zones for protection, enhancement, or restoration.
2. Inventory of land uses and activities that threaten the quality of the corridor.
3. Development of goals for protection, enhancement, and restoration within the context of a planning process that includes all stakeholders—farmers, cities, environmentalists, recreationists, and regulatory agencies.
4. An implementation strategy that would include provision of incentives for protection, strong regulations, and land acquisition as required.

Funding to conduct a large-scale project of this nature is limited; Catalonia and Spain as a whole are not rich. Yet, the Riu Fluvia, Garroxta Natural Park, and Emporda Marshes Natural Park are of national and even international concern. Funding should be provided by the rest of Europe, which would directly benefit from protection of Mediterranean wetlands, as well as by international conservation organizations, and perhaps even the US.

Every day, the integrity of the Riu Fluvia is reduced incrementally by unilateral local actions. At some point, perhaps soon, the possibilities for protection and restoration will be lost, if positive action is not taken soon. ▮

Richard Harris is the Extension Forestry Specialist at UC-Berkeley (College of Natural Resources, Environmental Science, Policy, & Management, 163 Mulford Hall, Berkeley, CA 94720-3114). His current interests and work focus on landowner education, collaborative resource planning, and riparian community restoration. His research on riparian community ecology and restoration has been published in over a dozen journal articles over the past ten years. He is president of the Watershed Management Council.

Rescuing a Remnant of Wild Earth in El Salvador

by Milagro Cristales de Harrouch

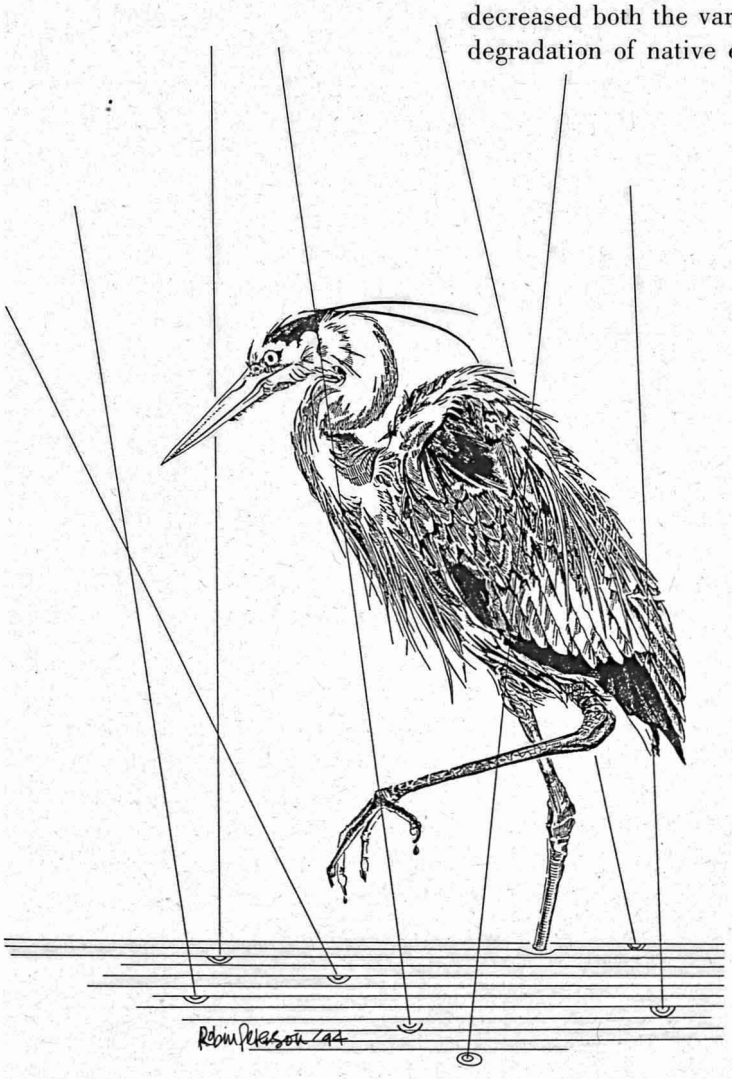
Although small in size, tropical El Salvador is home to diverse groupings of flora and fauna. Unfortunately, the past decade's fast paced development has increased the human population and decreased both the variety and numbers of native plants and animals. The degradation of native ecosystems has dramatically increased. As always, this reduction of biodiversity has disrupted food chains and ecosystem processes.

In particular, the mangroves and estuaries of the Lempa River delta, the country's largest and most powerful, are being seriously affected. Where this mighty river meets the Pacific Ocean, we find "Montecristo Island," a biological corridor and a Wildlands pilot project for Mesoamerica.

Ironically, considering the destruction the rest of the country suffered, the twelve year war helped this area remain wild, as guerrilla occupied territories saw little human interference. Since the signing of the peace treaties in 1992, the story has changed. Entire working communities were relocated onto the island, and today two major cooperatives control the area. One co-op is involved in the production and harvesting of cashew nuts. The second is the Montecristo community, whose members are mostly ex-guerrillas and make their livelihood by fishing.

It has been my goal, since becoming a member of The Wildlands Project (TWP) board of directors, to protect the resident and migrating birds that live in or pass through the sanctuaries. Egrets, herons, and many other wading and shore birds spend their winters here searching for food and enjoying this safe haven.

By meeting with members of the fishing communities, work corps that live on the island, and professional conservationists, we began to develop a



Great Blue Heron *by Robin Peterson*

conservation plan. From the initial meetings we formed the "Ecological Committee for Montecristo Island." Our first major challenge involves working with the Natural Resources Office to develop and sign a treaty that would declare the island a protected Wildlands Area. Another challenge we face is hiring two local rangers whose jobs would be to watch over the island. This is especially needed in places where poaching still occurs.

As a group we are also committed to environmental education as a necessary step toward sustaining the biodiversity and integrity of the island. We are currently working on a support program and a bilateral sustainable assistance program. The support program is aimed at improving the living conditions of the people who now live on Montecristo Island. The bilateral sustainable assistance program is to protect the aquatic fauna. The sea turtles that arrive on the island once a year to lay their eggs are in desperate need of protection.

I am convinced there are many other people out there who share our motivation to save whatever is left of the wild around the world. If you share these feelings and are able to help our conservation work, we would be most appreciative. Camping equipment, funds, and bird guides in Spanish are among our first needs. ❙

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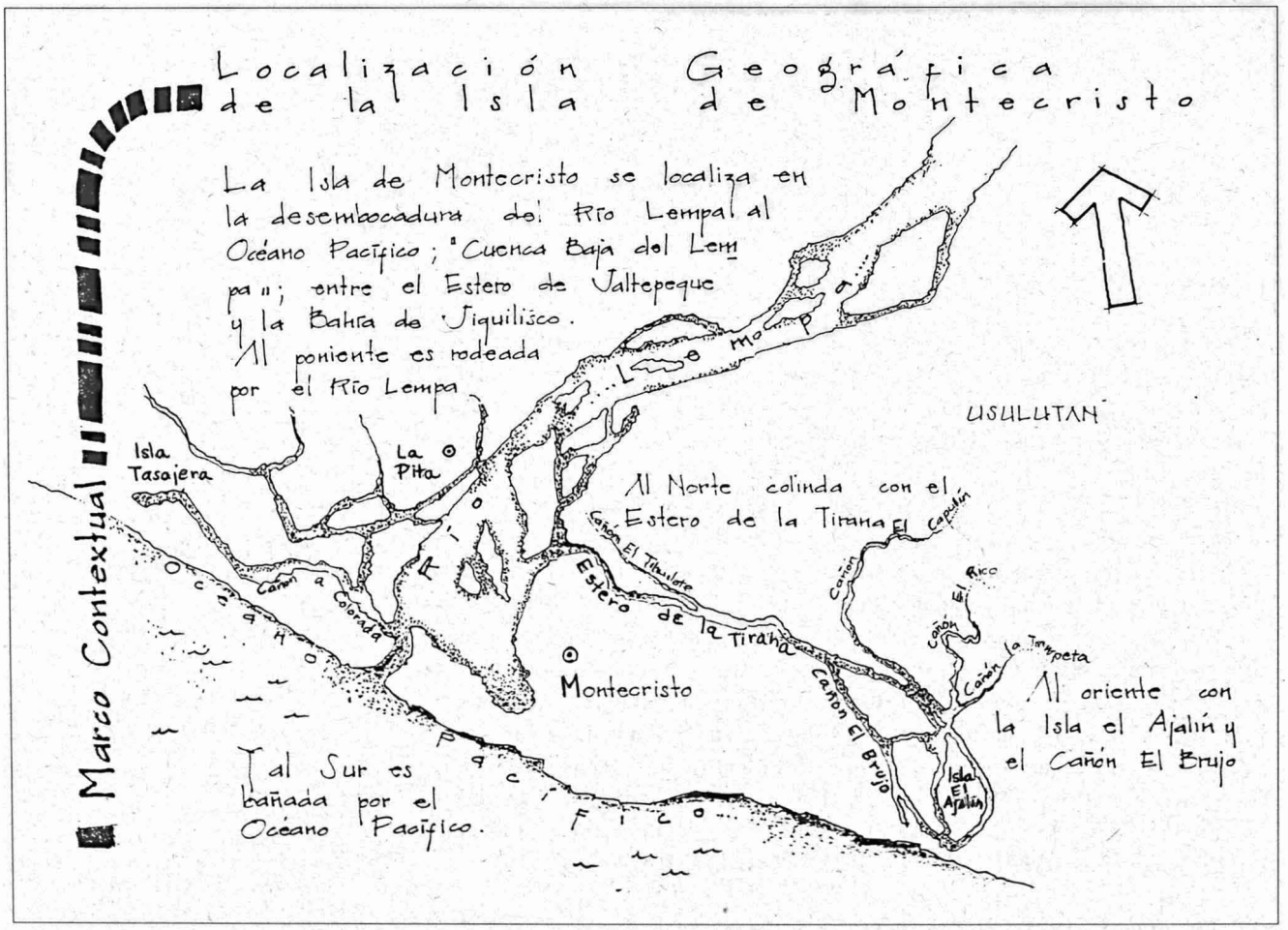
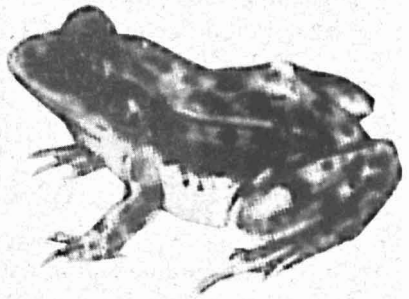
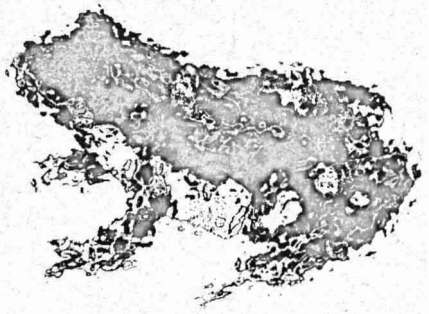


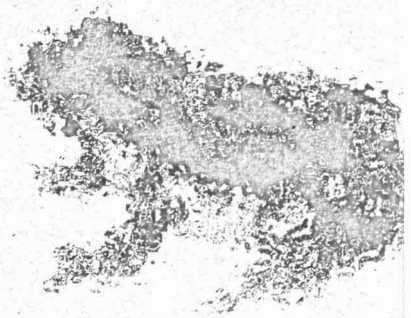
map Marco Contextual

The Las Vegas Leopard Frog, *Rana fisheri*

by Bryant Furlow







RANA FISHERI

The Las Vegas Leopard Frog, first described by scientists in 1893, belonged to the North American *Rana pipiens* (leopard frog) complex of species (Dubois 1992; Platz and Frost 1984). Its range was restricted to the grassy areas surrounding springs and seeps in what became the city of Las Vegas, Nevada. The species was distinguished from close relatives by its dark spots, which lacked light-colored edges, and a large eardrum (Behler and King 1979). The undersides of hind legs were a golden yellow. Precious little else is known about the species. Its mating call, diet, and basic ecology are unknown. It was last seen in 1942, three decades before the US Endangered Species Act became law.

As Las Vegas expanded and groundwater was pumped out for city use, springs and seeps used by *Rana fisheri* dried up. Streams and pools used by the species were cemented over (Behler and King 1979), and the species fell quietly into extinction beneath the traffic and asphalt of business buildings and casinos.

LESSONS

Groundwater conservation and the protection of riparian and freshwater habitats are fundamental components of conserving desert biodiversity. Habitat loss due to attempts at agriculture in Death Valley brought on one of the nation's first lawsuits on behalf of an imperiled species, to protect desert pupfish that lived in small, isolated desert pools. In the early 1960s, the water sources feeding these pools in Death Valley were being drained by agricultural irrigation wells. Biologists sued and stopped the dewatering, saving the pupfish. Agricultural dewatering of the Rio Grande in New Mexico contributed to the extinction of endemic minnows there [see *Wild Earth* spring 1996].

Apparent amphibian declines around the world have concerned the scientific community sufficiently for the International Union for the Conservation of Nature (IUCN) to devote funds to the Task Force on Declining Amphibian Populations (DAPTF), chaired by Ronald Heyer of the Smithsonian Institution. For further information about attempts to identify and stem amphibian declines, including information on how you can volunteer to help researchers, visit the DAPTF web page on the internet: http://www.open.ac.uk/OU/Academic/Biology/J_Baker/JBtxt.htm. ❙

Bryant Furlow is a biologist living in New Mexico.

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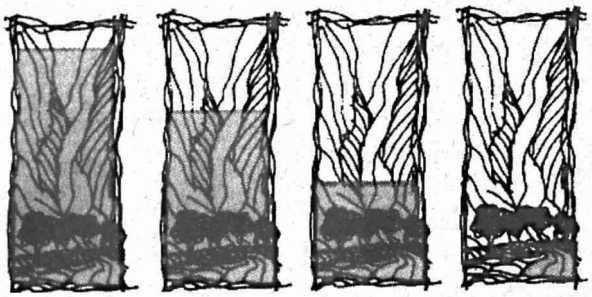


Un-dam It!

Glen Canyon Institute Says Let a River Run Through It

by Christopher Franklin

> There was a time
> when, in my search
> for essences,
> I concluded
> the Canyonlands country
> had no heart.
> I was wrong.
> The Canyonlands
> did have a heart,
> a living heart,
> and that heart
> was Glen Canyon
> and the golden,
> flowing Colorado River.
>
> — Edward Abbey

Earlier in this century hydroelectric and irrigation reservoirs created by mega-dams heralded a new age of progress, promising water security and inexpensive power for the growing cities of the new West. Now, as we near the turn of the century, the underestimated negative effects these dams have had on native species, energy security, development patterns, and agriculture has prompted conservationists to re-evaluate their construction, and, in some cases, to advocate their dismantlement or decommissioning. The infamous Glen Canyon dam on the Colorado River is such a case, and the Glen Canyon Institute is leading the effort to see the canyon restored to its former splendor.

Few ecosystems have been as severely altered by dams as the Colorado River—flowing from the high mountains of Colorado and Wyoming to the deserts of the Southwest, no fewer than sixty dams now clog the river's oxbows and canyons, wreaking havoc on native species, traditional water users, and the Colorado River delta ecosystem, where the river's brackish and polluted remnants empty into the Sea of Cortez.

The incomparably beautiful Glen Canyon was lost in 1963, when the gates of a just-completed dam at Lee's Ferry were closed, and the canyon began to disappear beneath a 187-mile-long reservoir, dubbed Lake Powell. Built initially as a means to conserve the waters of the Upper Colorado River basin states, and as a silt trap to extend the life of Hoover dam at the far end of the Grand Canyon, Glen Canyon dam eventually became the basin's hydroelectric cash cow, with its huge subsidized revenues being poured back into ill-planned water impoundment and irrigation schemes for water hungry crops such as alfalfa, citrus, and cotton. Nearly forty years after the dam-building began, Glen Canyon Institute's campaign to drain "Lake Powell" may drive fear into the hearts of western planners, but there are compelling ecological and economic reasons to un-dam the canyon now:

- The evaporation and bank storage rates at Lake Powell alone represent an average loss of 7–8% of the river's annual flow.
- Impoundment denies the river nutrient-rich sediments historically distributed by seasonal floods which are vital for natural processes like beach building.

• Changes in water temperature and water quality have imperiled the majority of endemic species in the Colorado River and its delta ecosystem.

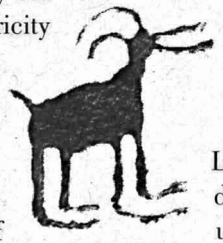
• Sediments laden with heavy metals are causing an unnatural accumulation of toxic selenium and other metals.

• Western cities like Las Vegas are trying to reopen the Colorado River Compact to secure more water for their burgeoning populations.

• High water levels in 1983 severely threatened the dam's foundation; catastrophic failure of the dam would harm the lower basin.

• The glut of generating capacity and energy currently on the market make GCD-produced electricity less attractive to power users.

• The costs for ecological band-aids continue to escalate, making full restoration cost-effective.



Until recently, proposals to drain Lake Powell were found only in the writings of 'Cactus' Ed Abbey, the songs of Katie Lee, the speeches of David Brower and Martin Litton, and from a handful of elder adventurers who witnessed the pre-dam Glen Canyon, one of North America's finest wild places.

In 1996, Brower, Litton, and Lee got organized, and along with current GCI president Richard Ingebretsen and noted Colorado River ecologist Dave Wegner, formed the Glen Canyon Institute (GCI). Through classes, river trips, symposia, and an unprecedented citizen-led Environmental Assessment, GCI is working to design and implement a restoration plan for Glen Canyon and the Colorado River. We are committed to studying, promoting, and encouraging public debate of our proposal to drain the reservoir behind Glen Canyon dam and allow the Colorado River—through the Grand Canyon and on to the delta—to sustain a healthy balance of use and conservation.

Restoring rivers by removing, circumventing, or retrofitting existing dams is a new discipline with little precedence. Hopefully, our knowledge will soon increase with the planned and proposed removal, in the interest of habitat restoration, of dams on the Elwah and Snake Rivers, respectively. GCI also benefits from the expertise of Wegner, who, while employed by Glen Canyon Environmental Studies, studied the ecological effects of dam operations and engineered the 1996 test flood release for the Interior Department and Bureau of Reclamation.

Reservoirs have a limited life expectancy, inversely proportional to the inflow of sediments. Currently there is no planning for the eventual dismantling and decommissioning of the West's larger water banks. GCI believes that the cost of restoring these areas when completely filled with sediment, coupled with the loss of natural capital while they fill, is too high. Rather than deferred maintenance, we believe active restoration efforts now will have ecological and economic benefits for generations to come.

The spring 1996 test flood release from Glen Canyon, designed to restore habitat through the Grand Canyon, demonstrated the river's natural resilience. High sediment flows from the dam helped restore beaches eroded by years of low-sediment "hungry" water, backwater channels essential to native fish and plant species were recreated, and invasive species populations declined. But this was only a short-term fix. Long-term solutions require innovative and bold approaches. Draining Lake Powell would be such an effort.

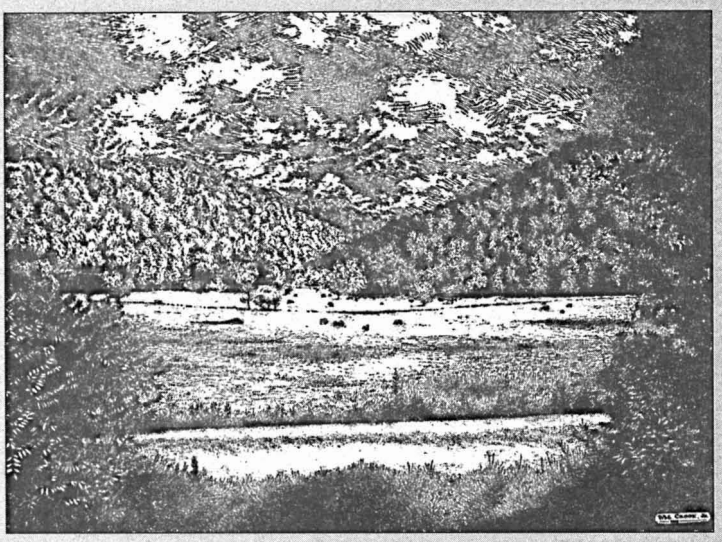
○

As the age and experience of Brower, Litton, and Lee testify, these dams were built at a time when we did not consider consequences, we did not yet understand the true value of intact, healthy ecosystems, and we did not understand the price being paid for lost habitats and species. As David Brower says, "We must ask ourselves what it will cost the Earth, and the future, if we do NOT restore Glen Canyon."

It is time to question the opulence that these towering hydrodams were built to sustain. What are the best uses for the millions of acre-feet of Colorado River water available each year? Should not the needs of wild Nature and natural processes be a priority? Not according to city planners in Las Vegas, who think the water is needed to support that city's booming population and expanding infrastructure, including a proposed Venetian-style development (with canals!) to be built just down the street from a recently-completed New York City theme development, which showcases a tug-boat-filled Hudson River replica.

The Glen Canyon Institute opposes the profligate waste such developments symbolize, offering instead a vision of redrock canyon walls and free-flowing waters. Investment in riverine restoration and protection could enable future generations to witness once again the grandeur of the wild Colorado River, not a stagnant succession of polluted reservoirs feeding artificial outposts in the deserts of a tamed West. ▮

Christopher Franklin is a Glen Canyon Institute Board Member and Director of the Brower Fund at Earth Island Institute in San Francisco. For more information or to become a member, contact the Glen Canyon Institute, 476 E. South Temple #154, Salt Lake City, UT 84111; 801-322-0064. Or visit GCI's web site at WWW.glencanyon.org.



Subdivisions and Extractive Industries

by George Wuerthner

Subdivisions. As the West has become increasingly popular for retirement and for relocation of foot-loose industries, and as residents of these regions see ranchettes and housing tract after housing tract arise from what was formerly field or forest, concern has grown that open space and wildlife habitat will disappear from the region. A similar uneasiness over the presumed loss of private forest lands to development has arisen in the Northern Forest of New England and New York as well.

Extractive industries have capitalized upon this fear. They tell us that whatever negative environmental effects result from their activities, they are insignificant compared to the impacts that follow if a farm or ranch is subdivided or a timber holding is fragmented and sold for summer cabin sites or a new shopping mall. They warn that if pushed too far in efforts to end environmentally destructive practices, the result will be subdivisions everywhere as farmers, ranchers, and timber companies give up and sell out.

It's an effective threat. Many conservation groups have reassessed their stance on things like ranching and logging, wondering if an overgrazed meadow or a clearcut hillside may be preferable to a row of houses or recreational cabins. Some have taken this reappraisal to the extreme, and basically aligned themselves with the extractive industries, seeing them as the last holdout against creeping urbanization. Organizations like The Nature Conservancy, Rocky Mountain Elk Foundation, Trust for Public Lands, Grand Canyon Trust, High Country Alliance, and others to a greater or lesser degree view agriculture, particularly ranching, as a way to maintain open space and wildlife habitat. In their publications and press releases, they either ignore or minimize the real cumulative environmental and economic costs associated with livestock production, focusing instead on a few "show-case" operations that reputedly demonstrate environmentally sensitive livestock operations.

The same kind of industry and conservation alliances have formed in the Northern Forest, where some organizations champion the "working forest" as the salvation of forest ecosystems. In both instances, industry representatives frequently serve on the conservation groups' boards of directors. The endorsement of environmentally destructive industries by reform-minded conservation groups frequently saps support for substan-

The extractive industries have been in place so long we accept them as part of the landscape, not realizing that they are more destructive of our wildlife, ecosystems, and ecological processes than any conceivable amount of new housing and urbanization...

illustration by William Crook Jr.

tive changes in policies, as occurred recently in Maine when a proposed voter ballot ban on clearcutting failed, in part, due to collusion between industry and "conservation" groups who opposed the clearcutting ban.

While acknowledging a few of the more obvious environmental impacts associated with farming, ranching, or logging, these organizations accept several seldom-challenged premises:

1) subdivisions and urbanization are the most important factors in the loss of biodiversity and wildlife habitat;

2) maintaining the economic viability of extractive industries will keep the lands from falling into the hands of developers, thus can check the spread of subdivisions;

3) all lands currently used for commercial crop, livestock, or timber production are necessary to satisfy human needs and consequently must continue to be utilized;

4) reform of current resource extractive industry practices can mitigate most, if not all, of their negative environmental costs.

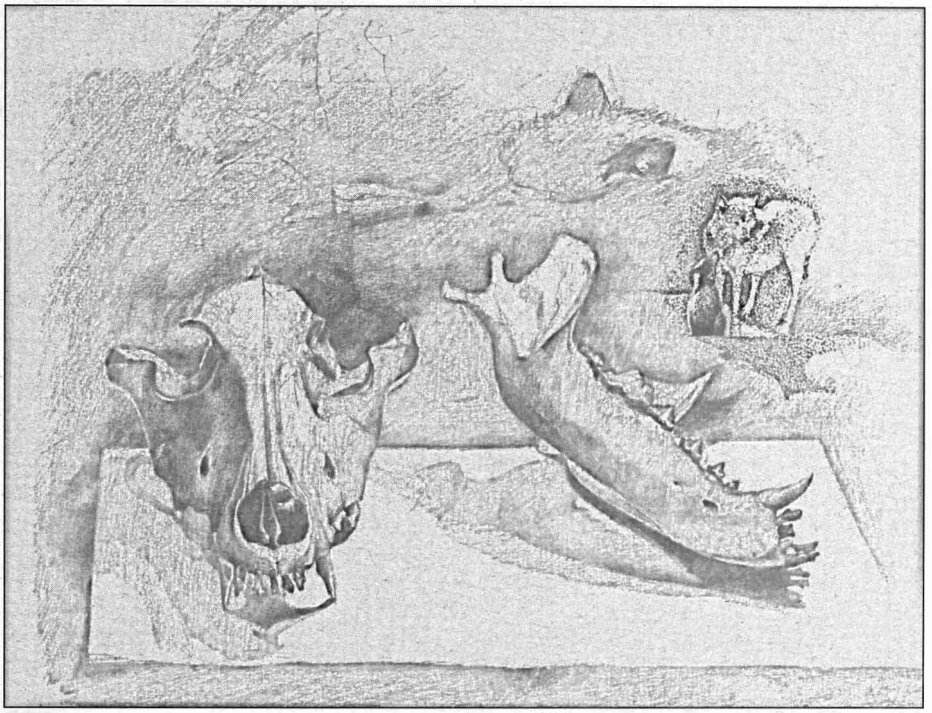


illustration by Lia Kass

On the surface these assumptions seem credible. Nearly all subdivisions are carved out of former farm, ranch, or timber land, so it's logical to think that economically viable extractive use can prevent subdivisions. The agriculture and timber industries, and even some conservationists, argue the solution is to subsidize these industries further through various "incentives" like tax breaks and cash payments such as the Conservation Reserve Program, which pays farmers to idle highly erodible lands. A less visible subsidy implicitly supported by farm, ranch, and logging advocates is the externalization of the costs of environmental degradation, including soil erosion, non-point water pollution, wildlife habitat losses, genetic diversity losses, and other "costs" resulting from the development of monoculture crops and forests.

It might be debated to what degree these subsidies should be implemented, if they really worked; but they don't. Subsidizing extractive industries on private land doesn't prevent subdivisions, since subdivisions are driven not by land for sale, but by demand for housing. As a place becomes more attractive, with more and more amenities and jobs, people choose to live there. The demand for housing increases and subdivisions result. Plenty of private land is available for purchase in North Dakota, but lack of demand there means few subdivisions. Ironically, conservation organizations may sometimes even contribute to development. Success in protecting small tracts of land may actually increase the likelihood that nearby lands will be developed. For example, due to the desirability of being near Nature Conservancy reserves, parks, wildlife refuges, and other protected areas, adjacent land values often rise, creating a greater incentive for subdivision. This doesn't argue against protected landscapes; rather it demonstrates that such protection, if not part of a larger preservation strategy, may ultimately be self-defeating.

The extractive industries, particularly ranching and farming, have been in place so long we accept them as part of the landscape, not realizing that they are more destructive of our wildlife, ecosystems, and ecological processes than any conceivable amount of new housing and urbanization, if for no other reason than the vast acreages they affect. Some statistics demonstrate this geographic fact. Of the roughly 3 billion acres in the United States, 1 billion acres are farm and ranch land. Excluding Alaska, some 64% of non-federal lands are devoted to agriculture (including livestock grazing), and the majority of federal lands as well—with 90% of BLM lands and 69% of US Forest Service lands leased for livestock grazing. By comparison, only 5% of US non-federal (and none of the federal) lands are urbanized.

For the western US, the data are skewed even more toward agriculture. In the Pacific Northwest, farming occupies 25 million acres, or 16% of the land. Add the private lands used for livestock production, and nearly 40% of the land in the Northwest is devoted to agricultural production—and this figure doesn't include public lands committed to livestock production.

Nevada is perhaps the clearest example of how agriculture, in particular livestock production, dominates land use and compromises biological diversity on a landscape scale. There is virtually no logging in Nevada, nor is there any significant amount of farming outside of forage production for livestock. Mining, livestock production, and urbanization are the major land uses.

According to the Nevada Division of State Lands, there are 70 million acres of land in the state. Even with the booming growth around Las Vegas and Reno, the total amount of urbanized land in the state covers approximately 227,000 acres, or 0.32% of the state's land area. Private croplands, primarily pasture and alfalfa production for livestock, are 9.2 million acres or 13% of the land. Some 87% of the state is under federal government management, primarily the BLM and Forest Service. The vast majority of these federal lands are leased for livestock grazing. Livestock grazing even occurs on the bulk of the land within Nevada's major National Park units, Lake Mead NRA and Great Basin National Park. Clearly livestock production dominates the state, and the direct effects of urbanization are small by comparison.

In what is the driest state in the nation, the dominance of livestock production upon water consumption is astounding. Urban and rural domestic use accounts for only 4% of all water consumption in the state. Industry accounts for another 6%. And agriculture—in a state that is mostly sagebrush, not crops—takes fully 90% of all water consumed in Nevada. Nearly all of agricultural water goes toward production of hay or pasture for cows.

Meanwhile rivers and springs are dried up by agricultural ground water pumping, and water diversions threaten many fish and other species with extinction (Devil's Hole Pupfish and Pyramid Lake Cui-ui are examples. [See Walker Lake article by Tom Myers in *Wild Earth* summer 97.]) Even entire wildlife refuges go dry in drought years, and one, Winnemuca Lake National Wildlife Refuge, was eliminated when the lake disappeared entirely due to agricultural diversions. Yet groups like The Nature Conservancy focus on subdivisions as the major threat to Nevada's biodiversity, while ignoring the complicity of the livestock industry in the extirpation of species and habitat degradation across the state.

Subdivisions, while destructive of habitat, are relatively land intensive when compared to these land extensive industries. For example, even in highly urbanized California, between 3 and 6% (depending upon which source you use) of the landscape is committed to urban uses, while nearly 30% of the state is devoted to agricultural production. And despite the preponderance of golf courses in Palm Springs and swimming pools in Los Angeles and other wasteful urban uses of water, agricultural producers consume more than 83% of California's limited water supplies. To add insult to injury, most of that water is used to grow forage or irrigated pasture for domestic livestock, not food consumed directly by humans.

Without a doubt, any increase in any kind of development has an environmental cost. In particular, poorly designed and located subdivisions increase congestion, ruin some wildlife habitat, and reduce the sense of open space; but they are not necessarily worse than the industries they replace—particularly if one presumes the goal of reform efforts is to maintain indefinitely the resource extraction on that land. A field of row crops is a biological desert. A housing tract built on a potato or wheat field will likely have more habitat diversity, as some natural vegetation is planted for landscaping, than the farm crop it replaced. Even if covered entirely in pavement, the net effect upon wildlife is negligible; the damage has already been done.

I hasten to add a disclaimer. I do not find spreading urbanization desirable, nor do I see it as a positive environmental influence. Rather I am suggesting that urbanization does not yet pose as great a threat to western ecosystems, with a few exceptions (such as southern California) as do extractive industries.

The litany of species listed as endangered, threatened, or extinct across most of the West (and, to a slightly lesser degree, the nation as a whole), reads primarily as a list of the victims of farming, ranching, and logging, not housing tracts. Almost the only exceptions to this generalization are in states with high numbers of endemic species, such as California and Florida, where urbanization threatens species with limited geographic distribution.

For instance, every species listed in Montana as endangered or threatened has declined due to habitat losses resulting from extractive industries. These include Grizzly Bear, Arctic Grayling, Columbia Sharptail Grouse, Sage Grouse, Gray Wolf, Bison, Black-footed Ferret, and Swift Fox. If the only human land use affecting Montana were urban dwellings and summer cabins, most of the state would be as wild and full of wildlife as Alaska.

Significantly, Grizzlies, wolves, Elk, and other wide-ranging species survive in western Montana, where urbanization is greater than in eastern Montana, which is dominated by agriculture. The Great Plains are wonderful habitat for all these animals, but there is no place for them among the wheat fields and ranches. The bulk of the West, even where there is no house in sight for tens of miles, is domesticated and degraded by agriculture and timber cutting. Protection of biodiversity means more than protecting patches of habitat; it means also preservation of ecological and evolutionary processes. Without large unmanipulated landscapes, natural disturbances like wildfire, predation by wide-ranging carnivores, and migration are truncated. The only way to establish and protect large-scale reserves is by reducing marginal extractive uses of land. No farming is truly and fully compatible with native ecosystems and biodiversity. Farming is, by definition, a displacement of native species and a simplification of natural ecosystems. To a lesser degree, so is ranching. Even well-managed ranches divert the majority of water and forage into livestock instead of native species. Moreover, major portions of farm crops grown in the US as a whole, and the West in particular, are actually fed to livestock, not people—so the ties between farming and ranching are closer than many suspect. Roughly 70% of the grains consumed in the US are used to feed livestock, with cows the leading consumers.

The litany of species listed as endangered, threatened, or extinct across most of the West (and, to a slightly lesser degree, the nation as a whole), reads primarily as a list of the victims of farming, ranching, and logging, not housing tracts.

Again, this is not to suggest that subdivisions are more desirable than farming, ranching or logging; but let's not kid ourselves—ALL these activities are environmentally destructive. And the less of our landscape that is committed to ANY of these activities, the better.

The alternative to elimination of resource extraction over much of the West is reform. Yet reforming extractive industries can only slow, not stop, environmentally destructive practices. Reform efforts ignore the basic geography of the West. Most western landscapes are less productive and more difficult to exploit than eastern landscapes, with higher costs because of steep slopes, arid conditions, and severe climates. For the same reasons, they typically require more acres than do moister areas per unit of production. Thus if we acknowledge that any of these activities are environmentally destructive, even under the best management, then it only makes sense to limit the activities to as small an area as possible, using only the lands best suited for the extraction.

Some biologists might argue (correctly) that concentrating resource extraction on biologically productive lands has even higher ecological costs, but this assertion ignores an unfortunate truth: Most of these rich lands are already under agricultural or timber production.

illustration by Marty Ring

Of course, the effects of urban sprawl extend far beyond the boundaries of suburbs. Urban dwellers depend upon the logged forests and irrigated crops for their existence—thus indirectly contribute to many distant ecological impacts. Nevertheless, much of the acreage devoted to resource extraction is not "needed." It continues to be exploited because the resource extraction industries have a vested interest in maintaining production, not because the production is necessary to meet human needs.

Vast areas of the West are marginal for resource production. It takes 250 acres to grow a cow in Nevada, whereas a single acre in a moist place like Georgia or Missouri can support the same cow. We could produce the same ten inch diameter tree in 40 years in Mississippi or Pennsylvania that requires 150 years to grow at the higher elevations of the Rockies. In most years you get three times as many bushels of wheat per acre in Kansas as in Montana.

Furthermore, there are fewer economic constraints imposed by the environment in other parts of the country. For example, a farmer with moist, productive pasture in Kentucky can, at no significant additional cost, house his cattle in a barn at night to reduce the likelihood of predation, while on the arid rangelands of the West, the rancher has little choice but to range his cattle over thousands of acres so they can get enough to eat; thus, predators have a greater opportunity to dine at the rancher's expense. Ranchers have eliminated predators from much of the West to make the region safe for cows, because that costs less than making cow production safe for the region.

Similarly a cattle producer in the East with lush, green pasture has fewer problems with cows trampling riparian areas than has the western producer, who must physically exclude cattle from waterways, where the only lush forage exists, or accept cow-blasted stream channels. Exclusion means costly fences, herding, or water developments.

No supporter of "reform" efforts has ever been able to explain to me how any of the extractive industries can significantly reduce their ecological impacts while operating in a relatively unproductive environment and still remain economically competitive with producers in other parts of the United States. How can ranchers grow cows in the arid rangelands of the West without dewatering rivers for irrigated pasture, without trampling streams, without shooting predators, without destroying crytogamic soil structure, without polluting waterways, and without a significant increase in operating costs? Likewise, it would be exceedingly difficult to log timber from relatively inaccessible, steep, unstable slopes in an economic fashion without roads, without significant removal of biomass, and without disrupting natural ecological processes like wildfire, insect outbreaks, and disease.

We need food and fiber from agriculture, and nearly everyone relies on timber products to some extent, but that doesn't mean we "need" to graze cows in Nevada or Utah (or anywhere for that matter), grow cotton with Colorado River water in Arizona or California, or clearcut mountain slopes at 8000 feet in Idaho or Montana. Most of the resources extracted from marginal western lands are also produced elsewhere. With all producers selling to the same markets, the externalization of environmental costs by western producers jeopardizes the profitability of producers in more suitable regions. Farmers growing potatoes on irrigated acres in Idaho are putting farmers in Maine out of business. Ranchers producing cows on irrigated pasture in Nevada make it more difficult for the Kentucky or Missouri farmer to make a profit raising cows.

To be sure, we must not simply transfer all impacts to other regions of the country. Rather, we must greatly reduce our presumed need for resources by consuming less and using extracted resources more efficiently. Recycling paper can reduce acreage logged. Less packaging on products could reduce the volume of paper wasted. Alternative house construction materials, including packed earth, hay bales, and recycled materials, reduce the need for wood. Eliminating beef from our diets reduces the need for crop production, irrigated pasture, hay production, and grazing of rangelands. Small-scale organic farming in backyards and utilization of the "empty spaces" within our cities, such as gardens on rooftops and vacant lots, could significantly reduce the need for food production elsewhere.

These changes could reduce for a while the demand for ever increasing urbanization as well as resource extraction. However, in the long run the best way to prevent expansion of subdivisions as well as extractive industries is to reverse human population growth. Demand is partially driven by sheer population increase. We will not have a hope of protecting agricultural and timber lands, much less wildlands, unless population reduction, coupled with reduction in resource consumption, is part of a long-term strategy. In the short term, we can begin to reduce the impacts associated with sprawl AND resource extraction industries by utilizing conservation easements, outright fee purchases of land, strong zoning, and other permanent methods of restricting land development and resource extraction to appropriate locations.

Alternative solutions proposed to avoid antagonizing "property rights" proponents, such as increased subsidies or tax incentives, do not prevent subdivisions. Subsidies, in addition to wasting money that should be used to purchase and protect lands, are counterproductive because they give people the illusion that land will remain as open space. If land prices rise, farms, ranches, and timber lands will be sold. Subsidies and tax incentives merely delay the day of reckoning, ultimately driving up the eventual cost of full fee purchase or acquisition of conservation easements.

Worse, subsidies tend to promote development. Often the costs of new roads, water and sewer systems, and schools are not paid by developers, but are "transferred" to all taxpayers. Likewise, permitting house construction in timber lands prone to burning or river bottoms prone to flooding, and then bailing out people whose property is destroyed by "natural disasters," also contributes to inappropriate development.

For every acre of land in the West paved over or covered with a housing tract, 100,000 acres are plowed up, cut down, or pounded to death under the hooves of livestock. Environmentalists need to understand the real

threats and work to effectively limit all of them. Likewise, in the Northern Forest, the clearcutting of millions of acres has far more severe ecological impacts than construction of a few summer cabins. We should strive to restrict both, but if we must focus energy on one or two problems, the "working forest" poses a far greater threat to the landscape than the current level of housing development.

We really do have choices. Without environmental and economic subsidies, most western extractive industries and the timber corporations in the Northern Forest would find it impossible to compete with other more productive regions. If the only impacts western ecosystems had to face were housing developments, most of the West would remain as undeveloped open space with Bison, not cows, with native forests and wildfires, not tree farms and clearcuts, and with native prairie, not wheat fields. The towns and communities intermeshed with this landscape would be pin pricks upon the ecological fabric of the region.

It is increasingly apparent that even our largest reserves are not of sufficient size to preserve ecological processes, wide-ranging species, and ecosystem functions. In at least some parts of the country we must greatly expand our reserves. We cannot accomplish this without a commensurate reduction in the amount of the landscape used for resource extraction.

We need new myths for the arid West and the great North Woods. They never were, and never will be, the breadbasket or the woodpile of the nation; but they could be places where wildlands, wildlife, and people come together. What we could sustain are not farms or timber plots, but wildland ecosystems. ▌

George Wuerthner (POB 3975, Eugene, OR 97403) is a wilderness explorer and writer. His books include The Adirondacks: Forever Wild, California's Sierra Nevada, Nevada Mountain Ranges, Oregon Mountain Rangers, Idaho Mountain Ranges *and several others in the American Geographic series (*American and World *Geographic Publishing, POB 5630, Helena, MT 59604).*

The River Gathering

The way down
starts steep but not too risky.
A rutted path to the cabin in its green
clearing, chrysanthemums
bronze-golden this time of year
like nuggets mined from mother lode.
Yellow of turning oaks, all the ages
of the leaves' fall. A swale
catches thin cool air, quiet
draining off the ridges:
a pool where swallows sail on blue
light. At the base, a trickle
down to the water that made this place.
The way down finds
you: not so much a trail
as certain spaces between trees,
narrow rockholds.
You hear the river booming
and then it spits and hisses
20 meters straight
below you. All the silvers
and pewter-grays of water at November flood.
Rapids shred rainbows
and glisten the cliffs.
A sharp monotone cuts and pulls.
This is the place you found
to slip, all at once,
out of the precarious falling
that was life.

—Taylor Graham
first printed in free lunch

Maintaining Ecoregions in Mountain Conservation Corridors

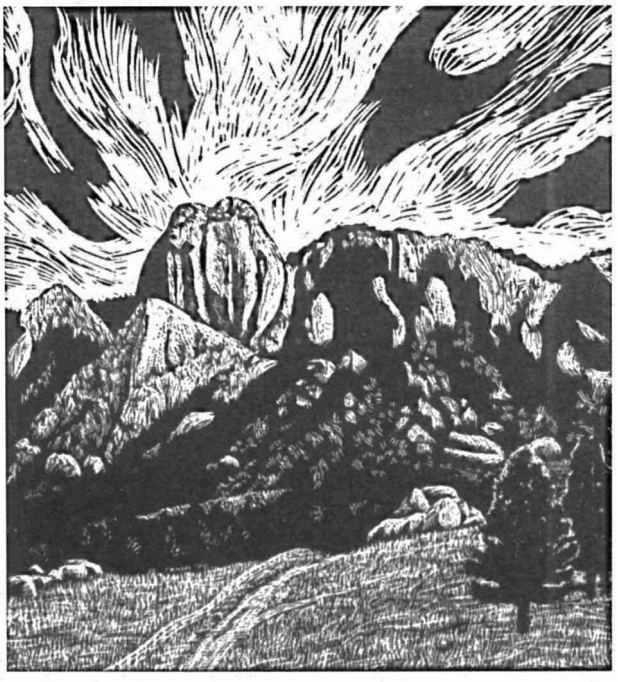
by Lawrence S. Hamilton

The vision of bioregional conservation corridors along large portions of, or even entire, mountain ranges worldwide, has begun to capture the minds and hearts of those working for biodiversity conservation and concerned with the impacts of climate change. It is a transborder dream that may well provide the framework for the creation of new mountain national parks, nature reserves, and innovative zones of conservation and sustainable resource use as we approach the 21st century.

The science of conservation biology has shown the inadequacy of small "islands" of nature protection, if we really wish to conserve the heritage of biological diversity that is in our stewardship. These isolated areas, if surrounded by a sea of human-transformed landscape which is nature-unfriendly, are usually not large enough to maintain the full assemblage of native genes, species, and ecosystems, particularly the wide-ranging megafauna such as bear, wolf, lynx, and eagle. This insufficiency will be especially acute if climate change brings about shrinking of appropriate habitat due to warming, altered rainfall, upward shifts in altitudinal zonation, and increased frequency of severe disturbances or catastrophes such as hurricanes or fires. Flora and fauna must have opportunities to migrate, not only *up* and *down* the mountains as altitudinal belts of habitat change, but *along* the mountain ranges (poleward if temperatures increase, and latitudinally as rainfall patterns change).* Unfortunately, many of our mountain national parks and other protected areas were indeed established to protect single outstanding mountain peaks, and usually only at the higher elevations above the areas valued for agriculture and forestry. They are extremely vulnerable, as "sky islands." New and expanded protected areas are urgently needed.

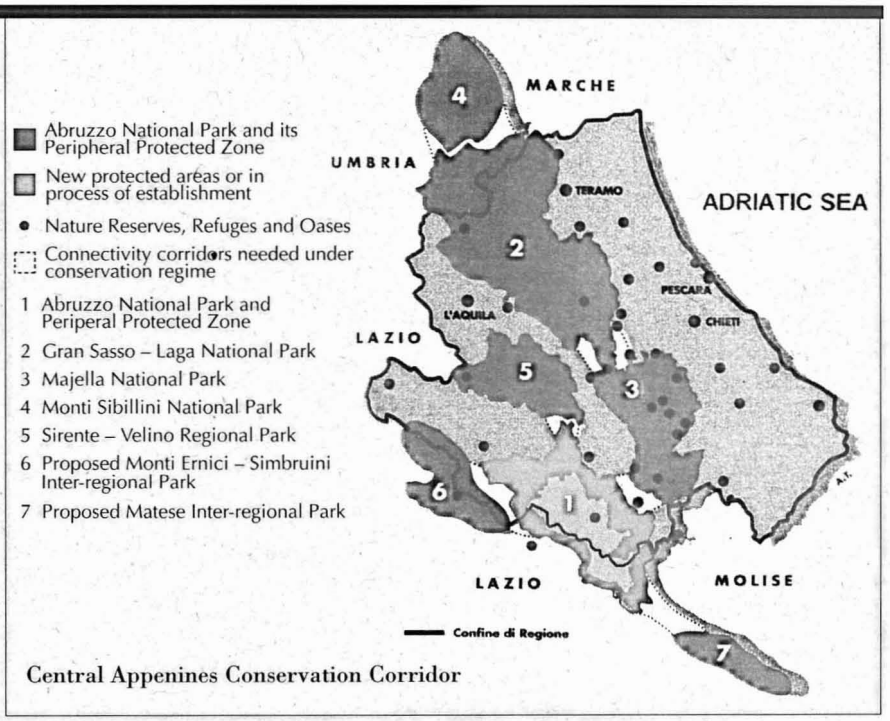
Unfortunately, many of our mountain national parks and other protected areas were indeed established to protect single outstanding mountain peaks. They are extremely vulnerable, as "sky islands."

At the same time, there has been a growing concern among landowners, local governments, and planners that



Twin Owls, Rocky Mtn. National Park *by Evan Cantor*

* Science Editor's note: Many biologists predict that the most successful responses to climate change will not involve movements north or south or up or down mountain slopes. Rather, many species may adapt by shifting their use of microhabitats. Thus, regions with great physical heterogeneity—for example, many soil types, slopes, exposures, and aspects—may retain their fauna and flora better than more homogeneous regions, particularly if climate change is rapid. —RFN



Central Appenines Conservation Corridor

the fragmented, piecemeal approaches to land use planning are not providing suitable and sustainable results. The dwindling per capita supply of quality water for domestic use, irrigation, industry, and recreation is forcing people to look at headwaters on a much larger, bioregional scale, in "nested" catchments. Other water problems, too, such as floods, inadequate low flows, and sedimentation, have long been recognized as only susceptible to management on a large watershed or basin-wide level. The need for achieving true sustainability in mountain farming and forestry, and at the same time incorporating, where appropriate, such other land uses as hunting, collecting non-wood forest products, and tourism, also pushes us toward planning for large bioregions, in which protected areas of various kinds have a key role.

These two approaches—expanding protected areas in accordance with conservation biology, and supporting sustainable uses of lands around the reserves—come together when we expand the planning horizon to a large bioregional scale in mountain areas. Which of the two approaches leads the way in initiating action will depend on the regional situation. Where there are still large areas of wildland with few permanent human inhabitants, as in the northern Rocky Mountains, the enlargement (altitudinally as well as longitudinally) of existing parks (perhaps with peripheral conservation or buffer zones) and the connection of these units along the mountain spine by conservation corridors is the way to proceed. Where the mountain landscapes are in various intensities of human use, as in the European Alps, innovative extensions of existing regional nature parks and national parks (which include people) along with conservation corridors of nature-friendly human use can achieve a desirable result. In both cases, whether or not it is mainly "government land" involved, local inhabitants (in or near the area) and distant users of the area need to be fully involved in the planning and decisions.

One of the earliest of these visionary dreams of a mountain range corridor of conservation was in the Central Appenines. It was conceived by Dr. Franco Tassi, Director of Abruzzo National Park and Chairman of the Italian Committee for National Parks and Equivalent Reserves. Using the 44,000 hectare Abruzzo National Park (and its buffer zone of almost 80,000 ha) as an epicenter and catalyst, Tassi proposed an "Appenines Green Range of Europe" consisting of five national and regional parks (Abruzzo, Gran Sasso-Laga, Majella, Monti Sibillini and Sirente-Velino), two new parks (Monti Ernici-Simbruini and Matese) and a series of approximately 21 small nature reserves, refuges, and oases, to create a conservation area of some 600,000 ha. The remaining need was for seven relatively short connectivity zones of protection to connect these areas; they have been identified and are being worked on (see map).

Meanwhile, in the United States and Canada, largely spearheaded by The Wildlands Project, a series of mountain corridors of essentially wild lands has been proposed, and the proposals are in various stages of design and implementation. One of the most ambitious is a corridor from Yellowstone National Park to the Yukon, along the length of the Rocky Mountain Range, and including such well known National Parks as Yellowstone (USA), Banff, Jasper, Kootenay, and Yoho (Canada), Waterton/Glacier International Peace Park, the US Forest Service's Bob Marshall Wilderness, and in Canada, the Mountain Assiniboine, Kananaskis and Willmore Wilderness Provincial Parks. The Wildlands Project, the Canadian Parks and Wilderness Society, and allied groups are promoting this initiative. One needs little imagination to visualize an extension southward along the Rockies, reaching toward Mexico. Elsewhere in the United States, The Wildlands Project is working with regional groups to reconnect and protect wild lands in

the Southern Appalachians (roughly 560 km long); the proposed Cascades International Park and Stewardship Area (involving seven different protected areas both sides of the international border between Washington and British Columbia); the Klamath/Siskiyou mountains of California and Oregon; the Columbia Mountains Ecoregion, between the Cascades and the Rocky Mountain Continental Divide, involving British Columbia, Montana, Idaho, and Washington; and the Southern Rocky Mountain Ecosystem. Though not qualifying as a mountain, the conspicuous landscape feature of the Niagara Escarpment has been declared a Biosphere Reserve for all of its 725 km length. It includes much of the wild and semi-wild land of this settled area of southern Ontario, and has trees over 1000 years old (possibly the oldest trees in the Northeast). Another relatively new initiative is proposing to link the Adirondack Mountain area of New York with the Canadian Shield through the Frontenac Axis of the St. Lawrence Islands National Park (Algonquin to Adirondacks or A2A). Many of these efforts to restore connectivity across large landscapes have been reported on over the past three years in this journal.

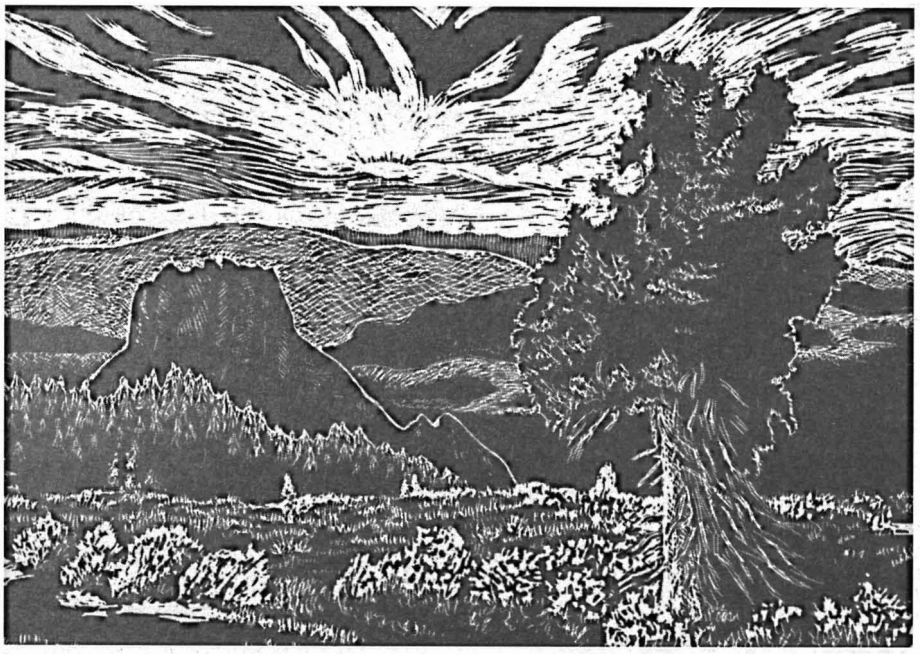
Scattered around the mountain world are various other mountain conservation corridor plans. One of the most amazing, because it has secured agreement from seven different national governments, is the Mesoamerican Biotic Corridor, which extends through Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panamá, mainly in mountainous areas. It is incorporated in a treaty of October 1994, the Alliance for Sustainable Development, and is supported by the United States, United Nations Development Program, and the Global Environmental Facility. Originally conceived as *Paseo Pantera* (Path of the Panther), it may not only spell the difference between extinction and survival of much biodiversity, but may also determine the viability of agriculture, forests, water, and the general well-being of the seven nations of this mountainous isthmus.

In Australia, the recent (1996) declaration of a 90,000 ha South East Forests National Park on the Great Escarpment closes a gap to now provide a continuous protected area corridor of public land 150 km long from the border of the state of Victoria north through New South Wales. Transborder agreements are underway with Victoria to bring adjacent protected areas there under a coordinated management regime. Moreover, actions are pending in New South Wales that could add existing state forest land further north to achieve protection for a total length of 600 km. Potential also exists for 400 km of the Great Escarpment in New South Wales north of Sydney. Nearby, eight different units aggregating 1.5 million ha are already protected, under four different jurisdictions in the Australian Alps, managed cooperatively under an Australian Alps Liaison Committee. Involving Victoria, New South Wales, Australian Capital Territory, and the Commonwealth, this committee is a world leader in facilitating protected area transborder cooperative planning, management, and education.

Potential for more mountain corridors is boundless, if individuals, organizations, and governments "catch" the vision.

The Serra do Mar, containing threatened Atlantic Forest and extending in an arc south of, behind, and north of Rio de Janeiro, has an almost complete corridor of 11 state and federal conservation units extending for some 550 km. There is critical fragmentation due to a few roads, banana plantations, and small cattle ranches, (and some of the conservation units are not well protected); but the vision exists in the minds of dedicated NGO conservationists, who are working to devise appropriate institutional arrangements along with local, state, and federal officials.

Elsewhere in the world are constellations of adjacent parks, protected areas, and national forests, where linkages are beginning to result in large mountain bioregions with a common vision and management regime. Many cross international boundaries. To mention just a few: Andean Spectacled Bear Habitat Corridor in Venezuela's Sierra Nevada Range—hopefully soon collaborating across the border with Colombia; the Karakoram Constellation, anchored by the Khunjerab and Central Karakoram National Parks (the latter contains K-2); an altitudinal corridor from Manas Tiger Reserve in India (tropical habitat at 100 m elevation) through Bhutan's Royal Manas National Park and Black Mountain National Park (up to 4900 m and permanent ice), which was realized in 1996 by the gazetting of a protected area corridor linking the two Bhutanese parks; designation in 1995-96 in Bolivia and Perú of two additional national parks, Madidi and Bahuaju-Sonene, to create a transborder Andean slope corridor of some 9.3 million ha; the cluster in Alaska (USA) and the Yukon



(Canada) of Wrangell-St. Elias/Glacier Bay/Kluane/Tatshenshini-Alsek parks covering some 10 million ha, the world's largest World Heritage Area, with US and Canadian park professionals now discussing common themes of management and interpretation. The 10.5 million hectare (26 million acre) Northern Forest that occupies the mountainous areas of New York, Vermont, New Hampshire, and Maine is increasingly being visualized as a unit for broad regional conservation planning and management, even though it contains a mix of state and federal forest, industrial forest lands, and small private ownerships. Protection of key wildland areas and more conservative management of the connecting lands are part of the vision being supported by a broad array of conservation interests called the Northern Forest Alliance.

Potential for more such mountain corridors is boundless, if individuals, organizations, and governments "catch" the vision. For instance, an inspection of a map of the various kinds of protected areas in the southern arc of the European Alps indicates the possibility of gradually linking Alpi Marittime/Mercantour (now in active transborder cooperation) with a series of French and Italian national parks and regional nature reserves—Ecrins, Vanoise, Gran Paradiso, Monte Avic, Queyras and almost a dozen others—to create a mountain conservation corridor of about 250 km long. Possibilities also exist in the Tatras, the Austrian Alps, the Caucasus, Altai and many other places. The vision is there to be seized, even if the implementation is a long and bumpy road.

The Mountain Theme of the World Commission on Protected Areas of IUCN (World Conservation Union) has adopted this dream and has been supporting such initiatives whenever possible. Would a "Conservation Corridor of the Americas" be a magic quest—from Tierra del Fuego to the Bering Straits, along the mountain spine of the continents? The Mountain Theme has this as a long-term goal (see Jim Thorsell's article in *Wild Earth* summer 1996).

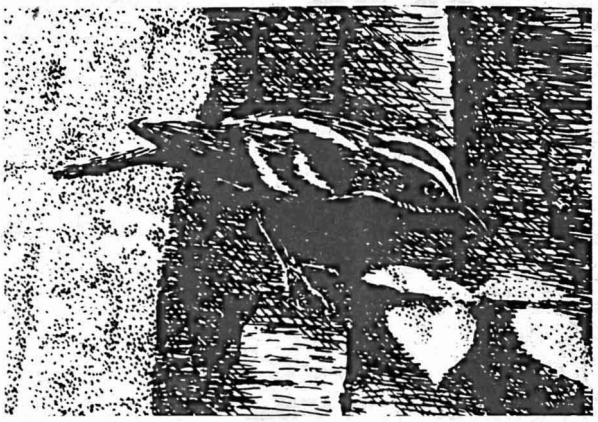
Any corridor, whether crossing up and down altitudinal belts or along ranges, will involve cooperation between different protected area jurisdictions, and often between nations. Mountain ranges are often national frontiers. Transborder cooperation in protected area management pays large dividends that can be biological, cultural, economic, and in the interests of a peaceful border. A recent (1996) policy publication of the IUCN's World Commission on Protected Areas discusses the benefits, difficulties, types of arrangements, and criteria for effective cooperation, and gives a set of case studies. ("Transborder Protected Area Cooperation" is available from the Protected Area Programme, IUCN, Rue Mauverney 28, 1196 Gland, Switzerland.)

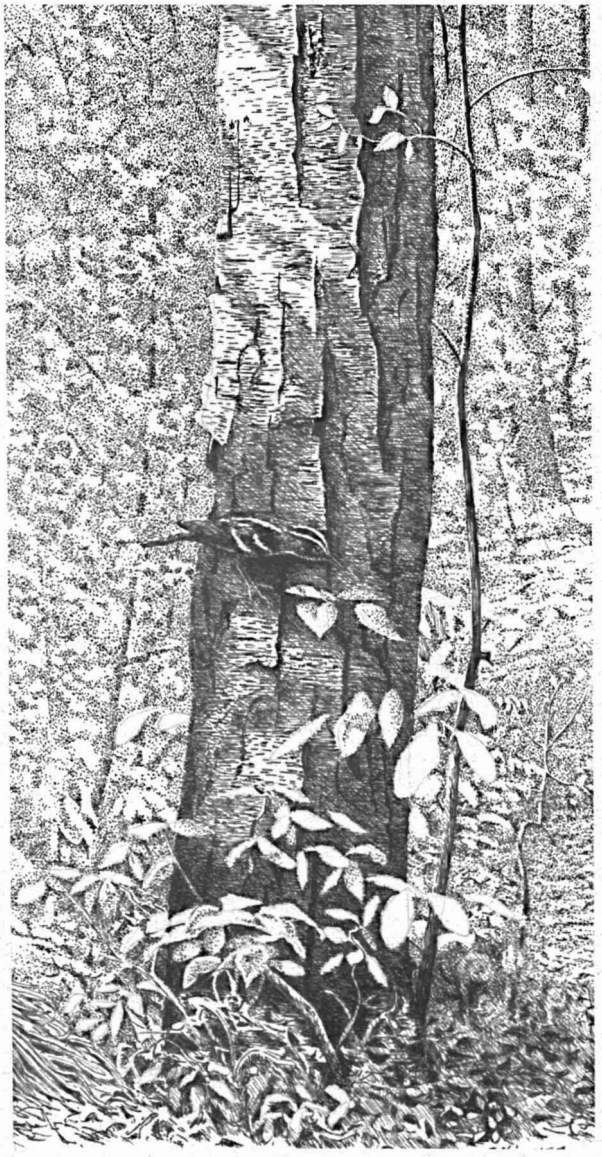
The dream of these large bioregional corridors, constellations or clusters in mountain areas was brought to the attention of the global conservation community at the IUCN World Conservation Congress in Montréal in October 1996. A three-session workshop was organized and implemented by the Mountain Theme Vice-Chair of IUCN's World Commission on Protected Areas. Steve Gatewood, Mario Boza, and Harvey Locke, all associated with The Wildlands Project, made presentations in the workshop. It is the fervent hope of the author that IUCN, the world's foremost "officially blessed" conservation organization (cumbersome though it be most of the time), become fired with the enthusiasm of the individuals and groups in The Wildlands Project and of those who put *Wild Earth* out into the public forum four times a year. The IUCN/WCPA Mountain Theme gives a tip of the hat to this leadership. ▮

Lawrence S. Hamilton is semi-retired and with partner Linda Hamilton operates a small environmental consultancy, Islands and Highlands, based in Charlotte, Vermont. He is Emeritus Professor of Forest Conservation, Cornell University, and former Senior Fellow at the East West Center. Larry now volunteers half his time to the World Commission on Protected Areas of IUCN where he is Vice-Chair for Mountains. In this capacity he puts out a quarterly newsletter Mountain Protected Areas UPDATE *to a network of scientists and managers working in mountain parks and reserves. Any readers qualifying who wish to receive this newsletter may write to 342 Bittersweet Lane, Charlotte, VT 05445.*

Halfmoon Pass *by Evan Cantor*

Can the Precautionary Principle Protect Us From Imperial Ecology?





Black-and-white Warbler on Black Birch *by Bob Ellis*

by Walter Kuhlmann

The renewed debate about the meaning of wilderness (*Wild Earth* winter 1996/97), in response to Bill Cronon's essay, can also prove useful in understanding proposals for actively managed lands. Because of the biological importance of lands outside of presently designated Wilderness Areas, and the interrelationship between wild and managed lands (Meine 1992), we must analyze management proposals with the same vigor and understanding as we do Cronon's conceptions of wilderness. There are striking parallels between efforts to deconstruct wilderness and proposals to reconstruct the meaning of the term *ecosystem* to license ubiquitous human manipulation of the managed landscape.

A common feature of both areas of discourse is the dichotomy between the imperial, anthropocentric approach to ecology (which seeks to find a human "home" in both wilderness and "working" landscapes) and the foundational form of ecology exemplified by Leopold's ultimate commitment to ecocentrism. Understanding this dichotomy is particularly important in the late 1990s as the first round of National Forest plan revisions gets underway, and as responses to conservation biology change from simple denial to sophisticated plans for active management, proposed in the name of protecting and restoring ecosystems.

A simplistic response to management proposals purporting to be based in "new biology" might be to categorize

them as the work of "new engineers" who should not be allowed to experiment with the public lands. Or one might seek Congressional designation of Wilderness as a more absolute defense. Such reactions fail to acknowledge several unfortunate truths: the biotic value of wilderness is not yet sufficiently appreciated, new Wilderness designations are not likely to be substantial enough in the short run, and multiple use planning will have a critical impact on the ability of native biodiversity to weather the next several decades. Moreover, it is not always unbiocentric to manage (Alverson & Waller 1992).

A more discriminating approach would begin with a keen appreciation for the imperial-foundational dichotomy to help us guard the language of conservation biology just as we must guard the language of wilderness. Secondly, we should impose a higher burden of proof for management proposals that exhibit the attributes of imperial ecology, such as reliance on more active techniques, a presumption that we can prescribe adequate ecosystem protections for logging in recovering second-growth forest, or a proposal largely driven by human needs or desires rather than primarily intended to restore ecosystem structure and function. Indeed, we may be able to refine the "precautionary principle" from international environmental law, and develop a sliding scale which increases the burden of proof on proposals for new management as more precious biological conditions would be affected.

Readers of *Wild Earth* need little review of the imperial-foundational dichotomy in ecological thinking. In a lengthy law review article on "making the law more ecocentric" (Kuhlmann 1997), I discussed the two approaches to ecology as reflecting different perspectives on the role of humans in ecosystems:

One such perspective is the foundational approach, which is characterized by little faith in human engineering of nature, is troubled by our track record of highly manipulative approaches, and tends to value a wild course of events. A second perspective is the imperial approach, which is characterized by a more utilitarian view of nature, such as existed in the Progressive conservation movement of Gifford Pinchot and Theodore Roosevelt, and is more friendly to manipulating and dominating nature. (Worster 1977)

Max Oelschlaeger has explicated the tension and transition in Aldo Leopold's thinking "away from a progressive, Pinchotlike management philosophy toward a radical, Muirlike preservationist philosophy" (Oelschlaeger 1991; at 232) resulting in the land ethic with a "biocentric perspective, where foundational knowledge and aesthetic judgment have supervened merely scientific, economic and technical judgment..." (Oelschlaeger 1991; at 232).

In contrast, Daniel Botkin's popular book, *Discordant Harmonies* (Botkin 1990), exemplifies the imperial approach, with its assurances that we can "mimic nature realistically" (at 120), that we "must enter into the modifications of the environment as constructive power" (at 167), and "engineer nature at nature's rates and in nature's ways" (at 190). Botkin calls for a new organic view of the Earth "in which we are a part of a living and changing system whose changes we can accept, use, and control, to make the Earth a comfortable home, for each of us individually and for all of us collectively in our civilizations" (at 189).

Botkin's Earth to be used and controlled is Bill Cronon's "planet in which the human and the natural can no longer be distinguished" (Cronon 1995; at 82) and his wilderness which is largely a "complex cultural construction." (Cronon 1995; at 81) Botkin's "comfortable home" metaphor is also found in Cronon's wilderness discussion:

In particular, we need to discover a common middle ground in which all of these things, from the city to the wilderness, can somehow be encompassed in the word 'home.' Home, after all, is the place where finally we make our living.... Calling a place home inevitably means that we will use the nature we find in it, for there can be no escape from manipulating and working and even killing some parts of nature to make our home. But if we acknowledge the autonomy and otherness of the things and creatures around us—an autonomy our culture has taught us to label with the word "wild"—then we will at least think carefully about the uses to which we put them, and even ask if we should use them at all. (Cronon 1995; at 89)

The "comfortable home" metaphor, defined by the needs and desires of one species, *Homo sapiens*, is antithetical to Leopold's ecocentrism, regardless of whether the tools of the management proposals are defined in the modern terminology of conservation biology or the blunt and primitive methods of earlier game and timber management.

While deconstruction threatens the meaning of wilderness, the Forest Service would *re*construct the meaning of core terms in conservation biology to fit an imperial ecological world view, and explicitly grant humans a home throughout the National Forests. The Forest Service's proposals to re-write its forest planning regulations have many shortcomings (FS 1995) but here I focus on two aspects of the proposals that clearly manifest the urge to make the ecology of the National Forests of the imperial variety. Although the Forest Service has delayed final adoption of these proposed rules, many

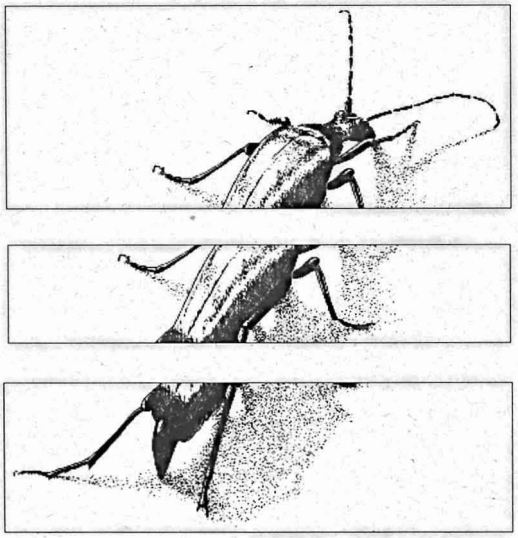
believe that the pressure from Senator Larry Craig's forest "reform" legislation, coupled with Republican dominance of the Senate, may compel final promulgation of these rules as a way of staving off a more politically visible and contentious overhaul of the National Forest Management Act (NFMA).

The prime example of this problem is the combination of "ecosystem" with "management" to form the brand new policy idea, Ecosystem Management. Reed Noss and Alan Cooperrider define "ecosystem" as:

A dynamic complex of plant, animal, fungal, and microorganism communities and their associated nonliving environment interacting as an ecological unit. (Noss & Cooperrider 1994; at 391)

From this root, one might expect that Ecosystem Management (the FS term) would simply be "the management of a dynamic complex of plant, animal...communities...interacting as an ecological unit." But to the Forest Service, Ecosystem Management is something quite different. The agency's proposed definition would provide:

A concept of natural resources management wherein National Forest activities are considered within the context of economic, ecological, and social interactions within a defined area or region over both short- and long-term. (FS 1995; at 18,920)



This definition converts the management of ecosystems from protection and restoration of biological systems to a multiple use balancing of human socio-economic needs with other values. As I said in the law review article cited above (Kuhlmann 1997; at 154):

...[U]nder the Proposed Rule, a manager may engage in Ecosystem Management, and evaluate the overall economic, ecological and social context as being well-served by a particular management program (and thus tout the result as being "good for the ecosystem") without ever taking cognizance of, or ever separately examining degradation of, the purely ecological interactions which will determine whether the "ecosystem," as that term has well-accepted scientific meaning, is thriving or losing ground.

The proposed rules further would make the forests our "home," as a matter of law, by declaring that "people are part of ecosystems." The current NFMA planning regulations, adopted in 1979, include the statement that "the National Forests are ecosystems and their management for goods and services requires an awareness and consideration of the interrelationships among plants, animals, soil, water, air, and other environmental factors within such ecosystems" (36 C.F.R. § 219.1(b)(3) (1995)). Under this regulation, people could be a part of an ecosystem only to the extent that they play a role in interactions as defined by ecological structure and function at relevant scales. In contrast, under the Proposed Rule, people (including expressly their "needs *and desires*") are simply declared, by fiat, to be "part of ecosystems" without any qualifying degree or nature of biological interaction (FS 1995; at 18,919). This new approach gives the full range of human action in a forest equal standing with those structural and functional elements of the "system" that are biologically interactive and interdependent from an ecological and evolutionary perspective. As I said in the law review cited above (Kuhlmann 1997; at 155):

It is certainly possible for people to be part of ecosystems in the biological sense, if they are part of the biological "community," but that entails a level of biological interconnectedness that very few people have any more. People are, for the most part, not *a part of the structure or function of the ecosystems next to which they live. It is not enough to qualify as a part of the ecosystem to merely be present, or to merely take a small fraction of one's needs from the community. One must be part of the structure and function to be a part of the biological "membership," and that is quite different than saying we need to consider humans' needs along with, and in some sort of balance with, the needs of the legitimate biological communities that are present in the National Forest System.*

In this way, the Forest Service has acted in parallel with the teachings of Botkin and Cronon, and re-defined "ecosystems" and their management to be the management of the affairs of humans within a forest environment. Such an imperial reconstruction of the language of ecology will deprive us of the basic terminology necessary to carry on a reasoned debate about the environmental consequences of forest management.

These new inroads of imperial ecology also suggest a level of confidence in new engineering that is similar

illustration by Bob Ellis

The precautionary principle would reverse the burden of proof by requiring proponents of anthropogenic change to prove that the proposed actions will not harm species and habitats...

to the overconfidence in earlier game and timber management. Instead of denying the importance of conservation biology, these new imperialists have incorporated the findings of the "new biology" but wield them in a manner similar to Pinchot's promotion of "scientific forestry" earlier in the century. How can we sort out the best of active management proposals without repeating the mistakes of the past?

One aid may be found in the precautionary principle. Utilized in strategic environmental problems such as global warming, ozone depletion, and ocean dumping, the precautionary principle would reverse the burden of proof by requiring proponents of anthropogenic change to prove that the proposed actions will not harm species and habitats, rather than requiring the defenders of habitats and ecosystems to prove a high likelihood of damage or extirpation before an activity will be halted. The precautionary approach is in contrast to the usual paradigm of domestic environmental law—the so-called "assimilative capacity approach"—which assumes that nature is highly resilient to anthropogenic disturbance and pollution, that we have the capability of measuring the extent of our harm to the ecosystem, and that we can do so in time to reverse damaging behavior (Hey 1992; at 305). Although a few species have been rescued from the brink of extinction with tremendous subsidies of human time and energy, there is strong evidence that these assumptions are generally not valid when applied to communities or ecosystems.

Given that, as Leopold told us, "...the land mechanism is too complex to be understood, and probably always will be" (Leopold 1944), and given our track record of species and habitat loss, a precautionary approach is warranted. Leopold's humility was not a rejection of science, but a wisdom that restraint, not experimental use, was often the better course.

The precautionary approach provides a more workable and flexible mechanism for evaluating new management proposals than simple skepticism or humility. One can refine the concept further by use of a sliding scale of proof, rather than a simple reversal of burden. That is, for areas of particular long-term biological significance (even if they have been heavily disturbed in the past by human activities), one might require a particularly high burden to be met, when compared to areas with more common characteristics.

The precautionary approach is also a technique to overturn the unreasonable application of the presumption of agency expertise, and deference to agency discretion. Such presumption and deference concepts that have a long history in US administrative

illustrations by Bob Ellis

law (to keep the courts from unduly substituting their judgment for agencies, and thus effectively invading the realm of the Executive Branch), but are substantively unwarranted given the low priority accorded to scientific concerns in most land management agency decisional processes.

CONCLUSION

Friends of conservation biology are now everywhere. Rather than contest its implications head on in biological terms (e.g., the appropriate size of reserved areas, the importance of connectivity, etc.), the imperialists would change the language, and the law, to rig the game. If the claims of other species are too great to be tolerated, then the imperialists would re-write the definitions so that there are no terms in which to separately account for biological losses, and they would equate human socio-economic needs and desires with biological conditions that actually constitute a (current or potential) ecologically robust web of life, forged by evolution. We must guard the language of ecologically-based management from attacks by imperialists every bit as much as we must guard the language of wilderness from attacks by "home"-builders.

When our instincts tell us that new forms of management may be making the same mistakes of hubris as past generations, even if we presently think that the "new biology" is much closer to the mark, we should explicitly require that a precautionary burden of proof be met, given the irreplaceable species and ecological conditions at stake. This is not a rejection of the predictive capability of science, but rather an understanding of how limited our knowledge is, or is likely to be, over the relevant time period in which each of us may have a voice in land management decisions. ▮

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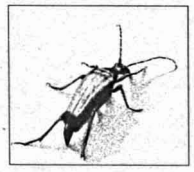

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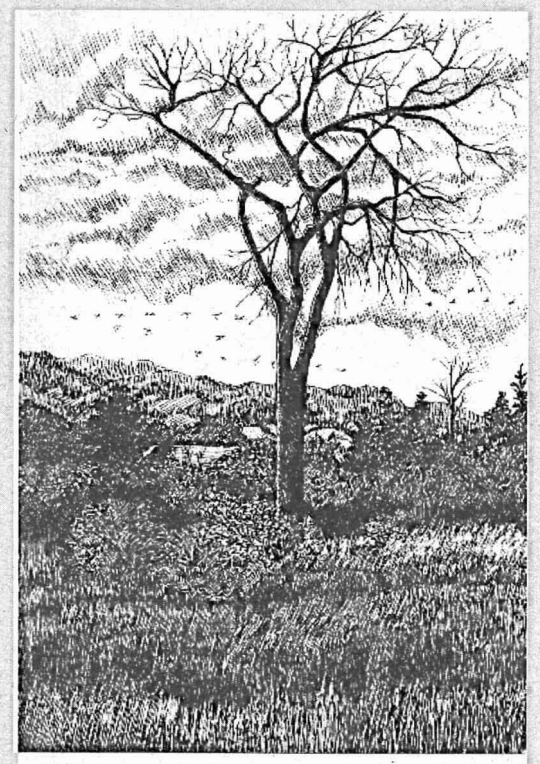


Forever Wild Easements in New England

A View from the Table

by Nancy Smith

As a foundation director involved in many conservation transactions throughout New England, I would like to weigh in with an opinion on the use of conservation easements in wildlands protection. Wilderness advocates need to understand how important conservation easements are to conservation that must happen now because of narrowing windows of opportunity. In New England, which is vastly different from the West in that most land is privately owned, conservation easements are the best tool in the whole tool box. Easements need friends, creative practitioners, and more funds.

For those unfamiliar with easements, I offer a simple definition: a conservation easement is a voluntary legal agreement between a landowner and a land trust or public agency that permanently restricts certain developments and uses of the land. This agreement can be given or sold by a landowner. The conservation easement is recorded in the Registry of Deeds, and runs with the land through all future ownerships. For more background I recommend Brian Dunkiel's excellent articles from the fall 1995 and summer 1996 issues of *Wild Earth.*

Because they are amazingly flexible, conservation easements can fit all sorts of public and private situations, and adapt to every sort of terrain. They are often used to protect privately owned land. My enthusiasm for their use is greatest when they are held by one conservation group (or two! even better!) on land already under conservation, including federal and state lands. These layers of protection give many parties a real ownership interest in the conservation property. Through

illustration by Margaret Parlour

land trust involvement, conservation easements can be the means by which local people obtain an actual property interest in conservation land. It is axiomatic that the more complex the land protection structure is, the more parties that have a piece of ownership in it, the more enduring it will be.

The utterance of "Forever Wild" stirs in wilderness advocates a visceral, animal response. This fight reflex compels the struggle to protect large natural areas from the twitchy human hand which wants to "improve" everything. A Forever Wild easement can protect not only the land itself, but the native wild plants and animals in their natural communities and the abiotic environment that supports them. It precludes adverse uses. But let's bring this lofty "Forever Wild" concept down, put it on the ground, and flesh it out with some political and legal realities.

"Forever" doesn't mean forever in the world of law and politics. One of the compelling reasons to use conservation easements is the strong legal basis of their permanence. A conservation easement is an actual conveyance of property rights to the easement holder, thereby extinguishing those rights. It is a solid property transaction, with antecedents in common law and broad statutory basis. Forever Wild easements are at least as permanent as other forms of land protection.[1]

Massachusetts alone in New England has a detailed process for approving conservation "restrictions," as they are called in this state, requiring local and state governmental approvals. It is therefore harder in Massachusetts to release a conservation easement in part or in whole, because public hearings are required, as is the approval of all parties and agencies, with a current interpretation by the Secretary of Environmental Affairs requiring consent of a two-thirds majority in a vote of the state legislature.

In Vermont, New Hampshire, and Maine the statutes that describe the procedure for creating conservation easements do not include a state role in their approval or in a process to extinguish them. The perpetuity of carefully drafted conservation easements held by land trusts is supported by state statutes, the Uniform Conservation Easement Act, IRS regulations, charitable trust law, and case law. Under the IRS regulations, conservation easements cannot be extinguished by a qualified charitable trust without a court order, and then only under the doctrine of changed circumstances or eminent domain. Under the Uniform Conservation Easement Act[2] a conservation easement cannot be terminated for financial reasons under the doctrine of changed circumstances. In my experience

Because they are amazingly flexible, conservation easements can fit all sorts of public and private situations, and adapt to every sort of terrain.

1 The permanence of conservation easements compares very well to the constitutional or statutory basis of permanence of publicly owned fee land. For example, Wilderness Areas and National Wildlife Refuges are created by an act of Congress. Many conservationists fear that someday some public agency might yield to wayward calls from the fringe to "cost-save" by privatizing public lands. Land could be de-classified by a simple act of Congress. Fortunately, this would not be so simple: because of the vigilance of wilderness proponents and of non-profit friends like the National Wildlife Refuge Association, there would be significant commotion on the floors of Congress. In addition to Wilderness Areas, state and federal lands throughout New England have special designations for small natural heritage sites, for example, the Research Natural Areas (RNA) on National Forests. Many of these are administrative designations and can be changed again through the administrative process, so these have no statutory safeguards.
In New York State's Adirondack Park, Forever Wild land is constitutionally guaranteed. It would take a 2/3 vote of two successive legislatures to amend Article 14 to undo the forever wild status of land so protected, and then the issue would go to a statewide ballot in the fall. That is about as forever as Forever Wild gets in the Northeast; state conservation lands in New England are not so strongly protected. Occasional problems on some state and town fee holdings in New England have inspired comment that conservation land might be a piggy bank for future development. Despite statutory protection for state conservation lands in New England, they can be traded or taken out of conservation for development, without adequate public notice. "Sunshine" legislation designed to shed more light on deconservation actions is needed, to ratchet up protection by alerting people and allowing greater comment well before a legislative vote. Overall, though, the view from here of "forever" is that state and federal conservation land in New England has been relatively secure.

2 The Uniform Easement Act is the basis for state statutes in Massachusetts, Maine, and New Hampshire.

with New England land trusts, I don't know of any easements that have been terminated this way.[3] Land held "in trust" under an easement, if released by the owner and easement holder, could be challenged by the attorney general of the state under charitable public trust powers.

Fortunately, the choices for conservation are not either/or: either conservation through fee ownership or conservation by easement. A third choice is available and increasingly popular. Public or non-profit conservation land can be encumbered by a Forever Wild easement running to another conservation group or agency. There are many instances in New England of the conveyance of conservation easements on state lands. Often this happens because private moneys have been raised and expended on land that ultimately came under state ownership, and the conservation group that raised the funds insisted on a level of protection that they could enforce.

Government lands further protected by Forever Wild easements are a paragon of stable conservation ownership. In the second half of this article, we will look at a case study of state fee ownership encumbered by a forever wild easement.

In my opinion, these ownership complexes cannot be too dense or involve too many groups. It would be very hard to undo wilderness protection with a crowd holding the various pieces of interest in conservation land. If the conservation owner, public or private, got the twitchy hand syndrome with bright ideas about how to "improve" the land, that hand would be stilled by others.

"Wild," of course, defies strict definition. If "forever" has intricate foundations in the law, the definition for purposes of land conservation of "Wild" is, well, wild. Put aside the colossal disagreements about wildlife between government land managers, foresters, and wilderness advocates. Even within the circle of conservation biologists and wilderness proponents there are disagreements, as this journal has amplified. Some issues back, Reed Noss wrote "What is natural? Hell if I know."

It is easier to define what is *not* natural. In a forever wild easement, activities that impact and degrade Nature are written into a "Prohibited" uses section, which is the heart of the document. When writing a Forever Wild easement, these are the issues that make agreement between parties downright hair-raising. Government agencies and even the most hallowed of land protection non-profits do not particularly want to give away the market value and management options on their lands, but in certain circumstances they will. The right to build condo units is easy to give away when drafting an easement on conservation lands. Other issues are tougher, whether the land holder is a government agency, a land trust, a foundation, or a private party.

Road closure is a particularly tough sell. Everyone gets worked up about roads during a discussion of Forever Wild on a specific piece of land. Remember, public officials and all host of well-meaning conservationists have for years "improved" land through road-building for emergency access to put out fires and to rescue recreationists *in extremis*, and for timber harvesting. So second-nature to all of us is road-building that a first discussion about road closing to restore land to wildness might send shock waves 'round the table. The biological imperative of road-closing may not seem compelling next to the arguments raised by strong-voices that love roads: the snowmobilers and RVers obviously, the hikers, hunters, campers, environmental educators and handicapped who want easier access than walking provides. But where there is easy human access, there is garbage and its collection, road and bridge-building and maintenance activities, maintenance yards, sheds and heavy equipment, parking areas, hydrological disruption, soil compaction and erosion. Hunters follow radio-collared hounds by pickup, poachers invade, and vehicles drag in noise, exotic plants, exhaust.... Roads can cause a stewardship nightmare.

Road closing is only one issue to face those who negotiate the prohibited and the permitted uses on behalf of Forever Wild land. Other items I

3 Under the doctrine of merger, if the fee title of land is conveyed to an entity that holds a conservation easement on the property, the easement would be extinguished. But there is no reason the entity could not then convey the easement to a new land trust, thereby ensuring a perpetual protection which fee ownership does not necessarily provide. There have been easements in New England terminated in whole or in part by eminent domain takings.

illustration by Margaret Parlour

try to get into the "Prohibited" uses section include no timber management; no use of biocides or other chemicals, no erection of permanent or temporary structures of any kind, industrial, commercial, residential or recreational (lean-tos and tent platforms included); no introduction of non-native plants and animals (horses and dogs included); no disruption of soils and water courses; no access by motorized anything.

A FOREVER WILD EASEMENT SHOULD PROTECT WILDLANDS, NOT MICROMANAGE THE FUTURE.

To achieve flexibility, a role for conservation biologists needs to be crafted into the easement in an "Ecological Management" section (which we sometimes put as a subsection under "Permitted"). One of the tensions of writing Forever Wild easements is in allowing the flexibility for future wilderness management of rare species and significant natural communities, exotic species, infestations, etc. according to the dictates of good conservation science, while at the same time restricting harmful activities. Land trusts and state agencies appear to be increasingly responsive to conservation science, and often show an openness to drafting such provisions into their management process. The Ecological Management section should require consensus of recognized experts in the field of conservation biology, as well as agreement between owner and easement holder with all proper permits in place, for any override of prohibited uses.

For example, even the use of pesticides and herbicides, which should be prohibited generally, must be allowable under special circumstances, as the following case illustrates. In western Massachusetts, an easement on Kamposa Bog prevented use of biocides. The Nature Conservancy needed to control an infestation of Phragmites which was crowding out other plants—many of them rare. Careful research had shown that the best alternative to control the Phragmites under these circumstances was to drop minute amounts of a short-lived herbicide into the cut stem. The proposed activity was awash in controversy, but finally approvals were given. Today the Phragmites are slowly dying back, allowing the reestablishment of native vegetation. If the easement had been enforced as written, the bog might have been lost.

Every conservation easement gives the easement holder the right to enforce compliance. This is the muscle of the easement. The easement holder is granted the right to enter the land for purposes of inspection. To deal with potential problems that may be difficult to handle amicably, remedies are spelled out in the easement, including language like this: "The right to enforce this Conservation Easement by appropriate legal proceedings and to obtain injunctive and other equitable relief against any violations, including, without limitation, relief requiring restoration of the Property to its condition prior to the time of injury." Usually, conservation easements require the property owner to pay reasonable costs incurred enforcing the conservation easement. Sometimes a third party, not the owner or the easement holder, is given the right of enforcement as well.

I hope I've covered most basic features of a Forever Wild easement. The drafting process is usually a long and thoughtful one, overseen by lawyers familiar with them.

Let's examine what brings the parties to the table to discuss a Forever Wild easement in the first place. In my experience several conditions are usually present for a Forever Wild deal to transpire: passionate voices in support of wilderness, good science, money, and (too often) a threat to the resource.

VOICES

The critters of cove forests and vernal pools can't testify, therefore the voices of wilderness advocates, outside and inside land trusts and government agencies must speak to the fact that intensive human use and "wild" cannot cohabit the same piece of landscape. The principle of Forever Wild should be permanently spelled out in a Forever Wild easement; it should not be subject to the vicissitudes of changing political climate or the lobbying of special interests which would be reflected in management plans. Understanding and support for the conservation easement tool by wilderness folks is critical.

GOOD SCIENCE

Many of the Forever Wild projects with which I have been involved have been preceded by ecological assessments and inventories which serve to put the land into a landscape and historic context. They shift everyone's attention from the needs of recreationists, hunters, and loggers to the needs of interior forest songbirds, salamanders, wetland complexes, and old growth. One should never underestimate the effect of good conservation science on thoughtful people in government and in land trusts. In addition, because an easement is a perpetual document, one should make a determined effort to understand the land before drafting an easement.

MONEY

There are increasing opportunities for public and private partner-

ships in land conservation. We could cite many wonderful New England collaborations, such as the Camel's Hump State Park example to follow. Foundation money or privately raised land trust money can come to the table with a Forever Wild easement as consideration. If they aren't already, land trusts and funders of land acquisition should begin exploring such conservation options now.

Money to purchase Forever Wild easements should be included in bonds and other funding mechanisms for New England states to protect wildlands. The Biodiversity Projects in Maine and Vermont and the New Hampshire Ecological Reserve System Steering Committee are all attempting to lay the framework for statewide ecological reserve systems; hopefully, public funding inclusive of money for the acquisition of conservation easements will follow. Government agencies can put money into conservation projects, too, in consideration for which they will hold the easement.

THREAT TO THE RESOURCE

Too often, not until an area is under immediate threat do people mobilize to find a conservation alternative. Sometimes the lack of proactive planning means land prices are driven skyward by a developer's interest. A hurried conservation plan is not likely to be the most thoughtful or durable one.

CASE STUDY
CAMEL'S HUMP STATE PARK: PHENN AND STARK BASINS, FOREVER WILD

I chose Phenn Basin, an addition to Camel's Hump State Park in Vermont, as the case study for how a Forever Wild easement can be used to insure wildlands protection on state land.

The Phenn and Stark Basins tract is in the town of Fayston. The land lies inside a nine mile stretch of unbroken mountain forest from the Winooski River to Lincoln Gap.[4] The Green Mountains are characterized by a series of basins on the east slopes of the spine, where glacial ice scoured concavities and meltwater cut gorges of headwater streams. Western slopes tend to be more exposed to severe winds and consequently less moist and less biologically rich. This 2780-acre tract, consisting of two eastern basins and part of a third, was collectively called Phenn Basin, and we will continue this reference here. The western boundary of the tract follows the Green Mountain ridgeline.

As in most exciting conservation projects, Phenn Basin is part of a mosaic of other conservation holdings and private lands. It lies four miles from the northern limit of the Green Mountain National Forest in Warren and nine miles northeast of Bristol Cliffs Wilderness Area. It abuts Camels Hump State Park. Also in Fayston is the Big Basin Forest, a privately owned conservation trust. The partially protected corridor of the Long Trail follows the Green Mountain ridgeline.

Many conservationists had nervously watched the multiple holdings of the Ward Lumber Company when they were put on the market in the early 1990s. The two largest tracts are in the towns of Fayston and Duxbury. There was a general consensus among conservationists that the asking price exceeded market value, and that we should wait for the price to drop. We collectively swallowed a bitter pill when the land was sold in 1994 to Keith Van Buzkirk, a businessman from upstate New York. Through a timber lease to a Quebec timber outfit, the 3500 acre piece in Duxbury was cut hard, with plans underway to start cutting in Phenn Basin.

Many parties were at the table to save Phenn Basin. The lead role in the struggle to put a deal together was played by the Trust for Public Land (TPL), with intense involvement also by Vermont Land Trust (VLT) and several state agencies, including the Department of Forests, Parks and Recreation, the Department of Fish and Wildlife, and Vermont Housing and Conservation Board (VHCB). Also involved were the town of Fayston, Mad River Valley Planning District, Green Mountain Club, and Sweet Water Trust, the organization I work for. Several years earlier Sweet Water Trust had looked at the Duxbury land, cool and green, forested with big old hardwood trees. Now everyone sat together looking at the latest photos of the Duxbury land, clear cut.

The most likely protection scenario was to incorporate Phenn Basin into Camel's Hump State Park, since it rubbed shoulders with the Park up on the ridge. But for Sweet Water Trust to help fund this project would require the state's willingness to embrace some or all of this land as

4 Much description here comes from *An Ecological Assessment of Phenn Basin, Fayston, Vermont,* by F. Brett Engstrom and Charles V. Cogbil, A Report to the Trust for Public Land, June 8, 1995.

Forever Wild. As a funder of such projects, we do not concede on this. We put the funds we have available every year into the best Forever Wild projects in New England.

With optimism and perseverance TPL negotiated a purchase option on 2780 acres for $1.3 million. VHCB had pledged about half that amount. GMC, whose Long Trail runs along the ridge, in part on this property, committed $150,000. A sizable funding gap remained. It was clear to some of us that an ecological assessment and inventory must quickly be done, because good conservation science often points to the best strategy. So in the spring of 1995 Brett Engstrom and Charles Cogbill undertook to do just that.

The report is a synthesis of existing information about the natural and cultural history of the land, followed by a rapid ecological reconnaissance in mid-May. Despite the necessarily hurried nature of this report, it was comprehensive enough to be pivotal in the decisions that followed. Cogbill and Engstrom found that, although the land was not unique, it was worthy of a high level of protection. In the summary and conclusions, they say:

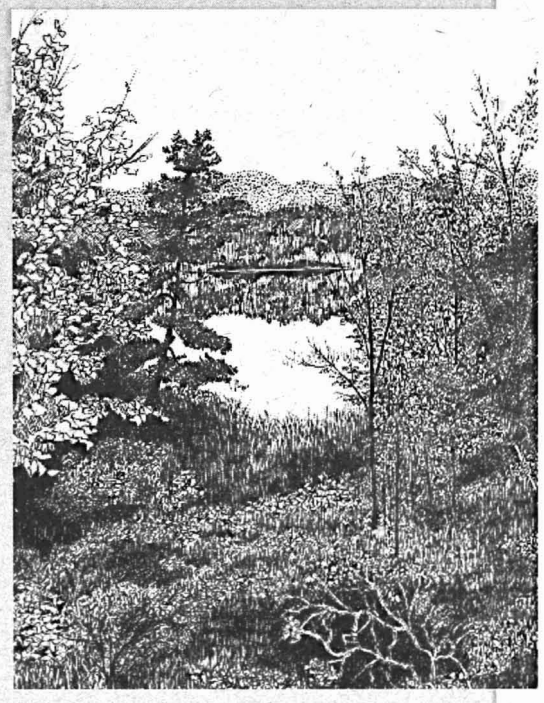
In fact, its ecological value is that it is a typical representative of the Green Mountains, with a full range of organisms in intact communities...regionally significant because it has relatively large watersheds which would enlarge and extend the adjacent public and private conservation lands, particularly to the lower hills on the east slope of the mountains. Most importantly, this land would become unique if allowed to develop with minimal human influence....Within several generations it would be a mature example of the Green Mountain landscape totally unknown today....

Small patch protection for rare species and significant natural communities exists within state parks and state forests in New England. Could a tract this size of "common land" be protected as wildland given the specter of opposition from the forest products industry and the "Wise Use" faction? Would a backlash undermine other funding commitments?

Several parties at the table argued against Forever Wild. It was too soon, they thought. State agencies were just beginning to reckon with ecosystem management and were in the wee early hours of thinking about ecological reserves. The state has a public process leading to a management plan, which they thought should suffice to insure protection. But management plans are at the mercy of shifts in public mood; Forever Wild is better protected through the permanence a conservation easement guarantees.

At this point SWT offered a sliding scale of commitment based on whether one or two complete watersheds would come under this high degree of protection. If both basins, or 2100 acres, would be designated Forever Wild, then Sweet Water Trust would pledge $300,000. (The remaining 680 acres, on which lie the remnants of an old farmstead, is used more intensively for recreation. In our judgment, a Forever Wild designation that displaced local recreational use would be unpopular with local people.) However, even if the State of Vermont chose the Forever Wild option for both basins, a funding gap remained.

Time ticked away deafeningly, as it does at the tail end of a risky conservation project. Money was pledged by two anonymous foundations. The week before the closing, a fax flurry between Vermont Land Trust, Vermont Housing and Conservation Board, the State of Vermont, and Sweet Water Trust tried to narrow differences in the suggested language for the conservation easement, which would be held jointly between VHCB and VLT (they often co-hold conservation easements). In fact, this language was still being refined the day before the closing. All the prohibited uses mentioned previously in this article SWT tried to incorporate into the easement, especially: no timbering, closing of roads, non-motorized low impact recreation, and a role built in for conservation biologists.



Although the final easement isn't a flawless piece of wildlands protection such as one might encounter in heaven, it's darn good.

illustration by Margaret Parlour

Two Books that Can Help Conservationists Protect Family Lands

Preserving Family Lands: Essential Tax Strategies for the Landowner, 2nd edition

by Stephen J. Small; Landowner Planning Center, Boston, MA; 1992; $11.95

Preserving Family Lands: Book II–More Planning Strategies for the Future

by Stephen J. Small; Landowner Planning Center, Boston, MA; 1997; $14.95

Both books are available from Preserving Family Lands, POB 2242, Boston, MA 02107; prices include shipping.

"In New England, the average age of the woodlot owner is over 60. In the Southeast, the average age of the private forestland owner is 64," Stephen Small notes in his 1997 book. Much the same situation prevails across the United States. "Over the next fifteen to twenty years, millions and millions of acres around the country are going to change hands, and potentially change use, as these older landowners plan for, or don't plan for, what's going to happen to their land" (p. 9). In writing on the impact of income and estate taxes on private land ownership, Small is addressing a subject of critical importance not only to private landowners but to the conservation movement as a whole.

Through his initial book, first published in 1988, Small warns that heirs to estates worth $600,000 or more must pay estate taxes, that these taxes are often so high that heirs must sell the land they inherit to pay them, and that due to appreciation in the value of land (and also, though not mentioned by Small, the soaring stock market), many families who have never considered themselves rich have entered the $600,000 or over bracket. (At this writing, Congress is considering raising the $600,000 level to $1 million, but the alteration would not be large enough to appreciably change the problem.) Small then discusses basic income and estate tax rules; and, as a few important tools to meet tax problems, conservation easements, remainder interests, wills, and gifts to family members during the donor's lifetime.

Book II overlaps the first volume by again looking at basic tax rules, conservation easements, wills, and gifts to family members, though at a somewhat more technical level. In addition Small describes various ways of structuring family ownership of land: corporations (a bad idea, Small says), S corporations (similar to regular corporations but taxed under a different set of rules of the Internal Revenue Code), general and limited partnerships, limited liability companies, and revocable and irrevocable trusts (neither helps ward off estate taxes). Other potential conservation tools he analyzes include life insurance, charitable remainder trusts (CRTs), wealth replacement trusts (a combination of life insurance and CRTs), and private foundations (any family with sufficient assets can create a foundation to support or conduct charitable or educational activities).

Obviously Small writes primarily for families with assets of over $600,000. The fictional families whose planning he describes are wealthy. However, the book will be useful to owners of land of any value who wish to preserve it after their deaths. Small succinctly disposes of the option of simply writing restrictions into a property deed: "In most cases it is not at all clear whether a simple deed restriction is enforceable at all or who can enforce it" (p. 24). The books will be especially

illustration by Margaret Parlour

useful to people who hold land in common with other family members.

Book II is challenging reading, due to the complexity of the subject. Nevertheless, Small's writing is concise and well organized. An index would have been helpful, but use of bold type for key terms helps readers to find their way. Furthermore, Small forcefully reiterates key points. Though the average reader may not long remember the definitions of the types of partnerships and corporations, he or she will not quickly forget such basic principles as: place a conservation easement on land before donating it, and always "run the numbers" when evaluating options.

Another reiterated point is that we must be willing to pay for competent professional assistance in estate planning. Even Book II is only a generalized approach to a difficult subject, Small emphasizes; and, much as landowners may wish to forget tax issues, they cannot afford to do so. For their lands' sake, they should explore all conservation options long before passing those lands along. ❙

—Reviewed by Mary Byrd Davis

photo by Jonathan Blake

Sweet Water Trust was able to support the project because all parties agreed to a high level of protection for both basins. Moreover, everyone feels fine about it. There was, it turned out, little dissension, no cries of "foul" or "locking up the land" heard from outside special interests. Both Stark and Phenn Basins are protected under a Forever Wild "Ecological Zone." In the long "Purposes" section of the grant, and several places thereafter, a consulting role is given to conservation biologists: "With respect to the Ecological Protection Zone...the Management Plans shall be designed to protect the health and viability of the native fauna and flora and the abiotic environments and ecological processes which support them by drawing on expertise from recognized experts in the field of conservation biology." The prohibition against tree cutting also states that any management activity the owner wishes to undertake to maintain and enhance biological diversity and old-growth forest must be done in consultation with recognized experts in the field of conservation biology. The easement prohibits use by any motorized vehicles except snowmobiles on the VAST trail (which can be moved if a scientific study so suggests). Roads will be blocked and allowed to revegetate, except one or two absolutely deemed essential for emergency access, and these too will be barricaded. The owner, Vermont Parks and Recreation, agrees to conduct no activity that would have adverse impacts on the land. The list of prohibited uses is long and detailed.

VLT and VHCB, co-holders of the easement, are the vigilantes. They have excellent working relationships with Department of Parks and Recreation and we expect the issue of compliance to be smooth. SWT hopes to monitor public processes leading to management plans, and work with the holders to monitor the land, and, over the years, provide funds for further study. As Engstrom and Cogbill said in their report, the land will serve as a classic control site "to observe the processes of long-term recovery of former...timberlands under future conditions. The baseline for these 'experiments' is already initiated."

The land, encumbered with this easement, was purchased by TPL in late summer 1995 and transferred to the State of Vermont shortly thereafter. TPL had to borrow internally to close the deal. Subsequent funds came in to bridge the gap, including a grant to TPL from the National Fish and Wildlife Foundation.

Hats off to David Houghton, TPL's lead negotiator, for the risk he and TPL took and the success they achieved. And to Commissioner Conrad Monytka of the Department of Parks and Recreation, for his courageous leadership; had there been fire from the timber products industry or the "Wise Use" contingent, he would have been scorched by it. And congratulations to all the groups who worked tirelessly, including easement holders, Vermont Housing and Conservation Board (every state should have one), and the Vermont Land Trust, who did much of the ground work and provided legal assistance.

Since that time, much other land in this area of the Green Mountains has come under various degrees of conservation, including a Forever Wild easement held by Green Mountain Club on 600 acres along the Long Trail.

Right now, conservation happens in New England parcel by parcel, 10 acres here, 10,000 there. Block by block, Nature's kingdom will be rebuilt by dedicated nonprofits and public agencies, often working in close partnership. With

several hundred land trusts on the ground in New England, full of feisty local folks and sophisticated professionals, the land trust movement is a populist force which is increasingly involved in conserving whole places. The Wildlands Project has begun building bridges to land trusts in New England and nationwide to help them expand their understanding of biodiversity and ecosystem health. New land trusts are formed everyday, and some of these are dedicated to wilderness.

We all want the federal government to change its tired tune and its funding priorities. Why are the federally funded conservation easements in New England only forestry easements, with money going into the pockets of timber companies? Where is the fairness in that; where is the balance of conservation priorities? We all want an enlightened, flexible, scientific, federal government to help build the edifice for true conservation of wilderness and biodiversity on the large scale needed. Certainly in Maine, where so little land is publicly owned, it is hard to envision a way to adequately protect biodiversity without major government acquisition. It is absolutely worth advocating!

As a practical matter, however, wilderness advocates should look anew at the tools available for conservation, and not dismiss a tool that can protect land as Forever Wild. Would you throw out your hammer? What will you pound nails with, your hiking boots? Please, support the tool that drives home the nails, Forever Wild conservation easements. ▮

Nancy Smith is the Director of the Wildlands Program for Sweet Water Trust, a foundation dedicated to the conservation of wild Nature. The Wildlands Program's funding and direct action priority is to help in the acquisition of fee land and Forever Wild easements for the creation of wildlands reserves. Write for guidelines to Sweet Water Trust, 294 Washington Street, Room 312, Boston, MA 02108-4608; or watersweet@aol.com

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Many thanks all around: To the New England lawyers and land protection specialists who returned my calls.

To Karin F. Marchetti, Maine attorney, who edited the legal part of this article pertaining to conservation easements. She has worked for many years with the Maine Coast Heritage Trust as Land Protection Specialist and General Counsel. She has written extensively about conservation easement law, and is presently writing a chapter analyzing easement enabling legislation in New England states for a book on conservation easements in the USA.

To Cheryl Fischer for her editing assistance. As an employee of TPL, she was one of the advocates for a Forever Wild easement to protect Phenn Basin. She is currently the Director of the New England Grassroots Environment Fund.

To the trustees and staff at Sweet Water Trust for lending their talents to help evolve our policy of conservation through Forever Wild easements.

illustration *by Jean Cannon*

Integrating Conservation and Community in Colorado's San Juan Mountains

by Andrew J. Kroll and Dwight Barry

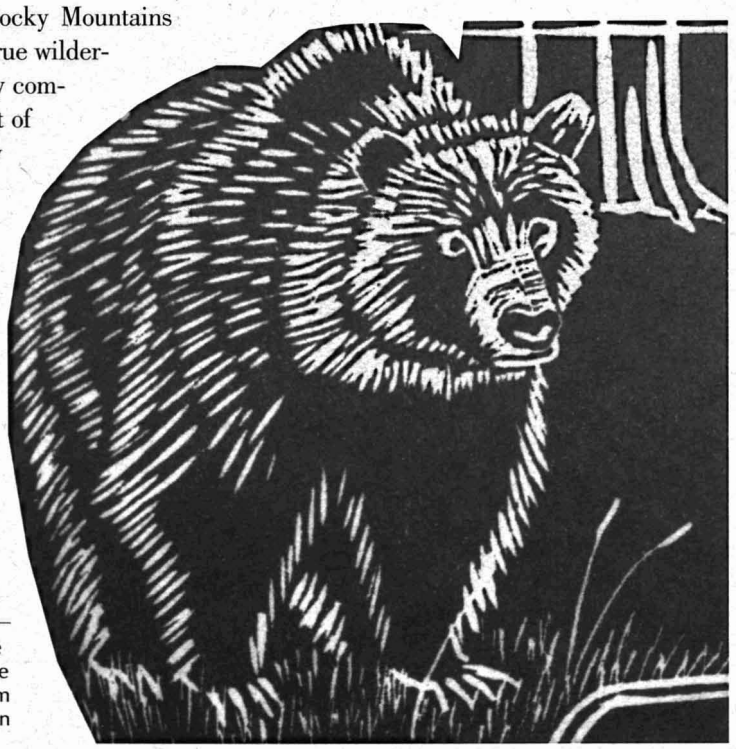
. . . proving a few [Grizzlies] still roam the San Juans is not, or should not be, the ultimate goal for those who care. Rather, the real question to be addressed, the appropriate first concern, is the future of the San Juan ecology—this wild montane landscape which, in one way or another, helps sustain us all, bears and *men.*

—David Petersen

INTRODUCTION

A diverse mosaic of forest and meadow spreads across the verdant watersheds of the San Juan Mountains in southwestern Colorado and northwestern New Mexico, falling gently away from the craggy spine of the continental divide into the lowland deserts lying some seven thousand feet below. The rocky, vulcanized topography belies a lush intermingling of vegetative communities; the sun-dappled understories of aspen groves rise waist high, the tundra blooms with a rainbow fire of wildflowers, and even the high dark spruce and fir forests shelter a dense growth of berries on the forest floor. Extensive stands harbor old trees over four feet in diameter, tucked away in steep side drainages forever free from ax or saw; in these ancient stands deadfall trees tilt through the understory while lightning-killed snags crumble slowly back into the soil. Swift, shallow streams ripple with trout from the icy, snow-fed headwaters to their meandering progress across the flatlands. Elk and Mule Deer are abundant, flocks of grouse poke through the crackling grass and brush of Ponderosa Pine and Gambel Oak woodlands. In the mid-elevation riparian zones of cottonwood and alder, Black Bears walk their midnight rounds, descending in autumn to take advantage of the oak mast windfall.

Compared with the rest of the Southern Rocky Mountains Bioregion, the San Juans are a paragon of true wilderness—healthy, diverse, and wild. But a key component of the San Juans' ecology is lacking: as in most of the American Southwest, the top predators—Grizzly Bears and Gray Wolves—are missing, having been persecuted and hunted into regional extinction. However, the San Juans have not suffered as intensive resource use as some other areas in the Southern Rockies, and so the biota of these highlands has remained relatively intact. Indeed, recent evidence indicates that Grizzly Bear, Lynx, and Wolverine may occur in areas where previously thought to be extinct.* (The recent reestablishment of River Otter and Peregrine Falcon, and the possibility of a future reintroduction of Gray Wolf, further indicate the remoteness and wildness of the San Juans.) These top predators serve as flagship species



*The Colorado Division of Wildlife has been searching for the Wolverine in the San Juans and surrounding mountains, the presence of Lynx was confirmed by tracks found by Jim Halfpenny, and a general overview of the Grizzly in the San Juans can be found in David Petersen's *Ghost Grizzlies.*

Grizzly Bear, *linocut by Amy Grogan*

in the effort to safeguard the ecology of the Southern Rockies; as symbols, they are inspiring as well as controversial, and their plight helps to illuminate the issues that impede the long-term conservation of these majestic mountains.

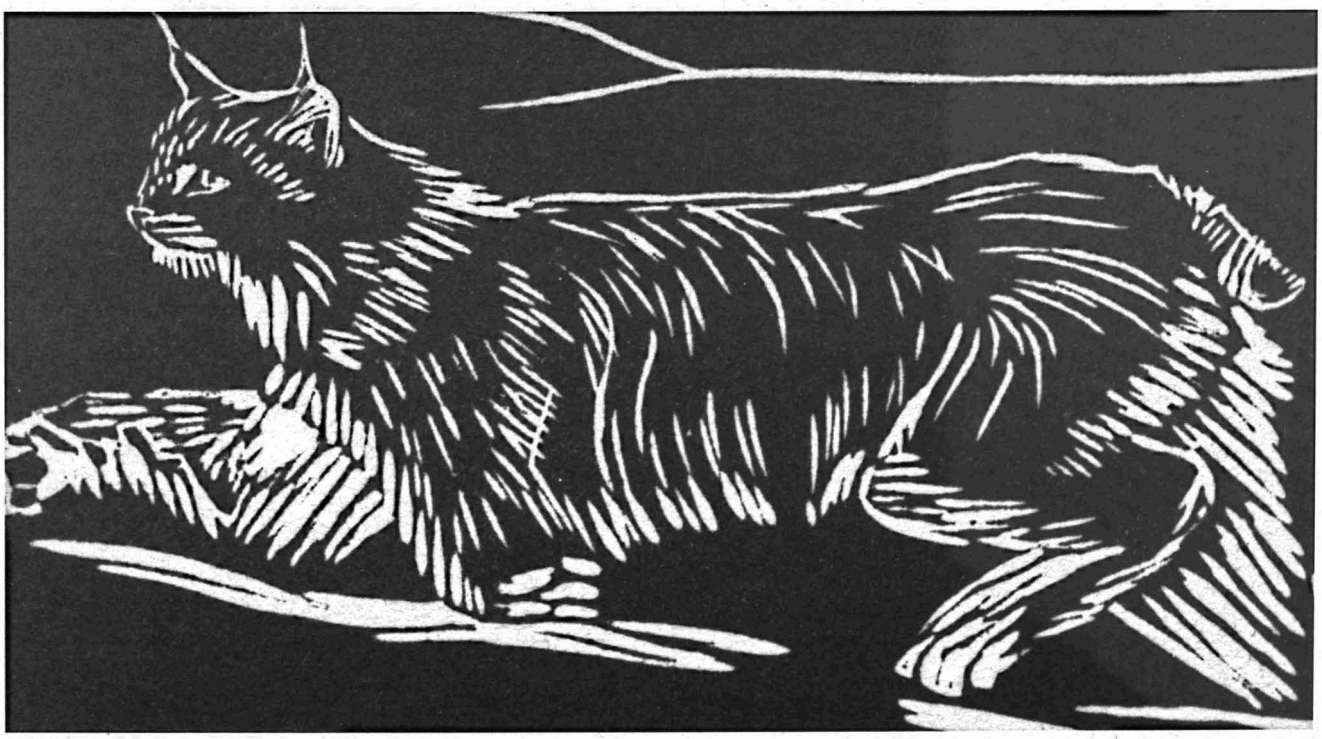
If the Grizzly Bear and the Gray Wolf are to return to the San Juans, if the long-term sustainability and health of the bioregion is to be preserved, the local communities must support and be involved in conservation efforts.

Unfortunately, the protected areas of the San Juans do not include the full range of the biological communities that occur in the bioregion. This incomplete protection has contributed to the fragmentation of wildlife habitats, a rising disruption of watersheds and ecosystem processes and services, and endangerment of several plant and animal species. Large-scale private development efforts are present or proposed throughout the bioregion, and local communities and land management agencies have not yet demonstrated a vision that incorporates biological conservation as a guide to human activities. To return the San Juans to a healthy level of ecological function and diversity, viable populations of the top predators must be reestablished. These predators also serve as umbrella species; if their populations are restored, their wide-ranging life-history requirements should provide the temporal and spatial protection needed to protect the ecology of the bioregion.

However, even progressive, predator-friendly and landscape-oriented conservation plans, no matter how scientifically rigorous and well formulated, are doomed to failure if local communities—those people who interact with the land daily—are alienated during the development and implementation of the plan. Historically, human activities have been diametrically opposed to those of the top predators. The bottom line is that if the Grizzly Bear and the Gray Wolf are to return to the San Juans, if the long-term sustainability and health of the bioregion is to be preserved, the local communities must support and be involved in conservation efforts. If they do not, the unique qualities of this sublime montane landscape will eventually succumb to the tidal wave of encroaching human development.

METHODS

The ecological aspects of regional descriptions are well understood by most scientists and naturalists. Discussions of the geology, soils, hydrology and natural processes provide a context for understanding the patterns of vegetation, which often provide the context for understanding the faunal components of the landscape. Set alone, however, such information has only a limited audience. What is required for a wider appeal is the integration of the human component—the sociological interactions that not only explicate human impacts but provide the context for the dynamic interplay between wildlands and civilization. In addition,



Lynx, *linocut by Amy Grogan*

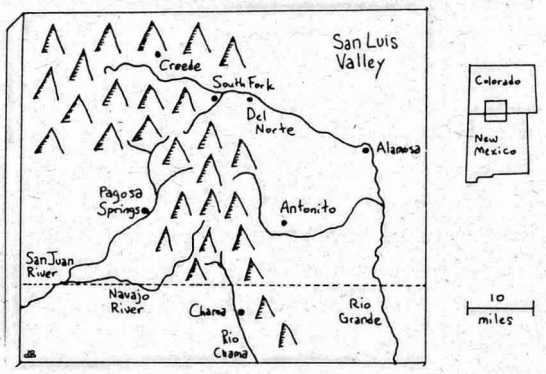
an analysis of the socio-economic dimension is needed to provide practical guidance on how natural areas protection may be accomplished within a particular region. Without such an analysis, management suggestions may be ineffective. By gathering and explaining ecological data with these issues in mind, insight may be gained into the entire biological community, including the human worlds of sociology, economics, and politics (see Appendix).

EXPLORING THE HUMAN DIMENSION: THE COMMUNITY PROFILE AND INFORMATION ANALYSIS

In order to gauge local sentiment, learn about land-use patterns, and record local historical narratives, a tool called the community profile may be employed. The perspectives of regional citizens need to be heard and documented, the "pulse" of the communities must be monitored; action within these communities would be futile without first determining the residents' concerns and opinions.

Our community profile studies, although informal, have a consistent method. We begin by researching local sources, finding information in libraries, town halls, historical societies, and chambers of commerce. Although hard data such as census statistics and regional economic figures provide essential background information, the community profile's goal is to reflect less tangible aspects of a community—the way its members cope with divisive issues and interact with the landscape that surrounds them. The potent emotions and ideas behind community views may be elicited with care and circumspection from individual sources.

The heart of the process is the interview, more an informal conversation than an inquiry dictated by a list of questions. After we have introduced ourselves and stated our goal of gauging local sentiment, most people are willing to sit down and talk, gracious with their answers while offering substantial amounts of information. The depth and length of interviews vary: some people are terse and laconic, others offer a cornucopia of ideas and stories. Some people are suspicious, concerned that they may be quoted in print and held accountable by friends and neighbors for any inflammatory remarks they make. Although we include a list of interviewees at the end of each profile, we do not cite quotations within our reports and we respect requests for anonymity. We do not actively pursue a specific interviewee; however, we try to include a diversity of landowners, workers, and public and private professionals, particularly those associated with natural resource-based industries. We close each interviewing day by organizing notes and discussing the day's sessions; this helps us avoid redundant interviews, recognize important local issues, and better focus questions on succeeding days.



The San Juan Mountains of Colorado and New Mexico

Some questions we pose include: Is there a problem? How did the problem arise? Why is it a problem? Who believes it is a problem? Who does not? Are studies recommended to get further detail on the magnitude of the problem? What is an acceptable solution? What are the alternatives?

The reason to address these questions in the formulation of an analysis section is that *the manner in which an issue or problem is defined by different participants will shape their range of acceptable management solutions* and alternatives. This is an important point, substantiated by dozens of case studies, but is often overlooked by ecologists. Without such a perspective, conservation efforts may be misguided or irrelevant.

NATURAL HISTORY OF THE SAN JUANS

The San Juans and the other ranges of the Southern Rockies rose out of an ancient sea during a broad, regional uplift (the Laramide Orogeny) about 70 million years ago, making the San Juans one of the most recent North American mountain ranges. The mountains are still rising, but continue to erode as they grow. The last active volcanoes in the Southern Rockies disappeared between 5 and 25 million years ago. Sedimentary rocks and landforms still exist from the San Juans' pre-mountain days, but most have been eroded and washed to the lowlands. Igneous rocks (volcanic leftovers) remain, however, and constitute most of the visible geology of the San Juans today. Huge boulders, moraines, and cirques are remnants of the most recent glacial activity of the Pleistocene period some 10,000 years ago. Metamorphic rocks, caused by recrystallization of rocks and sediments in lava flows, are also prevalent in the Southern Rockies.

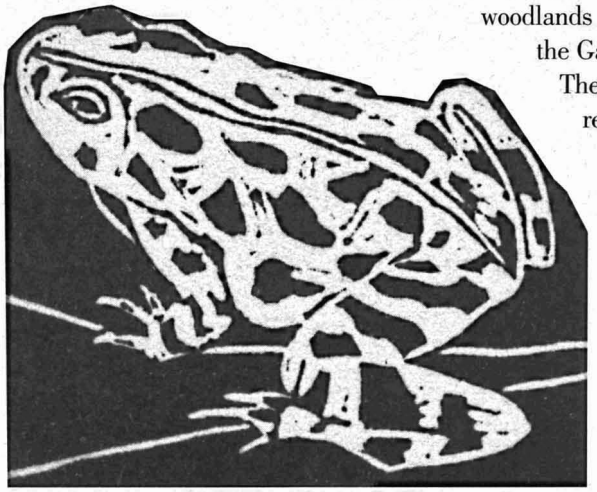
The early indigenous cultures of the San Juans, predominantly nomadic hunters, left little trace of their presence in the region. The probable descendants of these archaic tribes, the Anasazi, occupied southern Colorado from roughly 800-1300 A.D., leaving behind prominent archaeological sites such as the Cliff Palace at Mesa Verde and the ruins at Chimney Rock west of Pagosa Springs. The Anasazi supplemented their agricultural economy with

map by Dwight Barry

hunting; remains of many of the same animals that exist in the region today, such as Elk, deer, bear and Mountain Lion, were excavated at Chimney Rock.

When Europeans began entering the San Juan region, the Ute bands were the undisputed rulers of the mountains, nomadic horseman who roamed from the La Plata Mountains rising northwest of Durango southeast into the San Luis Valley. They were the last indigenous peoples to live in the San Juans. In the 1870s, the Anglos scouring the mountains for precious minerals began to call for the removal of the Utes; and eventually the various bands, including the famous Ouray, were all sequestered on reservations.

The dark spruce and fir woods, which surrounded the small mining towns built high in the mountains near mineral strikes, were cut for lumber for buildings and to buttress the mine shafts. The expansive Ponderosa Pine forest around Pagosa Springs—the massive boles so widely spaced that settlers easily negotiated their wagons through the stands—were felled by the Denver and Rio Grande Railroad, with only the straining groan of the oxen teams and the sawyer's cry for fanfare. The land carried livestock at enormous levels: many ranchers loaded the range with as much stock as they could purchase. Cattle trampled the streambeds, opening the way for erosive spring floods. As late as the 1920s, a million sheep were run in the already degraded alpine allotments of the Rio Grande National Forest, the herders guiding twenty thousand head a day down the stock driveways to holding pens east of the Continental Divide. Predators received the same treatment in the San Juans as they did along the rest of the western frontier: Gray Wolves and Grizzlies were shot from the saddle and eventually eradicated, Coyotes trapped by the thousands, Black Bears hounded to the point that even today their numbers seem lower east of the Continental Divide than on the west side where grazing was far less intense.



Western Boreal Toad, *linocut by Amy Grogan*

SAN JUAN ECOLOGY TODAY

Despite the detrimental activities of the frontier culture, the San Juans still possess enormous ecological wealth. In the alpine parks and low-lying river valleys, Elk and Mule Deer still find summer and winter range, but the Elk are hard pressed by the human demand for second home development. A large portion of the montane landscape has been preserved as federal Wilderness—although a great deal of critical roadless country still needs to be protected—and countless trailless drainages provide the seclusion and habitat that sensitive creatures require to fulfill their life histories. The San Juans have long been recognized as the southernmost range of Lynx and Wolverine in the Rocky Mountains; evidence suggests that both animals survive here as remnant populations. Coyotes and Pine Marten are abundant, and Mountain Lions thrive in the wooded fastnesses of the San Juans, safe in country too rough and wild to hunt with dogs.

Perhaps the most representative creature of these mountains is the Grizzly Bear, which historically found ideal habitat in the San Juans. The high peaks of what are now called the Weminuche and the South San Juan gained the reputation of "grizzly mountains." Big bears occurred frequently in the lowlands, feeding in the rich riparian woodlands and littoral meadows, foraging in the Gambel Oak thickets for fall mast. The high altitude denning sights required by the animals to survive long winters were abundant in these craggy mountains, as were the avalanche chutes and the winter-kill deer and Elk that provided much-needed nutrition when the Grizzlies emerged in the spring. Nearly every major river and tributary has a literature reference for Grizzlies; they were clearly common in the lowlands, not yet relegated to the dark alpine forests where we so often imagine them. Shot on sight, poisoned, trapped by government predator control agencies, the Grizzlies soon retreated into the recesses of the high mountains. By the 1930s, their numbers were much reduced in Colorado; California, Arizona, Utah, New Mexico, and Oregon had by this time lost all of their Grizzlies. Despite this sorry state of affairs, Colorado failed to halt the persecution, and in 1952 the last Grizzlies of record were killed.

In 1979, like a prodigal son's unexpected return, a female Grizzly Bear allegedly attacked and was killed by an outfitter deep within the confines of the South San Juans. A shocked current ran through the channels of wildlife watchers: Was she the offspring of the previous "last" Grizzlies, finally the end of the storied line, or was

she part of a remnant population canny enough to avoid detection and confrontation?

Even if she was the last, that Grizzly's presence in the San Juans says much about the wild quality of these mountains. Although the San Juans see more human visitors each year, less and less livestock is turned out on the open range—less livestock to tempt the Grizzlies and spur the wrath of ranching interests. On the west side of the Continental Divide, the less-visited side, sheep are no longer grazed, and the cattle are kept in mid-elevation pastures. With the decline of livestock grazing has come a resurgence in the alpine meadows that provided mid-summer forage for the bears.

The rich sidehill parks and the deep drainages thick with berries and other vegetation, as well as the high country for seclusion and denning, still exist. Sharing these habitats are Beaver, Coyote, Black Bear, Pine Marten, and Red Squirrel, Golden Eagle, Great Blue Heron, and Olive-sided Flycatcher, Elk and Mule Deer. The habitat, although greatly reduced, is there for the Grizzly; the task for today is finding if any of the great bears remain, and if not, deciding how we might best restore them.

HUMAN COMMUNITIES OF THE SAN JUANS

Within an hour's drive to trailheads in both the Weminuche and South San Juan Wildernesses, the towns of Pagosa Springs, Creede, South Fork, and Antonito are having a tremendous impact on the natural history of the San Juans. While Pagosa Springs is growing most rapidly, all of the towns are experiencing the changing land-use patterns common throughout the Rocky Mountains: the decline of traditional resource-extraction industries such as grazing, logging, and mining and their replacement with tourism and residential development. Big cattle ranches are being subdivided into 35-acre "ranchettes"; once empty streets are now lined with tourists; prices are increasing at the local stores; taxes are rising to pay for expanding infrastructure.

Other trends are more difficult to measure. The growing resentment long-time residents feel, the loss of community as population sizes increase—these intangible qualities influence how a community views itself and plans for the future. Generalizing about towns as diverse as these four is difficult. The same diverse mixture of cultures and values that makes the region so intriguing for visitors also defies the ready-made categories of researchers. Despite these obstacles, we were able to uncover similar trends in these four Colorado towns, trends that will greatly affect the future of natural and human communities in the San Juans.

Changes in the economic foundations of a community also bring societal changes; this notion is borne out in the experiences of San Juan residents. The steady decline of resource extraction industries has opened the way for commercial and residential development. New residents demand the same public services that they left behind. Such development presents a direct contrast to the old state of affairs in mountain towns; located in rural areas, residents were content with what outsiders view as a paucity of goods and services. The building boom occurring in South Fork and Pagosa Springs, and its accompanying financial opportunities, has marginalized long-time residents; to a lesser degree, this marginalization has also occurred in Antonito and Creede.

Newcomers to the area appear to have plenty of money and are less disturbed by rising property taxes, or, in the case of Pagosa Springs, taxes for a new clinic the town has gladly lived without in the past. Newer citizens often fail to understand the close relationships that earlier residents maintained with the land, forged by ranching, logging, or guiding. Also, they do not see how increased population densities, such as development on the wintering grounds of the area's Elk herds, threaten these lifestyles. As a result, land-use opinions, and resulting management plans, focus on the mountains as scenery, as distant backdrops with which no visceral connection is ever established. Some newer residents find difficult to understand that local communities were once dependent on a working relationship—however detrimental that relationship may have been.

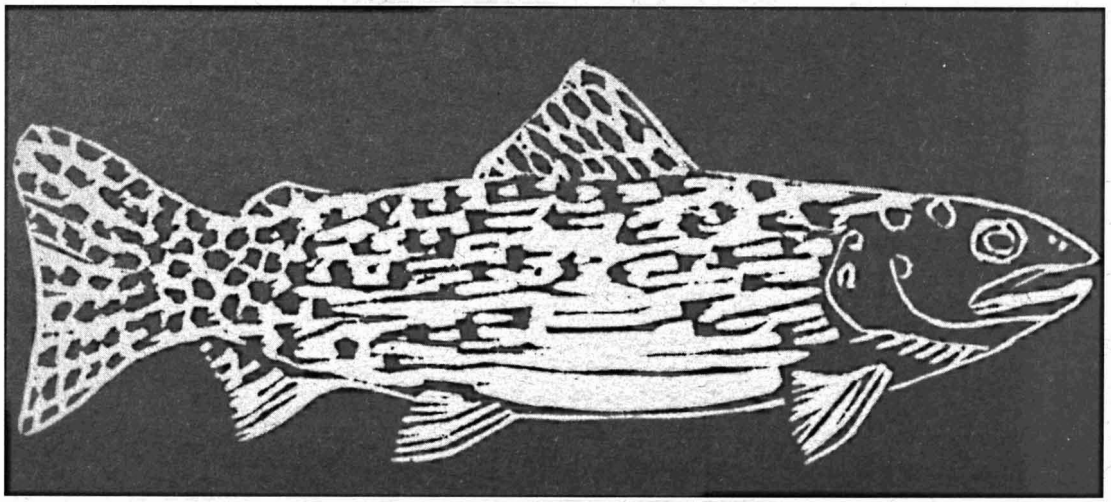
Adding to the difficulties is the historical willingness of area residents to let a handful of people conduct the towns' planning and direction; a few were ordained to take control of civic matters in the public's interest. The new public in the area brings with it opposing goals and desires, as well as an ardent, involved voting block with the time to attend planning meetings and civic functions. Conservation is confounded by a public unaware of problems that threaten the ecology of the San Juans.

In researching local opinions and values, we have tried to focus our discussions around the importance of public participation for effecting the desired outcomes of plans and policies. We believe traditional values in the rural towns of Pagosa Springs, Antonito, Creede, and South Fork played an important role in preserving wilderness in the San Juans. The lack of development, the low demand for goods and services, and the willingness to drive on unpaved roads left room for both human and natural needs. Although some of these human needs inflicted damage on the landscape, the relationships they fostered provided a knowledge of and compassion for the San Juans that moved beyond appreciation of the mountain scenery. If successful conservation

strategies are to be implemented in the San Juans, then this old interest—the interest developed as a result of depending on the landscape for a livelihood—will have to be regained and established as a benchmark for community attitudes. Only then will the idea of healthy human and natural communities have a future in the San Juans.

THE FUTURE OF THE SAN JUANS

A sad aspect about our country's participatory democracy is that those few who participate often end up making the rules for the majority; this knowledge can be both depressing and empowering. San Juan residents need to understand the nature of our government, and use it to their advantage. Immediately, they need to decide if they want development in their communities like the unthinking growth that has swept over Pagosa Springs and South Fork. If not, then they need to consider zoning alternatives or find solutions that will allow them to assess proposed development and determine if it is detrimental or beneficial to the community. In addition, local residents need to become involved with the federal government; the National Environmental Policy Act scoping process that goes into the composition of forest plans for the Rio Grande and the San Juan National Forests represents an excellent opportunity to participate. To their credit, the Forest Service has been somewhat proactive in involving local communities, although the appearance of "Citizens' Alternatives" documents soon after the recent forest plan was published shows that their scoping process is not incorporating a wide enough array of public voices. While we, and other concerned groups and individuals may advocate for these towns, only the residents can instigate change. If these towns fail, though, so will our greater dreams for the San Juans as a whole.



Rio Grande Cutthroat, *linocut by Amy Grogan*

Difficult questions remain. Can room still be found for all the demands on the land? Can recovering forests support logging at a level that threatens neither supply nor native biota? Can ranching continue, yet allow for viable populations of predators and native ungulates? Can the rampant growth characterizing the region be controlled or at least ecologically accommodated? We believe that stable communities are constructed and thrive upon healthy ecosystems and sustainable economies that involve carefully considered landuse. Some interests want the San Juans to be open, "multiple-use" land, available solely for resource extraction and unrestrained development; others desire designations protecting all aspects of the land. We believe that common ground may be found between these two extremes. The San Juans can provide quality habitat for a full complement of native species and sound livelihoods for local businesses and residents. Finding such a balance is an arduous endeavor. The ways and means are raw and untested in the area, the difficult issues rarely discussed within the communities or at any level of government. We will continue to be a catalyst in these debates, with the hope of perpetuating the San Juans as a wild, unique place. ▮

Andrew J. Kroll is an apprentice ecologist and Dwight Barry is a conservation biologist. Both are avid naturalists and backpackers devoted to the wildlands of the southwestern United States.

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Appendix: A Framework for Integrative Natural History Reports

A comprehensive ecological report could contain the following sections:

- General Overview—draws upon information presented in all sections of the report to provide a one page overview of the narrative.
- Title Section—general information regarding the context of the area being examined (geographic location, primary watershed, political jurisdictions, and so on).
- Introduction—general information regarding the qualitative aspects of the area.
- Regional Setting—information on the ecological, sociological, and political variables influencing the area.
- Geology—how the area came to be on a geological time scale.
- Soils—information on the types of soils found on the site and their potential for affecting vegetation, wildlife, and human use.
- Hydrology—chemical and physical characteristics of aquifers, lakes, and streams in the area.
- Vegetation—flora of the area including community and species composition, with particular attention to threatened, endangered, or management-sensitive species.
- Fauna—community and species composition, with particular attention to threatened, endangered, or management-sensitive species.
- Community Profiles and Human Land Use—patterns of human land use in the area including historical and current use, aesthetic perceptions, and major impacts.
- Analysis—a comprehensive overview of the interplay between the ecological and sociological factors gathered from the information in the above sections, with a particular focus on how mangement problems are (or should be) defined for the bioregion.
- Recommendations and Conclusions—from the management options outlined in the analysis section; included in these recommendations should be suggestions for future research and potential management options.
- References—standard list of literature used to compile the narrative report.
- Appendices—all maps, figures, species lists, example data forms, and raw data for the study.

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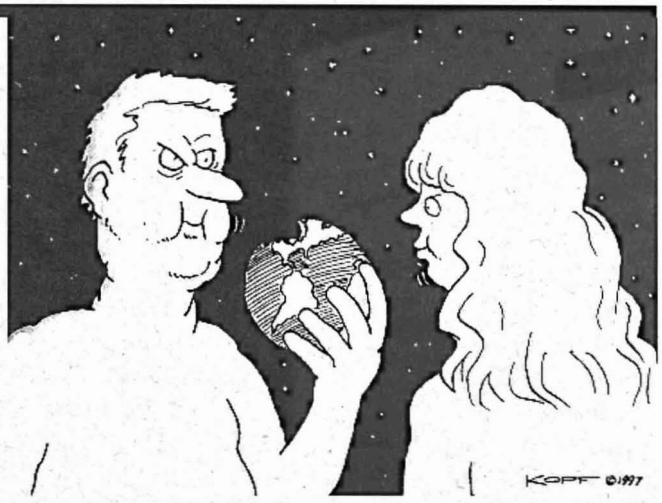
Is There A Population Problem?



by Albert A. Bartlett

My answer to the question is "YES" there is a problem. The scale of human activities is now so large that we are appreciably affecting the global climate and ecosystems. The total impact of people on the environment is proportional to each of two factors:

A) The number of people, and

B) The average impact of each person.

If we are to reduce the total impact of people on the global environment, we must address one, or preferably both, of these factors.

There are many strong forces that will cause continued growth of the average impact of each person on the global environment. To the extent that people in underdeveloped countries seek to increase their material standard of living to levels more like ours, material consumption *per capita* will grow. So we are left with the imperative of halting population growth, and then of studying the question, "Can this stable population be sustained?"

To gain a better appreciation of the seriousness of the problem, let us review some very elementary arithmetic. Let us consider a quantity that is experiencing steady growth at a rate such as 5% per year.

First we note that this growing quantity will double in size in a fixed time. This doubling time is found by dividing 70 by the percent growth per year. For example, the doubling time for a steady growth rate of 5% per year is 70/5 = 14 years.

Second, we note that a few doublings can give enormous numbers. It is convenient to remember that ten doublings causes the growing quantity to increase in size by a factor of approximately 1000: twenty doublings will cause an increase by a factor of 1,000,000, etc.[1]

Let us look at some current approximate data (1997).

	United States	World
Population	270 million	5.7 billion
Annual increase	3 million	90 million
Annual growth rate	1% per year	1.6% per year
Doubling Time	70 years	44 years

The smallness of the annual growth rates is both deceiving and disarming. We might initially think that surely nothing bad could happen at growth

cartoon by L.J. Kopf

rates as small as 1% or 1.6% per year. A study of the doubling times brings us back to reality. If the world population continues to grow at its present rate, it will double before today's college students are my age! Think what this means in terms of food and resource consumption.

Of course, population growth rates change in response to physical and social factors. The world population growth rate was close to zero through most of human history, and it started to increase significantly a few centuries ago. Around 1970 it reached a high of about 2% per year, from which it has recently declined to an estimated 1.6% per year. Detailed social studies and more elegant mathematical models can give us insight into the mechanisms that affect these rates of growth.

Why, then, do we need to look at the simple models of constant growth rates? First, they are a useful, though *approximate*, representation of the facts. Second, we in the United States are in a culture that worships growth. Steady growth of populations of our towns and cities is the goal toward which the powerful promotional groups in our communities continuously aspire. If a town's population is growing, the town is said to be "healthy," or "vibrant," and if the population is not growing the town is said to be "stagnant." Something that is not growing should properly be called "stable." Yet, the promoters of growth universally use the word "stagnant" to describe the condition of stability, because "stagnant" suggests something unpleasant. Since it is the goal of the promoters in our communities, we should understand the arithmetic of steady growth.

illustration by Robin Peterson

Let's look at some global aspects of our population problem.

1) Global Warming

There is a growing scientific consensus that the early phases of global warming may be upon us now. With each passing year, our knowledge of the situation will increase so that we will know better if the Earth is warming, and if so, how rapidly change may occur. Whether or not the Earth is warming, it is clear that by pouring increasing quantities of greenhouse gases into the Earth's atmosphere each year, *we are embarked on a global experiment whose outcome we don't know.* On the scale of a human lifetime, these changes happen very slowly. So the burden of dealing with the unknown outcome of the present global experiment will not fall on today's political decision makers: it will fall on our children and grandchildren. Present population growth, so ardently advocated by the many in the older generations, is putting following generations at risk.

2) The Ozone Hole

The destruction of ozone in the high atmosphere allows more ultraviolet light to reach the surface of the Earth where it can have serious biological effects on plants and animals, including humans.

3) Food Grain

The Worldwatch Institute reports that global annual *per capita* production of grain dropped from 346 kilograms per person in 1984 to 313 kilograms per person in 1996.[2] This is a drop of 9.5% in just 8 years. We've all heard it said many times that *per capita* food production has been growing ever since the time of Thomas Malthus, and that this growth has proven him wrong. Now we see that grain production has leveled off, so the continuing growth of populations means that the *per capita* production of food is declining. Perhaps Malthus was right after all.

4) World Oceanic Fisheries

Growth in the annual oceanic fish catch stopped in 1989, and since then the available fish *per capita* has been declining. For many of the world's people, fish is a major source of protein. Many of the world's major fishing areas are seriously depleted. The Grand Banks off of Newfoundland was one of the world's major fisheries, with stocks of fish once thought to be unlimited. Now, these fish stocks are apparently almost gone.

5) Fresh Water

A report in January of 1997 from Stockholm indicated that by the year 2025, two-thirds of the world's people will suffer from water shortages, and the report noted that the rate of fresh water use was growing at twice the rate of world population growth.

All of these problems are caused by population growth, and none of these problems can be "solved" if population growth continues.

Today we hear many people talking about "Sustainability," as though we can accommodate continued population growth with something vague and ill-defined that is called "sustainable development." The thought seems to be that there is no need to worry about population: all we need to do is to make minor modifications of our way of life, (conserve, recycle, etc.) and this will suffice to make our society "sustainable." Please remember the First Law of Sustainability:[3] *We cannot sustain population growth or growth in the rates of consumption of resources.*

We now must address two questions:

1) Where on Earth is the popula tion problem the worst?

It is my opinion that *the world's worst population problem is right here in the United States.* This is because of our *high per capita resource consumption.* It has been estimated that a person added to the population of the United States will have 30 or more times the impact on world resources as will a person added to the population of an underdeveloped nation. Indeed, our burgeoning population numbers amplified by our excessive consumption make North America the key player driving the global assault on Nature.

2) Where should we apply our efforts to have the most beneficial effect in helping to solve the population problem?

The answer is, right here in the US. For many people, the population problem is a problem of "those people," in distant undeveloped countries. In early 1997, many people successfully lobbied Congress to restore family planning assistance in the US foreign aid programs. This was a great victory, but it treats "those people" as though they were the big problem. As one member of Congress said:

Unchecked population growth in the Third World means depletion of water resources. It means famine. It means suffering. It pushes populations to clear rainforests. It pushes populations to go out and graze on land that cannot sustain cattle, and that leads to expansion of deserts worldwide. We all have a stake in the global environment.[4]

It is easy to blame the problem on others and to identify what other people should do while we ignore our own responsibilities. We need to work to stop population growth in the US.

Two sources contribute approximately equally to population growth in the US: the excess of births over deaths, and immigration. Both of these must be addressed.

Let's compare three aspects of efforts to stop population growth in other countries with efforts to stop population growth in the United States.

1 When we give family planning assistance to other countries, we are dealing with countries over which we have no legal jurisdiction and where we have little or no immediate political responsibility. When we confront population growth in the United States, we are dealing with a country where we as citizens have full and complete jurisdiction, and where we have political and family responsibilities. It should be much easier to solve our problem than it is to help others solve their problems.

2 The negative effects of runaway population growth in an underdeveloped country are generally felt only in that country and in its immediate neighbors. The negative effects of population growth in the US are felt throughout the entire world, because of our enormous *per capita* consumption of resources. Indeed, one of the aims of the many current free-trade agreements is to open up the world's resources for consumers in the US.

3 In countries receiving family planning assistance from the US, there will always be individuals who claim that this assistance is a form of "genocide." *They will be strengthened in this belief if we in the US fail to take steps to halt our own population growth.* As Tim Wirth of the US Department of State has said, the best thing that we in the US can do to help other countries stop their population growth is to set an example and stop our own population growth.

As you think about addressing the problem of population growth in the US, please ponder this challenge:

Can you think of any problem, on any scale, from microscopic to global, whose long-term solution is in any demonstrable way aided, or advanced by having continued population growth at the local level, the state level, the national level, or globally? So we can see that Pogo was right: "We've met the enemy, and they's us!" ❙

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3 A.A. Bartlett, "Reflections on Sustainability, Population Growth, and the Environment." *Population & Environment,* Vol. 16, September 1994, pgs. 5-35

4 *Population & Habitat Update,* Vol. 9, No. 2, March 1997, pg. 5. Population & Habitat Campaign of the National Audubon Society, Boulder, CO, 80303

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Book Reviews

REVIEWED IN THIS ISSUE:

Wetlands

D.H Lawrence: Future Primitive

Wolves of Isle Royale

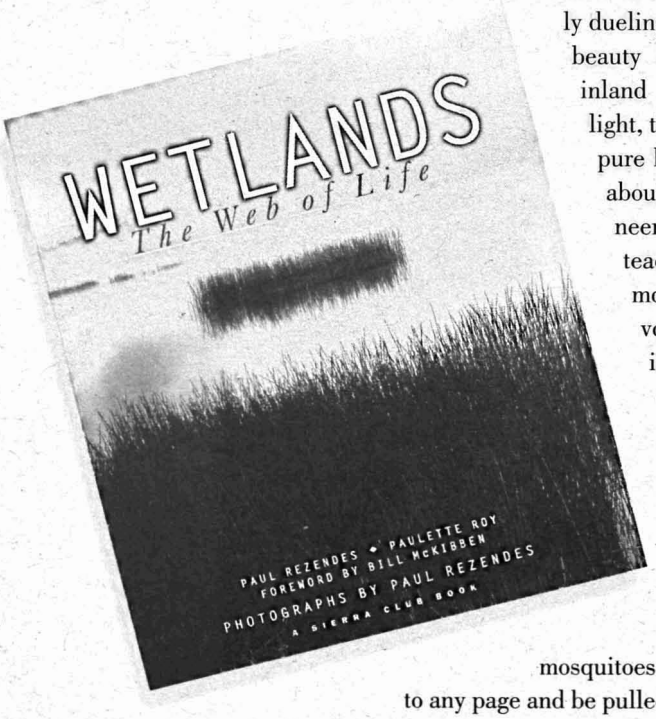
Buffalo Nation

Wetlands: The Web of Life

by Paul Rezendes and Paulette Roy, foreward by Bill McKibben; Sierra Club Books (85 Second St., San Francisco, CA 94105-3441); 1996; $25 paperback; 156p.

Every naturalist knows that if you want to see wildlife, hear wildlife and study the signs of their comings and goings, there is no better place to go than a wetland at dawn, where out of swirling mists moose and beaver may appear. So it is natural for Paul Rezendes and Paulette Roy to follow up an excellent book on tracking, *Tracking and the Art of Seeing*, by photographing and writing about wetlands. *Wetlands*: *The Web of Life* is a celebration of damp, oozy places where water meets land as it pounds on the coast, surfaces from subterraneous journeys, and pools after rain.

Traveling from the coast of Alaska to the Okefenokee Swamp, Rezendes and Roy chronicle the beauties large and small of wetlands. Rezendes describes Nature photography as "painting with light." Rezendes and Roy paint luminous and sublime images of wild Nature. Rezendes shares his mastery of the art of seeing in the last chapter of the book, illustrating how it takes light, timing, and persistence to capture the full beauty of a stand of Joe-Pye Weed behind his home in Athol, Massachusetts. Not only do landscapes come alive in the photographs, but so do detailed close-ups. Viewing a pitcher plant, a common dweller in northern bogs, through their lens is an invitation to truly see one for the first time, even if you are a seasoned naturalist.



Wetlands is an ambitious book with dual and potentially dueling purposes. Besides celebrating the diversity and beauty of wetlands, capturing splendid examples of inland marshes, peatlands, and swamps in exquisite light, the authors also want to educate readers about the pure biology of wetlands. The general lack of literacy about wetlands forces Rezendes and Roy to be pioneers breaking trail to write about them. This patient, teaching voice anchors the text in the muck and mosquitoes. While on occasion the book's earthy voice seems slightly at odds with its soaring vision, in the end the photography and text work together to create a rich story line. The bullfroggy text down in the mud, walking us through wetland terms and outlining the importance of photosynthesis complements the airier, more poetic wetland images.

No one can read *Wetlands* without being hugely bitten by a travel bug. In fact, by the end of the book, travel bugs as numerous as mosquitoes in a swamp will be swarming you. Open the book to any page and be pulled headlong into another beautiful place. *Wetlands* is a book that succeeds in making us want to visit North America's damp spots and contributes to our cultural appreciation and understanding of places often passed over for higher, drier terrain. •

—Reviewed by Alicia Daniel, Associate Director of the Field Naturalist Program at the University of Vermont

D.H. Lawrence: Future Primitive

by Dolores LaChapelle; University of North Texas Press (POB 13856 Denton, TX 76203); 1996; $26.50; 242 pp.

When present day environmentalists look toward their prophets, bards, and visionaries for inspiration, they look to the likes of Ed Abbey, Gary Snyder, John Muir and Henry Thoreau. But if deep ecology philosopher and author Dolores LaChapelle has her way, environmentalists will add D.H. Lawrence to their pantheon.

D.H. Lawrence was misunderstood in his own day and is largely forgotten today. LaChapelle says that when people think of Lawrence—if they think about him at all outside of classic-literature classrooms—what comes to mind is the sex of *Lady Chatterly's Lover* or the exquisite post-Victorian language of *Sons and Lovers.* They do not think of Lawrence as a radical environmentalist pushing ideals and actions as anarchistic and revolutionary as anything Abbey or Thoreau put forth. They should, though, argues LaChapelle, for those values drove Lawrence's work.

Few heard his ecological messages when he was writing them in the 1910s and 20s, says LaChapelle, because Lawrence was "trying to articulate concepts for which there were not yet words." (p. 91) "The same theme runs through all his work from his very first novel, *The White Peacock,* to the last line in his final book, *Apocalypse,*" LaChapelle explains. "Always it is nature. He said this over and over again—in letters and essays—and no one understood him. Always, Lawrence sought to elaborate on possible ways to regain the wholeness with the earth that our modern industrial culture was losing." (xi-xii)

Things have changed, though. Since Lawrence's time (he died in 1930) sciences, philosophies, vernaculars, media, and movements have risen based on the concepts Lawrence had discerned on his own decades earlier, in particular what LaChapelle calls "his lifelong awareness of the influence of place on human beings." (100) Using these new disciplines as tools, *D.H. Lawrence: Future Primitive* is LaChapelle's attempt to recast and support Lawrence's work in the terms of contemporary environmentalism.

She has been eminently successful. In setting the eco-philosophy record straight on Lawrence, LaChapelle has created her own extraordinary and enlightening work, a very readable book that is more than a treatise on Lawrence. Because of her extensive use of contemporary and classic environmental science, philosophy, and spiritual writings, this book stands as a reflection on how to live well through a connectedness with the land, an exploration in which Lawrence's works become both metaphor and model for a way of seeing different from what Lawrence calls the "machine" way of thinking that industrial society teaches us.

This is not new terrain for LaChapelle. For the last twenty years she has been recognized world-wide in the deep ecology movement, ranked alongside the likes of Arne Naess and Paul Shepard, for her own works of environmental philosophy, including *Earth Festivals, Sacred Land Sacred Sex,* and *Deep Powder Snow.* She also founded the Way of the Mountain Learning Center, in Silverton, Colorado, as a deep ecology study and practice center.

Like Abbey, Snyder, Muir and Thoreau, Lawrence believed that personal fulfillment arises from accepting all of life—including the sometimes harsh and ugly realities of physical existence—as it is, and that joy and happiness lie in embracing the mystery of all rather than struggling to alter the world and life to some made-up ideals. When attacking such artificial ideals, Lawrence was, like those other writers, particularly hard on contemporary Christian churches which put forth the values of human domination over the earth and an after-life that devalues earthly life. Unlike the Romantics, Lawrence did not see Nature as a mere metaphor for how to live; it is the living

D.H. Lawrence: Future Primitive is LaChapelle's attempt to recast and support Lawrence's work in the terms of contemporary environmentalism. She has been eminently successful.

illustration by Eva Thompson

guide, a tangible conscience, and an inseparable partner in human life.

"Throughout his life Lawrence wrote of the damage that the ever-growing industrial process inflicted on the countryside with the destruction of the forests, the fouling of the waters and the accompanying destruction of the human spirit," LaChapelle writes. Lawrence's belief that the source of industrial society's destructive insanity is a loss of sense of place—a natural connection that we have to be taught and forced to break—and his corresponding belief that we can restore those connections on both personal and social levels, leads to LaChapelle's dubbing him a "Future Primitive." She explains the meaning of the term (which she borrowed from writers Jeremiah Gorsline and Freeman House) by quoting biologist Edward O. Wilson: "Only in the last moment of human history has the delusion arisen that people can flourish apart from the rest of the living world. Primitives struggled to understand the most relevant parts, aware that the right responses gave life and fulfillment, the wrong ones sickness, hunger and death." To be a "Future Primitive" in LaChapelle's use of the term, then, is to renew and live life based on that subdued—but never lost—sensibility.

In *The Plumed Serpent*, the novel that Lawrence himself called his most important work, his environmental ideals and thoughts on how to make them reality came together in a book that makes The *Monkey Wrench Gang* look like an afternoon tea party (or maybe a keg party). In *The Plumed Serpent*, Lawrence creates a group of idealist activists who want nothing less than to take back—by force, if necessary—Mexico in the 1920s from industrialized Europeans and the Christian church. If Abbey suggested the use of Jeeps and monkeywrenches to drive out industrial madness, then Lawrence had his conspirators use as tools a revival of the pagan Church of Quetzalcoatl and organized armies.

To be a "future primitive," according to LaChapelle, does not mean to focus on the "primitive," though; it means working toward the future. "This does *not* mean attempting to go back and imitate a past culture," LaChapelle argues, "rather it means acknowledging the body and nervous system, which we have inherited from past ages, and beginning again to live the life which harmonizes this body and mind with the surrounding environment." (152)

Lawrence believed he saw this living connectedness still flourishing in European rural communities, including the English coal mining community he was raised in, as well as in tribal societies; he also saw it in the American West during his two years living in Taos, where he wrote *The Plumed Serpent*, *Pan in America*, and *St. Mawr*, perhaps his most explicitly environmental writings. He also saw that both rural and primal communities were threatened.

Again like Abbey, Thoreau and Snyder, Lawrence urged a living on and with the land, using it as we must but without killing it, in a style closer to Jefferson's agrarian ideal than Silicon Valley's industrial suburbia. The society created by this close-to-the-land living and struggling is as vital and essential an element to a practical environmental ethic as any wilderness ideal is. "The spirit of place is a great reality," Lawrence wrote in *Studies in Classic American Literature*. "Men are free when they are living in a homeland... Men are free when they belong to a living, organic, *believing* community, active in fulfilling some unfulfilled, perhaps unrealized purpose." (19)

To recreate those "primitive" connections, both in individual lives and in communities, Lawrence suggested ceremony and ritual as acts of recognition of the role of the land in keeping mind, body, spirit, and community in balance and functioning well. "We ought to dance with rapture that we should be alive and in the flesh, and part of the living, incarnate cosmos," Lawrence wrote in his last book, *Apocalypse*. "What we want is to destroy our false, inorganic connections, especially those related to money, and re-establish the living organic connections, with the cosmos, the sun and earth, with mankind and nation and family. Start with the sun, and the rest will slowly, slowly happen." (173-4)

Guided by these intuitions and instincts, Lawrence was able to articulate over seventy years ago the belief lying at the philosophical heart of the deepest of today's environmental and sustainable society movements, when he wrote in *The Plumed Serpent:* "Then there is the possibility of a new type of human life which combines 'the old blood-and-vertebrate consciousness'... The sinking of both beings, into a new being... It's not a helpless, panic reversal. It is conscious, carefully chosen. We must go back and pick up the old threads. We must take up the old, broken impulse that will connect us with the mystery of the cosmos again, now that we are at the end of our tether." (151)

A grand, hopeful, idealistic aspiration, the mission of the future primitive. And how to begin that movement? Again, Lawrence addressed that question in The Plumed Serpent: "All that matters to me are the roots that reach down beyond all destruction. The roots and the life are there. What else it needs is the word, for the forest to begin to rise again. And some man among men must speak the word."

Many great writers have, and D.H. Lawrence's words should be added to that stockpile of environmental inspiration and philosophy, LaChapelle argues convincingly. So should her own book. •

—Reviewed by Ken Wright, co-editor San Juan Almanac *(POB 4480, Durango, CO 81302) and author of* A Wilder Life: Essays From Home *(Kivaki Press, 1995)*

The Wolves of Isle Royale: A Broken Balance

by Rolf O. Peterson; Willow Creek Press, Minocqua, WI; 1995; hardcover $29.50; 188p.

Rolf Peterson's *Wolves of Isle Royale* is strewn with bits and pieces of the place and creatures he has studied for nearly three decades. A wildlife biologist who has researched the interaction of Gray Wolves and Moose on Lake Superior's Isle Royale since 1970, Peterson includes everything—from tales of camping with his wife and watching wolves on the hunt, to the "cognitive maps" that wolves develop of their habitat and prey, and the endorphins that numb a Moose to pain as it falls prey to the pack. The book is wandering and raw, full of a park naturalist's exclamatory fun facts. It is also charming and nostalgic. The reader emerges from this book with a remarkably complex image of Isle Royale and its inhabitants, and many questions about their future.

Timber Wolf, *illustration by Patrick Dengate*

Over the years, Peterson and his colleagues felt from time to time as if they had the wolf-Moose dynamics figured out. Their neat theories and generalizations were always dashed, however, by unpredictable Nature. Gray Wolves are thought to have crossed the ice to Isle Royale in the late 1940s. At that time, the Moose population on the island, which had crashed in the mid 1930s after decimating the island's Balsam Fir stands, was growing exponentially. Biologists thought that the Isle Royale wolves might prevent a second Moose overshoot and crash. In the early 60s, Dave Mech, one of Peterson's predecessors, determined that the wolves had done just that, as both wolf and Moose populations seemed to level out. For roughly a decade, Isle Royale was cited by biologists as a system that had reached a "stable equilibrium."

During Peterson's tenure on Isle Royale, however, these early hypotheses have proven to be drastic oversimplifications. Severe winters, parasites, and disease are just a few of the factors that have driven dramatic swings in both Moose and wolf populations in recent years. Peterson concludes that "the longer one studies a particular living system, the less one can say with certainty about its behavior. We may show improvement in our ability to explain what has just happened, but we must ever be humble in predicting what lies immediately ahead."

Since the 1980s, the Isle Royale wolf population has dwindled. Peterson and his peers in the National Park Service have been forced to ask the question, after years of non-intervention: should we subsidize a wolf pack that seems to be dying out of its own accord, or let Nature run its course, even if this leads to the population's extinction? Here, the author's argument becomes jumbled, but his point is well taken. Isle Royale is one of the last unthreatened areas of wolf habitat in the world. Chances of the wolves reestablishing themselves without human intervention are slim. Humans will decide the fate of the wolves of Isle Royale. •

—Reviewed by Gregory Hanscom, assistant editor, High Country News

Buffalo Nation: History and Legend of the North American Bison

by Valerius Geist; Voyageur Press (123 North 2nd St., Stillwater, MN 55082); 1996; $35 hardcover; 144 pp.

Valerius Geist is one of the world's most creative and innovative thinkers on animal behavior and its evolutionary roots. His early studies focused on mountain sheep in the wilds of British Columbia; later, as Director of Environmental Science at the University of Calgary, Alberta, he turned his attention to Ice Age mammals, and their modern-day counterparts. Now in this richly illustrated volume, Geist turns his attention to Bison, offering an overview of the natural and cultural history of North America's largest and shaggiest herbivore.

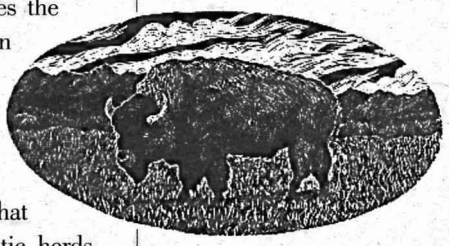
Geist begins his book with an introduction called "Wild Things in Wild Places," where he suggests that without wild places, there can be no wildlife. He calls the Bison a symbol of success—the return of a species from the brink of extinction. But this success would not have occurred without the efforts of early conservationists who worked for protection of Bison as well as a place for wild Bison. He argues convincingly that we must protect habitat—more Yellowstones, Wood Buffalos, larger National Parks, etc.—to ensure the long-term protection of wildlife.

In the chapter "Origins of the Buffalo," Geist delves into the evolution of the Bison as a species adapted to life on the open grasslands. Here we learn about the evolutionary pressures that helped create the modern Bison. This is particularly important reading for anyone harboring the mistaken notion that cows are an adequate ecological substitute for Bison.

Other chapters explore the relationship between the plains Indians and Bison, and the unprecedented 19th century slaughter that resulted in the Bison's near extermination. All are fascinating, but Geist's primary contribution to the study of Bison ecology and history comes in his last chapter, where he speculates on the future of the Bison.

Geist warns that all current Bison herds are descended from a very small number of founding members, and, as a consequence, have suffered genetic bottlenecks that may make them more vulnerable to environmental changes. Further population reductions—such as the massive herd reduction in Yellowstone this past winter due to concerns of the livestock industry over brucellosis*—create even greater danger of genetic bottlenecks in the few remaining wild populations. Any future management actions must consider the genetic and evolutionary history of contemporary Bison herds.

In addition, Geist believes the trend toward domestication poses a threat not only to Bison, but to all wildlife. "Bison ranching is not conservation; it is domestication," he warns. Geist speculates that selection pressures on domestic herds could destroy the genes necessary for life in the wild. Just as hatchery salmon threaten wild populations, ranching of Bison and other wildlife poses a grave threat to the long-term viability of wildlife throughout North America.



I heartily agree with Geist that "market" solutions such as game ranching ultimately threaten what we hope to preserve—namely wild animals in wild places, and that the way to ensure viability of wild bison populations is by preservation of "public Bison on public lands by public institutions."

While many books on the topic have recently been published, *Buffalo Nation* is the best I've seen, containing good science and a strong conservation message in an attractively designed package, with many quotes, drawings, and photos that bring Bison to life for the reader. •

—Reviewed by George Wuerthner, (Box 3975, Eugene, OR 97403) wilderness explorer and author.

*See Doug Peacock's "Yellowstone Bison Slaughter" in *Wild Earth* summer 1997.

illustration by Evan Cantor

Other Recommended Titles

The Work of Nature

by Yvonne Boskin, foreword by Paul Ehrlich, illustrations by Abigail Rorer; Island Press (1718 Connecticut Ave. NW, Suite 300, Washington, DC 20009); 1997; 288p; $25

Be not deterred by the apparently utilitarian bent of this forerunner in the nascent genre of books on ecosystem services. Yvonne Boskin keeps Nature central throughout, only occasionally bothering to remind the reader that without the many ecological processes and interrelationships so clearly described here, life for humans as well as for other creatures will deteriorate. Some types of lessons you'll learn from *The Work of Nature*: dwindling populations, as much as extinctions, threaten ecosystems (quantity, as well as quality, matters); desertification in some xeric landscapes may be irreversible; diversity of forms—more than of species per se—helps stabilize long-term productivity; scientists have underestimated the role of organisms in shaping landscapes... This book would serve especially well as a text for undergraduate or graduate biology courses, but is perhaps most needed by agency and political decision-makers. —*John Davis*

Thermal Warriors

by Bernd Heinrich; Harvard University Press (525 Great Rd., Littleton, MA 01460); 1996; 220p; $27

Record-holding ultra-marathon runner, raven researcher, entomologist, acclaimed author, and good-old-fashioned naturalist Bernd Heinrich here in his current popular volume manages to make the seemingly arcane subject of insect thermodynamics fascinating and broadly meaningful. After reading this energetic account of arthropod adaptations, you may well conclude that insects are at least as highly evolved as we primates are. You'll be inspired to support the groups working on behalf of the world's largest class, Insecta, such as Xerces Society and North American Butterfly Association. You'll also be inspired to get out and study our little six-legged friends. —*JD*

Walden

Boston, MA 02108); 1997; 312p; $17

Along with John Muir, Mary Austin, Aldo Leopold, Rachel Carson, Mark Twain and a few others, Henry Thoreau is one of those prescient forebears who must be continually rediscovered by successive generations of conservationists. As Bill McKibben—who will soon be counted among these timeless luminaries himself—so beautifully explains in his introduction, Walden is as telling, and needed, now as ever before.

For readers who have shied away from Thoreau, assuming transcendentalists to be a singularly dull lot, you've a treat in store if you take the plunge. Thoreau was at times almost as funny as Twain. He even made *The Dispersal of Seeds* (newly available in *Faith in a Seed*, Island Press) enthralling! —*JD*

Tuberous Indian Plantain *(Cacalia tuberosa) by Gary Eldred*

ANNOUNCEMENTS

BWA Roadless Areas and Wilderness Report

Big Wild Advocates has just released a comprehensive report that documents the history of the wilderness movement in the US, presents a conservation biology-based appeal for protecting biodiversity, includes a US map of unroaded, undeveloped wildlands over 5000 acres, corrects the most common misperceptions about wildands, and explains the leading causes of the destruction of wilderness. The report offers suggestions for supporting Wilderness designation in Congress and your community, and an essential reading list. For information, contact Big Wild Advocates, POB 318, Conner, MT 59827.

ONDA Riparian Report

The Oregon Natural Desert Association has released a report titled *Survey of Livestock Influences on Stream and Riparian Ecosystems in the Western United States,* written by Joy Belsky, Andrea Matzke, and Shauna Uselman. The report focuses largely on the local effects of livestock grazing on riparian zones, but also covers the landscape and regional effects of livestock grazing and other factors contributing to riparian degradation. To order a copy, send $5 to Oregon Natural Desert Association, 732 SW 3rd Ave., Ste. 407, Portland, OR 97204; 503-228-9720; jbelsky@onda.org. Also available free of charge is *Effects of Livestock Grazing on Stand Dynamics and Soils in Upland Forests of the Interior West* by Joy Belsky and Dana Blumenthal, recently published in *Conservation Biology.*

Global biodiversity

Global biodiversity magazine's fall 1997 issue will have an Ecoforestry theme, and will be guest-edited by Herb Hammond, director of the Silva Forest Foundation in British Columbia. The issue will include articles on practical strategies for communities and governments in transition to ecoforestry, indigenous forest use, forestry impacts on wildlife, and alternative fibers. The subscription cost is $26.75 for individuals, $53.50 for institutions, $8.03 single issues. Outside of Canada, please pay in $US; overseas orders add $10 for surface postage. For information contact, *Global biodiversity,* Canadian Museum of Nature, POB 3443, Station D, Ottowa, ON K1P 6P4, Canada; 800-263-4433 (phone) 613-566-4763 (fax); sswan@mus-nature.ca.

Report on Presettlement Conditions of Southwestern Ponderosa Pine Forests

The Southwest Forest Alliance has recently released a paper titled *Presettlement Conditions of Ponderosa Pine Forests in the American Southwest,* prepared by Michael M. Pollock and Kieran Suckling of the Southwest Center for Biological Diversity. The paper provides information on the structure, composition, and successional processes of Southwestern Ponderosa Pine forests. Using both data and inference, the authors determined the density and size distributions, spatial structure, regeneration and mortality patterns, successional processes, and fire regimes in presettlement forests. For a copy of the report, contact the Southwest Center for Biological Diversity, POB 710, Tucson, AZ 85702-0710; 520-623-5252 phone; swcbd@sw-center.org; www.envirolink.org/orgs/sw-center (web site).

Epic of Evolution Conference

The Epic of Evolution, a conference on evolutionary science and religious interpretation, will take place 12-14 November 1997 at The Field Museum in Chicago, Illinois. The conference is sponsored by The American Association for the Advancement of Science, The Field Museum of Natural History, the Chicago Academy of Sciences, and the Chicago Center for Religion and Science. For information, contact Jim Miller, Program of Dialogue Bt. Science and Religion, AAAS, 1200 New York Ave. NW, Washington, DC 20005; 202-326-7044; jmiller@aaas.org.

Red Sails in the Sunset

"The great and fast growing imbalance between human society and the rest of the planet is the all-important and all-pervading issue of our time. The only truly relevant and worthwhile politics in the forthcoming decades will be one that meets this challenge." In *Red Sails in the Sunset: An ecopolitical critique of the socialist inheritance, Real World* editor Sandy Irvine discusses the possible meshing of socialism and green politics from a historical perspective. As socialism traditionally is marked by a deep ignorance of ecology, Irvine emphasizes many ecological lessons the party would have to learn to redeem itself. If socialism incorporates these values, and remains socialist, it could perhaps become an important political party of the future. *Red Sails in the Sunset* was produced by Real World Publishing and can be purchased from ECO, The Campaign for Political Ecology, 42 Rose Terrace, Horsforth, Leeds, LS 18 4QA.

Teaming with Wildlife

Teaming with Wildlife is a national conservation funding proposal to expand existing user fees on hunting and fishing gear to include a wide range of outdoor recreation equipment and supplies. Funds generated by the proposal would provide $350 million annually to states for conservation, recreation, and education purposes. Teaming with Wildlife aims to reverse declines in wildlife, meet escalating demands for outdoor recreation opportunities, and assure an economic future for the outdoor industry. Over 1600 conservation/recreation organizations and businesses have voiced their support. For information, contact Deborah Richie Communications at 406-721-6609; debrichi@ montana.com.

Southbound

Doug Hawes-Davis's most recent environmental documentary, *Southbound,* discusses the newly developed chip mills in the Southeast and their devastating effects on ecosystems and local economies. Contact Bullfrog Films 800-543-FROG or Ecology Center Productions, 1519 Cooper St., Missoula, MT 59802; 406-728-5733; dhd@wildrockies.org.

6th World Wilderness Congress Postponed

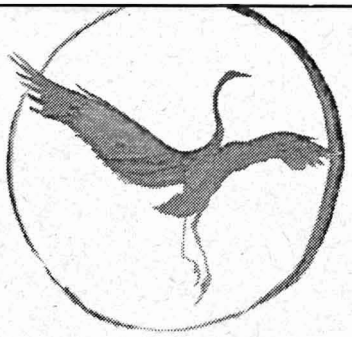
Vance Martin of the Wild Foundation has officially announced that the 6th World Wilderness Congress is postponed until late October of 1998. The conference will still take place in Bangalore, India—hopefully during a time of more stability for the Indian Government. For information, contact Vance Martin at 805-649-3535 (phone), 805-649-1757 (fax), wild@fishnet.net or Alan Watson at 406-542-4197 (phone), 406-542-4196 (fax), awatson/int_missoula@fs.fed.us.

Wild Forests for the 21st Century

The Foundation for Deep Ecology seeks to promote discussion of the foremost issues and strategies that will shape the protection of our wild forests into the next century. FDE has assembled a pool of prominent speakers in six topic areas: Biodiversity Protection and Habitat Conservation Plans; Ecocentric Philosophy; Ecoforestry; Fire Ecology and Forest Health; Globalization, Corporations and Forests; and Zero Cut on Public Land. FDE is offering to provide speakers from this pool for environmental and student organizations that wish to host a public forum on the future of forest protection in the US, and also to pre-existing conferences. They will sponsor up to three speakers per event. Organizations in the South, Midwest, and East are particularly encouraged to apply. For more details, contact the Foundation for Deep Ecology, 1555 Pacific Ave., San Francisco, CA 94109; 415-771-1102.

Dave Foreman at Rowe Conference Center

Dave Foreman will present a workshop on The Wildlands Project 23-25 January 1998 at the Rowe Conference Center in Massachusetts. Dave will be joined by conservation biologists and leaders of the New Conservation Movement in the Northeast. For information, contact the Rowe Camp & Conference Center, Kings Highway Road, Rowe, MA 01367; 413-339-4468 phone; 413-339-5708 fax.



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***Heron Dance* is worthwhile and inspiring.** John Davis, Editor, *Wild Earth.*

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Back Issues

We list here only the major articles of each issue, by partial title or subject. For a more complete listing, request a comprehensive Back Issues List (see form on reverse).

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, 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 SOLD OUT (but photocopies of articles are available). The New Conservation Movement continued. Farley Mowat on James Bay, George Washington National Forest, the Red Wolf, George Wuerthner on the Yellowstone Elk Controversy, The Problems of 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 SOLD OUT (but photocopies of articles are available). Foreman on ranching, Ecological Costs of Livestock, Wuerthner 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, U.S. Endangered Species Crisis Primer, Wuerthner 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, Wuerthner'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 Adirondack Proposal, National Roadless Area Map, Preliminary Wildlands Proposals for Southern Appalachians & Northern Rockies, 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, Wuerthner 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, 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, 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 Wildfire, Bernd Heinrich on Bumblebee Ecology, Michael Soulé on the Health Implications of Global Warming, Peter Brussard on Nevada Biodiversity Initiative, Preliminary Columbia Mtns. Conservation Plan, Environmental Consequences of Having a Baby in the US

19 Fall 1995 SOLD OUT (but photocopies of articles are available.) 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, 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 Strittholt, and Reed Noss confront Obstacles to Implementing TWP Vision

21 Spring 1996 Bill McKibben on Finding Common Ground with Conservatives, Public Naturalization Projects, 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, Soulé 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, 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, NPS Prescribed Fires in the Post-Yellowstone Era, Alaska: The Wildlands Model, Why are Cougars Killing People?, The Adirondack Blowdown, The Yukon Wildlands Project, Mad Cows and Montanans, Humans as Cancer, Wildlands Recovery in Pennsylvania

24 Winter 1996/97 SOLD OUT (but photocopies of articles are available.) 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 biologists, Hugh Iltis challenges abiologists, 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 two of NPS Prescribed Fires in the Post-Yellowstone Era.

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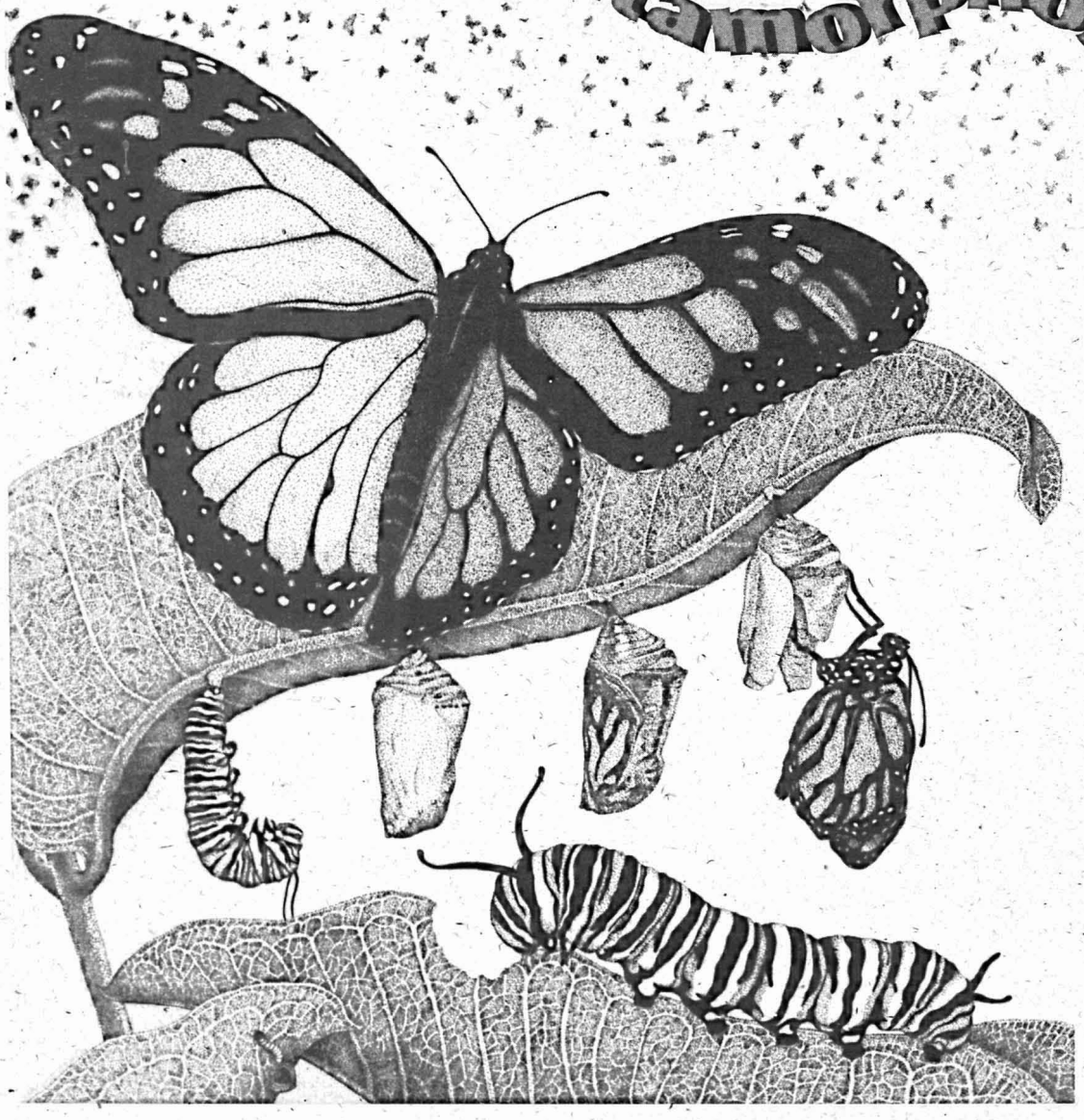
Species Spotlight

Monarch Metamorphosis

Danaus plexippus by D. D. Tyler



Wild Earth's current changes are as nothing compared to the metamorphosis that an exceptionally popular butterfly, the Monarch, undertakes. As with other insects that undergo complete metamorphosis, the Monarch has four distinct life phases: egg, larvae (which we think of as caterpillar), pupa (which we know as a cocoon), and adult. This last phase—which comprises only a small fraction of the life span for many insect species—is when insects become recognizable even to non-arthropods and non-scientists as butterflies, moths, bees, flies, and the like.

Monarchs stand out from an already spectacular order, Lepidoptera, for their unique yearly migration. Whole books have been written on this fragile phenomenon. Here, suffice it to say, the Monarch's marathon migrations, and overwintering congregations in a very few sites, make absolutely essential the protection of native milkweeds throughout this regal butterfly's range and of the Oyamel Pine forests in Mexico where Monarchs mass each winter.

Yes, the Monarch, too, supports the call of *Wild Earth* and The Wildlands Project for large core wilderness reserves connected by broad swaths of wild habitat. This flagship insect will enjoy a secure future if we enact a North American Wilderness Recovery Strategy.

—*John Davis*

Maine artist Diana Dee Tyler is known for the scientific accuracy that informs her artwork. Her many book illustration credits include Bears in the Wild, Keepers of the Animals, *field guides, and award-winning children's books. D.D. and Hank Tyler operate Tyler Publishing (POB 243, Augusta, ME 04332), which distributes D.D.'s natural history posters, prints, notecards, etc.*

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CWC has four primary goals:

We seek to create a vibrant, grassroots activist network throughout the state.

We work to ensure that critical wildlands in California are defended from immediate, short-term threats.

We strive to achieve long-term protection for wildlands through promotion of wilderness legislation, such as the California Wilderness Act of 1984, (a bill that CWC played an instrumental part in passing), and through our work as The Wildlands Project affiliate in California.

We help serve the California conservation community in a coordinating and leadership capacity.

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Sequoias, photo by Dave Foreman

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