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Summer 1997

WildEARTH



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DOUG PEACOCK BLASTS BISON KILLERS

Hugh Iltis Challenges Biologists

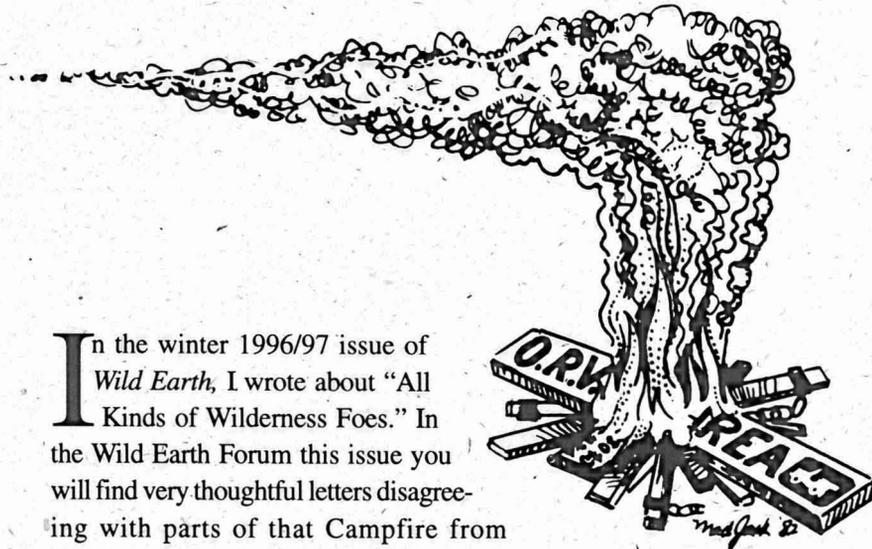
Dave Foreman Challenges Abiologists

Threatened Eastern Old Growth

Fire in Parks



Around the Campfire



In the winter 1996/97 issue of *Wild Earth*, I wrote about "All Kinds of Wilderness Foes." In the Wild Earth Forum this issue you will find very thoughtful letters disagreeing with parts of that Campfire from Wendell Berry, Bill McLarney, and David Rothenberg. I welcome their comments and take them to heart. Part of the reason for their disagreement with what I wrote is because what I wrote was a severely compressed summary of my book-in-progress, *The War on Nature*. Part of their disagreement is because...well, because we really do disagree on some points.

Here, I'd like to expand on my thoughts about how immaturity in adult humans and a disbelief in biology lead people to war on Nature. In doing so, I hope to show a few of the psychological and anthropological reasons why many people think they can live without wild things, some of whom go so far in their alienation from Nature that they want to bring to heel wild things and kill those wild things that will not heel.

IMMATURITY

In *Nature and Madness*, Paul Shepherd hacks his way through the weedy thickets of human psychohistory to ask "why do men persist in destroying their habitat?" As he searches, he finds that "[a]n uncanny something seems to block the corrective will, not simply private cupidity or political inertia." That "uncanny something" is that "[m]ost of us fail to become as mature as we might."¹

Homo sapiens is a neotonic species. *Neotony* means one retains immature characteristics in adulthood. Adult humans look like juvenile apes. But the immaturity that drives our war on Nature comes from the "progress" of civilization. Shepard tells us, "Agriculture not only infantilized animals by domestication, but exploited the infantile human traits of the normal individual neotony." The result was "childish adults."² We moderns seem frozen in the destructive impulses of preadolescence.

¹ Shepard, Paul *Nature and Madness*. Sierra Club Books, San Francisco, CA 1982. pg. 1-5
² Ibid. pg. 113-124

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.



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continued from inside front cover

The overblown manliness of Old Testament herders is a trait of childishness rife in American culture today. Shepard says that in *The Melancholy Herd*,³ "[Lewis] Lapham portrays our aristocratic desert-mindedness as a catalog of childishness, a sort of amalgam of teenybopper frothiness and macho juvenile vapidness..." Shepard goes on to say, "Yet the similarity of Americans to mandarin Bedouins is neither accidental nor due to direct cultural heritage. It incorporates that body of adolescent traits and pastoral attitudes first assimilated into Western consciousness by Hebrew prophets and later reworked and secularized by Greek philosophers and modern Protestants. It is dominated by themes of alienation, disengagement, and unrelatedness—hence chaos."⁴

The intellectualism of Classical Greece made us even more immature than the loin-girded desert patriarchs: "[T]he 'maturity' of Periclean Greece seems typical of an immature personality. Of the Platonic ideal of neuter human relationships and pederasty linked to pedagogy, [Joseph] Campbell exclaims, 'Everything that we read of it has a wonderful adolescent atmosphere of opalescent, timeless skies—untouched by the vulgar seriousness of a heterosexual commitment to mere life.'

"In most of the myths of creation of an androgynous ancestor, there is a paradisiacal sexlessness or infantile autosexuality that is unmistakably puerile."⁵ Hmm. Almost sounds like the otherworldly computer nerds of "Heaven's Gate."

The consequences of our failed maturity are all about us. Shepard warns, "the only society more frightful than one run by children, as in Golding's *Lord of the Flies*, might be one run by childish adults."⁶

If alienation from Nature comes from civilized immaturity, so does our hatred of limits. Setting limits underlies both maturity and conservation. Shepard again: "To be fully mature, as Rollo May says, is to understand and to affirm limitations."⁷

Many wilderness foes seem trapped in a two-year-old's sense of freedom. *All revolves around me. There are no limits. Actions have no consequences.* Maturity, on the other hand, means responsibility. Conservationists believe that there are limits in Nature (carrying capacity), which require us to act responsibly. Wilderness foes bristle at any sense of limits and thus rebuff pleas from society to behave responsibly toward Nature.

This American rejection of limits tracks back to the beginnings of English colonialism in North America. After the scarcity of Europe and faced with mind-boggling resource abundance in the sea and forest, the first settlers in Massachusetts and Virginia hatched the *Myth of Superabundance*. From the board rooms to the woods, from the economics departments to the Congress, this age-old faith holds sway. "There are no limits. Why should we worry about the consequences of our actions?"

³ Lapham, Lewis H. "The Melancholy Herd," *Harper's* July 1978

⁴ *Nature and Madness* pg. 69-70

⁵ *Ibid.*, pg. 79

⁶ *Ibid.*, pg. 17

⁷ *Ibid.*, pg. 13

ABILOGISM

As I noted in my winter Campfire, another shared trait of wilderness foes is *abiologism*—a disbelief in biology. Wilderness foes (whether active destroyers of Nature or those who merely see wilderness preservation as irrelevant) do not accept the reality of evolution, the basic biological kinship of all living things, including humans.

Harvard evolutionary biologist Stephen Jay Gould tells us that Sigmund Freud wisely noted, “Humanity has...had to endure...great outrages upon its naive self-love.” Freud identified the two most important such outrages: the cosmological shift from a geocentric to a heliocentric universe and Darwin’s discovery of evolution, which “robbed man of his particular privilege of having been specially created, and relegated him to descent from the animal world.”

But, Gould says, evolution “has not been able to surmount a mental roadblock. Evolution still floats in the limbo of our unwillingness to face the implications of Darwinism for the cosmic estate of *Homo sapiens*. Physical reconstruction, the first step in a Freudian revolution, has been accomplished: All thinking people accept the biological fact of our ‘descent from the animal world.’ But the second stage, mental accommodation toward pedestal smashing, has scarcely begun. Public perception of evolution has been so spin doctored that we have managed to retain an interpretation of human importance scarcely different, in many crucial ways, from the exalted state we occupied as the supposed products of direct creation in God’s image.” The reason for this is because no “other ideological revolution in the history of science has ever so strongly or directly impacted our view of our own meaning and purpose.”⁸

To reiterate what I noted in the winter issue, the Christian right urges humans to transcend biology through supernaturalism and special creation; free-market zealots lift humans above biology with Smith’s invisible hand; secular humanists free *Homo sapiens* from ecological constraints through the “second nature” of human culture; and postmodern deconstructionists can tell us that Nature is all in our heads because they emotionally do not believe in biology.

It’s not so hard to understand abiologism among the uneducated; it’s a bit tougher among the intelligentsia. But it is there, as Gould shows. Rutgers biologist David Ehrenfeld tells us, “There is...a strong anti-Nature (at least raw Nature) element in humanism, although it is not always expressed and is sometimes denied.”⁹

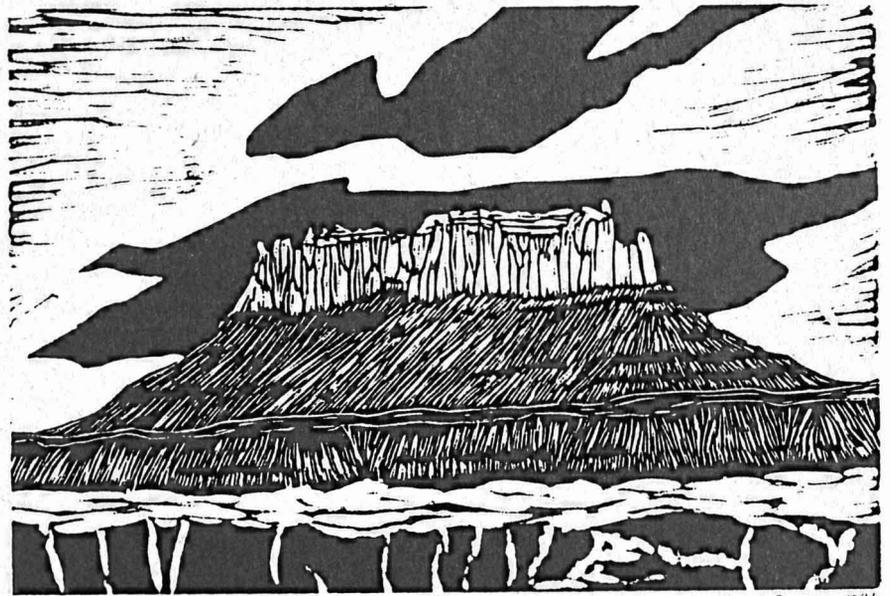
Rejecting biology for humans, wilderness foes cannot find value in Nature—and so find it easy to trash wilderness and other species.

It seems to me that the immaturity of modern humans resulting from agriculture, pastoralism, and industrialization, and our emotional rejection of biology are the reasons for the duality that exists between humans and Nature. Wilderness Areas, the idea of wilderness, and the need of many of us to escape periodically to wilderness are the best ways we have found to break down that duality and become biological once again. ■

Happy Trails,

—Dave Foreman

The Grand Canyon



Amy Grogan 1976

⁸ Gould, Stephen Jay “This View of Life” *Natural History* July 1995

⁹ Ehrenfeld, David *The Arrogance of Humanism*. Oxford University Press, Oxford, UK 1978. p. 6



Wild Earth Update

Wild Earth wishes to give special thanks in this issue to the Society for Conservation Biology. SCB continues to be the leading scientific society in efforts to better understand and protect biological diversity. Moreover, this year SCB is being exceptionally gracious to *Wild Earth* in honoring us with a distinguished service award for education and journalism. In early June, I'll attend the 1997 SCB meeting in Victoria, British Columbia, and there proudly accept this award on behalf of all the writers, reviewers, staff and board members, and friends who make *Wild Earth* a strong and growing link between the conservation biology community and wildland activism community. More good news from SCB includes the choice of Gary Meffe, of Savannah River Ecological Laboratory and author of a definitive text on conservation biology, to succeed outgoing editor Reed Noss at the helm of *Conservation Biology*; the election of Reed (ongoing *WE* science editor, too, of course) to be president of SCB; and the election of Greater Laurentian wildlands scientist Steve Trombulak to SCB's board of governors.

We also wish to thank the extremely generous readers who responded to our appeal last issue for contributions to help complete a wildlife corridor in the eastern Adirondacks. The protection work is proceeding slowly but surely. Please call or write us if you'd like information on this exciting conservation opportunity.

In this issue of *Wild Earth* and the next we pay special attention to original ecosystems. It bears repeating that old-growth remnants—the seeds of recovery—in the East (see article by Mary Byrd Davis) and Northwest (Andy Kerr & Rick Brown) are still being cut; that natural disturbance regimes are still being suppressed (Robert H. Jones); that many whole ecosystems are imperiled (Reed Noss); and that even some of our continent's original denizens that we might assume are being treated with veneration, such as Bison (Doug Peacock) and Tui Chubs (Tom Myers), are still being persecuted. Our winter 97-98 issue will explore one of the root causes of this destruction, human overpopulation.

An exceptionally cool wet spring with brisk northwest winds here in the Adirondacks and Vermont (if any weather in the climatically diverse Northeast can be considered exceptional) is whispering of exciting change, growth, and migration (some of which Monique reports below) here at *Wild Earth*. As the calm of summer settles upon us, we'll duly note these range expansions for your perusal in our fall issue. Meanwhile, thanks as always for your comments, encouragement, and contributions.

—John Davis, Hemlock Rock Wildlife Sanctuary, eve of warblers' return

With the arrival of spring wildflowers and returning warblers have come exciting changes at *Wild Earth*. With gratitude we say farewell to business manager Suzanne DeJohn, who leaves us to begin full-time work at the National Gardening Association. We welcome as the newest Wild Earthling incoming business manager Andrea Beenhouwer.

Wild Earth has long distinguished itself both editorially and by its unique role in the conservation movement. But other facets of this organization may have escaped notice by even some of our most devoted subscribers. I refer in particular to *WE*'s policy since its inception seven years ago, not to a) trade, barter, or sell its mailing list, and b) send more than one fundraising mailing to members per year. Most professional promoters would dismiss such policies as being hopelessly naive. We hope you disagree.

Your generous response to our annual appeal last year confirmed for us that we should maintain these policies, while working vigorously to attract more people to the cause of wildlands restoration and protection. One promotional idea we believe worthwhile is providing a business reply envelope bound into the pages of *Wild Earth* beginning with this issue, allowing you to subscribe, renew, or order gift subscriptions and other publications with ease. The envelope also contains a section asking for the names of friends and family who might be interested in learning more about *Wild Earth*—we hope you will use it!

If you support our policy of not selling our mailing list and refusing to flood subscribers with direct mail solicitations, please let us know—checks are welcome, but so are letters! Your enthusiastic support of our work sustains our efforts.

—Monique Miller



Prothonotary Warbler by Chuck Ouray

The Wildlands Project Update

by Steve Gatewood

Good science, particularly the tenets of conservation biology, forms the foundation of the work and ultimate success of The Wildlands Project. The efforts of activists must be backed up by sound technical information and be defensible in the scientific arena. We must be able to "translate" this science for use by lay activists and make it understandable by ordinary citizens, and also create opportunities for basic scientific principles to be "transformed" into interesting, readable and inspirational formats for wider distribution rather than just allowing peer reviewed journals and technical publications to publish the data.

Several things are happening in TWP that will greatly enhance our ability to provide scientific outreach and assistance to cooperators, citizens, and the scientific community. First and foremost, a staff ecologist should be on board by the time you read this. From a field of excellent candidates, we are hiring someone to fill the role that Reed Noss played from our founding in 1992 until early last year. This is a full-time position based in our Tucson office, but he/she will spend a considerable amount of time on the road meeting with collaborators. The needs of you folks out in the trenches will help define the specific activities our Wildland Ecologist will be involved in, so please, let us know what assistance you need.

Second, we have received a small grant from a family foundation to provide funds for Reed Noss and Jim Stritholt of Earth Design Consultants to be involved in Wildlands activities. Jim has already attended on behalf of TWP a NASA meeting designed to get them involved in collaborative activities and funding of conservation NGO projects. Reed is scheduled to get more deeply involved in the science programs of the Yellowstone to Yukon Biodiversity Initiative (Y2Y).

Third, TWP Board President Michael Soulé is organizing a science workshop for this fall that will involve 25-30 top scientists in an open dialogue regarding key issues and controversies related to the wildlands movement. Issues to be addressed include the theories and principles of corridor design, compatible uses of buffer zones, the ecological importance of large carnivores, a peer review process for reserve designs, and exploration of the similarities and differences in the twin objectives of rewilding of landscapes and representation of biodiversity. Major products will be a summary technical report, the bulk of which will be generated at the workshop, a book that will represent a more complete account, and possibly a series of white papers on key topics.

It is important that we hear in what directions you believe our science program should be going. We know there is a need for outreach, but what are the specific issues that we can help you with? What questions need to be asked? Of whom? We have ideas and there is no lack of specific work for the ecologist to engage in, but tell us what you need.

We would like to thank our many foundation and corporate supporters who provided funding in 1996:

Compton Foundation, Geraldine R. Dodge Foundation, Charles Engelhard Foundation, EnTrust Foundation, Evergreen Foundation, Foundation for Deep Ecology, Richard & Rhoda Goldman Fund, Janelia Foundation, Max & Anna Levinson Foundation, Mennen Environmental Foundation, Merck Family Fund, Norcross Wildlife Foundation, Ruth Mott Fund, Patagonia, Inc., Sweet Water Trust, Turner Foundation, Town Creek Foundation.

More than 300 individual donors supported our work in 1996, and hundreds more attended Wildlands benefit events and speeches. We thank you all for your enthusiasm, good will, and financial support. ■

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.





Field Report

Yellowstone Bison Slaughter

by Doug Peacock

I have been unable to live without wild things from my earliest memories as a boy growing up in northern Michigan. During my twenties, this requirement for turtles, swamps, and geese took a surly turn and I discovered that without big dangerous animals ranging freely over huge hunks of wild habitat, my prior life paled and I despaired. More recently, the addiction twisted again and I found it difficult to get out of bed without the anticipation of the daily fix of physical and psychic proximity to some big native animal. It was no longer good enough just to know they were out there. Others, probably more mature and better adapted, seem to do just fine with whatever Nature they find around their backyards. I don't think anyone is wrong in determining their own minimum wild needs and tend to think of mine as merely a personal problem, born of violence in and to the planet, an accident of history to one who remains a second rate human if deprived of regular contact with the wild ones. I see this pattern less as a singular trait of quirky characters than as a personality defect, which occasionally approaches true perversion (because there are dark sides) in its need for wild and sometimes dangerous critters.

How the cumulative effects of this individual compulsion impact wild ecosystems is a subject for another time best written by somebody else. To chart your occasional spiritual success by conserving wildness is not the only measure of gratification in the late 20th century; yet for me, many of these small victories have come when I remembered the fragrance of walking through a place, the stare of a particular wild animal, my own fear in its presence. The supposition here might be that it is necessary to know something in order to save it.

I offer this personal observation because this winter I ran into something I couldn't save, a conservation problem I could not solve, indeed none of us could. It concerned Bison in Yellowstone National Park. Despite the efforts of hundreds of individuals—good people—many preservation groups and conservation organizations, we failed to save a single wild Bison during the brutal winter of 1996-97.

The nation's only wild free-ranging Bison herd was decimated by agencies and bureaucrats, cheered on by regional politicians, and we couldn't find a way to stop them. Of the park's estimated 3500 Bison, over 1100 were shipped to slaughter by the National Park Service or blown away by shooters of the Montana Departments of Livestock or Fish, Game, and Parks. Another estimated 1400 were winter-killed by early April. The dying continues today and it is possible we will be left with so few Bison that the viability of the population is in question. The starving Bison's only crime was looking north across the park's border down the valley where I lived.

From my home some 45 miles north of the park, down the Yellowstone River in the valley they call Paradise, I watched as one of the worst slaughters of North American wildlife in recent history unfolded.

Yellowstone's Bison had been important in my own life. I had camped with them in the backcountry of Yellowstone Park for three or four months each year for over fifteen years during the two decades after Vietnam when I lived with Grizzly Bears. Sometimes I didn't see Grizzlies for weeks but the Bison were there every day, offering me the wild gift of their companionship, kicking, romping, rolling in the dirt and shaking off clouds of dust, bellowing and grunting as the summer proceeded.

These creatures were remnants of the greatest herds of game animals ever to roam the face of the Earth—greater than the wildebeests of the Serengeti or the Caribou of the Yukon—the American Bison of the High Plains. Numbering perhaps seventy million at the beginning of the nineteenth century, the American Bison was slaughtered into near extinction by 1900.

This was no hunt but butchery. In less than a hundred years, we European Americans reduced the quintessential animal of the continent by 99.999%. Both the magnitude of this milling, vibrant animal spectacle and the rapidity with which the herds were slaughtered are unprecedented in human history; I'm saying no other people, maybe no other species on Earth, ever had the impact on the planet's biomass that we had on the Bison in the late 19th century.

Seventy million were reduced to a few dozen wild Bison that survived by finding refuge in Yellowstone National Park. In 1902, twenty-three Bison eluded Yellowstone Park's efforts to capture them. Another 700 or so lived in captivity at the turn of the century. Those were all that was left of them.

Since that cold spring in 1902, the Buffalo has made a small recovery and, indeed, the origins of the American conservation movement are connected with its return. The Lacey Act of 1894, a precursor to the Endangered Species Act, made it illegal to kill Bison. In 1905, President Roosevelt helped found the American Bison Society. Protective measures were implemented, and in 1909 the National Bison Range was established in Montana. Today, more than 150,000 Bison live in private herds, on Indian reservations, and in a few parks. But only in Yellowstone have these animals always been free to roam, especially once the park committed to a policy of natural regulation in 1966, allowing Nature to take her course. Descendants of the only free-ranging Bison in the country increased their numbers to about 3500 by 1996.

This historic connection was what first attracted me to Yellowstone's wild Bison and held my attention for three decades. They were the great-great-grandchildren of the last and only wild ones. This kinship lent me abiding pleasure, a gift. I owed these animals and I had a personal stake in their survival. During the killer winter of 96-97, I visited these animals every week, bearing witness to this unprecedented twentieth century wildlife disaster.

It went something like this: Winter slammed down on Yellowstone Park early, ending wildlife grazing. In late December, snow pack measured twice the normal depth. Worse for the Bison and Elk who winter here, a rare freezing rain had blasted the high plateau with an impenetrable ice layer just before New Year. Grazing was impossible. The animals had to get out, migrate down off the plateau to lower habitats or starve. This habitat was mostly on public land outside the park, National Forest land. The Elk were welcome here, but not the Bison. The Bison would be killed for trying to cross the park boundary. Stay or leave, the Bison were dead.

The danger compounding the death inflicted by winter was a new government policy known as the Interim Bison Plan. Agreed to last summer by the US Departments of Agriculture and Interior and the state of Montana, Yellowstone National Park officials reluctantly implemented the new agreement in December 1996. Bi-

The nation's only wild free-ranging Bison herd was decimated by agencies and bureaucrats, cheered on by regional politicians, and we couldn't find a way to stop them. Of the park's estimated 3500 Bison, over 1100 were shipped to slaughter... or blown away...

son were no longer free to roam. Under the Interim Plan, all Bison that appeared to be headed across the northern park boundary were to be rounded up, captured and shipped to slaughterhouses. On the west border of Yellowstone, the wild Bison that couldn't be corralled (90% of them) were simply shot by sharpshooters of Montana's Department of Livestock.

The ostensible reason for this slaughter is a disease called brucellosis, a contagious bacterium present in both domestic animals and wildlife. The European disease was probably brought over by domestic animals, though humans can also contract it. Cattle infected with brucellosis often miscarry their first calf. Montana livestock interests are concerned about losing the state's brucellosis-free status—a threat made by the federal Animal and Plant Health Inspection Service (APHIS), a threat the Montana Department of Livestock (DOL) took very seriously. Never mind that there has never been a documented case of Bison infecting cattle with brucellosis in the wild.

The killing began in earnest in late December. Nearly every day, three or four dozen Bison were shipped to slaughter from inside the park's northern boundary. Those left in the park's interior were reduced to browsing on pine needles and bark—starvation food. On the west border, the Montana DOL shot another 200 during this brief period. Yellowstone's superintendent and the governor of Montana argued publicly about "whose Bison problem" it was. By the third week of January, the number of Bison killed by humans exceeded the previous late twentieth century record of 569 (for the winter of 1988-89). The superintendent had earlier stated with great accuracy: "If we managed AIDS the way brucellosis is being managed here, you'd be shot when you left your house."

On February 1, APHIS announced it would back off and allow some Bison on public land without stripping Montana of its disease-free status. But the state wouldn't hear it and the killing continued. Lying just north of Yellowstone Park, and arguably the Bison's worst neighbor, the Church Universal and Triumphant once again whined about gutpiles of Bison left on their private property adjacent to Yellowstone Park, even though these Buffalo had been shot by the DOL in response to the New Age cult's request. When the number of Bison dead ap-

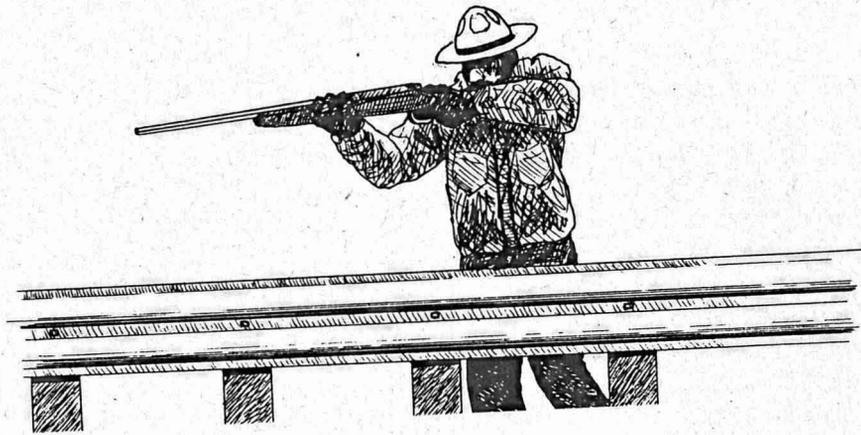
proached 800 in late January, the NPS announced a moratorium on killing. Just two weeks later, YNP's superintendent said the program of shooting and shipping to slaughter would resume with a few modifications. The park spokesperson reported that Yellowstone had no choice but to return to its policy of killing Bison. "We're between a rock and a hard place," she said. By the end of February, 1000 of Yellowstone's estimated 3500 Bison had been shot by government sharpshooters or shipped to the slaughterhouse. An aerial survey conducted on February 21 counted 1720 Bison left, meaning another 800 had starved to death with winter barely half over.

During March, Montana's DOL continued to blow away nearly all Bison crossing the western park border. Montana's chief veterinarian had made the DOL position clear: "The one thing I'm going to tell you is exposure (of wild Bison) to livestock is not a negotiating point." Of course, there were no cattle in the area and wouldn't be until June 15. The killing persisted even after APHIS, in a letter signed by heads of the Park and Forest Services, wrote Montana's governor saying tolerance for Bison would not endanger the state's brucellosis-free status. DOL shooters killed 83 more Bison after that communication, all but one on public land, including 41 bulls, which present the least threat of transmitting the disease. About the only way the bulls could contaminate a beef cow, the state veterinarian had stated, was if a Bison bull tried to breed the cow and injured her in the process. Since no cattle were in the area, precluding this most unlikely of unnatural acts, the 41 bulls died just to show, once again, that the Montana DOL could kill them anyway if they damned well pleased, with or without APHIS's blessing. The most recent aerial survey counted less than 1100 Bison.

Spring equinox arrived and the public began to tire of this muddy controversy with no apparent human heroes. As late as March 17, 1997, the press was still reporting that the issue was simply poor diseased Bison who sadly had to be killed. "Yellowstone's Bison Biting the Dust as Brucellosis Spreads," read a front-page article in the *Salt Lake Tribune*. Elsewhere, the slaughter of Yellowstone's Bison was being widely reported as a state's rights issue, portraying mismanaged federal ani-



illustrations by Martin Ring



mals invading the blameless state of Montana. By late March, a chinook blew in, the weather warmed and, although Bison continued to winter-kill within the interior of Yellowstone Park, the regional press forgot about the Bison massacre and dropped its coverage. By the end of March, we had lost more than 2500 of the estimated 3500 Yellowstone Bison. Winter up there wasn't over. Down here, in paradise, an abrupt and heavy silence lay over the land: the protests and outrage evaporated and the popular media abandoned the issue altogether.

It is now April. Winter lingers on the high plateau. The high peaks of Yellowstone Park's Absoroka Mountains, which run behind my house, are encased again in fresh hoarfrost, a terrifying white beauty with the wind chill at 12 degrees below zero. The dying continues. Combined with the natural mortality of the harsh winter, this government policy has led to the most deadly year the American Bison have faced since being slaughtered into near extinction in the late nineteenth century.

A couple observations may be appropriate here; the issues engulfing the slaughter were lost in the murk and smokescreen of brucellosis. The rights of native wildlife on public and other lands were scarcely discussed. The media culmination of the Bison issue was a town meeting on March 23 in Gardiner, MT, which was attended by three US senators and MT's governor for the sole benefit and edification of the US Secretary of Agriculture. Wildlife personnel were not present. Yellowstone's superintendent was permitted a two minute reply. The driving management forces throughout this butchery of wild animals were the Department of Agriculture's APHIS and MT's DOL—agricultural agents managing wildlife as domestic chattel, a holy war in the endless taming of the earth whose victory would be the replacement of wild America with a zoo.

Conservation groups were ineffective, though not necessarily inactive. The Fund for Animals wrote papers and threatened to file law suits; in late January the Fund took out an ad in *USA Today* calling for a tourist boycott of Montana. The Sierra Club Legal Defense Fund did file against the NPS but lost the case on appeal. Groups that do good jobs on land use seemed less directed: The Greater Yellowstone Coalition republished a color insert in their newsletter that called for allowing Bison to roam on National Forest land; and the Jackson

Hole Alliance received a \$3000 grant from Patagonia to do a Bison PSA, but they couldn't get it together in time for this winter. Cold Mountains, Cold Rivers provided invaluable and ghastly video of the slaughter which was widely viewed, especially by Native Americans. The local Bison Action Group, a tiny bunch of impoverished activists from Bozeman and Missoula, got the most press by their collective protests and for trying to douse Montana's governor with rancid Bison guts at the Gardiner meeting.

On Valentine's Day, 1997, seven conservation groups finally presented their long-term plan for handling Bison migrating out of Yellowstone National Park. The plan, presented in a letter to the governor of Montana and President Clinton, calls for the park to stop grooming the snowmobile trails that have facilitated the exodus of Bison. Outside the park, the letter suggests, the US Forest Service should allow Bison to graze public lands and APHIS should guarantee its coveted brucellosis-free status if the Bison are in a quarantine facility or on state lands. Other suggestions include a state Bison hunt and the acquisition of easements or leases from private landowners allowing Bison to use and migrate through their lands. The letter was signed by representatives from the Greater Yellowstone Coalition, Defenders of Wildlife, Natural Resources Defense Council, Sierra Club Legal Defense Fund, Intertribal Bison Cooperative, and Jackson Hole Alliance. Presumably because of the recommendation for a hunt, Fund for Animals did not sign on.

These sound recommendations came too late to make any difference. The Yellowstone Bison population had already "crashed."

For myself, I stayed put much of the winter just north of Yellowstone, making mostly ineffective phone calls to people I thought might help: many Native Americans, especially the Intertribal Bison people; I went so far as to call Russell Means, who was busy being a movie star but who said he'd make some calls. I accomplished nothing beyond my weekly travels into Yellowstone Park to visit my shaggy brothers and bear witness to their plight.

What are the implications of the Yellowstone Bison crisis for us conservationists? Each group or organization might look at their own goals and agenda and see how they did. How many animals were saved by Earth First!, the Fund for Animals, or

Defenders of Wildlife; how much ecosystem management or natural regulation was advanced by the efforts of the Jackson Hole Alliance or the Greater Yellowstone Coalition; how much support was garnered for corridor linkage by groups like the Alliance for the Wild Rockies or The Wildlands Project. That sort of thing. By every standard I can think of, we took—by what it's known as up here in Bison country—an asskicking.

We lost on every level. Eleven hundred native wild Bison were blown away for crossing an artificial boundary, in defense of an unproven threat to privately-owned domestic livestock who weren't even present on public land grazing allotments. The easy talk about restoring Grizzlies to California and Nebraska, of linking wolves from Maine to Mexico, sounds in this context like empty eco-babble. It was a major defeat handed to us by mid-level bureaucrats and local politicians leering for media attention.

Among the voices missing in loudly protesting the slaughter—the ones I noticed—were hunting groups, sportsmen, guides, those whose outrage would have been thunderous if Elk, instead of Bison, were being killed. Also noticeably silent here were the collective spokespersons of The Wildlands Project, though Dave Foreman was immensely supportive in his public lectures. A quote in the national press or a letter of protest would have been useful. Nothing much came in beyond the protests of the activists, Native Americans, and the Intertribal Bison Cooperative, Joe Gutkoski of the American Buffalo Foundation, and finally a letter to the editor of the *Livingston* paper, from George Wuerthner, a bit late, but, as usual for George, right on the money.

And accountability? Read the papers and magazines. Listen to what the bureaucrats and politicians say. Where was the Clinton-Gore White House on all this? They sound clueless on issues of American wildlife and wilderness. Why couldn't they rein in the rogue agency APHIS and why was the Agriculture Department handling wildlife issues anyway? Who advises the president? The Secretary of Interior's silence was deafening. The director of GYC reported that Secretary Babbitt had got his butt kicked once on grazing reform and, being from a ranching family, didn't want another livestock defeat. The NPS regional park spokesman talked about the need for Yellowstone to be a "good neighbor"; part of being a good neighbor, he said, was being sensitive to the APHIS threat to strip Montana of its brucellosis-free status (therefore, having won on the wolf reintroduction and the New World Mine, it was time to lose on the third issue, Bison).

At the Yellowstone Park level, the chief scientist correctly characterized the controversy as "a struggle between the park and agribusiness and we're losing badly. They did not like us winning the wolf issue and they are determined not to lose this one."

Park managers were counting heavily on public opinion to bail them out of a bad deal. They hated what they were doing but did it anyway. I think YNP officials figured no more than a hundred or so Bison might wander north out of the park

and actually end up at the slaughterhouse. The media coverage of the corralling, trucking, and butchering and subsequent public outcry would force intervention from above and thus slam the lid on the operation. A more enlightened Bison management plan could then be formulated by next winter. YNP officials miscalculated badly, and nobody could have predicted the killer winter.

The agency responsible for most of the Bison killing was the Montana Department of Livestock. Once control of wild Bison was turned over to agricultural agencies, their fate was sealed. Most intractable has been the core of the operation run by DOL, with little or no supervision, answering to none, headed up by director Larry Peterson and the state veterinarian, Clarence Sirochi. Local activists have called Sirochi "the Eichmann of Yellowstone."

Even more corrupt than the DOL, who were after all only doing their job with striking efficiency, were Montana's governor and congressmen, who got on the bandwagon only after sensing the Feds were bleeding and they could safely make political hay out of blaming the Park Service. Though not all equally of course, they did collectively aid and abet a false presentation of the brucellosis issue and a phony substitution of legitimate ranching interests by bureaucratic power brokers within the Livestock Department. All these agencies and officials, incidentally, claimed to be "caught in the middle," a most cowardly contradiction of ethical configurations.

Late this winter, livestock associations from the states of Oregon and, especially, Colorado took cheap shots at Bison through dishonest representation of a brucellosis threat. All of these people, as well as the above politicians and agencies, got off scot free. What could be done, then, to put some heat on these cold executioners and professional spit-dribblers? Perhaps a mainstream conservation group could take on the task of sorting out wildlife interests from the legitimate interests of livestock growers (neither state livestock associations nor departments of agriculture necessarily speak for regional ranchers here). The right of Bison to lead a wild bovid life on America's wildlands must be a given. Ideally, the model would be the dolphin-safe label on the tuna can. People who eat beef should have a choice beyond "organic" raised meat. This will not be easy because current packaging and labeling does not permit identification of from where or whom or how such food arrives nor if it's Bison friendly. Many cattle-raisers from the Yellowstone to the Malpais would endorse such accountability. Livestock raisers who deal responsibly with the issues of native habitats and wildlife should be rewarded, not lumped with welfare ranchers.

Finally, I don't think this is a time to merely talk conservation and ecology. I feel close enough to the legacy of Ed Abbey to believe this is not what he had in mind when he said, "Sentiment without action is the ruin of the soul." A wilderness strategy for the twenty-first century cannot be successful without fighting like hell all through the twentieth. What is called for is closer to the metaphorical equivalent of a lynch-

ing. I don't believe in lynching, but I believe in retribution appropriate to the deed. It may not be practical or positive, but there are times to lay down your imaging software and pick up a baseball bat. Or perhaps pick up the moral arms of your own choices, including, but not limited to, prayers, letters, and tomahawks in defense of native wild rights.

The ease with which the second slaughter of 1100 wild American Bison went down took all of us by surprise. How could this happen again? I believe the American Bison has never entered our consciousness as a sentient creature, but somehow lies in our history as a black hole of denial, obstacles to Manifest Destiny that we expediently slaughtered as part of the final solution to the Indian Problem, not unlike colonial cultures treated subordinate races. How else could we kill them so easily? The Yellowstone slaughter went far beyond any notion of "wildlife management" in both scale and brutality. All through this winter, officials made a point of delineating between individual Bison and the "population." Yellowstone's superintendent said that even the Secretary of Interior got it: "It's the population, stupid." The park's senior Bison biologist called the winterkill a "critical ecological need" because the Yellowstone Bison population had become "inflated." Even conservation biologists, if I read them right, subscribe to such detachment, which so facilitates extermination of undesired nonhumans or "sub"-humans. Ask Pol Pot. The ribs and pelvis of the starving Bison shot four times at the Sheridan, Wyo-

ming slaughterhouse looked like emancipation day at Auschwitz. Do My Lai and Yellowstone share this convenience? I've been both places and I think so. The lightning efficiency with which we butchered our 70 million Bison boggles the mind and lingers yet, I believe, near the heart of our flawed relationship with the American wilderness and its wild inhabitants.

We never really knew these animals. ■

Doug Peacock, inspiration for Ed Abbey's famous hero Hayduke, is a writer and naturalist and close friend of Grizzly Bears (though charged 25 times, each time he has reached an amicable truce with his would-be ursine devourers). Doug's first book, Grizzly Years, describes his quest for big bears following his return from the Vietnam War. His next book, dealing partly with the Abbey years, is due out this year.

Readers interested in learning more about Bison history, natural and human-inflicted, should read Ernest Callenbach's book *Bring Back the Buffalo* (Island Press, 1995) and *Bison: Distant Thunder* by Douglas Gruenau with a preface by Doug Peacock (Takarajima Books, 1995).

To assist in efforts to protect the Bison, contact Stan Wilson, Bison Action Group, POB 7326, Bozeman, MT 59771; 406-586-9141.



illustration by Martin Ring

MORE THOUGHTS ON DECONSTRUCTION AND DEVELOPMENT
(AND OXYMORONS AND DECONSTRUCTING OXYMORONS...)

All Kinds of Cubbyholes

I consider myself a friend of Dave Foreman, and so I am not happy to be in disagreement with his editorial, "All Kinds of Wilderness Foes" (winter 1996/97). I hope that he and *Wild Earth* readers will understand that I disagree both reluctantly and in a proper convivial spirit.

What I object to in that editorial are its dualism and its categorizing of "wilderness foes." The second problem proceeds directly from the first. If to start with we separate the wild world and human beings, then we may logically go on to classify human beings as friends and enemies, and further to sort the enemies into several unflattering "cubbyholes." Finally we end up with a system of divisions and disconnections in no way different from that of "scientific" industrialism.

Is it an established fact that humans, *any* humans, can live apart from wild creatures? Dave Foreman holds that some can, and to that effect he quotes Aldo Leopold: "There are some who can live without wild things, and some

who cannot." This sentence, quoted alone, raises a problem that it does not solve. From my own reading of Leopold, I think the sentence means that some can live without appreciating wild creatures and wild places, and this evidently is true. That humans literally can live without wild things—wild forests, wild oceans, the weather, the wild creatures who populate our soils and intestines, etc.—has yet to be demonstrated.

More troubling is Dave's quotation from Bob Marshall. I have not read Bob Marshall, and so I can only take the two quoted sentences at face value. They say that one reason to preserve "undefiled panoramas" is "the overpowering desire to escape periodically from the clutches of mechanistic civilization," and further that, having so escaped, we may enjoy not only solitude and natural beauty, but "complete independence" as well. This, on its face, is the old dualism of humanity and nature in its rawest and simplest form. The danger here is that to affirm the validity of this escape as "the most important passion of life" is implicitly to affirm and grant validity to the mechanistic civilization that one needs to escape from; it is to say that we need wilderness *because* we have a mechanistic

civilization that some people find intolerable.

This raises a most urgent question: What is the appropriate response to an intolerable civilization? There may be some merit to the proposition that we need occasionally to escape from it (though that raises further questions, as I will show). But surely we also are obliged to change our civilization into one that is tolerable. For if we *merely* escape then while we are gone the intolerable civilization grows larger, and when we need to escape again we find there is less room in which to do so. If we understand the need to change our civilization (our lives) then we will have to undertake the improvement of local economies (farming, forestry, banking, manufacturing, etc.) and promote projects to reduce and finally eradicate all forms of pollution.

But is "escape" actually possible? The only honest answer is no. There is no wilderness area now that is free of the influences of our mechanistic civilization. And how might one achieve "complete independence" in any wilderness at any time? Modern hikers and paddlers go into the wilderness by courtesy of highways, airlines, nylon and other synthetic fabrics, "space age" metals and alloys, gas stoves, packaged food, etc.—all products of



the mechanistic civilization these wilderness lovers are escaping from. To be completely independent in the wilderness would require a local economy capable of providing food, clothing, shelter, cooking vessels, weapons, and other necessities. And then of course "the wilderness" would no longer be "wild" in the modern sense, but a place also of human domesticity.

In fact, no boundary or division can be drawn between humanity and nature, any more than between humanity and culture. Dave's reference to the Pilgrims is a case in point: "As soon as they stepped off Plymouth Rock, the Pilgrims drew back, afraid of the wilderness howling around them." Though nobody could argue that the Pilgrims were exemplary members of their American ecosystem, Dave's sentence is historically incorrect. According to Howard S. Russell (*A Long, Deep Furrow: Three Centuries of Farming in New England*) the Pilgrims did not at first confront a howling wilderness:

If any single factor proved the key to the eventual success of the Pilgrim enterprise, it was that their exploring party found at Plymouth...a tract of tree-cleared hillside, long farmed, but whose numerous farmer cultivators had been completely swept away by a recent pestilence.

The people of the Mayflower were taught to use those old fields by an English-speaking Indian named Squanto. They planted 26 acres, mostly in maize, and thus were able to survive. Human civilizations, though they certainly need to adapt themselves to the nature of their places, do not arise from nature; they arise, however perversely or adversely, from other civilizations. The preeminent question is not how to escape either civilization or nature, for no such thing is possible, but how to fit the two together so that no escapes are needed.

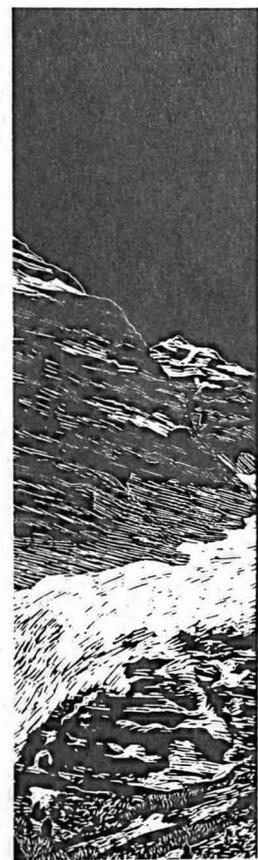
What, then, is one to make of Dave's cubbyholes for wilderness foes? This is not an easy question. I agree readily that if you have opponents you had better study and know them. And I confess that I am good at antipathy and understand very well the temptation to categorize and belittle opponents by name-calling.

But what is the result of this? It can only be to divide and isolate conservationists in their own cubbyhole of feckless and dishonest self-righteousness—dishonest because all of us are guilty; I, at least, do not know a soul who is not in some ways depending on, patronizing, and abetting our mechanistic civilization.

What conservationists desperately need are alliances between themselves and people with whom they only partly agree. One of the biggest tragedies of this century, for example, has been the failure of conservationists and the rural population to occupy the common ground that exists between them. Instead of coming out united against the corporations that are everywhere destroying *both* the wild things and places and the possibility of small-scale local economies, they have sat yelping in their cubbyholes, relishing their useless animosities while losing what they thought they were defending.

I suggest, in defiance of human nature, that we have got to learn to think of our foes as potential friends—or even as potential half-friends. What is suggested by the possibility that the same person might be *both* a rancher and a conservationist? Or *both* a conservationist and an "environmentalist"? What might be the results of a bona fide wise use movement among conservationists? What then would be meant by "wise"? The trouble with cubbyholes is that they preserve the illusion of innocence, obscure sight, and prevent thought.

—Wendell Berry,
Lanes Landing Farm, Port Royal, Kentucky 40058



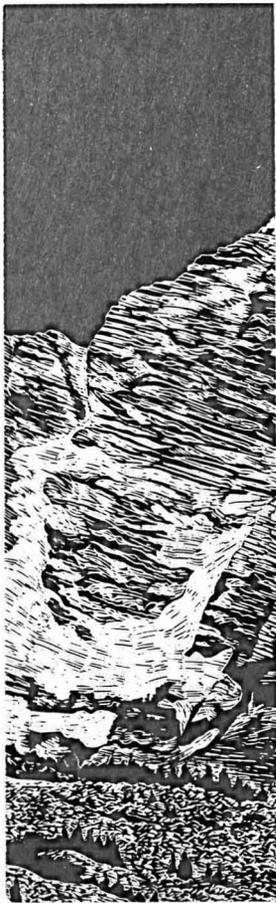
Maintaining the Naturalist Tradition

The winter issue of *Wild Earth* is remarkable. I want to send it to all my acquaintances.

I think Don Waller's article is especially on target. I liked his statement that "the chief proponents of wilderness have been expert naturalists who draw on their intimate familiarity with the subtlety and nuance of natural systems." Remember the quote from my father: "...we might get better advice from economists and philosophers if we gave them a truer picture of the biotic mechanism." (1940!)

Once again I see my father not "passing the buck" but taking responsibility for the problem.

—Nina Leopold Bradley, Aldo Leopold Foundation, Inc., E12919 Levee Rd., Baraboo, WI 53913



Deconstruction and the Third Reich

The articles in the winter 1996/97 issue of *Wild Earth* rebutting the deconstructionist assault on wilderness by William Cronon and his colleagues were excellent reading, and they properly skewered the philological parlor tricks and semantic goofing off that underpin most of the deconstructionists' case. However, Gary Snyder made what was for me the key point: that wilderness, whatever other values it has to humans, is first and foremost living space for non-human beings; that is the most important reason for preserving it. Snyder's humorous example of applying the anti-wilderness deconstructionist rhetoric to human politics—how a deconstructionist might solve race relations problems by trivializing them

into non-existence—was intended, I think, to be hypothetical. Of course, Snyder says, "critical theorists don't talk this way when it comes to fellow human beings..." But maybe they would. Maybe they already have...

To begin with, take the thread in many postmodern anti-wilderness writings that preserving tiny fragments of ecosystems and biodiversity is as good as having true wilderness—the "theme park" approach. In an earlier *Wild Earth* article (Flowers 1992), I noted what I thought were some uncomfortably close parallels between the Third Reich assault on non-Aryan races and the modern assault on non-human species. Both now and 50 years ago, *Living Space* (*Lebensraum* it was called back then) has been sold as the ultimate solution to social problems. The modern claim that humans have a right to every square inch of the planet is a grandiose update of the earlier dogma that Germanic people had a right to every nook and cranny of Europe. As we take over more and more land, the fate of the non-human inhabitants usually parallels the doom of the millions of Russians, Jews, Slavs, and other non-German populations that lived in the path of Nazi "development" during World War II.

The idea of managed theme park as substitute for wilderness, is meant to reassure the public that nothing really terrible is happening to non-human

life, while allowing extermination to continue full-blast in places safely out of public view. In the initial phases of the Final Solution, the Nazis also used the "theme park" ploy as part of their effort at cultivating and tranquilizing world opinion. The Theresienstadt Concentration Camp was their "theme-park camp" where Jewish artisans and craftsmen, among others, were housed and given some minimal encouragement for self-expression. Living conditions were somewhat more humane than elsewhere in Himmler's empire. When rumors and complaints about what was happening to Europe's Jews reached annoying levels, Nazis would run Red Cross representatives and other selected dignitaries through a guided tour of Theresienstadt, thus "proving" that nothing particularly awful was going on. Today, all the well-produced nature shows on television make it easy to believe that wilderness is doing fine, but every "compromise" that offers to protect a tiny "natural" area in return for the right to develop/destroy much larger areas should remind us of Theresienstadt.

Dave Foreman and the other *Wild Earth* contributors are correct to be concerned about the wilderness deconstruction fad undermining our efforts. However, we should not be gulled into believing that Cronon, Alston Chase, and the rest of the deconstructors have some

irrefutable method of analysis that is beyond questioning. While we can spot the problems with the deconstruction of wilderness, most of us in the environmental movement are not familiar enough with the humanities to evaluate the ideology of deconstruction on its own ground. Since the late 1960s, deconstruction has taken over literary criticism and a good part of sociology in much the same way that genetic engineering has swamped academic biology. But even on its home turf of literary critical theory, deconstruction has run into serious trouble. In the late 1980s a series of revelations about two of the men whose philosophical writings underpin deconstructionism rocked the world of literary criticism: Paul de Man was revealed to have written anti-Semitic articles for collaborationist magazines in the early 1940s, and during the same period Martin Heidegger apparently aligned himself philosophically with National Socialism to a much greater degree than previously acknowledged. Very embarrassing to their many disciples, but do these and other dubious wartime activities (like one postmodern critic's having served in the Waffen SS) invalidate deconstructionism itself as a philosophy? In a strongly argued book, *The Deconstruction of Literature: Criticism after Auschwitz*, David H. Hirsch (1991) has claimed that the

postmodernist/deconstructionist paradigm was spawned in an intellectual milieu of National Socialism, and since then has served the goals of covering up the past of some of its founders, and of "reinterpreting" the recent past so that we will not look too closely at how European "high culture" proved completely unable or unwilling to respond to the Nazi horrors. Hirsch charges that those enamored with deconstruction are "pursuing obscurantist philosophies that have been implicated in twentieth-century disasters, philosophies that have subsequently shown no capacity to cope with their own complicity in human destructive impulses" (Hirsch 1991:165). Gary Snyder's humorous example of deconstruction applied to human politics is not so hypothetical, as Hirsch shows. One of the letters of Derrida (among the deconstructionists mentioned in George Sessions's article) excusing de Man's anti-Semitism has Hirsch concluding, "...it comes as no surprise to see him demonstrate that silence is not really silence but a scream of anguish; that concealment is actually confession; that lying is a higher form of truth-telling; that anti-Semitic statements turn out under close scrutiny to be philo-Semitic utterances in disguise; that being a collaborator with the Nazis is not very much different from being a resistance fighter against the Nazis; that those who are repelled

by de Man's collaboration with the Nazis are actually Nazis themselves; and that any one who does not accept these Derridean subtleties is a simpleton" (Hirsch 1991:81). One can see the attractions that deconstruction ideology might have to someone who wants to convince us that clearcutting is conservation; that civilization is wilderness; that extinction is biodiversity; that Big Sugar is a friend of the Everglades; that Charlie Hurwitz is John Muir reincarnated...

I suspect that Cronon, Chase and the others—including the many deconstruction fans in the humanities—may be honestly unaware of the dark side of their shiny new toy. Nevertheless, it is quite ironic that an ideology so closely connected with one holocaust is now being used to excuse another.

Citations:

Flowers, R.W. 1992. Night and fog: the backlash against the Endangered Species Act. *Wild Earth* 2:6-9.
 Hirsch, D.H. 1991. The deconstruction of literature: criticism after Auschwitz. Brown University Press, Hanover. 314+xpp.

—R.W. Flowers, 3250 Apollo Trl., Tallahassee, FL 32308-1902



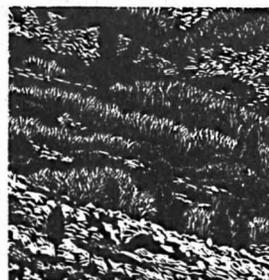
**Deconstructionists:
A Cultural Construct?**

Thanks for your thoughtfully compiled response to wilderness deconstruction (winter 96/97). I recently learned from friends within academia that the style of thinking inherent in Cronon and crew's arguments is all the rage in departments of humanities and social sciences on many campuses.

That those attempting to construct a liberal, intellectualized form of wise-use willingly call themselves deconstructionists is so appropriate as to be almost amusing. What I'm wondering about is the postmodern part. How can a Disneyland-friendly bunch of simulacra devotees be postmodern?

I'm somewhat consoled by the possibility that they don't even exist but are merely a cultural construct. However, since *Wild Earth* spent most of its winter issue responding to their nonsense, maybe they do exist. Hmm. Whatever, it's all relative, right? Well, perhaps not.

Wilderness is no more an intellectual construct, romantic notion, or fad than is gravity. This becomes clear when we relieve wilderness of its all too heavy



cultural baggage, allowing it to stretch out and loosen up. What comes forth is land (and sea) that manifests its own order. This is an observable condition whose clear physical presence, like that of a whale rising from the sea, gets muddled and diminished when reduced to an idea. Since it is not an invention, it cannot be reinvented.

All that we do and advocate as wilderness activists needs to stem from Dave Foreman's simple and direct definition of wilderness in "Around the Campfire": "land beyond human control." It not only provides a good basic premise from which to respond to the heady utterances of virtual philosophy, it forces us to address the whole issue of control and the structuring of a human identity at peace with wilderness.

"Beyond human control" is also an essential reference for reflecting upon our own conservation strategies. What follows is that "wilderness management" and "ecosystem management" are just as much oxymorons as "sustainable development." Wilderness should truly be a big blank spot on the map.

Large areas of earth left completely to their own self-order is what defines and affords meaning to all wild life, including humans. As your respondents to Cronon so aptly point out, the more-than-human cannot flourish without wild lands, and, as Wayland Drew states in "Killing Wilderness," a 1972 essay,

"wilderness is the sole index by which we can measure the extent of our own subjugation to unnatural forces."

The great tragedy is that there is so little wilderness, and it is so endangered and in need of defense. That an academic clique is now perpetuating itself by gnawing at the roots of wilderness, adding to the onslaught, is unfortunate. If they must chew on tough intellectual matters to keep their dendrites from growing through their skulls, why not pick a burgeoning alien species devouring wild habitat due to a lack of predation, rather than an endangered one like wilderness. Progress, resourceism, economic growth, and unbridled human reproduction, to name a few, ought to provide ample abrasion.

—Kraig Klungness,
POB 516, Houghton, MI
49931



Reclaim "Development"

While agreeing with the general thrust and many of the specifics of Dave Foreman's "Around the Campfire" in the winter *Wild Earth*, as someone who has devoted his life to championing biodiversity conservation *and* sustainable development, I do have to take exception to his demonizing what he calls the "ideology" of the latter. Granted that the term "sustainable development" has been misappropriated, for purposes of greenwashing, by all kinds of people neither Dave nor I would want much truck with, but why compound the problem by acquiescing to their erroneous definition of "development"?

"Development," the common usage of too many county commissioners, economists, and Wise Use stooges notwithstanding, does not necessarily involve measurable growth of anything. Much less does it necessarily involve tearing up the natural world. Conservationists would do everyone a service by aggressively reclaiming the word for application to human beings and institutions, rather than just material wealth and infrastructure.

There is not even necessarily an anti-conservation bias in the routinely abused term "economic development." (Unless one thinks the present distribution of material wealth in the world is just right.) One of the reasons I work for a form of economic development which I innocently

referred to as "sustainable" development before the term got co-opted is the obvious one—people need it. The other reason is that without it some of the biodiversity conservation areas I care most about haven't a chance.

Perhaps part of our problem is the lack of a commonly accepted definition of "sustainable development." With that in mind, let me explain what I mean by it, and what ANAI is promoting in some of the economically poorest and biologically richest parts of Costa Rica and Panama:

1. The notion of sustainable development implies that while we humans need to alter some portion of the planet to meet our particular needs, this should not be confused with a justification for the unending growth of population and infrastructure.

2. It involves the very old conservation idea that some of the things most useful, enjoyable or convenient for humans (protection of drinking water supplies, avoidance of catastrophic damage by floods, natural thermoregulation, etc.) are best developed by minimizing modification of natural systems.

3. It asks that when we must alter the landscape, we do so in ways that minimize on and off-site environmental consequences. For example, whatever it may not be, an agroforestry plantation is superior to a pasture in terms of soil conservation, corridor uses, etc.

4. It implies a concept

of limits. While it is politically impossible, in the short run, to sell the concept of "too much" to a person who has never had enough (and who is fully aware of what you and I have) we First Worlders can at least stake out the ethical position that, beyond a certain point, accumulation of material wealth is a *bad* thing, because it necessarily leads to the loss of things more valuable.

5. Above all, what I have always thought of as sustainable development avoids the mistake I think Dave made, of only looking outward. "Development" is not just something that's *done to* whatever raw material (such as your local ecosystem); it is first and foremost a human process. I have this argument all the time where I live in the US, not always in a natural systems context. Why is building a factory or a highway development while improving the quality of education in our schools is not? Is it because someone, consciously or not, is misdefining the word?

6. Taking a "bottom line" approach, and without getting into the question of the rights of other beings, the sustainability position argues that unsustainable development is not development at all. To use a simple example, suppose we open a mine and thereby create jobs and material goods for some years but, in the process, sterilize land, pollute rivers, reduce biodiversity, eliminate educational resources (= natural systems) for the

future, and create social problems. You don't have to deny the benefits (jobs and products) to make the case that no *net* development has occurred. Rather, something opposite to development has happened. Sustainable development produces net benefits on a long-term basis.

If we equate development with measurable growth, then Dave is right—sustainable development is an oxymoron. It doesn't take much intellectual effort to realize that nothing can get bigger forever. But sustainable development imagines a process whereby we can get *better* forever. Who can imagine a person, an institution, a community or even an economy so perfect it couldn't be made better? If our future economy could be made more compatible with maintenance of biodiversity than the present one, would you be willing to say it had "developed"?

Dave Foreman has been a leader in pointing out some of the traps that are set by the anti-conservation forces, as for example in trying to pit hunters against the rest of us. I hadn't considered the co-optation of the term "sustainable development" to be a parallel case, but it looks like it may be. So, in the spirit of inclusion which has characterized some of Dave's recent writings, I would ask biodiversity conservationists and wilderness advocates to not waste their time building walls against development workers.

Beyond that, for anyone who has not had the opportunity to live with poor people, I would ask you to consider the probability that there is absolutely no way to achieve sustainable biodiversity conservation in most of the world without simultaneously working for truly sustainable development.

—Bill McLarney, Co-Director, Association ANAI, 1176 Bryson City Rd., Franklin, NC 28734



Manage Managers, Not Wilderness

Having spent much of my working life as a manager and management consultant, I know that managers feel compelled to manage. Thus Sarah Vonhof in "Green Confusion" (winter 1996/97), a recent graduate in Forest Resources Management, offers a plan for wilderness management, an oxymoron. A Wilderness Area is not a Forest Resource.

In true management style, she carves chunks out of hard-won Wilderness Areas, creating "outer cores" and "buffer zones" which would no longer be wilderness. The Forest Service wants to save it by cutting old growth. Sarah Vonhof wants to save it by zoning.

We managers can set up shop just outside the boundaries. Here we can post our rules and registers, intercept motorized vehicles, and give advice to backpackers and skiers. But don't let us inside. Once managers are allowed to invade, we can't be stopped.

Many car-accessible campgrounds are just outside Wilderness Areas. From them people make day hikes inside the boundary. They seldom venture far, and the experience makes them a useful constituency. But I would not sacrifice one acre of a Wilderness Area for such a campground. It would inevitably spread.

In establishing the Adirondack Park, the New York State constitution

barred managers with a simple provision: "forever wild." That says it all. A Wilderness Area is not a state of mind, a philosophy, or a concept. It is a place with metes and bounds and a legal status. Let the arguing be done in the years of struggle as we try to keep the road builders, tree cutters, and developers out of the region we wish to save. We never win enough, but when we have won, when a wilderness becomes a Wilderness Area, let it be!

—John Perry, 116 South Lake Florence Dr., Winter Haven, FL 33884
[Editor's note: *Hallelujah!*]

Campfire Roasted Too Many

Bravo to Dave Foreman for trying to set the record straight on exactly who are the enemies of wilderness. Unfortunately, by the time he's done, it doesn't look like wilderness has any friends at all.

Everyone turns out to be on the other side. Some of these characters are our friends! I wish he'd been a bit more careful in his generalizing.

For example, Dave says that Bob Gottlieb wants to "subsume conservation in human-oriented environmentalism." I don't think that's what he wants to do at all. He wants the wilderness preservation movement to seek new alliances with working class environmental movements. His alternate history, from Alice Hamilton through Lois Gibbs, is not presented in opposition to the history

of wilderness concern but in parallel. He's a good guy. He does care about wilderness, and believes it is important for all of us. It's just that the connection between the wild and the toxic backyard needs to be developed to deepen, not water down, the movement as a whole.

Remember how Gottlieb begins his book *Forcing the Spring* by putting forth Bob Marshall as the ideal environmentalist: a wilderness advocate who wanted to preserve nature *for the people*, meaning people from all walks of life, not just the elite great white hunters who began the American environmental movement. This is confirmed by Michael P. Cohen's famous "The Bob" article (in *Wilderness Tapestry*, ed. Mikel Vause, University of Nevada Press 1993; one of the funniest, most surprising articles ever written about an eco-hero). Marshall was a rich city kid, but he knew wilderness was important for itself, and for all of us.

So I think Dave should have given Gottlieb more credit. He's done his homework, and he wants to work with us. He's no Cronon.

Similarly, Foreman ought to be more careful dissing Dennis Martinez and Ram Guha. Both would take him to task for claiming that they "trumpet the notion of the Noble Savage." Martinez has written that native americans have "no word for wilderness," but that's probably true. We are the culture that has come to the point of recog-

nizing the value of wilderness, because we have destroyed the land, not them. As Foreman so aptly quoted Bob Marshall, some of us have an "overpowering desire to escape *periodically* from the clutches of mechanistic civilization." That suggests the value of taking *vacations* in the wild, not directly addressing the concerns of those who might live all the time in wild places. So we have an obligation to save what little wild country remains, but we ought to frame this in a way that is compatible with native people's evolving interest in gaining new responsible control over some of their former lands. Martinez is no casino-monger! A model of a culture that can live closer to nature is an inspiring one for our time—what can you have against the picture of Indians catching salmon the old way?

As to Guha, I think it is important to recognize that wilderness as we know and love it is an American concept. India has a different set of problems, as even the foothills of the Himalaya are densely populated and people have lived close to the land for centuries. Sure there are too many of them today, and there is massive deforestation and erosion. Some areas will need to be closed off to human presence. But this will involve much more relocation of people than a similar act in the US. This aspect of wilderness preservation in India is akin to the relocation that giant hydrodevelopment projects

require! Something to think about. If we export wilderness as an unequivocal idea over there, it is another form of American imperialism. We should be smarter than this, and recognize that what is right in our country may need some finessing in other parts of the world. Note that Guha is not against the preservation of wilderness in the US, but only warns of the export of our cultural norm elsewhere. Even in India, he does not deny the importance of protecting wild country (he and I are co-organizing a meeting on the subject in Bangalore as part of the Sixth World Wilderness Congress this October), but only points out that in a country as densely populated as India, there are problems that North Americans often overlook.

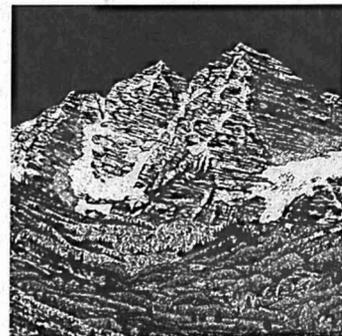
As to Cronon, I think Foreman is right on. Here is someone who should know better, who *claims* that "wilderness is his religion" [in *Environmental History* Vol. 1, no. 1]. Someone with as much learning and authority as Cronon should take the time to realize that the concepts of wilderness and environmentalism both have a detailed history, a history he decided not to investigate before he started to make his pronouncements. But perhaps there is hope: Another one of our prophets, Aldo Leopold, began his life in the wild as a hunter and a game warden, dedicated to the eradication of nasty predators. Then one day he saw the fierce green fire and he vowed to kill no more

wolves. His attitude toward the wild *changed* from management into awe. We can only hope Cronon will make the same leap sometime, from academic naysaying to constructive support.

And I hope Dave Foreman can make the leap from shock attacks to positive collaboration. He ought to think seriously about this as he works on his much-anticipated book, *The War Against Nature*, especially if he is interested in *convincing* some of these people that wilderness does matter. It is definitely *not* true that some people can live without wildness and some cannot. All of us need the wild. Some just require more convincing than others.

At the same time, we must remember who our friends are, and tolerate some difference in emphasis and approach.

—David Rothenberg,
editor, Terra Nova,
Cullimore 501, New Jersey
Institute of Technology,
Newark, NJ 07102



Maroon Bells by Evan Cantor

More Threatened Eastern Old Growth *Part 1*

by Mary Byrd Davis

The publicity accorded to old-growth forest in recent years has not halted its destruction. The sites listed below are only a sampling of currently threatened old growth. Many of the National Forests in the East are in the process of revising their management plans; and, until these plans are complete, all old growth without formal protection in these forests is threatened. Invasive non-native species, particularly alien insects and pathogens, may be the biggest danger to old growth. To learn about this problem, read "Exotic Pests of American Forests" by Faith Thompson Campbell in the Winter 1993/94 *Wild Earth* and her forthcoming *Wild Earth* paper. See *Wild Earth*, fall 1995, winter 1996/97, and spring 1997 for background information on several of the sites mentioned below. Here we will briefly describe some of the most immediately threatened old growth; next issue we will cover additional imperiled old-growth sites.

CANADA

Old-growth boreal forest in the Christmas Mountains of New Brunswick is presumably still slated for clearcutting this summer, but Avenor's buyout of Repap, the company authorized to do the logging, is incomplete (*WE* spring 1997). In western Quebec, Tembec is moving ahead with construction of a mill that will cut primary Northern White-cedar from Témiscaming Forest (*WE* winter 1996/97). In Ontario, the 1997 plans for logging old-growth Red and White Pine in Ontario's Temagami wilderness were to be released in April (*WE* winter 1996/97). Opposition to all three projects will continue.¹

Logging is still allowed in much of Algonquin Provincial Park, and 90% of the park has been logged to some degree during the past 120 years. Some of the remaining 10% is protected in designated areas. Conservationists are trying to identify and protect the other unlogged stands (hemlock, basswood, Yellow Birch, Black Cherry, Red Spruce...). (They are also working to gain support for the park's Timber Wolves. Only 50% of the wolves' range is protected within park boundaries, and they are often trapped or shot when they leave the park.)



The Algoma Highlands of Ontario, crown land about a hundred kilometers north of Michigan's Sault Sainte Marie, are under threat of logging. According to a pending plan, 75% of a 70,000-hectare mixed White Pine, Yellow Birch, Sugar Maple forest, recommended for protection by conservationists and an independent government-appointed commission, would be logged. About 70% of the forest has never been cut. The Ministry of Natural Resources must complete an environmental assessment before logging can begin and, because of public outrage, has delayed the process for a year. Conservationists are trying to maintain the pressure. Letters to Premier Mike Harris, Legislature Building, Queen's Park, Toronto, Ontario, Canada M7A 1W3 would be helpful.²

NORTHEASTERN US

An indirect but major threat has arisen in New York. The 6 million acre Adirondack State Park, a mixture of public and private land, contains at least 200,000 acres of old growth. Recently Marylou Whitney submitted to the Adirondack Park Agency a request to subdivide 15,000 acres of her family's 51,000-acre estate. The Whitney Estate contains no known old growth, but is at the heart of the proposed Oswegatchie (Bob Marshall) Great Wilderness, which would include extensive old growth. Creation of lake-side estates and a hotel on the Whitney's 15,000 acres would wreck plans for the wilderness and could accelerate the fragmentation of the

park. Conservationists should urge Governor George Pataki (Executive Chamber, New York State Capitol, Albany, NY 12224) to follow up on his promise to try to buy the Whitney Estate and to ask the Park Agency to require a master plan for the entire Whitney property before discussing the proposed subdivision.³

In western Pennsylvania conservationists are fighting a 5000-acre timber sale, Mortality II, on Allegheny National Forest. According to the US Forest Service (FS), logging will heal damage caused by drought, disease, and insects. The Allegheny Defense Project disagrees. Among the project's complaints is that the FS is cutting to the border of the never-logged Tionesta area and also felling an old-growth stand, dropped from the National Forest's first old-growth protection plan. According to the initial plan, the FS set aside at least 5% of each management area as existing or future old growth. In 1995, it created a new old-growth plan based on landscape corridors that link core areas and mostly follow waterways. Unfortunately, the corridors are narrower than conservation biologists recommend—less than one mile wide in many cases—and are broken by numerous private holdings. Establishment of the new plan resulted in the declassification of the old growth protected in the initial plan.⁴

Officials of White Mountain National Forest in New Hampshire have issued a decision to log in the Kearsarge North Area, although not in the buffer of the Shingle Pond old growth (WE winter 1991/92). RESTORE: The North Woods will appeal.⁵ In Massachusetts conservationists have learned that the Massachusetts Department of Environmental Management's promise to protect the old growth on Mount Wachusett is no guarantee—work on snow-making equipment recently damaged the old growth (WE winter 1991/92).⁶ In Delaware the 80-acre Mudstone Branch and the 25-acre Scarborough Road old-growth sites are still slated for logging (WE fall 1995).⁷

MIDWEST

Last December, Minnesota conservationists, using a variety of tactics, caused the FS to suspend logging of the Little Alfie Timber Sale in the LaCroix District of Superior National Forest. Little Alfie is a 100-acre Red and White Pine old-growth tract. The sale, like 38 others later suspended, was found not to meet federal requirements for environmental assessments. The FS is preparing new assessments, and in March announced scoping for another sale in Little Alfie.⁸

Also in the LaCroix District, the proposed Coldsprings II sale would entail clearcutting 770 acres of forest that is, according to the FS, likely to be primary and is on or near the border of the Boundary Waters Wilderness. Sales under preparation in the Laurentian District include Beaver River and Greenwood, areas also likely to be primary forest. Both sales would entail logging lowland Black Spruce (551 acres and 750 acres respectively), good habitat for Snowshoe Hare and for the Lynx that prey on them. Superior National Forest has never been field inventoried to identify primary forest.⁹

CENTRAL HARDWOODS

In Ohio, Ohio Valley Mining Company has filed for a permit to mine underground near the 45 plus acres of old-growth mixed mesophytic forest that constitute Dysart Woods. Ohio State University owns the woods and Dysart Farm within which the woods are located. The university is looking into whether the mining would encroach on Dysart Woods' buffer and will try to buy private land to protect the woods if need be.¹⁰

The Pierce Downer's Heritage Alliance in Downer's Grove, Illinois, is fighting to save 8 acres of oak savanna on upland loam soil, an extremely rare type of savanna.¹¹ The 8 acres adjoin the Lyman Woods preserve, which includes 18 acres of upland loam savanna that have never been grazed or otherwise disturbed. The savanna in dispute is owned by a hospital that wants to clearcut it as part of its construction of a "wellness center." Letters area needed to Mayor Betty Cheever, Downers Grove Civic Center, 801 Burlington Ave., Downers Grove, IL 60515; President Richard R. Risk, Advocate Health Care, 2025 Windsor Drive, Oak Brook, IL 60521; and President David McConkey, Good Samaritan Hospital, 3815 Highland Ave., Downers Grove, IL 60515.¹²

The Missouri Highway Department still plans to build a road through St. Louis County's Creve Coeur Park (WE fall 1995). The land destroyed would include 25 acres of old-growth oak (WE fall 1995). The Sierra Club has filed suit.¹³

SOUTHEAST

In November Steven Krichbaum filed suit against the US Forest Service to prevent logging of the Hematite Timber Sale in the James River District of Virginia's George Washington National Forest, which he now believes contains 20 acres of old growth (WE winter 1996/97). Krichbaum is also trying to stop the Hiner Hollow Timber Sale on the western slope of Shenandoah Mountain in the Deerfield District. According to FS statistics, four 20-25-acre stream-side units of dry-mesic oak forest that were proposed for cutting are at least 130 years old. After an agency ecologist found two of them to be old growth, FS withdrew them; but the agency is still planning to log the other two, which Krichbaum believes to be old growth also. Using the National Environmental Policy Act and, in regard to the Indiana Bat, the Endangered Species Act, he has filed a 60-day notice of intent to sue.¹⁴

Pickem Mountain, in Jefferson NF in southwestern Virginia, is a 700-acre old-growth site with mixed mesophytic and Chestnut Oak-Pitch Pine forest. In 1996 the Forest Service initiated scoping for three timber sales—Clear Creek, Machine Creek, Burns Creek—which include two helicopter cutting units in the Pickem Mountain old growth. The environmental assessment will be released this fall.¹⁵

The US Marine Corps plans to construct at its Quantico Base in Virginia a large Manpower Center and parking area amidst 15 acres of old growth. The old growth, slated to be partially logged, is across a road from a wetland that supports

Bald Eagles. The National Planning Commission and the Environmental Protection Agency recommended that another site be found on the 60,000-acre base. Phone calls to the base to learn the status of the project were not returned.¹⁶

Mining has long threatened a Kentucky forest containing 260 acres of mixed mesophytic old growth, Lilley Cornett Woods. Ironically, the state-owned land, used for research by Eastern Kentucky University (EKU), was originally purchased and protected by a coal miner. Two companies own rights to the coal underneath the woods: Enterprise Coal Co. and DLX Inc. EKU recently asked the state's Heritage Land Conservation Fund to buy Enterprise's mineral rights; DLX, which was refused a mining permit, is suing the state for a taking.¹⁷

As we write, two timber sales in the Redbird District of Daniel Boone National Forest threaten confirmed or likely old growth. The Cawood Sale would cut along the edge of 100 acres of class B old growth, within a 1000-acre watershed that The Nature Conservancy and the Kentucky State Nature Preserves Commission have recommended for protection.¹⁸ The Bowmen's Creek Sale includes a mountainside with likely old growth that is 80% mature beech.¹⁹ The Nature Preserves Commission recommended that the FS, in revising its management plan for the Daniel Boone, protect 53 specific sites, many of which contain older forest; some have now been logged.

Two proposed timber sales in the Watauga District of Tennessee's Cherokee National Forest currently threaten old growth: Iron Mountain with class two old growth and Slide Hollow, with class two or three old growth, very near an area classified as roadless in the past. The organization Cherokee Forest Voices is looking for areas of old growth and using the results of its surveys to fight forest destruction.²⁰

The movement of chip mills into the South makes likely the cutting on a massive scale of old growth in Arkansas and Oklahoma. In Arkansas much of the old growth is comprised of small trees growing in thin soil on steep slopes—forests previously considered "uneconomic" to log, but attractive to the mills. In Oklahoma ancient Cross Timbers forest and savanna are in the same category. Mills are in operation already in Arkansas, one of them at Van Buren on the Arkansas River, close to the Oklahoma border; and Guthrie Wood Fiber is considering building a mill near Tulsa in the heart of Post Oak territory. The Arkansas Natural Heritage Commission has been unable to determine where in Arkansas logging for the mills is taking place²¹; and conservationists whom *Wild Earth* contacted had little information on old growth. The extent of logging of ancient forest in Oklahoma at this time is also not known, although Post Oak is apparently already being chipped. The Arkansas Watershed Alliance is working to pass chip mill legislation in Arkansas, and, with the multi-state Dogwood Alliance, is asking the Environmental Protection Agency to draw up an environmental impact statement on the cumulative impact of the mills in the South.²² |

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National Park Service Prescribed Fire in the Post-Yellowstone Era *part two*

by Robert Hunter Jones

INTRODUCTION

In the first section of this report (Wild Earth, fall '96) we looked at the prescribed fire program in Sequoia National Park, with a particular focus on the Mineral King Project, a five-year, 24,000-acre prescribed fire experiment meant to test the feasibility of large-scale prescribed burns within our National Parks. We will have an update on the relative success of that program in a later section of this report. In part two we take a close look at the Matthes Fire, a prescribed natural fire that went awry at Grand Canyon National Park in the summer of 1995. This focus is part of a larger look at the prescribed fire program at Grand Canyon in particular, and the struggle to reform national fire policy in general. This section ends with a discussion of these issues with Bruce Babbitt, Secretary of the Interior.

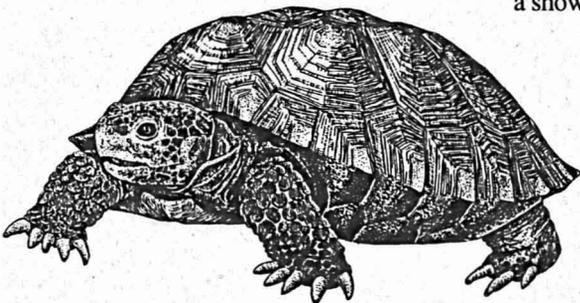
*You cannot fight fire
as we do and not
love this shift. You
cannot know fire as
we do and not be
acutely aware of the
stupidity of what we
are doing.*

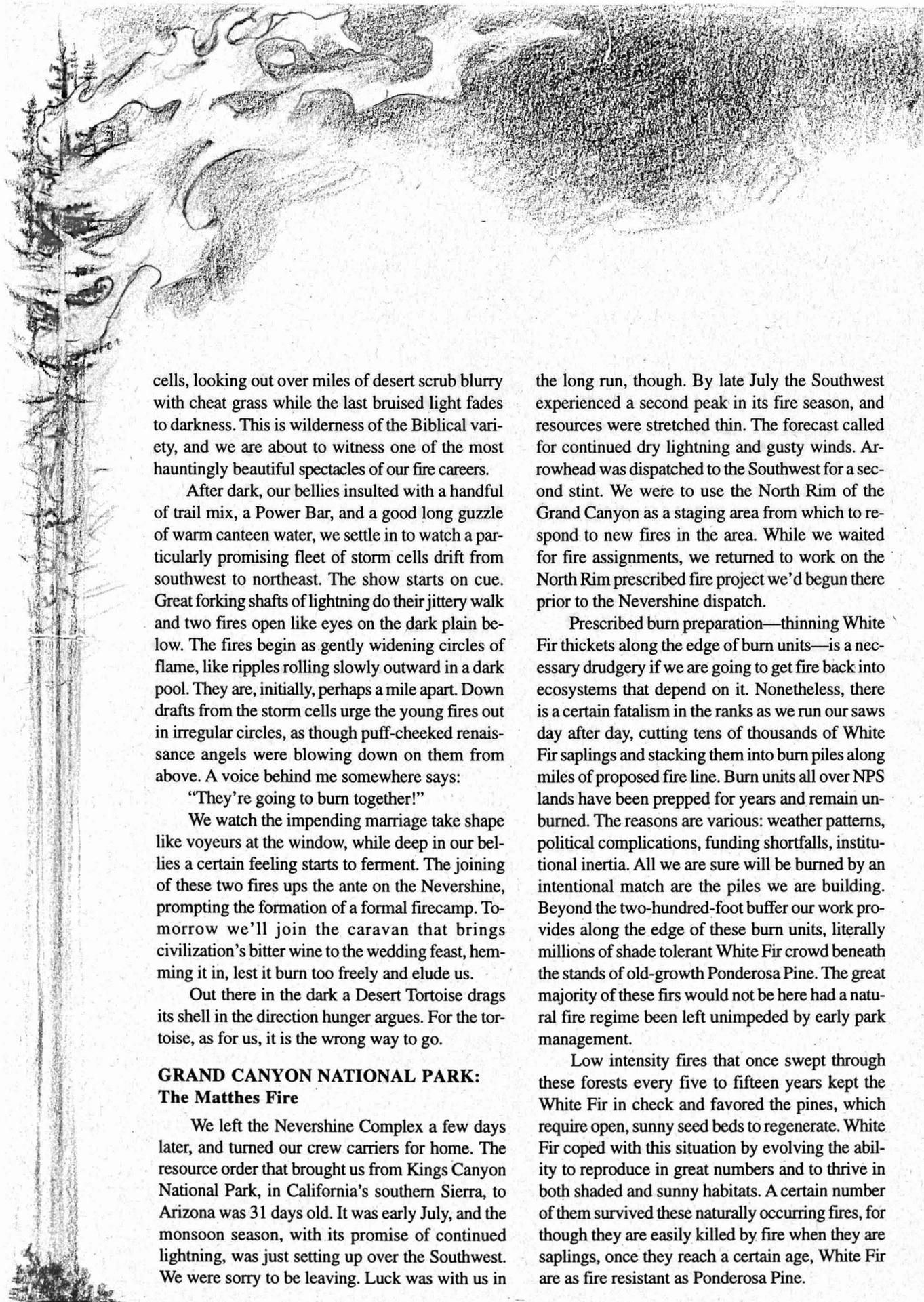
During break along a hopeless stretch of fireline, I watch the frenzied activity of ants scurrying around my boots. The hotter the sun leans down, the faster the ants run, and they are really running now. It is late June of 1995. Jerry Garcia is still alive. My crew, the Arrowhead Hotshots, is deployed on the Tank Fire, one of a complex of lightning-caused fires called The Nevershine, burning in northern Arizona eighty miles south of the Utah state line. The Tank Fire started on rangeland but is now burning a few miles inside the Grand Wash Wilderness, a remote expanse of buttes and mesas scored by ravines that channel water when it rains hard enough and wind the rest of the time.

Wind, as erratic and radical as the convoluted terrain that funnels it, calls the tune today. It pushes, and we follow. We dance with wild, untamed flame, pounding our rude tools in front of it like so many stone-age miscreants in the thrall of an irrational god, chasing fire down one drainage and up another, catching it, losing it, catching it again. The battle has been epic and exhilarating, marred only by an absurdity that follows us as our shadows do.

You cannot fight fire as we do and not love this shift. You cannot know fire as we do and not be acutely aware of the stupidity of what we are doing. Therein lies the dilemma of the fire community in the United States. The ostensible reason for fighting these fires is to "protect" the habitat of the Desert Tortoise, an endangered species. The only example of that retiring reptile any fire fighter will see on The Nevershine will be the one run over by a shower truck en route to a fire camp that, in a saner world, would not have been organized in the first place. When it is all over, \$1.1 million will have been spent on this vain enterprise.

We've been chasing our fire for two days now, and several similar ones are burning nearby. We don't know it yet, but later today the helicopters, busily shuttling crews and equipment here and there (at something between \$2000 and \$8000 per hour), will run out of flying time and strand us for the night on top of this unnamed mesa without food, water, or sleeping bags. It is a common complication, and we carry enough food and water in our packs to compensate. Tonight we'll huddle among sage and cactus, wrapped in worn space blankets against the gusty downdrafts from passing storm





cells, looking out over miles of desert scrub blurry with cheat grass while the last bruised light fades to darkness. This is wilderness of the Biblical variety, and we are about to witness one of the most hauntingly beautiful spectacles of our fire careers.

After dark, our bellies insulted with a handful of trail mix, a Power Bar, and a good long guzzle of warm canteen water, we settle in to watch a particularly promising fleet of storm cells drift from southwest to northeast. The show starts on cue. Great forking shafts of lightning do their jittery walk and two fires open like eyes on the dark plain below. The fires begin as gently widening circles of flame, like ripples rolling slowly outward in a dark pool. They are, initially, perhaps a mile apart. Down drafts from the storm cells urge the young fires out in irregular circles, as though puff-cheeked renaissance angels were blowing down on them from above. A voice behind me somewhere says:

"They're going to burn together!"

We watch the impending marriage take shape like voyeurs at the window, while deep in our bellies a certain feeling starts to ferment. The joining of these two fires ups the ante on the Nevershine, prompting the formation of a formal firecamp. Tomorrow we'll join the caravan that brings civilization's bitter wine to the wedding feast, hemming it in, lest it burn too freely and elude us.

Out there in the dark a Desert Tortoise drags its shell in the direction hunger argues. For the tortoise, as for us, it is the wrong way to go.

GRAND CANYON NATIONAL PARK: The Matthes Fire

We left the Nevershine Complex a few days later, and turned our crew carriers for home. The resource order that brought us from Kings Canyon National Park, in California's southern Sierra, to Arizona was 31 days old. It was early July, and the monsoon season, with its promise of continued lightning, was just setting up over the Southwest. We were sorry to be leaving. Luck was with us in

the long run, though. By late July the Southwest experienced a second peak in its fire season, and resources were stretched thin. The forecast called for continued dry lightning and gusty winds. Arrowhead was dispatched to the Southwest for a second stint. We were to use the North Rim of the Grand Canyon as a staging area from which to respond to new fires in the area. While we waited for fire assignments, we returned to work on the North Rim prescribed fire project we'd begun there prior to the Nevershine dispatch.

Prescribed burn preparation—thinning White Fir thickets along the edge of burn units—is a necessary drudgery if we are going to get fire back into ecosystems that depend on it. Nonetheless, there is a certain fatalism in the ranks as we run our saws day after day, cutting tens of thousands of White Fir saplings and stacking them into burn piles along miles of proposed fire line. Burn units all over NPS lands have been prepped for years and remain unburned. The reasons are various: weather patterns, political complications, funding shortfalls, institutional inertia. All we are sure will be burned by an intentional match are the piles we are building. Beyond the two-hundred-foot buffer our work provides along the edge of these burn units, literally millions of shade tolerant White Fir crowd beneath the stands of old-growth Ponderosa Pine. The great majority of these firs would not be here had a natural fire regime been left unimpeded by early park management.

Low intensity fires that once swept through these forests every five to fifteen years kept the White Fir in check and favored the pines, which require open, sunny seed beds to regenerate. White Fir coped with this situation by evolving the ability to reproduce in great numbers and to thrive in both shaded and sunny habitats. A certain number of them survived these naturally occurring fires, for though they are easily killed by fire when they are saplings, once they reach a certain age, White Fir are as fire resistant as Ponderosa Pine.

It needs to be understood that "fire resistant" is a relative term. The fuel loads, in these and many other forests of this type, are truly staggering—as much as two hundred times the estimates for the same forests in pre-settlement times. We are long past the time of easy intervention. Run a fire through these forests of adequate intensity to take out most of the White Fir, and you'll lose most of the pine as well.

This fact puts in context the angst fire managers feel as they approach the task of returning fire to these unbalanced ecosystems. It is a little like defusing a charge of dynamite by burning away the fuse. Let us extend the metaphor still further: the explosives are under the manager's desk chair, near the family photos and the carefully framed accolades that decorate the office walls.

Fire managers who choose to act despite the obvious dangers deserve more support than they're getting. Ponderosa Pine are outnumbered by encroaching White Fir just as genuine fire managers are outnumbered by the complacent nest builders in their own ranks, not to mention the press, Congress, and a hellish host of extractive industries. Alliances need to be developed between private conservation groups, wilderness and wildlife advocates, scientific societies, writers and filmmakers—any one who will advance the critical task of public education regarding reform of fire policy. This will provide the political support state and federal fire managers need to make vital reforms. The malingerers will follow once they see the dead wood being burned away.



A few days after we arrived on the North Rim of the Grand Canyon, a storm blew over and started a dozen new fires in the park, one of which was the Matthes Fire. Because of its location in

a North Rim natural fire zone on the Walhalla Plateau, the Matthes was declared a PNF (prescribed natural fire) and allowed to continue burning within the bounds of park policy. Over time, the Matthes began to acquire a personality. As it got larger, increasing in complexity, the park decided to put Arrowhead to work on it before we were called away to fight a higher priority fire elsewhere in the Southwest.

The Maximum Allowable Perimeter (MAP) of the Matthes was defined by a combination of the canyon edge and a system of old fire roads that run in even grids across the plateau. Arrowhead's job initially was to prepare these single track roads so that we could light backfires from them to contain the Matthes should the need arise. A twenty-person type-two crew arrived to help, and other resources had been ordered.

On the day the Matthes was converted to a wildfire, the significant change was in personnel, not in fire behavior. Jim Schroeder, a regular member of Grand Canyon's prescribed fire overhead team, had been operations chief since the time the fire had been declared a PNF. The "ops" chief is in charge of the on-the-ground management of the fire. Arrowhead had worked with Schroeder regularly during our detail in the park, and had he been operations chief on the day in question, matters would probably have shaken out very differently. But Schroeder had been working the fire for many long shifts in succession; so while he bedded down for some needed sleep an operations chief from another federal agency took over.

By ten o'clock in the morning foreshadowings of what was to come began to crackle from our radios. We were prepping line along one flank of the fire when the new ops chief called dispatch to request information on the availability of air tankers. Ordering airtankers

to drop retardant on the fire would require converting it from a PNF to wildfire status, a move that has enormous political consequences. The move would be a black eye not only for Grand Canyon's PNF program, but for other such efforts nationwide.

Rich Mattingly, one of our squad bosses, looked at the wispy column of smoke coming from the fire and raised his eyebrows when he heard the ops chief's request.

"What's that all about? Maybe there's another fire we don't know about," he observed wryly.

"Yeah," Brit, our foreman, bantered back. "Stand replacement in the attic." He pointed at his head, crossed his eyes, and made a twirling motion with his finger. We laughed, then bent again to work.

As the day wore on, real events would continue to feed the imagined possibilities burning in the ops chief's mind. Afternoon brought the predicted storm cells drifting over the fire, and the down drafts that attend them. Every forty-five minutes or so another cell would drift over the fire; and while it passed, the winds it generated pushed the fire into the crowns of the surrounding reproduction, occasionally lifting higher to punch holes in the forest canopy. The weather, in other words, was interacting with the fuels present to produce the mosaic effect fire managers often describe as their goal for prescribed natural fires.

We've set the scene. Here's how it played out.



Arrowhead finished prepping sections of the south and west flanks of the MAP before lunch. The type-two crew set up a hose lay along the west flank to support a firing operation along the west line to contain the Matthes as it approached. The firing operation wasn't of



illustration by Chris Billis

particular concern. The forest canopy opened up as it approached the west flank, and the topography for the most part was table flat.

The storm cells moved over the fire in the hours after lunch, and with them came the questionable behavior of the operations chief. As the fire was closing in on the west flank, we watched the ops chief shoot past in his red Bronco and turn down a road leading into the fire. Jim Cook, our crew superintendent, could see what was about to happen. He had Dan Dewey, my squad boss, assemble part of our squad. We threw our tools and fire packs into the pickup bed, clambered into the crew cab, and followed the ops chief down the road to take a closer look.

The fire, to be sure, was impressive. The area we watched respond to the passing storm cells would later be called "the hole," a thirty-acre patch of younger pine and fir that consumed itself in something under an hour. We drove on toward it, Cook looking casually for places to turn around, all of us scanning the forest around us for spot fires. In front of us, entire stands of fir and pine wavered skyward in an undulating curtain of fire perhaps a hundred feet in height. Waves of radiant heat surged through our vehicle windows. The sound of the fire seemed to push against us as the heat did. The scene produced a strong visceral flight response; it took some doing to still the imagination. About 50 yards from the fire, to my relief, we turned around, parked Cook's crew cab facing back the way we'd come, and climbed out onto the road.

"Tool up," Cook said, pulling his own pack and tool from the pickup bed.

I'd seen fire of this intensity quite a few times; nonetheless, I was taking my cues from Cook. He was calm and thoughtful, watching the fire, the fuels it was burning into, the progress of the

storm cells above us, and the ops chief's reactions to all of this. I looked around us. The canopy opened considerably toward the west line, and there were fewer saplings underneath. These more moderate fuel conditions no doubt played a role in the selection of the west line.

The ops chief had turned his Bronco around and parked a short distance away from us. He stood beside the vehicle, looking at the fire and talking into his radio. Cook walked up to him and the two began talking. The ops chief had gray hair and a carefully groomed gray mustache that suggested a touch of vanity. He wore his nomex shirt tucked in above a cowboy belt buckle the size of a pie plate. Flames reflected in its tooled silver made him look as though he had a belly full of fire.

Later Cook told me he had tried to help the ops chief see the connection between the fire behavior he was observing and the storm cells drifting by overhead. I saw Cook gesture toward the lighter fuels back toward the west line. It is impossible to know how the ops chief received such information from the superintendent of a California hotshot crew. There are a lot of big egos in the fire world. Maybe he felt insulted by it. All that is certain is what ultimately happened.

Cook walked toward us, shaking his head. Behind him the fire pulsed and surged in the "reprod," but it already seemed less imposing. The worst, it seemed, was over.

"Dew," Cook said, "spread your people through here and pick up any spots you see. Let's keep this thing on the ground from here on out."

Cook radioed Brit and had him spread the rest of the crew out to grid for spots ahead of the main fire. Then he sent Brit to scout the fire further north. About then the ops chief ordered the airtankers.

Dewey's radio was scanning the command channel, so we listened while events unfolded.

Jesse Duhnkrack, prescribed fire specialist for Grand Canyon, came up on the radio to talk to the ops chief. Duhnkrack wanted to clarify the implications of ordering the tankers. In the all-or-nothing suppression-based structure of resource allocation, ordering airtankers meant converting the fire to wildfire status, which radically alters the fire's place in the grander scheme of things, regionally and nationally. On the ground the fire hadn't changed appreciably. It was still burning in the same fuels, responding to the same topography, and subject to the same weather conditions. What had changed was the way one man was looking at it. Duhnkrack was on the South Rim, at least an hour away by helicopter. He was in no position to second guess. Duhnkrack's question was inviting the operations chief to think his assessment over.

This was, literally, a million dollar moment. While we worked our way around a little spot fire, we waited to see how the ops chief would respond. Communication by radio is not private. Duhnkrack's question was crafted for that medium. It expressed doubt politely, and allowed the ops chief a graceful way out. He declined. The tankers were ordered, the fire was declared a wildfire, and the generous gates of suppression funding swung wide.

As though on cue, the storm cells passed and the fire calmed accordingly. In the two hours it took the airtankers to arrive the fire didn't move appreciably. Several retardant drops (roughly \$3000 apiece) were made on the west flank, pretreating fuels we would have to burn a few hours later to secure the north and west sides of the burn. The retardant drops allowed for the plausible scenario that they had stopped a fire which oth-



erwise might have escaped the MAP, an outcome no one I talked to about the Matthes Fire ever deemed likely. The only spot fire ever found outside the MAP was just beyond the west line. It was about the size of a dinner plate and had gone out on its own.

Both Jim Cook and our foreman, Dan Buckley, maintained that, at the time of its conversion to wildfire status, we could have secured the entire perimeter of the Matthes Fire with a firing operation, using the resources already on hand, at a cost of roughly \$50,000. Some months after the fire was out I mentioned this estimate to Duhnkrack. He did not quibble with the numbers. By the time it was all over, the independent leadership of the ops chief cost the American taxpayer about \$1 million, a sum for which he was not, and never will be, held accountable.

A CONVERSATION WITH JESSE DUHNKRACK

Arrowhead returned to the North Rim early in the '96 fire season, less than a year after the Matthes Fire. In the park to do more prescribed burn preparation, we took a break one afternoon from the drudgery of cutting and piling White Fir to revisit the scene of the Matthes Fire. In the company of Brenda, a fire monitor on the North Rim's prescribed fire crew, we walked back from our old staging area along the west line into "the hole."

While Brenda explained the stages of succession that would bring a new forest to the thirty acres of stand replacement around us, I took in the eerily beautiful silence of the blackened forest. Here and there patches of lupine had pushed through the gray ash. These will be joined by aspen shoots, Ponderosa Pine saplings and the ubiquitous White Fir, Brenda explained. The new growth, particularly the aspen shoots, grasses, and forbs, which will spring up beneath

the opened canopy, will be a boon for a variety of wildlife. As the dead trees fall, they'll provide fuel for lower intensity fires to thin the future stand.

The future of natural fire, however, is uncertain at Grand Canyon, as my subsequent conversation with Jesse Duhnkrack made clear. Duhnkrack was still prescribed fire specialist at Grand Canyon when I interviewed him in August '96, but he has since moved on to become fire management officer of Rocky Mountain National Park. He is well versed in both the suppression and prescribed fire programs of the NPS and is particularly well informed of the problems Grand Canyon faces in returning fire to the troubled North Rim forests.

I asked Duhnkrack about Grand Canyon's long-term fire management goals on the North Rim.

"When I came [to the prescribed fire specialist position] in '91, I was pretty ambitious about trying to do something about North Rim fuels," he said. "I haven't lost my momentum, but I have taken a different perspective." Duhnkrack went on to discuss the worsening fuels situation, describing the changes in forest composition due to fire suppression as "an ecological disaster."

The park, he said, had originally wanted to put as much acreage on the North Rim as possible into PNF zones. But due to the park boundaries, "which are pretty much straight lines over there," and the explosive fuels, "it is not really going to be feasible." The park borders Kaibab National Forest to the north, which is managed primarily for timber and grazing. Management Ignited Prescribed Fire (MIPF) is a good option along the park's boundaries, but the prospect of a PNF crossing the boundary in full rage is not a scenario managers of either agency savor.

"So really only small portions of the coniferous forests of Grand Canyon will

ever be in PNF [zones]," Duhnkrack concluded. The Walhalla Plateau, where the Matthes Fire burned, is an example of one such place. Well inside the park boundary and hemmed in by canyons on three sides, chances of an escaped fire on the Walhalla are minimal. Even so, the area in PNF status has been substantially reduced since the Matthes, for reasons we'll discuss shortly.

According to Duhnkrack, MIPF is the park's primary option for reintroducing fire to North Rim forests, at least over the next 20-30 years. The opening phase of Grand Canyon's plan is reminiscent of Sequoia National Park's (*Wild Earth*, fall '96) in the sense that it is aimed more at averting disaster and building public support for changes in fire policy than it is at ecological restoration, overtly anyway. The initial prescribed fire target areas have been selected to help protect developed areas that are threatened by catastrophic fire because of failed full-suppression policies of the past.

"For us," Duhnkrack continued, "it's just a small bite at a time, given the constraints of everything from smoke to the amount of preparation needed [in order to conduct a burn safely]." He described a program designed to test a variety of fire intensities to see which are most suitable to Grand Canyon's particular problems, with the goal of eventually doing "some broadcast burning" of larger units once earlier burns had lowered fuel levels.

With respect to smoke management, Duhnkrack was more upbeat than I had expected. I had heard because visibility issues are a key concern at Grand Canyon, acreage levels set by the state for MIPF were held to 150 acres a day. But when conditions are favorable, Duhnkrack said, those numbers are negotiable, and "we're willing to walk out on the plank in the name of fire hazard prevention and ecosystem restoration



We do enjoy a good relationship" with the state on smoke issues. Duhnkrack also stressed that he had administrative support within his park, a key to implementing any fire program. "Our superintendent," he said, "is willing to stand up for those temporary visibility impacts."

Duhnkrack described a cooperative, inter-agency approach to smoke management in Arizona which recognizes the necessity of prescribed burning over the long haul. He said state and federal officials are well aware that they may have smoke impacts from wildfire that far exceed those from a carefully implemented prescribed fire strategy aimed at reducing fuels and restoring ecological balance to our forests. A key component in this process is the monitoring of air quality impacts due to burning, with a view toward reducing them in the future, a process Duhnkrack describes as necessary, time consuming, and expensive.

The alternative to this approach was well illustrated during the '96 fire season by the Bridger-Knolls Fire, which burned on the Kaibab National Forest just a few miles north of Grand Canyon's boundary. The Bridger-Knolls, at 60,000 acres, was the largest fire in Arizona history. The crew of the space shuttle reported seeing its immense smoke column from outer space.

Duhnkrack's assessment of what happened with the Matthes Fire was both carefully articulated and frank. While he didn't want to fault anyone in particular, he did make clear that the system as it now stands is ill-prepared to deal with the realities of prescribed fire in general and PNF in particular. As the Matthes Fire grew in complexity, the park faced a shortage of resources in the region to staff it adequately.

Duhnkrack stressed that the Southwest was experiencing "a second peak" in their fire season at the time, and resources were again stretched thin. It is

interesting to note, though, that once the Matthes was declared a wildfire, resources were suddenly plentiful.

Asked about the ops chief's role in converting the Matthes to wildfire status, Duhnkrack said:

"[Ordering airtankers] was an experienced operations chief reaction to that kind of fire in northern Arizona. That's how [they] deal with it. When ... you bring an ops chief into a fire that's starting to get with it, the ops chief ... is going to feel a tremendous responsibility, and they're going to plan for the worst case scenario, because that's how that suppression organization is built. The use of air tactical operations is ... ingrained in that [culture]," Duhnkrack said. The suppression organization as it is currently configured has taught these people that "no matter what they do they come out smelling like a rose. They're heroes."

Sometimes that all-out type of response is appropriate, Duhnkrack stressed, but "it doesn't apply to some of these remote western wildlands that are really ecological disaster areas" as a result of fire suppression, and fire managers steeped in the suppression culture need to understand that. "It's a matter of changing the paradigm and having them [become more] comfortable with prescribed natural fire," Duhnkrack concluded.

While that is easily said, the reality is more complicated. You cannot expect all suppression personnel to have the courage of their convictions with respect to PNF, because many have no such convictions to be courageous with. They may be perfectly competent in an urban-interface fire situation, but many cannot make the switch to a more subtle way of envisioning fire and its restorative possibilities in wildland settings. Nor can they tolerate the risks such a change of emphasis carries with it. They are, if you

will, Yellowstone-walled. They associate PNF with controversy, something that might harm their careers.

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The problems of staffing PNFs during the height of fire season have long been recognized, and even prior to the Matthes Fire the NPS had begun addressing them. In the summer of '95, when the Matthes Fire burned, the NPS fielded their new prescribed fire modules. One of these teams was at the Matthes and another was en route when the fire was converted. This program consists of crews of qualified personnel who move around the country to help individual parks prepare and execute both PNFs and MIPFs. The program enters its third season in 1997 and is still evolving. It is an important innovation.

A second positive development, which in part is a response to problems posed by the Matthes Fire, is the establishment of overhead teams specifically designed to manage PNF complexes. This concept is in its infancy, and the initial deployments of such teams on PNF complexes during the '96 season were less than a complete success, according to Duhnkrack. Nonetheless, the idea represents a big step in the right direction and deserves support.

Finally, in 1995 the National Park Service lifted the budgetary ceiling for PNFs, thus removing a major incentive for converting PNFs to wildfire status. In the past, if a park had, say, a \$20,000 budget to manage PNFs, once they exhausted it there was no alternative but to convert active PNFs to wildfire status. Removing that arbitrary budgetary constraint is another major step toward giving prescribed natural fire parity within the budgetary process.

These three changes are good examples of NPS leadership in the formulation of saner fire policies in the



post-Yellowstone era, particularly in the area of prescribed natural fire. How these programs are evolving and to what extent they are being replicated by other federal agencies will be discussed in a later article. In the meantime, the NPS should be challenged to do even more, which brings me to some final comments about the Matthes Fire.

Babbitt insisted on being treated as an ordinary crew member. We were soon driving out to our section of line, with Bruce bouncing around in the back of the crew carrier with the rest of the squad. Big Head Todd blared from the tape player. Outside, stands of Ponderosa Pine flowed past...

The Walhalla Plateau, where the Matthes burned, thrusts out into the Grand Canyon, connected to the rest of the North Rim forests by a narrow neck of land about half a mile wide. Any escaped fire on the plateau could be easily contained by firing out that half mile strip of forest, thus the Walhalla's status as a PNF zone within the park. Since the Matthes Fire, however, the PNF zone on the Walhalla has been greatly reduced; it no longer contains the entire 7000-acre plateau.

Dan Buckley, long-time foreman of Arrowhead and an expert in firing operations, was puzzled during the Matthes Fire about why the lines for the MAP were so arbitrary. Why not let the fire have the run of the plateau, and burn the narrow portion of forest connecting Walhalla to the mainland should that become necessary to contain the fire?

Duhnkrack agreed that this was a good question. His response made sense regarding the Matthes Fire, but changes in policy since that time make limiting

the PNF zone on the Walhalla seem overly conservative. While the Matthes was burning, the park was still working under the old PNF budgetary rules. Part of the rationale for limiting the size of the MAP for the Matthes was to control cost. Removal of the budget ceiling for PNF since then negates that concern. Duhnkrack's reservations

about smoke management and fuel loads on the plateau deserve consideration. Nonetheless, the park should return the entire Walhalla Plateau to PNF status. Here's why.

Duhnkrack has said that the park plans to experiment with MIPF, employing a range of fire intensi-

ties to see which are most appropriate. Grand Canyon should do the same sort of experimentation with PNF. Sequoia and Yosemite National Parks, Duhnkrack notes, have successful PNF programs in part because they are carried out in the high country, in terrain that makes escaped fires unlikely. Fair enough. The Walhalla is the Grand Canyon equivalent of such terrain, and its geographic isolation should be taken advantage of to provide needed research on the effects of PNF under a variety of fire intensities. Duhnkrack also notes that the plateau has some history of natural fire, with the 1700-acre Matthes being the most recent. So a mosaic of fuel conditions already exists there, and should serve to some extent in moderating fire behavior on the plateau.

"The Park Service," Duhnkrack says, "hasn't done too well with moderate to high intensity fire." He notes that there is widespread agreement about the need for "hole punching" fires in order

to open the forest canopy and allow regeneration, but that agencies need to do a much better job educating the public about the need for such fire.

"We've got so much spruce and fir coming up under the pines, the only way we're going to burn is pretty hot, with all the [hazards] that come with that, spotting and so on." That being so, the feasible PNF areas at Grand Canyon should not be reduced in size, particularly because the park would reap a variety of research benefits from these areas—while risking only small areas of their forest. And what, finally, is the risk? While allowing some higher intensity fire may cost the park a little of its pine overstory, continued suppression would likely lead to overstory loss due to moisture stress in the long term, as has already happened in the Sierra. Millions of White Fir saplings are sucking up very limited water supplies beneath the big pines, and each year they require still more of the share.

Finally, on the question of smoke, Duhnkrack stated that the park is willing to "walk out on the plank" in the name of ecosystem restoration. The Walhalla Plateau PNF zone seems like a plank worth walking. PNF provides a natural point of departure for interpretive programs to continue the public education process Duhnkrack rightly identifies as vital.

Grand Canyon has got to move forward. Whenever and wherever they are in prescription, they should burn. The alternative was suggested by the 60,000-acre Bridger-Knolls Fire mentioned earlier, which might as easily have burned a few miles further south within the park itself. Duhnkrack's emphasis on management-ignited prescribed fire may be a realistic starting point to restore North Rim forests, but the park should allow, where feasible, prescribed natural fire to play a reasonable role. The park's long-term goal must be to move beyond this conservative initial stage of forest restoration to one where fire is allowed to move freely across the landscape again, just as any other wild thing does.

MOVING THE MEDICINE BALL: Conversations With Bruce Babbitt

In one of those synchronistic moments that occasionally attend life, Bruce Babbitt showed up on the Hochderffer Fire near Flagstaff, Arizona, in late June '96, and asked to go out on the line with our crew. Arrowhead is one of the few hotshot crews within the Department of the Interior, so we were a natural choice for the Interior Secretary when he came looking for a crew to join. The Hochderffer, burning perilously close to Babbitt's old home town, was an appropriate choice for his purposes too. At the time it was the largest fire in Arizona history (eclipsed a week later by the Bridger-Knolls). Such adventures are part of Babbitt's mystique. He relished telling the story of how, at 15, he had lied about his age in order to fight fire in these same mountains. That was in 1953, the year before my birth; and since Babbitt

is on record as an aggressive supporter of a proactive fire policy, I was keen to sound him out on prescribed fire issues.

Part of the price we paid for hosting our high level visitor was being assigned to a quieter part of the fire. Instead of firing a section of line in twenty-five-mile-per-hour winds with relative humidities as low as three percent, as we had the day before, we were sent to the opposite side of the fire to mop up along an inactive stretch of fireline. The assignment, while less than thrilling from a fire behavior standpoint, did provide the relaxed atmosphere conducive to conversation.

Babbitt insisted on being treated as an ordinary crew member. To make us feel at ease, he slipped immediately into the vernacular common to fire crews. We were soon driving out to our section of line, with Bruce bouncing around in the back of the crew carrier with the rest of the squad. Big Head Todd blared from

the tape player. Outside, stands of Ponderosa Pine flowed past, either black from ground to crown, or scorched half-way up, with the crowns still green and vibrant. I turned down the stereo and commented on this to Babbitt, establishing the theme for the day's conversation. We later verified with a fire behavior specialist that most of the areas on the Hochderffer spared stand replacement fire intensity had been treated earlier with prescribed fire. I heard Babbitt repeat this fact to several members of the media, calling it "a vindication of prescribed fire policies."

In the late morning, while "cold-trailing" the edge of a fire line that had been gouged through the forest with a bulldozer, I asked Babbitt what the chances for real change in fire policy are. He'd been squirting a little patch of heat in the dirt while I stirred it with my shovel. He straightened up, shifted the straps of his backpack pump to a less un-



illustration by Eva-Lena Refnmark

comfortable position, then looked up through the blackened limbs of the pines around us. One whole side of his nose was black where he'd rubbed it with his gloved hand.

"You know," he said, "I always thought that when I got to the top, making change would be easy, something like a laying on of hands. It hasn't been that way."

He described a world in which key players with conflicting interests push against the various sides of any given issue. His answer conjured an image of men and women clustered around a huge, head-high medicine ball, with everyone pushing in a different direction. The only hope of movement is to get a diverse group of interests pushing from one direction.

The process Babbitt described for change involved an intricate and incremental series of initiatives of the type discussed in this report. He saw his own role, if I understood him correctly, as creating the context for change in the form of budget initiatives that encourage long-term, science-based management of ecosystems, and then moving around the country to rally support for such changes. In a telephone interview a few weeks later, he went into more detail.

Most of our discussion centered on the need to move fire management out of the realm of what are called "collateral duties" into a separate, professional category within the federal government. While this may seem peripheral to the promotion of prescribed burning, it is actually a central concern. The collateral duty mentality is what broached the outcome we observed on the Matthes Fire.

Babbitt envisions a position he calls "fire specialist," a working title for the fire manager of the future, who will be fluent in all aspects of fire management, not simply suppression.

"Fire has got to have a larger place in the lives and careers of land managers, rather than...being out on the periphery. We've got to...think of fire [management] as more than just suppression. We need to think of it as [a profession] extending across the entire year to

all the presuppression activities, and [to] the use of prescribed fire. I think that's the key" to putting a federal fire program in place that responds to fire as an ally in land management.

"We've got to move all land managers toward the use of fire as a management tool," Babbitt said.

What can be done, I asked, to encourage hesitant land managers to move away from full suppression programs and embrace riskier management strategies that employ fire in the maintenance of healthy ecosystems?

"There are two issues that we've got to get better at," he replied. "One is to be sure that there are specific objectives in the management plans [of each management area]" which outline the historic role of fire in that particular ecosystem and how it will be replicated. "The beginning of accountability is to have standards. We must move toward clarifying [those].

"Secondly, we've got to do a better job [of letting managers know that they] will be rewarded for [managing fire] well, rather than either [being] ignored or penalized [for it]. We recognize that there are some risks, but the people who are willing...to acknowledge those risks and move forward anyway [must] be rewarded," Babbitt said.

While that may be a laudable goal, it is far from the case at present. All fire managers and their superiors are keenly aware of the double standard within the current system—which exempts managers from fiscal or environmental chicanery undertaken in the name of suppression, yet punishes forward-looking managers when attempts to implement a rational fire management program go awry. I noted to Babbitt that many National Parks and Wilderness Areas have fire management plans in place but are not implementing them.

At present, he replied, you won't find a line item in any federal budget for the allocation of prescribed fire monies. The money for prescribed fire, he said, is in discretionary funds within resource management budgets.

"We're going to see if we can write up a budget plan which actually starts to

allocate some monies specifically for prescribed fire, as a way of beginning to draw attention to this issue."

This sort of talk must seem arcane to readers unfamiliar with the struggle to reform fire policy, but the battle will be won or lost on this terrain. Remember the medicine ball image. Change in policy requires public support. Letting land managers know you are paying attention to what they are doing is one way to support the courageous and hold the others accountable for their weaknesses. Write letters to the editor protesting unnecessary fire suppression in parks and wilderness and supporting prescribed fire. Call the media to task for reports that sensationalize fire suppression activities while failing to discuss the actual causes of increasingly catastrophic fires. Finally, take the time to educate yourself and others on the issues so that your arguments cannot be easily brushed aside.

All systems evolve, which is why the pursuit of happiness is always just that: a pursuit. Our land management agencies are organized around a morass of inconsistent human desires, a fact now mocked and amplified by the complex reality of the ecosystems themselves. The task of reform before us is more Sisyphean than Herculean, all the more so because whatever change takes place will have to be realized within bureaucracies calcified by self-interest, competing budgets, conflicting mandates, and all of the predictable turf wars typical of any human organization facing a massive, post-hubristic payback. The fires which must burn through our diseased forests must move too through our federal and state agencies, gently but inexorably obliterating boundaries, burning away accumulations of dead wood, and quickening the creative impulses all such disturbances usher forth, until the agencies themselves mimic the natural systems that they purport to manage. ■

When not out in the field with fires, Robert Hunter Jones divides his time between teaching and writing. He will have another first-hand account for us after this year's fire season.



The Bottom Line on Option 9

by Andy Kerr and Rick Brown

THE BATTLE for the federal forests of the Pacific Northwest has gone on for nearly a century, but of late it has been red hot. Since the first court injunction against timber sales in Northern Spotted Owl habitat in 1989 until the retirement of Senator Mark Hatfield and the expiration of the Salvage Rider at the end of 1996, the region has seen unprecedented lawsuits, demonstrations, arrests, media attention, government action, death threats and political action for and against forests.

The purpose of this article is not to tell this story, as others have told parts of it already (start with Kathie Durbin's *Tree Huggers: Victory, Defeat & Renewal in the Northwest Ancient Forest Campaign*, The Mountaineers, Seattle, 1996), and remaining pieces will be told in time. Rather, we wish to examine the present state of affairs and expectations to finish the epic struggle for the public forests of the western Pacific Northwest (Northern Spotted Owl range, not the drier eastside forests). We answer the questions:

- How much forest has been "saved"?
- Is the President's Northwest Forest Plan (Option 9) good, bad, and/or ugly?
- What's next to finish the job?

HOW MUCH FOREST HAS BEEN "SAVED"?

If one properly defines "saved" as the goal set by former Oregon Natural Resources Council executive director and Western Ancient Forest Campaign founder James Monteith in the mid-1980s as "permanent legislative protection," then precious little has been "saved." Scientists estimate that about two-thirds of the pre-settlement forests were "late successional" (which includes forests down to 80 years old), or perhaps 26 million out of 40 million acres of forested land within the range of the Northern Spotted Owl. Optimistic agency inventories suggest that one-third of this—8.5 million acres—remained by the early 1990s, and only 2.4 million was protected in Wilderness and National Parks. Since the oldest and biggest trees were cut first, the widely accepted estimate that no more than 10% of original, true "old growth" forest remains is quite reasonable.

The plan has both loopholes big enough to drive log trucks through and time-bombs big enough to blow up most—but not quite all—log trucks.

Depending on which definition and which maps of ancient (or old-growth or late-successional) forests are used, estimates vary widely—perhaps from 45% to 75%—as to how much of otherwise unprotected forest is “protected” under Option 9. As the Salvage Rider demonstrated, the administrative protections established in Option 9 can be overridden at Congress’s whim. Neither environmentalists nor the timber industry has had the power to get the permanent legislation they wanted out of Congress.

On the plus side, two small, but highly critical Oregon areas have recently received permanent legislative protection. In the closing moments of the 104th Congress, Senator Hatfield, the person most singularly responsible for the destruction of the region’s forests, pushed through a bill to permanently protect from logging the City of Portland’s Bull Run Watershed (65,000 acres) and Opal Creek (28,000 acres variously designated as Wilderness, Wild and Scenic River, and Scenic Recreation Area). Hatfield acted in an inadequate attempt to mitigate his clearcut legacy. While the timber industry hasn’t fulfilled its fantasy of permanently legislating away the protections of the National Forest Management Act and the Endangered Species Act or the processes of the National Environmental Policy Act, it has achieved temporary suspen-

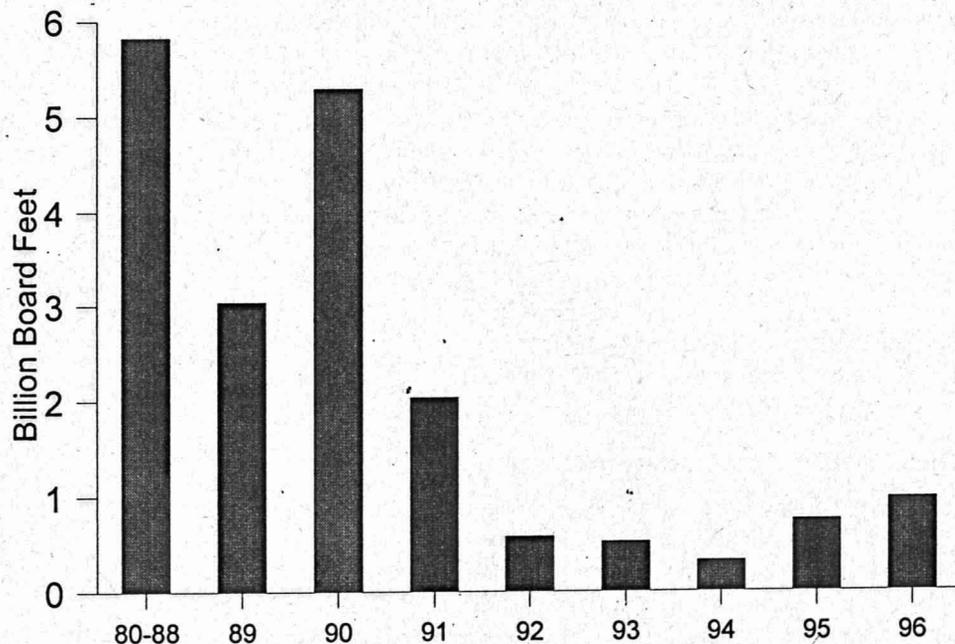
sions of the environmental laws as applied to Pacific Northwest forests in 1989-90 and 1995-96 by attaching provisions to must-pass annual appropriations bills. These “riders” (non-germane amendments) limited citizens’ access to the courts to enforce environmental statutes. (Ironically, the provisions that saved Bull Run and Opal Creek were also riders.)

While few forests have been permanently “saved,” the amount being “lost” to logging has declined dramatically. Figure 1 depicts cutting levels from 1980 to 1996. The upward bumps against the overall downward trend are due to the riders.

Prior to the first court injunction in 1989, 5 billion board feet (BBF) per year (three square miles of federal forest each week) was being logged. A billion board feet translates to 200,000 log trucks. Before the injunction on the Mount Hood National Forest, for instance, logs came off the Forest at a rate equivalent to a truck-load every six minutes, 24 hours per day, no holidays.

While the President’s Northwest Forest Plan (Option 9) made it much more difficult to log the federal forests, the single best indicator both of forest destruction and of environmentalists’ success and failure continues to be the amount of timber cut despite environmentalists’ best efforts.

Figure 1. timber sale levels on federal forests — range of the Northern Spotted Owl
Oregon, Washington, and California
1980-1996



LEGEND

- 1980-88: Average sale levels for 1960s and 1970s were very similar.
- 1989: First of several court injunctions takes effect.
- 1990: Appropriations bill Section 318 “Rider From Hell” forces sales despite injunctions.
- 1991: Injunctions resume effect, with some carry-over of Sec. 318.
- 1992-93: Injunctions continue in effect.
- 1994-95: Option 9 begins to take effect.
- 1996: Public Law 104-19 “Salvage Rider” in effect.

IS THE PRESIDENT'S NORTHWEST FOREST PLAN GOOD, BAD, AND/OR UGLY?

It's political, so it's all of the above. The earlier plans issued by the federal forest agencies were also political, but the President's political needs were different than the agencies'.

The President's plan purports to consider and protect over 1000 species. This is an unprecedented attempt in conservation biology. However, the plan is built around the Northern Spotted Owl and Marbled Murrelet (both protected under the Endangered Species Act) and various stocks of Pacific salmon (several are listed, several others are proposed for listing, under the ESA); other species mostly benefit coincidentally.

Politically, no federal forest plan has done more. The amount of land (in absolute acres and relative fractions) withdrawn from scheduled logging is unprecedented.

Unfortunately, it is not enough ecologically. As politically precedent-setting as it is, the plan tolerates unacceptable levels of risk for species. None of the original eight options would cut an amount of timber considered politically adequate, hence Option 9.

The favored option was developed to cut at least 1.1 BBF of timber annually. To do so, optimistic assumptions about the ecological compatibility of new logging techniques, generally known as "new forestry" (kinder and gentler clearcuts), were made. The plan has both loopholes big enough to drive log trucks through and time-bombs big enough to blow up most—but not quite all—log trucks. The amount of timber that gets through will turn on politics, budgets, enforcement and vigilance.

To keep projected logging levels above 1 BBF, the plan defers many decisions to the future. Depending on the success of environmentalists in monitoring the plan, and forcing its full implementation (all the while seeking to replace it with a stronger, adequate plan), the plan could allow as much as 1.1 BBF to be sold annually, or perhaps as little as 0.1 BBF (the amount which could be cut if all the old growth is saved) or 0.4 BBF (the amount logged during the injunctions protecting Spotted Owl habitat).

To keep cutting levels up, Option 9 calls for logging a substantial portion of the old growth that is left. Judge William Dwyer, who imposed most of the "owl injunctions," found

the plan to be legal, but just barely. To support the high logging levels, the plan calls for unprecedented levels of monitoring, inventory, and mitigation.

Option 9 is as much a bureaucrat's dream as it is a taxpayer's nightmare. Selling far less timber will cost more tax money than previously. In a 1996 report to Congress, the USDA Office of Forestry and Economic Assistance admits: "Although the timber sale rate has been reduced, the amount of staff and financial effort to re-establish the new program is comparable to what was needed to run the full timber program."

If all the monitoring and mitigation is done as required, it will result in less timber being sold. Even using the bogus accounting methods of the Forest Service, where the liquidation of inventory (big old trees) is posted as profit, federal forests within the range of the Spotted Owl now join the rest of the US National Forests in being money losers.

Budgets are not going up, so it is almost certain the federal forest agencies will fail to do what the plan requires, if for no other reason than a lack of money.

Consider the standpoint of the timber industry. They used to expend X amount of effort (lobbying, schmoozing, threatening, contributing, etc.) for Y amount of timber. They now must expend 10X for possibly 1/10Y. The smart ones are getting out and moving to private lands or non-wood fiber resources.

The hope left to the timber industry is that Option 9, while making it much more difficult to log, depending on the land allocation, still offers the potential. The federal forest agen-



cies prefer the logging option because so much of their budget comes from timber sale receipts. The only people saying they believe the full 1.1 BBF can be produced are administration and agency officials speaking publicly.

Complicating the implementation of Option 9 and environmentalists' attempts to thwart it was the enactment by Congress of the "salvage" logging rider which prohibited citizens from holding lawless federal forest agencies accountable in court. The rider expired in 1996 and is unlikely to be renewed. The main driving force for this and all other logging riders has retired. Senator Hatfield routinely sought to (ab)use his power as chair or ranking minority member of the Appropriations (money talks) Committee to advance the timber industry's agenda. The timber industry still has friends on the Appropriations Committee to do their bidding, but they are less powerful than Hatfield was and less willing to expend political capital for the cause of clearcuts.

WHAT'S NEXT TO FINISH THE JOB

Now that the rider has expired and the 105th Congress is seated, environmentalists are back on track.

If the federal forest agencies don't follow the plan, they'll end up in court.

Or, if they ignore new scientific information demonstrating the need to revise the present plan, they'll end up in court.

The owl's populations are still declining (and the rate of decline is increasing) and should be reclassified from "threatened" to "endangered." The President's plan anticipated, and indeed called for, a continued decline; but the plan assumes that as habitat recovers (cut-over lands become old forests again), the owl will recover with it. To achieve the political necessity of keeping the cut above 1 billion board feet, the agencies propose to drive the owl closer to, but not over, the brink. Environmentalists and scientists do not share the agencies' confidence in their ability to precisely predict where this brink occurs.

More stocks of declining salmon will also be listed, which should require stronger forest protections.

Option 9 was a species conservation plan, not a municipal watershed protection plan. About two-thirds of Pacific Northwesterners get their drinking water from surface sources, primarily federal forests. Option 9 calls for logging in municipal watersheds, yet some municipalities are now calling for an end to logging in their watersheds. One such is Salem, Oregon, whose watershed comprises most of the Detroit Ranger District of the Willamette National Forest. A decade ago, no ranger district anywhere logged

more. Oregon US Senator Ron Wyden has called upon the Administration to strengthen the President's Northwest Forest Plan by fully protecting all municipal drinking water supplies from logging and roading. In addition, general water quality concerns may limit logging further, as many of the watersheds have been severely hammered already and are in need of recovery.

The intentional tension between the National Environmental Policy Act (which requires the agencies to tell the truth) and the National Forest Management Act (which requires them to conserve species) will likely continue, as will listings under the Endangered Species Act (which requires them to protect listed species).

Environmentalists should advocate permanent legislative protection in two major forms: municipal drinking water protection and salmonid habitat conservation and restoration. In combination, these measures would protect essentially all the remaining ancient forest. Our ability to achieve such permanent legislative protection has increased, even with the Republican takeover of Congress, because timber levels have already dropped due to administrative and judicial actions. Legislative action would simply make it permanent. Legislating a *fait accompli* is always easier than legislating change, especially since Hatfield no longer wields a chainsaw in Congress.

In addition to seeking permanent legislative protection for forests, environmentalists must seek new ways to fund the federal forest agencies. The present system of funding much of their budgets through timber sale receipts leads the agencies to advocate timber sales to save the salmon, save the watershed, save the forest, save the campground, or save the whatever, but in reality to save the bureaucracy.

For various administrative, economic, and social reasons, federal forest cutting levels in the western Pacific Northwest are moving toward statistically (and economically, but not ecologically) insignificant amounts, if not zero. The challenge to environmentalists is to see that this occurs before the last of the big trees are logged. ■

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The High Uintas

Endangered Wilderness

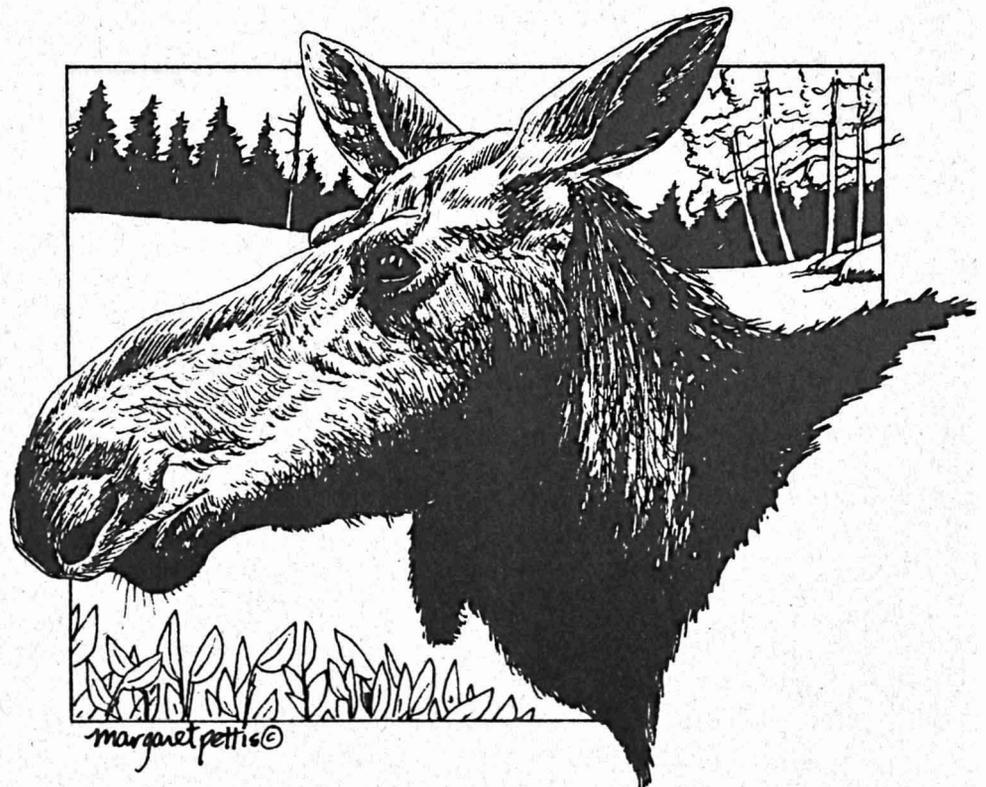
The High Uintas are Utah's magnificent mountain anomaly. Walter Cottam, one of Utah's preeminent botanists, noted in 1930 that "the Uintas Mountains represent Utah's only claim to typical Northern Rocky Mountain flora." According to *Intermountain Flora*, the Uintas' area above timberline in a true alpine flora surpasses all other alpine areas in the Intermountain West combined. Also anomalous, the range runs east and west for 150 miles across northeastern Utah; the core 55 miles of this wrinkled ridgeline rarely drops below 11,000 feet, with at least a dozen major summits soaring to over 13,000 feet (including Kings Peak, Utah's highest point at 13,528 feet). Hundreds of glacially carved lakes dot small and large basins, some as high as 12,000 feet; others lie hidden in dense spruce and fir forests. While active glaciers no longer find refuge in the Uintas, these mountains are continually reshaped by harsh weather.

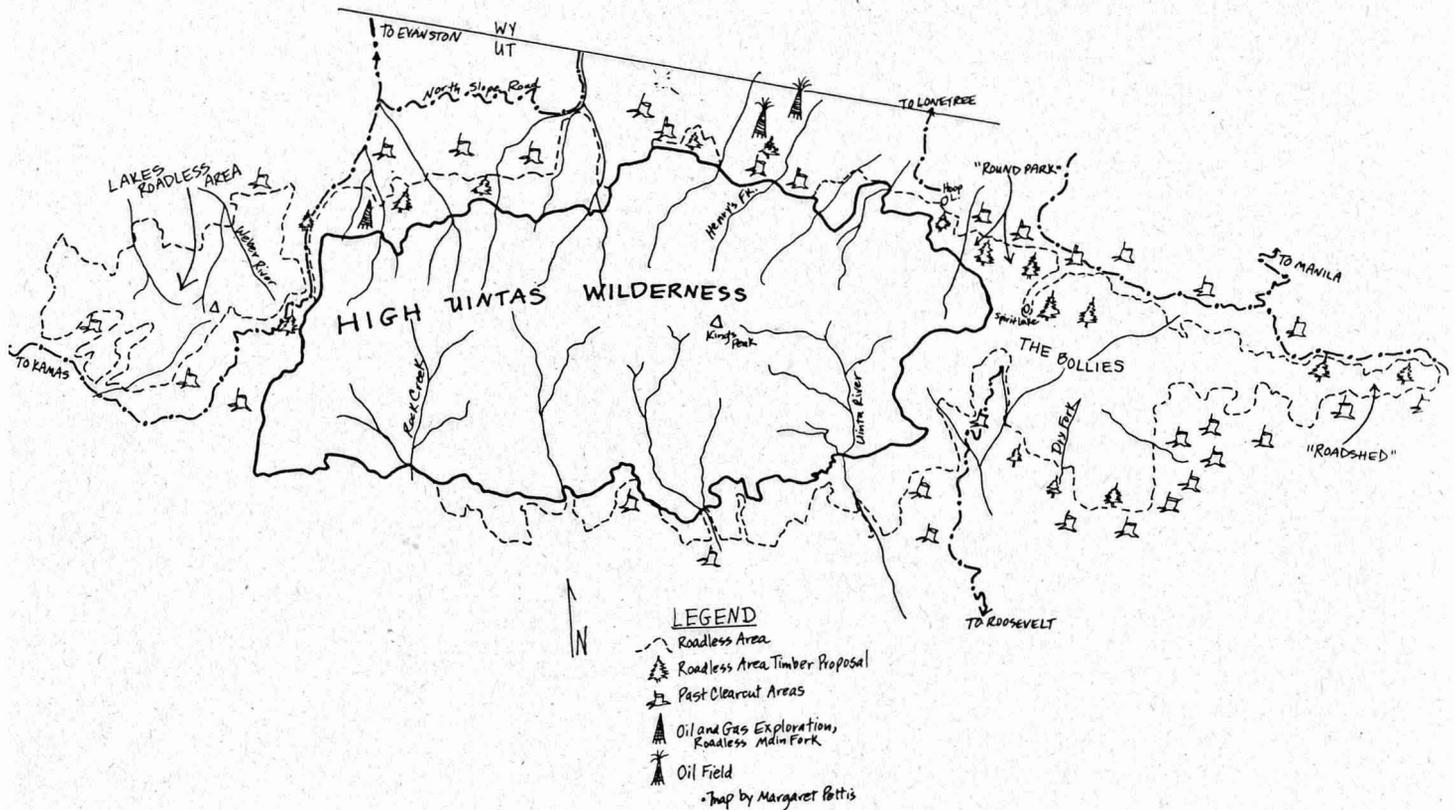
The North Slope is a gentle, almost plateau-like region of Lodgepole Pine forests surrounding meandering open parklands and high mountain meadows. River bottoms are wide and filled with willows, potholes and Beaver ponds. A series of steep glacial stairs rises to a belt of spruce and fir forest leading to the tightly packed krummholz of alpine basins. Looking into the South Slope, the heart of the Uintas, one fathoms the unique massiveness of this range. Here huge glacial basins dominate the immediate landscape. Off in the distance, deep glacial canyons lost in the long jumble of spruce and fir forests gently tumble down river basins into Lodgepole Pine and out into the sagebrush of the Uintah Basin.

Although it has only a few tree species (Lodgepole Pine, Englemann Spruce, Subalpine Fir, Quaking Aspen and smaller stands of Ponderosa Pine and Douglas-fir), the range has great vertical and horizontal heterogeneity. It is unique in the Intermountain West.

This topographical variety and size allow the Uintas to harbor a diverse fauna—Canada Lynx, Black Bear, Cougar, Wolverine (sporadic sightings), Great Gray and Boreal Owls, Golden Eagle, Goshawk, Osprey, Pileated and Three-toed Woodpeckers, River Otter, Pine Marten, Rocky Mountain Bighorn Sheep, Moose, and Elk. Grizzly Bear, Gray Wolf, and Bison once found a secure home in the Uintas. In this mountain

by Dick Carter





sanctuary, the sensitive and native Colorado and Bonneville Cutthroat Trout still have a few isolated stream miles within which to hide.

Although fragmented by destructive Forest Service policies of timber harvesting, livestock grazing, oil and gas development, and predator control, as well as by state wildlife management activities focusing on game production, the Uintas have proven resilient. This range remains a biologically important and relatively intact mountain sanctuary. Yet only a portion of it is actually protected.

Historically, the Uintas were at the crossroads of development in the Interior West. First described by Father Escalante in 1776 and later by John Wesley Powell in 1869, the Uintas have been hunted by the Utes, trapped for Beaver by the Rocky Mountain Fur Company, surveyed and studied by some of the greatest naturalists of the 19th century—Hayden, Agassiz, Gilbert, Cleveland, Leidy, Marsh—and more recently explored by increasing numbers of backpackers.

In 1931 a 237,000 acre portion of the Uintas was designated by the Forest Service as the High Uintas Primitive Area, almost exclusively above 10,000 feet. For over 50 years the Uintas witnessed a plethora of administratively proposed wilderness boundaries. Ironically, while these wilderness proposals have offered increasing acreage, the roadless nature of the range has been steadily eroded by logging and energy developments.

In 1979 the Utah Wilderness Association proposed a 659,000 acre High Uintas Wilderness. The Forest Service responded a year later with a 511,000 acre recommendation. In 1983 the Utah Wilderness Association succeeded in pushing

the Utah congressional delegation to introduce a Utah Wilderness Bill. Emerging in 1984 was a 460,000 acre High Uintas Wilderness. Although smaller than the Forest Service recommendation, the creation of the High Uintas Wilderness marked a major wilderness stepping-stone.

The ecologically-based 659,000 acre wilderness proposal made by UWA would protect the lower forest basins and entire unroaded watersheds. Unfortunately, the area proposed for protection is fraying at the edges under Forest Service management.

“Tie-hacked” for the railroad at the turn of the century, Uinta timber resurfaced as an issue in the 1950s. By the 1970s extensive harvesting was occurring in the area. Systematic over-harvesting was excused by the Forest Service as a response to a forest health crisis. In 1991 the Wasatch-Cache National Forest finally proposed to reduce the timber harvest by over 50% because of concerns for wildlife, watersheds, wilderness values, declining timber inventories and regeneration difficulties associated with high elevation forests.

Commissioned by the Utah Wilderness Association in the mid 80s, Cascade Holistic Economic Consultants (CHEC) prepared a report showing that Ashley National Forest managers overestimated its volume of timber and that within three decades all old-growth Lodgepole Pine outside of the High Uintas Wilderness would be liquidated.

The “forest health” crisis was initiated by the Forest Service following World War II when the agency escalated its attempts to circumvent the natural processes that built forests

over eons of time. Wild fires and parasitic insect outbreaks create gaps in the forest which allow for regeneration, assist in nutrient recycling, enhance wildlife habitat, and create the patchiness that adds to the vertical and horizontal diversity inherent to natural forests. Natural disturbances are agents of creation. Step by mysterious step, the forest builds itself in places and falls apart in others, due to beetles, mistletoe, fire, and wind, moving vertically, horizontally, forward and backward through time.

Disturbances highlight the difference between a "productive" forest and an integral forest. Healthy forests according to the Forest Service are those that efficiently produce lumber. The trees grow rapidly and are of the same age and structure. The integral forest is diverse in age, structure, and composition. It is a new-old, scraggly-straight, stunted-tall forest. Timber plantations do not mimic Nature.

Hiding behind the metaphorically incorrect concept of "forest health," Congress and President Clinton approved in 1995 Section 2001, the Emergency Salvage Timber Sales Program. Clinton belatedly canceled the salvage rider at the end of 1996, but the administration's so-called reversal only affected previously unadvertised timber sales. Meanwhile, curtailment of environmental laws and meaningful public involvement will be around for some time, as timber sales offered under the rider are cut in coming years.

The most egregious salvage sale is slated for Round Park, on the eastern end of the Uintas' North Slope. This undulating expanse of old pine forests, parklands, wet meadows, and churning streams is the heart of the unprotected North Slope. The southern boundary of the proposed harvesting is the High

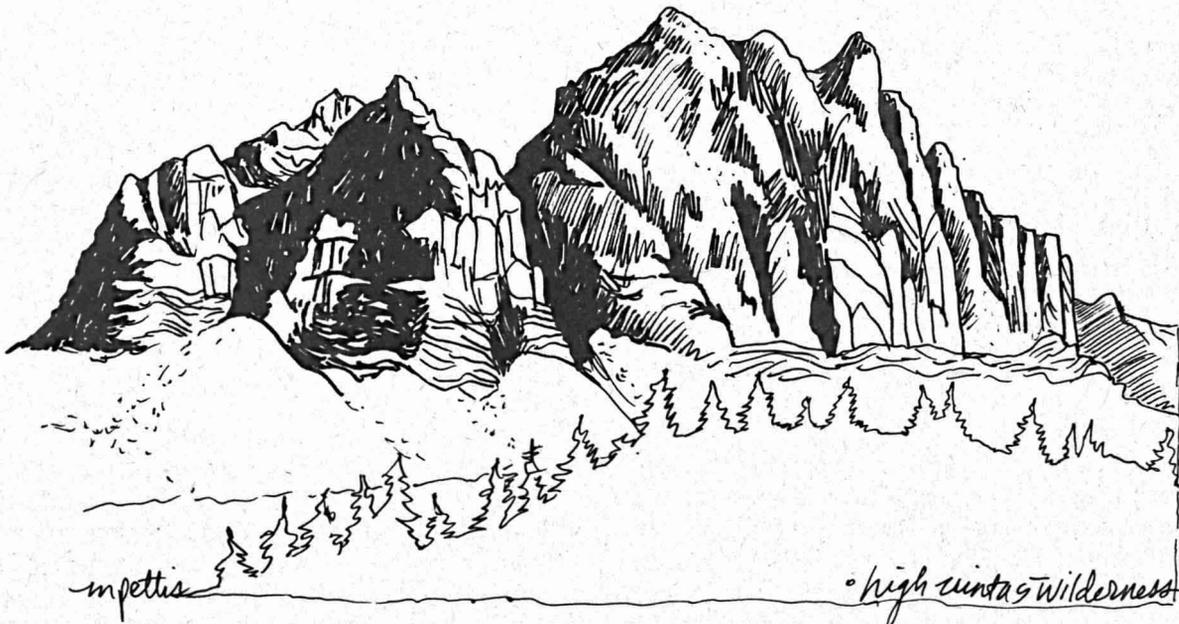
Uintas Wilderness. On the north are the Doug-fir forests of Widdop Mountain, a small roadless area important for ungulate winter range. The Forest Service proposed logging 2218 acres of roadless country, harvesting nearly 21 million board feet—the largest timber sale ever on the Uintas. These forests are home for Pine Marten, Goshawk, Black Bear, Moose and a host of other species needing wild forests. Even the Forest Service admitted this proposal would significantly fragment natural forests.

After an angry group of wilderness advocates challenged the proposal, Agriculture Secretary Glickman's policy directive removing roadless areas from salvage sales stopped any cutting in the roadless portion of this area, about half the volume and acreage. It was a hopeful, if only partial step toward protection.

In a 1993 LANDSAT satellite photo, Forest Service clearcuts on the Uintas are easily seen; and more are planned—many in roadless areas. The Forest Service has admitted that most future timber harvesting will be in currently roadless areas simply because other timber potential has already been overharvested. Round Park is just the beginning. Salvage or not, the Forest Service has shown no inclination to chart a fresh course allowing wildness to define the Uintas.



Leasing means development. Early in 1994 Amerac Energy Company was authorized to construct a road and well four miles into the roadless Main Fork of the Bear River at about 10,000 feet. The Utah Wilderness Association appealed this decision, but the appeal was denied. Amerac has since cleared



the roadway into the wild Main Fork. The roadless area is now marred by roadcuts, trucks, graders, fences and culverts.

There are already two oil fields on the North Slope. In thirty years, the Bridger Lake Field has produced 12 million barrels of oil (approximately 20 hours of US demand). In 1987, development of the Hickety-Table Mountain Field in the lower Henry's Fork forever fragmented this lower drainage with roads, drilling pads, and collection plants.

Yet most geologists generally feel that the Uintas' precambrian origin precludes significant oil reserves. US Geological Survey reports in 1983 and 1988 and the 1994 Forest Service North Slope Oil and Gas Leasing EIS note the vast majority of the mountain range has low potential for oil and gas discovery, with estimates ranging from nine minutes to two days of oil at present US consumption rates.

Nonetheless, the Forest Service recently proposed to lease almost 200,000 acres of National Forest lands for oil and gas development. The Utah Wilderness Association challenged this decision, forcing the Forest Service to withdraw the leasing decision on the roadless area and to prepare a separate analysis of oil and gas potential in roadless areas. This analysis is expected soon and will test the Forest Service commitment to ecosystem management.

Livestock grazing poses another threat to the mountains. The Uintas are marked by 43 cattle allotments and 34 sheep allotments, with over 12 allotments and 13,000 sheep munching and trampling primarily within the designated Wilderness and adjacent unroaded terrain. Because of this, it is estimated that less than 40% of the Uintas are in good ecological condition. The victims include native Rocky Mountain Bighorn Sheep (susceptible to diseases spread by domestic sheep), Coyote, Cougar and the ghosts of Griz and Gray Wolf, targeted because they are predators.

The Uintas harbor the headwaters of all of Utah's major river systems—the Provo, Weber, Bear, and the major tributaries to the Green, the Duchesne, Uinta and Yellowstone. Each drainage is identifiably unique, from the broad green meadows of the West Fork of Blacks Fork and the deep canyon of the Uinta to the timbered slopes of the Yellowstone. Unfortunately, the Uintas have already borne the brunt of myopic water development.

Whereas the Ashley National Forest has identified five river segments on the South Slope as eligible for Wild and Scenic River Act evaluation, the Wasatch has identified only one small segment of the Stillwater Fork as eligible. Hundreds of miles of free flowing rivers, coursing through subalpine forests inhabited by Pine Marten, Great Gray Owls and Black Bears, rimmed by 12,000 foot peaks, were found to have no outstanding characteristics—"run-of-the-mill"

ivers. Characteristically, the Wasatch National Forest got trapped into thinking recreationally rather than ecologically.

Stocking of non-native fish has led to the near extinction of native Bonneville and Colorado Cutthroat Trout and has negatively influenced other aquatic species in lakes and ponds historically without fish. Introduction of non-native species like Mountain Goats could harm native vegetation. Wildlife "management" should emphasize natural processes, not the fishing pole or rifle, and should protect native species, including the large carnivores.

On many drainages, only after several miles of tranquil hiking will you see the sign, "High Uintas Wilderness," the artificial boundary that separates protected Wilderness from unprotected wilderness. When Congress passed the Utah Wilderness Act in 1984, it ignored critical roadless lands on the North Slope and the eastern 11,000 foot "bollies," and the vast upper drainages of the Provo and Weber Rivers at the base of Mt. Watson, a wonderland of subalpine forests dotted with small meadows, deep canyons, lakes and ponds. Adding these areas to the High Uintas Wilderness would assure a large and wild landscape to protect its remaining natural biodiversity.

A Uintas vision is braced by Aldo Leopold's profound advice: "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise." Imagine an integral High Uintas *defined by wildness*, not board feet, animal unit months or full creels. Imagine a mountain range defined by the creation of life, not the production of resources. ■

What You Can Do:

Get on the mailing list of the Wasatch (8826 Federal Building, SLC, UT 84138) and Ashley National Forests (355 N. Vernal Ave., Vernal, UT 84138) and urge the Forest Service to chart a new course for the High Uintas—a course where wildness and biodiversity matter. A loud, civil and vigorous voice is needed. Contact the High Uintas Preservation Council, POB 72, Hyrum, UT 84319 for additional information.

Dick Carter is a forester by profession. After spending five years as a seasonal wilderness ranger in the Sawtooths and Uintas, he worked for three years as the Utah regional representative of The Wilderness Society, founded the Utah Wilderness Association, and coordinated that organization for 17 years. He has since founded the High Uintas Preservation Council.

Walker Lake, Nevada: Oasis in the Desert

by Tom Myers

Flying west at 30,000 feet over the Great Basin, after passing the Great Salt Lake, a remnant of ancient Lake Bonneville, a San Francisco bound traveler notices several lakes lined up from north to south. Prior to crossing the Pacific Crest on the Sierra Nevada and Cascade Mountains, there is Abert Lake in southern Oregon, Pyramid Lake in northwest Nevada, Walker Lake in western Nevada, and Mono Lake in eastern California. All are remnants of wetter times during the Pleistocene and all lie at the end of their tributary rivers. And all are subject to the whims of humans living upstream.

Walker Lake is the terminal lake of the Walker River watershed draining east off the Sierra Nevada (see map). It supports threatened fish and hundreds of thousands of migrating birds, including biannual visits by up to 1400 Common Loons migrating to and from unknown locations. It is one watershed north of Mono Lake, which became infamous when the City of Los Angeles diverted much of its inflow to suburban lawns and golf courses causing water levels to drop and water chemistry and limnology to change.

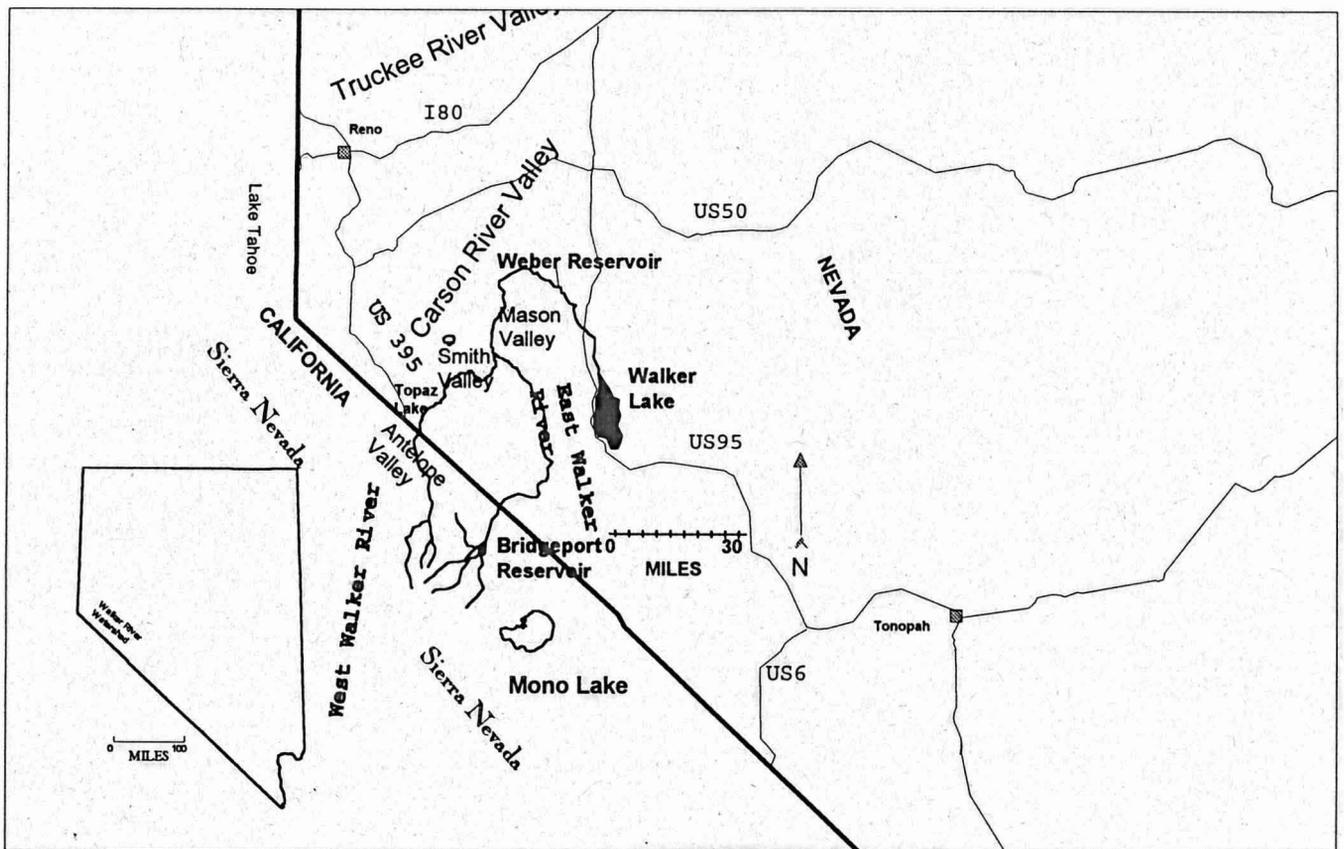
Walker Lake has similar problems in that upstream diversions are causing water level decreases and salt content increases to levels lethal to the resident fish and invertebrates. While there was one villain in the Mono Lake story, the Walker watershed has hundreds of individual irrigators in five separate major upstream valleys. The solution to the problem of a disappearing Walker Lake is simple: obtain more water. Implementing that solution is as complex as the watershed. Quoting limnologist Dr. Alex Horne of California-Berkeley, Walker Lake is a "rare and endangered species of lake" of which only a "handful exists in all of North America and on earth." The unfolding story of Walker Lake provides a case study of complex water issues that will be repeated all over the western United States.

PALEOGEOGRAPHY

From the east side of the Sierra Nevada, the Walker River flows north and east through broad, rich alluvial valleys before turning south to terminate in Walker Lake, where there is no outlet except for evaporation. These valleys, including Antelope, Smith, and Mason Valleys, support as much as 100,000 acres of alfalfa. As lake water evaporates, dissolved material remains behind and, because there is less water for the same amount of solids (salts), the concentration, expressed as total dissolved solids (TDS), increases.



illustration by Ann Young



Walker Lake is a remnant of the Pleistocene Lake Lahontan which covered much of central and northern Nevada (Grayson 1993). As the climate dried, Lake Lahontan receded and many closed valleys became isolated dry lake beds. However, the three major rivers draining east from the Sierra Nevada continued to support lakes and wetlands. More famous than Walker Lake is Pyramid Lake, the only habitat of the endangered Cui-ui fish, into which drains the Truckee River. The Carson Sink and Stillwater Wetlands, recognized by the United Nations as a Biosphere Reserve, lie at the terminus of the Carson River.

The level of Walker Lake fluctuated greatly during the past 5000 years (Benson et al. 1991). Most of these fluctuations were due to evulsions of the river channel rather than climatic variability. For example, the Walker River may have diverged through the Adrienne Valley north to join the Carson River (King 1993) around 2100 BP. When this occurred, Walker Lake completely dried. This may have prevented the Cui-ui fish from establishing because it cannot survive in fluvial systems. This diversion and subsequent desiccation may have allowed Walker Lake to attain its current low levels of salinity because much of the salt blows from a dried lake bed. Prior to the unnatural drying beginning in 1882, TDS would have been near 2600 mg/liter (Myers 1997) which compares with values in a natural Mono Lake exceeding 20,000 mg/liter.

BIODIVERSITY

Because of the historic fluctuations, only three endemic fish species survived in Walker Lake. Most numerous is the Tui Chub (*Gila bicolor*), a subspecies of special concern to the American Fisheries Society. The Lahontan Cutthroat Trout

(LCT, *Oncorhynchus clarki henshawi*) occupies the top of the fish food chain. An adaptive species, adult LCT in lakes may reach lengths of several feet, while adult individuals in fluvial populations may be only six inches long. Because of Weber Reservoir just upstream from the lake on the Walker River Paiute Reservation, LCT have not successfully spawned since the 1930s. Although classified as Threatened under the federal Endangered Species Act, the Walker Lake population has no protection because it is maintained by artificial propagation. A third native species, the Tahoe Sucker (*Catostomus tahoensis*) is rare in Walker Lake because of a lack of spawning habitat. These fish have evolved high tolerances to adverse conditions.

Many birds use the lake as a migratory rest stop and feed on the fish, especially the Tui Chub. The region around the lake is so important that it has been nominated as a "US Important Bird Area" by the American Bird Conservancy. Birders found almost 100 bird species within 15 miles of the center of the lake during the 1996 Christmas bird count.

THE PROBLEM

The water law of most western states is based on the principle of prior appropriation which basically means: "first in time, first in right." The first person to put water to a beneficial use owns the highest priority water right on a river. Each water right owner on a river system has a priority date equivalent to the first date the water was used. The oldest, or senior, rights on a river must be completely filled before younger, or junior, rights receive any water. This is true without regard to the value of the use to which the water is applied. Water must be used at the same location in perpetuity unless the owner applies for, and receives, a transfer in point or type of use. Other

users may protest such a change if they feel they will be harmed. For example, a user may be harmed if his or her water right is actually the return flow from another's use and the proposed change will eliminate that return flow. Return flow is the water that "returns" to a stream after being used and may be either on the surface or in the groundwater.

Some states have begun to require minimum flows on some rivers to preserve habitat. Some states merely allow their wildlife department to purchase water rights and "use" the water by allowing flow to remain in the stream. On streams with unappropriated water, states may choose not to grant rights if doing so would lower flows below a minimum. Nevada does not currently have any instream flow requirements.

Diversions primarily to irrigate alfalfa have caused the decreased flows. The river basin is federally adjudicated, which means that a federal district court certified the water rights. Water rights exist for about 130% of the normal river flow. The only rights dedicated to the lake are flood water rights, which basically means that the lake is legally entitled to all water that currently escapes the diversions.

Most of the water rights owners are organized into an irrigation district to improve their water management. The district also owns two reservoirs on the system to store spring runoff. Prior to development, most lake inflow occurred during spring runoff. The district's reservoirs evaporate about 10,000 acre-ft/year and Weber Reservoir, owned by the Walker River Paiute Tribe just upstream from Walker Lake, evaporates 4000 acre-ft/year. (An acre-foot is a volume equal to one foot of depth spread over one acre.) Evaporation is a rather small proportion of Walker River flow compared to many other developed rivers in the West, but the reservoirs deplete the flow by allowing storage rights to supplement the surface water flow rights which allows additional acreage to be irrigated.

Beginning in the late 1950s, many irrigators developed supplemental groundwater wells to be used only when surface water flows are insufficient to meet their right. This is a form of water banking in that wintertime surface flows will make up groundwater deficits. Pumping has decreased the groundwater levels by tens of feet, which decreases groundwater flow to the river in the Smith Valley and causes flow losses in the river in the Mason Valley. During high flow years in the early 1980s, a much smaller proportion of flow made it through the valleys to Walker Lake than during previous years because of the aquifer recharge.

The combination of overappropriation, reservoirs, and groundwater pumping has led to decreased flows to Walker Lake. Flows reaching Walker Lake from its river have decreased by two-thirds, from 285,000 acre-ft/year to 90,000 acre-ft/year since 1882. The lake level dropped 150 feet between 1882 and 1994 and the volume decreased from 9.1 to 1.9 million acre-ft. During an eight-year drought prior to 1994, no flow reached Walker Lake. TDS concentrations peaked at over 14,000 mg/l which is almost lethal for Lahontan Cutthroat Trout and Tui Chubs. If allowed to continue, most fish will die and

most of the birds that feed on them will have to find a different resting and feeding location. In arid Nevada, free water surfaces are long ways apart; the different productivity of reservoirs makes them poor replacements. Fortunately, high flows returned in 1995 because of an extremely wet winter. As of this writing (March 1997) after three wet winters, the lake level is up eight feet. Nonetheless, with evaporation rates of four feet per year, a return to dry conditions for just a few years would cause ecosystem collapse.

SOLUTIONS

People working to save Walker Lake have one primary goal which will satisfy most other interests: reestablish spawning runs of Lahontan Cutthroat Trout. This requires three things. The lake must have sufficient water that TDS levels are low enough to allow natural growth and productivity. The river must flow into the lake during the spring of enough years to allow spawning runs. And either a fish ladder must be built on Weber Reservoir or the dam must be removed to allow spawning runs up the river. Even hatchery-spawned LCT feel the reproductive urge when flow reaches the lake. During high flows in 1996, trout moved upstream until stopped by the Weber Reservoir stilling basin.

The first two needs will probably be solved jointly. If water rights are obtained for the lake, they will likely be satisfied during the spring spawning run. But western water law has impediments to the transfer of water rights for environmental purposes.

Buying and transferring rights, or water marketing, is a solution, but the irrigation district has promised to oppose transfers in court. Although it is difficult to imagine how others are hurt by allowing water to remain in the river, court battles are costly. Ongoing groundwater and water rights modeling studies are being performed to show the impacts of potential transfers and retirement of irrigated fields. Ironically, it is possible that irrigated acreage retirement could lower well levels and decrease return flow because irrigation is the primary source of groundwater recharge. As the groundwater table lowers, it will no longer slope as steeply toward the river and return flow will be slower. Prior to the advent of irrigation in the 1860s, the river probably lost water to the groundwater.

Other alternatives include paying for irrigation efficiency improvements and transferring the saved water to the lake. This would require a change in state water law. No states have recognized the transfer of saved water, but the Bureau of Reclamation has considered it as part of its new (since there are no more dams to build) water management mission. Arguments over the amount of savings from structural improvements (such as lining ditches) will occur. Advantages to the ranchers are that they could continue growing the same quantity of crop and have an easier irrigation system to operate. The district holds out because they argue that saved water should go to irrigate additional acreage. This would mean the end of Walker Lake and its ecosystem.

Litigation is an alternative currently being pursued. Attorneys for Mineral County, where the lake is located, plan to argue that a "public trust" exists for water to reach Walker Lake. The public trust doctrine is a common law legal rule that the public has an interest in its natural resources such as lake levels and fisheries. This doctrine was used to save Mono Lake in California; the court recognized that the public had a right to a certain lake level and curtailed the diversions to Los Angeles. For Walker Lake, the doctrine could be used to argue for a public right to a lake level necessary for certain ecosystem functions such as LCT and Tui Chub productivity.

Saving the lake does not require stopping all diversions. The amount of water required depends on the final desired level. The current volume of 2.2 million acre-feet is one-fourth of what it would be without irrigation. Current inflow averages less than 90,000 acre-feet/year. This must be increased by at least 50% to maintain a minimally productive level, which could be accomplished by retiring about 20% of the irrigated acreage and enforcing existing groundwater pumping laws (Myers 1997). (While the savings of retiring fields varies with location throughout the watershed, the 20% figure is based on a consumptive use of almost 200,000 acre-ft/year.) Additional inflow would allow the lake to rise to more productive and more natural levels that would withstand future droughts.

CONCLUSION

Saving Walker Lake will require that the water rights structure of the Walker River basin be changed radically. It requires the transfer of existing surface water rights to the lake and the cessation or substantial curtailment of groundwater pumping. It can be done in ways beneficial to both humans and Nature, but it requires the political will to make hard choices regarding whether we will save an ecological treasure or allow it to die. We need to ask whether it is ethical to so totally use a resource that all else dependent on it must die. Problems in the Walker River watershed resonate throughout the West, where overappropriated rivers are diverted dry during low flow periods to the detriment of Nature and downstream economies. It is time to reconsider "first in time, first in right" water law by remembering that the first in time were the native fish and birds and other wildlife that have been using Walker water for millennia. ■

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RIMROCK

*Azalea blooms
on rimrock,
granite headland
looking toward
green hills
across the lake.
Columbines root
on fissure walls
exhaling
cold earth air.*

*Wildflowers fuse
past & present,
witness Iroquois
hunters ghosting
riverbanks—
submerged beneath
dammed waters.*

*Only twilight
holds the medicine
to smooth the wake
of motorboats,
to muffle roars
of fighter jets,
to drain upland
death as hunters
resurrect & spark
an evening's fire.*

—Walt Franklin

Endangered Major Ecosystems of the United States

by Reed Noss

Entire ecosystems—habitats, communities, and landscapes—in the US have declined greatly and, in some cases, vanished because of human activities. Research commissioned by the National Biological Service (Noss et al. 1995) and a follow-up study by Defenders of Wildlife (Noss and Peters 1995) determined that a large number of ecosystems, many of which are unique to North America, are endangered. Among the major ecosystems that have suffered substantial losses and remain at risk in the US are those listed below. Direct habitat destruction, fire suppression and other disruptions of natural disturbance regimes, and secondary effects such as invasion of exotic plants and animals were identified as major threats to these ecosystems. As these ecosystems decline in extent and quality, so do populations of the species that compose them. It stands to reason that conservation strategies, including restoration, focused on entire ecosystems or landscapes will be more efficient than separate plans prepared for hundreds of individual species at potentially thousands of sites.

Listed here are the most highly endangered major ecosystems of the United States as determined by a coarse analysis of extent of areal decline since European settlement, current rarity (areal extent), number of endangered and threatened species associated with each type, and level and urgency of continuing threats. Adapted from Noss and Peters (1995) and included in Noss et al. (1997).

- South Florida landscape
- Southern Appalachian spruce-fir forests
- Longleaf Pine forests and savannas
- Eastern grasslands, savannas, and barrens
- Northwestern grasslands and savannas
- California native grasslands
- Coastal communities (terrestrial and marine) in the lower 48 states and Hawaii
- Southwestern riparian communities
- Southern California coastal sage scrub (and associated communities)
- Hawaiian dry forest (and associated communities)
- Large streams and rivers in the lower 48 states and Hawaii
- Cave and karst systems
- Tallgrass prairie
- California riparian communities and wetlands
- Florida scrub
- Shrublands and grasslands of the Intermountain West
- Ancient eastern deciduous forest
- Ancient forests of the Pacific Northwest (including redwoods)
- Ancient Red and White Pine forests of the Great Lakes states
- Ancient Ponderosa Pine forests
- Midwestern wetlands
- Southern forested wetlands

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Yendegaia

A proposal for a forest conservation and restoration project in Tierra del Fuego, Chile

by Alan Watson Featherstone

Situated at the southern tip of South America, Tierra del Fuego and neighboring mainland Patagonia contain some of the best remaining temperate wilderness on the planet and the only sub-antarctic forests in the world. In Tierra del Fuego, the Andes meet the Pacific and Atlantic Oceans in a spectacular area of snow-covered mountains, fiords, and glaciers which calve icebergs into the Beagle Channel. In the Chilean part of Tierra del Fuego, the main mountain range—the Cordillera Darwin—is protected in the remote 1,460,000-hectare Alberto de Agostini National Park, while in the eastern, Argentinian half of the island, the Tierra del Fuego National Park encompasses 34,500 hectares of land adjacent to the international border.

The land in between these two parks, and fronting the Beagle Channel, is the 39,000-hectare Estancia Yendegaia, which is currently used for cattle ranching. 'Yendegaia' is a word from the language of the Yahgan people, one of the now-extirminated indigenous tribes of Tierra del Fuego, and means *long bay*. That 'Yendegaia' includes 'Gaia,' the ancient Greek name for the Earth Goddess, and a word lately adopted by many to refer to the living Earth, adds a deeply symbolic dimension to the proposal to establish a Nature reserve and forest restoration project there.

The owner of Yendegaia has put 25,518 hectares of the estancia up for sale, and a consortium of conservation groups from Argentina, Chile, and Scotland is seeking to raise the funds to purchase this area. Our plan involves protection of the intact forests and an ecological restoration project to return the degraded forests there to a condition of natural wilderness. This would link the existing Alberto de Agostini and Tierra del Fuego National Parks, thereby creating a continuous protected area along the northern side of the Beagle Channel, from the westernmost point of Tierra del Fuego to within a few kilometers of the town of Ushuaia in the Argentinian half of the island.

The 25,518-hectare area up for sale has a total of 10,685 ha of forest including 2850 ha of Magellanic evergreen rainforest characterized by Coigue or Guindo trees (*Nothofagus betuloides*), while the other 7835 ha is a mixed forest in which Lenga (*Nothofagus pumilio*) predominates. The remainder of the land is 2600 ha of sphagnum peat bog and 12,223 ha of alpine vegetation.

However, an as yet undetermined area of the forest and some of the bogs have been degraded by cattle grazing, so one of the priorities of the project will be restoration of these fragile ecosystems. Drawing on the experience of Trees for Life's award-winning restoration work for the Caledonian Forest in Scotland (a forest the same distance from the equator as those of Tierra del Fuego, which consequently shares many ecological characteristics with the sub-antarctic forests of the south), this project will be implemented by local conservationists in Chile and Argentina in an inspiring example of international cooperation to help the healing of the Earth. One of the significant features of this project is

[Yendegaia] would link the existing Alberto de Agostini and Tierra del Fuego National Parks, thereby creating a continuous protected area along the northern side of the Beagle Channel...

that it will protect Lenga forest; none of this forest type is protected in Chilean Tierra del Fuego at present. This is a significant omission in Chile's system of protected areas, as Lenga forests are being degraded throughout Tierra del Fuego by conversion to cattle pasture, burning, and large-scale "development" such as the Trillium Corporation's Rio Condor project. This US-based multinational logging company already owns over 250,000 hectares of land in Chilean Tierra del Fuego, where it proposes to carry out a controversial "indefinitely sustainable" selective logging operation, and has made an offer to the owner of the Yendegaia estancia for the 25,518 ha he is selling. However, in March, the Chilean Supreme Court ruled that Trillium's Rio Condor project would not be environmentally sustainable, which may derail their plans in Yendegaia. Meanwhile, the owner of Yendegaia has indicated he would prefer to sell to someone who will not cut down all the trees.

The choices for the future of Yendegaia and other wild lands in Tierra del Fuego provide a stark microcosm of those all over the world—uncontrolled exploitation through logging by multinational companies and degradation by cattle ranching, or protection and restoration of their unique wilderness qualities. |

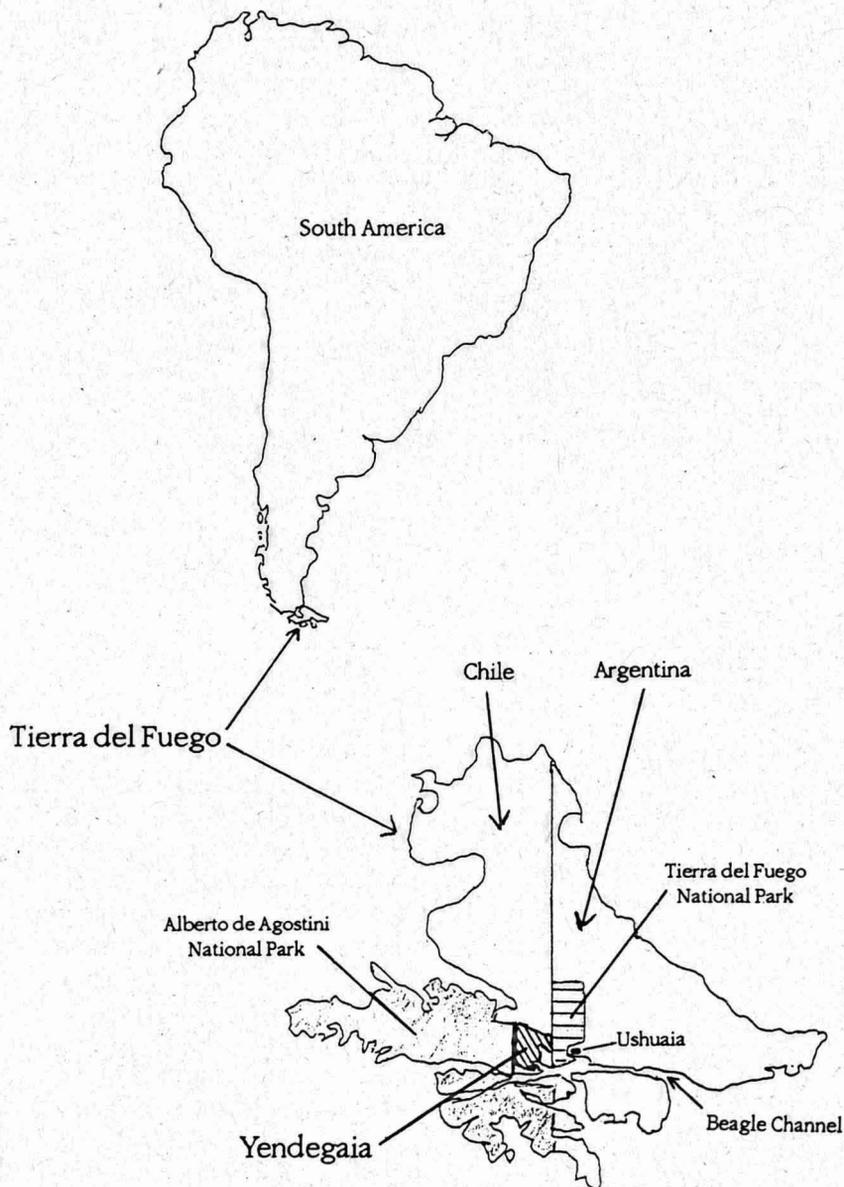
What You Can Do

For this project to succeed, and for Yendegaia to be protected, funds and support are urgently needed. An estimated US \$2.5 million is required for the purchase of the land and initial management. Please send donations or offers of support to:

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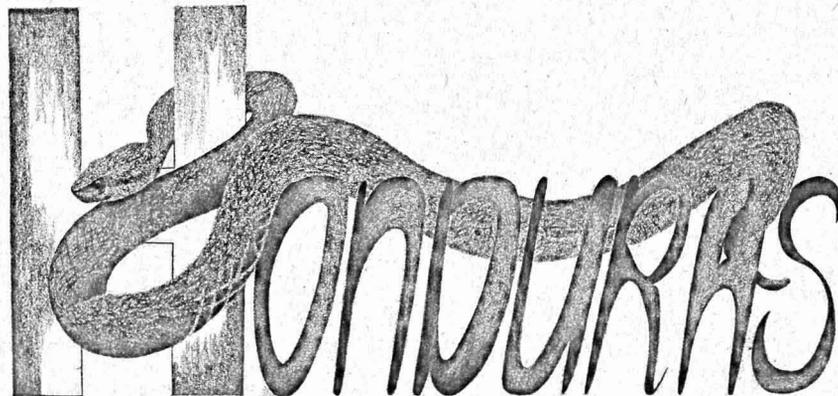
Gracilea Ramaaciotti, Finis Terrae, Ap. Postal 22, Teuk 802, 9410 Ushuaia, Tierra del Fuego, Argentina. Tel +54-901-34122 Fax: +54-901-33302 or 31890

Alan Watson Featherstone is the executive director of Trees for Life. He described Trees for Life's efforts to restore Scotland's Caledonian Forest in Wild Earth's first Wildlands Project special issue (1992), and plans to update WE readers on their work soon.



Exploration

of the Montana De Susmay Olancho,



by Bruce J. Sleazeweazel Morgan

The next day was particularly cold, clammy and miserable, so we all decided to take an easy stroll back to the beautiful pine ridge, rather than risk being refrigerated in the cloud forest. Ann and Alycin had found their way to the ridge the previous day by means of a different trail, and were eager to show us their discovery. They had not carried a machete, but had marked their way by tying vines into macrame trail markers. No need to be macho. We turned off onto their trail just beyond the howler monkey tree. Nobody was home, but we could hear the monkeys howling off in the distance. Just beyond the juncture Chris bumped into a large wasp nest hidden beneath a palm frond. They rushed to attack, and landed in mass all over his pants legs. Only a few stung him. The rest just hung there buzzing angrily while Chris froze in terror. What to do? The greater mass was removed by ever so gently slipping a leaf beneath their feet. The rest were removed by beating his butt as he ran howling down the mountain.

We emerged onto the ridge, then followed it north to a promontory from which we had a magnificent panoramic view. The clouds momentarily lifted to reveal the hidden mountain peaks. From these I was able to triangulate our position. At last, we were no longer lost! From our position on the ridge, I was able to deduce that we were in fact camped in the bottom of the giant sink that we had been looking for all this time!

The bandits' trail continued northeast down the mountain toward Gualaco, so we followed it past the pine clad Cerro del Suyatal into a confusing area with a series of small sinkholes. The clouds closed in and rain began to fall. We tried to take a shortcut and immediately got lost. After hacking our way back to the trail through a dense fog, we thought better of the effort, and headed toward camp.

It was difficult not to worry about what might happen if we should encounter the imaginary banditos. Fog is a fertile broth for overactive imaginations. We were on their trail, on their turf, and without a gun. Chico had remained behind to guard the camp. Everyone in Honduras assumes that everyone else has a gun, so I partially opened my

*I have made
many blunders
due to my
bad Spanish.*

Editor's note: Part 1 of the intrepid Sleazeweazel's expedition account ended with him and his companions sliding back down to camp after climbing to the cloud forest in search of a view that would disclose the huge sinkhole they sought.

raincoat, arranged a wad of clothing to look like a concealed gun, and intended to bluff my way out of any encounter. To go along with this charade, I silently practiced a series of grave pronouncements with which to terrorize my imaginary antagonists. My grasp of Spanish syntax is absurdly bad, so when I recited my threats to Ann, she almost fell over laughing. What I had said was, "Halt, or I'll shoot myself!"

I have made many blunders due to my bad Spanish.

That night at camp, I bragged to Chico and his friends that I was the laziest bum around, that I had never held a regular job in my life, and that I was "El Jefe de los flacos." They gave me very odd looks, as though afraid to laugh. It turns out that in Honduras a "flaco" is not a lazy person, as is the meaning in Mexico; but rather one with a flaccid penis, so I had called myself "Chief of the limp dicks!"

One time in Costa Rica I tried to ask my gracious host if a certain elderly woman was his relative, instead I asked, "Do you have sex with that old hag?" She was his mother. He was not pleased.

Another time, in the Guatemalan highlands, I was crossing a mountain pass. The trail hugged the cliff just like in a Snuffy Smith cartoon, nowhere to run. I was wearing camouflage pants and wearing jungle boots, always a mistake in war torn Guatemala, where such a uniform means you are either a soldier or a guerilla. Either one is bad. Coming around a corner, I surprised a poor little Indian woman and her two children. She froze in consternation, so I tried to say "don't be afraid" (no tenga miedo), but instead I said, "no tengo mierda" which means "I have no shit." She fled in terror, and from that point on all the villages we encountered were abandoned.

Nor am I atypical of Americans with my linguistic lapses in Latin America. Recently, a friend of Ann's was in a furniture store in Costa Rica, looking at a new bed. He tried to tell the shopkeeper that he wanted to show (*mostrar*) his wife first, but instead he said *montar* (to mount, as in to have sex with). When he led his wife inside to look at the bed, everyone eagerly gathered around to watch.

Then there was Ann's friend Penny, a third year language student, who went to Mexico to practice her Spanish. The name "Penny" just doesn't sound quite right in Spanish, so she began calling herself "Pene" (Pay nay), which sounds more euphonious. The nice dignified people that she was visiting were too polite to explain to her that Pene means penis in Spanish, so that is what she called herself for several months, until a drunken bum informed her of her indiscretion.



It rained hard all night. The following morning Alycin had to leave to return to Canada, so Chico saddled up and led her away through the mist and mud. I was glad not to be going anywhere. I kept the shotgun to make sure that Chico would return promptly. Getting a cowboy to part with his gun is like taking an infant from a doting mother. "Please, señor, be nice to my little gun!"

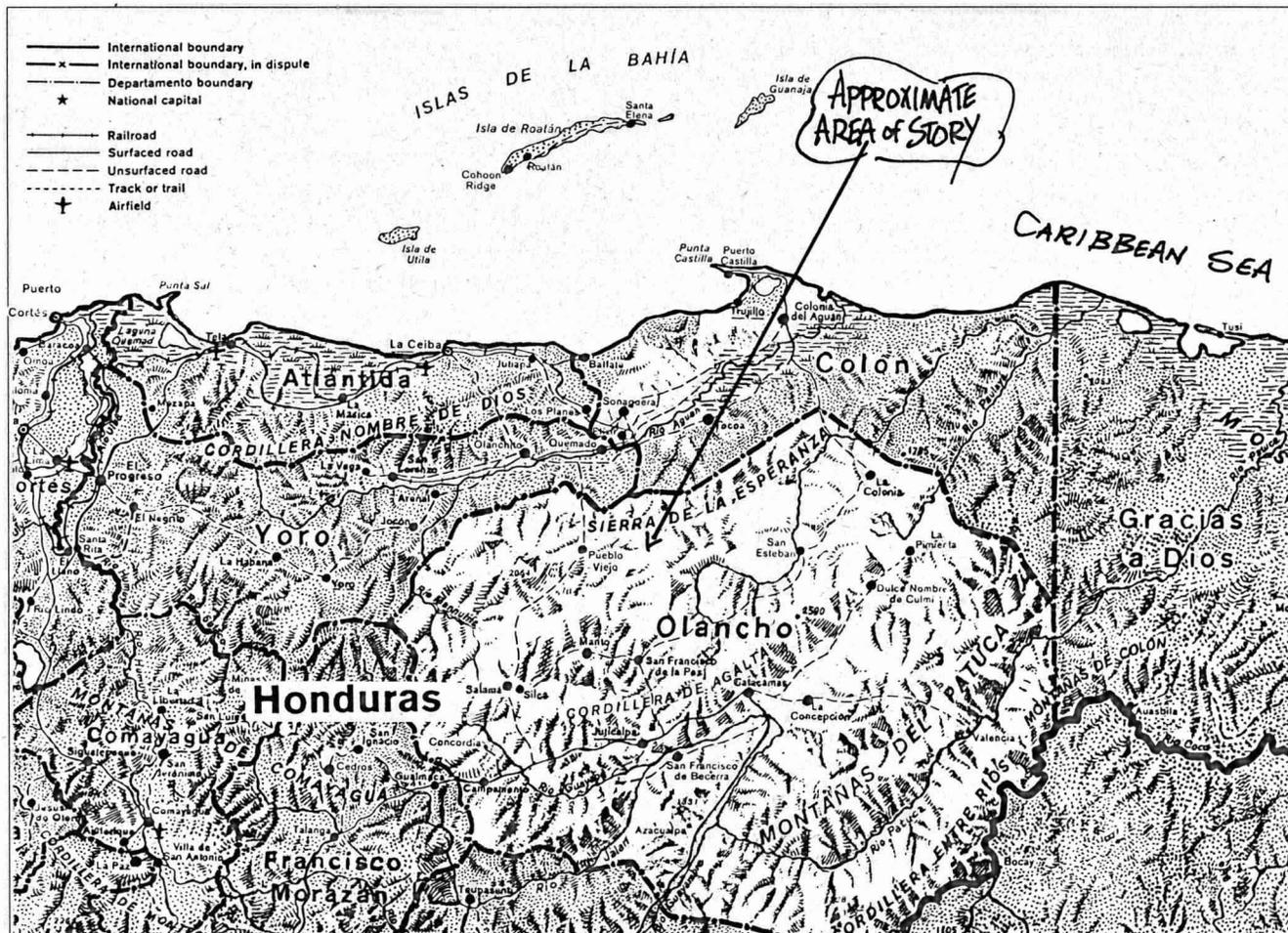
The day was too dreary for a major effort, so I wandered off to the south to commune with the forest. It is difficult to describe the majesty of the enormous trees that grow on the flanks of the dolina. The biggest trees are the lucky few that happened to grow on steep rocky slopes, with good purchase for their roots in deep rock crevices. Gravity is the ultimate enemy. Who knows how long such a tree must wait as a sapling beneath the umbra of the forest giants, until gravity, wind, or lightning clears a path to the sun? Then, with a great spurt of growth, the tree overtops all the others, loses its lower branches, and emerges above the canopy to become king of the forest.

It reigns supreme for centuries, maybe for millennia, until one day a little bird shits on one of its branches. The droppings contain the seed of a strangler fig, known as "matapalo" (tree killer) in Spanish. A few leaves sprout, just enough to get a photosynthetic foothold. Unlike the thousands of other epiphytes, such as orchids, bromeliads, aroids, ferns, and mosses, which cling to the great limbs without doing any harm, the young fig puts all of its energy into one long thin root that dangles down a hundred feet or more, one strand among countless vines hanging from the spreading crown. When the tiny root finally reaches the life-giving soil, it begins its insidious work. The root tightens against the trunk of the tree, then it sends out lateral sprouts which wrap the bole in an ultimately fatal embrace. Soon the entire trunk of the tree is enmeshed in an ever growing web. Incredibly, juvenile figs, and many other sorts of vines as well, can actually "see" their host tree, and will climb toward it, by means of a process known as negative phototropism. Most plants simply grow toward the light, but these plants grow toward shadows, and can somehow recognize whether or not the object toward which they are growing is a suitable host.

If the forest giant is still growing rapidly in girth, it will quickly succumb to the strangler, like a young tree girdled by a strand of fence wire; but the old monarch spends centuries in senescence, barely growing at all, so there is little need for the cambium layer to expand. The strangler continues to grow, the sinuous aerial roots wrapping the trunk like an orgy of huge writhing serpents, but it does little immediate harm to the host.

Eventually, the strangler wins. The giant slowly dies. What appears at a distance to be a healthy head of foliage, may actually be just the leaves of the fig. More time goes by. How long does it take for the heart of a giant mahogany or walnut to rot completely away? In the end, nothing is left standing but the enormous reticulated trunk of the giant fig, perhaps twenty feet in diameter, and hollow on the inside where the old tree once stood. You can see right through it, or climb it like a ladder to the very top, providing that you are not afraid of the innumerable snakes, scorpions, spiders, ants, bees, and wasps that live inside.

Such a tree is a marvel to see. Even more spectacular is the great bounty of fruit that the fig "tree" can produce. When conditions are right, countless figs litter the ground. Animals



come for miles to share in the feast. Possums and fruit bats gorge until they puke. Toucans croak and argue with their mouths full. Tweety birds of every description fill the sky. Delirious butterflies slurp fermented nectar. Drunken monkeys pelt each other with fruit like frat brothers at a food fight. Mice, rats, agoutis, tepesquintles, Tayra, peccaries, deer, and tapirs turn the ground beneath the tree into a rich pudding of mud, shit, bugs, and fig pulp. Even though lunch is free, this is not the peaceable kingdom. In the shadows, higher on the trophic mountain, lurks El Tigre—Jaguar—and all too often these days, a hungry man with a gun.



Once we knew where our camp was located, it was relatively easy to find our way around, so all of us except Chico decided to head southeast in search of a remote sink hidden behind the peak that I had explored with Barbara. This range of jagged peaks is variously known as the Montaña del Zapotillal or the Cerro los Volcanes, the latter name presumably derived from the numerous sinkholes that some people confuse with the calderas at the top of extinct volcanos. Whatever the name, it is one of the most remote and unexplored places in all Olancho.

We made our way up through the beautiful grove of parlor palms, past the giant sweetgum, to the trail that led around the mountain to El Gorrion. This trail was a mystery. I sup-

posed that it must continue across the mountains all the way down to the town of Catacamas, though Chico had dismissed the idea as impossible. We followed it to the east, away from the village, and in a short while came to a clearing on the mountainside. Some enterprising soul had decided to make a little finca in the wilderness, miles from nowhere.

As usual, the clearing had grown up into a hellish mess, so we walked along the trunks of the fallen giants until we reached a little house, perched on a 45 degree slope. The hermit was not home. It was a nice, well constructed house, made of daub and wattle (mud plastered to sticks), and had a wooden shake roof. The inside was bare except for a hammock, shelf, pot, and mud oven.

I climbed up on a burned stump to survey the scene. The clearing opened up an expansive view to the north. A mile away, a mile across, and seven hundred feet below, was the giant sinkhole where we were camped. Beyond that, the beautiful pine ridge separating the sink from Quebrada Seca, then on to the ocher desert below. It was a magnificent scene, too bad they had to cut down the jungle to see it.

The trail stopped at the house. To the east was an impenetrable thicket on an almost vertical slope. We all argued as to the existence of a trail. I was certain I could see it, a slight change in the texture of the wall of vegetation. Chris argued that, with his artist's eye, he should be able to see it, but couldn't.

I sharpened up, then began to hack my way along the slope.

It was a mixture of saw bladed grasses and giant herbaceous weeds, especially the wretched Chichicaste. All this was tied together with innumerable vines. A soft fuzzy blanket of Chichicaste settled on us as we hacked our way through. A touch from either leaf or stem sent needles of searing electric pain into our quivering sweat-soaked flesh. Big angry welts rose up on our necks and arms. The slope was impossibly steep. With every other step we fell to the ground, clutching at razorgrass, risking disembowelment by machete.

The fallen trees are often too large to easily climb over. Sometimes it is necessary to climb up a stump just to get on the log. As soon as you do, you slide off the smooth slimy surface back down into the tangled brush. Even worse are the fallen crowns, interlaced with all of the above, and truly impenetrable. Eventually we reached the edge of the clearing and entered the welcoming jungle.

The hermit had come here years ago to collect thatch, hence the barely discernable trail. After the thatch patch, the trail ended. We hacked our way onward. It was rough, but the open jungle was infinitely easier than the second-growth hell. At a low pass that led to the hidden sink we encountered another barely visible trail. The old hermit knew all the secrets! It led through a narrow defile, then down into a deep ravine. I had wanted to be the first person to see this hidden place, but why not share one's discoveries with a hermit? They never tell.

It was deep and dark in the bottom of the sink. Mountains surrounded our lost valley on all sides, blocking out the afternoon sun. The floor area was about one quarter of a mile long by an eighth of a mile wide. Deep silence reigned in the green gloom. We searched the bottom, expecting to find an enormous cave. There was reason to suppose that we might find a pit over a thousand feet deep, but we found nothing, not even a swallet to drain the valley. I had expected great cliffs, but little or no rock was visible, just hard mud.

Despite our lack of success in finding a cave, we were elated by having reached this wondrously remote place. We were truly lost in the jungle, four middle-aged gringos who had gone where nobody except the hermit had ever gone before.

We returned to the hermit's hut to pilfer a few vegetables. He had graciously done the work for us by leaving a small pile of squashes and chayotes by the front door. Easy pickings. In return for the vegetables we left some money hidden under his cooking pot. In addition, I left a note written on my business card which said, "Thank you for your generosity Señor. You have a very beautiful finca, but if you cut down any more trees God will be very angry with you, and you will be punished." Signed, "Los Duendes Perdidos," which means, "The Lost Duendes."

Duendes are little bogeymen that inhabit the jungle everywhere from southern Mexico to Bolivia. They rather resemble dwarf tropical abominable snowmen. They manifest themselves differently in different parts of their range. In northern Central America they are about three feet tall, covered with hair, wear enormous sombreros, and have feet pointing back-

wards to throw you off their track. In Ireland they are called Leprechauns. Like bogeymen everywhere, they come out at night to play devilish tricks on unsuspecting Christians. The poor hermit probably couldn't read, so imagine his consternation when he took the card to town, and discovered that his finca was infested with duendes so rich and powerful that they give away American dollars, and are angry with him for cutting down trees!

Just to befuddle him a bit more, at the fork in the trail we left a sign pointing straight up the mountain, up the trail that I had cut to the cloud forest. No one in their right mind would hack a trail straight up a cliff for no reason. For a Honduran peasant there is nothing of interest on the top of a mountain. Surely some great treasure must be hidden up there, but who would dare follow a duende?

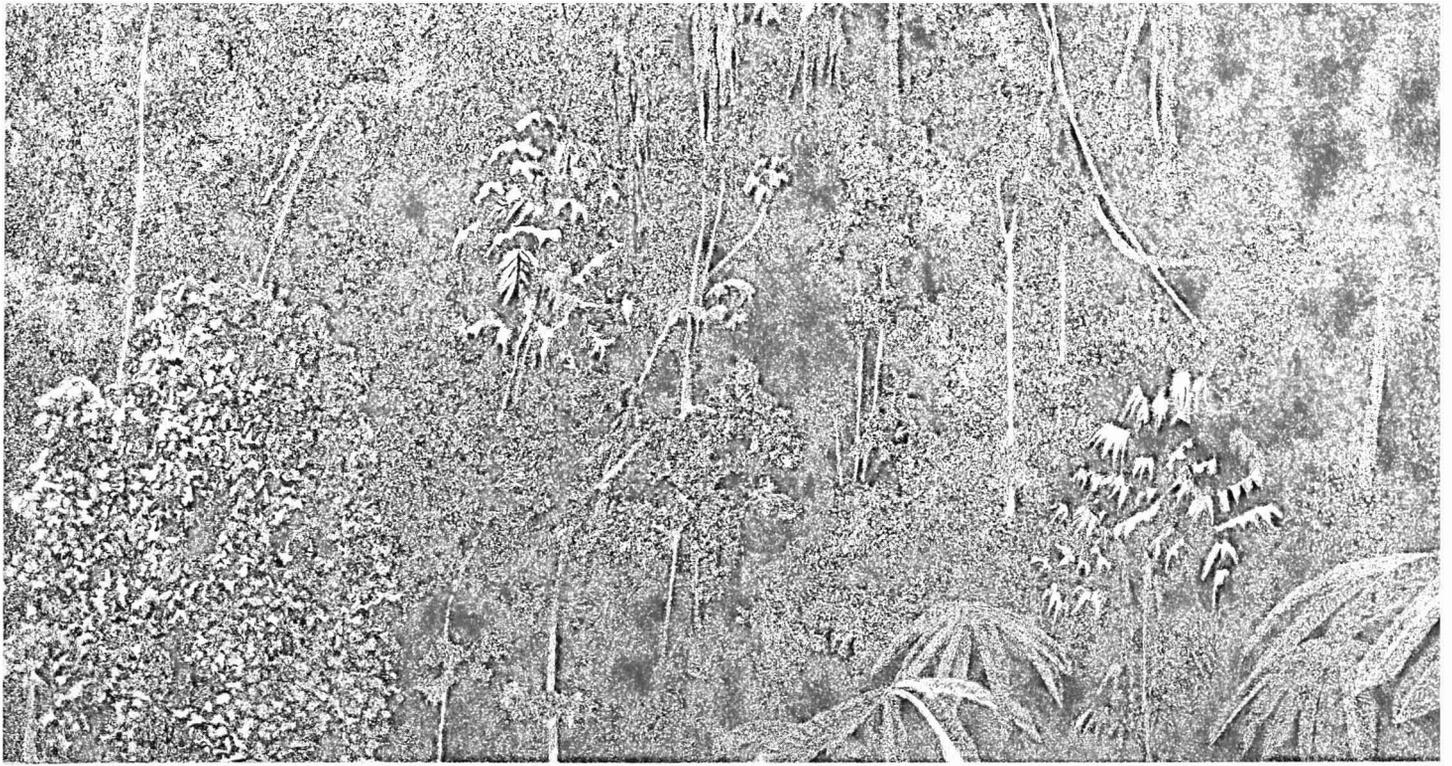
Our efforts thus far had not revealed a single cave, and we were tired, dirty, and cold; so, after a day of rest, we decided to head back down to the Nameless Valley and camp at the big flat we had passed through on our way up the mountain. I left ahead of the others and enjoyed an easy stroll down the mountain, pausing to collect rock samples along the way. The geology here is far more complex than what is shown on the geological map. Alternating bands of limestone, red sandstone, and a quartzite-like metamorphic rock were found on every ridge. I could not predict where I would find a given type of rock.

After two weeks in the deep green jungle it was a shock to come out into the brilliant sunshine and brown expanse of the devastated flat. I lay down on the trunk of a fallen giant and baked in the sun while waiting for my friends. It was good to be warm and dry. In the distance I could see the mountain ridge where the map showed two caves in a deep sink. This would be our next objective.

We set up camp in the yard of an abandoned house at the upper end of the big flat. Nearby was the prettiest pig farm in all the world, owned by a nice young couple named Rutilio and Diana. Diana was a veritable princess in a pigsty. She could have been a knockout in a New York City disco, but instead she presided over her little bit of paradise deep in the mountains of Honduras. Good choice. Despite the presence of innumerable pigs, including a huge boar whose warty testicles dragged the ground, the place was remarkably clean. The family welcomed us like visiting royalty, offered us fruit and bacon, and invited us to use their most precious commodity, a supply of fresh clean water piped from a spring far up the mountain.

The next morning we headed out early, intending to chop our way directly to the caves shown on the map. None of the local people seemed to have any idea where these caves were, though everyone agreed there must be caves somewhere up there.

Right behind Rutilio's house the big flat tightens to a narrow gorge. Everything was sopping wet, and the boulders as slick as glass. Even in this deep dark gooeey gorge the Nameless Valley had no running water. We followed the dry stream



for half a mile, then a trail led up to a new finca from which we had a view of our objective.

We were looking head on at a series of knife-edged ridges less than half a mile away, between two of which lay the hidden valley with the caves. How could the local people not be familiar with such a nearby place? The answer was simple: the terrain was hell. The ridges were extremely steep and rocky, and the summits had all been burned. Horrible second growth vegetation blocked all approaches to the hidden valley; nevertheless, it seemed a simple matter to chop our way straight up.

I chopped until my hands were numb and bleeding. It was impossible to continue on the high route I was taking, so Chris headed down to a lower pass by literally walking on top of the tangled mess. At the pass we found a tiny hidden garden of bananas and young coffee plants. Someone had been here before, but his trail had completely disappeared. The configuration of the pass led us astray, and we were soon headed in the wrong direction. Anyone would have been so deceived. It was the natural lay of the land. No wonder the local people had never found the caves.

With difficulty I convinced the others that we had to climb up and to the west toward a towering cliff that we could see through the dense jungle. Just short of the next pass my arm gave out. I could chop no more. Chris took the lead, hacking furiously with his dull little machete. (He should know better than to carry a little machete in Macholand; someone might make a disparaging comparison to the size of his penis.) Our progress was agonizingly slow, less than a hundred yards an hour. Chris was about to give up, saying we had already proven there were no caves in Honduras. I called up to him, "just one more chop, my friend, we're almost to the promised land!" He gave a few more mighty whacks, then yelled out, "Holy Shit!!!"

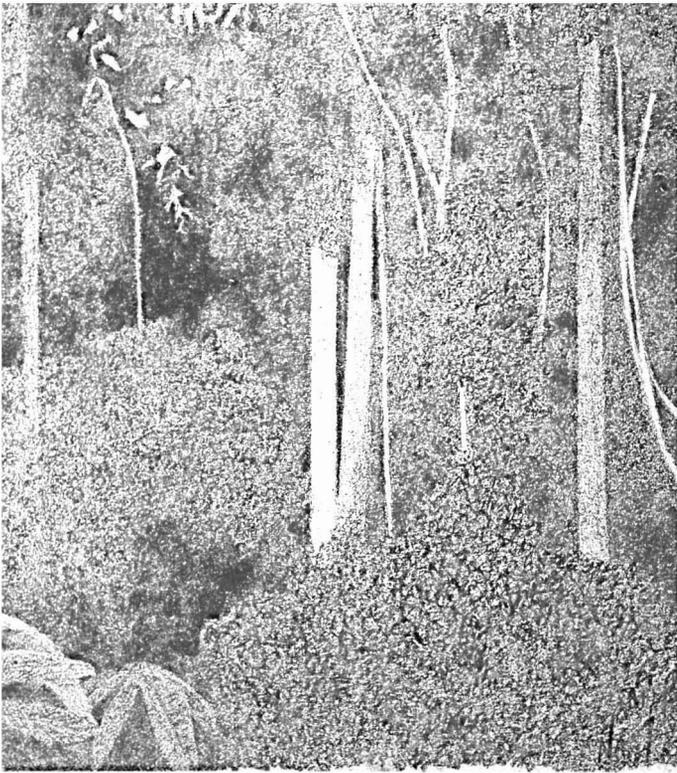
His voice echoed across a vast void. We had discovered the lost world.

We were perched precariously on the crumbling lip of an enormous precipice. Below us yawned a chasm approximately a quarter of a mile long by an eighth of a mile wide. To our right was a stupendous overhanging cliff at least 600 feet high. At our feet was a sheer drop of at least 400 feet to the cave entrance. The other walls of the chasm were steep, but not perfectly vertical. At the opposite end a quebrada (dry stream) could be seen cutting its way through the deep jungle at the bottom of the sink.

In many respects it resembled El Sotano—the world's deepest pit, in the Sierra Madre Oriental of central Mexico—though only half as deep. I had visited El Sotano the previous year, and had done the 1400 foot rappel and ascent, but that in no way diminished the thrill of discovering this wondrous place.

It was scary. The rock along the lip had been dissolved into something resembling crumbled cheese, all held together with a mass of vines. One nudge could send a boulder, or all of us, straight to hell. It was impossible to see where we were putting our feet. Were we standing on rock, rotten wood, vines, or 400 feet of nothingness? We slowly made our way to the left along the lip in order to get a better view of the giant cliff. We eventually succeeded in reaching a secure perch from which we could enjoy the view. It is likely that we were the first people to ever see this sublime sight.

There appeared to be no easy way down. The southeast face was covered with jungle, but it seemed dangerously steep. Acrophobia kicked in, so I was unwilling to try it. The only plausible way down appeared to be from the top of Montaña de Susmay, then down the quebrada, but this required going entirely around to the opposite side of the mountain, a daunting task.



We were tired, but elated. No matter how rigorous, the trial is always worth it, to make such a discovery. Yet I seemed to be even more exhausted than I should have been. This was the first sign that something was wrong.

It was time to celebrate with a cold beer, so the next morning Ann and I elected to head to town for more supplies. Chris and Barbara decided to remain at camp in the big flat for a much needed rest.

Ann and I hiked to Susmay, then acquired a pair of noble steeds to make the rest of the journey in style. Actually, I rode Muñeca, Chico's favorite mule. A more placid beast never loitered by the roadside munching grass. I could easily have walked out in half the time.

We were accompanied by Orli, "El Profesor," the village intellectual and schoolteacher when not busy picking beans. He is a very interesting fellow, easy to communicate with, and the only person in Susmay with any idea of what goes on in the outside world. He is a philosopher, too, and has formulated a cosmology, not unlike that of John Lennon, based upon the transcendence of love. All you need is love.

Orli also discussed the Romance roots of the Spanish and English languages. This is quite an accomplishment for someone who lives in a village where can't nobody read right or talk good. In Susmay the verb "ser" (to be) is always used in the infinitive and never declined. This is interestingly similar to the Afro-American declination of the verb to be, as in: I be, you be, he she it be, we be, you be, they be.

We arrived in Juticalpa, got a nice hotel room, showered, and proceeded to binge. I ordered not one, but two "pinchon" (shish kebab) dinners, replete with greasy sausage. Ann would never consider such a thing, so she ordered fish, always a mistake in a desert town surrounded by mountains in the middle of Central America. We were never able to determine if the

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substance was fish, flesh, or fowl. Needless to say, I consumed an enormous quantity of Flor de Caña rum, my favorite ever since the time we smuggled in a boatload to Monkey River Town in Belize to help celebrate the Iguana Fest. Even my grotesque overindulgence didn't explain why I felt so bad the next day, yet another sign that something was wrong.

We bought goodies galore, candy and cookies for our friends, but most important, blankets and hammocks for Chico and poor old Santos. A thick woolen blanket can be had for US \$3 in the market. Only three bucks to keep Santos's shriveled old body warm. How many times has he wrapped himself, shivering, in banana leaves? No more.

After a full day of detox, we headed for the bus station bright and early. We were joined by a fine fellow from the Peace Corps. The bus never came so we had plenty of time to chat. Honduras appears to be overrun with Peace Corps workers. They are everywhere. This fellow was quite serious about his work with the Indians, but most of the ones I met were idealistic young fools selling pie in the sky. They mean well, but it is difficult to sell new age nonsense to some of the most conservative people on Earth. They do serve as cultural ambassadors. It must be hard for the Hondurans to reconcile these peach-faced kids with the sinister popular image of greedy gringos.

We finally arrived in Magua with our Santa sack of presents and goodies. Chico was waiting with horses for the load. I decided to race ahead to see how fast I could walk the 7.5 miles across the mountains to camp. It took 2 hours 45 minutes, for an average speed of 2.7 miles per hour. I was walking fast and never stopped. Quite a bit better time than the six hours it took to go two miles the day we found the giant pit, for an average speed of 0.3 mph. Slow? I'd like to see you get there faster!

While we were gone, word had spread about our discovery. Nobody believed it. Rutilio offered the services of Darlín, his 13 year old son, as a guide to lead us around the mountain. Darlín was a winsome lad, but utterly useless as a guide. He tried to lead us up the Nameless Valley, which was entirely in the wrong direction, so we decided to head straight up the mountain. As usual, this proved to be a daunting task. Chop chop chop. We intended to follow a ridge up, then circle around to the cave. This proved impossible. The vegetation was impenetrable; it would have taken days to hack our way through. So, after passing above a cliff that blocked our retreat, we decided to descend into a small valley where we hoped to find running water. We listened and hoped until we could imagine hearing the cool running stream which Darlín insisted he had seen before. Not surprisingly, it didn't exist.

That evening we were introduced to a fast talking little runt of a man named Juan Amado de Jesus. I preferred to call him Juan Amado del Diablo (beloved by the devil), but Ann called him the used car salesman. He claimed to know the way to the cave, which was known as Cueva del Tigre (Tiger Cave) after the Jaguar that lived there. He agreed that we had to come around from the other side of the mountain, and offered to lead us there. Everything sounded right, so we accepted his offer.

The next day we all hiked back along the path to La Pimienta, and at the top of the pass headed up and over the first mountain. From there we descended into a quaint settlement hidden in a dolina, then up onto the main flank of the Montaña de Susmay. The forest had been cleared, so we baked in the hot morning sun as we trudged up the steep slope.

We finally reached the shade of the deep forest, and paused to admire a walnut tree of monumental proportions. The trunk was about twelve feet across at the base. The first limbs were eighty or ninety feet up. This tree, like all the others, was slated to be cut and burned. Chris knows something about the value of wood, so he did a few rough calculations and determined that the value of this tree, while still on the stump, was about US \$60,000. This is an inconceivable figure to a rural Honduran, more money than he and his family could ever hope to earn in an entire lifetime of hard work. To them it is worth nothing. A coastal fisherman would see this tree and envision himself captain of a proud canoe capable of sailing the entire Caribbean with a heavy cargo. But the mountain man knows nothing of boats.

If an enterprising devil with a team of oxen should build a road to this tree and drag it down to La Pimienta for sale to the gringos, then at least it would die for a purpose, and its value would be recognized. Instead, one of three things will happen. Most likely, within a year, it will be cut and burned to make way for corn, beans, and coffee. Commercial exploitation would be an even worse fate. Total war against the jungle. The Japanese could bring in a whole fleet of bulldozers, give chain saws to all adult males of fighting age, and pay off the local politicians. The people must be given an alternative to this. Ecotourism not only pays the bills and gives the people a rea-

son to protect the ecosystem, but the respite in time and cushion of easy money helps the people to forget their hard working ways. Lazy is good. It's not easy to get back behind the plow after being paid hard cash to show pretty people pretty trees.

We hiked up and up until we reached a beautiful finca high on the mountainside. The view was sublime. To the north we could see across most of Honduras, almost to the sea. A fine old man was the patron of this remote spot. He and his sons invited us to have a cool drink of water and to set a spell. He had on his Sunday best, blue jeans, cowboy hat, fancy shirt, and spurs. His horse was saddled up and ready to go. He was headed to town. We asked about Tiger Cave. He told us it was just across the hill then down the ravine.

A faint trail led down the ravine. The compass bearing and location were all correct. We were almost to the cave. A great cliff could be seen rising through the jungle ahead of us. When we got there we discovered, to our astonishment, that we were not at the cave we expected to find. This was indeed Tiger Cave, not the great chasm we had discovered before. A flimsy bamboo tower had been erected so hunters could wait safely for the tiger to emerge. A cliff towered above us, but it was only about 250 feet high. I plotted our location on the map. We were right where we were supposed to be, yet we weren't.

The map showed two caves, but only one sinkhole. I had supposed that these were two sections of a continuous passage with a karst window, an enormous collapsed room, in between. Instead, it seemed, there were two separate sinkholes. The two sinks were separated by a tall thin fin of rock. It seemed a simple matter to go through the cave to the next sink, but this proved impossible. The rock was crumbly limestone, more dirt than rock. A huge jumble of loose boulders plugged the entrance. Soft dirt filled every crevice. It was a nasty place. No way could be found.

Back at the finca no one believed me when I told them that there was another cave a short distance away with a 600 foot cliff entrance. They had lived there all their lives, but had never seen such a place. Darlín turned to one of the other young men and said, "the Gringos are liars." I heard that! Indignantly I stated that the next day I would take anyone who wanted to go directly to the cave. To hell with people who don't know their way through the woods. Let me show you how a Gringo does it!

The entire entourage set out early the next morning. Juan and Rutilio were amazed at the Gringo highway we had blazed through the bush. One step below a bulldozer. When they got to the cave they were even more amazed. How could such a place exist, unknown in their midst? With a great burst of enthusiasm they proposed to chop their way to the bottom, down the slope that I had rejected as too steep and dangerous. Away they went like human brush hogs, whacking their way into the abyss. I could not keep up with them, even though they were doing all the work. There were a few tricky spots, but the profusion of vines and saplings offered innumerable hand- and footholds. It was basically a controlled fall, all the way to the bottom.

The bottom was a deep green primeval wilderness, dripping with moss and ferns. Truly a lost world. The quebrada was dry, but polished rocks showed that upon occasion the cave gulped great gouts of water. We made our way down to the entrance, a forbidding vertical slot beneath the brow of the great cliff. A flock of birds rushed out so quickly that we could not identify them. There was no easy way down. The first drop was about 35 feet deep, beyond which the passage turned out of sight.

It seemed reasonable to suppose that there would be other, older, fossil entrances along the base of the cliff, so we climbed up the scree slope, then made our way along the base. In places pendulous masses of stalactites dripped off the cliff. Several possible entrances were completely plugged with travertine formations. The high leads were inaccessible to all but a fly.

With no further leads to explore, we turned our attention back to the main entrance. Lacking ropes, or other vertical caving equipment, our only choice was to cut down a medium sized tree to lower down the first drop in a foolhardy attempt to enter the cave. With this accomplished, we stood around looking sheepishly at each other to see if anyone had the nerve to climb down. I certainly didn't, but it seemed to be my job since it was my idea. The pit wasn't quite deep enough to be immediately fatal in the event of a slip. What a lousy way to die, with a broken leg at the bottom of a hole in Honduras. Perhaps if enough lariats were tied together they could remove my bones at a later date.

Juan Amado del Diablo was aware that we didn't think much of him. His machismo was in question, so he bravely stepped forward and offered his puny body to the gods of the underworld. We were all greatly relieved at his bravado.

Shaking like a leaf, Juan stepped forward to his doom, then slid down the slippery trunk into the gloom. We had wedged our spindly tree into a crevice about halfway down. From there, a log, no doubt slick as glass, sloped down to the bottom of the first drop. Juan somehow made it down, then began babbling rapidly in broken Spanish that there was another deeper drop just ahead. This was all the excuse anyone needed to abandon the effort. Juan climbed back up to a hero's welcome. He seemed to have grown several inches in the process. He had proven himself in the eyes of all.

The cave goes! Thousands of feet straight down into the bowels of the Montaña de Susmay. Quite likely, the cave drops quickly down through a series of vertical pits, gathering water as it goes, then levels out in a big trunk passage with many sumps before reaching the resurgence miles away at the base of the mountain. Only another trip will tell, next time with ropes, gear, and a small army of fools.

The intrepid reader will be spared the gory details of all that followed: The endless bus ride, the glorious beach at Trujillo, the crystalline waters of the Bay Islands, the loathsome wharf rats of Puerto Cortez, the overland crossing through the swamps to Guatemala, the boat ride to Belize, the weeks of suffocating heat, sweat, and bugs while we hacked out the site of Jake's Jungle Lodge along the banks of the Monkey River, and last but not least, the growing pains in my liver.

It was hard not to notice that I was getting slower and slower. Old age and excess could explain a lot, but the onset seemed a bit abrupt. In Miami I consulted a tropical disease specialist. She asked about my lifestyle and where I had been, then announced in a stern voice, "You are going to die, but before you die, the brain worms will drive you insane. As for your girlfriend the doctor, who should know better, she is going to die too!" In return for this cheerful admonition I slipped her a turd. In it she found *Entamoeba histolytica*. It seems that my gut is so toxic, from a constant diet of alcohol and chile peppers, that the little slime wads took refuge in my liver and brain. There they feast on paté every day. Otherwise sober parasitology textbooks describe the substance thus produced in the abscesses as resembling "anchovy paste."

As I write this account eight months later, all the while with a gnawing pain in my abdomen, I await the results of yet another round of tests. It seems that nothing works. The bad thing about an amoebic liver abscess is that it diminishes your capacity for drink; whereas the nice thing about a brain abscess is that you are the last to notice. Toodle-oo. ■

Bruce Morgan, sculptor and spelunker, writer and explorer, herpetologist and linguist, may be able to report on his recent South American travels and travails in a future issue. Readers keen to learn more about Central American caves, liver flukes, or scatological Spanish may direct inquiries to POB 6-A, Archer, FL 32818.

Epilogue

...The amoebas are dead, but Sleazewazel is not. It was a fluke that he survived, a liver fluke to be exact. Thus invigorated, he disappeared into the jungle once again, and was last seen on the Brazilian border, headed across the Pakaraima mountains into Guyana to investigate the weird indigenous "hallelujah" cult, and photograph the countless magnificent waterfalls that pour off the "lost world" plateaus in the nethermost end of nowhere.



Southern Rockies Ecosystem Project

Mapping and Telling Tales of Trails

by Roz McClellan

In its first four years, the Southern Rockies Ecosystem Project has used Wildlands Project mapping methods to influence both the physical and the political landscapes of Colorado. In recent forest plan revisions, thousands of acres of Forest Service lands have been protected from timber cutting and motorized use, due in part to SREP's mapping work. And conservation biology terms such as "landscape connectivity," "patch dynamics," and "edge effect" have become common parlance within the Forest Service thanks to SREP's and other groups' four years of intense dialogue with the agency.

SREP has focused on National Forest planning in the first four years because it is at the planning stage that core reserves on Forest Service lands can best be protected. Enormous tracts of land are at stake in the decision process—in many cases the last blocks of land in the region large enough to accommodate natural processes and interior habitat. Mapping core reserves later will be moot if they are not protected in forest plans now.

SREP, along with other groups, wrote core reserve plans for three National Forests in Colorado. In all three cases the plans were incorporated into the Forest Service's planning process and in at least two cases resulted in much better protection for SREP's proposed core reserves than would otherwise have been the case.

Meanwhile, SREP has finally acquired GIS technology and hired staff sufficient to launch the first stage of vision mapping for the Southern Rockies. By spring 1997, a preliminary reserve map for the region will be complete and ready to present in map and slide shows around the region. This first map will include roadless and protected lands and potential corridors based on known wildlife migration routes.

The next cut of the vision map, projected for summer 1997, will incorporate the habitat requirements of rare and indicator species such as Lynx, Wolverine and Goshawk, as well as vegetation, natural heritage, and old growth data. SREP will develop a mapping protocol for the vision map as it evolves, which will produce a scientifically credible end product and be consistent with Wildlands Project mapping methods being used elsewhere on the continent.

As a first step in gaining public acceptance of the need for a reserve plan, SREP is also working with Forest Guardians of Santa Fe, New Mexico, on a "State of the Ecosystem Report" for the San Juan Ecosystem. This report will use GIS to document loss of roadless areas, declines in some vegetation types, such as Ponderosa Pine forest, and future threats to the ecosystem. The report will show areas needing restoration and create a scientific and ethical justification for a San Juan region core reserve plan.



TALES OF TRAILS

SREP's mapping work has taken on new urgency because of powerful recreational pressures now overwhelming the Southern Rockies. Indeed, trail developers are sweeping across Colorado like an avenging army. Trails advocates and land managers alike are falling all over themselves to build loop trails, parallel trails, scenic byways, regional link trails, and roads in an effort to get as many people into the backcountry as possible. From a landscape ecology perspective, the trail mania represents a sort of reversal of conservation principles accepted in recent years. Where conservation biologists seek large blocks of wild habitat to protect wide-ranging and sensitive species, trail buffs seek access to the unbreached. Where biologists look for wildlife corridors across the landscape, trails advocates are laying down a dense grid of human connectivity, in a veritable frenzy of habitat fragmentation.

Hundreds of miles of trails are being upgraded on Colorado's public lands each year to meet the exploding demands of mountain bike and off-road vehicle (ORV) users. Mountain bike use on Colorado's Front Range alone is expected to double in ten years.

Trails are being developed in the roadless areas which SREP plans to include as core reserves in its Southern Rockies Reserve Plan. Trail upgrades are often done with trail machines or with chain saws and dirt bikes, transforming low use trails into high use trails overnight. Trail systems are, if anything, *more* permanent and pervasive than extractive activities such as logging and mining. The latter are more limited in geographic scope and to some degree reversible.

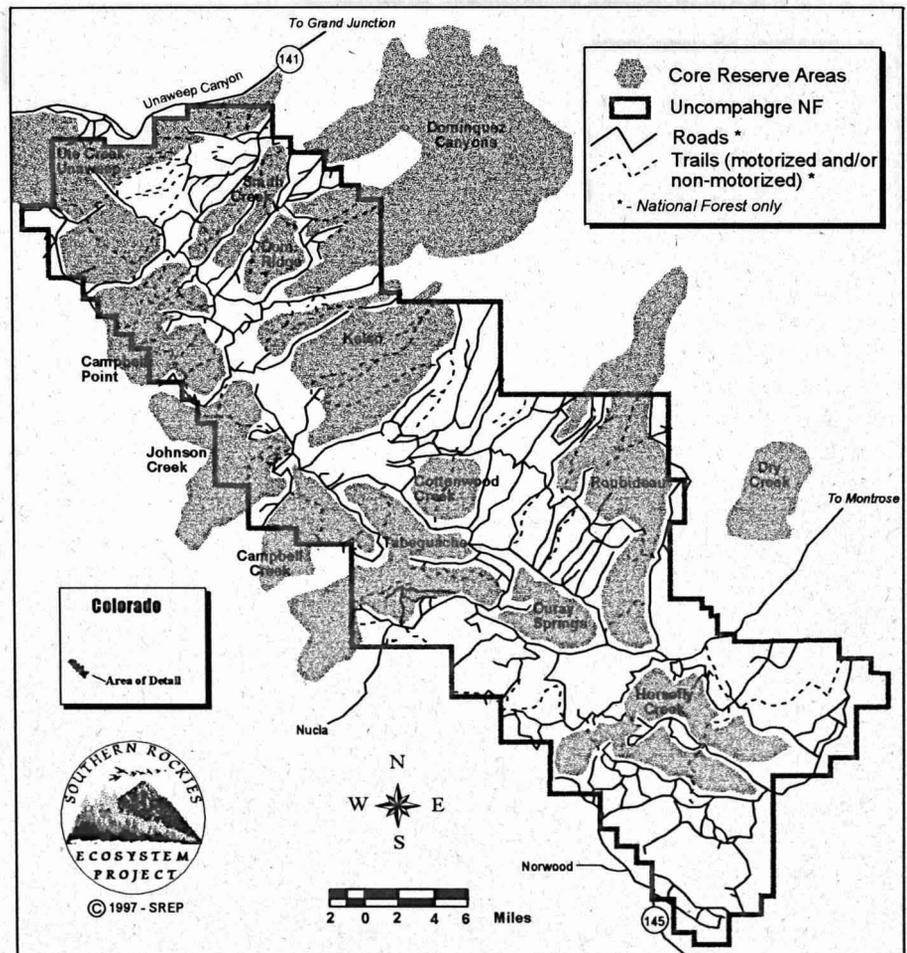
Trail expansion is the latest form of habitat fragmentation on public and private lands in Colorado. Studies show that trails, like roads, reduce the size of habitat patches, adversely affect breeding birds, change plant and animal species composition, introduce opportunistic plant and animal species, and—by providing human access into interior habitat—displace forest interior species.

Roadless areas that are invaded by motorized or mountain bike trails often lose their wilderness potential. Of the twenty areas qualifying for wilderness in Colorado's first three forest plan revisions, all but one

were rejected by the Forest Service, mostly because they contained logging roads or motorized trails. Seven out of eight of the Rio Grande National Forest's largest roadless areas, totaling about 200,000 acres, are crisscrossed with motorized trails. None were recommended for wilderness designation.

Recreation differs from previous uses of public lands in that the commodity being produced is not logs or minerals but outdoor "experience." The experience is geared often toward gravity thrills and challenge. It is mediated through expensive sports equipment, leading to a burgeoning sports industry with an interest in securing land for the deployment of its gadgetry. This gadgetry ranges from global positioning systems to snow boats to militia-style all-terrain vehicles (ATVs).

Because the sports industry cannot fund public lands recreation directly, it teams up with trails advocacy groups to promote trail development on Forest Service and BLM lands, amounting to a new form of privatization of public lands. At a recent mountain bike trail funding workshop, the catch phrase was "more trails, more sales." Budget cuts in the agencies exacerbate the problem by creating a funding void for trail maintenance, which is more and more filled by trails groups funded



by off-road vehicle registration fees, the National Trails Act (Symms Act), and, in Colorado, by lottery funds distributed by the "Great Outdoors Colorado" program.

Years of diligence on the part of trails advocates have resulted in an elaborate funding and legal infrastructure which is now driving trail development in Colorado. Several memoranda of understanding between the agencies and motorcycle groups allow the agencies to receive funding and enter into partnerships with motorcycle clubs for the purpose of developing motorized trails. About \$1.3 million in funding for motorized and non-motorized trails is distributed each year by a State Trails Committee. The committee is divided evenly between motorized and non-motorized trail users, even though a recent poll shows that only a small percentage of Colorado's population engages in backcountry motorized recreation.

Recreation use also differs from extractive uses of public lands in that it develops through "creep," rather than through any formal decision process. Mining permits or timber sales require an environmental review process, but trail systems are often established merely by use, sometimes without the consent or even knowledge of the federal agencies. Even though their impacts can be as great, cumulatively, as those of a timber sale, there is no single starting point to trigger an official decision. Trail use is usually ratified after the fact by the Forest Service, based sometimes on little more than a National Forest's latest recreation map. In one instance a motorcycle club published a map of motorized trails on Forest Service lands, in which the trails had not been approved by the agency.

At times it seems that the only limit to Colorado's recreational expansion is topography—and even that limit is crumbling beneath new recreational technologies.

Motorized and mountain bike trail users have an advantage over foot users—by virtue of their greater mobility—in being able to occupy and effectively lay claim to many more miles of backcountry trail. ORVers' strategy consists of expanding motorized use on backcountry trails and then threatening appeals and lawsuits if the Forest Service fails to approve the use. The tactic has proven highly effective in getting the FS to back down on decisions to close motorized trails. The Gunnison National Forest supervisor agreed to reopen to motors one hundred miles of trails that he had previously closed.

Likewise, under pressure from motorized groups, the Rio Grande National Forest decided to change its backcountry prescription to include motorized trails. Forest Service staff who attempt to enforce road and trail closures are sometimes subjected to harassment and intimidation. Motorcycle, snowmobile and ATV groups in Colorado are highly organized, legally equipped, well funded and intimately involved with the agencies at all levels of decision-making.

Environmentalists are at a disadvantage because the recreation debate favors use over non-use of public lands, with priority given to groups who can leverage the most, not the

least, use. Science offers little help since few studies of trail impacts have been conducted in the region and ORV groups have been successful in promoting studies that show, for example, that Elk are more harassed by hikers than by ORVs.

Recreational threats are difficult to fight because in many ways "the enemy is us." Most trail users are also environmentalists, but environmentalists who have not yet been educated on the ecological impacts of trails. Trail recreation spans a gradation of uses from walking to horse riding, to mountain biking, to off-road vehicles, and each user group is in competition with the others, making it difficult to create a united front.

In this atmosphere, mapping efforts of the type being done by the Southern Rockies Ecosystem Project can be among the most effective forms of defense. SREP is developing core reserve plans for areas threatened by trail systems and using these plans to counteract a glut of trail proposals. Core reserve plans are being translated into trail maps, showing where trails can be located without harming sensitive habitat.

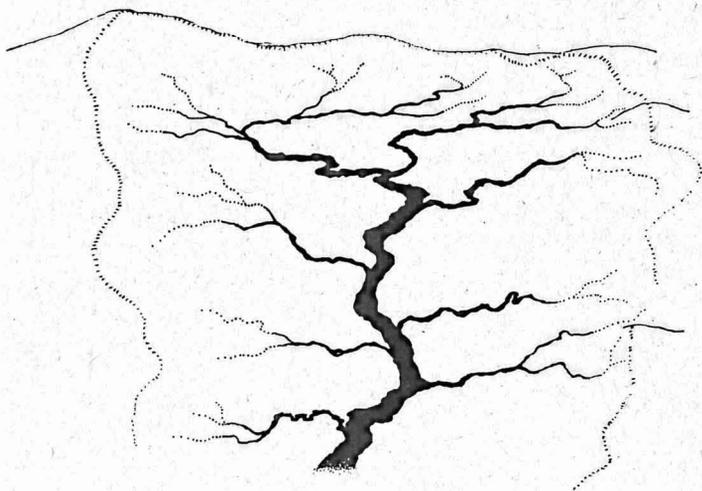
Fortunately, merely educating the agencies and trails advocates on the fragmenting effects of trails can sometimes put the brakes on a particular trail proposal. However, the momentum is strong enough that recreational expansion is on the way to becoming the single greatest threat to implementing a wildlands vision in the Southern Rockies. Only the most resolute and ferocious effort will stave off a future of exuberant human proliferation into every remaining relict of undeveloped habitat. Only an effort of extraordinary proportions will ensure that wildlife connectivity is maintained.

We seem to be entering a curious Alice in Wonderland world where trails are the new form of landscape connectivity, where environmentalists and trails enthusiasts are no longer synonymous, where the Forest Service and BLM more often than not are on the side of environmentalists, and where collaboration—not confrontation—with embattled agencies (fending off explosive recreational pressures) is the new name of the game.

Nationwide, the Clinton administration is projecting astronomical increases in public lands recreation. By the year 2000, National Forests are projected to contribute \$3.5 billion in timber revenues to the nation's gross domestic product, \$10.1 billion in mining revenues, and a staggering \$97.8 billion in recreation revenues! (speech by Secretary of Agriculture Dan Glickman, 25 September 1996). Clearly recreation is superceding extraction as the principal threat to our public lands.

The Southern Rockies Ecosystem Project would like your help in mapping and protecting wildlands. Send donations or volunteer your services to SREP, 1567 Twin Sisters Rd., Nederland, CO 80466. ■

Roz McClellan, a co-founder of The Wildlands Project, is the coordinator of SREP.



Protected Areas, Watersheds, and Development

by Lawrence S. Hamilton

Water looms large as a limiting factor to economic development in the world's poorer countries and indeed, even in the so-called developed countries. Particularly critical in the tropical developing countries is the alarming rate of sedimentation which reduces the useful life of existing reservoirs and which will plague future uses of planned storage. We are producing a disturbing number of "sand boxes" with our large dams, which are losing capacity at twice or three times the expected rate (see for instance the Ambuklao in the Philippines and the Wonogiri in Indonesia). Building up of the beds of river channels through accelerated sediment deposition also helps turn water into an enemy, as overbank flooding becomes more common for the same amount of discharge.

While much of the sediment is the product of natural erosion forces, the portion of sediment resulting from human activities in upper watersheds must be brought under control. Moreover, reducing erosion in the uplands not only reduces sediment harms, but keeps the uplands more productive and healthy. Such activity puts us into the arena of upland watershed management. Sound watershed management can also control fertilizer, herbicide, and pesticide pollution of water resources; alter the total amount of water in a local stream; and influence the distribution (baseflow and stormflow) of local streams (Hamilton 1988). Although some aspects of watershed management may involve structural measures, a major way of influencing water quantity, timing, and quality is by improving or controlling land uses in the upper watersheds.

AGRICULTURE AND FORESTRY NOT NECESSARILY HARMFUL

The major rural land uses or covers in tropical upper watersheds are national parks or other protected areas, production forests, shifting agriculture, grazing lands, agroforestry, food-tree crops, and annual cropping. Any of these can be excellent vegetative coverings or use systems from a watershed perspective, if located appropriately and managed well. Who can fault as an appropriate watershed land use the intensively managed, aesthetically pleasing, and enormously productive wet rice terraces that occur in limited areas in many tropical countries (e.g., the terraced padi in Bali or the Philippine Cordillera)? Water is carefully husbanded and soil jealously guarded as two basic factors of production in these agricultural wetlands. Traditional shifting agriculture carried out under low population pressure and low technology uses long fallow periods, exposes very little soil area for long, and does so in a mosaic pattern in a watershed. It is not seriously damaging to land or water (Hamilton with King 1983). Close-growing grasses, even *Imperata*, are very acceptable watershed cover as long as there is no grazing or very light grazing, and no fire (in the latter case, in humid areas, the land will gradually be invaded by shrubs and trees and eventually become forest which is even

In a large watershed or river basin, there will be a mosaic of areas with various kinds of uses. National parks and other protected areas are key components in the water quality and water quantity scenario.

better). Agroforestry has been proclaimed as combining the production aspects of annual crops with the protective role of woody perennials. Oil palm, cloves, cocoa, coffee, and other woody perennials produce leaf litter, are not removed and replaced annually, and when combined with longer-lived trees, are good watershed land uses. And production forests, even in important municipal water supply areas, have been conservatively logged (as in Seattle's watershed or Melbourne's) without impairing water values.

ON THE OTHER HAND

Unfortunately, sensitive watershed logging practices that characterize much of the Old World and some parts of temperate North America, Australia and New Zealand are almost impossible to achieve in tropical developing countries. More than the cutting of trees, the poor location, design and maintenance of skidding tracks, landings, and logging roads damage the watershed. We can minimize adverse impacts by implementing known conservation logging guidelines, but only rarely in developing countries has it been politically, institutionally, and economically possible to do so. In a recent study of tropical forest cutting, what can be termed "sustainable harvesting" was found to be rare (Poore et al. 1989) and questions are also raised about sustainability of many forest exploitation practices in temperate forests (Dudley 1992).

Similarly with most of the other uses that can be benign in a watershed context, they usually are not. In most of the tropics, the traditional stable, long-fallow, subsistence, *shifting* agriculture, which was not damaging to watershed values, is being rapidly switched to, or replaced by, a cash crop, short- or no-fallow, *shifted* agriculture that "flogs" the land before moving on, with resulting serious erosion, much harmful sediment produced, and degraded land left behind.

Most of the land suitable for stable wet padi terracing has already been developed. In upper watersheds, the soils are too thin and the slopes are too steep for the kind of landscape one sees in the best parts of the Philippines or Bali. Nonetheless, potentially watershed-damaging cropping systems in the uplands can have soil and water conservation practices applied, as dryland terracing, contour cultivation, and the well-known practices in the conservation farming scenario seen in parts of the middle mountains of Nepal. *But* where population pressures are strong, where incomes are low, where tenure is insecure, or where new migrants from the lowlands are developing farms in the uplands, it is extremely difficult to achieve the reliable conservation cropping that is good watershed land use. Our record of achievement, in expanding conservation farming in the steep lands of the tropics, is not a howling success after decades of effort (Hudson 1992).

Introducing tree crops into sloping cropland (agroforestry) or having tree food or beverage crops on the land can indeed reduce surface erosion and increase slope stability against shallow landslips—but only if the soil under the trees is kept covered with vegetation or leaf litter. It is the litter and the low

Table 1

Erosion in Various Tropical Moist Forest and Tree Crop Systems (ton/ha/year)	Minimal	Median	Maximal
Multi-storied tree gardens (4 locations, 4 observations)	0.01	0.06	0.14
Shifting cultivation, fallow period (6 locations, 14 observations)	0.05	0.15	7.40
Natural forests (18 locations, 27 observations)	0.03	0.30	6.16
Forest plantations, undisturbed (14 locations, 20 observations)	0.02	0.58	6.20
Tree crops with cover crop/mulch (9 locations, 17 observations)	0.10	0.75	5.60
Shifting cultivation, cropping period (7 locations, 22 observations)	0.40	2.78	70.05
Taungya cultivation (2 locations, 6 observations)	0.63	5.23	17.37
Tree crops, clean-weeded (10 locations, 17 observations)	1.20	47.60	192.90
Forest plantations, burned/litter removed (7 locations, 7 observations)	5.92	53.40	104.80

From Wiersum (1984)

vegetation that protect the soil from splash erosion by raindrops, not the tree canopy itself (Hamilton 1988). This factor of understory and litter protection is well illustrated in a research summary by Wiersum (1984) and is presented in Table 1 (note the last two examples where litter and understory are removed).

Grass is fine watershed cover (usually yielding more water than forest); but grass is usually grazed, and grazing animals can damage not only the grass cover but the soil. Stocking levels are difficult to control and overgrazing prevails in much of the world on pasture and rangeland. Consequently, sediment production from grazing lands is often unacceptably high. Much grassland is burned in the tropics to keep out shrubs and trees and to remove old, dry vegetative matter. Erosion, sediment production, and flood flows from burned grassland all increase substantially under a fire regime.

PROTECTED AREAS IN WATERSHED— EL ULTIMO

The land use that stands out by far as the safest from hydrological and erosional aspects is the *natural area*—maintained as such by some protective mantle such as national park or other class of protected area where human disturbance is absent, minimal, or controlled. To be sure, many natural, undisturbed areas are eroding and putting sediment into streams,

especially geologically young, still uplifting unvegetated areas, or where earthquakes are common and trigger landslips. But this is natural erosion. Human activity in these areas (e.g. the Himalayas) usually accelerates erosion. Because of their fragility, importance to watersheds, and spectacular scenery, much upper mountain land should be in totally protected status. At lower elevation, national parks and reserves can reduce the human disturbance of forests, grasslands, and woodlands, thereby minimizing the *change* in natural levels of erosion (erosion does occur even in undisturbed forest) and water production. Many of these lowland reserves might be in the category of Protected Landscapes (IUCN Category V), or the outer zone of a Biosphere Reserve.

Aside, therefore, from all of the very compelling reasons for establishing national parks having to do with biological diversity, cultural heritage, scenic amenity, scientific benchmark and study area, tourism development, *etc.* the role of the protected areas in a watershed context deserves much more attention. All other land uses have a much greater propensity for intense human activity, and the repeated disturbances that accompany intensive use impair soil and water. Certainly, we must guard against negative impacts from heavy tourist or recreational use in parks (see Guidelines by Poore 1992), but these users are easier to control than are loggers, cultivators, graziers, tree-crop cultivators and road-building enthusiasts.

So it is, that in the interests of safeguarding a nation's precious water resources, particularly from the quality standpoint and for reducing "wild" fluctuations in flow, protection lands have been designated in upper watersheds. In Malawi, for instance, a long narrow country consisting basically of three increasingly high plateaus separated by escarpments, large portions of the highest plateau have been designated as reserves of different kinds for watershed purposes. Here are located most of the forest reserves, Nyika National Park and its extensions, Nkhoskoti Game Reserve and the extension to Lengwe National Park, and Majete and Mwabri Game Reserves (Kombe 1984).

Similarly in Sri Lanka, the importance of protected areas in upper water catchments and along watercourses has been recognized by government policy and action. In the Accelerated Mahaweli Basin Program, water conservation protected areas are combined with wildlife habitat protection, particularly for elephants (de Alwis 1984).

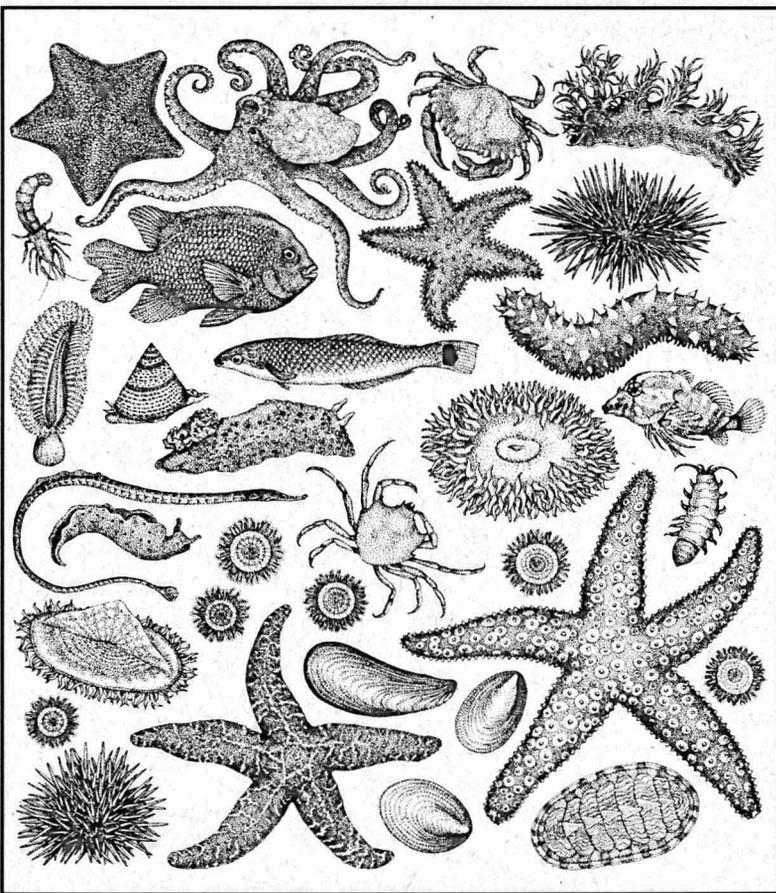
One of the best known examples of recognition of the key role protected areas can play in safeguarding water values is the case of Dumoga Bone National Park in Sulawesi, Indonesia. Here The World Bank, in funding the Dumoga Valley Irrigation Schemes, allocated funds to support the establishment and management of this park in the catchment headwaters (MacKinnon et al. 1986).

José Rafael García, the former Director of National Parks in Venezuela, aptly pointed out that Canaima National Park, with the savannahs, gallery forests, *tepuy*s, rivers, and waterfalls (including Angel Falls), is a guardian of the hydroelectric production of 9 million kilowatts from the Caroni River (García

1984). The park was enlarged from its original 1 million ha size of 1962 to 3 million ha in 1975, so that it covered one-third of the Caroni basin. The justification for the tripling in size was not scenery or endangered species, but to safeguard the huge investment in power development then, and in future expansion to 20 million kilowatts, by supplying high quality (low sediment) water. Likewise, Guatopo National Park is headwaters of a major water supply area for Caracas. García stated "the most important thing is that the water from this park is of very high quality, and for this reason, its treatment for human consumption is less expensive" (García 1984). Spectacular rainforest and high quality water source only two hours from Caracas! Note that Director García did not fall into the disproven trap of claiming that forest protection in Guatopo will stop floods on its streams, or produce more water in the dry season. He put the finger directly on the scientifically-proven function—that of sediment minimization by maintaining forest.

THE IMPORTANCE OF CLOUD FOREST

There is one hydrometeorological situation, however, where protection of forests can beneficially augment water supply. Where repeated and consistent moisture-loaded cloud moves through high-elevation forest, an unusual "cloud forest" ecosystem develops. The forest captures water by condensation and adds it to the water budget as effective precipitation. Some of it eventually shows up as increased streamflow which is important to human uses of surface water, or as groundwater. Removal of cloud forest results in loss of this water-capture function. These unusual ecosystems go by various names in various languages: *bosque nublado*, *nebelwald*, *wolkenwald*, *forêt néphélique*, elfin or dwarf forests, and mossy montane forests (see Hamilton et al. 1995 for review). On some small Pacific islands they may occur as low as 350 meters in elevation, but more commonly on larger mountains they occur in a belt upward from around 1500 meters. They are often as much as 1000 to 1500 meters in elevational thickness. During the dry season most of the water being added to the budget of the watershed may come from cloud forests. The establishment of a few national parks in Central America has given protection to some cloud forest areas; most of these are volcano parks, for example Volán Barú in Panamá, Volcán Poás and Volcán Cherripó in Costa Rica, Montecristo in El Salvador, and Armando S. Bermúdez in the Dominican Republic. In addition, the Monteverde Cloud Forest Reserve in Costa Rica and the Quetzal Cloud Forest Reserve in Guatemala have been designated officially as private protected areas. Many more cloud forests merit protection throughout the tropics, not only for their significant role in watershed processes, but because of the rare and often endemic flora and fauna occurring in these unusual ecosystems. The Mountain Gorilla's remaining habitat is largely cloud forest in Rwanda, Zaire and Uganda, much of it now in protected area status, though suffering from the impacts of war and refugee problems.



COASTAL AND MARINE RESOURCES

One of the most precious natural resources of many tropical islands is their coral reef. The reef not only produces a traditional subsistence food resource, but is an increasingly important asset for Nature-based tourism which may be one of the few sustainable development options for the small islands. For many of these islands additional key resources are the seagrass beds and mangrove forests which nourish the offshore fishery, offer protection against coastal erosion, dampen storm surges, and are important and valuable ecosystems in their own right. Protected areas in the upper watersheds and along streams that drain these islands provide a control over excessive sediment production which can damage all of these coastal and marine resources. Thus, the small island state of Pohnpei in the Federated States of Micronesia, recognizing this linkage, recently enacted a Watershed Forest Reserve and Mangrove Protection Act (1987, revised 1992) and is attempting to implement land use controls under the complicated situation of customary land tenure.

PROTECTED RIPARIAN BUFFER ZONES

Among the best measures that can be taken in watersheds to protect water quality is to maintain natural vegetation in buffer riparian strips along the watercourses. These protected linear zones can trap much sediment and pesticide or fertilizer runoff from upslope lands, thus keeping the pollutants out of the aquatic ecosystem. They also provide corridors for migrat-

ing organisms and key habitat close to water for wildlife. The streamside vegetation can slow the process of streambank erosion, and keep water temperatures cooler in hot climates for aquatic life. In production forests, streamside buffer zones of undisturbed vegetation at least 25 meters each side should be maintained (Hamilton with King 1983), and no logging or ground disturbance permitted. If these are to be protected areas, which include the function of flora and fauna conservation, they will need to be much wider to be viable. Many countries (e.g., Bhutan) have recognized the valuable role played by riparian buffer strips and have mandated them as protection zones, but implementation in almost all countries is lacking. An example of a protected area fulfilling a riparian function on a large scale is Everglades National Park—guardian of the water flows draining south to the marine environment. Unfortunately, Everglades National Park is victimized by harmful land uses and water manipulations “upstream.”

FRESHWATER WETLANDS

Freshwater wetlands also have key roles as natural water storage areas, and temporally buffer excessive water discharge (Brazil's Pantanal is a fine example). Destruction of wetlands by draining and filling not only eliminates or greatly reduces the habitat for wetland wildlife, but can hasten discharge of water that formerly was stored, thus contributing to floods. Wetland reserves are usually established to protect waterfowl, but the watershed value is another benefit that should be brought to the fore when the arguments are being made against another “lock-up” instead of “development” which would drain the area and turn “wasteland” into a productive asset. Floodplain wetlands also are important safety valves when floods do occur. Giving flood-prone areas protected status precludes human occupancy or the establishment of high-value but easily flood-damaged infrastructure in these vulnerable areas. Parks and reserves are simply “good land use” in floodplains which generally cannot be given real protection by large dams or other artificial structures. The Ramsar Convention, which fosters the conservation of wetlands mainly in the interests of migratory waterfowl, really has a second fine watershed string for its bow.

SUMMARY

In a large watershed or river basin, there will be a mosaic of areas with various kinds of uses. National parks and other protected areas are key components in the water quality and water quantity scenario. Critical areas for water need to be identified. Where cloud forests, wetlands, or areas prone to severe erosion when disturbed are not already in protected status, conservationists should promote the establishment of reserves with

some official conservation designation. In addition, however, much watershed land will necessarily continue to be devoted to subsistence or commercial commodity production. High standards of soil and water conservation need to be applied to these lands. Innovative promotion of the World Conservation Union (IUCN) concepts of Protected Cultural Landscape, Sustainable Resource Reserve, or Biosphere Reserve might well be explored in order that we win the game of "casting dice against gravity" by instituting land uses that retard the inexorable "march to the sea" of productivity (Leopold 1949). In this way we can maintain productive, safe, pleasant and sustainable watersheds over the land surface that accommodate as many, and as much, as possible of our fellow forms of life on this planet—its biodiversity. ■

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The Indri's Song

*This dawn I heard, in Madagascar,
the sad singing of lemurs.*

*The forest smelled of autumn and of smoke;
a few birds chirped, half-heartedly;
my boots were red with road and village dust.*

*In a minor key they cried, the Indri,
soft wails proclaiming their diminished presence
to a few fellow Indri who listened,
paused likewise in their soft leaf-plucking,
and replied—their cries accompanied,
even at that hour, by the staccato chopping of axes.*

*Two charcoal makers passed me on the track,
sweat soaking their shirts
as they carried home the forest on their backs.
They did not see the pale yellow eyes,
the sad ancestral eyes, that peered down,
through time as much as through leaves,
I imagined, and woke a cry in my heart.*

—G. Frank Oatman Jr.

Geology in Reserve Design, an Example from the Folded Appalachians

by R.F. Mueller and Gus Mueller

INTRODUCTION

The establishment of wildland reserves in the Appalachian Mountains requires an appreciation of the ecological functions of the array of forest types and other biologic communities of the region. The varied forest types and plant communities result in part from and interact with enveloping physical systems: rock type and structure, topography, climate, soils, etc. They are an example of the functional landscape mosaic listed by Noss (1995/96) as necessary to reserve viability.

Soils are usually regarded as the most fundamental interface between biologic systems and the physical environment. While this is in a sense true, soils are difficult to work with in the field and represent on maps because they show so much small-scale variation in response to local topography and even recent history of human disturbance. Geologic rock units have an advantage over soil units in that their boundaries may be more easily projected or interpolated. This is especially true in the folded Appalachians where many rock unit boundaries tend to be linear along fixed trends. Also, in colluvial deposits detached rocks may be more easily identified than soils and traced to their points of origin. This relative ease of identification extends to mineral specimens, using no more than a hand lens (for texture), a knife blade (for hardness), and an acid bottle (to test for carbonate). By contrast soil characterization usually requires lab work. These advantages are particularly important to activists who have little time and few resources. For these reasons we deem bedrock geology a more practical indicator of major regional variations in forest type, and one of our objectives here is to demonstrate the value of geology in regional ecological mapping. Nothing in the foregoing, however, should be seen as diminishing the role of soils. The characteristic of variation in response to local conditions that makes it difficult to map soils is at the same time useful in the interpretation of microhabitats that determine precise locations of species. For example, soil depth and type over limestone governs where alkali or acid-favored species occur. Thus, over limestone bedrock, Chinquapin Oak (*Quercus muehlenbergii*), which demands high pH, is favored by shallow soils while Red Maple (*Acer rubrum*), an acid-lover, requires deep and leached soils. Of course, forests also vary in response to such factors as elevation, slope and aspect, which may be independent of geology or show their effects within geologic formations; and indeed these factors have received attention in the region in the past (e.g., Stephensen and Adams 1991). Although the writers know of few specific studies of the relation between forests and geology in the Central Appalachians, this relation is referred to frequently in a general way by Braun (1950) and is implicit in recent works on certain plant distribu-

Abstract

A strong relation exists between bedrock geology, forest type, and land use on Warm Springs Mountain in Virginia and by extension in other parts of the folded Appalachians. These relations have important implications in the design of wildland reserves in the region. Most de facto wildlands that are potential reserves are public land, which is a consequence of low biologic productivity associated with refractory bedrock. However, more productive rocks, such as carbonates (limestones, dolomites, and some sandstones and shales), frequently occur on adjacent private lands or as enclaves within public lands. The tracts on which these productive rocks occur should be targeted for protection and restoration as vital complementary parts of the reserves. Geology has an important role in the identification and characterization of this diverse terrain and should be an integral part of reserve planning.

tions. Thus Ogle (1989) discussed the distribution of rare and disjunct plants which occur on certain Ordovician dolomites. Also the relation is well recognized by the Virginia Natural Heritage Program (Ludwig et al. 1994), which has used it in inventories of rare species and unusual communities.

Many of the ranges of the folded Appalachians have an asymmetry with respect to rock type exposure.¹ Frequently one side of a range and the summit consists of erosion-resistant and nutrient-poor sandstone or quartzite while the other side is dominated by limestone, dolomite, shale or siltstone in various proportions. Usually carbonate and/or shale also form the floors of the narrow valleys that separate the ranges. The north-east-southwest linear extension of the ranges form fairly extensive *de facto* wildland corridors in this direction. However habitat continuity in the cross-range direction is frequently interrupted by agricultural development not only in the valleys but also on midslopes. Forest types developed on the refractory sandstones and quartzite have important functions as remote habitat, excellent cover (e.g., laurel thickets), and sources of certain important forage such as acorns. However, they are also limited by lack of forage and habitat diversity and productivity. Far different were the original forests that occupied the midslope and valley bottoms on the highly productive soils associated with carbonate rocks. These forests consisted not only of a high, complexly structured and diverse mesic canopy but also of a multitude of fruiting and tuber-producing plants, fungi, and resident fauna that provided abundant foraging opportunities for animal life with access to them. The areas once occupied by these forests, but which now possess them only in degraded form if at all, are thus priority targets for ecosystem recovery.

WARM SPRINGS MOUNTAIN

Warm Springs Mountain extends 28 miles (45 km) northeast from Covington, Virginia. Like a number of similar ranges in this part of the folded Appalachians, it averages about three miles (5 km) in width and is capped by erosion-resistant Silurian sandstone and quartzite. It attains 4000 ft (1220 meters) elevation in several places, with Bald Knob at 4225 ft (1288 meters) being the highest. In terms of geologic structure it is part of an anticlinal fold (folded layers form an upward pointing crest), but this anticline has been breached by erosion over much of its length, exposing older Ordovician rocks that form its core (Figure 1). The central and oldest of these rocks are limestones and dolomites of the Beekmantown Group and the Moccasin Formation which underlie the Warm Springs Valley just northwest of the range. Slightly younger carbonate-bearing shales of the Martinsburg Formation form the northwest slope and these are overlain by shales, siltstones, and sandstones of the Juniata Formation. The Juniata is in turn overlain by the Silurian Clinch quartzite of the summit.

A feature of Figure 1 that needs to be clarified is the ap-

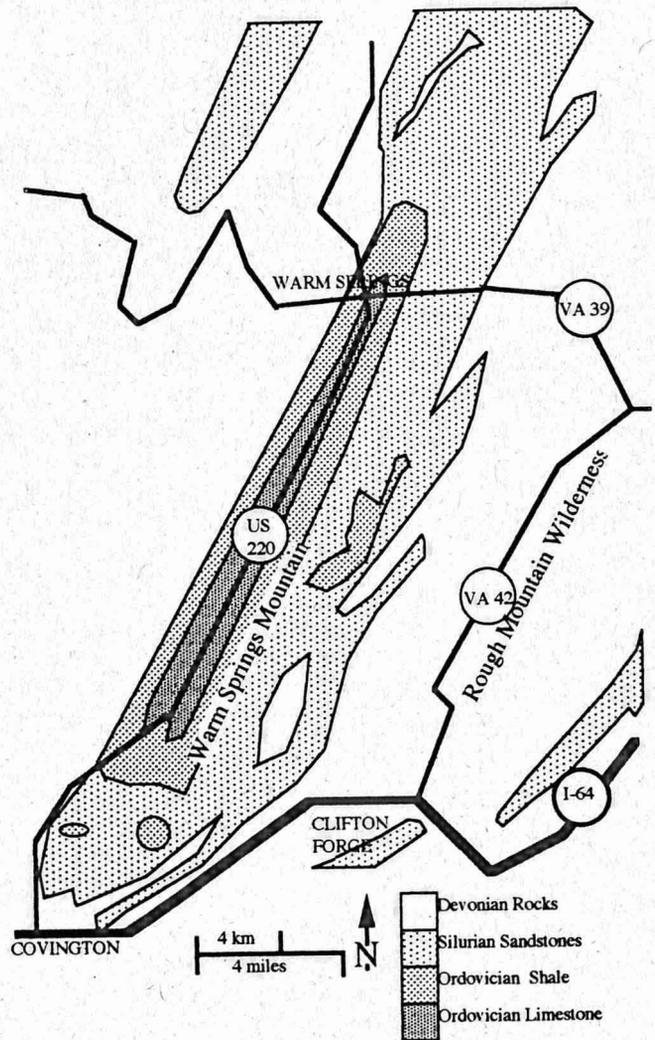


Figure 1. Geology of Warm Springs Mountain and vicinity

parent absence of Silurian rock on the northwest limb of the anticline. This is a consequence of a failure to distinguish the Silurian from lower Devonian in this area as well as the relative thinness of the Silurian (Rader and Evans 1993).

If the pattern of land ownership (Figure 2) is compared with the distribution of rock types, it appears that correspondence is quite good. Public land and particularly National Forest is largely confined to areas underlain by Silurian rocks of low productivity, while limestone and carbonate areas are predominantly in private hands. Where the areas of Silurian age are expanded southwest and northeast of the Ordovician belt (points A and B of Figure 2), the anticline is not breached and the forest cover is similar to that which occurs on the southeast limb (points C, D and E of Figure 2). It should also be noted that in the vicinity of Point B the Silurian rocks of the anticline plunge beneath the Devonian as a result of cross deformation. Everywhere on the uplands this forest is dry and ericaceous, consisting dominantly of Chestnut Oak (*Quercus prinus*) with lesser amounts of White (*Q. alba*), Northern Red

¹Except where otherwise stated, geologic information has been taken from the Geologic Map of Virginia and the expanded explanation (Rader and Evans 1993).

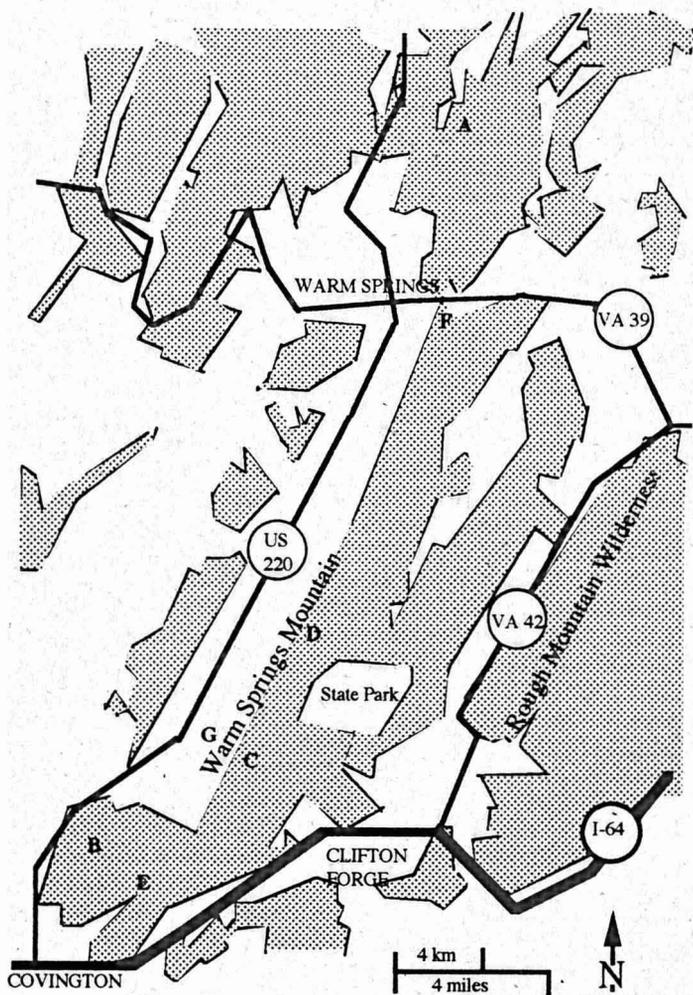


Figure 2. National Forest lands of Warm Springs Mountain and vicinity (in gray)

(*Q. rubra*), Black (*Q. velutina*) and Scarlet Oak (*Q. coccinea*), Red Maple (*Acer rubrum*) and Black Gum (*Nyssa sylvatica*). The shrub layer consists largely of Mountain Laurel (*Kalmia latifolia*), Upland Low Blueberry (*Vaccinium pallidum*) and Black Huckleberry (*Gaylussacia baccata*). The leaf mat is heavy and ground cover is usually confined to scattered small heaths such as Teaberry (*Gaultheria procumbens*) and Trailing Arbutus (*Epigaea repens*) and herbs such as Wood Tickseed (*Coreopsis major*). *Leucobryum* cushion moss and *Cladonia* lichen are common at tree bases and on patches of open ground.

Examples of at least one other forest type occur at lower elevations on the silica-rich Silurian rocks. These are the mesic forests along streams and in well-watered coves. Like those of the upland forests, soils are acid as reflected in both woody vegetation and herbs. The most imposing example is Dolly Ann Hollow (point E, Figure 2). The canopy here is dominated by large old-growth Canada (or Eastern) Hemlock (*Tsuga*

canadensis), White Pine (*Pinus strobus*), White and Chestnut Oaks, and Pignut Hickory (*Carya glabra*), with smaller sized Black Gum, Northern Red Oak, Tuliptree (*Liriodendron tulipifera*). American Basswood (*Tilia americana*), and Shagbark Hickory (*Carya ovata*). Witch Hazel (*Hamamelis virginiana*) and especially Great Rhododendron (*Rhododendron maximum*) form thickets along the stream. The acid and nutrient-poor near-surface soil layers result in sparse herbaceous ground cover and its limitation to a few species such as Partridge Berry (*Mitchella repens*). Similar "acid-mesic" forests also occur in coves near location A (Figure 2) but here contain such species as Striped Maple (*Acer pensylvanicum*), Canada Mayflower (*Maianthemum canadense*) and Star Flower (*Trientalis gorealis*) in response to somewhat higher elevations than at Dolly Ann Hollow. Our point here is that despite abundant moisture in the acid-mesic forests, they differ greatly from the mesic forests on rich or circumneutral soils.

If we now consider the forests developed on carbonate rocks of the Ordovician formations, we see stark differences delineated by geologic boundaries. The richest soils, and those most utilized for agriculture, occur on the limestone and dolomite rocks of the Warm Springs Valley along US Route 220 (Figures 1 and 3). Forests here are diverse, with many mesic species such as maples, elms, ashes, and tuliptree; yet they also contain many oaks, due to the ready subsurface drainage of limestone bedrock and the consequent drying of soils during periods of drought. Indeed, this valley is a notable karst area with many sinkholes and caves (Hubbard 1988).

Of greater interest to us than the valley limestones is the Martinsburg Formation because it underlies areas nearer the Silurian rocks and public lands. This formation consists of predominantly "yellow to brown weathering limy shale" with a thickness of about 1000 ft (300 meters). The overlying Juniata Formation of 300 to 400 ft (90-120 meters) in thickness forms a narrow transitional zone between carbonate rocks and the Silurian Sandstones (Bick 1962). Both of these formations are included under "Ordovician Shale" in Figure 1.

One of the most striking—and accessible—transformations in forest type associated with the contact between two rock units occurs in the high gap by which State Route 39 crosses the range just east of Warm Springs, VA. Here (Point F, Figure 2), after passing through oak forest on the southeast slope, is an abrupt change in vegetation at the gap. At almost 3000 ft (914 meters) elevation Black Walnut (*Juglans nigra*) and other mesic species, including particularly many grape vines (*Vitis aestivalis*), suddenly appear. Other mesic species encountered on descent of the northwest slope are Slippery Elm (*Ulmus fulva*), Northern Red and White Oaks, Black Birch (*Betula lenta*), Shagbark, Bitternut and Pignut Hickories (*Carya ovata*, *C. cordiformis*, *C. glabra*), Bitternut (*Juglans cinerea*), Cucumber Magnolia (*Magnolia acuminata*), White Ash (*Fraxinus americana*), White Basswood (*Tilia heterophylla*), Black Cherry (*Prunus serotina*), Black Locust (*Robinia pseudoacacia*), Red, Sugar, and Black Maples (*Acer rubrum*,

A. saccharum and *A. nigrum*) and Red Mulberry (*Morus rubra*). Shrubs include Black Elderberry (*Sambucus canadensis*), Witch Hazel, Maple-leaf Viburnum (*Viburnum acerifolium*), and Flowering Raspberry (*Rubus odoratus*). Black Maple in particular is considered to be an indicator of the richest (eutrophic) forest type in the state (Rawinski 1994). Martinsburg Shales are conspicuous in road cuts on the slope.

A similar transition of forest types may also be observed in the southern part of the range along State Route 606. This road ascends the northwest slope obliquely toward a broad wind gap at the range crest. The aspect here varies from west to southwest but the forest is mesic. Approximately 2 miles (3.2 km) southeast of Route 220 (Point G, Figure 2) typical Martinsburg Shale is exposed in a road cut beneath dark brown mull type soil which is characteristic of mixed mesophyte forest. Although this forest is secondary and has suffered obvious degradation, its original character is identifiable. The canopy is dominated by White Ash with subordinate Sugar Maple, Black Locust, and a little Northern Red Oak, the most mesic of the oaks. As is characteristic of such mesic forest, there is virtually no leaf mat. It appears that the water retaining properties and fertility of the limy shale are, despite the unfavorable aspect, adequate to maintain mesic conditions throughout the year, enabling the observed species to out-compete such oaks as occur on the valley limestones. The mesic character of the forest is maintained to the mountain crest. At this point, Route 606 meets Route 703 which follows the ridge to the northeast. The transition from mesic to dry oak forest occurs in 0.3 mile (0.5 km) along this road where it climbs out of the gap and encounters resistant sandstone. The forest here and extending along the ridge consists of Chestnut, White, and Northern Red Oaks and considerable Red Maple. Mountain Laurel is common in the shrub layer.

Above approximately 3500 ft (1070 meters) this oak forest itself undergoes a transition to predominately Northern Red Oak, as is usual for higher elevations in the region (Mueller 1996). On the exposed culmination of the ridge at Bald Knob, the oak forest becomes stunted and wind contorted. On the most exposed slopes it gives way to Pitch Pine (*Pinus rigida*) heath with shrubby Bear Oak (*Quercus ilicifolia*), Catawba Rhododendron (*Rhododendron catawbiense*). Minnie-bush (*Menziesia pilosa*), Black Chokeberry (*Aronia melanocarpa*), huckleberry and blueberries. Accompanying these are such boreal species as American Mountain-ash (*Pyrus americana*), Canada Mayflower, and the rare Variable Sedge (*Carex polymorpha*).

CONCLUSIONS AND RECOMMENDATIONS

Close correspondence appears to exist between the geology and forest types on Warm Springs Mountain, a fairly typical range of the folded Appalachians. This correspondence includes not only the obvious contrast between valley bottom and ridge top but also the slope-formations. In at least some situations the effect of bedrock dominates that of aspect and

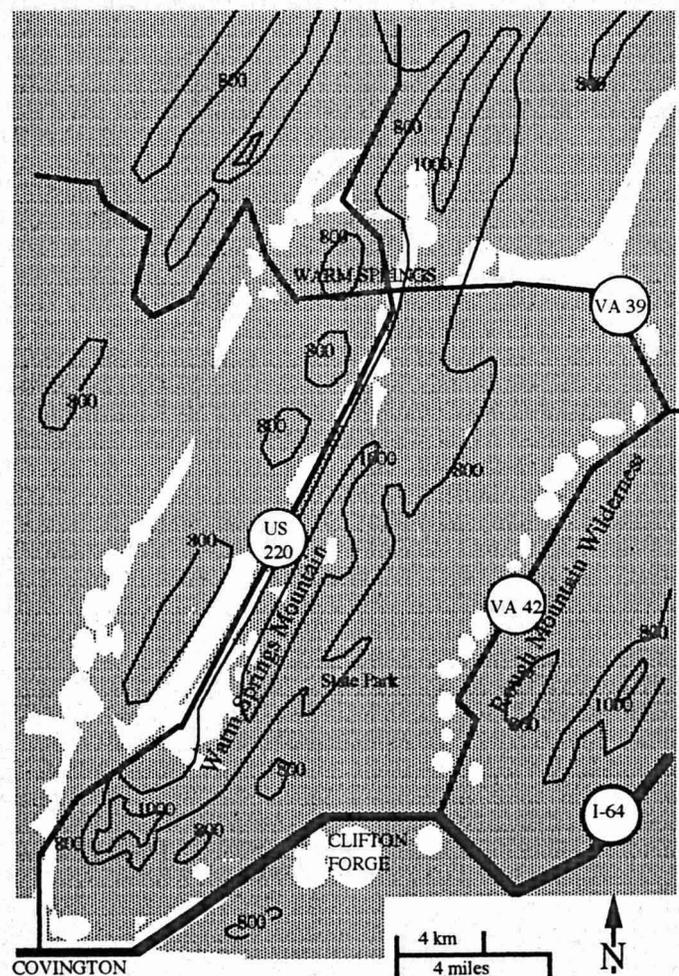


Figure 3. Forest cover (in gray) and 800 and 1000 meter contours of Warm Springs Mountain and vicinity

other slope factors and may be the primary determinant of forest type distributions. Although the present study was confined to Warm Springs Mountain, a perusal of geologic, land use and forest cover maps, as well as cursory field observation, indicates that similar relations probably occur on many ranges of the folded Appalachians. Specific examples include Peters, Clinch and Walker Mountains in southwest Virginia and ranges to the north and northwest of Warm Springs Mountain. To varying degrees, such relations should occur in unglaciated terrain quite generally, and even in glaciated terrain where bedrock is near the surface. Correlations between fluvial and glacial deposits and forest type have also been recognized, an example being the association of Jack Pine (*Pinus banksiana*) and glacial outwash (Braun 1950). Relations between fluvial deposits and forest type in the unglaciated Appalachians should be investigated.

This study indicates that geologic formation delineation and trend lines can facilitate ecological mapping. Relations

between geologic formation, topography, and forest type should also enhance the value of aerial photographs and aid field work. The use of geology thus provides several converging avenues to ecosystem protection and recovery. Although State Natural Heritage programs give most attention to rare species and ecosystems, integration of geology into these programs can help realize the potential of degraded but critical areas in the regional ecologic mosaic. In the absence of geologic information, recognition of such areas and their ecological functions will be more difficult. Consequently we urge that geologic mapping and formation characterization be incorporated in evaluating ecosystems on a scale much larger than its present incidental use as a guide to certain rare occurrences.

Geological data and concepts should be integrated into wildland planning by activists. An additional benefit of such planning could be the involvement of a larger segment of the scientific community. Many geologists might be surprised to learn that they can make significant contributions to preserving and restoring biodiversity through their knowledge of rock distributions and mineral chemistry. Scientists are ever on the lookout to expand their activities into new fields. Unfortunately, to the present, most geologists have been single-mindedly concerned with the exploitation of Nature. This could be changed by revealing to them their role in wildland research and preservation. ■

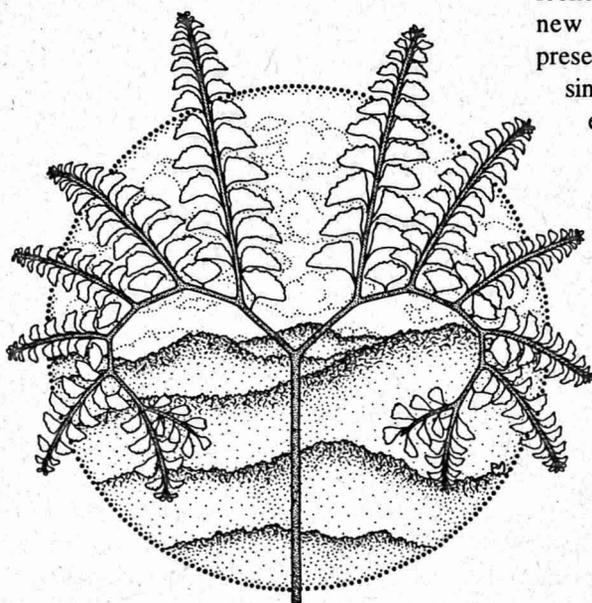
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Acknowledgment

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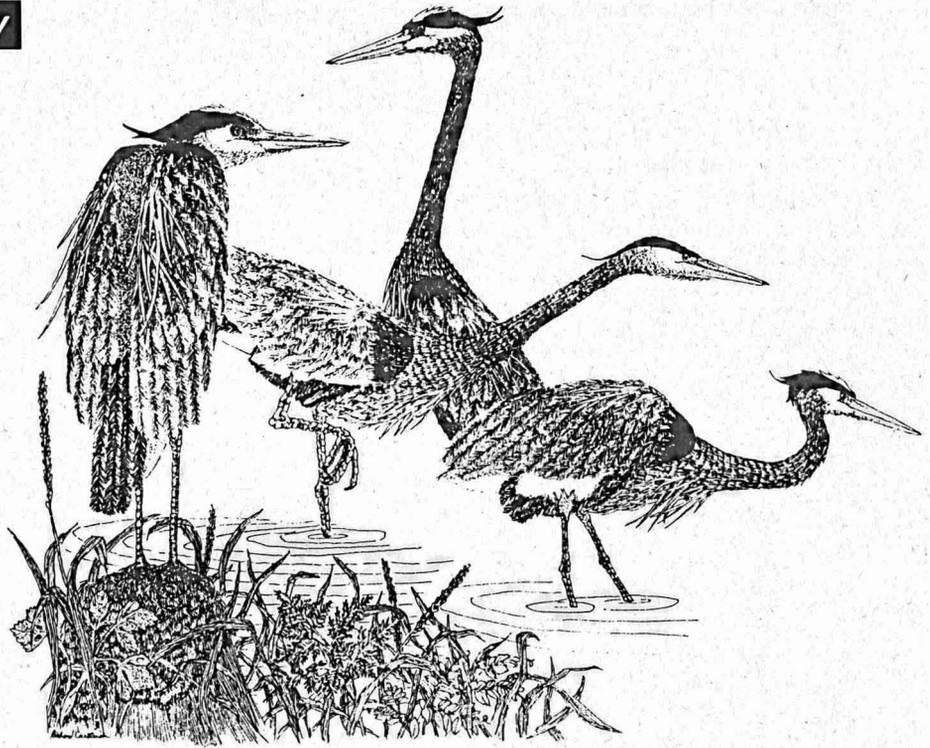


by Naki Stevens

ESTUARIES! What are they and why so important? Estuaries are usually known by their local monikers—bays, sounds, inlets, lagoons...even most harbors are estuarine. They are semi-enclosed coastal bodies of water where fresh water from rivers and streams meets and mixes with salt water from the ocean, creating a nutrient-rich environment that is one of the most biologically productive on Earth.

America's estuaries are economic, cultural, and ecological treasures that produce more food per acre than the nation's richest farmland. The many habitats of estuaries and other coastal waters provide jobs to 28 million Americans in commercial and sport fishing, tourism, recreation, and other industries, with fishing alone contributing \$111 billion to the nation's economy every year. Many communities' traditions and quality of life depend on the health of the estuary near them. And estuaries are treasured by those who live near them and those who visit them for their beauty and the recreational opportunities they provide, such as bird watching, tide-pooling and beach activities.

Despite the many values of estuaries, they are gravely threatened by water quality degradation and habitat alteration and loss. Estuary watersheds are home to over 100 million Americans, and impacts from their heavy use have taken a toll on the health of estuaries. Population growth in coastal watersheds, dredging, draining, bulldozing, paving, pollution, and dams have destroyed millions of acres of salt



Saving Our Nation's Estuaries

Habitat Restoration is the Key

marshes, sea grass meadows and other critical estuary habitats that support countless wildlife species. Forty-three percent of the nation's assessed estuaries do not fully support their designated uses, such as fishing and swimming. Throughout the nation, degraded estuaries have led to the loss of commercial fishing jobs, closed shellfish harvesting areas, algal blooms and subsequent fish kills and waterfowl declines, and increased coastal storm damage due to the loss of coastal wetlands and other natural lands.

Of special concern is the loss of estuary habitat. Salt marshes, coastal fresh-water marshes, forested wetlands, sea grasses and shellfish beds nurture many endangered fish and other wildlife species. Up to 40,000 acres of estuary habitats are destroyed every year. Examples of habitat loss in the nation's estuaries include:

- San Francisco Bay—95% of wetlands gone
- Chesapeake Bay—90% of sea grasses gone
- Puget Sound—73% of salt marshes gone
- Galveston Bay—85% of sea grasses gone

The areal loss of estuary habitat, which has resulted in stressed ecosystems that are no longer as biologically productive as in the past, can only be reversed by actively restoring habitat in estuaries. Many estuaries have numerous sites that are suitable for restoration yet will soon be lost altogether without prompt action.

Restore America's Estuaries is a coalition of eleven regional environmental groups, formed in 1995 in partnership with The Pew Charitable Trusts to push hard for habitat restoration in estuaries. The groups are People for Puget Sound, Save San Francisco Bay Association, Galveston Bay Foundation, Coalition to Restore Coastal Louisiana, Tampa BAYWATCH, North Carolina Coastal Federation, Chesapeake Bay Foundation, American Littoral Society (Hudson-Raritan Estuary), Save the Sound (Long Island Sound), Save The Bay (Narragansett Bay), and Conservation Law Foundation (Gulf of Maine estuaries).

We have set a national goal to restore at least one million acres of estuary habitat by the year 2010. To accomplish this goal, we are urging Congress to establish a voluntary, incentive-based estuary habitat restoration program based on public-private partnerships. Such a program would provide citizens the necessary resources to save their estuaries before it is too late.

Please call Restore America's Estuaries at 202-289-2380 for more information about our habitat restoration campaign and legislation. ■

Naki Stevens is executive director of Restore America's Estuaries, 1200 New York Ave. NW, Ste. 400, Washington, DC 20005; 202-289-2380; 202-842-4932 fax; e-mail <restore@estuaries.org>.

Gar

*The marsh was waiting
where the next long beach curved in
noon and still. Listless
reeds bent across our bow,
dry wisps of sound sliding
down the gunwales.*

*On the water's gelatinous surface
the longnose garfish lay
bedded like a fossil.
Heavy body sodden in the sun,
long thin bony snout
unwieldy as an old saw.
Her only beauty a black-
spotted fan-shaped tail
spread like isinglass against
the water. We came alongside
but she didn't move.*

*Was her belly cool in the water,
her back weighted with heat?
Locked in a rhythm of her own,
this ancient fish,
silent relic of Pangaea's dull shores,
measured time in terms beyond my grasp
in a cosmos uncomplicated by why.*

*We shoved the canoe free of the marsh
and the gar's unanswerable gaze,
into a quickening lake
where waves broke the sunlight
into a golden mesh that slid
across the sand. Along the cliffs
harebells quivered, and naked roots of cedars
coiled like muscles against the rocks.
A kingfisher sipped the water, and
the great blue heron's wings
stroked a weightless blue sky.*

—Sally S. Spear

GOVERNMENT TAX SUBSIDIES: PROBABLY THE SINGLE LARGEST THREAT TO WILDERNESS AND HABITAT PROTECTION

Readers should beware, the following article contains arcane tax rules that Exxon, Crown Butte Resources, and other companies that profit by extracting natural resources do not want you to know exist or to understand. Eliminating these tax breaks would strike at the jugular of the beast that scarifies landscapes, flattens mountains, and pollutes streams—government subsidized profitability for resource extraction industries.

All too often the nation's tax policy is in direct conflict with environmental goals, including efforts to protect habitat and biodiversity. Few wilderness activists give tax policy much attention, yet the tax code and budget policy in general may be the single largest influences on conservation efforts. As illustrated below, one tax break to the domestic oil industry can create an incentive to increase oil exploration in numerous sensitive habitat areas. Tax breaks force us to wage more battles to protect specific places, spreading our resources still thinner.

This article identifies some of the more outrageous federal tax laws that harm habitat. Many others exist, and resource extraction industries are always working to create new ones. A Friends of the Earth report, *Dirty Little Secrets: Polluters Save While People Pay*, identifies 15 corporate tax breaks that subsidize environmental destruction and cost taxpayers \$22 billion over five years.

The United States' internal revenue code, which has more than 9,000 sections, details the principal ways in which the federal government raises revenue. Although only four taxes are explicitly identified as "environmental," many others have significant (albeit unintentional) effects on the environment.

Taxes influence both individual and corporate behavior by altering the effective prices of particular goods and services or the rates of return on particular investments. Tax code provisions influence decisions about real estate development, resource extraction, energy use, and other activities that affect the quality of air, water, and wildlife habitat.

Some of the tax laws described below influence activities on both private and public lands, while others only influence private lands. As new regulatory controls protecting habitat on private and public lands become more challenging to pass and implement, taxes ought to be viewed as an alternative method to influence how land is managed.

Reforming tax laws is an important tool for conservation activists because tax policy is a blunt instrument and its influence on behavior sweeps broadly. These characteristics make taxes more effective in some respects and less effective in others than commonly employed conservation tools. These distinctions can be drawn out by comparing taxes to, for example, local zoning laws.



How Government Tax Subsidies Destroy Habitat

by Brian S. Dunkiel

Portions of this article originally appeared in "Should Tax Policy Be Subject to NEPA and EPA?" in *Environment*, Dec. 1996, p. 16.

When used to protect critical environmental features, zoning laws are like a rifle shot, in that the rules can be designed to protect specific areas; while the tax code is more of a shotgun approach. Much more development is captured by tax rules, but they are not aimed at any specific areas. Another distinction is that zoning is generally a local issue, which grassroots activism can influence; while federal tax policy is a national issue, often made behind closed doors where conservationists are traditionally not welcomed. Both can be hard nuts to crack. A final salient characteristic of tax policy is that it does not prohibit activities; it only creates incentives or disincentives. Therefore, tax policy should be viewed as a tool to complement more restrictive environmental laws and regulations.

HOUSING SUBSIDIES FOR THE WEALTHY

The federal tax code allows owners of second homes to deduct interest paid on the mortgages of those homes.¹ The deductibility of mortgage interest for second homes makes it less expensive to own such homes, thereby increasing the overall demand for them. As a result, more homes, roads, and related amenities are built in pristine or environmentally sensitive areas than would occur without this tax provision. Oliver Houck, professor of environmental law at Tulane University, suggests that this provision is a major impediment to the protection of threatened and endangered species.²

The home mortgage interest deduction is the largest development subsidy in the country; it cost the US treasury \$42 billion in foregone revenues in 1994 and is projected to cost \$254 billion in revenue losses between 1994 and 1998.³ Planners attempting to protect the endangered Fringe-toed Lizard from the spread of ranchettes in California's Coachella Valley believe this subsidy is one of the largest threats to their efforts.⁴

WELFARE FOR THE MINING INDUSTRY

The tax code contains special provisions for activities related to mining. One such provision permits mining companies to deduct exploration costs the year in which they are incurred instead of spreading them over the lifetime of the property (which is the usual practice with investments by business).⁵ In recent years, mining companies have claimed more than \$160 million annually in such deductions.⁶ The economic—not to mention the ecologic—consequences of these deductions are actually broader than only the lost revenue, insofar as these special tax breaks attract investments toward mining and away from investments that might be more economically and socially justifiable.

Mining, of course, is often very detrimental to the environment. It irreparably scars the landscape and pollutes surface and ground water, destroying the habitats of many species of plants and animals, including some listed as endangered. The extent of the destruction wrought by mining is indicated by the more than 550,000 abandoned mines spread over 32 states.⁷ Some of these sites are listed on the Superfund National Priority List, with estimated cleanup costs in the billions of dollars.⁸

Another tax break permits mining companies to automatically deduct a certain percentage from their gross income to reflect a mine's reduced value over time. Known as the percentage depletion allowance, the percent allowed to be deducted does not reflect the mine's actual reduction in value, but is fixed. The fixed percentages range from 5% to 22% and are based on the type of substance mined.⁹

The fixed deduction often bears no resemblance to the actual loss in value or to the amount of investment. In fact, mining companies often recoup more money through this tax break than they actually invest in the mine. This means that taxpayers provide the bulk of the investment that makes mines subject to the break possible. Government estimates show that this loophole has subsidized mining activities costing taxpayers \$2.8 billion over five years.¹⁰

What makes this tax break even more outrageous is that the higher percentage deductions are given to the more dangerous substances mined. Uranium, lead, mercury, and asbestos qualify for the highest rate of deduction, creating absurd contradictions in government policy. For instance, federal and local public health and environmental agencies are struggling with a vast children's health crisis caused by lead poisoning. Nearly nine percent of US preschoolers, 1.7 million, have lead poisoning. Federal agencies spend nearly \$200 million each year to prevent lead poisoning, test young children, and research solutions. Likewise, advisories warning of mercury-contaminated fish are frequently heard throughout the country, even as the federal government subsidizes mercury extraction.

Tax privileges of this nature effectively lower the cost of mining, leading to more of this activity than would be justified in a "free market." The extent to which these tax breaks affect the environment is not well studied, but it is safe to conclude that mining subsidies damage the natural world and ought to be eliminated.

WELFARE FOR OIL AND GAS EXPLORATION

The tax code also contains tax privileges for the oil and gas industry. One such tax break allows large oil and gas producers to immediately deduct 70% of their "intangible" drilling and development costs—the costs of wages, fuel, repairs, hauling, supplies, and site preparation. The remaining 30% of these costs may be deducted over five years.¹¹

Under tax rules that apply to other businesses, similar costs related to the investment in property are permitted to be written off over time as the property wears out. To allow oil and gas companies to immediately deduct most of these costs means that they are deducting the value of the assets faster than they actually wear out. With the tax bills early in the life of the oil or gas exploration investment lower, these investments are more attractive than they would be otherwise. It is estimated that this tax break provides a \$2.5 billion subsidy for oil and gas exploration over five years.¹²

Another tax break allows an investor in oil and gas to deduct losses from these investments even when the investor is

not substantially involved in the operations of the activity. This kind of so-called "passive loss" deduction was eliminated for virtually all other types of investments with the 1986 Tax Reform Act; but the powerful oil and gas lobbies managed to protect their special loophole, costing American taxpayers \$665 million over the last five years.

In the last thirty years, conservationists have fought numerous legal and political battles to prevent the destruction of wilderness and other sensitive habitat areas by oil and gas corporations. Many of the corporations proposing the destructive activities had the economic subsidies of the tax code as incentives for their plans.

Among the pristine areas threatened by oil and gas exploration that have required expensive legal battles by environmentalists to defend is the St. George Basin, off the west coast of Alaska in the Bering Sea. Scientists described this as "the gateway to virtually every marine mammal, fish and bird species moving between the North Pacific and the Bering Sea,"¹³ and estimated only a 28% chance to find commercial quantities of oil in the area. Yet, the companies proposing the exploration were willing to pay almost half a billion dollars for the right to seek oil there. The investment, which on the surface seems absurd, appears more rational once the generous tax deductions for "intangible drilling costs" are understood.

Another wild area threatened by oil exploration in the 1980s was the 247,000-acre Badger/Two Medicine roadless area in the Targhee and Bridger-Teton National Forests of Idaho and Wyoming. This area is still not safe from drilling proposals, and many other examples exist.

TAX POLICY IS ENVIRONMENTAL POLICY

By focusing on a few federal tax laws, this article has only touched the surface of how tax policy affects the environment. Other federal laws and numerous state and local tax policies, such as property taxes, also affect conservation efforts.

In coming years, tax policy and other economic triggers will likely gain importance in battles to defend wilderness and habitat. As regulatory methods of protection become increasingly difficult to pass and implement, expanding the debate to alternative fronts can only enhance existing efforts. By waging a campaign attacking the very government subsidies that enrich firms that profit by extracting resources, conservationists threaten the fundamental interests of these companies.

Another benefit of waging such a campaign is that identifying these tax giveaways puts a price tag on unwise resource use that threatens wild places. It should be recognized that this is not a dollar figure on the value of wilderness itself, but on the wasted public resources employed to destroy it. Showing how government policies hit the taxpayers' pocketbooks is a sure way to expand the base of people in favor of stopping destructive activities in wild places. ■

Brian Dunkiel, an environmental attorney, works for Friends of the Earth on reforming tax policy and other alternative conservation tactics from Burlington, Vermont. For a copy of Dirty Little Secrets, send a request and \$12 to Friends of the Earth, 1025 Vermont Avenue, 3rd Floor, Washington, DC 20009.



Citations

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2. O.A. Houck, "Reflections on the Endangered Species Act," *Environmental Law* 25 (1995): 689.
3. United States Congress, Joint Committee on Taxation, *Estimates of Federal Tax Expenditures for Fiscal Years 1994-1998* (Washington, DC 1993) 24.
4. Houck, note 3 above, page 689.
5. Internal Revenue Code, sec. 617.
6. Congressional Budget Office, *Reducing the Deficit: Spending and Revenue Options* (Washington, DC 1995); and Office of Management and Budget, *Analytical Perspectives: budget of the United States Government, Fiscal Year 1996* (Washington, DC 1995).
7. House Committee on Natural Resources, *Taking from the Taxpayer: Public Subsidies for Natural Resource Development*, 103rd Cong., 2nd sess., 1994.
8. In 1992, EPA estimated the cost of cleaning up one-third of the 52 mining sites on the list to be \$7 billion. The agency has no estimate for the cost of cleaning up the 66 sites on the list in 1996, however. US Environmental Protection Agency, *Mining Sites on the NPL, draft report* (Washington, DC 1992).
9. Internal Revenue Code, sec. 611.
10. House Committee on Natural Resources, note 9 above.
11. Smaller, independent oil and gas producers, who are not involved in retailing or refining activities, can immediately deduct all of these costs.
12. House Committee on Natural Resources, note 9 above.
13. *Village of False Pass v. Watt*, 565 F. Supp. 1123, 1129 (D. Alaska 1983).

Can Natural Value be Restored?

by Robert Elliot

Consider the case of a mining company that wants to mine an ore-body using the open pit method. Imagine that environmentalists are concerned about the violent damage such mining will do across a wide area. The environmentalists are concerned that mining will destroy certain natural values associated with the surface ecology, which, they say, has hitherto been undisturbed by humans. Spokespeople for the mining company agree, perhaps surprisingly, that the mining process will destroy natural values. They accept that if those values would be permanently lost, then the case against mining is compelling. They claim, however, that the natural values destroyed in mining can be fully restored, and they promise that the company will do exactly that. They promise that the company will, once the relevant minerals are recovered, rehabilitate the mine site, recreate the original surface ecology and thus restore all natural values destroyed by the mining. Their argument is that because natural value will be restored, the case against mining is weak. They support this claim with an account of the various economic benefits that will accrue to humans, at least presently existing ones, if the mining goes ahead.

It is easy to imagine variants of this argument which seek to justify various kinds of environmental despoliation. For example, a defense of clear-cutting wild forests could take the same form. This style of argument has some initial appeal, for it recognizes that there are natural values: values that directly emerge from or are associated with the intrinsic characteristics of wild areas and that do not derive from the uses to which such areas might be put or from the benefits or pleasures they might provide for humans. In other words, the argument concedes a core claim of environmentalism. It also accepts that the existence of natural values generates human obligations toward wild areas: it accepts that natural values constitute a compelling reason for letting wild Nature alone.¹ It claims, though, that natural value can be restored and promises to do so. If natural value can be and will be restored, then the obligation to leave wild Nature alone is weakened, perhaps to the point where it has little force. Let us call this key premise, the claim that natural value can be restored, the *replacement thesis*.

This dangerously seductive argument can be challenged at several points. First, it might be argued that the argument overstates the benefits that would result from environmental despoliation. Taking the case initially considered, it might be urged that the benefits to humans of mining are exaggerated or that equivalent benefits can be achieved in some other way. But this response will have most bite if natural values cannot be restored. For even if the benefits of mining are exaggerated or even if there is some alternative way of realizing similar benefits, there is scope to discount considerably the significance of the loss of natural values, because they can and will be restored, or so it is claimed.

Second, it might be urged that even if natural values can in principle be restored, most likely they will not in fact be restored. In the mining case it might be maintained that efforts at rehabilitation are almost certain to fail to create a surface ecology exactly like the earlier one. This might be due to some failure of will on the part of the

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mining company or, where the will persists, a failure of science and technology. Either way, since the features of the original surface ecology are not exactly replicated, not all of the original natural value is restored.

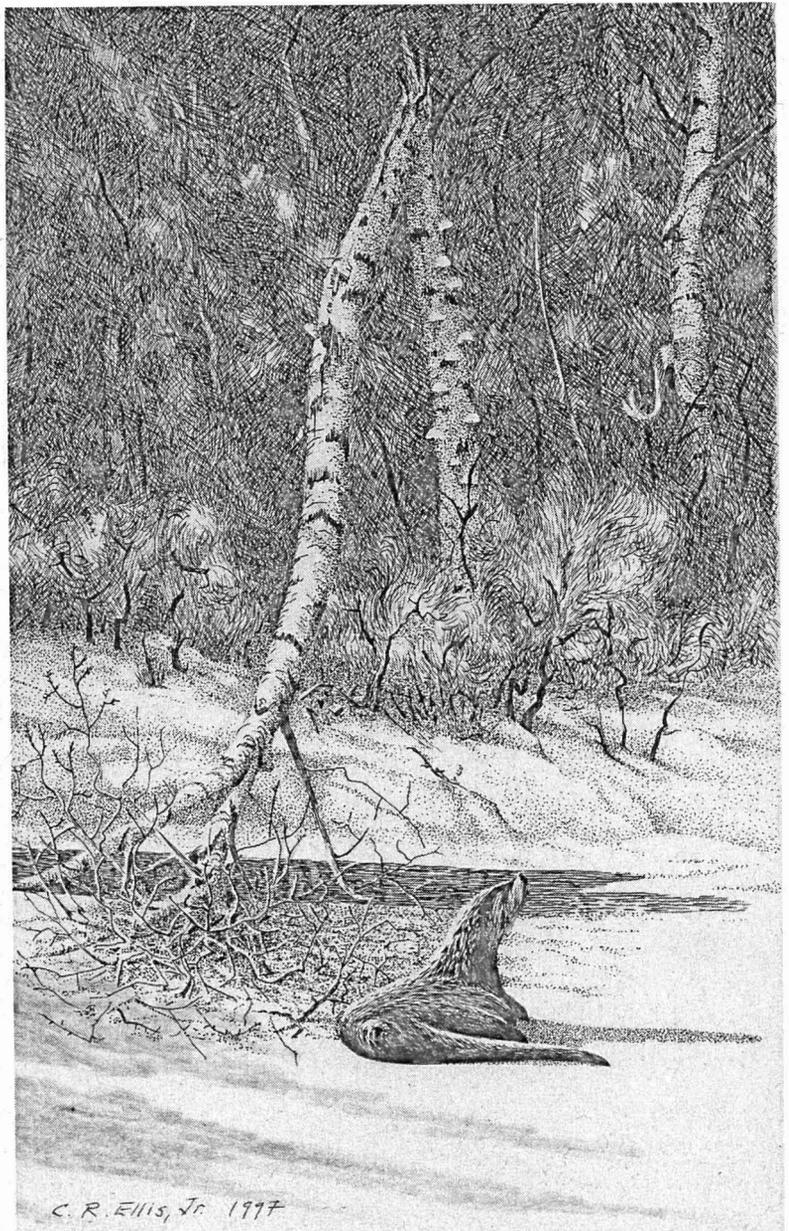
These two styles of response are important and should never be neglected. There is, however, a third style of response which does not depend for its cogency on contingencies such as current technological limitations or the inaccurate calculation of benefits. This third response urges that natural values can *not* be fully restored, not even in principle. The claim is that even if rehabilitation is possible, such that, say, a surface ecology completely indistinguishable from the one existing prior to despoliation is recreated, an important basis for natural values is missing. In what follows, this third response is defended and those natural values that cannot be restored are delineated. If this response is sound, it decisively defeats the seductive argument.

It should be noted, too, that at least one other powerful argument might be deployed against despoliation which does not have to do with the question of whether natural values can be restored. This argument emphasizes the felt suffering inflicted on living creatures as their habitats are destroyed.

The replacement thesis entails that the full value of some piece of the natural environment at any given time derives entirely from characteristics or properties that can be replicated, reproduced, or recreated. Imagine that an area of rainforest is cleared and later replanted to create an environment exactly similar to the forest there earlier. According to the replacement thesis, the earlier and later environments necessarily have the same value. I argue, however, that some of the value of the earlier rainforest derives from a property it possessed that cannot possibly be replicated. Specifically, the distinctive, natural genesis or origin of the earlier rainforest contributed to its value. The earlier rainforest had naturally evolved, whereas the later rainforest is the direct product of human artifice. This, I claim, makes for a significant value difference between them.

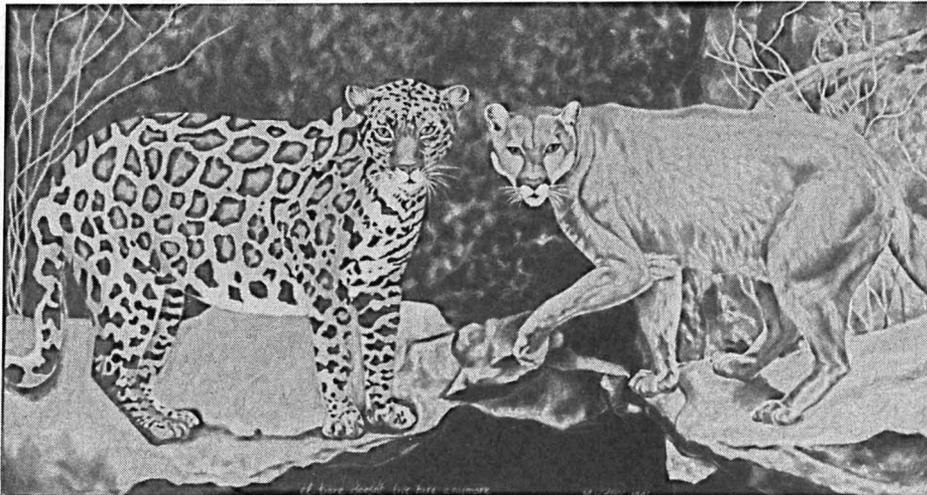
Another example might make the point more graphically. Imagine two islands close by one another and exactly alike. One island is in every sense a product of natural forces, whereas the other island has been constructed by environmental engineers out of natural components. The former island is entirely natural; the latter island is an artifact. According to the replacement thesis, because the islands are exactly similar, they have the same value. I think this is false. I claim that the first island has more value than the second.

In each of the examples two arrays of apparently natural objects are compared. They are indistinguishable in terms of their perceptible properties. If we took snapshots of the earlier forest and the later forest, and compared them, we would discover no differences. It is their relational properties—the relationships they have to objects



and events outside or beyond themselves—that differentiate them. In particular, the two rainforests have different histories. One is the product of natural forces, whereas the other is the intentional creation of human agents. This factual difference between the two forests underpins the value difference; the natural forest possesses a relational property the other lacks. The factual difference would not be revealed by a snap-shot; rather, it is a difference that would be revealed by a video depicting the genesis and evolution of the two arrays of objects. A similar point applies with respect to the two islands example.

The replacement thesis is flawed because it assumes that the factual differences, upon which the value differences supervene, are all revealed by a snap-shot. They are not. The particular history or genesis of something can be one of those characteristics or properties upon which the value of that thing is directly based. That a thing's value can supervene on its relational properties, including its history, is the conceptual basis for that we might call the *anti-replacement thesis*.



The anti-replacement thesis distinguishes between full value and equal value. Full restoration would involve not merely creating something *equal* in value to something else that has been degraded or destroyed; it would also involve achieving that equal quantity of value by creating something with the very same pattern of value-adding or value-supporting properties earlier possessed by the thing degraded or destroyed. So, the anti-replacement thesis leaves open the abstract possibility that restored Nature could have value as great as original Nature. In fact, however, restored Nature certainly would not have the same value as original Nature. This is partly because of the practical difficulties of restoring nature. More significant, it is because the property of being naturally evolved is intensely value-adding. An intensely value-adding property is one that acts in concert with other properties to produce an overall value in excess of the sum of the value of the proper-

ties taken singly. This idea of synergy needs explaining.

We can imagine a naturally evolved object possessing only meager value, such as a meteor in space. The value of the meteor is small because there is no plausible value-adding property it possesses apart from the property of being naturally evolved. We might even hesitate to say that it has any value at all. This might lead us falsely to infer that the property of being naturally evolved is not value-adding, and that the value of natural states of affairs is contributed by other properties. We can say instead that although the property of being naturally evolved is not value-adding in isolation, it nevertheless intensifies the value that derives from other value-adding properties. Take the example of the two islands earlier discussed. Both islands exhibit biological complexity, which we take to be a basis of value. One island exhibits biological complexity that has naturally evolved; the other exhibits biological complexity that has been intentionally created by humans. The value of the biological complexity in the first context is much greater than in the second, since the first has a property, namely the property of being naturally evolved, that intensifies its value.

The anti-replacement thesis clearly presupposes a distinction between the natural and the artificial, between what Nature produces through evolutionary, geomorphological and climatic processes etc. and what humans, as creatures of culture and technology, produce. It does not assume, though, that the distinction marks a sharp dichotomy: it acknowledges degrees of naturalness, that some environments are more natural than others. Nor is there any assumption that the distinction marks a deep meta-

physical divide. The thesis also grants that probably no terrestrial environment remains entirely natural. The impact of human activity is, after all, disturbingly pervasive and affects ecologies even in remote places. Environments even slightly altered by human activity may follow different evolutionary pathways than would otherwise be the case. Recognizing degrees of naturalness, the anti-replacement thesis claims that value increases as naturalness increases.

Even though the anti-replacement thesis recognizes degrees of naturalness, it nevertheless requires a clear conceptual distinction between the natural and the artificial. Critics of the distinction generally take the line that humans are just another species acting in ways that modify environments, displace other species and so on.¹ Yet the merest glance at a humanized landscape makes obvious that we are not just another species. With our cultures and technologies, we have separated

ourselves from Nature. We are members of a natural species, yes, we are animals with natural instincts and drives; but much of what we do is not natural.

In elucidating differences between the natural world and human society, we should note how differently information is transmitted in Nature and in culture.² In Nature, information is transmitted mostly through genes and chemicals. In culture, information is transmitted through language, rituals, traditions, and memes. Acquired information is transmitted, its transmission is comparatively fast, and it is not necessarily from parent to offspring. Moreover, culture and technology insulate humans from natural processes, including natural selection. For example, we use medical technology to assist injured or ill conspecifics, one result being increasing human populations. Technology in general makes possible massive intervention in ecosystems; and such cultural structures as economic and political systems drive such intervention. Also setting us apart is our capacity for active decision-making involving culturally constructed attitudes, desires and preferences. Our propensities are not as genetically determined as are those of other organisms. In short, the differences between human agency and the agency of other living and non-living things are profound and provide the clear conceptual distinction the anti-replacement thesis requires. It is simply counter-intuitive to think of our kind as just another species embedded in, and acting within, Nature.

How are we to conceptualize environmental restoration in the context of the discussion so far? A particular ecosystem may be thought of as an instance or example of an ecosystemic type. An ecosystemic type is a naturally evolved design, revealed through its particular instances. Environmental restoration aims at reconstructing instances of such designs, though sometimes no instances of the design remain. The specifications of the design must, of course, be fairly broad so as to allow particular ecosystems differing in fine detail to count nevertheless as of the same kind.

Consider two cases the New Zealand philosopher Alistair Gunn discusses.² The first involves replanting a clear-cut forest, where environmental engineers may be guided by some particular ecosystemic type, so what they produce is a non-natural instance of a natural type. The result is the same kind of forest but not the same forest, since there is no continuity of natural, as opposed to technological, processes. Again, the earlier forest possessed a relational property not possessed by the later forest, namely the property of being naturally produced.

The second case involves the restoration of some islands in New Zealand. This case differs from the first, in that the environmental degradation has not been as extreme. Here restoration involves the removal of introduced flora and fauna and the reintroduction of native species. Not only is the restoration guided by a natural design, it is carried out on a substantially natural object, a slightly degraded ecosystem that imperfectly fits the (loose) design specifications. The restored ecosystem will be to a large extent continuous with the original, since the

degradation has not been sufficient to count as having destroyed the original.

Naturalness enters into evaluations of environmental restorations in two ways. First, we may ask whether a particular restoration accords with a natural design. If it does not, then the value of the "restored" environment is significantly lessened. For example, replanting sections of felled eucalypt forest with *Pinus radiata* puts trees back on the ground but not in accordance with a natural design. There seems little value in such a restoration compared to a restoration according with the natural design. Second, we may question the degree to which a restored ecosystem is a natural object, a naturally produced instance of a natural design. My claim is that, other things being equal, value increases as naturalness increases. Furthermore, it is the normative significance of naturalness to which I have elsewhere sought to draw attention with the phrase "faking nature." An apparently natural ecosystem is faked, to some degree at least, if it does not accord with a natural design or if it is not entirely a natural product. And that is why we should not be seduced by the replacement thesis and the policies it is invoked to justify.

Of course a restored natural environment may possess considerable intrinsic value; the anti-replacement thesis does not dispute this. While the original environment had more value than has a restored environment, the latter certainly has more value than the degraded environment. Restorations that accord with natural designs and are constructed out of natural components do possess significant value; and, arguably at least, we have a duty to restore value that we destroy or erode.³ ■

References

1. The views canvassed in this article have been critically discussed in a number of places, besides those referred to here. Some samples are: Allen Carlson, "Nature and Positive Aesthetics," *Environmental Ethics*, 6 (1984): 5-34; C. Mark Cowell, "Ecological Restoration and Environmental Ethics," *Environmental Ethics*, 15 (1993): 19-32; Eric Katz, "The Ethical Significance of Human Intervention in Nature," *Restoration & Management Notes*, 9 (1991): 90-96; Eric Katz, "The Big Lie: Human Restoration of Nature," *Research in Philosophy and Technology*, 12 (1992): 231-241. Other papers relevant to this discussion include J. Baird Callicott "The Wilderness Idea Revisited: The Sustainable Development Alternative," *The Environmental Professional*, 13 (1991), p. 241; J. Baird Callicott, "A Critique of and an Alternative to the Wilderness Idea," *Wild Earth*, Winter 1994/95, p. 56; Elliott Sober, "Philosophical Problems for Environmentalists," in Bryan G. Norton ed. *The Preservation of Species* (Princeton: Princeton University Press, 1986), pp. 179-84.
2. Alastair S. Gunn, "The Restoration of Species and Natural Environments," *Environmental Ethics*, 13 (1991) p. 306.
3. Here I am indebted to Holmes Rolston III, "The Wilderness Idea Reaffirmed," *The Environmental Professional*, 13 (1992), pp. 370-1.

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Gaian Ecology and Environmentalism *by Alan Marshall*

INTRODUCTION

The Gaia concept has laudits from diverse breeds of environmentalism: from the deep environmentalism of George Sessions, through the ecopsychology of Theodore Roszak, to the ecosystems ecology of Eugene Odum. The Gaia concept views the Earth as a stupendous living unitary organism that possesses homeostatic, or self-regulating, properties. (See Margulis & Lovelock 1975, Lovelock 1987, Lovelock 1988a; Lovelock 1988b. The scientific dubiety of the Gaia concept is analyzed in Doolittle 1981, Dawkins 1986, Ehrlich 1991 and Williams 1992.) This paper explores the normative implications of the Gaian perspective of ecology and environmentalism.

THE FUNCTIONALIST NATURE OF THE GAIA CONCEPT

Gaian advocates rarely acknowledge the extreme functionalist tendencies inherent in the Gaia concept. The functionalism of the Gaia concept stems from its unitary and systems view of nature. Gaia, in many ways, has become the epitome of systems ecology, perceiving the biotic and abiotic constituents of the Earth as components in a system. Systems ecology, itself, is only sparingly ecological. Its main intellectual heritage lies in engineering, cybernetics and system science, imbued with the philosophy of holistic ecology.

The functionalist approach of Gaian systems ecology converts living things into mere packages or unidentified shells involved in the transfer of materials and energy between themselves and the abiotic Earth. Individual species are not classified according to their genetic heritage, and individuals are not valued in and of themselves but according to their functional status. A *Hebe* becomes a primary producer, converting so many tons carbon dioxide into organic carbon per unit time, a *Hoiho* becomes a consumer of organic carbon and a user of so many kilowatts of energy per seasonal period, while *Heterobasidion annosum* becomes a decomposer at the rate of x amount of cellulose molecules per year.* Any evolutionary, biogeographical, or cultural relevance of an individual or species is wiped away by such a categorization. The *Hebe's* job can be undertaken by an exotic shrub or a large amorphous blob of plant cells, for all Gaia cares.

Not all species can be considered equally valuable in their functional or quantitative contribution to the great organic Gaia. The extremism of the Gaian functionalist approach declares that some species, indeed some ecological communities, may be considered expendable: "Gaia has vital organs at the core, as well as expendable or redundant ones on the periphery. What we may do to the planet may depend greatly on where we do it" (Lovelock 1987:127).

The Gaia view of biodiversity is also governed by functionalism. The diversity of lifeforms on Earth is not valued for any other reason than as a useful genetic backup in the homeostatic system of Gaia.



**Hebe* is the name of a genus of flowering shrubs native to New Zealand; *Hoiho* is the Maori name for the Yellow-eyed Penguin; *Heterobasidion* is a fungus.

Gaian ecology suggests that in the event of massive changes in the taxonomic composition of Earth's biota, the identity of Gaia remains unchanged because the mechanisms involved in matter and energy flow remain in place. Gaia has even been said to be capable of retaining her identity in the face of mass extinctions (Lovelock 1988a) and global thermonuclear war (Margulis 1986) despite the radical changes in biotic composition and ecological integrity these situations would present.

Contrary to what Gaia proponents might have us believe, the Earth's biotic composition is one of the very defining features of its identity. An individual or species should not be valued merely for its quantitative contribution to the overall whole, but for its intrinsic value. I, for one, am not about to bow to an Earthly goddess whose valuation of me lies in my contribution to the matter and energy flow of a homeostatic feedback loop, just as I am not ready to concede the authority of a government that values me according to my contribution to the gross national product.

Some Gaians shy away from regarding the Earth as an actual single living organism and prefer to employ the word "system" to describe the Earth and its biota. For instance Lewis Thomas states "the Earth is a system" (quoted in Roszak 1991:137). The closeness of the intellectual relationship between a system and a unitary organic entity can be found by perusing just about any dictionary, where a "system" is often defined as a "complex organized whole" with references to things "organic" or "unitary." Whatever Gaians prefer to call the Earth, an organism or a system (or a "holon" as Goldsmith, 1989, prefers), it all amounts to the same thing: the Earth is a unitary whole.

Whether one views Gaia as a system or an organism might seem irrelevant, but it does separate the true organicist from those with mechanistic leanings. Gaians often pride themselves on their organicism (see Abram 1985 and 1991), but the scientific explanations of Gaia are firmly based in mecha-

nistic principles. As Loehle (1988) and Merchant (1990) point out, mechanicism is intrinsic to a systems analysis of anything—including Earth. Gaians think they favor organicism over mechanicism, yet really their concept is an eclectic synthesis of both (Visvader 1991). Whether perceived as an organism, a system, or a holon, Earth emerges to Gaians as a unity whose parts are united by the passing of matter and energy. You are at one with nature not because you care for it, but because you transfer matter and energy with it; i.e., because you eat it...and it eats you. "All flesh is grass" may be considered a Gaian sentiment. But it would not encapsulate the true state of affairs—namely, that the grass does not want to be flesh. Many grasses have evolutionary adaptations to evade ever becoming flesh. I, likewise, do not want to be eaten by another of Gaia's components, even though this would be an expression of Gaia's inherent unity.

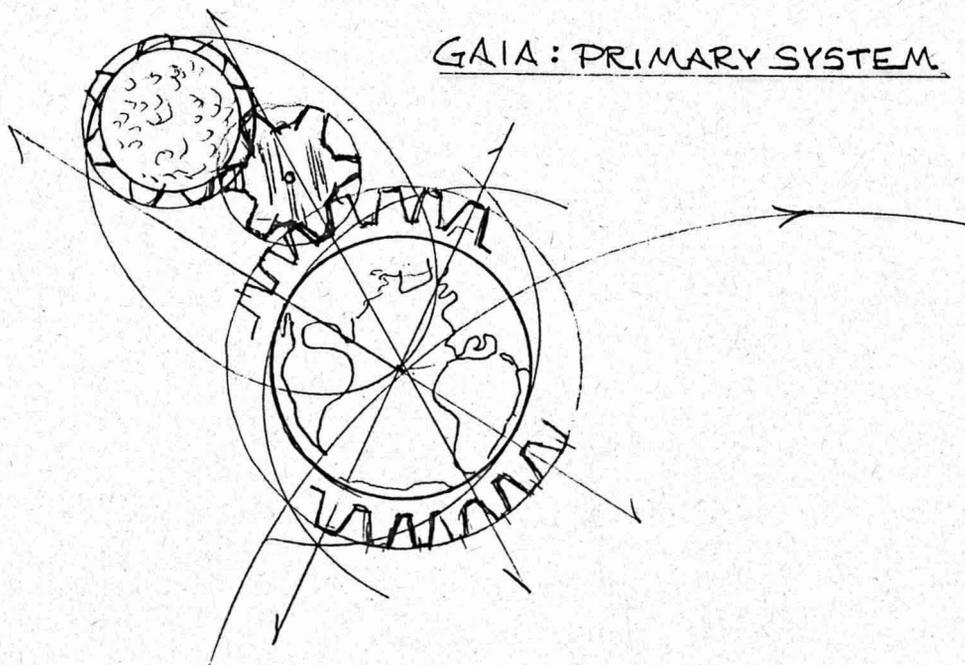
The unitary perspective of Gaia can only be maintained from a physical perspective of the Earth. Gaia proponents present relationships between different organisms as physical rather than ecological. This is an adequate explanation for the unitary nature of an individual or-

ganism, where the transfer of matter and energy proceeds according to physio-chemical laws, but not for a group of co-living but distinct individuals in which the phenomena associated with getting into, or out of, a position that enables a transfer of matter and energy are more important in determining the relationships in nature than the mere transfer of matter and energy. Such inter-organismal relationships are not reducible to physio-chemical laws.

According to the Gaian way of thinking, all living things possess a standard set of biological characteristics expressible in physical terms. Far from giving life to the Earth, the Gaia concept sucks life out of the living. Such is the fate of a concept that emerges from the "physics envy" of systems ecology.

THE BOURGEOIS NATURE OF THE GAIA CONCEPT

The bulk of the ecological evidence points to the view that biological members in nature comprise a collection of competitively interacting individuals in pursuit of their own personal agendas without concern for the fate of the whole biotic community of Earth. The Gaia concept does not necessarily negate this view, but it suggests that individualistic



and competitive tendencies in the natural world are rendered benign or benevolent by the operation of global homeostatic mechanisms. Thus, although nature may be "red in tooth and claw," the predominant outcome, according to Gaians, is global harmony.

The existence of homeostasis above the organismal level presupposes that some sort of balance or ordered norm exists in nature which is being maintained by such homeostasis. But balance and order in nature above the organismal level does not exist, at least not more than ephemerally (see Wiens 1984, and Botkin 1990). Gaians might be excused for perceiving much balance and orderliness in nature, for they are concentrating on the physical essences of matter and energy cycling rather than on the identity of particular ecological communities. But their persistence in advocating balance, harmony, and order goes beyond that, as most Gaians tend

also to perceive a balance of nature from the point of view of ecological structure and community composition.

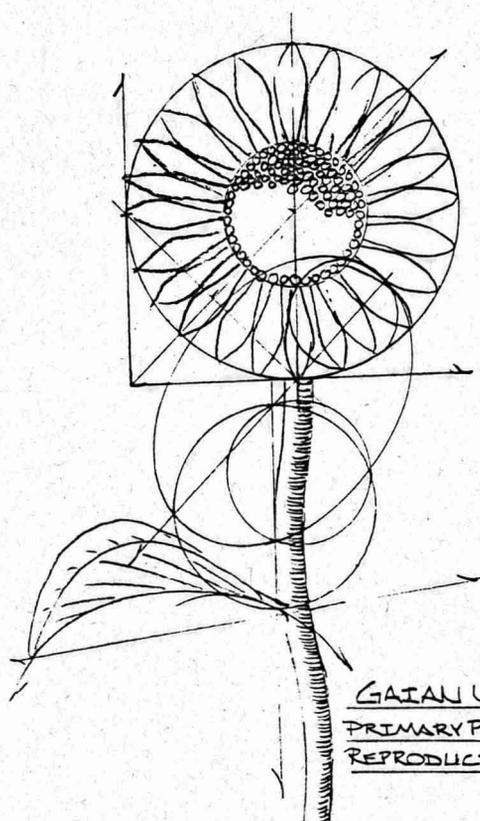
The longevity of the "balance of nature" concept, despite evidence to the contrary, owes much to the continuing influence of three traditions embedded deeply in modern culture: ancient Greek metaphysics, natural theology, and bourgeois economic philosophy, all of which have had a fixation with harmony, order, and balance, mainly as legitimizing devices by those in power. The rich and powerful typically produce a dogmatic

discourse that espouses the ordered and harmonious nature of the world, and extols the virtues of acting to maintain this order. The poor can thus be prescribed a role that mustn't be interfered with lest a breakdown of order and harmony occur.

In classical times, Platonists conceived of an ordered world to justify slavery. In the "Dark Ages," Christians maintained a metaphysical viewpoint of order and balance to anesthetize the minds of peasants to their poverty. Today's ruling classes espouse notions of economic order and harmony to repel subversive tendencies from the underclasses. The first line of defense against subversive threats is to accuse those seeking social change of upsetting the natural or god-given order and harmony of things.

Beyond the individual level of organization, nature is low in or devoid of order and harmony. Any order and harmony we see in our lives, we make. Through our labors, we have assembled some sort of harmony from a world of disharmony. Those who have appropriated from others more than their fair share of material benefits see more harmony because they no longer need to eke out an existence from an often improvident world. For such people, the world seems to positively ripple with harmony and bubble with balance. Yet those nearer the struggle for survival see only the barest amount of harmony.

Even though a metaphysical viewpoint cannot emerge to prominence until ideological support for it is strong, scientists continually claim to be largely independent in their social and political environment, and to be able to neatly disengage their own politics from their scientific work. Lovelock (1987) claims to have been only mildly affected by the society in which he lives. A feminist critique of science might suggest otherwise. "While scientists firmly believe that as long as they are not conscious of any bias or political agenda, they are neutral and objective, in fact they are only unconscious" (Namenwirth 1986: 29). The Platonists and Neo-Platonists may have



GAIAN UNIT:
PRIMARY PRODUCER
REPRODUCTION

thought as Lovelock does; but Pythagorus's perfect polygons, Ptolemy's ordered geocentric universe, and Kepler's geometrically and musically harmonious planetary orbits are also impositions of human notions on the natural world that could have emerged only in a society whose metaphysical and ethical commitment to harmony and order was encouraged by the prevailing elite.

The Gaia concept suggests that the world's biological membership acts in a self-regulating manner that ensures the Earth is maintained as a healthy place for life. Where have we heard this sort of thing before? A bunch of selfish individuals striving for nothing but their own welfare, giving rise to a situation that not only benefits the whole, but is capable of keeping aggressive competitors in check—this sounds suspiciously like the classical economists' invisible hand that guides the free market so that it benefits the whole of society. Just as in the natural world, however, the rampant egocentrism and competition we see in laissez-faire capitalism leads not to harmony and balance for all but to bloody battles, poverty, oppression, inequality, and suffering. The ability of individuals to survive such disharmony and chaos has less to do with the self-regulatory ability of Gaia or the free market system than to their own sheer tenacity.

The Gaia concept could become the new opiate for the masses, promising the poor that their oppressors will be taken care of by a mighty and inevitable natural process acting at the global level. The Gaia concept is both a product and a function of our society. It emerges from a society's promoting the sanctity of the free market and functions to legitimize the view that there are inherent self-regulating properties in the capitalist system.

The human tendency to personify and individualize collections of independent entities is carried out on a mythic scale by Gaians. Because we perceive the world from the viewpoint of an organized and integrated individual, we tend to view the world as such. Personifications and individualizations of ab-

stracted or constructed entities aren't just the result of human psychological tendencies, though. Such individualizations owe their existence to bourgeois notions of individualism. Bourgeois individualism (which is often hidden under the name of liberalism) involves the recognition of any particular social entity as a fundamental unity when it suits the interests of those in power. Most of the time the sanctity of the individual is paramount, as this allows continued dominance by those doing well within the free market system. In times of political crisis, such as war or revolution, the notion of individuality is extended to the nation, in order to encourage national cohesion against threats from within and from outside the nation.

An explicit example of the Gaia concept's unitarianism serving to reinforce social dogma lies in its conception of the Earth as a woman or a mother. This makes the essential nature and identity of women to be their biological function of motherhood. Gaia proponents tend to uphold the dualism of women as "earthly" and "natural" beings, and men as "cultural" beings who have been able to break with their "earthly" nature and pursue more abstract endeavors. Such essentialism, whether instituted by the male hierarchy or by radical feminism, is described by Gayatri Spivak as a bourgeois trap since it implies that all the concerns of women are homogenous due to their common relationship with nature (see Spivak 1987, and Quinby 1990).

THE IMPERIALIST NATURE OF GAIA

According to Lynn Margulis, Dorian Sagan, and Gregory Hinkle, the Gaia concept emerged from James Lovelock's fertile imagination and the US space program (Sagan and Margulis 1988, Margulis and Hinkle 1991). There is certainly a strong connection between space exploration and Gaia; some of the most prominent Gaians call for the expansion of Gaia to other worlds (Lovelock & Allaby 1985, Margulis & Sagan 1992, Schwieckart 1987). As well, Lovelock, Margulis, Sagan and Thomas

have all received official appointments or research funds from NASA.

The onward advance of humans into space is seen by these Gaians as a manifestation of the reproductive tendencies of the organism Gaia. Humans are perceived as the seeds or spores of Gaia, rightly acting to spread a representative biota of Earth to abiotic worlds. Humanity moving into space is essentially the same phenomena as plant seed dispersal. Some Gaians believe our expansion into space is a natural progression of an ecologically advancing organism bestowed with the powers of interplanetary dispersal.

The seed analogy evades the central point that human expansion into space is a social phenomenon, not a biological one. A seed is an individual plant embryo that acts according to its physiology and morphology, derived from millions of years of biological evolution. Those entities taking part in space expansion, such as nations and corporations, are not unitary individuals but social collections that act according to forces derived from their social, political and economic history.

The seed analogy attempts to naturalize the social, political and economic forces that lead to human expansion in space. However, a human embryo is not adapted to space as a medium of dispersal as a seed is to air, water or the fur of a mammal. Nor does a human embryo happen to spontaneously fall into space and colonize another planet.

Michael Allaby (1989) states that "Humans might not be the seeds of the Earth, but we are behaving as though we are, so it comes down to the same thing in the end." This acknowledgment, that humans are not the evolutionarily derived biological dispersal agents of the Gaian superorganism but have asserted our role to act as such, exposes the Gaia concept as an anthropocentric instrument that legitimizes human expansion in space.

Beyond the earthbound, socially malevolent repercussions of Gaia's expansionist agenda, space imperialism might destroy indigenous extraterrestrial

creatures. The probability of the existence of native species on other planets may be small, but it is real; and the effects of a Gaian expansion on such lifeforms would probably be devastating. If a Gaian invasion did not alter the environment of the native lifeforms irrevocably, they might still be condemned to extinction by the action of invasive terrestrial microbes (Marshall 1993). The native lifeforms themselves would most likely be microbial, but that does not necessarily detract from their moral considerability.

SUMMARY AND CONCLUSIONS

The Gaia concept has been hailed as a revolutionary ecological theory with positive implications for environmental thought. Apart from the scientific dubiety of the concept, the view of the Earth as a unitary organism is not an appropriate metaphysical stance for environmentalists to adopt. To suppose that the Earth is an individual organism is to declare that the planet is a united entity composed of integrated parts that act with common interest to maintain the living planet as a whole. The biotic constituents of planet Earth do not exist in a state of unity, and to regard them as such is to confer a non-existent state of balance upon the natural ecology of the world. This in turn, reduces the various biotic constituents of planet Earth to mere functional entities, whose value is dependent upon their respective contributions to energy budgets. The Gaia concept does not take into account the intricacies of inter-organismal relationships and community structures.

The Gaia concept is an example of cybernetics and systems science being applied to ecological phenomena, and along with systems ecology, tends to perceive order and balance in nature whether or not it is there. The Gaia concept is thus inherently bourgeois. Seeing order and balance in a chaotic and imbalanced world is the preoccupation of the rich—those who have acquired sufficient material protection to secure

themselves from the imbalanced chaos.

Gaia proponents exhibit a strong faith in technocentric solutions to the world's problems and thus firmly plant Gaia in the shallow end of the environmental pool. The epitome of Gaia's technocentrism lies in the proposal to extend the realm of humanity into space.

Rather than viewing the Earth's constituents as existing in unity, the Earth is more appropriately regarded as a community, composed not of a group of integrated organisms engaged in a common goal, but of a collection of separate organisms engaged in their own pursuits, during which the interests of others are often transgressed. Within such a view of nature, balance and harmony may exist above the organismal level, and negative feedback loops may be present, but only ephemerally and with little relevance to species composition and community structure.

The community approach offers greater explanatory power of both natural and social phenomena, realizing that there are often unassailable differences between individuals and groups of individuals that produce the structural relationships evident in nature and society. The community concept also allows for a multiplicity of spiritual interpretations of nature—from the reverence afforded to a particular tree or mountain to the ancient, pre-scientific conception of Gaia itself.

The community concept recognizes that a physical approach to ecology allows an identification of some environmental problems, but not all. Because the Gaian concept adheres to a purely physical interpretation of the natural world, it is unable to identify many environmental problems. In fact, Gaian ecology stalwartly refuses to even see some environmental problems, such as the effect of chemical and nuclear pollution on natural communities.

Although a physical approach to nature might help in identifying some environmental problems, it has no ability to solve them. The solutions offered by physical interpretations of environ-

mental problems are purely technical. Under the community approach, the primary identity does not belong to some holistic, homogenous mass of individuality but to the distinct individual members that make up the biotic community of the Earth. Therein lie the different value premises between the Gaia concept and the global community concept. Individuals, species, and communities are not valued only for their functional contribution to the whole, but for their own intrinsic and basic values. ■

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[Editor's note: *Wild Earth* has invited Lynn Margulis, who disagrees strongly with Alan Marshall's contentions, to write a response to this paper.]

Grist For Grace

*Let me speak for the gray-green lichen,
Know how the Blackjacks go crone in harsh weather,
or on account of mistletoe.
Help me say how winter comes in on a red-gold downbeat,
an orchestra of oak.*

*Sing me a forest.
Sing me in the sweet pitch of ochre, the bassy rusts.
Play me in the key of mountains,
Rising always above myself.
Hum the rustling needles of the pine's constant undressing.
Make me naked to any season.*

*Make me open to the tender rays of late sun.
Call my name in the sounds of absent water.
Write my address this way:
Turn right at the quartzite boulder,
Go straight 'til you remember your first kiss
and the smell of toast that first morning.*

*Dress me in evergreen, in blue spruce and fir.
Make an altar of the ordinary.
Pinon cones and the feathers of Steller jays.
Write me a simple story, hummingbird's soar,
raven's wing and rock bed.*

*Tickle me with Turkey feathers.
Make me laugh.
How many religions does it take to screw in a light bulb?
Dance me along a sacred maze, back into my body,
That other, most hallowed ground.*

—Judyth Hill

Whose Is the Fight for Nature?

by Hugh H. Iltis

Editor's note: This article is from a prescient paper first delivered over thirty years ago, at the 13th Annual Symposium of the Missouri Botanical Garden on Systematic Biology, Washington University, St. Louis, MO, 15 October 1966. It subsequently ran in Sierra Club Bulletin, 10-67, and was adapted for BioScience, 12-67.

I shall discuss a platform based on the understanding of human evolution and its meaning to conservation. It is here that the best arguments against blind technological progress may be found and it is here that biologists can find logic to support their inherent love for Nature.

Academic biology twenty years ago was largely untouched by concern for the preservation of Nature, and a student could go through graduate school without knowing that a serious problem existed. After all, in 1950 the weekly net population increase in the world was only 700,000 individuals. In 1966, it was about 1,300,000; and by 1980, only 13 fateful years away, it will be close to 2,000,000 individuals—*each week, two million additional human beings* will need food and space, will bend Nature to their human needs, and will set about exterminating countless species of plants and animals with a ferocity that only the human species is capable of. It must be clear to all but the blindest of evolutionary optimists that the biological problem of man in Nature is now much more complex and that every day brings greater urgency to deal with it.

I want to discuss some of the fundamental reasons for Nature preservation in the world. These are but rarely discussed, although they include the most basic of motivations ever to slumber in the hearts of men; mostly they have been either ignored or ridiculed, sometimes even by scientists who should know better. Their proper appreciation will not only vitalize our own efforts, but provide a powerful platform for rallying the indispensable public support without which all conservation is bound to fail. I shall discuss a platform based on the understanding of human evolution and its meaning to conservation. It is here that the best arguments against blind technological progress may be found and it is here that biologists can find logic to support their inherent love for Nature.

THE PROMISES OF TECHNOLOGY—A DECEPTIVE HEAVEN

Technology has promised us a post-evolutionary heaven in which wild Nature has but a very minor role. Molecular biology, too, has gleeful visions of genetic manipulations of DNA which would change the face of all creation and recast man into a "perfect" image. Others dream about a cheerful if dull world with unlimited opportunity for at least 40 billion people. But any one of us, if not blind, who has hunted for prairie flowers in Illinois, or gone exploring in the Peruvian Andes or on the Mexican Plateau, or tried to find a tree growing in Brooklyn, knows that life's diversity is threatened with imminent destruction, that in twenty or thirty years it will be all but over for this exuberant biotic wealth. *The crisis for all the living is here and now.* The world of the future threatens to be without flowers, without animals, almost without life except for masses of people. In the next century, in a nightmare world of steel and concrete, of algae steaks and yeast pies, the day may well come when our great-grandchildren will hold hands in a circle and sing

"Spring has sprung
The grass has ris
I wonder where the flowers is"

Is there anyone among us who would like to live in such a world? Would anyone among us not agree that, to remain human, man needs a good portion of wild Nature to walk in, to cherish, to love? Indeed, we all love flowers and birds, and we seemingly must, through some inner unexplained urge, go exploring for plants and find Nature, even if only in a botanical garden. But it is not enough to say that "we need," that "we love." The skeptics want to know "why?" and the despoilers of Nature, the technicians of utility, are not impressed by sentiment, but rather by dollars and profit, board feet, and yield per acre. How can we biologists defend sanctuaries for prairie flowers and "song" birds and Mountain Lions and Pitcher Plants? How can we defend wild Nature for reasons other than commercial return? Can we defend it for reasons other than scientific use, including intrinsic species interest or maintenance of diversity to insure a degree of stability against the dangers of "one-crop" technologies? Can we defend, in short, a truly human environment for purely human reasons?

HUMANS IN NATURE AS A GENETIC RELATIONSHIP

Let us try to define a human environment, one in which humankind could find maximal fulfillment. May we not say that the best human environment is one in which the human animal can have maximum contact with the type of natural environment in which it evolved and for which it is genetically adapted without sacrificing the major advantages of civilization; that is, does not the optimum modern human environment require a compromise between our genetic heritage, which we cannot deny, and the fruits of civilization, which we are loath to give up?

Physically, as any animal evolved in the tropics, we are fundamentally adapted to wild tropical or subtropical habitats; but culturally, especially away from the equatorial regions, we are dependent on towns and cities and adapted to them. Thus, even though we live in houses for our physical well-being, Na-

ture must be thought of as an indispensable biological need in our daily life. Every basic adaptation of the human body, be it the ear, the eye, the brain, yes, even our psyche, demands for proper functioning access to an environment similar, at least, to the one in which these structures evolved through natural selection over the past 100 million years. For millions of generations, as George Gaylord Simpson points out, any of our monkey ancestors whose faulty vision caused them to miss the branches they jumped for fell to the ground and failed to become our ancestors. Only those who were adapted contributed to our gene pool.



We, who are Darwin's grandchildren, can thus easily appreciate that, like the need for love, *the need for Nature, the need for its diversity and beauty, has a genetic basis.* We cannot reject Nature from our lives because we cannot change our genes. That must be why we, civilized and clothed apes though we are, continually try to bring Nature into our civilized lives, yet without any real understanding of why we do so. We have flower pots and pedigreed pets in our homes, members of the "Plasticales" in our banks, and even in our airplanes "puke bags" with green beech leaves imprinted on the side to make us feel better, to alleviate boredom or sickness by tending to our largely genetically based appreciation of natural beauty.

In contrast, spend a week in the downtown heart of a metropolis, with all its noise, stench, and congestion. No "natural" selection equipped us humans for such insults to the senses, except that in the past 100,000 years we have probably degenerated: in comparison to our ancestors we have poorer powers of sight and smell, less sensitive ears, and much less hair. Someday, if we are not careful, through city-selected degeneration, the 40 billion members of half-deaf, half-blind *Homo post-sapiens* will lead a life resembling that of termites. Then, even if high quality natural environments survive somewhere by accident, our descendants may not be able to appreciate them.

This is not what we ought to want! Yet the beginnings are here at our very doorsteps. Is not the initial wreckage of such selection already crowding our mental hospitals? Interestingly, in the last ten years several states have tried group camping with the mentally ill, using contact with the out-of-doors as psychotherapy. During the past four years, for example, the Maryland Department of Mental Hygiene took 90 chronically ill patients from the state hospitals to a summer camp for two weeks of standard camp activities. The patients, 40 to 60 years old, had been hospitalized for two to thirty years. In the camp the most unanticipated changes took place. Some schizophrenics spoke for the first time in five years! Perhaps because flowers do not talk back! Perhaps because of innate needs for unfenced freedom (the first words uttered by one patient after years of silence: "This is freedom!"). Significantly for the field botanist, hiking and Nature study became the most popular activities aside from eating. Following the camp experience, 41 of the 90 patients were able to leave the hospital within three months. Despite great difficulties, efforts have been initiated to buy wildlands for such a camp in Maryland; hopefully this will be done in other states as well. To us, as botanists and conservationists, this should be an encouraging sign, a hopeful rebirth of sanity, a reawakening to the human values of wild land.

NATURE IN HUMANS AS A CULTURAL FORCE

Separated from Nature, the human animal as a biological unit is in most ways a meaningless bundle of adaptations. Similarly, humans as a cultural force cannot be understood without their landscape. Today, as never before, there is an overriding urgency to awake in time to prevent the permanent subjugation and extinction of the living landscape, whether wild and free or farmed in a nonintensive way.

Senator Ingalls of Kansas said some eighty years ago, "Give the philosopher a handful of soil, the mean annual temperature and rainfall, and his analysis would enable him to predict with absolute certainty the characteristics of the nation."

Today we ignore this basic truth. In this overly rich country, we now worship the high standard of living, but we forget that ultimately it arises in the land. We credit scientific advances, the pioneer spirit, and democratic institutions with our great agricultural wealth in the Midwest, but often neglect to mention that due to an accident of Nature we have some of the richest farm soils in the world.

It should never be forgotten that this is the only living world, the only flora and fauna, that you and I and our children will ever have.

Until thirty years ago, we identified closely with the pioneers, their hardships and devotion, their environment of hostile Indians and waving grass, of cattle and cowboys. The prairie was their garden in more than one way! The six feet of topsoil, the magnificence of millions of Buffalo, the sweat of breaking the sod, and the harvest of vast yellow fields of wheat are part and parcel of our history. Without the prairie or the forest we, the American people, cannot understand where we came from, what we are, or where we are going. Yet today the prai-

ries and the forests have largely been killed, and thousands of species, especially of the prairie flora, are on the verge of extinction. By our avarice, we are losing touch not only with our biology but with our history and with our culture. Meanwhile, our technological cheerleaders are urging us on to more intense utilization with resultant greater destruction, both here and in underdeveloped countries—all this with the blessings of many a thoughtless scientist, who can think only of his specialty and the good safe problems of years ago, and with the unqualified approval of most economists, who can dream only of expanding economies and the stockmarket.

Does all this really matter? Surely our technology may keep us rich and abundant; but will it keep us human? Will it satisfy the simple and vast unspoken needs of humanity, the need to keep in touch with its ancestry and the need to live a biologically and culturally meaningful life?

The original landscape as it was before the settlers came is still vitally important to our educational process. We need fenceless wild lands to know how our forebears lived and worked. We need wilderness to know where we, the human species, came from. Yet we are

rapidly becoming cultural and evolutionary orphans—a people without a past, a species out of context.

Whether we are concerned with

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

THE SOCIAL RESPONSIBILITY OF SYSTEMATIC BIOLOGY

But whose responsibility is this preservation? Who should take the first step to deflect the technological tide? Some of my scientific friends tell me that botanists are not, as I charge, irresponsible in their lack of concern for preservation, because, they say, such concern is simply not their responsibility! They are scientists, not conservationists. Preservation, they say, is a public and political and moral problem (which is indeed true), and therefore lies in the province of the politician and the voting citizen. It is not, they say, the scientist's (more specifically, the taxonomist's) duty to get involved in preservation as a scientist, but only as a human being. This, I submit, is perniciously false: chemists, physiologists, agriculturists, in fact, most professional biologists generally don't know an *Astragalus* from a *Zinnia*! And neither do they much care. Yet if there is anybody who can provide leadership in the preservation movement, it is the systematic and environmental biologists, you and I.

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

THE IRRESPONSIBILITY OF BIOLOGY

But the record of the taxonomist is far from perfect! Many of us are asocial, often insecure introverts: timid, apathetic, self-centered, and a bit ashamed for caring what happens to flowers. Perhaps we enter botany because we *are* peculiar people. "You don't have to be crazy to be a taxonomist but it sure helps!" Jack Sharp used to say. Edgar Anderson once quipped in provocation, "Taxonomists are mice hiding behind herbarium cases hating each other."

Do we deserve such sarcasm? Yes, indeed! How do we use our convictions? Where are we botanists when the going gets rough, as, for example, when our wild lands go on the auction block and become part of the Gross National Product? Where is there a botanical group to protest our Gross National Destruction?

Does the Botanical Society of America have a committee on conservation? It does not!¹ What about the American Society of Plant Taxonomists? No, indeed! And neither does the International Society of Plant Taxonomy, nor the Society for the Study of Evolution. Shouldn't these groups, at least, show their concern? What will we taxonomists and evolutionists study when cows and corn dominate the earth?

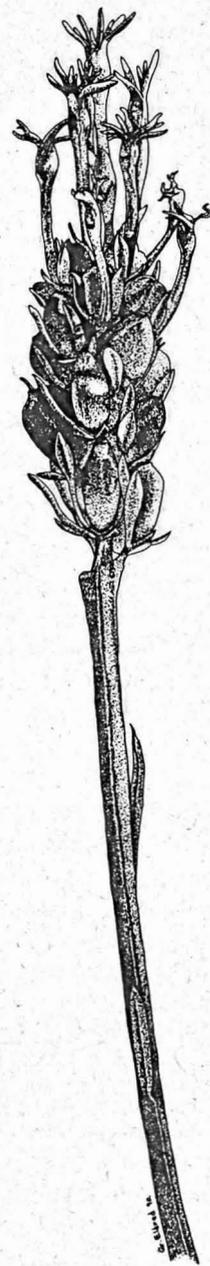
Except as members of the Ecological Society, do we botanists send representatives to the wilderness or pesticide bill hearings? Why, no! Most of us do not even send letters defending our views. If botanists do not get the public's confidence, it is as much their fault as anyone else's. For all that Congress and the American people know, botanists don't exist, much less care.

The consequence of this apathy is disastrous! For the opposition is always there in force, including lawyers and lobbyists, and all the members of "academia" involved in that gray area of consulting and advising the vested interests; foresters and cattlemen, bacteriologists and economists, geologists and agricultural entomologists, all have their say.

By default, by indifference, or by unintentional or intentional cooperation, we *give* almost all the victories to the exploiters, who are superbly organized, have money to burn, talk "common sense" in doctored press releases, and have as allies a vast number of underlings, in and out of our universities, in and out of government, who can hardly be expected to bite the hands that feed them. Someday, when it will be far too late for the issues to matter much, the history of the "Silent Spring" controversy of the early 1960s will be written, as well as that of the shameful and cowardly role of much of biology and the blindness of most of agriculture.

In botany courses of most universities we teach about the birds and the bees and DNA, but we are noncommittal about their human and ecological implications. By our silence, we perpetuate the pernicious falsehood that science has nothing to say about ethical values. We acquiesce to silencing and censorship by university deans and reap a moral "Silent Spring." *Through collusion or indifference, we biologists are thus losing not only our self-respect but also what could be our strongest ally: a well-informed and aroused public.* In fact, it is the public that, taking the initiative, often forces *us* to take a stand in the interest of humankind. It is a sad paradox that most contemporary botanists should require propaganda to persuade them to initiate or even support political measures assuring some survival of biotic communities, and thus a healthy human environment.

What about our leaders of the American "Botanical Establishment," many of them graying heads in the National Academy of Sciences? Surely, they, in their wisdom, must see that the living world is breaking apart at the seams. Surely they should feel a moral and cultural obligation to voice their concern to their profession and to the public over the extinction of species, the loss of major plant formations, and the horrible destruction of life in the tropics, the last often in the name of US foreign aid or the United Nations. Let me hasten to



We know
where the wild
and significant
areas are, we
know what
needs to be
saved and why,
and we know
what is
threatened with
extinction. We
are responsible,
because we
know, and
because we
love.

assure you that if they have some understanding or concern, most of them do not show it.

All botanists should read the 167-page report by the National Academy of Sciences—National Research Council (Publ. 1405, 1966) "The Plant Sciences Now and in the Coming Decade, a report on the status, trends, and requirements of plant sciences in the United States." For the next ten years, an expenditure of some 1.5 billion dollars is recommended for the botanical sciences—150 million a year! In the fields of taxonomy, paleobotany, and plant geography, the report generously recommends 49 million dollars for general research and training support, and another 35 million dollars for special projects and equipment in the next decade. It signals a bright future for numerical taxonomy and for "DNA taxonomy," and nearly a third of the total 84 million dollars is most laudably suggested for the acquisition or development of botanical gardens. Although admittedly this was not in the charge to the committee that wrote the report, **not one cent is recommended for the acquisition and preservation of natural areas and study areas!** Surely, this is blindness! Surely, the authors must know that land for learning is rapidly disappearing. The slant of the whole report is clear; molecular biology is the overwhelming theme, and increased agricultural production the background music. Ecology has no score of its own; it must take its chances with physiology. Yet, how are we to teach taxonomy or ecology forty years from now? This report gives lip service to conservation in but three places, for a total of twelve lines, with obscure recommendations that species about to become extinct should be salvaged into cultivation. Surely, the authors must know that most plants and animals cannot be brought into cultivation divorced from their ecosystems, and that soon the gardens of the world would not be big enough to hold all the plant species being destroyed by man.

Reading this botanical report of the NAS-NRC, we can see that these mostly

highly conservative scientists are fascinated with the latest of fads, molecular biology. They do not wish to realize that the world's ills are ethical consequences of ecological issues. They were asked to report on science, and that they did. From reading this it would never be guessed that in the larger longer view, the most crucial botanical problem of the next 10,000 years will be the human habitat and its conservation.

Conservation is not so much a science as an ecological point of view, a morality, an ethics inseparably linked to the science of biology and to human welfare. Intelligent politicians like Senator Gaylord Nelson of Wisconsin are beginning to recognize this morality and to introduce appropriate legislation. Although some problems of food production might be temporarily solved, they know that *the fundamental issue for the human species is not going to be the quantity, but the quality, of life.* What sort of life will the animal species *Homo sapiens* lead? Here again, those who have a new viewpoint of humankind's role in the universe, who now worry about a "land ethics" and a "conservational conscience," have to appeal to the public directly and bypass the entrenched administrative and scientific oligarchy.

The taxonomist's role should then be clear: he or she must use part of his or her energies to educate the public. In this he or she should feel assured that now is a good time to become involved. Vast changes have taken place in conservation in the last ten years. Destruction is accelerating, but so is biological understanding and efforts for preservation. The many books, from Aldo Leopold's classic *Sand County Almanac* to the recent works by US Supreme Court Justice Douglas on the legal aspects of American conservation and by Secretary Udall on its historical aspects, are encouraging signs. The increased influence of The Wilderness Society, the Sierra Club, The Nature Conservancy, National Audubon Society, and others points to an increased public realization that humans need the wilderness.²

Recently, Garrett Hardin noted the

two most significant publications in biology in the last decade: Watson and Crick's paper on the chemical basis of hereditary material, which ushered in the newest era, that of molecular biology; and Rachel Carson's *Silent Spring*, which forever shook our optimistic blind faith in science, and, for the first time in history, thrust upon biologists their awesome but inescapable social responsibilities.

Preservation thus starts with your own small efforts. The influence each one of you can have is enormous! What can you do? What must you do?

- 1) Even if you are not a joiner, join two or three national conservation organizations and one or two local groups that are to your liking. Without political implementation, all our understanding will be to no avail. You have to rock the conservation boat to make any political ripples.
- 2) Start at least one project in your local area, not just for the sake of the land preserved, but as an educational vehicle for the public. For only an educated public can insure our children a rich world. It is in the process of saving forty acres of maple forest or three miles of abandoned railroad prairie that you can reach a thousand citizens, and teach, teach, teach!
- 3) Instruct your students by example! All students should witness the unashamed involvement of their teachers in the conservation of Nature. All students graduating in biology should read Leopold's *Sand County Almanac* and Carson's *Silent Spring*, and become aware of the scientific and social issues. A clear exposition of the issues from a biological-ecological viewpoint is crucial.
- 4) Keep watch of a major trend in national and state parks in this country which can have disastrous consequences; namely, the efforts, under tremendous pressure from the public and from vested interests, to turn these into giant amusement parks and picnic grounds. The controversies over the proposed Smoky Mountain Na-

tional Park transmountain road and the Grand Canyon dams instance but two such efforts, and the end of such perversion is not in sight.

- 5) Mostly through United States and Russian leadership, and with good intentions, western civilization is introducing its type of land exploitation in the underdeveloped countries, too often accompanied by doubtful blessings. Should we botanists, in our state universities and with our legislators, not demand that ecologists and taxonomists always be found among those sent to direct such introduction? Should we not at least question the use of 2-4D to kill thousands of square miles of tropical forest, thereby destroying their tremendous gene pools, only to replace them with mono-cultures of Eucalyptus? Should we not ask ourselves whether the prevention of the destruction of the remaining tropical wilderness and the *preservation of primitive tropical agriculture* are not our responsibilities? Edgar Anderson and Carl Sauer have long pointed out that we have much to learn from primitive peoples and their ways.
- 6) And finally, speak out! If you are housed in the no-longer-so-ivory towers of a university, you have doubtfully more to lose than a raise, but everything else, including the respect of your students, to gain. If you are less sheltered, you may have to risk more, but by your silence you will risk immeasurably greater loss for yourselves, for your children, and for society generally. You must demand the right to say what you believe and to defend what you know to be right. Fight for life, biologists! The time is short.

We who understand that the basis of human culture lies in the past, we who believe that man does not live by bread alone, must pledge our conservational ideals with concrete action. That our prairies and our forests, yes, and our deserts and our waters, shall survive and thrive, is our responsibility. That these wild lands shall live and bloom for 10,000 years to come is our dedication to human culture, and its fruition our most precious legacy to our children; so that they on a warm day, can feel peace in a sea of grass, watch a bee visit a shooting star, hear a sandpiper call high in the sky, and marvel at the incomprehensible symphony of life. ■

*Hugh Iltis is a professor emeritus of botany at the University of Wisconsin Madison (53706). Contributing to conservation biology before it became a recognized discipline, Hugh was the instigator of a team of several US and Mexican botanists who discovered and described Zea diploperennis, the most primitive of the four species of "wild corn" or teosinte, the wild progenitors of our cultivated maize. His discovery initiated the establishment by the Mexican governor of the world's first reserve, 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. This list of species has recently been published as a book, Flora De Manantlán.**

POSTSCRIPT

Today, my 31-year-old manuscript does not seem much out of date. After all, "We are still marching in the streets with little victories and big defeats," (Joan Baez) empowered by an enormous increase in ecological and biodiversity understanding, yet defeated by a continuing shrinking of ecosystems and extinctions of species, on a global scale. It is this that our enemies in the multinational corporations, in the labor unions, in the World Bank or the USFS cannot understand—that we fight for the good wild Earth because we love its diverse and lovely face, and are mourning the loss of the irreplaceable. And in the meanwhile, shielded by greed, hunger, and the arrogance and ignorance of those in power, the population tidal wave is heading inland—nearly 2500 million (!) more human beings since that week in September of 1966, when I sat down to write that sermon to my fellow biologists and to the National Research Council for ignoring ecological realities. It took fully 20 years before that august establishment (under the prodding of Walter Rosen and his coining of a new word for a very old concept—"biodiversity") held an important conference in Washington, and finally gave *biodiversity* its due. Who knows—if we all work as hard at educating the public as *Wild Earth*, we may, with luck, turn things around in another 20 years. Thanks for this resurrection, from your old (now 72!) pessimistic optimist. —Hugh Iltis

Bioscience added these two footnotes:

¹ As a consequence of A.J. Sharp's thoughtful speech at the 1966 AIBS Annual Meetings, the current president of the American Botanical Society, Dr. Harold Bold, has appointed, finally, a Conservation Committee.

² Yes, even the National Academy of Sciences has come out strongly for control of environmental destruction, for "Restoring the Quality of our Environment," and for increased "Waste Management Control" (Report of the Environmental Pollution Panel of the President's Science Advisory Committee, November

* *Flora De Manantlán* by J. Antonio Vazquez G., Ramón Cuevas G., Theodore S. Cochrane, Hugh H. Iltis, Francisco J. Santana M., and Luis Guzman H; 1995; ISSN 0833-1475; paper US \$45; Sida, Bot. Misc. 13: 1-312; Botanical Research Institute of Texas (509 Pecan St., Fort Worth, TX 76102).

How Population Growth Discourages Environmentally Sound Behavior

by Virginia Abernethy

Strategists for conservation, politicians, and industry all want to know: how substantial is the “constituency for protecting ecosystems” (Cairns 1994, p. 12)?

In fact, the depth of the public interest in conservation is not easily measured. Active environmentalists extend themselves in the service of recycling, car pooling, “green” consumerism, population stabilization, natural habitat protection, and pollution abatement, or giving to organizations that do these things. Many other Americans appreciate the benefits of environmental quality but are largely “free riders.”

One wants to believe that the active environmentalist constituency is large, but evidence for that is spotty. Americans’ love for birds and some other animals may be the most enduring motive for conservation, and an informal poll suggests that recycling is the most prevalent “green” behavior. Certain Nashville neighborhoods all began to separate garbage when the city made individual recycling bins available.

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

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

Few sectors avoid every cost of environmental protection. That is, energy might be temporarily cheaper if the Arctic Refuge were exploited, other consumer prices might fall in the absence of regulation on air and water quality. However, the average consumer perceives that his or her cost is small relative to benefits. The constituency for environmental protection shrinks remarkably when individual costs press closely against these individuals’ expected gain; much depends upon whose ox is gored.



The abiding risk is that people *needing* jobs, *needing* housing, *needing* heating oil, or *needing* whatever—all needs that entail the throughput of more resources—can overwhelm the constituency for protecting the environment. Moreover, human needs are easily transposed into humanitarian claims. Good-hearted people are persuaded of the gravity of the humanitarian claim and do not reflect that many uses of resources and most new jobs and housing degrade the environment.

Humanitarian claims are compelling. They become more compelling when attached to persons residing within one's own country, but the asserted "right" of economic migrants to move across international borders also counts on good will. Yet, by adding to urban density and swelling the labor force, newcomers drive expansion and transformation of wild and agricultural lands to commercial or residential uses. Each person added to the population results in utilizing one acre of land for urbanization and road building (Pimentel 1996).

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

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

But, one might counter, more people could be accommodated were all less wasteful. True, but this returns one to the problem of *active* environmentalism. Why is this constituency small and vulnerable to defections? What obstacles stand in the way of enlarging the active environmental constituency? In the words of John Cairns, "Benefits to soci-

ety and maintenance and restoration of ecological quality must be more closely coupled" (1994, pp. 12, 14). But how?

Here we focus on 1) education, teaching why it is important to all that each of us conserves; and 2) predispositions of human nature identified by behavioral ecologists. The latter divide into why natural selection operates against altruism (Trivers 1985; Low & Heinen 1993), and the higher cost of altruism in the particular context of a "commons" (Hardin 1968).

Education on the necessity of conservation is widely believed to be an effective and usually sufficient way to promote environmentally correct behavior. We "commonly think of ourselves, as ethical individuals, giving value to the common good; thus, because none of us wishes to cause destruction of resources, each of us will accept some level of personal cost" (Low & Heinen 1993, p. 8).

This said, Low and Heinen's review of the literature suggests, to the contrary, that both in preindustrial societies and modern industrial nations, conservation schemes "based solely on information are arguably less successful than those incorporating individual cost-benefit leverage" (Low & Heinen 1993, p. 31). This conclusion is congruent with sociobiological theory.

Sociobiology's premise is that individuals of all species including humans are genetically predisposed to act in ways that maximize their "inclusive fitness," that is, the chances that duplicates of their genes appear in successive generations. Axiomatically, every living individual had ancestors that succeeded in this realm through reproduction, so most of us carry genes impelling us toward similar goals and behavior.

Nevertheless, some individuals sometimes act in ways that enhance the success of unrelated others at a likely cost to their own fitness. Sociobiologists call this "altruism." By definition, altruists face an increased probability that their genes, including those predisposing them to altruism, will disappear from the future gene pool; i.e., these genes are selected *against*. For this reason, in no

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population can the prevalence of a genetically-based predisposition to act altruistically be large; bearers of such traits are out-competed, on average, by those predisposed to maximize their own and their relatives' reproductive success. Low and Heinen observe that, "Selection cannot favor individuals who act for the benefit of a group of nonrelatives at the expense of their own inclusive fitness. Situations in which the costs are paid by individuals other than those gaining the rewards are unstable" (1993, p 13).

However, altruistic-seeming behavior can enhance rather than diminish inclusive fitness. The seeming altruist's sacrifices are made on behalf of kin (individuals likely to bear duplicate genes) or in the context of a fairly closed, long-lasting community where favors are likely to be returned. (Note again that these are not instances of true altruism because they involve a gain calculated to be roughly equal to or greater than its cost.)

The relevance to environmentalism is this: conservation behaviors often burden the actor with most of the cost, but the return is imperceptible; the benefits are widely disseminated, whereas the cost is concentrated. That is to say, most voluntary environmentalism is altruistic. Education may be too weak to overcome the powerful genetic loading against altruism.

The final element in this conservation calculus is "the commons." A commons is a resource treated as though it belongs to all. When anyone can claim a resource simply on the grounds that he wants or needs to use it, one has a commons.

Disincentives to conservation inhere in common property because a resource both limited and accessible to all is disproportionately utilized by fast and prodigal users. A conservative approach to the resource is punished by losing out on one's fair share. A commons may function when a population is stable and social pressure prevents any individual from abusing the resource. However, if the population using the commons grows from within, or if non-natives cannot be barred, conservation breaks down.

Neighborhoods, cities, and states are commons in the sense that no one is denied entry. The defining characteristic is that anyone may enter and, by entering, lay claim on its resources. Educational opportunity, the social safety net, the infrastructure, clean water, clean air—these are among the community's resources. A country becomes a commons to the extent that it allows immigration and that new residents are treated nearly equally with citizens.

A commons amplifies the genetically programmed resistance to altruism. As the individual costs of conservation rise, and to the extent that the benefits cannot be captured by kin or local community, selfish behavior inevitably becomes more advantageous and, therefore, ever more pronounced.

It follows that those who are disposed to use a resource modestly and sustainably must also have the means to protect it. If not, all efforts to conserve are futile. Ability to protect resources is the antithesis of the commons.

The United States is in some respects a "commons." Its population—the sum of potential claimants on its wealth—is growing rapidly, and is projected to reach one-half billion by the middle of the next century. The growth comes from both within and without. Accounting for 50% of US population growth already, immigration and children born to recent immigrants increasingly dominate America's demographic future. Over five million net new settlers between 1 January 1990 and 1 March 1995 (Census Bureau 1995) continue the transformation of America into a commons. Particularly in the states where immigrants concentrate, ordinary citizens find it increasingly difficult to capture the benefits of personal sacrifices made on behalf of the environment, the construction of infrastructure, investment in public education, or spending on other public projects. The mounting disincentives worsen, in my judgment, the prospects for developing a "constituency for preserving ecosystems."

The adjustments I foresee, as individuals recognize the elements of a commons and inevitably attempt to protect themselves, include regionalization (a fulminating scenario worldwide and as close as Quebec), regional control of immigration policy (which California has attempted with its constitutionally-in-limbo Proposition 187), privatization of infrastructure (for example, Hong Kong's privately-owned transportation arteries between the island and the mainland, and privately funded toll-roads which are increasingly seen in the United States), privatization of education, healthcare, and conservation lands, and walled residential communities protected by private security forces.

These adjustments are not "solutions" because they do not optimize the well-being of all Americans in the spirit of unity we have traditionally treasured. But Congress and the President have not yet taken meaningful steps to protect our national home.

Who will be the environmental altruist in this context? How many will be found tomorrow? ■

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Book Reviews

The Forgotten Pollinators

Nga Uruora

Rage for Justice

A Hunter's Heart

The Abstract Wild

THE FORGOTTEN POLLINATORS

by Stephen L. Buchmann and Gary Paul Nabhan; 1996; Island Press (1718 Connecticut Ave. NW, Ste. 300, Washington, DC 20009); \$25; 312 pp.

In a recent editorial in *Conservation Biology*, ecologist Reed Noss laments the decline of naturalists. Ecologists, he asserts, increasingly spend their time designing computer models or performing complex statistical analyses. Contemporary ecologists are more of an indoor breed than their predecessors, and Noss worries that the tradition of great field naturalists—from Charles Darwin to E.O. Wilson—is dying. Although it is true that many ecologists find themselves facing a computer screen more often than wild creatures, field ecology is “not completely dead yet” as Monty Python might say. As *The Forgotten Pollinators* beautifully illustrates, the field of ecology still harbors a diverse group of conservation-minded scientists whose love for the world of birds, bats, bees, and plants deeply grounds their work. Buchmann and Nabhan integrate the knowledge of these scientists with critical issues in conservation biology and agriculture.

Few of us contemplate the miniature creatures that help our apple trees to produce fruit, that flit from flower to flower in agricultural fields and meadows, and that ensure the persistence of wild poppies. The authors of *The Forgotten Pollinators* show that the loss of pollinators is a significant yet neglected aspect of the global biodiversity crisis.

Buchmann and Nabhan provide both an engaging introduction to pollination biology and a call for pollination conservation: “Scientists have barraged the public with mind-numbing numbers, species-area curves, equations, doomsday predictions,” they write, “but often fail to convey a sense of just how much we all depend on this flamboyant diversity of life forms, or how it is responsible for what we eat, drink, and wear.” To find “common ground between farmers and forest ecologists,” Buchmann and Nabhan argue, we need “more than...statistics...We will need tales, fragrances, tastes, and images.”

The use of stories to convey ecological and ethnobotanical information is one of Nabhan's trademarks: he won the John Burroughs Medal for outstanding Nature writing for his earlier book *Gathering the Desert*, an account of traditional human use of Sonoran desert plants. In *The Forgotten Pollinators*, Nabhan and Buchmann share the personal remembrances of two pollination ecologists. Their subjects range from the pains and pleasures of field research to attending honey gathering rituals in Malaysia.

As the authors describe the diversity of plant-pollinator relationships, we find ourselves transported from deserts to rainforests, and from the Americas to Asia. We learn about highly specialized “monolectic” bees that pollinate the rare Bearclaw Poppy in southwestern Utah; and we discover Panamanian orchids pollinated by iridescent metallic-blue male bees, which gather fragrant compounds from orchids to manufacture perfumes to attract females.

Another fascinating interaction takes us to the tropics where wild figs (*Ficus*) have a highly specialized relationship with a group of tiny wasps. Many *Ficus* species depend on the fig wasps for

pollination. Yet the significance of this mutualistic relationship extends beyond pairwise interdependence. Figs serve as an important, relatively predictable food source for many forest birds and mammals throughout the year. Deforestation and habitat fragmentation may endanger not only figs and their pollinators but the species that depend on them. Ecologists have dubbed the fig-wasp relationship a “keystone mutualism,” upon which many other species depend.

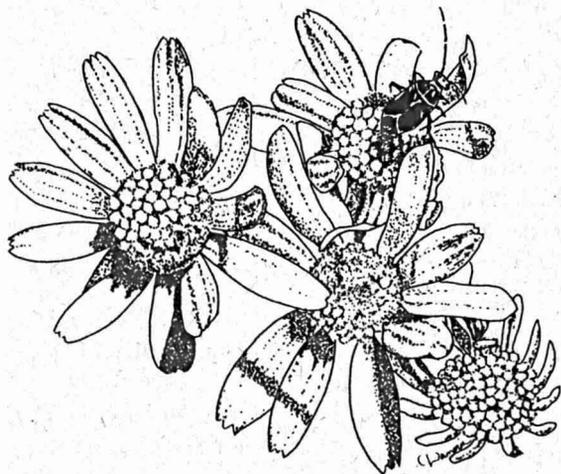


illustration by Damaris Barry



Exotic species, habitat fragmentation, and pesticides threaten many pollinators throughout the world. But aside from sheer biophilia, why should we care about pollinators? Food is reason enough. Approximately one-third of the plant food we eat depends on animal pollination for its production. The decline of native pollinators should concern not only environmentalists, but farmers and their customers as well. Despite the vast success of European honeybee introduction, pesticides,

mites, pathogens, and Africanized bees have recently caused dramatic declines in honeybee populations, leading Buchmann and Nabhan to pose the troubling question: "If honeybees continue along in their present declining trajectory, what bees and other pollinators will take up the slack in providing essential pollination services for our vast commercial and home agricultural plantings?"

The authors remind us that accompanying the biological diversity crisis is a cultural diversity crisis, and that many of the agricultural practices that foster positive relationships between humans and native pollinators are rapidly disappearing. The study and conservation of traditional "agro-symbioses" and the development of new ones is a challenge facing ecologists, ethnobotanists, and farmers.

The Forgotten Pollinators contains a variety of sobering tales, yet the book also offers hope and inspiration. Buchmann and Nabhan provide suggestions for change, from personal to political, to help preserve and restore native pollinator diversity. For example, Nabhan describes the pleasure of creating pollinator gardens to restore communities of these oft-forgotten insects, bats, and birds. On a larger scale, the authors call for a national pollination policy to protect natural and agricultural systems and their mutualists.

The Forgotten Pollinators is a rarity: it is a beautifully crafted scientific book written with skill and sensitivity. The book inspires hope that the naturalist tradition will go on, and that ecologists like Buchmann and Nabhan will help us remember and rediscover the beauty of the natural world. ●

—Reviewed by Marion Hourdequin and Carlos Martínez del Río

At the opposite extreme from the highly specialized fig wasps is the European honeybee, an extraordinary generalist that utilizes pollen and nectar from an incredible array of flowering plants. Those of us who enjoy local honey in our tea may be surprised to learn that European honeybees colonized North America along with the English settlers at Jamestown. This introduction and others allowed honeybees to successfully invade the entire continent. Scientists have found that honeybees compete with native pollinators and are not as effective in pollinating some plants as native bees. Because the honeybee invasion has been replicated throughout the world, it is difficult to find any environment free of feral and cultured honeybees. Thus it is almost impossible to guess the effect that this global experiment has had on native floras and faunas.

Honeybees are not the only worry for native pollinators. Ecologists in northwestern Argentina have found that small forest fragments cannot support a full complement of pollinating insects. In these highly fragmented habitats, generalist honeybees are the primary flower visitors. Buchmann and Nabhan also discuss the dangers of pesticides and herbicides. Even in protected areas chemicals from surrounding agricultural fields can take a significant toll on pollinator numbers and diversity. Buchmann recounts his experience studying a night-blooming cactus along the US-Mexico border. One evening as he was marking cactus flowers, Buchmann found himself under the poisonous path of a crop duster. "As the plane made its first pass over the ...field... it kept its nozzles open and insecticides were sprayed past the field's edge into the protected area on the other side of the boundary line." Spraying can cause what the authors label "chemically-induced habitat fragmentation."

NGA URUORA: THE GROVES OF LIFE

by Geoff Park; Victoria University Press
(POB 600 Wellington, New Zealand); 1995;
\$45; 376 pp.

Although the running heads atop all left-hand pages of this book indicate its title and subtitle as listed above, on its outside cover the main title is prominently followed by the more content-indicative phrase: "Ecology & History in a New Zealand Landscape." As one commences reading it, the impression quickly forms that perhaps it is about *history VERSUS ecology in New Zealand*, but its message is not really that simplistic. It deserves to be read by people in many countries.

Aldo Leopold's "land ethic" is implicit throughout, and evidently looms large in the worldview this book is meant to express. Leopold is cited at a number of points and is apparently one of the author's heroes. Readers should savor such passages as this: "It may take many centuries for the European culture in New Zealand to discover just how far what it did to the land was from any long-term guarantee of sustainable harmony. When it does, any surviving trace of the richest pieces in the jigsaw of these islands' native ecosystem will have a value we today can barely imagine." (pp. 298-299)

New Zealand is almost exactly on the opposite side of the globe from Great Britain, at the lower left corner of the "Polynesian triangle" that sprawls across much of the Pacific Ocean. Its two main islands have an area roughly equal to that of the state of Colorado, but a larger percentage of its area is mountainous or hilly.

The author, Geoff Park, a research scientist with the N.Z. Department of Conservation, is acutely aware that the plains, which constitute a minor fraction of the country's territory and which "had been the larder of Maori life," became "the centrepiece of the attempt to replicate rural Britain in the South Pacific." (p. 308) His book depicts his own quest to reconnect (largely via canoe) with four vestigial bits of almost primordial landscape. Many of his sentences contain place names and

other phrases in the Maori (Polynesian) language, and many pages express sadness over the enormity of ecological change wrought by Pakeha (European) settlers. The lament seems addressed as much to the ecologically inept expectations of British settlers as to the ecosystem modifications resulting therefrom.

But readers of this book should not jump to the conclusion that ecosystems in New Zealand were humanly untrammled prior to the explorations of Abel Tasman and James Cook and the takeover by Britain. Nor does Park deplore all ecological change as "damage." He recognizes that ecosystems are alive; they change according to dynamics of their own, even without human involvement. And significant changes have occurred as a result of both Polynesian and European use of this land. Unfortunately, the small black-and-white illustrations are too poorly reproduced to work well in harness with the earnest prose, and the page on which the excellent color photos by Craig Potton are individually identified is inconveniently far from the location of those pictures in the center of the volume.

It seemed to me the most inspirational writing in this book came in Chapter 4's portrayal of Sir Walter Buller's "sense of the wild" and its description of the role Buller played in launching conservation in New Zealand. Buller was a fallible human being, though, and later portions of the chapter show how deeply involved he was in the land-grabbing that mars but undergirds the nation's history.

I began reading this book in the overseas departure lounge at Los Angeles International Airport. I finished it in comfortable temporary accommodation I had rented for the southern hemisphere summer in the city of Christchurch, New Zealand, where I had lived for a while, a quarter of a century ago. It seemed appropriate that I was reading most of it after taking a few days for personal renewal of acquaintance with some 1996 New Zealand landscapes, learning to see behind their present beauty how much changed they are from the pre-European and pre-Maori condition Geoff Park so longs to retrieve. ●

—Reviewed by William R. Catton, Jr.
(Professor Emeritus, WSU, 25307 103rd Ave.
E. Graham, WA 98338-8971), author of
Overshoot

A RAGE FOR JUSTICE: THE PASSION AND POLITICS OF PHILIP BURTON

by John Jacobs; University of California Press (2120 Berkeley Way, Berkeley, CA 94720); 1995; \$34.95; 605 pp.

The bronze statue of Philip Burton at Fort Mason, under San Francisco's Golden Gate, stands ten feet tall, appropriately larger than life. Tucked in the pocket of Burton's suit, the sculptor shows the replica of a note, the visible portion of which reads, "The only way to deal with exploiters is..." Those familiar with Burton and his favorite saying can readily finish the sentence: "to terrorize the bastards."

Philip Burton served in Congress as a two-fisted fighting San Francisco liberal from 1964 until his death, at 56, in 1983, living out his "rage for justice" in behalf of labor, the disenfranchised, and the environment. The day after he died, the House of Representatives devoted almost three and a half hours to eulogies from colleagues of both parties and then, as a memorial tribute, passed the California Wilderness Act, Burton's legislation to preserve five million acres of Wilderness.

For all his good ideas and high ideals, Burton personally was far from lovable. He could be ruthless, vulgar and boozy, much too human and often no fun to be around. But it's fitting that his biographer, John Jacobs, a seasoned political writer, should show Burton as he was, warts and all. And maybe the best part of the book is the look inside how politicians shuffle and deal the cards.

Burton knew how to play the deck. Wilderness advocates will find incredible his record from 1977 to 1980, when he served as chair of the House subcommittee on National Parks. His 1978 omnibus bill—"the national parks bill of the century"—tripled the acreage of park Wilderness, tripled the miles of national trails, and doubled the miles of Wild and Scenic rivers, and much, much more. Another epochal accomplishment was passage of the Boundary Waters Canoe Area Wilderness Act of 1978, which Burton and his citizen allies in Minnesota pushed through despite powerful

opposition, thus protecting great canoe country from logging, motorboating, snowmobiling, and mineral exploration.

Reading *A Rage for Justice* makes one aware of Phil Burton's legacy and challenge. Besides winning establishment of the Golden Gate National Recreation Area, where his statue now stands, he believed in safeguarding the public's assets as a major responsibility of government and was adamant that the public should never have to pay a fee to enter such parklands. These principles need to be reinforced, considering the current political chatter about "privatization" and "partnerships," phony code words to justify giveaways to commercial interests.

A scary case in point involves the Presidio, at the edge of the Golden Gate. Burton won passage of the original legislation authorizing the National Park Service to assume jurisdiction of the Presidio if the Army should ever quit that historic military post. Now, alas, as a consequence of legislation passed in 1996, control of the Presidio will be in the hands of a business-biased trust—another way of privatizing.

Representative Nancy Pelosi, who holds Burton's old seat, says that the trust approach was the only way to insure park status for the Presidio, given the current conservative power in Congress. Maybe so, but at some future time, when Congress is thinking more clearly, we should terminate the Presidio Trust. For now, the president ought to carefully appoint trustees who are not interested in turning the Presidio into a huge real-estate development. Reading *A Rage for Justice* certainly would help them. ●

—Reviewed by Michael Frome (1303 Bonanza Way, Bellingham, WA 98226), author of *Conscience of a Conservationist*, *Battle for the Wilderness*, *Strangers in High Places*, *Regreening the National Parks*, and many other conservation works.

A HUNTER'S HEART: HONEST ESSAYS ON BLOOD SPORT

by David Peterson, ed. Henry Holt and Company (115 W. 18th St., New York, NY 10011); 1996; \$25; 352 pp.

Can hunters save hunting from hunters? That question lies at the core of this collection of 42 writers reflecting on the meaning, value, and spirit of hunting in the late 20th century. Most of the writers in this compilation are hunters, and they are unabashed about their love to hunt. But it's clear that these hunters hunt not for macho or sadistic or even "sport" reasons, and not merely for food. These are hunters of spirit, stalking the connection and intimacy with the fully functioning wild world that taking a place in the predator-prey play offers. They hunt, these writers argue, for the sense of animal-kin membership that *only* hunting and killing offers.

That perspective on carrying a bow or gun into the woods is a hard sell in many circles. And it is also clear in *A Hunter's Heart* that this relationship troubles these hunters-with-conscience as well (for a firm distinction is made between these "hunters with heart" and "slob," trophy, and sport hunters), afflicting them with what Mike Gaddis calls the "mix of accomplishment and remorse I have almost come to dread."

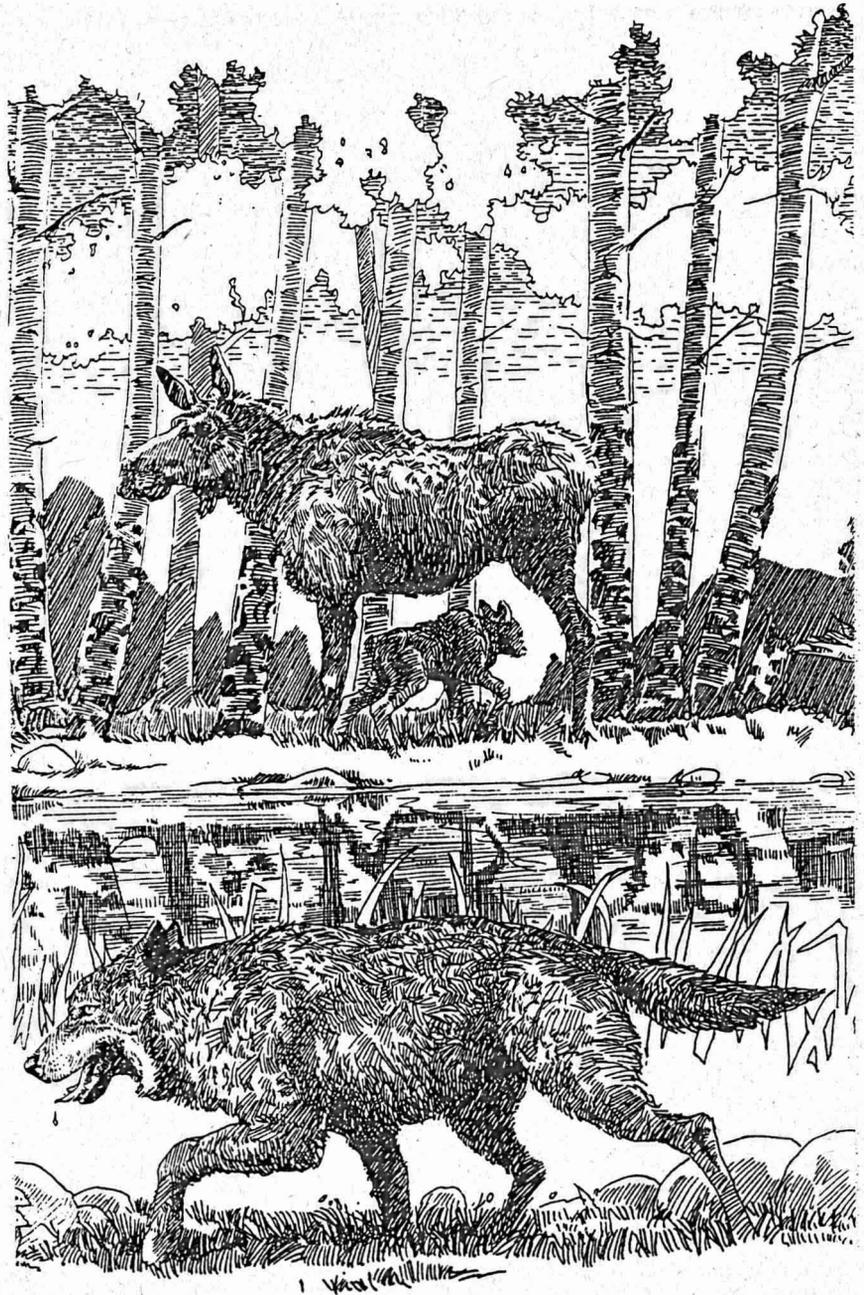
But when I am ready, when the range and position of the animal presenting itself are correct, when I'm sufficiently confident of my equipment and abilities, when all of this is as it should be, that moment of decision, marked by the sudden knowledge that I am going to attempt to kill, is overwhelming and even addicting... Sure, the killing bothers me. It's supposed to. And if it ever stops bothering me, I pray I'll be big enough to let go of hunting forever. Because to hunt and not to despise the killing would be to become not an animal but a form of human that is already far too common in the festering cities of this world. (Bruce Woods)

This collection of essays compiled

by David Petersen, a writer of natural history and editor of Edward Abbey's published journals, does not contain your typical how-to/what-it-was-like hunting stories found in many sport-hunting rags (what one writer labels "horn porn"). Instead, this intriguing, inspiring, and thought-provoking anthology fills an empty niche that today is in desperate need of filling: hunters who ponder *why* they hunt.

This is a desperate need because hunting is now more than ever threatened by a combination of habitat loss from urban and industrial growth and laws that limit hunting arising from citizen ballot initiatives. Both threats are compounded by inaction on the part of hunters: not rising to become advocates for land and wildlife, and refusing to denounce the many unethical hunting practices that the citizen-initiatives seek to halt. Clean up hunting or it'll be cleaned up for you, this book argues; and if that clean-up is left to non-hunters, then hunting will suffer some tragic losses. But while the gun lobbies and right-wing pro-hunting groups charge that it's the "environmentalists" and "liberals" and "animal lovers" who threaten to take hunting away, ultimately hunting's greatest threat comes from within hunting's own ranks, from what Ann Causey calls "our mistaken belief that to protect any form of hunting, we must defend and protect all forms."

The root problem is the hunting community's bullheaded refusal to admit that some things some hunters do, even when legal, are ethically indefensible: baiting, using hounds to tree bears and mountain lions then executing them like bass in buckets, rich man's globe-trotting trophy hunting, canned "hunts" on fenced "game ranches," rampant littering and ATV abuse, road "hunting," contest killing, employing space-age technology to minimize challenge, dead animals conspicuously displayed on vehicles, alignment with the no-compromise anti-environment far-right radical militia mentality, and a general carelessness in our behavior afield. (David Petersen)



The key to solving this problem, to creating a hunter constituency that can save hunting, is for hunters to figure out what hunting means—personally, socially, and culturally—and to act in ways that show non-hunters that meaning. But to act in ways that show meaning, hunters must first have the courage to confront and answer for themselves the Big Question, a question hunters so far have avoided, at least publicly: Why kill?

If any one word characterizes most people's feelings when they reflect on the morality of killing an animal for sport, it is "ambivalence." With antihunters insisting that hunting is a demonstration

of extreme irreverence for nonhuman life, thoughtful hunters must concede, albeit uncomfortably, the apparent contradiction of killing for sport while maintaining a reverence for life... It seems this contradiction, inherent in hunting and increasingly the focus of the debate, lies at the core of the moral conundrum of hunting. How can anyone both revere life and seek to extinguish it in pursuit of recreation? (Ann Causey)

These essays seek answers for that question, answers leading the way to the deeper, genetic, spiritual, and physical link with the intricate workings of land and the animal world that hunters have

long said hunting offers—a sense hard to convey in words. Be forewarned, though: This book does not answer that and the many associated ethical and moral questions hunting raises—at least not clearly and concisely, as a specific set of directives to be followed. Like Zen koans, the stories and reflections in this book try to merely indicate directions, point down some paths each person may follow, by describing, rendering, and mulling on what is ultimately a feeling, that beyond-words sense.

Still, this is not a failing but rather a strength of this book; it doesn't shirk the tough questions, yet it avoids the pretense of dictating and doesn't resort to the usual pro-hunter defenses that gut the ethereal spirit from hunting: population numbers and harvest figures and the dollars and cents of the hunting industry. The ideas presented in here are not a debate, and not even a defense, really; this book is more of an extended discussion among thoughtful hunters that lets readers—hunters and non-hunters alike—draw their own conclusions and choose their own courses of action.

Perhaps most impressive about this collection is that as these writers stalk answers, the ultimate paradox is left intact—this is where the “honest” part comes into the title: How can you love something yet deliberately kill it? Nobody really can say, but ethical hunters agree that partaking in the hunter-prey relationship works to keep ourselves, our society, and our culture in touch with a human lineage and perspective reaching beyond the TV wildlife documentary and amusement park sense of Nature warping our modern view of the wild world. Hunting is more natural, real, and responsible than hiding our need to kill behind grocery store labels and clothing manufacturers that let unseen industrial killers reduce non-human life to products.

And more than anything else, our forgetfulness is created by the supermarket, where we pluck from the shelves processed bits of plants and animal that are hidden inside boxes, cans, and packages—creating an illusion that we can have food without harvest, that life can be maintained without death, that our daily existence is separate from the land, and that we are fundamentally different from all other organisms. (Richard Nelson)

Only hunting can keep us viscerally in touch with the real functioning of the world, these hunters agree:

Again, how can anyone who hasn't seen and touched death know or understand? I know, in fact, that they cannot. And I realize that each successive sheltered generation in turn widens the growing chasm between man and the land. Between those of us who kill and those who are mere consumers. Users. (M.R. James)

In that sense—that the book appeals to this shared experience and perspective—then, this book will speak primarily to other hunters, as a rallying cry to stand up for the deeper values of the sport and as a call for ethics in those who hunt heedlessly. Yet, non-hunters, too, will garner much from reading the ideas and experiences presented here—it's a high aspiration, but this is perhaps the closest a non-hunter can get to sharing in the sense of rooted wildness that ethical, thoughtful, wilderness-loving hunters find in the act of hunting.

And that's where *A Hunter's Heart's* greatest potential lies: to bring together those who should be allies—wilderness advocates and ethical hunters and wildlife defenders—and to show who the greatest enemy to hunting, and therefore wildlife and wildlife habitat, is: hunters without heart. ●

—Reviewed by Ken Wright, author of *A Wilder Life: Essays from Home* (Kivaki Press 1995), hunter, and father, living in Durango, Colorado

THE ABSTRACT WILD

by Jack Turner; University of Arizona Press; 1996; \$32.50 cloth, \$15.95 paper; 136 pp.

When I first met Jack Turner several years ago at an environmental conference, I immediately liked the man for his frankness, erudition, precision of thought, and ability to swear creatively. After reading his book, *The Abstract Wild*, I like him even more—for much the same reasons. How can you not admire (and wonder about) an ex-professor Buddhist mountaineer who goes berserk at a zoo and single-handedly battles a group of cretinous bullies casually tormenting a caged Mountain Lion? The weird Morrissey lyric comes to mind:

*The pain was enough to make
a shy bald buddhist reflect
and plan a mass murder.*

The zoo incident, recounted in the book, forms a kind of disquieting nucleus to Turner's main theme. For our bonds with the nonhuman world to mean anything, they must be visceral, emotional, sensual. As Turner puts it, we should react to the destruction of wild Nature with familial passion, the same way we would “when we discover the landlady strangling our cat.”

But of course we don't. Behavior like that brands the perpetrator as abnormal, criminal, even psychotic. Reflecting on large and small epiphanies from his own journeys to the margins of modernity, Turner explores how the passion for wild existence has dwindled into an abstract sentiment about the wild. Even the views of those trying to preserve the nonhuman world, laments Turner, often lead to a lifeless, self-reflective indulgence in simulacra rather than an authentic firsthand relationship with pelicans, redrock canyons, and indigenous peoples. We have become spectators not only to the destruction of Nature, but more pitifully to our own denatured existence:

Even our emotions about the wild are mediated. The majority of people who feel anguish about whales have never seen a whale at sea. The majority of people who want to reintroduce wolves to Yellowstone have never seen a wolf in the wild, and some, no doubt, have never seen Yellowstone. We feel agony about bludgeoned seal pups and shredded dolphins without ever having touched one or smelled one or watched it swim. However much these emotions promote popular environmental causes, they will not preserve wild nature, for the objects of the emotion are usually experienced

through movies, TV, the printed word, or snapshots. They are the emotions of an audience, the emotions of sad entertainment, and they will pass as quickly as our feelings about the evening news or our favorite film. (p. 29)

These words should cut most environmentalists like razors. Other writers have addressed the commercialization of our internal lives. Marcuse and Foucault, for instance. But Turner challenges us to face the possibility that our failure to cultivate an intimate personal relationship with the wild is the real source for the loss of the wild—not counted just in species but in exuberant participation and freedom). Even the most ardent defenders of wilderness, if they are honest, must admit their environmentalism is probably based less on a close relationship with wild Nature than with images of “The Wild” edited and reproduced by the mass media. A whole generation has grown up with enviable amounts of zoological information from *Sierra Magazine* and the *Discovery Channel*, but without ever having touched an animal bigger than a lap dog. Remember Mutual of Omaha’s *Wild Kingdom*? A show about the wild presented by, of all things, an insurance company. As a symbol of our mediated relationship to Nature, this is exactly the kind of spiritual disorientation Turner lays open.

That is not to say Turner dead-ends into anti-intellectualism. On the contrary, the book’s first chapter, “The Maze and Aura,” is a learned analysis of modern culture’s capacity to flatten out, and hence control, our relationships with the wild. He recounts the wonder and excitement he felt as an adventuring photographer in the 60s, stumbling by chance upon the Harvest Site pictographs in a remote, inaccessible southern Utah canyon—one of the first non-Native Americans to view the giant images. Thirty years later, he returned, as a tourist, holding a camping permit, under the supervision of the National Park Service. The pictographs were the same, but not the same; physically preserved, as Turner thankfully acknowledges, but stripped of

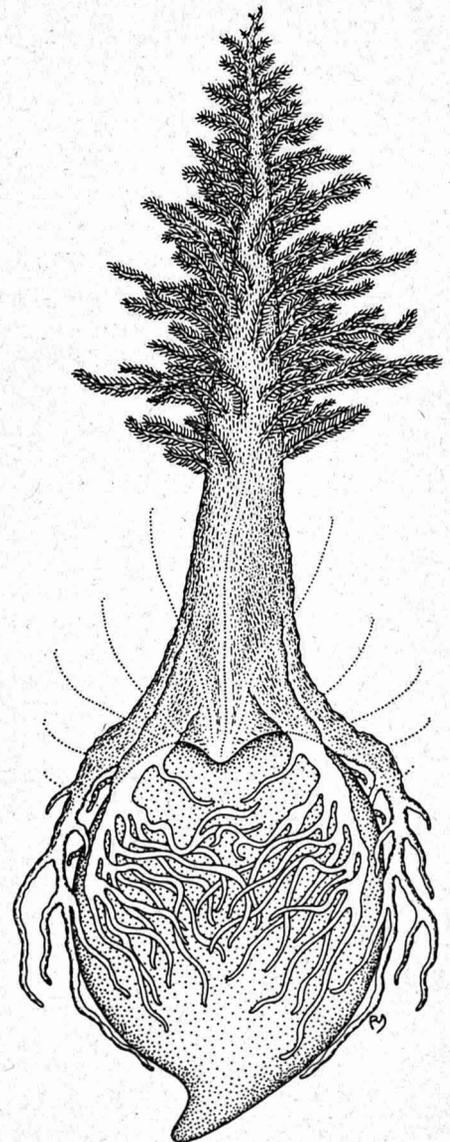
their radiant independence. They had become assimilated by modern culture and made into a spectacle, the fate of the wild and sacred everywhere. Such is the price of preservation in a society in which everything is either packaged for use or simply effaced.

The Abstract Wild offers no easy answers to this dilemma. Honest throughout, Turner admits he has no idea how indigenous people relate to the land; has no special access to the sacred; is no neo-shaman. Still, Turner has faith in the liberating power of contact with Nature on the human soul, trusting that a long night in a dark wood can transcend the shallowness of modernity like a stone dropping through pond scum. His chapter entitled “The Song of the White Pelican” expresses this mysterious transcendence, and in the realm of contemplative essay writing ranks with Thoreau and Abbey.

Perhaps the only shortcoming of the book is its reticence in exploring some of Turner’s own personal contradictions that carry wider implications for his theme. He admits his love of the wild does not prevent him from enjoying his four-wheel drive vehicle or the tourist accommodations at Yellowstone. An honest sentiment, probably true for most of us. But since the culture of machines and development is at the core of the physical effacement of the wild, we want something more than a healthy conscience. The incongruities cry out for further exploration, whether reconciled or not, at least mulled over with the same acuity Turner exhibits elsewhere in the work. But this is the kind of point reviewers feel obliged to bring up to show they’re doing their job. My apologies to Jack.

Read *The Abstract Wild*, then honor the author’s summons by making a month-long trek across Iceland or Borneo or some other margin on the map of modern abstract thought where real contact can still take place. ●

Reviewed by Christopher Manes, author of *Green Rage: Radical Environmentalism and the Unmaking of Civilization* and the newly released *Other Creations: Rediscovering the Spirituality of Animals* (Doubleday, 1997).



Editor's Note: Jack Turner's writings have lately stirred up considerable controversy, particularly his criticisms of deep ecology and *The Wildlands Project*. Deep ecology philosopher Harold Glaser is writing a critical review of Turner's work for WE fall 1997. See also *Wild Duck Review*, December 1996 and February 1997. —JD

Y2Y Conference

Connections, the first conference of the Yellowstone to Yukon Conservation Initiative (Y2Y), will be held 2-5 October 1997 in the Waterton townsite of Waterton/Glacier International Peace Park, Alberta, Canada. Y2Y is a science-based conservation initiative that seeks to restore and maintain the ecological integrity of 1800 miles of North America's most celebrated mountains from Yellowstone to the Yukon. Key speakers and guests include Dave Foreman, Dr. Reed Noss, Harvey Locke, Colleen McCrory, and Sid Marty. For information contact Kathleen Wiebe, Y2Y Conference Secretariat, 105 Spray Dr., Harvie Heights, Alberta, Canada T1W 2W2; phone/fax 403-609-3099; y2yconf@telusplanet.net.

Changes to USGS Topographic Maps

The US Geological Survey (USGS), traditionally the producer of the most detailed topographic maps in the world, is in the process of changing the form and content of its 7.5-minute quadrangle topographic maps. Due to the increasing requests for digital-map data, USGS has reevaluated the information available on their paper maps. Unfortunately, their changes will reduce the quality of the maps. The proposed changes include some that may adversely affect wildland reserve mappers:

1. Wooded areas, shown by green overprint, will not be revised.
2. Buildings will no longer be classified as to type: no distinction will be made between houses, barns, schools, etc.
3. The level of content, particularly for features requiring field verification, will be reduced.

At present, USGS oversees the updating of map features. In the future, data for hydrology, transportation, boundaries, public land surveys, and elevation will be revised and maintained in electronic format. Although USGS will develop standards for independent or state agencies to follow, they will not be able to ensure that national standards of content or accuracy are met. Agencies may only digitize features that they deem important.

An evaluation of map users was performed by the USGS, but 60% of the respondents were from the geographic-information-system (GIS) user community (USGS, Open-File Report 95-201). The needs of individuals who rely primarily on paper maps were not adequately evaluated. For people concerned about the quality of topographic maps, questions and information can be directed to: Dr. Gordon Eaton, Director, US Geological Survey, Mail Stop 11, National Center, Reston, VA 20192 with copies to Secretary Bruce Babbitt, Department of Interior, Interior Building, 1849 Street NW, Washington, DC 20240.

6th World Wilderness Congress

The 6th World Wilderness Congress (WWC6) will convene in Bangalore, India 18-25 October 1997. The theme of WWC6 is "The Call For A Sustainable Future." Sessions will be offered relating to central themes such as International Wilderness (Aldo Leopold Wilderness Research Institute & The Wilderness Society); The Use of Wilderness for Personal Growth, Therapy, and Education (University of Idaho); and Participatory and Local Management to Conserve Wildland Biodiversity (Centre for Eco-

logical Sciences, Indian Institute of Science). For registration information, contact Alan Watson, Aldo Leopold Wilderness Research Institute, POB 8089, Missoula, MT 59807; (406) 542-4197; (406) 542-4196 fax.

MERP Intern

The Minnesota Ecosystems Recovery Project (MERP) is seeking a self-motivated individual committed to conservation issues for a summer/fall internship in Minnesota (location flexible). Possible projects include: newsletter writing, GIS mapping, inventorying National Forest roads, ecological research, membership development and outreach, fundraising, and general office assistance. Funding may be available depending on qualifications. MERP is a non-profit organization dedicated to developing a comprehensive strategy for protecting and restoring MN's biodiversity. Send cover letter summarizing skills, resumé, and three references to Michael Biltonen, Exec. Dir., MERP, POB 293, Red Wing, MN 55066.

CCEA Annual Meeting

The theme of the Sixteenth General Meeting of the Canadian Council on Ecological Areas (CCEA) is "Protected Areas and the Bottom Line." It will explore the relationship between protected areas, biological conservation, and sustainable development. The New Brunswick Department of Natural Resources and Energy is hosting the event, on behalf of the CCEA. For information, contact 1997 CCEA Conference, c/o Forest Recreation & Heritage Branch, Dept. of Natural Resources and Energy, POB 6000, Fredericton, New Brunswick, Canada E3B 5H1; 506-453-2730 phone; CCEA97@gov.nb.ca.

Forest Reform Rally

The 11th Annual Forest Reform Rally will take place 11-14 September 1997 at Camp du Nord near Ely, Minnesota. The site is on the edge of the Boundary Waters Canoe Area Wilderness in Superior National Forest. This year's rally will feature nationally known speakers and include sessions on the problems facing each region of the country, with special emphasis on the Great Lakes region. Also included are panels on forest protection issues, leadership training sessions, forest/biodiversity workshops, and field trips highlighting native ecosystems. For information contact Laurie Fenner, SWAN, 2052 Carroll Ave., St. Paul, MN 55104; 612-646-6277; fenner@pioneerplanet.infi.net.

Renew America

Renew America, a non-profit organization, is a leading source for environmental solutions. Their Environmental Success Index chronicles more than 1600 effective environmental programs nationwide that protect, restore, or enhance the environment. Renew America presents annual National Awards for Environmental Sustainability to 26 programs for successful environmental sustainability projects. For information, contact Renew America, 1400 16th St. NW, Ste. 710, Washington, DC 20006; 1-800-922-RENEW.

illustration by Lia Kass

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).

Back Issues

1 Spring 1991 Ecological Foundations for Big Wilderness, Howie Wolke on The Impoverished Landscape, Reed Noss on Florida Ecosystem Restoration, Biodiversity & Corridors in Klamath Mtns., Earth First! Wilderness Preserve System, GYE Marshall Plan, Dolores LaChapelle on Wild Humans, 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 LaChapelle'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, WER 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 Restores Biodiversity by Way of Science. Imperiled Freshwater Clams, Wild Waters Project, eastern old-growth report, American Sycamore, Kathleen Dean Moore's Traveling the Logging Road, Mollie Matteson's Wolf Restoration, Maxine McCloskey on Protected Areas on the High Seas

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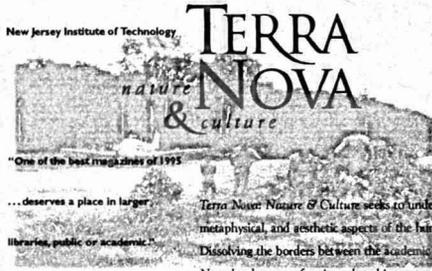
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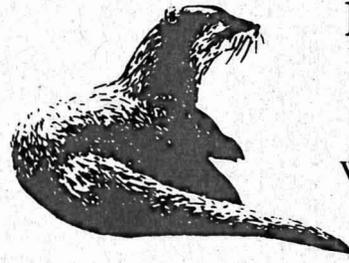
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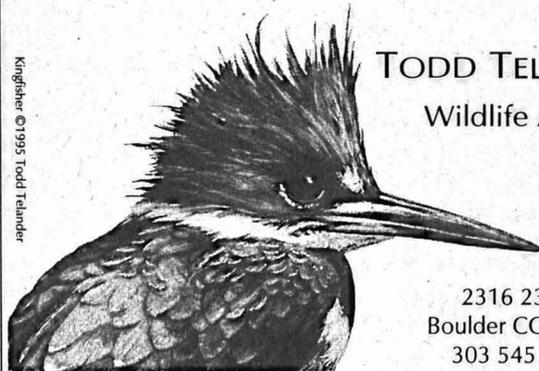
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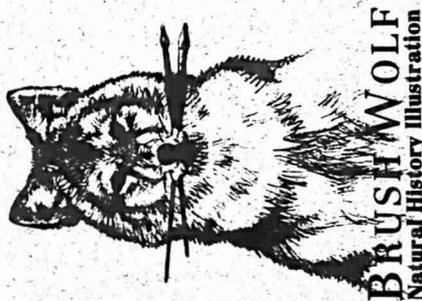


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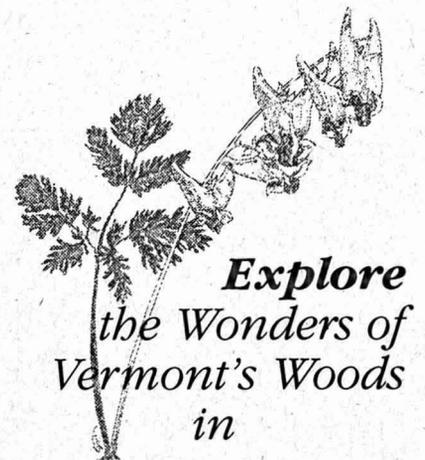
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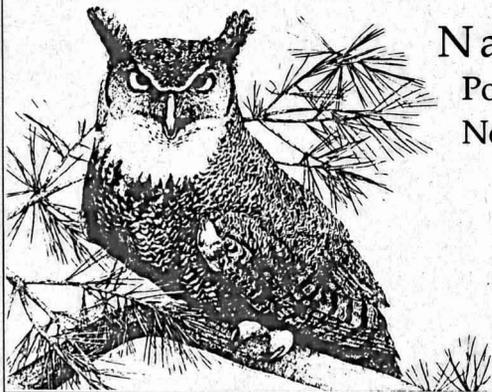
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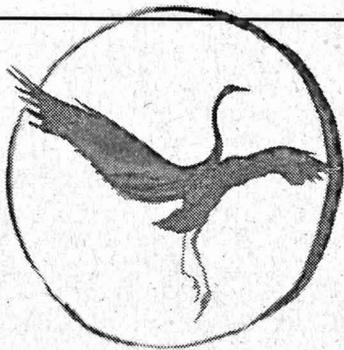
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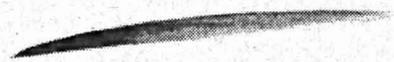
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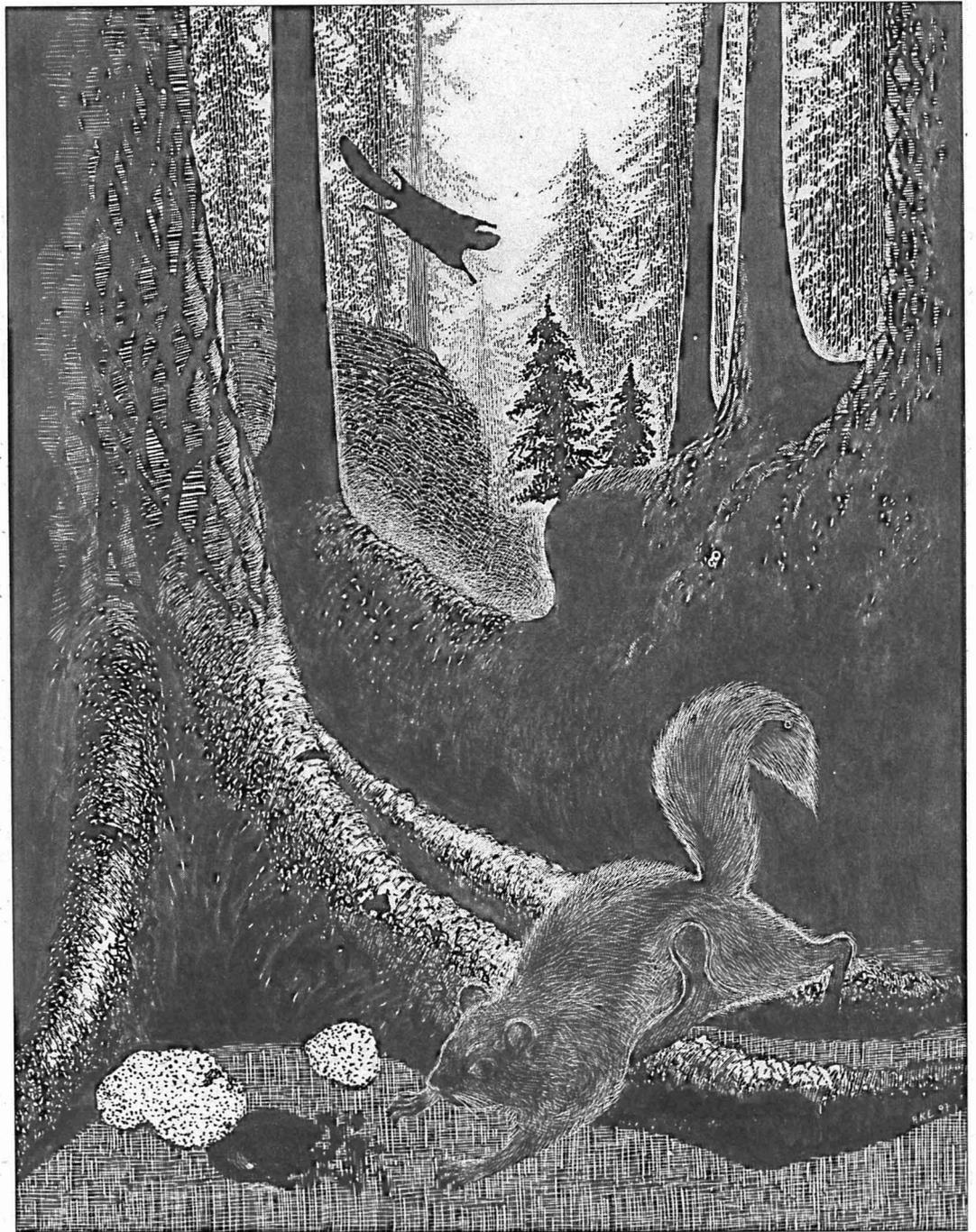
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Flying squirrels (whether they be Northern or Southern), hemlocks (whether they be Eastern or Western), and truffles (whether they be true or false) interact strongly. As described by Chris Maser in *Wild Earth* fall 1991 and *Forest Primeval* and other publications, the relationship goes something like this (with the caveat that most of the work on ectomycorrhizal fungi has been done in the Pacific Northwest, and little is known about such relations elsewhere): The flying squirrels glide and scamper about the forest each night in search of toothsome morsels, many of which may be truffles. The spores of these aromatic underground fungal fruiting bodies survive the rodents' digestive tracts and are dispersed and fertilized, as it were, by their hosts. That is, flying squirrel feces (pooperoonies, to use Dr.



Flying Squirrel, Hemlock, False Truffles, *scratchboard* by Heather K. Lenz

Maser's erudite term) can be rich in the spores of fungi (as well as in yeast and other bacteria that add to the complexity of this symbiosis), which, in turn, provide indispensable services (absorbing nutrients and water from soil) for many trees in mature forests. The relations between flying squirrels, hypogeous fungi, and large hemlock trees are tight enough that they might reasonably be compared to multiple sides of a single strand in the great Web of Life. Unfortunately, our felling of the original forests has rent that strand in many places, for this mutualistic relationship may not emerge until forests are many decades old. —John Davis

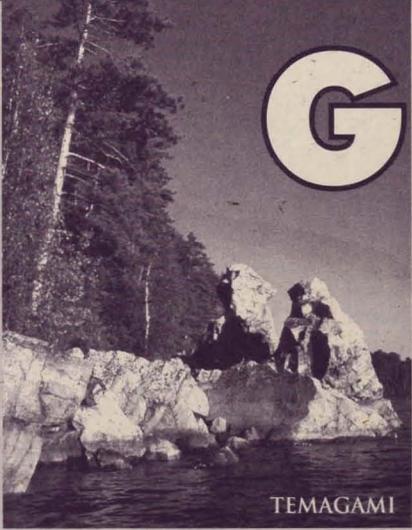
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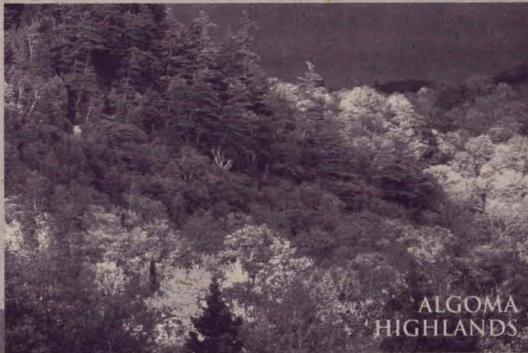
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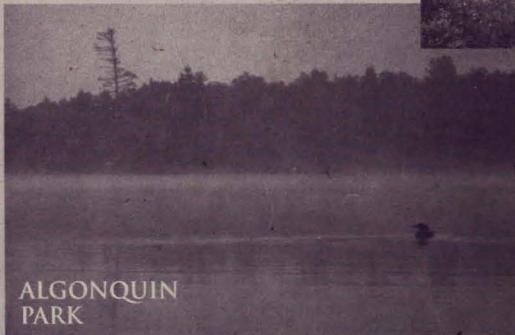
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