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WILDEARTH



Summer 1994

A WALK DOWN CAMP BRANCH WITH WENDELL BERRY

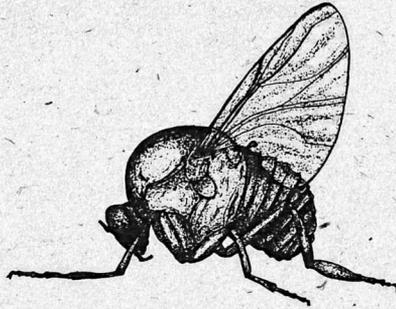


\$4.95 US



BUTCHERING THE BIG WILD
CARRYING CAPACITY AND THE DEATH OF A CULTURE
THE GREAT PLAINS: AMERICA'S BEST CHANCE FOR ECOSYSTEM RESTORATION

It's What We Do



In response to letters in our last couple issues, several explanations are in order. First we must apologize for several errata in recent issues. We've inadvertently omitted a table and a list of references in the last two issues—the computer ate them, in typical acts of technological perfidy—and have let slip past us several typos. What the computer ate it later regurgitated, so we can send these to readers upon request (see “Errata” of last two issues). The typos, however, will stand in infamy, testimony to the excess of verbage *Wild Earth* staff must digest.

Which is our excuse, also, for not fact-checking every article. Apparently, our inability to check all putative facts has allowed several errors through the filtering process. (See Letters section of this and last issues. Our astute readers nailed us!) Writers, I beseech thee: check all your facts. We are beginning to exploit interns to fact-check articles; but still, if you give a wrong number, say, or misspell a scientific name of a species, the error is likely to see print. (Reed Noss may be nigh on infallible [Noss for Pope in 96!], but he's also inaccessible sometimes when we're about to go to press, so he can't prevent all scientific inaccuracies.)

Now I should clarify a few matters for writers: Some of you may be in anguish that your articles appear to languish.... I've unintentionally misled several authors to believe their articles could be printed soon after acceptance. Unfortunately, our backlog continues to grow. We're receiving scores of articles each month; we can make space for only the best third or so of these; I must pare down significantly all but the most skillfully written of these accepted articles; and all but the very best or most timely of those accepted will probably have to wait a year or more before *WE* subscribers read them. That is, writers must fear rejection and expect delays—comparable to those of professional journals, where a two year delay is common. Please see our revised “About Submissions” page in this issue for new writing guidelines.

Poets, please remember, send your poetry to our Poetry Editors, Gary Lawless and Art Goodtimes. (Again, see Submissions page, near back.) Sending good poetry to the Richmond office is throwing pearls to swine. Of course, unless they trample them underfoot in their rush for the swill, the swine do eventually forward the poems.

The surfeit of important articles is a consequence of *Wild Earth's* choice of duties. Perhaps with naive ambitiousness, *WE* staff aim to serve several major roles in the conservation movement:

1) *Wild Earth's* overarching theme is the North American Wilderness Recovery Strategy—The Wildlands Project. *WE* is TWP's publishing voice.

continued on p. 2

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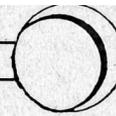
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Blackfly by Jeff Elliot



WILD EARTH



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It's What We Do...Continued

2) Undergirding *Wild Earth* is the New Conservation Movement. Our foundation is the full suite of grassroots biodiversity defense groups. We provide a forum for NCM groups and individual activists.

3) Along with our overarching and undergirding themes, we've several ongoing sub-themes and foci. Among these are covering old growth in the East, countering human over-population, critiquing technology, and considering deep ecology.

Notwithstanding the word glut, we still want those of you we've solicited for articles (especially Terry Tempest Williams, Garys Snyder and Nabhan, Stephanies Kaza and Mills, John Elder, Barb Dugelby, Michael Soulé, David Ehrenfeld, Wes Jackson, Trudy Frisk, and other *Wild Earth* correspondents and editorial advisors) to send us articles. We do sometimes let exceptional articles leap-frog over the backlog, and some such leap-frogging may be necessary to achieve a better gender balance in our pages.

How is a periodical to serve all these concerns in only four issues a year, you may ask. Well, it isn't, in as full a sense as scholars might hope; but it is, in a sense befitting activists, who

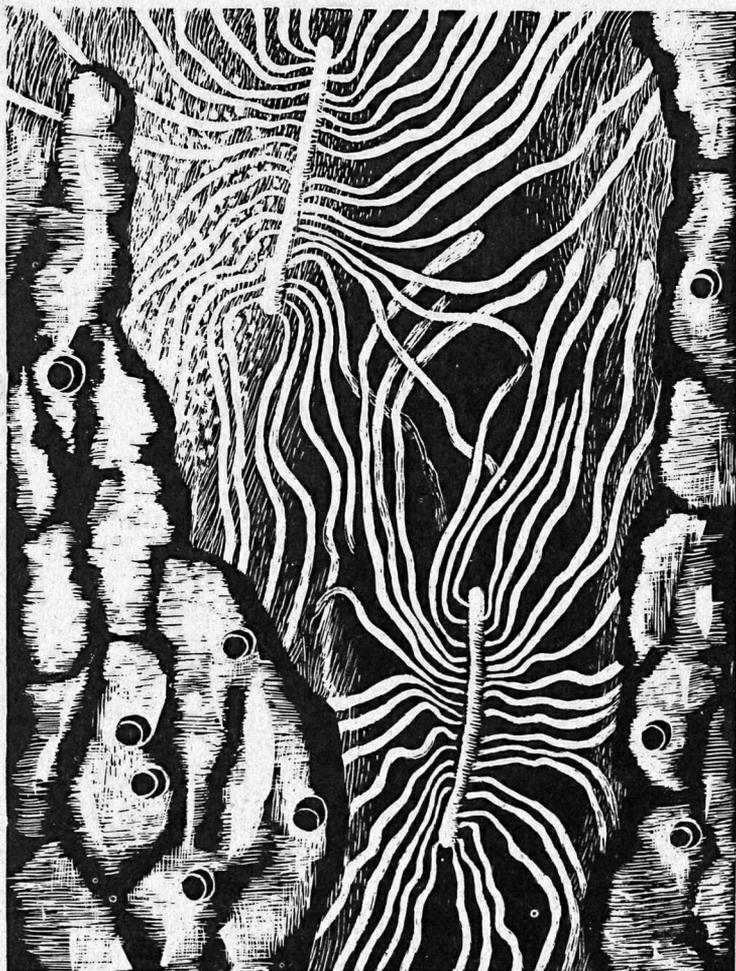
haven't time to read reams anyway. Moreover, we'll aim henceforth to publish in addition to our regular issues a Special Issue on TWP each year. (We're beginning work on the next but you may not see it till 1995.)

Also, we're trying to free space. I advocated reducing to 4 point type and issuing magnifying glasses, but was outvoted. Whereupon, I ruefully eliminated my own column, "Noteworthy Articles." We plan to keep "It's What We Do" very short in the future. (Dave's "Campfire," of course, will continue. Its absence this time bespeaks Dave's speaking—his oratorical duties left him no time this quarter to write his column.) We intend to restrict ourselves ever more to articles of undying import—articles that will be genuinely germane years from now. For news alerts, local reports, and political updates, readers should see the many timely New Conservation Movement news periodicals, such as *Wild Forest Review*, *Earth Spirit Calls*, *Heartwood*, *Headwaters*, *Northern Forest Forum*, *RESTORE: The North Woods*, *Save America's Forests*, *Southern Utah Wilderness Alliance*, *Carrying Capacity Network Clearinghouse Bulletin*, *Inner Voice*, and *Forest Voice*. (For Western news, see also *High Country News*.)

To the argument, enunciated well by Ken Wu in a letter this issue, that *WE* should run more philosophical pieces, I would respond that only a small part of the duty of wildland proponents to defend ecocentrism's philosophical bulwarks should fall upon *Wild Earth*. We do hope to strengthen and broaden our Land Ethics and Population Problems departments, and we've been contemplating adding a subversive section, possibly disguising it under the innocuous heading Questioning Technology. Again, though, our constraint is space. Also, many of the needed critiques (of modern technology, industrial civilization, and the whole panoply of evils) have already been written and published in such books as *Deep Ecology*, *In the Absence of the Sacred*, *Green Rage*, *Confessions of an Ecowarrior*, *The End of Nature*, *Beginning Again*, *The Unsettling of America*, *Overshoot*, *Sacred Land Sacred Sex*, and *Practise of the Wild*, or in the environmental philosophy periodicals, *Trumpeter*, *Pan Ecology*, and *Environmental Ethics*.

The most regrettable aspect of *Wild Earth's* inability to print all the worthwhile material we receive is that it means we're not fully employing all the people who want to advance North American Wilderness Recovery. Indeed, I believe the weak point in The Wildlands Project at present is in failing to fully engage and enlarge the New Conservation Movement. We must get more people involved. *WE* carries on partly to help fill these voids. Many people want North America to be healthy and natural again. *Wild Earth* aims to help these people help.

—John Davis



It's What We Do...

Recently we received a letter from Melissa Hardy of Asheville, North Carolina suggesting we print a financial statement for 1993 detailing our yearly budget and staff salaries. She was also interested in the financial relationship between The Wildlands Project and *Wild Earth*. She feels that while the ideological arrangement had been made clear, donors have no way of knowing if their money is supporting The Wildlands Project, *Wild Earth*, or both. Melissa believes "people are more likely to donate to non-profit organizations if they know where their money is going." We agree and want to thank her for taking the time to make these suggestions. Please look over the 1993 Statement of Cenozoic Society Revenues and Expenses.

While the expenditures may make you think you are looking at the Forest Service's annual budget for pencils, these are the **total** annual expenditures of *Wild Earth*. For perspective, should National Wildlife Federation President Jay Hair's annual salary be diverted to *Wild Earth* (an unlikely prospect), we could produce *Wild Earth* for nearly two years on that money alone.

We are proud to be able to produce a quality magazine on a small budget, but we would not be able to do it without the generous contributions of time and energy from the authors and artists whose work graces *WE*'s pages.

The Wildlands Project and *Wild Earth*, although sister organizations, are completely separate financial entities. Any donation made to either organization stays within that organization. The production of the *Wild Earth* Special Issue, which focused on TWP, was paid for with a grant from the Foundation for Deep Ecology. The coverage given to TWP in each issue of *Wild Earth* is a matter of editorial content. It is not a financial arrangement.

We welcome Erin O'Donnell as our new Administrative Assistant. She replaces Becca Cunningham who left us because she felt the chocolate-induced high energy environment was not good for her health and because she was about to have a baby. Becca's humor and natural energy will be greatly missed. Erin began working with *WE* as a volunteer and so far has exhibited a liking for chocolate. —*Marcia Cary*

Attesting to *Wild Earth*'s growing influence, sharp-eyed readers may have noticed *WE* articles reprinted or excerpted of late in several regional and national publications. From *Alternative Press Review*, to *Harpers*, to *High Country News* (which reprinted Dave Foreman's spring "Campfire" column wherein he takes on world-class wallydraigle Bruce Babbitt), folks are reacting to our movement's vision of recovering wilderness. We welcome periodicals to reprint articles, but do caution editors to seek permission both from *Wild Earth* and the author.

To the "Wise Use" propaganda rags who delight in quoting John Davis's and Reed Noss's most visionary pronouncements from *WE*'s Wildlands Project special issue, please send tear sheets along to Babbitt (alas, still at Interior and not sitting next to Clarence Thomas on the long hard bench of jurisprudence). Maybe Bruce will be inspired by persons speaking with the courage of their convictions. —*Tom Butler*

Statement of Revenue and Expenses (Year Ending Dec. 31, 1993)

REVENUE

Wild Earth Sales

Subscriptions- New	\$23,173
Subscriptions- Renewals	28,783
Wholesale Distribution	11,388
Sample Issue	445
Back Issue	2,123
"Old Growth in the East"	1,397
Advertisements	1,237
Merchandise	642
Miscellaneous	882

Contributions

General	9,560
WE Research Fund	7,387
Grants	7,580
Total Revenue	\$94,597

EXPENDITURES

Payroll

Salaried Pay (Net)*	\$40,607
Contract Pay	4,779
Payroll Taxes	10,404
Research Fund	3,527
Printing / Mailing of Magazine	36,285
Health Insurance	3,359
Rent	2,347
Utilities	1,018
Photostats/copies	1,386
Communications	
Postage/Express Mail/UPS	7,065
Phone/Fax/Econet	4,401
Office Supplies / Equipment	863
Travel	4,178
Entertainment	150
Memberships / Subscriptions	1251
"Old Growth in the East" Production	6290
Professional Fees	1100
Bank Charges	164
Miscellaneous	9436

Total Expenditures	\$138,610
(Deficit)	(44,013)**

*Gross Annual Staff Salaries: Exec. Ed.=\$6000; Editor=\$9600; Art Director=\$9600; Assistant Editor/ Outreach Director=\$10,000; Business Manager=\$11,200

**This large deficit represents the 1992 receipt of a grant to produce The Wildlands Project Special Issue while \$25,475 of the total production expenses were incurred in 1993.

The Wildlands Project

Update

April 1994

It's been over a year since *Wild Earth* published an entire issue introducing The Wildlands Project. Since that time we have been talking and working with thousands of you to bring a vision to life: a vibrant North America where Grizzlies, Jaguars, salmon, fungi, and prairies can thrive within the evolutionary ebb and flow.

The press is discovering us, intrigued by the boldness or perceived consequences of our task. We remind them constantly that in creating this vision—and in implementing it—The Wildlands Project is only a small piece of the process. Protecting and restoring North America's lands and waters depends first and foremost on those in the regions, whose love of place is combined with knowing place. The Wildlands Project exists to help coordinate the work of the regions: to help make sure the maps fit together, that groups get the scientific and other resources they need, to publish reserve proposals as they are developed, and to bring this vision to all the people of the continent.

In bringing this vision before all North Americans the choices we face will at last be clear: we will know what we must do if we truly value the earth from which we grow and all its life. That knowledge will be rooted in every region. It will change the way we think about the problems of our own species. Solutions at the expense of the Earth and other species will no longer be uncritically accepted; the burden will be shifted to those who would despoil.

We are asked about the practicality of The Wildlands Project and the vision it shares with regional groups. The answer is simple. Practical solutions have barely slowed the rate of biological degradation. We must first understand what solutions will halt and reverse that degradation, and then we must work to make those solutions practical. We must change what is practical. Of course, people must work with present practicalities, but it is equally important that people work to transcend these limits.



A vision of where we want to go serves the New Conservation Movement in a number of ways:

- It gives us a positive vision; we are no longer just on the defensive, saying no to this and that human scheme for transforming nature into money. We are saying yes to life in all its myriad forms. Responding to the endless assaults is vital, but more is needed.
- It gives us a direction. To get from here to there we need to know where there is. What sort of wildlands reserves, corridors and buffers do we need to protect all indigenous species, ecosystems, and ecological processes. Without that sense of direction, land despoilers will continue to shape society's agenda.
- It gives us a standard by which to measure our success.
- And finally, the very process of creating the vision—bringing together conservation action and biology, working coopera-

Wildlands Project Update from Tucson

An avenue little explored so far by The Wildlands Project is education in primary and secondary schools. We in the Tucson office are now working to change that. We are developing a Teacher Training Workshop based on the conservation biology concepts underlying The Wildlands Project. The program will be university accredited. It will be a week long retreat focused to impart both the science on which the North American Wilderness Recovery Strategy is based, and the ecocentric value system underlying The Wildlands Project.

We are still in the early stages of planning, and hope to begin developing an actual middle and high school curriculum based on large wilderness areas as essential to any landscape model. If you have input or are currently involved in the education system and wish to become involved in a Wildlands Project Environmental Education program, please contact the Tucson office: 1955 W. Grant Road, 148 A, Tucson, AZ 85745; 602-884-0875; or e-mail us at "wildlands@igc.apc.org".

The Wildlands Project still has a large number of *Wild Earth* special issues available for interested individuals or groups. If you or your organization would like to receive copies of the Special Issue, please contact TWP office in Tucson. Individual copies are available, but it is easier for us to ship them by the box for you to distribute to your group.

We ask individuals and groups to make copies available free of charge to those who would benefit from it. If you receive any contributions for copies of this issue, we would appreciate funds to cover postage. First class postage is about \$2 an issue and bulk shipping is \$8 a box to the West Coast and \$14 a box to the East Coast.

—Elise Granek, TWP intern

tively within and between regions, building a continental network—makes us more credible and stronger.

The Wildlands Project's ability to assist regional groups has just been vastly enhanced by Jim Strittholt and Barbara Wolman. Jim is a biologist with his Ph.D. in reserve design (his work was in the Ohio Appalachians). He also has extensive computer and hand-based mapping experience. Jim will start officially in mid-June, but we are urging him to attend vision mapping and organizing meetings in the interim.

Barbara Wolman has joined our staff and is already working hard to keep the nuts and bolts (excuse the mechanical metaphor) of the project tightened or loosened as needed. Barbara brings from the Oregon Natural Resources Council a combination of commitment and expertise gleaned from work in a larger organization.

We've just signed a lease on the new administrative/science office; the new address is 117 E. 5th St., Suite F, POB 1276, McMinnville, OR 97128; phone 503-434-9848, FAX 503-434-2781. The Tucson office remains alive and well, and for clearinghouse information or copies of the *Wild Earth* special issue please continue to call Tucson at 602-884-0875, Fax 602-884-0962.

We also welcome Dr. Rodolfo Dirzo to the board of The Wildlands Project. Rodolfo has conducted research and published widely on ecology and plant-animal interactions in the subtropics since the early 1980s. One of Mexico's foremost conservation biologists, his reputation throughout Mexico and central America has made him a persuasive advocate for biodiversity and wildness. He teaches at the Universidad Nacional Autonoma de Mexico Centro de Ecologica and has trained many of Mexico's best young ecologists and biologists.

In the last issue of *Wild Earth* I wrote some about the vision mapping process. In an upcoming issue I will talk more about both vision mapping and the longer term reserve design, and how people and groups can become involved. Meanwhile here's a brief update:

The vision mapping process is under way in the Northern Appalachians and Canadian Maritime region (Greater Laurentian Region), the Canadian Rockies, and the Southern Rockies (largely in Colorado). This spring the process will begin in the Southwest, Great Basin, Great Lakes Northwoods, and the Pacific Northwest (Klamath to Tongass). In the fall, Mexico, Central America, Alaska, the Canadian Arctic, Boreal Forest, California, Southern Appalachians, the Plains, Northern Rockies and the East & Gulf coasts will commence vision mapping.

We are pleased that in both the vision mapping and the longer-term science based mapping, Sierra Biodiversity Institute and Pacific GIS will work with us and regional groups. These two organizations have long experience in conservation mapping and in working with regional and local groups. Both have a deep commitment to conservation. Those of you who have worked with Steve Beckwitt and Ed Backus and their co-workers know of what I speak.

TWP will cooperate with the Biodiversity Legal Foundation in providing support to the Road-fighting Strategy Project that emerged from the February meeting in Healdsburg, California. The Road-fighting Project will be directed by an independent board. TWP will provide organizational support. (See "Road Scholars" article in this issue.)

The road-fighting strategy is only one area where wildlands reserve design efforts tie in with and support more immediate conservation work. Forest planning in US National Forests, Canada's Endangered Spaces campaign, and other conservation efforts can benefit from the scientific research and mapping undertaken for reserve design. In return, these efforts benefit wildlands work by providing immediate protection and building the biological case for a fundamental shift in priorities.

The Wildlands Project extends thanks to the Turner Foundation, Patagonia, ESRI, and as always the Foundation For Deep Ecology, for generous grants in support of our work. Turner has provided \$25,000 in general support, Patagonia has contributed \$10,000 to support vision mapping and organizing meetings, and ESRI has donated thousands of dollars of computer software for mapping. The grant-making community often reflects the larger community — only a few have the vision to lead and look to the long term. We are grateful for their leadership as well as financial support.

We also look to you for leadership. Please support The Wildlands Project with a generous (and tax deductible) contribution. The species we list at each gift level (see coupon below) are all threatened or endangered. Your gift will help save them all. Thanks.

—David Johns, TWP Executive Director

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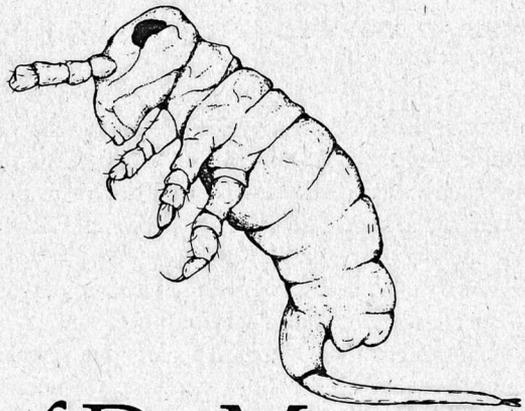
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- \$1000 Dudley Bluffs Bladderpod
- \$500 Kretschmarr Cave Mold Beetle
- \$250 White Wartyback Pearly Mussel
- \$100 Unarmored Threespine Stickleback
- \$50 Attwater's Greater Prairie-chicken
- \$25 Dismal Swamp Southeastern Shrew



THE WILDLANDS PROJECT POB 1276 McMinnville, OR 97128



The Habitat Island of Dr. Moreau

by Bil Alverson

To all but the most skeptical observers, the U.S. Forest Service appears to have begun a slow shift toward ecologically-benign silviculture. Their current public relations vehicle, Ecosystem Management (known last year as New Perspectives) informs us that the Forest Service will employ new technologies to protect biodiversity while simultaneously producing timber, game, and other commodity products.

Rosy pronouncements by *New Perspectives/Ecosystem Management* spokespeople must be carefully evaluated in light of the limitations of our scientific knowledge and technologies. Beyond skepticism over Forest Service motives, readers of *Wild Earth* must ask themselves whether or not the vision of future forest management suggested by *New Perspectives/Ecosystem Management* is in itself viable and desirable. Would a reformed and well-intentioned Forest Service of the future best protect indigenous biodiversity through intensive management?

The fictional account below offers one hypothetical future of Heart's Content, a real 50 hectare old-growth stand in western Pennsylvania. Heart's Content was designated as a National Natural Landmark in 1977, but despite its formal designation it is seriously impaired biologically because of changes in the surrounding forest. Loss of species, lack of reproduction of some tree species, and other problems due to Heart's Content's small size and isolation from other old-growth stands suggest that additional protection of the stand is needed.

How shall we provide such protection? This question is considered through the eyes of Dr. H.J. Moreau, a biodiversity specialist trying to maintain and enhance the biota of Heart's Content. Moreau's management philosophy is a direct descendant of *New Perspectives/Ecosystem Management* thinking, and his attractive technology will probably be common by early next century. Moreau's actions harken back to his intellectual predecessor and namesake, the fictional Dr. Moreau that H.G. Wells used a century ago to consider the limits of human ability to control nature.

**2020 A.D., WARREN COUNTY, PENNSYLVANIA,
U.S.A.**

Dr. H.J. "Hojo" Moreau reduced the tint in his windshield as he turned right at the Bivouac of the Dead statue and crossed the Allegheny bridge. Now headed south on Roadway 337, he no longer had to stare into the newly-risen sun. Edna Prendik slept soundly in the passenger seat.

As he brought the dust-colored Silviculture Service truck up to speed, Moreau's mind drifted to the megavideo he watched last night at the Kinzua Theater. In it, scientists had developed a technology enabling space miners to modify gravitational fields locally. The miners would strategically place asteroid traps, creating foci of high gravity into which passing asteroids would be drawn and held. Months later, the miners would revisit these traps to claim any asteroids that contained valuable rare metals. It seemed like a great plan until the cumulative effects of thousands of gravity traps produced first subtle then drastic changes in the orbits of nearby inhabited planets. Tides changed. Crops cooked. Earthquakes jolted historically quiet zones. Fortunately, just when things looked hopeless, the Professional Space Managers were able to use controlled fusion explosions to readjust the orbits and restore order. Great stuff, Moreau thought, and not really so far-fetched. He loved speculative fiction.

Moreau was glad to have some time to think. The last few days had been packed with conversations and presentations, and he'd been the center of attention much of the time. He looked over at Edna and smiled. She was tired from traveling, having arrived late last night from her previous job in Montana. What a great addition to his interdisciplinary team, he thought. Her technological skills were exactly what he had been looking for, and her entomological expertise would complement his botanical knowledge.

He met her last month at a meeting of the Sustainable Use Ecology (SUE) group. Her car marooned her in Milwaukee during a cross-country trip, and by sheer luck, she'd decided to attend the SUE meeting. Within an hour he made a job offer, and within a week he had his answer. The imminent layoff of her husband, a timber sale planner, had cinched the deal, and here she was on the way to see Moreau's brainchild.

Moreau opened the sunroof and felt the warm, dry wind on his face. The normal greenery of the forest on either side of the road here at the Rocky Gap Trail crossing was tinged with browns and yellows this June because of the drought. Without looking at the details of the passing forest, he could see it was second growth rather than the old stuff of Heart's Content. Their textures were different. He thought of the color-enhanced satellite image of Heart's Content on his office wall. It stood out from the surrounding matrix of young forest like a patch of tall, wild prairie grass on a closely clipped suburban lawn.

As they reached the turn-off to Heart's Content, Edna yawned herself awake. "Almost there, are we?"

"Yep," he said, "just another 6 clicks."

Ten minutes later, he turned the Honda Tufftruk into the parking lot at the Scenic Old-Growth Area. As usual, Monty had arrived before him, driving up early from Seldom Seen Corners. The gangly Commodity Biologist sat on a bench next to the small shelter that had been affectionately named "The House of Rain" by some wag. But not this year; dust stirred up by their arrival drifted across the parking lot into the wilted edge of the old-growth stand.

Moreau introduced Edna to Monty. As they chatted, he went to the back of the Honda, wiped dust from the dispenser spout on the inside wall of the truck bed, and drew off three steaming coffees. The air seemed to devour the vapor a centimeter above the cups.

Monty launched into a report of his early-morning soil invertebrate survey. He had taken 100 randomly-placed samples throughout the old-growth stand's 48 hectares, and had plugged each into the portable DNA extractor/Ligase Chain Reaction unit slung over his shoulder. The LCR unit's readouts were not surprising.

"Soil invertebrates of most concern: 18 of 20 present in a sufficient number of the samples," droned Monty. He was not excited by these data. "I transmitted those measurements," he continued, "plus values for the other 9331 species of soil invertebrates, directly from the LCR unit to the computer at headquarters. Analysis of long-term trends and permanent data storage will be done by the time you finish your coffee. Only two negative readings on the LCR tests."

"The same ones, again?" asked Moreau.

"Yep. Numbers 1887 and 1888," said Monty, "those damned whachacallits. Springtails."

Moreau considered this information. These two species of Collembolan insects were perplexing in that even with frequent reintroduction to the stand, they would diminish in number rapidly until their presence could no longer be detected by these weekly DNA/LCR surveys. To all appearances they were lost from the stand almost as fast as they were reintroduced. Unfortunately, the best genetic models available made uncertain predictions as to their biology, so it was difficult to know how to respond. If, as one might assume, it was normal for them to persist in the stand only in very low numbers, undetected by the weekly DNA/LCR surveys, then how in hell did they survive over the long run? Moreau couldn't answer that, so he chose an alternative prediction from the genetic models: these Collembolans should occur naturally in much greater numbers in Heart's Content, and therefore he'd simply have to keep reintroducing them from laboratory colonies. Surely their populations would eventually stabilize.

"Give me a hand with these, would you?" Moreau removed the carton of Collembolan inoculates from the truck and broke its protective seal. The individual packets inside always reminded him of the old-style cigarette packs so common when he was young.

"These are the problematic R-guild Collembolans, right?" asked Edna as she broke the cellophane wrap on the first packet.

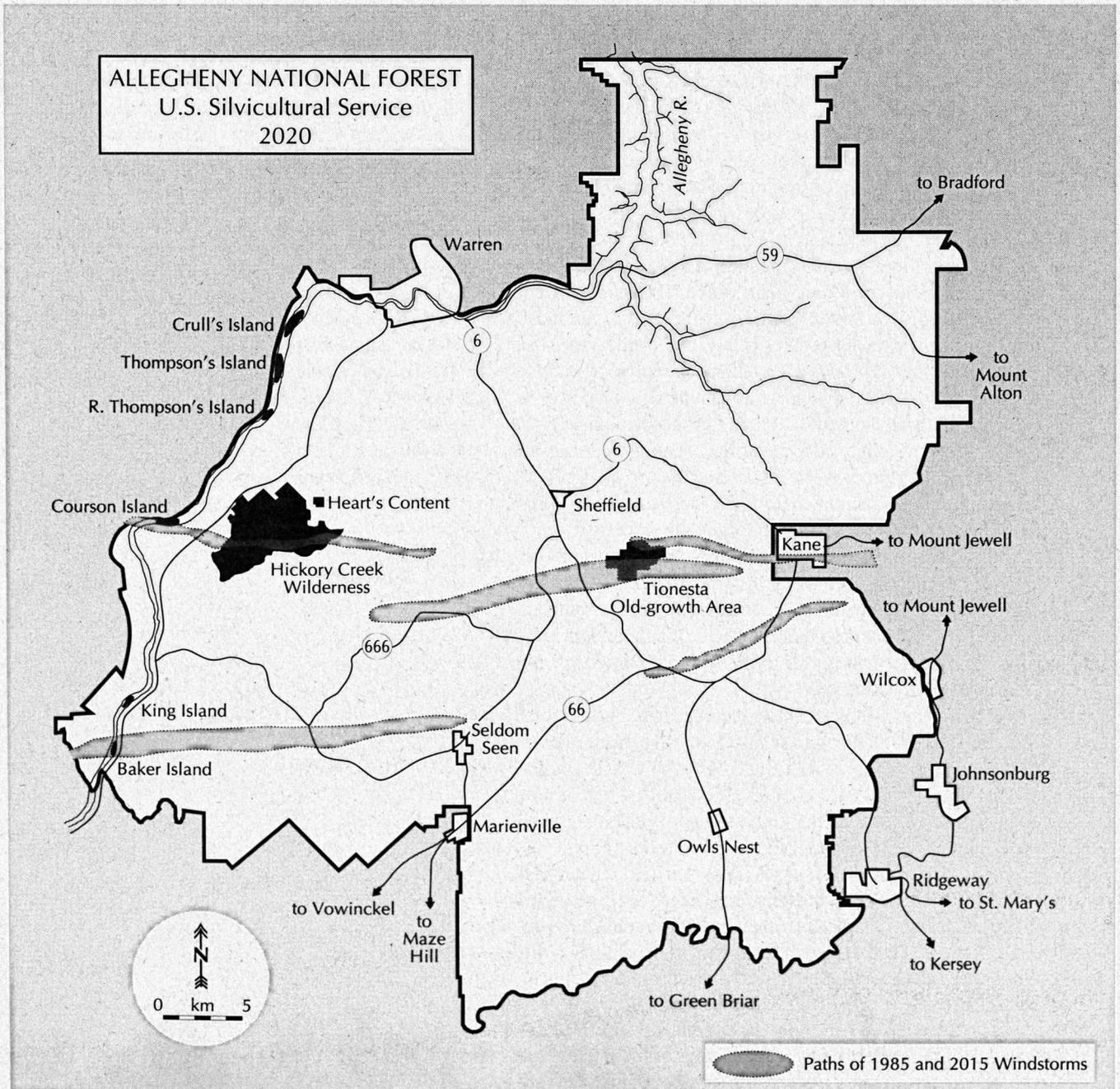
Viewpoints

Moreau smiled and nodded. Smart kid — a graduate of the Northern Michigan Institute of Quasinsular Biology. Even Monty, who had been reinoculating Heart's Content with these same critters for 10 years, hadn't the curiosity to learn much about the extensive body of invertebrate guild theory used to predict and evaluate population trends. In fact, Monty was skeptical about the whole business and resented the time spent on frequent manual reintroductions of invertebrates to the stand: "If you want these bugs so bad," he once grumbled, "why not just keep them in the laboratory where they're safe? The for-

est was slicked off a long time ago, so why get all warped out about ecological conditions in these little scraps of timber?"

Moreau clucked his tongue. They had been over this argument so many times that a reply was unnecessary.

Laden with packets for hand-dispersal of new Collembolan colonies, they passed through the gate in the solar-powered electric fence surrounding the old-growth stand. These fences are a nuisance, Moreau thought, but necessary. The hunting lobby was nearly as strong now as 40 years ago, and its political clout translated into high deer numbers on the Forest



— except in the areas surrounded by deer-proof fences. The fences surrounded all the remaining old growth in a five-county area: Heart's Content, the Tionesta tract 20 kilometers to the east, the small Cook Forest stand about 30 kilometers south, and several small islands (literally, in the middle of the Allegheny River) 14 to 24 kilometers to the west. Fence also surrounded the Hickory Creek Wilderness Area, immediately west of Heart's Content. Many more kilometers of electric fence surrounded hundreds of clearcuts and selective cuts on the Forest so that economically valuable tree species could regenerate successfully.

Edna was the last to come through the fence, and fastened the gate behind her. After brief instructions from Moreau, they spread out to opposite corners of the old-growth reserve.

Two hours later, Moreau sprinkled the contents of the last of his packets on the dampest soil he could find under the edge of a large rotten log. The inoculate looked like powdered ash. Today was probably an exercise in futility because of the drought and the perplexing biology of these invertebrates. However, one could never be sure about Collembolans; they sometimes survived in the most unexpected ways and places.

The top of the log was alarmingly dry but served well for a place to sit. Moreau let his attention drift to the brilliant orange stamens and cobwebby stems of Indian Cucumber Root plants waving in the breeze. Their backswept petals reminded him of the tri-winged spaceships he saw in the megavideo last night. It was a nice colony, at least 20 meters across, though to an untrained eye it would appear as a number of scattered individuals. Heart's Content had many of these colonies now, one of Moreau's many success stories. Having been almost totally eliminated from the stand before 2000 by years of deer browsing, Indian Cucumber Root was here to stay. In 2003, Moreau convinced his superiors to spend the money to fence Heart's Content and all the other old-growth stands on the Forest. Only then had it been worth his time to champion reintroduction efforts. Before that it was too disheartening to outplant native species and watch them be chewed into nothingness by roving ruminants. It was like trying to grow bratwursts in a kennel full of dobermans.

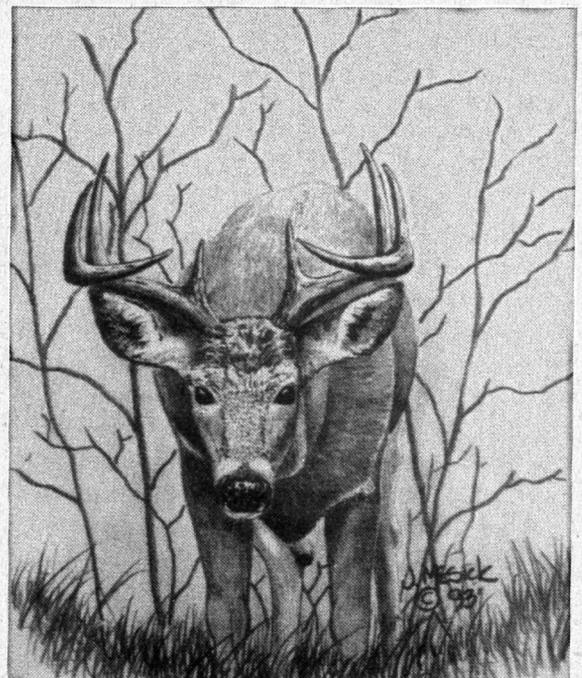
Reintroduction efforts began to succeed once the deer were fenced out of the old-growth stands. Extensive, healthy colonies of trilliums, Hobblebush, Elderberry, Wild Sarsaparilla, and Canada Yew all could be found in Heart's Content now after years of work. Constant monitoring of pollen and seed production, and of the status of juvenile and adult individuals, resulted in satisfying stable populations. Yew, in fact, did a bit too well inside the deer-proof fence and needed to be controlled to prevent it from choking out other important understory vegetation. Moreau had solved the problem by enlisting two Silvicultural Service volunteers to mimic deer browsing by periodically clipping the yew shrubs.

Moreau realized reintroducing extirpated vascular plants was one of the easiest parts of the biological restoration and enhancement of Heart's Content. He simply used lists of spe-

cies of this and nearby old-growth areas compiled by Lutz and Morey nearly a century ago. By transplanting seeds and cuttings from remnant colonies elsewhere on the Forest (the yew came from the tops of big boulders where it escaped browsing), he reconstituted the entire flora. On a stand-by-stand basis, he had actually enhanced plant diversity, adding to each stand all of the species originally found on any of the old-growth stands. Chestnut became amenable to reintroduction when an effective set of hypovirulent *Cryphonectria* fungi were genetically engineered. No other vascular plants presented many problems.

Much more challenging was the little stuff, the "worms and germs," as Monty called them: mites, fungi, insects, lichens, spiders, mosses, slime molds, and bacteria. Complete inventories of the biota weren't available until the Silviculture Service completed their exhaustive Forest-wide inventory efforts at the turn of the century. Then they began the massive task of determining the biology of each of the thousands of species, and all of their ecological interactions. Thanks to the efforts of many hundreds of autecologists and quasinsular biologists employed by the Service, the biology of most of these organisms was now well-known and available for management applications.

They knew the probability that spores of the lichen genus *Lobaria* would colonize branches in the crowns of old-growth Yellow Birch trees in Heart's Content in any given year. They knew what tiny percentage of these lichen colonists would be from other old-growth stands in western Pennsylvania, and what vanishingly small per-



centage would come from old-growth stands in states westward. And they could predict with great precision the population dynamics and genetic consequences of each colonization event.

They had in their computers the data on the 10-year cycles of fourth-level parasitic interactions between wasps, twisted-winged insects (Strepsipterans), plant hoppers, and their host plants. They could also accurately predict the outcome of competition between fungi on flying squirrel feces, as a function of relative humidity for the last 400 days and fungal abundance and distribution over the last 4000 (long-lived spores necessitated long-term data). Moreover, they knew how to adjust their management and reintroduction efforts to take into account these and tens of thousands more factors like them.

Moreau felt proud of these herculean accomplishments. Many had said he couldn't do it, but now, only 16 years since the first complete biological inventory of the Forest (58,895 species, of which 24,022 were found in Heart's Content), he could demonstrate an *enhancement* of species in the old-growth areas. As he always said, only three obstacles stood in the way of complete and proper management of these stands: insufficient knowledge, inadequate technology, and a lack of weather control. The first two had been overcome by the Service's immense commitment (largely due to his efforts) to gather all information relevant to understanding and controlling the biota. The weather was something else.

As he reflected on his 26 years in the Silvicultural Service, Moreau considered his main frustrations, those things that still lay beyond his control. In spite of the knowledge and management skills that he and his army of technicians had assembled, the antiquated Federal Wilderness Laws had prevented them from employing these technologies on potential old-growth areas like the Hickory Creek Wilderness Area adjacent to Heart's Content. Every time he drove down from Warren he had to look at the neglected 3500-hectare block as it crawled toward old-growth condition, like a slug moving at random across a lane of God's bowling alley...Moreau wondered if much of the stand would ever reach biological saturation before windstorms and fire took it apart, piece by piece. Part of it blew over in the same 1985 storm that devastated 400 of 1600 hectares of the Tionesta old-growth tract in a few minutes. The second big storm, in 2015, caused only local damage on the western part of the Forest but scalped another 40% of Tionesta's old growth.

Moreau could feel the second cup of coffee in his stomach when he thought about the weather, especially this year. A gridlock of science and politics prevented weather modification on any large scale in the United States, so weather remained a tormentingly uncontrolled source of variation in his biological equations. Logically, if you couldn't control the weather, at least you could compensate by speeding up the rate at which these stands achieved old-growth conditions.

He'd love to get his hands on the Hickory Creek Wilderness but the laws prohibited its proper management. He wanted

to plant genetically-engineered hemlock stock that not only had a much faster growth rate (without a concomitant reduction in longevity) but exhibited a reduced frequency of heart rot—heart rot being a big problem, in his opinion. He had never heard of a useless thing that wasn't ground out of existence by evolution sooner or later, and here was a perfect chance to make it sooner. Under the auspices of the Sustainable Use Ecology program, engineered hemlock was now planted in most long-rotation old-growth areas to demonstrate that commercial stock for the Japanese veneer market could be produced much more quickly than it was in unmanaged stands.

He would also carry out some surgical, small-scale habitat improvement. Removal of excess wood downed in the 2015 storm would reduce the fire damage this year. The possibility of a fire jumping from the Hickory Creek stand to the adjacent Heart's Content made him nervous. All it would take was a single ferocious windstorm or drought-spawned fire to undo his Heart's Content, his creation, the acme of his life's work.

"Dr. Moreau?" Edna's voice and the crunch of her footsteps on dry beech leaves brought Moreau out of his reverie. "Why is Monty so negative about this project? I started talking to him about efforts to reintroduce the American Burying Beetle to forest reserves in the Upper Great Lakes and he just said, 'Who cares?'"

Moreau stood up and stretched. How could he wise her up without diminishing her enthusiasm?

"Edna, Monty is somewhat old-fashioned. He doesn't place much value on things that don't seem particularly useful. Monty doesn't understand. He thinks my efforts to maintain Heart's Content as an old-growth biodiversity reserve are silly. Let's walk back to the truck. I'll explain more on the drive back."

Moreau dusted off the seat of his trousers. They shouldered their empty knapsacks and headed west through an old grove toward the parking area. Soon they were enveloped by a thick stand of hemlock reproduction. As soft needles brushed against Moreau's face, he thought about the many short-sighted colleagues who considered his obsession with old growth archaic, romantic, and useless. He recalled a time when he had to fight tooth and nail for even a tiny budget for active management of this and other old-growth areas in the Eastern Region. Things were much better now. The annual budget for Heart's Content alone was over a million dollars (2.7 million Yen), when one considered all of the research and reintroduction costs.

He felt optimistic about the future even when he acknowledged the cynicism that had slowly grown in him from exposure to so many years of the Service's public relation campaigns. You had to know how to ride the waves of change, find the small currents of fact in each of the PR initiatives and use them to increase your momentum toward a goal over time. Ecosystem Management, New Silviculture, Environments for a New Century, Frontiers in Forest Science, Stewardship for the Future, and now Sustainable Use Ecology— from each he

Letters

had increased his authority and staff within the Service, until he'd become the Service's Old-growth Management Professional. Finally most of his critics were silent, his projects hugely successful, and he had more than enough to do with all the constant monitoring and reintroduction efforts, even without habitat improvement in the Wilderness Areas. It was an awesome responsibility, but he was a Professional equal to the task.

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Bil Alverson is an Honorary Fellow in the Biology Department at the University of Wisconsin, Madison (430 Lincoln Drive, 53706). He divides his professional time between phycogenetic studies of tropical trees and conservation biology projects in northern forests.

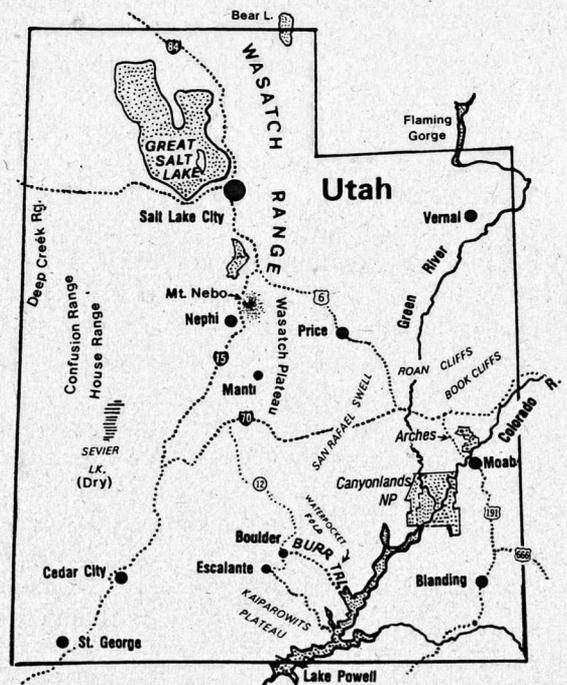
UTAH CORRECTED AND DEFILED

While I am a fan of quaint and eclectic maps such as the one rendered of my home state Utah on page 24 of the Spring 1994 issue of *Wild Earth*, I cannot let the inaccuracies depicted on this map pass without comment. This is, after all, the 1990s and not the terra incognita confronted by the mapmakers of the mid 19th century.

The Wasatch Mountains extend from the Utah/Idaho border down to Mt. Nebo, near the town of Nephi; they do not extend on down to I-70. The famed Burr Trail extends easterly from the small town of Boulder, Utah across the Waterpocket Fold to the Notom Road. The Burr Trail depicted on the map is actually the Hole in the Rock Road, which correctly runs southerly from near the town of Escalante. Canyonlands National Park consists of three sections: Needles, The Maze and Island in the Sky which sprawl on all sides of the confluence of the Green and Colorado Rivers. Arches National Park is north of Moab, not south and west.

Having just returned from the Escalante area and driven the Burr Trail, there doesn't seem to be any battle left to win. Although the county commissioners call it chip and seal, a paved road by any other name is still a paved road. The washes and gullies all sport new culverts and significant bulldozer improvements have been made. The road's been paved, the battle's been lost, mark up another win for industrial tourism.

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UTAH CORRECTED

SOUTHERN ROCKIES PROPOSAL NOT ENOUGH

Cheers to the Southern Rockies Ecosystem Project (SREP) and the Colorado Environmental Coalition (CEC) for their campaign to rebuild the fragmented Rocky Mountain National Park area

ecosystem. Still, I worry about the scope of their proposal as described in Roz McClellan's article "A Rocky Mountain National Park Reserve System Proposal" (*Wild Earth*, Winter 93/94).

If, as Roz points out, the proposal is "seriously lacking" because it would not adequately protect native wildlife and ecosystems, why is it billed as a genuine "reserve system" proposal, based on "scientific principles?" This is misleading to Forest Service planners, the general public, and even to conservationists.

The proposal includes a lot of small "core areas" and "corridors." What species will they serve? Certainly not wide-ranging Wolverine, Wolf, or Grizzly Bear! Even more specialized species (e.g. Bighorn, Pine Marten, and Flammulated Owl) may benefit little since the "core areas" were based largely on existing roadless areas and not tailored specifically to their needs.

The question of what is or is not (biologically) a suitable core or corridor area depends on the particular species one wishes to conserve. I question whether the proposed "reserve system,"

considering its relatively fine scale, provides a "coarse filter context" for conserving the area's biodiversity. Given the ambitious (and I might add essential) conservation goals stated in the article, the entire Rocky Mountain National Park area as shown, including national forest and many private lands, should be the recommended "core area"!

Understandably, SREP and CEC have weighed the practical matter of current land use and management practices in recommending to the Forest Service a set of management areas which would advance biological conservation. But why propose them as a "reserve system" if they are admittedly deficient as such? Indeed, a large conservation core zone that includes the *entire* Rocky Mountain Park area is needed, with the current management proposal applied as an interim strategy for achieving that goal.

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Editor's note: Tony Povilitis, founder of Life Net, is a biologist with years of field experience studying large mammals.—JD

Statement of Purpose

Wild Earth is a non-profit periodical serving the ecocentric grassroots elements within the conservation movement. We advocate the restoration and protection of all natural elements of biodiversity. Our effort to strengthen the conservation movement involves the following:

- ✦ We provide a voice for the many effective but little-known regional and ad hoc wilderness groups and coalitions in North America.
- ✦ We serve as a networking tool for grassroots wilderness activists.
- ✦ We help develop and publish wilderness proposals from throughout the continent.
- ✦ We render accessible the teachings of conservation biology, that activists may employ them in defense of biodiversity.
- ✦ We expose threats to habitat and wildlife, and offer activists means of combatting the threats.
- ✦ We facilitate discussion on ways to end and reverse the human population explosion.
- ✦ We defend wilderness both as *concept* and as *place*.
- ✦ We are the publishing voice of The Wildlands Project: the North American Wilderness Recovery Strategy.

Erratum

We inadvertently omitted the list of references accompanying Robert Zahner's article *Ecosystem Mismanagement of Cove Forests on the National Forests of the Southern Appalachians* (Spring 1994). Readers who wish may write us for a copy.

AGONUM PICEOLUM PEGGED WRONG?

Steve Trombulak's article "A Plea for Biological Honesty" (*Wild Earth* 3(4):6-7) makes a valuable contribution toward recognition of a little appreciated problem regarding biological integrity of many biodiversity conservation issues. The application of biological misinformation as a ticket to jump on the biodiversity conservation bandwagon is so widespread it appears even parts of the same issue of *Wild Earth* did not escape it. For instance, in reading with great interest R. Wills Flowers' "Endangered Invertebrates, and How to Worry About Them" (*Wild Earth* 3(4):25-31), I notice he claims (p.29):

"One ground beetle, not yet a candidate though it probably should be, is *Agonum piceolum*. This beetle is totally restricted to Northwest old growth. There may be some doubt about whether the Spotted Owl is absolutely tied to old growth but there is little doubt that *A. piceolum* needs that ecosystem and accepts no 'multiple use' substitutes."

This is a very strong and definitive statement! I have spent the last five years documenting the distribution and rarity of all ground beetles (Coleoptera: Carabidae) in the Pacific Northwest (ca. 650 species), and have conducted intensive field work on carabids in the San Juan (NW Washington) and Gulf (SW British Columbia) Archipelago (110 species) with a focus of documenting the effects of forest fragmentation and isolation on forest invertebrates. My reading of

the literature concerning carabid taxonomy and distribution in N. America indicates *A. piceolum* is quite a different species than Flowers makes it out to be. My records indicate *Agonum piceolum* (Leconte 1879) occurs in the following regions: Alberta, British Columbia, California, Colorado, Connecticut, Idaho, Massachusetts, Manitoba, Maine, Michigan, Montana, New Hampshire, Newfoundland, Ontario, Oregon, Quebec, Saskatchewan, Utah, Washington, Wisconsin, and Wyoming.

As a biodiversity ecologist, I am actually disappointed that *A. piceolum* is not a Pacific Northwest old-growth specialist. My list of carabids which are potentially Northwest old growth dependent, and have relatively small distributions, totals about two dozen species. Others are always welcomed; although this ecology may put them at greater risk of extinction, it also contributes greatly to the uniqueness of the Pacific Northwest forest insect fauna, which for many years was considered depauperate and unexciting by entomologists from warmer climates.

If Flowers has additional information on *A. piceolum*, I hope he will share it. Perhaps I have overlooked something. If not, I suggest that he, and everyone else, read Steve Trombulak's plea. As discussions concerning the ecology of biological diversity mature, it will be important to be biologically accurate and honest.

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Author's response

James Bergdahl is correct in his reading of the current literature on *Agonum piceolum*. My information came from an entomological society meeting two years ago, at presentation of a trapping study of insects of different forest types in Glacier National Park. My notes from that meeting show that *piceolum* was mentioned as an example of a species endemic to the old growth areas in that study. To my knowledge, that study has not yet been formally published (not unusual: papers given at our society meetings often predate formal publication by several years). The other possibility is simply a *lapsus calami* on my part while taking notes. Bergdahl and I are also at geographical cross purposes, for which I accept responsibility. He assumes that my "Northwest" is synonymous with his "Pacific Northwest." Actually I had the larger and more conventional Northwest in mind. Injecting the spotted owl into the discussion made confusion understandable and perhaps inevitable.

Conceding that I picked a bad example in *Agonum piceolum*, the underlying point I was trying to make—that we should be paying as much attention to old growth invertebrates as to old growth owls—still stands and in fact is strengthened by Bergdahl's letter which suggests there may be as many as 24 old growth carabids in his area. A recent article in *Conservation Biology* (which appeared after I had submitted the *WE* article) also sheds new and

interesting light on this issue. A study of old growth and regenerating plots in Alberta revealed a guild of ten carabid species that disappear after clear cutting (Niemela et al. 1993). Three species disappeared immediately, the other seven persisted for a few years in regenerating stands but none was present in 27 year old regenerating forests. It appears quite a few carabids cannot live with multiple mis-use.

Getting back to *piceolum*, could a beetle with such a wide range possibly be a candidate for the ESA? Yes, if *piceolum* really is a mature forest specialist. One of the species in the Alberta study, *Agonum mannerheimi* Dej. is Holarctic in geographic range but its ecological distribution is spruce mire with trees over a century old. It is listed as "threatened" in Finland and Sweden (Niemela et al. 1993).

Reference:

Niemela, J., D. Langor and J.R. Spence. 1993. Effects of clear-cut harvesting on boreal ground-beetle assemblages (Coleoptera: Carabidae) in western Canada. *Conserv. Biol.* 7:551-561.

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MORE PHILOSOPHY NEEDED

I have received every issue of *Wild Earth* from its beginning and I believe *Wild Earth* is the best and most important ecocentric conservation periodical in existence. Understandably, then, I was concerned when Dave Foreman wrote his "Around the Campfire" plea for financial help in the Fall 1993 issue. Reading *Wild Earth* and talking to numerous grassroots ecocentric activists, I believe a few improvements can be made that would substantially increase the quality and readership of *Wild Earth*.

1. It seems there are fewer and fewer philosophical and ideological articles in every succeeding issue. These are the articles which create the greatest controversy and help to shape and refine the fundamental goals, strategy, and direction of any movement. While Conservation Biology is an indispensable tool in protecting

The radical anthropocentric environmental movement is on the rise...

biodiversity, the underlying reasons why we care at all about wilderness also need to be articulated. Where are the Deep Ecology and eco-philosophy articles (preferably non-woo-woo)? One of the best articles I've ever read was George Sessions' "Radical Environmentalism in the '90s" in the Fall 1992 issue. What has happened to ideological articles by Christo-

pher Manes, Dave Foreman, George Sessions, Arne Naess, Bill Devall, Roderick Nash, and other ecocentric thinkers? Robyn Eckersley's new book, *Environmentalism and Political Theory: Towards an Ecocentric Approach*, is probably the most in-depth and sophisticated examination and defense of ecocentric environmentalism to date, yet it has hardly received any mention.

While it is important to fight the right-wing, industrial scum in control of this society, it is also important to critique some of the enemies of our enemies who can often be antagonistic to the ecocentric movement as well. The radical anthropocentric environmental movement is on the rise, in the form of social ecology, other forms of eco-anarchism, many strains of eco-feminism, and eco-socialism. These philosophies, while providing some important and valid insights that ecocentric activists can learn from, also present real dangers to nature-centered activism in the long run to a degree comparable to the dangers from the anti-environmental movement. There are constant challenges by these movements against the need for population control, stopping economic growth, recognition of the intrinsic value of all species, uncompromising wilderness protection against threats by any and all humans, focusing on biodiversity issues, focusing on destroying all forms of industrial society as opposed to only capitalism, and other fundamental components of ecocentric philosophy.

These criticisms must be

examined and refuted if the New Conservation Movement is not to be marginalized. These questions cannot remain unanswered lest these human-centered environmentalists pull in more new activists from the grassroots and funnel them down a path that ultimately is anti-nature. That the ecocentric movement has often been hesitant and nonconfrontational with such anthropocentrism is responsible for the quick rise in the influence of such ideas in the late 1980s and early 90s, especially among the more impressionable young people who've made up the bulk of the radical environmental movement in recent years.

I think it would be appropriate to designate at the minimum the last one quarter of every issue to such articles.

2. *WE* has the potential to be distributed in many more places. *WE*'s science articles are good enough to be used as reference sources for many university conservation biology programs. A greater effort should be made to contact universities and see if the conservation faculties would be interested in purchasing *WE* for their students and libraries. It is not known of in my conservation biology program at the University of British Columbia.

Also, most mainstream environmental organizations, at least in Canada, do not have subscriptions to *WE*. A subscription would be very beneficial for these groups, educating key members on the newest ideas in ecocentric conservation biology and strategy. Again, perhaps complimentary issues should be sent to every important chap-

ter office of all the mainstream environmental organizations associated with wilderness protection.

3. Although this would be controversial, I think it would be wise to print *WE* in colour on recycled paper with real photographs. We can often relate more to nature with actual pictures of the endangered wildlife than in drab black and white drawings and text. While most of the articles in magazines like Audubon or Sierra may not be as scientifically researched or ecocentric as in *WE*, the pictures in these magazines make them substantially more appealing on a general level, and also more educational in that regard, as a picture says a thousand words. *Wild Earth* would be an absolutely outstanding magazine with real colour photographs.

These are three of the main improvements I would suggest for *WE*. *WE* is the most sophisticated voice in uncompromising, ecocentric conservation and everything should be done to make it greater and more successful.

Ken Wu, President, UBC Student Environmental Centre; 1344 Shawnee Rd SW, Calgary, Alberta, Canada T2Y 2S7

Editor's response: Your third suggestion I'll summarily reject, but the first two seem good to me. We'll try to follow through on many of your promotional ideas, and will try to strengthen and broaden our Land Ethics and Population Problems departments, but see my editorial inside the front cover. —John Davis

Sage-Steppe and Irony Abound at Hanford

What do weapons grade plutonium production, 89,000 acres of pristine grassland, and the last free-flowing section of the mighty Columbia River above tidewater have in common? The answer, paradoxically, is the US Department of Energy's Hanford Facility.

Established in 1943, this 560 square mile reserve was preserving thousands of acres of native arid grasslands in eastern Washington as security buffer zones while producing the plutonium that destroyed Nagasaki, Japan and fueled the cold war's nuclear weapons arsenal. Ironically, the facility that has produced the world's most deadly materials has also resulted in the largest remaining tract of native sage-steppe grasslands in the Northwest including fifty undammed, salmon-producing miles of the Columbia River.

And it's up for grabs!

If justice prevails, the site that produced such destructive weaponry could soon provide a reserve against the destruction of our last large examples of the sage-steppe ecosystem, the fastest disappearing ecosystem type in the West. A block of 89,000 acres of untrammeled sage-steppe grasslands known locally as the Wahluke Slope will soon be released from the Department of Energy (DOE) as part of an accelerated cleanup of the Hanford Site, the nation's most polluted

federal facility. Wahluke Slope, located on the north side of the Hanford Site, is scheduled for release this October along with a 120 square mile block of pristine grasslands known as the Arid Lands Ecological Area located in the western part of the Hanford Site.

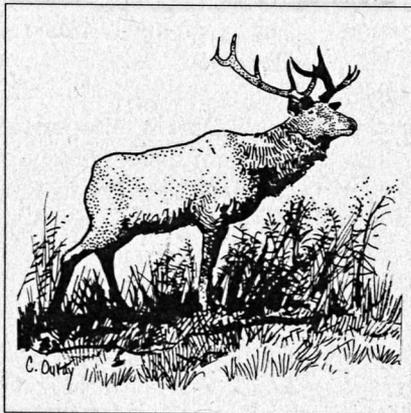
Both are threatened by development interests clamoring for their privatization and conversion to agricultural, urban, or industrial use. The Arid Lands Ecological Area has the largest herd of "dryland" Elk in North America. Naturally occurring Elk in arid lands represent a unique phenomenon deserving research. The Wahluke Slope is bounded on the south for fifty miles by the free-flowing stretch of the Columbia River known as the Hanford Reach. This riverine ecosystem harbors 48 threatened or endangered species, provides one-third of the remaining natural spawning grounds for Chinook Salmon in the Columbia River system, and is winter range for Bald Eagles and other raptors along with the seldom seen curlew.

The Hanford Reach is an integral part of any salmon recovery plan for the Columbia River watershed. This area could be easily linked by wildlife corridors to the US Army's nearby Yakima Firing Range. Taken together this would be one of the largest arid land reserves in the United States.

The Wahluke/Hanford Reach is situated amidst wheat, onion, and potato mega-farms and fruit orchards that stretch from the Cascade Mountains to the Idaho border. The agribusiness and investment interests in the area are united with the county commissioners of the four county area for development of every last acre of these arid lands.

The developers' stance is especially inappropriate given that other nearby lands are available for agricultural development. Moreover, there are already dryland crop surpluses regionally as well as nationally, and the Bureau of Reclamation has determined that the Wahluke Slope area is unirrigable due to unstable soil properties. The agribusiness call is for release of the lands for private ownership, with agricultural infrastructure (irrigation improvements) undertaken by such entities as the Bureau of Reclamation, at taxpayer expense, of course.

Contrasting the developers' plans for these areas is a local but increasing call for preservation. The Governor of Washington has publically endorsed Wild and Scenic status for the Hanford Reach. Preservation plans would include transfer of the Arid Lands Ecological Area to the Bureau of Land Management (BLM). This would be better disposition of the lands than development, but the BLM would need to be carefully scruti-



Elk
(*Cervus elaphus*)



Bald Eagle
(*Haliaeetus leucocephalus*)



Long-billed Curlew
(*Numenius americanus*)

nized given its management history in other areas. Strong promotion of this area to be managed for wildlife research over cattle grazing would be essential for its protection.

Under preservation plans the Wahluke/Hanford Reach would be managed by the US Fish & Wildlife Service, National Park Service, or an assemblage of state and federal wildlife or environmental agencies. Wildlife reserve and study area is the preferred use for the

Wahluke Slope in a recent study by the Department of Interior.

Much attention has been given to possible Wild and Scenic River designation for the Hanford Reach, and even many of the farmers desiring the adjacent Wahluke Slope for agriculture favor protection for the river. The Columbia River is the heart of the Pacific Northwest and its legendary salmon runs of the past are a symbol of the entire region. But we now know that riv-

erine ecosystems are not separate from the lands that surround them. Preserving the Reach without the Slope is false promise. An intact Wahluke Slope/Hanford Reach eco-system is essential to the river's survival.

At the time of this writing US Representative Jay Inslee, 4th district Washington, is undecided on the issue. Local environmental groups are organizing and have some grassroots support, but are a small voice against local city and county commissioners, who are controlled by the agri-industrial development interests.

Decisions are being made rapidly as to the disposition of these lands, with October as the deadline for a final decision. Strong support must be shown now. Write to US Representative Jay Inslee, Washington Senators Pat Murray and Slade Gorton, Secretary of Interior Bruce Babbitt, and the Hanford Advisory Board at the addresses below. Tell them this is a unique opportunity to change our abusive land policies of the past where a few benefit at the expense of the American public. Tell them you want our public lands protected for wildlife.

Robert Wilson, 509 Douglass Ave., Richland, WA 99352

Addresses:

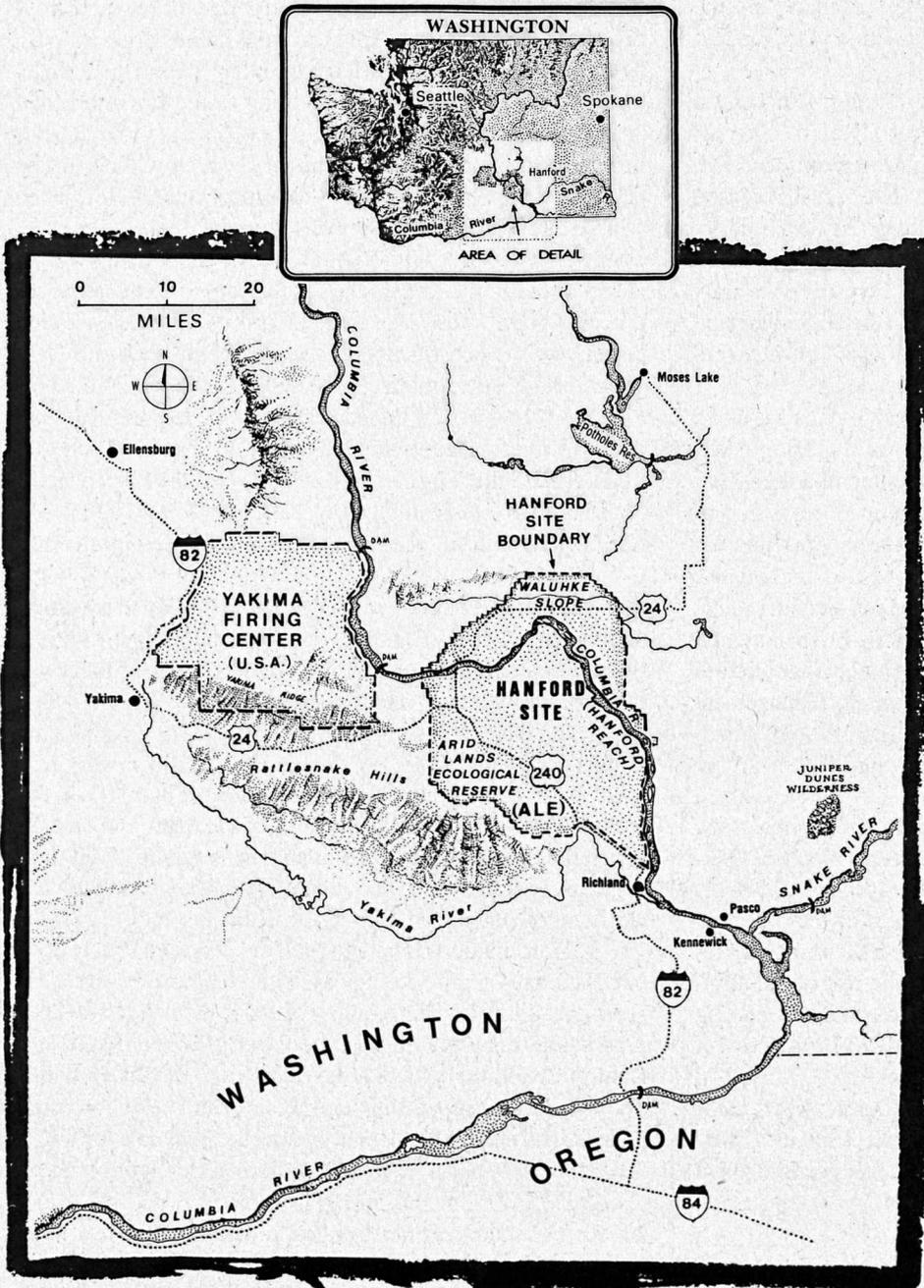
Rep. Jay Inslee
House Office Bldg.
Washington, DC 20515

Senators Slade Gorton & Pat Murray
Senate Office Bldg.
Washington, DC 20510

Interior Secretary Bruce Babbitt
1849 C St, NW
Washington, DC 20240

State Representative Lane Bray
P.O. Box 40615
Olympia, WA 98504

copies of letters to:
Columbia River Conservation League
135 Spengler
Richland, WA 99352



GGBP CHALLENGES THE CHOMPING OF GILA NATIONAL FOREST

In February, Gila National Forest Acting Supervisor Carl Pence announced that the controversial Alma Allotment Management Plan (AMP) had been withdrawn. The Greater Gila Biodiversity Project (GGBP) had appealed the AMP in December 1993. GGBP contended that the decision to re-authorize the allotment was not in conformance with the National Environmental Policy Act (NEPA) and that cattle grazing practices on the allotment were jeopardizing Threatened and Endangered species found in the San Francisco corridor—including the Loachminnow, Spikedace and the Southwestern Willow Flycatcher—in violation of the Endangered Species Act.

GGBP's victory was its fourth in a series of successful appeals of Gila National Forest grazing AMPs. The other allotments appealed were the Toriette Allotment near Luna, NM, and Schoolhouse Gulch Allotment and White Signal/Ferguson Mountain Allotment, both outside of Silver City. All four decisions to implement the AMPs were withdrawn.

Very few environmentalist appeals of Forest Service grazing allotment plans have been attempted in the Southwest, and even fewer have been successful. From 1990-92, only two environmentalist appeals of FS AMPs succeeded.

All four appeals challenged the Forest Service's use of a Categorical Exclusion (CE) to re-authorize a grazing AMP. CEs are low-level environmental documents authorizing very minor activities unlikely to have any significant environmental effects. Forest Service regulations expressly prohibit using a Categorical Exclusion to re-issue an AMP or make major changes in operations, as the Gila NF managers attempted. GGBP contended in their appeals that an Environmental Analysis or Environmental Impact Statement is required to re-issue or significantly modify an Allotment Management Plan; higher level Forest Service personnel confirmed this contention by ordering the appealed plans withdrawn for more detailed analysis.

The Alma Allotment includes nearly three miles of the San Francisco River. This section of the river is proposed Critical Habitat for the Southwestern Willow Flycatcher. The Forest Service did not mention the flycatcher or the proposed Critical Habitat anywhere in their Decision Memo, which re-authorized grazing along the river and the rest of the allotment. Since the plan would have allowed continued grazing of cattle along the San Francisco River, GGBP asserted it would violate the Endangered Species Act.

The appeals are part of an ongoing Desert Rivers campaign of the Greater Gila Biodiversity Project and its associate group the Phoenix-based Southwest Center For Biological Diversity. The campaign seeks to protect key watersheds in Southwestern river systems.

—Peter Galvin, Kieran Suckling (Greater Gila Biodiversity Project, POB 742, Silver City, NM 88062)

TOTAL OVERSTORY HARVEST FOR REFUGE RECREATION ENHANCEMENT?

Ten miles north of Monroe, Louisiana lies D'Arbonne National Wildlife Refuge. The 17,421 acre Refuge is composed of approximately 10,000 acres of hardwood bottomland, 3000 acres of pine, 2000 acres of cleared wetlands, and 2000 acres of reservoir. D'Arbonne contains a network of trails and roads which are not accessible during wet conditions, when as much as 80% of the Refuge may flood. D'Arbonne NWR supports a wide diversity of wildlife including American Alligator, Red-cockaded Woodpecker, Osprey and Bald Eagle, all Endangered or Threatened species.

Presently D'Arbonne NWR is in danger of severe disruptions from its manager, the US Fish and Wildlife Service (FWS), as the agency plans to do "selective cutting" within the Refuge. The purpose of the Refuge, according to the Environmental Assessment, is to "produce wildlife benefits and provide wildlife-oriented recreation for the public," which will clearly be altered and possibly destroyed by the timber cutting. How much will be cut is still unclear. As of February 1994, Refuge forester Steve Pagans estimated that 870 acres of "dying willow oaks" would be cut in the hopes of "speeding up the recovery process" of the forest. Most of the Willow Oak trees have died because of the construction of the Columbia Lock and Dam which has drastically affected the water table within the bottomland forest. When the dam was completed, the resulting backwater permanently flooded approximately 2000 acres on the Refuge. Following the "regeneration cut" the FWS plans to replant the cut areas with Red Oak and Nuttall Oak. Nuttall Oak is not a predominate species on D'Arbonne but it is more water tolerant than Willow Oak.

The removal of trees from D'Arbonne NWR will adversely affect soil, vegetation, animals, and water. The dying Willow Oak trees are needed to return important nutrients to the forest floor and provide food and shelter for animals.

The FWS seems to be dodging the real issue with vague terminology such as "heavy thinnings," "total overstory harvest," "selective cutting," and "group selection cuts." The truth is that D'Arbonne NWR is about to be clearcut. The date on which the killing is to begin is unknown, but there is still time to get involved and voice your opinion. For more information, contact Jimmy Witherington, 1484 Griggs Rd, Choudrant, LA 71227.

For information on how to fight the widespread abuses of our National Wildlife Refuge system (clearcutting, livestock grazing, military bombing, killing of native animals, oil and gas production, road-building, etc.) contact the Wildlife Refuge Reform Coalition, POB 18414, Washington, DC 20036-8414. The Coalition is supporting legislation to end most abuses of Refuges and enact a biodiversity protection mandate for FWS. Write to your legislators (representatives at US House of Representatives, Washington, DC 20515; senators at US Senate, DC 20510) in support of the strongest possible bill to ban such abuses of Wildlife Refuges.

—Tracy Perry, WE intern

Developing Roads Scholars

by Katie Scarborough and Kraig Klungness

While a core of committed activists have long agreed, the degradation of wilderness caused by roads has been largely overlooked by the mainstream. The committed road fighters have pointed out that roads open wild areas to logging, mining, poaching, development, pollution, off-road vehicle use and other disruptive human activity.

The wilderness recovery espoused by The Wildlands Project requires not only prevention of new road construction but also the closure and revegetation of existing roads. All classes of roads, from ORV "trails" to arterial and collector roads to major highways, need to be considered for closure, with a moratorium on new construction.

Recognition of this need for a bold program of road control led a coalition of groups to hold a Road-Fighting Strategy Session last February in Healdsburg, California. Originally conceived by Jasper Carlton of Biodiversity Legal Foundation (BLF), the three-day meeting was jointly organized by BLF, The Wildlands Project (TWP), and the Alliance for a Paving Moratorium. The Fund for Wild Nature, Patagonia, and Common Counsel's Grantee Exchange Fund provided the financial support that made the meeting possible.

The gathering of about thirty wilderness activists embodied an unprecedented collection of skills and experience for road fighting. Those attending shared extensive knowledge of biology, legal strategy, conservation history, and public land policy.

Using TWP's vision for North American Wilderness Recovery as a central organizing principle, participants worked to integrate biology and law into a visionary strategy for road control. Providing a biological framework for discussion, conservation biologist Reed Noss presented slides articulating TWP's goals for wilderness recovery. Noss reviewed the importance of setting aside large unfragmented core reserves linked by functional unbroken corridors.

Preservation of all major ecosystem types is an important part of TWP's vision. Historically, wilderness advocacy has failed to achieve this. The National Parks, Wildlife Refuges and Wilderness Areas that constitute our current systems of reserves, Noss pointed out, protect more scenery than biodiversity and biological productivity. This has left most of the biologically richest land in North America open to exploitation, with the result that many of these areas are now heavily roaded.

For example, of the 261 ecosystem types defined under the Bailey-Kuchler classification system, said Noss, only 19% are represented in roadless areas of 250,000 acres or more. That figure drops to two percent when examining units of roadless land at least 2.5 million acres in size.

Obliterate! Revegetate!

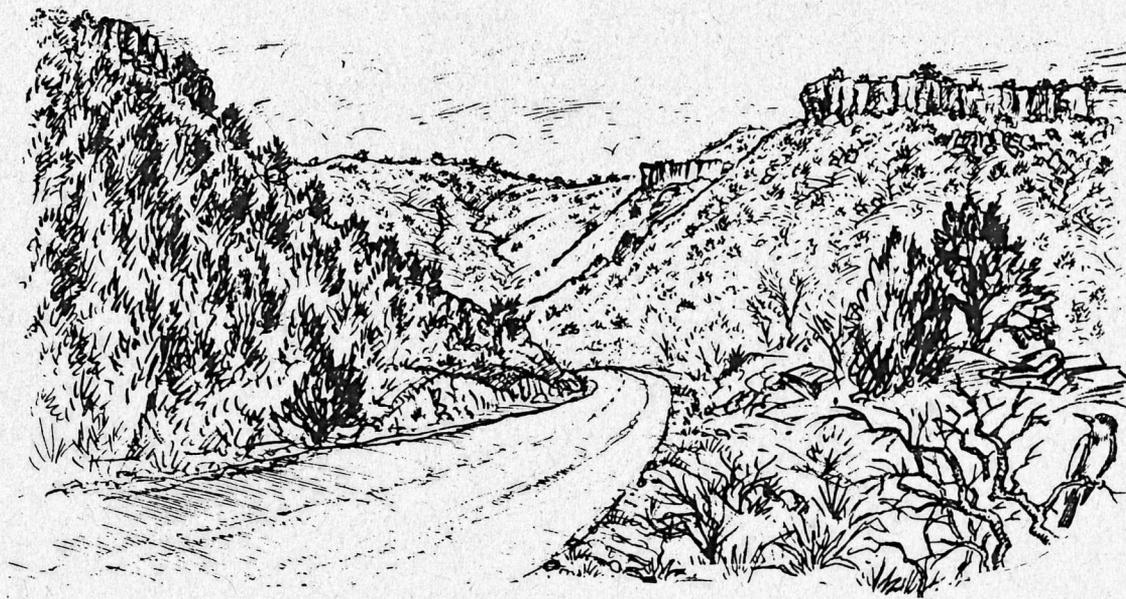
Obliterate! Revegetate!

*...There are too many roads
being built upon this land.*

—from the song "Roadents" by Glen Waldeck

*A road is a dagger placed in
the heart of a wilderness.*

—Supreme Court Justice William O. Douglas



To counter this problem, Noss told the group, "Our best option is restoring large roadless areas." He backed the statement with a litany of wilderness recovery principles now widely accepted by conservation biologists: "Species that are well distributed across their native range are less susceptible to extinction than those that are confined to a small portion of their range...Large blocks of habitat are better than small blocks...Blocks of habitat close together are better than those located far apart...Unfragmented blocks are better than fragmented blocks...Interconnected blocks are better than unconnected blocks."

With large unfragmented landscapes, species have access to more and better habitat. They can travel, unfettered, as they may need to for survival. They will be less accessible to human predation and other disturbance.

Noss punctuated his statements and slides with statistics. For example, 47% of wolf mortality in the Canadian Rockies is due to road kills; inside national parks, that figure rises to 69%. Road kills are also the largest cause of mortality for the Florida Panther, an Endangered species.

And this is unnecessary. "By my estimate you could close 90% of the roads on public lands without affecting hardly anyone except for those people that claim they need those roads for their recreation," said Noss. In spite of this, and in spite of agencies like the U.S. Forest Service writing road closure requirements into forest plans, "studies have shown that official road closures are not real road closures." In one study, Oregon's Department of Fisheries and Wildlife found that only 21% of road closures planned by the Forest Service after timber harvests in the Siuslaw National Forest were actually carried out.

Moreover, many agency "road closures" are not effective. If a road is merely gated or blocked, it is still there, still a barrier to many species, still imposing adverse impacts such as altering watershed hydrology. And many vehicles, especially ORVs, can drive around gates and barriers.

These comments from Noss underscored the importance of having activists monitor public agency road closure behavior. Keith Hammer, who produced a manual on how to do this, *The Road Ripper's Guide to the National Forests*, spoke at the Road-Fighting Strategy Session about road closure techniques he had used in the Flathead National Forest in Montana. True to its name, *The Road Ripper's Guide* advocates having the Forest Service physically rip roads and revegetate them as the only way to effectively close them.

Hammer's experience with road density standards proved enlightening. Road density, a measure that agencies like the Forest Service don't always use but should, is a measure of human land disturbance — a ratio of how much linear road exists per square mile — which can indicate the adequacy of habitat for some species. For example, for an area to provide optimum habitat for wolves, it should have a road density of less than 0.9 miles per square mile of land. Road densities should be no more than 1.5 miles per square mile to provide viable Black Bear habitat. Yet, as Reed Noss pointed out, a typical managed forest in the West requires a road density of five miles per square mile.

Hammer told stories not only of the Forest Service failing to use road density standards to determine the adequacy of habitat for various species, but also miscalculating road densities when they were used. Roads along the borders of Forest Service transportation analysis units, for example, are routinely left out of road density calculations. So are skid roads and ORV trails.

It is up to activists monitoring public lands to keep agencies honest on these points — or *make* them honest. Hammer and others detailed tools activists can use in campaigns for doing just this. Kieran Suckling of Greater Gila Biodiversity Project in New Mexico explained procedures for status reviews and listing of rare and endangered species, and using listings as a tool for achieving road closures. Mitch Friedman of the

Greater Ecosystem Alliance in the Northwest addressed the application of conservation biology and landscape ecology principles to prioritizing road closures.

Reiterating some of Keith Hammer's points, Friedman stressed the importance of documenting the existence of roads. "The first step in getting these roads removed is making sure they are all mapped," said Friedman. "Then make sure [public agencies] have road density standards." This gives activists a legal tool to limit how many roads can be within any given area.

Jasper Carlton recommended that activists do their "biological homework" since "the only way to defend your backyard is to know that ecosystem better than anybody else." Then use the biological data to argue for full implementation of the species and habitat protection clauses of existing environmental laws.

Be prepared to go to court if necessary. Carlton reviewed legal strategies used by BLF in such cases. As long as activists do their biological homework, BLF can provide them with administrative and legal assistance.

The spirit of committed activism pervading the meeting came through powerfully in presentations made on regional road-fighting. Discussing conditions in the Upper Midwest, Kraig Klungness of Northwoods Wilderness Recovery sketched a thick blue line across a map of Michigan's Upper Peninsula to show a proposed four-lane highway. The road would slash across an area with "incredible wilderness recovery possibilities, very low population density, four wolf packs, sensitive plant habitats. So," said Klungness, "we're not going to let them do that."

As Dave Foreman pointed out in his strategy session remarks, this was not the first time the issue of roads in wilderness had been addressed. Coinciding with the first proposals for the National Parks was a strong movement to make the outdoors accessible by building roads. Much of the early conservation movement endorsed this concept.

Shortly after Henry Ford's mass production techniques made the automobile widely available, Aldo Leopold expressed the fear that "there would be a smell of 'Ford dust' everywhere." A few other foresters shared his fear as automobiles began to penetrate the National Forests. It was this reaction to the first automobiles, said Foreman, that led to the designation of the first wilderness areas in the National Forests. But the Forest Service was quick to begin massive road-building programs. Bob Marshall co-founded The Wilderness Society in 1935 primarily to protect wilderness by fighting roads.

Marshall conducted the first serious inventories of roadless areas, in 1927 and then in 1936, with the idea of using this data to establish wilderness reserves. In 1927 central Idaho had a seven million acre roadless area. The Colorado River Escalante country of southern Utah was nine million roadless acres until after World War II.

Today, said Foreman, those areas have been divided by roads. The Forest Service now manages 350,000 miles of road and will have 500,000 miles by the year 2000 if they carry out

all their plans; 90,000 miles of this will be in former roadless areas, and Montana will have the road density of Pennsylvania.

Much of the meeting's work was done in brainstorming sessions that generated a list of criteria with which to assess road impacts; a list of damaging roads across North America that should be priorities for closure; and a list of ideas for developing a major wildlands road-fighting movement. Building on these program ideas and the energy generated by this meeting, Biodiversity Legal Foundation and The Wildlands Project will lead a coalition of grassroots groups in what is, for now, being called the Road-Fighting Strategy Project. The project will include three components: 1) training of activists to achieve road-closures and stop road-building; 2) coordination of grassroots efforts to fight specific roads; and 3) education of the public about the damage done by roads.

The project will empower activists from throughout the country to close roads by giving them the needed scientific, legal and organizational tools. By coordinating grassroots efforts to close existing roads and prevent new ones, the project will lend the strength of a nationwide effort to local and regional campaigns.

With public education, the project will strive to raise awareness of the damage done by roads to biodiversity and habitat. The media and government decision-makers will also be targeted for education.

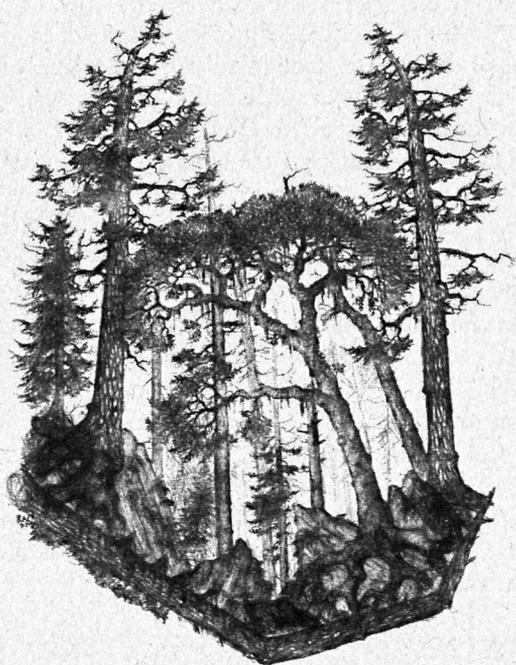
A road-fighting campaign can bring together conservation biologists from the academic community and conservation activists from the grassroots, to the benefit of both. It can demonstrate to the public that public lands are being mismanaged, that tax dollars spent on road projects put biodiversity at risk. It can empower grassroots activists to assure that agencies properly administer laws to preserve the ecological integrity of public lands. Ultimately it can compel even the most recalcitrant public agencies to close and revegetate roads.

The goal of this campaign, of course, is large-scale wilderness recovery. This will take years. Nonetheless, if the cadre of energized activists coming out of the Road-Fighting Strategy Session keeps growing, they may be able to obliterate roads and restore vast tracts of wildland. **WERF**

Katie Scarborough, writer, activist and former executive director of Alliance for a Paving Moratorium, was one of the coordinators for the Road-Fighting Strategy Session. She currently codirects the Road-Fighting Strategy Project. Kraig Klungness is a wilderness activist and executive director of Northwoods Wilderness Recovery in Michigan's Upper Peninsula. One of the originators of the Road-Fighting Strategy Session, he now codirects the Road-Fighting Strategy Project.

The Dilemma of Eastern Old Growth

by Robert Leverett



The isolated giants of extraordinary dimensions, scattered across the landscape in pre-colonial times, today are truly rare. Whole generations of Americans have become accustomed to picked-over, miniaturized woodlands.

BACKGROUND: FIRST EASTERN OLD-GROWTH CONFERENCE

In August 1993, the first conference devoted exclusively to Eastern old-growth forest was hosted by the University of North Carolina (UNC) at Asheville. The Western North Carolina Alliance (WNCA) acted as the organizational arm. Under the able leadership of Gary Miller of UNC and Mary Kelly of WNCA, the conference was an unqualified success. The event was attended by over 320 people and attracted prestigious co-sponsors from academia, government, and grassroots and mainstream environmental organizations. *Wild Earth* was a key participant. Dave Foreman gave one of the most inspiring speeches of the affair, and Mary Davis's report on her just released publication, *Old Growth In The East: A Survey*, was a cornerstone of the conference. Presentations by William Martin, David Stahle, Orie Loucks, Charlie Cogbill, Dan Boone, Don McLeod, Robert Zahner, Don Leopold, Albert Meier, Steve Silva, Joan Davis, Ed Yost, and Will Blozan gave attendees solid scientific information about Eastern old growth. Brock Evans gave a concluding speech that set the tone for future events spawned by the three day affair. Although the conference was highly successful, many questions were left unanswered. Indeed, we had envisioned the conference only as the first step in an ongoing process to raise public awareness of old-growth forest issues in the eastern United States.

A goal we had set was the strengthening of basic definitions for Eastern old-growth ecosystems. Beginning with a broad definition, we would tailor criteria to specific forest types. I personally felt that the spruce-fir, northern hardwood-hemlock, hemlock-White Pine, Appalachian cove (mixed mesophytic), and oak-hickory associations would make good candidates for definitional refinement. For a variety of reasons, we didn't tackle the definitions problem. We are ready now.

A PREOCCUPATION WITH DEFINITIONS

I confess an obsession with the need to resolve the definitions problem. My obsession is motivated by recurring nightmares. In spite of a genuine effort by some federal and state resource managers to protect the botanical treasures on the lands they control, the rank and file will continue to be motivated by economic considerations. I see them lumping pockets of prime old growth with maturing second growth and targeting the oldest trees for removal; i.e., cutting the real old growth, while paying lip service to biodiversity under the loose banner of everyone's new buzzword, 'ecosystem management'. The diminutive remains of our oldest forests could be irretrievably hacked away in the implementation of timber management plans with fine sounding words that belie the real, continuing priority of timber quotas over biodiversity. Are these nightmares merely the nocturnal outpourings of a demented old-growth evangelist? Is the picture more promising in daylight?

After sanctioning massive damage to the National Forests, the US Forest Service has finally begun rethinking its ways. The Forest Service is under seemingly more benign management, but I will remain openly distrustful until I see unequivocal evidence that "the good old boys" understand the long-term negative effects industrial forestry has on forest structure, composition, and native diversity.

Many regional managers are so enamored of computer modeling that they believe they can mimic the infinitely complex processes of nature while meeting arbitrary timber quotas. I worry that their intent is to rotate every acre of land through long-term cutting plans. Some have indicated as much. They must discard a lifetime of misconceptions, bad habits, and the belief that environmental ethics represent a direct threat to their livelihood.

Even if legitimate changes are implemented, there could be setbacks. The academic and environmental communities must not be lulled into a false sense of security. Currently unprotected Eastern old-growth ecosystems should be identified, studied, and continuously monitored by an independent coalition of academic and environmental organizations. As a first step we need to strengthen our definitions.

With the spilling of my bad dreams at an end, I'm ready to acknowledge that developing scientifically sound definitions is not easy. Identification of old-growth characteristics associated with specific forest types, existence of indicator species and old-growth obligates, impact of fragmentation, edge effects, and invasion of non-native species are but a few topics we must address.

CAUSES OF CONFUSION ABOUT OLD-GROWTH

There is no single accepted scientific definition for old-growth, but a lot of researchers are contributing insights. Below I explain some misconceptions perpetuated in popular writings.

Economic definitions. A first source of confusion is that criteria for identifying old growth have come from two sources:

the forestry profession and the scientific community. Economics clearly drives definitions devised by the former; curiosity about the evolutionary and successional processes that shape forests, the latter. Terms and phrases like "diseased," "over-mature," and "decadent" reveal a fatal commercial bias in forestry spawned definitions. This is hardly news, but the effects of such commodity oriented approaches linger and will probably be worked into ecosystem management, albeit with fresher scientific dressings. As a first step to simplifying the definitions process, we must cull out and permanently bury criteria based on economic considerations.

Conflicting historic descriptions. A second source of confusion about old growth lies in conflicting descriptions of virgin forests presented by colonial observers. A common description applied by early puritanical Europeans to the virgin woods was "dark and impenetrable." To them, evil lurked in dense woodlands. More enlightened individuals described what they actually saw. Some, believing themselves to be traveling through virgin woodlands, encountered park-like conditions, particularly in the Mid-Atlantic states. Descriptions of the latter are pervasive. We now generally recognize them as applying to forests managed by Native Americans. Some forest communities are naturally relatively open, though not to the extent described by the early travelers. Stands of mature Eastern White Pine and Eastern Hemlock, with their heavy beds of slowly decaying needles, suppress undergrowth; and xeric communities are quite open. Interestingly, the deep woods description gets a boost from the exalted personage of Francis Parkman. A renowned historian, Parkman was also a biologist of accomplishment who imaginatively described disheveled virgin forests filled with twisted trunks and rotting timbers. Few open spaces were apparent.

Deep, dark, and impenetrable, or airy, open, and park-like. Which is right? These contrasting pictures preoccupy those of us compelled to understand natural forests. In reality, the truth embraces both descriptions and everything in between. Nature produces all the variations. I believe the historic descriptions that stress the cluttered nature of forest interiors described the wetter and weather-battered forests. Such places did seem impenetrable. I suspect the cluttered versus clean descriptions will continue to confuse people who want things tidied up in a black or white set of choices.

Descriptions of different ecosystems. A third source of confusion lies in conflicting descriptions from modern day researchers studying vastly different ecosystems; e.g., boreal versus mixed mesophytic forest types. The former, and other acidic conifer dominated ecosystems such as the hemlock-White Pine association, have been described as botanical deserts. The mixed mesophytic is incredibly rich and diverse, as made known by Lucy Braun's published work. The differences in the descriptions of these old-growth ecosystems from qualified researchers are easily attributable to the fundamental differences in the ecosystems being studied. Some of the statements made by researchers have been too assertive. The bo-

tanical desert description caught on for a period and was mistakenly applied by a host of authors to all Eastern old-growth forest types, to the probable delight of those in the timber industry. We can easily resolve the conflicting descriptions that apply to different ecosystems.

Big tree stories. A fourth source of confusion comes from the perception that old-growth forests must exhibit large trees. Adding further confusion are the tree equivalent of big fish stories. Robert Pike's colorful *Tall Trees, Tough Men*, an anecdotal and pictorial history of logging and log-driving in New England, describes colonial White Pines of legendary proportions. Pike talks of 260 foot tall trees ten feet in diameter reaching a thousand years in age. Pike's flair for the dramatic makes him an entertaining writer. We can forgive him for slight exaggerations, but such accounts stretch credulity to the limit. Or do they? Solid evidence exists for spectacular huge old-growth specimens growing individually and in groves. On a trip near Augusta, Georgia, William Bartram encountered a stand of giant Black Oaks: "many of the black oaks measured 8, 9, 10, and 11 feet in diameter 5 feet above the ground as we measured several that were above 30 feet (in) girth and from hence they ascend perfectly straight with a gradual taper, 40 or 50 feet to the limbs, but below 5 or 6 feet these trunks would measure a third more in circumference on account of the projecting jambs, or supports ..." There are other well documented accounts of huge trees in virgin forests of the East. The work of naturalist Robert Ridgeway in the 1870s is a case in point. I reported his measurements of Tuliptrees in my recent Tuliptree article. (See the winter edition of *Wild Earth*.)

In nature most species exhibit broad size ranges, but for trees, incessant human interference is whittling down those ranges from the high side. As a result, accounts of gargantuan trees of yesteryear stand in sharp contrast to the pencil sized trunks commonly seen today. It is tempting to romanticize about the pre-settlement forests, rejecting anything we see today that fails to measure up to descriptions of yesteryear's super trees. Unfortunately, that eliminates a lot of today's old-growth. Researchers such as David Stahle, director of the University of Arkansas Tree-ring Laboratory, understand the problem well. Stahle explores diminutive stands of oak and hickory that have gone unrecognized as old-growth all these years. Stahle has also studied massive Baldcypresses that have weathered 1600 years and more.

Given the heavy dominance of young trees we see in today's over-managed forests, big trees are limited to pockets of old-growth, people's yards, city parks, campuses, and occasionally along roadsides. The isolated giants of extraordinary dimensions, scattered across the landscape in pre-colonial times, today are truly rare. Whole generations of Americans have become accustomed to picked-over, miniaturized woodlands. It is little wonder that descriptions like those of Robert Pike are considered improbable.

Pre-settlement vs. current old-growth. The acid test used by some old-growth researchers is the extent to which a stand

has retained its pre-settlement composition. The operative requirement imposed by these researchers is freedom from disturbance by persons of European ancestry. This is tantamount to the idea of the virgin woodland, but Native Americans had more influence on forests than we originally thought. Researchers are caught in a dilemma. To my mind, imposition of the condition of no European interference is unduly restrictive. Everything we observe today is post-settlement and altered to some extent by human activity. We cannot turn the calendar back five hundred years to glory in the Eastern forests as they existed before European colonization and then make meticulous comparisons to their progeny. We have lost those early forest ecosystems. There are many clues to a pre-settlement landscape, but we can only go so far in reconstructing what has been obliterated by both humans and nature. The terms pre-settlement, primary, original, virgin, and old-growth confuse the issue. To my mind, there is less reason today to differentiate between old second growth and original growth for definitional purposes.

A STARTING POINT FOR DEFINITIONS

Science seeks to understand the multitudinous life and death processes and cycles going on in a forest. The more we study the complex web of life, the more we come to respect and value biological diversity. Within a forest, how are soils built; water and nutrients recycled; micro-climates created and sustained; symbiotic, competitive, and parasitic relationships formed; niches and habitats filled? Science seeks to understand how young forests differ from their senior counterparts and what significance can be attributed to the differences. Along the way definitions are needed to facilitate our understanding.

Scientifically based old-growth definitions tend to incorporate a mix of qualitative and quantitative criteria crafted within a conceptual framework that asserts or implies old-growth is the final stage of forest succession, and that old-growth forests exhibit a state of relative balance between the processes of growth and decay. Forests reach this state: (1) by escaping catastrophic natural disturbances, including disease, which would re-calibrate the clock of succession, and (2) by being left essentially undisturbed by humans for centuries. The structural characteristics developed under these conditions are significantly different from those exhibited by young forests, particularly those influenced or controlled by humans. Old-growth characteristics will vary with the forest type.

The literally thousands of physical associations, processes, and relationships that combine to produce old-growth characteristics are devilishly hard, if not impossible, to quantify. We might agree among ourselves on threshold averages for such things as volume of downed woody debris, basal area of trees, age of stems by diameter class, annual contributions of living and dying organic matter; but we should not forget the arbitrary nature of those averages.

I believe we should aim to adopt numerical ranges for each characteristic that we choose to quantify, calibrated to forest

type. This approach would reduce the problem of attempting to treat as discrete that which is continuous. Call it a calculus bias, if you will, but I have serious reservations with arbitrary cutoffs. They remind me of federal and state tax tables and the mentalities that produced them. I have played the numbers game for years and find myself with more exceptions than cases that fit numerically based rules for Eastern old growth. I don't deny that numbers must enter the picture, but I suggest a fairly broad range for each measurable characteristic as the only feasible approach. Even then all ranges would not be applied absolutely.

Flexibility in applying numerically based criteria would allow us to work within a broader range of successional forests. Older second growth stands would increasingly fall within qualifying ranges, thus adding to the bank of recognized mature forest ecosystems. This approach would not require that the original forest type and structure at a location be achieved, laying to rest the feeling that we need to resurrect pre-settlement conditions.

The above amounts to ineffectual babbling unless we can: (1) agree on the characteristics to be included in a definition, fine tuned to forest type; (2) select which characteristics will be subjected to measurement; (3) settle on the numeric ranges for the characteristics to be measured; (4) decide if all characteristics are inviolate or whether we should prioritize them; (5) win broad acceptance for the results; (6) develop a repository of data; and (7) create a methodology for updating definitions and inventories. We also need to develop a master plan for keeping our attention focused on Eastern old growth.

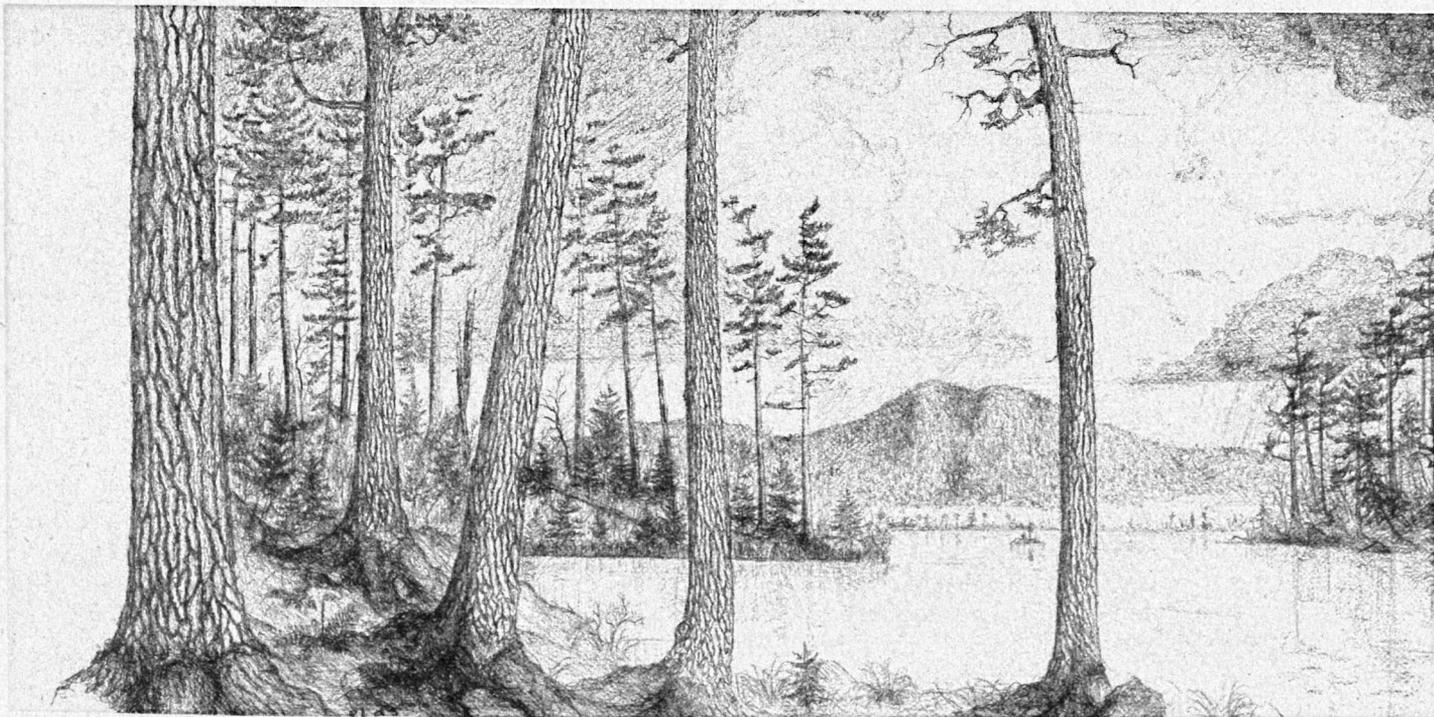
THE BEGINNINGS OF A MASTER PLAN

The job of protecting what remains of a precious natural heritage requires organization on a far larger scale than hitherto undertaken. The following steps represent the current state of our thinking.

I. Second Eastern Old-growth Conference

As with the first conference, key purposes of the second Eastern old-growth conference, to be held in the Northeast, will be to: (1) better understand old-growth ecosystems, (2) explore the values many attribute to those systems, and (3) seek ways to insure their survival. None of us have a blueprint for negotiating through the definitional quagmire, but the second conference will tackle that problem. The following topics are likely to be on the agenda.

1. Development of definitions by the scientific community for old-growth as applied to forest types represented in the Northeast; e.g., the northern hardwood-hemlock, spruce-fir, and oak-hickory associations. The general characteristics associated with these old-growth communities would be refined and quantified where possible with ranges established for the quantifiable criteria.
2. Identification of indicator plant and animal species that are (or suspected to be) either partially dependent on or reach maximum development in the old-growth ecosystems of the forest communities represented in the Northeast.
3. Analysis of the time required for old-growth characteristics to be reestablished for forest communities after human and natural disturbances of varying impacts. Discussion of patch dynamics.



... efforts to understand and identify old growth are essential to promoting preservation.

4. Strategies for including and preserving bonafide old-growth components within managed forests. Addressing how much acreage is needed to insure the survival of old-growth ecosystems, and methods for mimicking old-growth forest characteristics within managed forests.
5. Investigation of values that old-growth forests fulfill as seen from different perspectives.
6. Review of available literature describing the characteristics of the pre-settlement forests of the Northeast.
7. Identification of agencies and individuals involved in old-growth research.
8. Presentation of climatological reconstructions from data gathered through tree-ring analysis in the Northeast.
9. Discussion of current threats to the survival of old-growth ecosystems.
10. Investigation of how Mary Davis's *Old Growth in the East* could be kept current and used as a vehicle to disseminate information on Eastern old growth.

Our present plans call for a three day affair to be held October 28-30. Primary sponsors include the Massachusetts Audubon Society, Harvard Forest, the Department of Environmental Management (DEM) for the state of Massachusetts, Western North Carolina Alliance, and *Wild Earth*. Co-sponsors are sought.

The first day will be hosted by Harvard Forest at Petersham, Massachusetts and will be attended by researchers willing to tackle topics 1-4 above. The second day will be open to all; a high energy affair hosted by the Massachusetts Audubon Society. The third day is being reserved for field trips and will be hosted by DEM. *Wild Earth* will assist in promoting the event and WNCA will assist Harvard Forest and Massachusetts Audubon as the Southern organizational arm. Ideas, comments, and participation of *Wild Earth* readers are solicited.

II. Guide on Eastern Old-growth

As a second action to keep our attention focused, Mary Davis intends to publish a guide book on Eastern old-growth forests. As currently planned, the book will begin with an historical perspective on Eastern old growth and conclude with a summary of Mary's old-growth inventory. In between will be important papers from key researchers. Many of the distinguished scientists associated with old growth have already signed on to this project.

There will be sections on values, threats, preservation, and restoration strategies for old growth. The section on values will cover new ground, with inputs from diverse groups, including Native Americans.

III. Independent Field Inventories

The Western North Carolina Alliance and the National Audubon Society have initiated an inventory of the old-growth remnants of the Pisgah-Nantahala National Forests in western North Carolina. It is a job that must be done by an independent organization. The Forest Service's inventories are inaccurate and have often been misapplied. As but one example of many, the Alliance reports that "in certain sales, citizens have caught the Forest Service actually targeting old-growth for clearcutting while less exemplary, younger stands or steep, unproductive, biologically un-diverse stands are saved as old-growth."

Those of us living in other regions of the country who are members of the Alliance appeal to others outside of western North Carolina to aid this splendid organization. The Alliance is battling to preserve some of the most botanically rich forests in the continental United States. Much is at stake in the rainforest-like coves of the Southern highlands. We need to know how much old forest is left and where it is if we are to succeed in protecting it from the timber interests. The efforts of the Alliance will produce a blueprint for similar campaigns in other National Forests which almost certainly have pockets of old growth that have been targeted for logging. WNCA may host a third Eastern old-growth conference, again in Asheville, in 1995 or 96.

IV. Interface to The Wildlands Project

This visionary project is the hope of the future. While The Wildlands Project is not specifically about old growth, stranded pockets of ancient forest can serve a useful function as nodes, joining wildlife corridors for wilderness restoration.

SUMMARY

Our efforts to understand and identify old growth are essential to promoting preservation. Left to pursue their own agendas, resource managers will "administratively" define old growth to permit its gradual destruction. The performance of state and federal agencies to date substantiates this assertion. Through law and administrative regulation, resource managers can target old-growth stands for timber harvesting ... or remove them from timber management plans.

Bob Leverett remains the East's preeminent old-growth evangelist, though the countless converts he has won are themselves beginning to proselytize for primeval preservation.

Butchering The Big Wild

Tragedy in the Salmon-Selway

by *Howie Wolke*

The sun breaks through late afternoon stratocumuli, illuminating patches of conifers in shafts of intense yellow light, the kind of light that can only be seen in late afternoon, following rain, in wild country.

Mist rises from the primeval forest in a thousand wisps: swirling, rising, drifting, and evaporating mist; mist from water-drenched conifer needles, rising, drifting as vapor eastward across the heart of the Big Wild. Mist. Rain. Clouds. Fog, steam, vapor, water... we have many words for H₂O, including this: life.

Yet, somewhere just beyond the fuzzy border of this Salmon-Selway Ecosystem, evil lurks, casting a glum shadow upon the wild swirling mists. The evil has been manifest most recently in the Cove and Mallard timber sales.

Old-growth enclaves of spruce, fir, and Douglas-fir send conifer needles up to 200 feet above the acid soil that holds, harbors, *caresses* the water-soluble nutrients of life. Water again. Vast post-fire stands of Lodgepole Pine intermingle with the darker old growth in a complex mosaic that tells of past fire and wind, past outbreaks of bark beetle and budworm, droughts, storms, and snowpacks.

For deep within the largest tract of virgin (never been logged) forest in the U.S. outside Alaska, the forces of Nature still dominate. Out in the Big Wild, the idea that human manipulation of this landscape might mimic the swirling array of natural processes that shape these forested mountains seems terribly absurd—which, of course, it is. To pretend that humans know enough about ecosystems to mimic natural processes on a landscape scale, through clearcutting and related logging methods, as the Forest Service does with Cove-Mallard and other timber sales, is human chauvinistic arrogance.

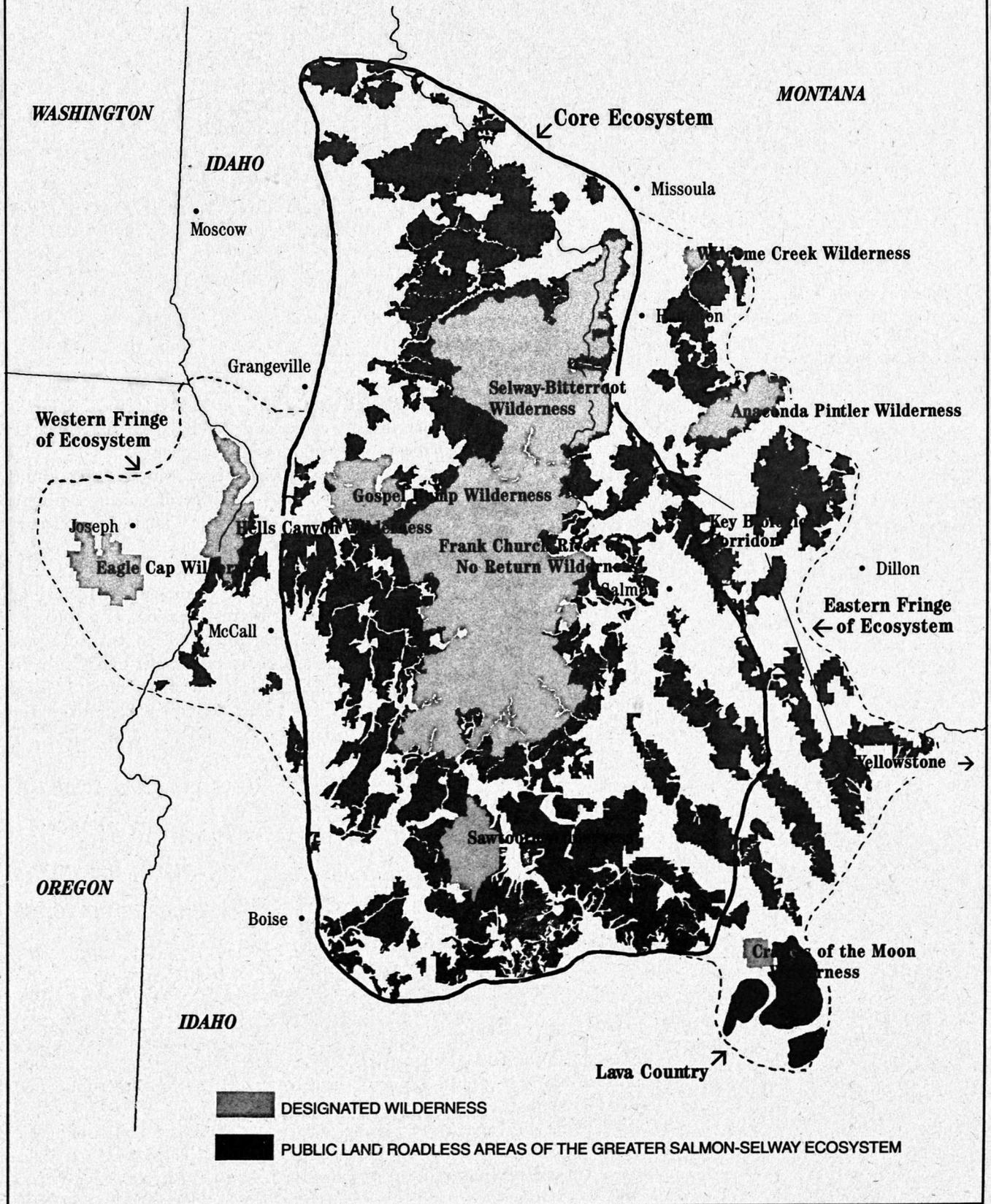
Way below the swirling mists and sinuous ridgetops, catching the lowest shafts of post-storm sunlight, the big old “yellowbellies,” or Ponderosa Pines, guard the canyons, sentinels over the tributaries of the main Salmon River. The lurking evil covets the old-growth Ponderosa.

The enemy's home is Grangeville, Idaho, in the supervisor's office of the Nez Perce National Forest. Its form is a government document entitled “Decision Notice, Cove and Mallard Timber Sales.” Begun in 1993, these two adjacent logging operations will, if completed, remove 80 million board feet of pine, spruce, fir, and Doug-

*Cove-Mallard
clearcuts will
shatter the largest
intact virgin forest
in temperate
North America.*



THE GREATER SALMON-SELWAY ECOSYSTEM



las-fir from the heart of the Greater Salmon-Selway Ecosystem (GSSE). Nearly 150 miles of new logging roads will scar the unstable slopes that lie in an enclave formerly known as "Jersey-Jack," abutting three designated Wildernesses: the Frank Church River of No Return (RNR, the largest designated Wilderness Area in the US south of Alaska), Selway-Bitterroot, and Gospel Hump. Cove-Mallard clearcuts will shatter the largest intact virgin forest in temperate North America.

Cove-Mallard is actually *in* the RNR. That is, the *real* wilderness, small 'w', including both protected and de-facto wildlands, consists of 3.2 million roadless acres. Only 2.3 million acres of the RNR are protected, while nearly a million acres of de-facto wilderness remain vulnerable to U.S. Forest Service chainsaw management. Cove-Mallard is within that vulnerable domain. Just to the north lies the 1.8 million acre Selway Bitterroot Wilderness and de-facto wildland, segregated from the RNR by one narrow dirt road. Together, these two wildlands constitute five million acres of forested mountains and river canyons in central Idaho and extreme western Montana, sometimes called "The Big Wild." The Big Wild is the heart of the 26 million acre (Ohio-sized) Greater Salmon-Selway Ecosystem, our largest temperate wildland complex. The GSSE extends from Idaho's wet northern panhandle south to the northern Great Basin Desert, and from Oregon's snowy Wallows and the searing depths of Hell's Canyon east to the high wilds of Montana's Big Hole.

Cove-Mallard logging is no less outrageous than clearcutting Yellowstone would be, or damming the Grand Canyon. Were the GSSE better known and appreciated, America wouldn't stand for this unfolding tragedy.

Most *Wild Earth* readers understand the ramifications of habitat fragmentation and artificial edge effects. Most are aware that dramatic losses in native biodiversity nearly always accompany the conversion of native forest to roaded tree farms (the Forest Service's usual goal) or to roaded and eroded wastelands (the Forest Service's usual shameful result).

The woods, meadows, and streams of Cove-Mallard support most of the species native to the Northern Rockies. Deer, Elk, Moose, Mountain Goat, Bighorn, Black Bear, Puma, Red-tailed Hawk, and Golden Eagle abound. These woods and waters also support many species rare or dwindling elsewhere: Gray Wolf, Marten, Fisher, Wolverine, Lynx, Boreal Owl, Northern Goshawk, Winter Wren, Varied Thrush and perhaps an occasional Grizzly Bear. These species depend upon interior forest, old growth, or wilderness-type habitats.

The Big Wild's waters are no less imperiled. They carry rainwater to the sea, sometimes as foaming rapids, other times as deep, clear, smooth water. They support a plethora of life: invertebrates such as caddisfly larvae that feed avian and other predators; vertebrates such as Cutthroat Trout and Bull Trout, Whitefish, Mink, River Otter, Osprey, Bald Eagle, and still a few salmon.

But dams on the Columbia have depleted the salmon runs. Outside of wilderness, Bull Trout are approaching extinction throughout the Northern Rockies, largely due to sedimentation from logging operations. These fish are basic to the food web, which unravels in the bulldozer's wake. Proposed clearcuts a scant mile from the Main Salmon River will foul our wildest river and its tributaries.

Big Wilderness is the key to restoring the fabric of life that once bound together the multitude of habitats called North America. Conservation biologists speak of the need to protect, restore, and connect a system of nature reserves dominated by wildlands tens of millions acres in size (Noss 1992), in order to maintain enough genetic diversity for populations of wide-ranging species to remain viable in the long term. They also point out the need to protect landscapes big enough to maintain within them the *processes* that drive evolution, that create a shifting mosaic of disturbance-driven habitats with plenty of space for late-successional communities to develop and evolve.

GREATER SALMON-SELWAY PROJECT (GSSP)

Due to the Greater Salmon-Selway Ecosystem's relative obscurity, Forest Service bureaucrats have successfully targeted its remote wildlands with more clearcutting, road-building, and other developments. The GSSP is a temporary project, not an organization, designed to raise awareness about the values of and threats to the Salmon-Selway. Through media work, articles, and publication of the Greater Salmon-Selway flier (with maps and photos; over 5000 have already been distributed*), the GSSE is finally nearing the level of recognition of such world-class wildland ecosystems as the Greater Yellowstone. This will aid efforts to protect and restore the GSSE's wildlands. Also, the project has made public presentations in Missoula, Salmon, Challis, Ketchum, Boise, Moscow, and other towns in the region. In conjunction with grassroots groups, particularly the Alliance for the Wild Rockies and Friends of the Bitterroot, the GSSP has made some important gains in developing grassroots activism for Northern Rockies wildlands.

During the next few months, the GSSP will complete its preliminary publicizing. Its important work must continue, either by merging the project with existing organizations or by continuing the project as a distinct entity. Either way, we'll keep *Wild Earth* readers posted.

—Howie Wolke

*If you or your organization would like to distribute fliers to folks who will actively work to protect the GSSE, please contact the Greater Salmon-Selway Project at: POB 318, Conner, MT 59827.

Yet today in the contiguous 48 states only five individual wildlands are larger than 2.5 million acres (Foreman & Wolke, 1992). At Cove-Mallard, the Forest Service assaults our biggest such wildland. Cove and Mallard are, arguably, the worst individual timber sales in the sordid history of the U.S. Forest Service. Logging and road-building began there in 1993; but thanks to fierce opposition from wilderness defenders, only a small amount of the intended damage has been completed.

These timber sales are something of an embarrassment to those Forest Service reformists and apologists who keep telling America that the professional descendants of Gifford Pinchot are changing, moving beyond the horrific clearcutting of the post World War II binge. And indeed they have moved: into an Orwellian nightmare of doublespeak and euphemisms, including the latest public relations buzzword: "Ecosystem Management."

Throughout the National Forest system, "ecosystem management" is being used as window dressing on the same old theme of building roads and converting complex forests into simplified plantations. Ecosystem *management*, as the name implies, means manipulation. It's an attempt to rationalize the continuation of the last half-century of blunders with impossible claims that agency managers can simulate the processes that have driven evolution for some four billion years. What ecosystems need is *protection and restoration*.

Fortunately, resistance to the monster grows. The Ancient Forest Bus Brigade and Wild Rockies Earth First! have led a campaign of civil disobedience resulting in arrests, jail terms (two months for Montana activist Eric Ryberg), and even violent assaults upon protesters. Equally important, the Idaho Sportsman's Coalition and the Alliance for the Wild Rockies have filed suit, hoping to neutralize the beast. On 18 February 1994, Federal District Court Judge Harold Ryan issued a preliminary injunction, halting further disturbance of the area. Plaintiffs' attorney Bernie Zaleha of Boise was to file all mo-

tions by April 15, after which Judge Ryan would either hold hearings or simply rule on the merits of the case. Endangered species habitat and water quality are key issues raised by Zaleha. As the winter snowpack dwindles, activists will return to the Big Wild for another season of protests and blockades. They will probably again face arrests and violence.

WHAT YOU CAN DO

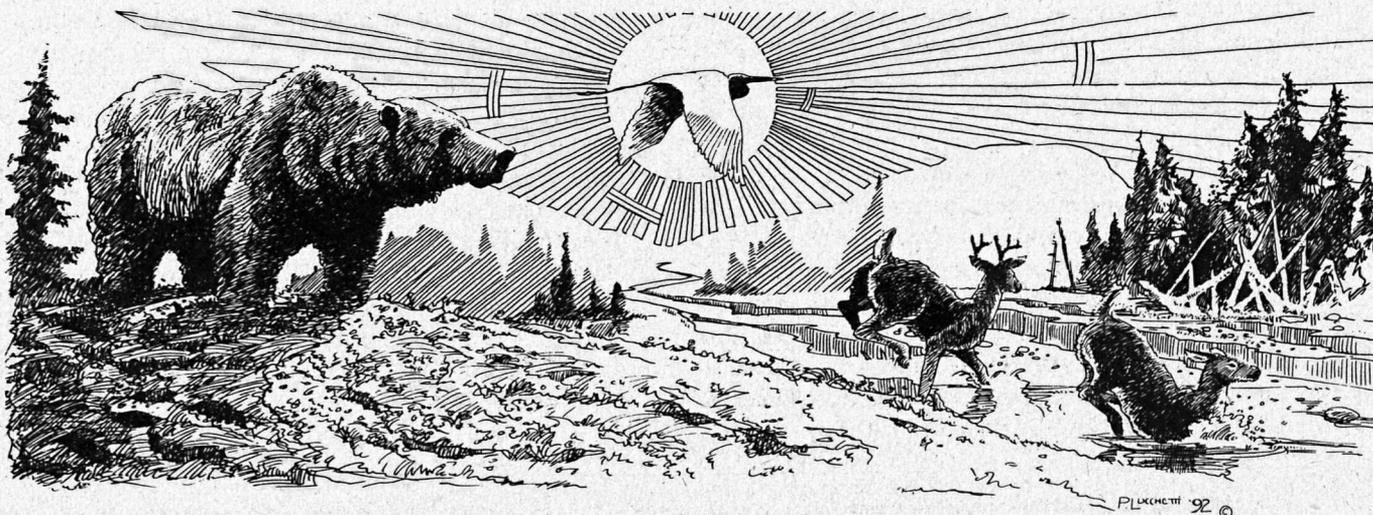
Plenty! Write letters to Congress, to Forest Service Chief Jack Ward Thomas, and to the editors of newspapers, particularly those that serve big metropolitan areas. Point out:

1. Forest Service Chief Thomas promised to obey the law. The illegality of Cove-Mallard is forcing citizens to, once again, expend their energy and money in holding the Forest Service accountable.
2. The Forest Service and Congress should protect all wildlands contiguous with the RNR, the biggest temperate forest wilderness in the U.S. They should also support the Northern Rockies Ecosystem Protection Act, which would protect the Cove-Mallard area as legal Wilderness.
3. Unroaded wildlands need ecosystem protection, not management. The Forest Service has been managing ecosystems since 1906, poorly, and has brought its domain to the brink of breakdown. **WERF**

Addresses:

US Forest Service, Jack Ward Thomas, Chief, Washington, DC 20250
 US House of Representatives, DC 20515
 US Senate, DC 20510
 Idaho Sportsman's Coalition, POB 4264, Boise, ID 83711
 Wild Rockies Earth First!, POB 9236, Missoula, MT 59806
 Alliance for the Wild Rockies, Box 8731, Missoula, MT 59807

Howie Wolke, author of Wilderness on the Rocks and co-author of The Big Outside, coordinates the GSSP and Wild Horizons Expeditions from his home in the Bitterroot Valley.



Is Logging Good for Songbirds?

by Thomas P. Rooney

INTRODUCTION

The regional decline of neotropical migratory birds has been attributed to the loss of wintering habitat throughout Central and South America and the decline in the quality of breeding habitat in North America (Askins et al. 1990). Many biodiversity activists in the eastern and midwestern United States have accused land management agencies of contributing to the decline of neotropical migrants by cutting publicly-owned forests. Yet these land management agencies maintain that cutting trees has a benign, if not beneficial, effect on these species. They point to numerous studies showing that many forms of logging, including clearcutting and individual tree selection, increase avian species diversity (Hagar 1960; Conner and Adkisson 1975; Adams and Barrett 1976; Webb et al. 1977; Titterington et al. 1979; Strelke and Dickson 1980; Yahner 1984; Derleth et al. 1989; Thompson et al. 1993; Welsh and Healy 1993). The mechanism seems to be the same no matter the location of the experiment: new early successional patches are created which facilitate an influx of early successional species. Some late successional species may remain unaffected while others decline in numbers, but seldom do these species disappear altogether. The end result is an avian community more saturated with species.

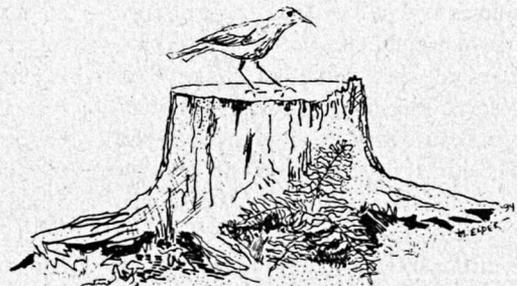
Judging by these studies, logging appears consistent with the protection and enhancement of biological diversity since both species diversity and evenness seem to increase in logged forests. However, such results are misleading, and logging may reduce regional diversity.

PROBLEMS WITH THE STUDIES

First, the studies do not include key-factor analyses to determine what factors limit forest birds. Mortality of adults by predation or other factors appears to be low during the breeding season (R. Roth, personal communication). Conversely, the mortality of juveniles is extremely high, through factors such as nest predation and fledgling failure. Any conservation strategy should address the key-factor responsible for species declines, such that declines might be reversed.

A second problem with these studies is that they do not measure reproductive effort of the birds. They only document the effects of logging on the presence or absence of birds. Yet it is this key-factor, the reproductive output of the birds, and not the presence of birds, that determines future population trends (van Horne 1983).

A third problem with these studies is that they fail to examine indirect and cascading effects of logging on fledgling success rates. For example, nest predation by birds and small mammals may increase along edges, thereby reducing the reproductive success of some individuals. This has been well documented in forest/agricultural edges. The same mechanism may be



operating along edges of clearcuts in forested landscapes, but few data exist to support or falsify this hypothesis.

Fourth, most birds prefer to nest near edges. However, in addition to suffering increased rates of predation and brood parasitism (Gates and Gysel 1978), these birds may produce fewer eggs per female than birds that nest in the forest interior. This is because the density of nesting birds is higher along edges, which suggests that intraspecific competition and intraguild competition may be higher. The result may be a lower reproductive effort per female, which may further reduce the production of offspring. This is pure conjecture, but should be considered nonetheless.

A fifth problem lies with the notion that increasing species diversity is always desirable. This notion assumes that all species are to be treated with equal weight. For example, if cowbirds colonize a site and the number of species originally present (n) remains constant, then the site now has $n+1$ species. However, for the purposes of avian conservation, a cowbird should not be considered an asset to the community (Brittingham and Temple 1983). The same may be said of Blue Jays, starlings, grackles, and crows, since all are predators of passerine songbird eggs. So while diversity may increase at a local level, these same species may reduce diversity at a regional level. The regional species pool is ultimately affected by processes at the local level, so parasitism, competition, and predation which reduce species abundance at the local level necessarily cause regional losses (Noss 1983).

A sixth problem with many of these studies is that they focus on the more common of the late successional species. Declining species like the Cerulean Warbler are often not included in such studies because they are too rare to sample. The effects of logging on rare late successional species may be different than the effects of logging on the more common late successional species. The more common late successional species may

be less "forest interior dependent" than the rare ones. There is no proof for this hypothesis, but it is plausible.

A seventh and final problem with these studies is one of experimental design. In every case, the logged areas (the treatment areas) are compared to second-growth forest (the control areas), which are still recovering from initial logging a century ago. Many of the control areas have not reached a steady-state condition, and thus may be inadequate control plots. In experiments comparing steady-state forest species diversity with managed forest diversity, neither forest has a greater species diversity. However, the steady-state forest has a greater presence and abundance of rare birds than does the managed forest (Virkkala 1991).

CONCLUSION

Because of these deficiencies, studies to date should not be interpreted as indicating that logging has a beneficial effect on forest bird communities. In some cases, logging may have a negative impact on rare and imperiled forest species (as in Virkkala 1991). In most cases, logging operations increase habitat for species common and over-represented in the landscape while potentially adversely affecting sensitive or under-represented species.

The evidence for declines in neotropical migratory birds since 1966 is convincing (Askins et al. 1990). However, it is unlikely that all species are responding to the same mechanism. Some species may be more sensitive to changes on wintering grounds, while others may be impacted by habitat modifications on the breeding grounds. Still other species may be declining as a result of adverse weather conditions during the migration season. Logging of the breeding grounds may have little impact on some species. However, other species may be severely impacted by logging. Since most studies to date fail to focus on the effects of logging on avian population dynamics, they cannot be used to justify current logging practices.

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Response to Rooney

by Rick Bonney

Tom Rooney has made an excellent start on dissecting an important and complicated subject. Much of what he says is well thought out. Unfortunately, in writing his title, Tom has set himself up for an impossible task—because the answer to the question whether logging is good for songbirds is “it depends.” It depends on which species you’re talking about, the kind of logging and the habitat to be logged, and the scale at which you ask the question. The effect of logging on songbirds is arguably different for each situation.

Many activists don’t want to hear that answer. “It depends” sounds like a waffle. “How can logging *possibly* be good for birds?” they might ask.

Well, each species has its own habitat requirements. Some birds, such as bobolinks and Henslow’s sparrows, nest in old fields. Others, like common yellowthroats and house wrens, nest in thickets and woodland edges. Some birds prefer orchards and parks—consider Eastern bluebirds and warbling vireos—and still others, like the ovenbird and wood thrush, nest deep in the forest.

So in any given area, the more diverse the habitat, the more different kinds of birds will live there. This means land management that increases habitat diversity also increases species richness—the number of species found in an area. The best way to increase the avian richness of a forest is therefore to leave part of it alone, to log parts of it—even clearcutting some areas to create openings—and to develop wetlands. For decades, habitat diversification has been the basic technique of wildlife management.

But there’s a problem with this concept: land managers should not want to increase the species richness of every individual area. Instead, we need to maximize the richness and diversity of every ecosystem.

Consider a large block of mature forest in the midst of an otherwise agricultural area. True, logging that forest would probably increase the bird species richness within by creating habitat for early successional species, but the logging could also cause a decline of forest-interior species such as scarlet tanagers. And the tanagers would have no other place to go, whereas the early successional species—for example, indigo buntings—might already be common in the area surrounding the forest.

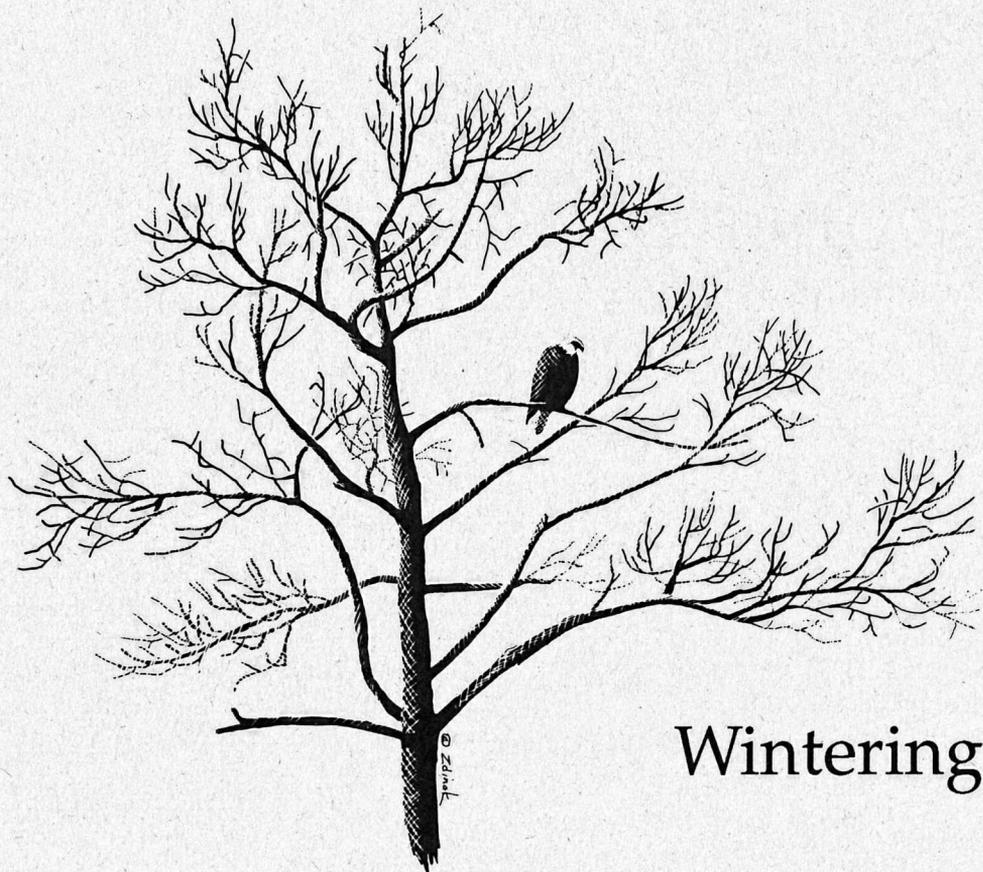
This is why successful management for birds, or for any group of species, must be done at the landscape level. To be truly functional, and to maintain maximum biodiversity, every ecosystem must be allowed to keep a healthy sampling of each of its habitat types.

Does this mean that reported declines of neotropical migratory birds cannot be used as ammunition for forest preservation?

No. Plenty of documentation exists to show that forest-interior birds are in trouble, and that to preserve their populations, we must preserve large tracts of wild land. Therefore, in my humble opinion, the best strategy for wild land proponents is to avoid unanswerable questions and to concentrate instead on the known benefits of wilderness. But remember: true wilderness is more than trees, even outside of the desert or prairie. It can also include openings created by fire, blowdowns, and other natural forces. And only if it does will it include a truly diverse wildlife population.



Rick Bonney is the Director of Education and Information Services at the Cornell Ornithology Lab (159 Sapsucker Woods Rd., Ithaca, NY 14850), and a Wild Earth editorial advisor.



Bald Eagles

Wintering in Arizona

by Sharon Masek

Silver light reflects off a million bent reeds. Marshall Lake is a watercolor in olive drab, gold and beige. Its slate gray surface is calm and the sound of beeping, “burbling” coots comes easily across. The late afternoon November sun hides behind streaks of hazy clouds in a pale blue sky. I gaze at the line where sky meets pine. Hearing clumsy fishermen clank wooden oars against an aluminum boat, I realize with regret that I will not see an eagle today.

So the next morning I get up at dawn, drive out to the lakes southeast of Flagstaff, and stop wherever there are waterfowl. On Lower Lake Mary I see a few Redheaded Ducks and hundreds of American Coots. Groups of 10-15 Canada Geese stand dolefully on the ice. I see, also, four hunters crouched along the shoreline with shotguns leveled. The geese spook and fly. A shot rings out and one goose drops away from the flock, flapping its wings erratically, wounded but not dead. Loud curses echo across the lake.

Upper Lake Mary is ice-free. Northern Shovelers paddle circles around each other as the morning sun rises higher, bringing warmth. At the southeast end of the lake in a Ponderosa Pine snag, I find one at last. An adult Bald Eagle sits in the very top of a 100-foot-high snag, preening itself and scanning the lake. Waterfowl are conspicuously absent from this section of lake just now.

Approximately 125-175 Bald Eagles winter in Arizona, according to estimates by eagle researcher Teryl Grubb, as compared to about 30 pair of resident Bald Eagles that breed in Arizona. The wintering population migrates from northern nesting areas to take advantage of a continuous winter food supply. Some come from Montana, Idaho and northern Canada, as indicated by satellite telemetry, but it is still unknown where the majority come from.

Eagles start arriving in November. Juveniles and subadults generally precede the adults. Their numbers peak in January and February. By early April most have left for the breeding grounds to the north.

A research wildlife biologist with the U.S. Forest Service, Teryl Grubb has studied the wintering population for over ten years. Using radio telemetry, he has tracked eagles to learn of their habitat needs and their social behavior. He has found that while wintering Bald Eagles are occasionally seen through-

out Arizona, they tend to concentrate on northern or higher elevation National Forests where water is abundant and prey species congregate. Most of the eagles frequent small lakes southeast of Flagstaff in the Coconino National Forest.

Coconino National Forest is on the Mogollon Rim, a geologic uplift that runs from the volcanic San Francisco Peaks near Flagstaff southeast to the White Mountains on the New Mexico border. Due to the higher elevation, the Ponderosa Pine forests of the Northland—as the region is called by the locals—experience cold, snowy winters, unlike the deserts to the south which most people picture when thinking of Arizona.

Eagles prefer the colder landscapes because of the availability of a continuous food supply. As long as lakes do not completely ice over, waterfowl can be snatched from where they congregate in open water. In severe winters when lakes do ice over, eagles scavenge on the numerous winter-killed or road-killed deer and Elk. Analysis of regurgitated pellets shows that they prey on rabbits and jackrabbits. Unlike their counterparts wintering farther north, Arizona eagles feed less on fish. American Coots comprise the biggest part of the diet with Elk carcasses as the second most important food source.

A day in the life of a wintering Bald Eagle goes something like this: Before dawn it leaves the roost site and flies to perching and foraging areas. At sunrise the eagle can be seen loafing on perches around foraging areas. Perches are usually in the tops of standing dead trees with full exposure to the morning sun which revives the bird after a long, cold night. From early to mid-morning the eagle forages actively. Mid-morning to mid-afternoon is siesta time; sunning, preening, or soaring is about as lively as it gets. In late afternoon the eagle forages again. When sunset comes, the eagle begins moving back toward the roosting area. Twilight to darkness usually finds it back on the roost for the night.

Roost sites are the most critical element of winter eagle habitat. Temperatures dip below zero Fahrenheit at times and if birds do not avoid the chilling wind, they can die of hypothermia. Most wintering Bald Eagle roosts are situated in protected landscapes such as draws or small drainages, oriented north or east away from the prevailing southwest winds. They are usually located in live trees surrounded by relatively dense stands. Often roosts are several miles from daytime loafing and foraging sites.

Forest Service wildlife biologist Cecelia Dargan identified 11 roost sites on the Coconino National Forest in 1989. These were mostly communal roost sites. Although eagles disperse during the day, they usually roost together at night. It is believed that roosting communally allows eagles to communicate about available food, hence increasing the chances for survival. Because juveniles and subadults are less experienced in finding prey, communal roosting is particularly beneficial to them.

The wintering eagle population in Arizona is small, but slowly growing. Population growth may be attributed to the increase in the region's Elk herds. More Elk mean more car-

casses on which to feed. Elk poachers often take only the head, rack, and select cuts of meat, leaving the remainder of the body to rot in the woods.

As many as five Bald Eagles have been observed feeding on one Elk carcass. Often there are others perched in surrounding trees; nine eagles have been seen gathered around one dead Elk. Observations such as this lend credibility to the theory that eagles cooperate in finding food. However, they are definitely competitive once they find food, often chasing each other off a choice morsel.

Another indication of cooperative food finding is the broad fluctuation in wintering eagle populations at Nankoweap Creek in the Grand Canyon. Rainbow Trout spawning is driven by the water level and temperature of the Colorado River as determined nowadays by Glen Canyon Dam. In years when few fish spawn, only one or two eagles appear. In large spawning years, up to 26 eagles have been seen at one time. This behavior is typical of eagles wintering in more northern latitudes, but it is highly unusual to see such a concentration of eagles in Arizona.

THREATS TO EAGLES

Winter recreational activities can disturb an eagle, causing it to leave a foraging area. If this occurs often enough, it could stress the bird to the point of threatening its survival. While snowmobiling is obviously loud and disruptive, even hunting and fishing can greatly disturb eagles if respectful distance is not maintained.

Severe weather poses the greatest natural threat to wintering eagles. That is why adequate roost sites are so important. Only a few roosts in the region have been identified to date. Because eagles come and go from roosts in near darkness, it is extremely difficult to track them. Snowy, rough terrain compounds that difficulty. It is unknown how many other roosts exist which are not protected by forest management plans.

WHAT YOU CAN DO

To help protect wintering Bald Eagles, be a conscientious birder. Avoid disturbing eagles by staying in your car while viewing them. If you see other people disturbing eagles, kindly make them aware of what they are doing and ask them to stop.

Protecting and restoring habitat is another way to promote the expansion of wintering Bald Eagle populations. More information is needed on the location of night roosts in order to protect them. If you are observing eagles in a National Forest and see a number of them fly in the same general direction at dusk, make a note of it. They are most likely heading toward a communal roost. Use land marks or a compass bearing to describe their direction of flight and then pass that information on to the district biologist.

Express your concern for eagles to the Forest Service and ask that funds be dedicated to further eagle research. Address your comments to:

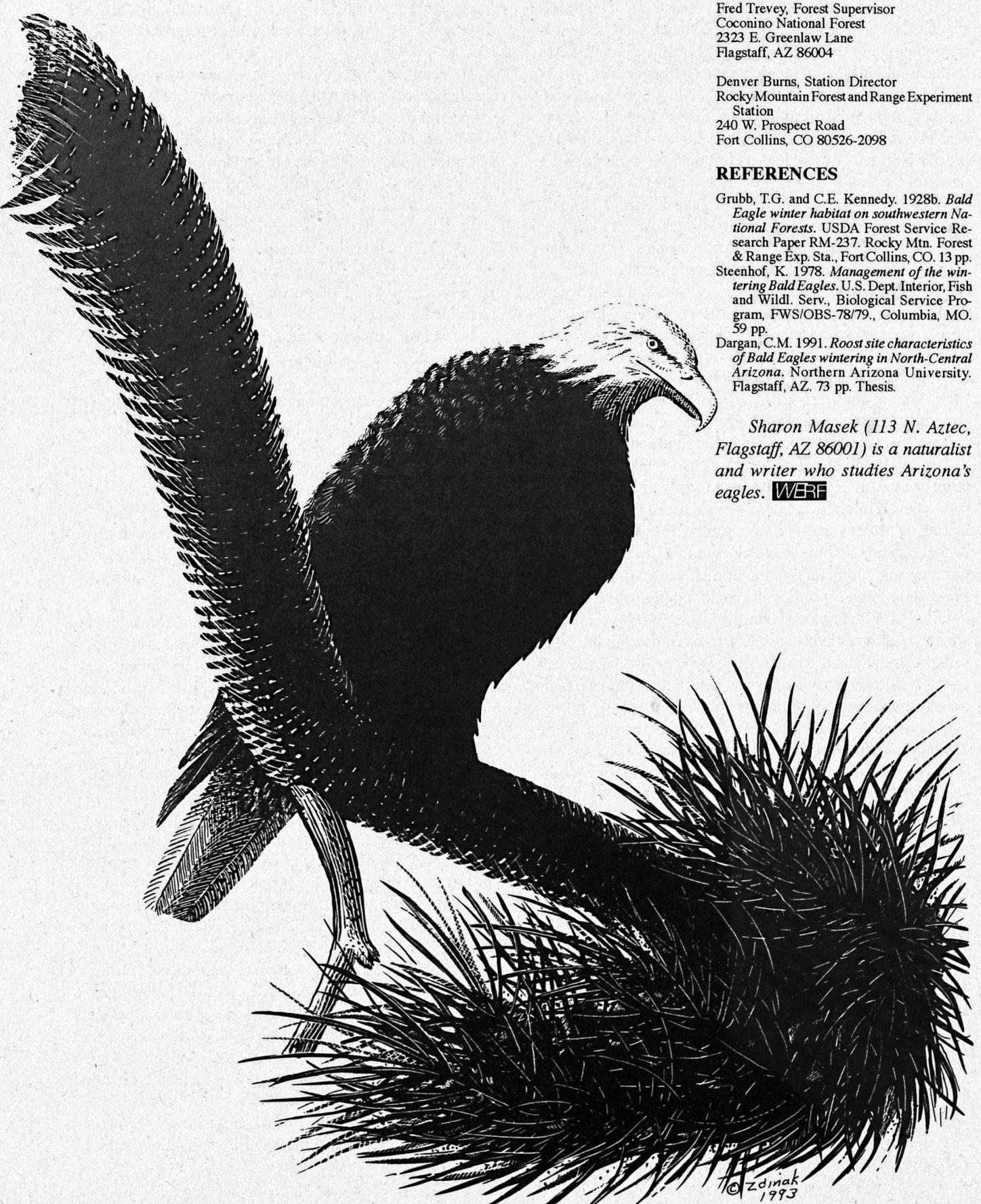
Fred Trevey, Forest Supervisor
Coconino National Forest
2323 E. Greenlaw Lane
Flagstaff, AZ 86004

Denver Burns, Station Director
Rocky Mountain Forest and Range Experiment
Station
240 W. Prospect Road
Fort Collins, CO 80526-2098

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Fish and Wildlife Service Experiments with Endangered Animals

by Tom Skeele

Few aspects of federal environmental policy have gone so under-reported as the government's efforts to designate some reintroduced populations of Threatened and Endangered species as "experimental, non-essential." This designation is allowed under "section 10 j" of the Endangered Species Act (ESA), enacted during the 1982 reauthorization of the ESA. Section 10 j allows the US Fish and Wildlife Service (FWS) to designate reintroduced populations of Endangered and Threatened species as "experimental," further labeling these populations as either "essential" or "non-essential." The section's purpose is to provide land and wildlife agencies with "greater management flexibility" in addressing potential conflicts between human enterprise and the recovery of imperiled species. Unfortunately, this allowance means the profits of industries that have pushed many species toward extinction may have gained equal or greater importance under federal law than the long-term survival of this continent's native flora and fauna.

The experimental, nonessential designation seems increasingly to be the US Fish and Wildlife Service's preferred strategy for reintroducing imperiled carnivores. The FWS is moving forward with plans to designate one or more populations of the Northern Rocky Mountain Gray Wolf, the Mexican Wolf, the Black-footed Ferret, and most recently the Grizzly Bear as experimental, non-essential (ENE).

...the profits of industries that have pushed many species toward extinction may have gained equal or greater importance under federal law than the long-term survival of this continent's native flora and fauna.

GRAY WOLF

The potential reintroduction of Gray Wolves into Yellowstone National Park and central Idaho has received more public attention than almost any other wildlife management issue in the history of this country. Probably the most controversial aspect of this issue is the impact wolves might have on live-stock ranchers, and to a lesser degree on logging, mining and other human activities infringing on the canine's native habitat. Because of this possible impact, the FWS has used section 10 j in its proposed plans.

To assess this situation, let's consider the prerequisites for using the ENE designation. First, the area for reintroduction must be "outside of the current range" of the species. Second, the newly introduced population must be "wholly separate geographically from the non-experimental populations of the same species." Even apart from ecological and ethical considerations—which weigh heavily against ENE designation in almost every case so far—the FWS may be abusing the ESA in its proposal to designate a reintroduced population of wolves in the Northern Rockies as experimental and non-essential.

Recent sightings of wolves in the Greater Yellowstone Ecosystem make it difficult to argue that the area is wholly geographically isolated from other Gray Wolf populations. The FWS falls even shorter of fulfilling this

prerequisite for central Idaho. Evidence is strong that wolves are already in the Greater Salmon-Selway Ecosystem, and that this region is ecologically connected to the area in north-west Montana known to be occupied by wolves.

In the past year, most of the larger conservation groups which historically supported the ENE designation (in hopes of improving public and political support for reintroduction) have reversed their stance on this issue. Predator Project applauds this shift, as we have always promoted full protection for all listed wolf species and subspecies. Though this change in the political weather doesn't insure that the FWS will change its present proposed designation, it is the best chance the less-compromising wolf advocates like Predator Project have had in a long time of securing full protection for wolves in the Greater Yellowstone and Greater Salmon-Selway ecosystems.

GRIZZLY BEAR

In the Spring 1994 issue of *Wild Earth*, the Biodiversity Legal Foundation (BLF) summarized the failings of the final draft of the Grizzly Bear "Recovery" Plan. One chapter of the misnamed plan deals with expanding the bear's recovery zone to include central Idaho, the Bitterroot or Greater Salmon-Selway Ecosystem. The summary of the Bitterroot Ecosystem Grizzly Bear Recovery Chapter states, "Options for classifying the relocated population would be examined through the development of an EIS, which would include an alternative to designate the population as 'non-essential experimental.'" As with every other ENE designation for an imperiled carnivore, this provides the US Forest Service, Bureau of Land Management and other agencies with the most liberal allowances for predator control and the least limiting restrictions on detrimental human activities.

This situation is even more inappropriate than the plans for designating wolves being reintroduced into the Greater Salmon-Selway Ecosystem as ENE. The final Grizzly Bear Recovery Plan acknowledges the importance of the Greater Salmon-Selway Ecosystem as an ecological connection between areas to the north that still have Grizzlies and the Greater Yellowstone Ecosystem to the southeast. Moreover, the GSSE is neither outside of the current range of the Grizzly Bear, nor wholly geographically separate from other existing populations of *Ursus arctos horribilis*.

BLACK-FOOTED FERRET

Predator Project, the Biodiversity Legal Foundation and others have tried to convince the Fish and Wildlife Service (FWS) of the biological and legal inappropriateness of its plans to reintroduce Black-footed Ferrets in Montana and South Dakota as experimental, non-essential populations. Nevertheless, the FWS's final rule on these designations is expected any day now, and word has it the agency will designate both reintroduced populations as ENE.

All along, we have argued that the loss of these popula-

tions "would be likely to appreciably reduce the likelihood of the survival of the species in the wild" (wording from the Endangered Species Act Amendments of 1982). FWS sees it differently, and feels that the captive breeding population, or "donor" population, is the "essential" population, and that all others are non-essential to the ferret's existence. Ferrets already reintroduced into Wyoming's Shirley Basin are designated experimental, non-essential; proposals to reintroduce ferrets into Arizona, Utah and Colorado include the same provision.

Section 10 j of the ESA, established to consider social jeopardy over biological imperative, seems to have served its purpose regarding the ever-threatening ferret. At this time it appears as if the best we can do is closely scrutinize the reintroduction efforts in Wyoming, Montana and South Dakota, while reminding the FWS that sooner or later the captive population will outlive its purpose and that at least one of the wild populations of ferrets should then be given the full protection it deserves. Predator Project and the Biodiversity Legal Foundation intend to closely monitor these reintroduction efforts. If we find any indication of inappropriate or excessive human-caused ferret mortality, direct or indirect, as a result of the reintroduction program, we will take every step available to challenge that program.

MEXICAN WOLF

Moving south, we find that the FWS has proposed reintroducing Mexican Wolves into the wilds of the Southwest as an ENE population. At present, there is almost no public discussion, outside of our own efforts to educate the public, in opposition to designating reintroduced Mexican Wolf populations as ENE. This silence needs to be broken. We are asking wolf advocates to help promote the idea that the Mexican Wolf deserves full protection for the same legal reasons — again, in addition to ecological and ethical reasons — that the Gray Wolf, Grizzly Bear and Black-footed Ferret deserve full protection.

The number of reported wolf sightings in Arizona, New Mexico and Texas raises questions of whether reintroduction of wolves in such proposed locations as the Greater Gila-Blue Ecosystem in Arizona and New Mexico or the White Sands Missile Range in south-central New Mexico would be done "outside of the current range" of the species, and whether these locations are actually "wholly separate geographically from the non-experimental populations of the same species." Biologists suspect as many as 50 wolves survive south of the international border, leaving open the possibility that wolves could disperse or migrate between there and the Gila-Blue or White Sands proposed recovery areas.

If it can be shown that the Gila-Blue and White Sands areas are both outside the wolf's current range and geographically isolated from existing populations of Mexican Wolves, then the issues we've raised with the Black-footed Ferrets would pertain. As with the ferret, the loss of these Mexican Wolf populations "would be likely to appreciably reduce the likelihood of the survival of the species in the wild."

CONCLUSION

This review of experimental, non-essential designation is timely for two reasons. First, the Fish and Wildlife Service seems to have latched onto it as a means of obeying the ESA without upsetting the industries that caused listed species' demise. Second, the ESA is up for reauthorization, and those who want to maintain human domination over the natural world aim to weaken the Act. Predator Project sees the 1982 amendment which allows for an ENE designation as more than enough weakening of the Act. Under an ENE designation, a population is treated the same as a "sensitive," or imperiled but unlisted, species — thus no Critical Habitat can be designated, and land and wildlife agencies do not have to formally consult with the FWS on any of their planned activities that may affect the species or its habitat.

The status of Grizzly Bears, Gray Wolves and Black-footed Ferrets is an indication that the ESA may already be too weakened and politicized to be able to secure the long-term survival of imperiled species. And we must always remember that the habitats and whole ecosystems that are home to these imperiled species are themselves threatened, even though the opening sections of the ESA state, "[T]he purposes of this Act are to provide a means whereby ecosystems upon which endangered species and threatened species depend may be conserved [and] to provide a program for the conservation of such endangered species and threatened species. . ."

WHAT YOU CAN DO

Tell Secretary of the Interior Babbitt and FWS Director Mollie Beattie that the ENE designation is being inappropriately used. Two approaches may be needed to convince the government of the inappropriateness of FWS's ENE designations: a groundswell of public opposition, and/or legal action. Your letters are badly needed to further the former in hopes of avoiding the latter. Write Interior Secretary Babbitt and FWS Director Beattie at: Department of the Interior or US Fish and Wildlife Service, 1849 C Street, NW, Washington, DC 20240.

Tom Skeele is Director of Predator Project, a grassroots group dedicated to protecting predatory species as ecological rallying points for ecosystem protection (POB 6733, Bozeman, MT 59771; 406-587-3389).

illustration by Rosemary Roach

what I know

write about what
you know
he said

and what I
know is that
three mule deer
can
in the
almost stillness
of
central wyoming
4,800 feet
above sea level

sometimes
stand
against the already
dimming eastern
horizon

while a
rainbow's rooted
crescent
frames
them
opposite the dying
sun

lighting the snow
edged absorokas
with august's
60 mile
distant
fire

—Al Ciccarone



Serpentine Biodiversity

by John Roth

The bioregion of northwestern California and southwestern Oregon, sometimes called the Klamath Mountains Province, has several hundred endemic species and subspecies of plants, one of the highest rates of endemism in North America. Many of the endemics are confined to soils on serpentine rock.

Serpentine is a brown, black, green, or blue rock that often looks greasy or shiny. The rock is made of heavy minerals and unusual metals such as chromium and arsenic. When serpentine rocks break down and become part of the soil, their ions may poison plants by substituting for similar ions in enzyme molecules, thus rendering the enzymes useless and disrupting plant metabolism. These poisons and the dry conditions found on serpentine soils prevent most species from growing there.

The perennial drought conditions allow a few plants to develop adaptations for living on serpentine soils and reduce competition with other plants. Adaptations to dry conditions include early flowering, small plant size, hairy and waxy leaves, large underground roots, and photosynthetic pathways that conserve water, such as CAM metabolism. This metabolic process takes in carbon dioxide overnight so that tiny pores in the leaves don't have to open up during hot days and lose water. Leaves in serpentine areas often are small to take advantage of air cooling rather than evaporative cooling, which entails losing water. Over many generations of new plants, the number and extent of these adaptations may become so great that a new species develops.

The unusual chemistry and areal extent of serpentine have sustained dry, nutrient-poor habitat for millions of years. Similar habitats in other areas are created by disturbances (slides, floods, fires, etc.) that destroy part of the original plant cover. These disturbances normally are not large enough in surface area and do not last long enough to evolve endemics. In contrast, over millions of years, erosion uncovered buried bodies of serpentine rock. Plants from wetter areas surrounding the serpentine gradually colonized the relatively empty serpentine lands, adapting to the unusual conditions and evolving into a new species.

However, no habitat lasts forever. Over geologic time, new masses of serpentine are uncovered and old ones are eroded away before any type of biodiversity equilibrium can take place. Serpentine areas are "new" and harsh enough that not all available niches have been filled, thus they may have relatively few plants. Like islands surrounded by water, these serpentine "islands" are still in a state of flux. Their incomplete ecological webs make it easier for outside species to invade these areas than larger land masses.

The large number of endemic species in the Klamath Mountains Province is not due solely to serpentine. Some of the diversity comes from great age. Moreover, diversity

begets diversity. Much older than the Cascades, the Siskiyou Mountains have allowed many plants to evolve and separate into different species. Plant communities from the boreal North, California, and the Southwest meet just south of an Ice Age purge. Over 150 species reach their northern or southern limit in the Siskiyou Mountains. The wide range of microclimates in the Siskiyou Mountains has supported paleoendemics which have died elsewhere when climates changed.

Other factors promoting high biodiversity are numerous moderate (intermediate) disturbances and differences in elevation and slope orientation. Late snowpacks, flood scour, and fires allow pioneer meadows to exist amidst virgin forest. Low elevations and south-facing slopes support fire- and drought-resistant oaks while firs reign at high elevations.

Plants and animals do best if they are pre-adapted for occupying a new habitat, such as drought resistant plants moving onto dry serpentine soils. However, complete adaptation is rare. Each species has an evolutionary history that shapes its future. The Port Orford Cedar, which was common and widespread in the western United States 30 million years ago, is now confined mostly to serpentine soils of southwest Oregon that are wet most of the year. The trees usually grow only near streams or bogs where the roots can reach water. Because of the increasingly dry climate, these trees now are poorly adapted to most serpentine areas. This mix of adaptive and maladaptive traits is evidence that plant species have a long history, some plants being able to change form and others being unable in a given time period. This mix is much better evidence for evolutionary change than is "perfect" adaptation.

The uncertainty and unevenness of adaptation and evolution promote biodiversity on serpentine and elsewhere in the world. For if evolution was more directed and even, species and communities would arise that would be so perfectly adapted that no new species could fill a vacant niche. Super competitors would out-compete all other species, expanding in form and behavior to fill all habitats. Freedom and diversity occur only under a multiplicity of conflicting and controlling forces.

John Roth is a Resource Management Specialist at Oregon Caves National Monument (19000 Caves Highway, Cave Junction OR 97523).

illustration by Andrew Paschetto

Night Visitor

Once in Alaska
I slept in a forest on a mountain top.
During the night a bear came down
and sniffed my face.

Part of me thought 'this is a dream'
and 'isn't this grand to be finally wholly
animal?' Part of me froze in terror
holding my breath in as if my breath
were the only
pulse a black bear would recognize
in the deep of the forest on a night
without moon.

Inside my sleeping bag
I pulled my breasts in close to my spine.
My baby still suckled them and I wondered
if the bear would rip me apart
for the sweet taste of my milk.

When this fat wall of night
leaned over my face
I knew suddenly
how the grass feels
when the rain starts to pound down:
raw, unprotected, vulnerable,
yet seeking this wet brush of life.

—Doris Lynch



Industrial Culture vs. Trout

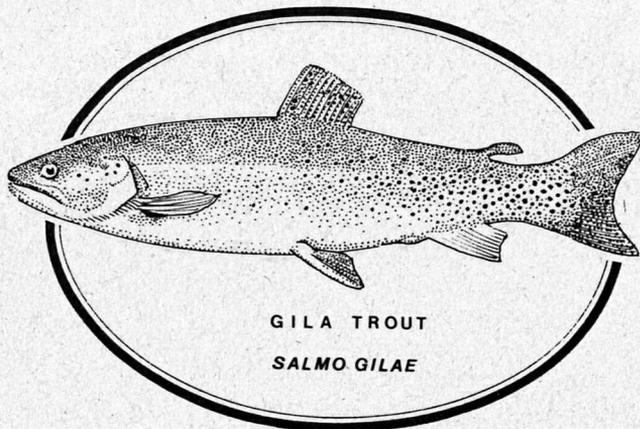
Strangling a Southwestern Salmonid

by David Hogan

The Gila Trout is one of the most studied fish subspecies in the Southwest. No less than thirty papers and theses have been written about the Gila Trout since its original description as a species in 1950. Despite this attention, it remains poorly protected. The rallying cry of "let's bring it back so we can fish it" tends to drown out those who speak of saving some of its clear, cold water habitat simply for the continued existence and evolution of the subspecies. Bringing the two parties, fisher folk and wildlife advocates, together is difficult if not impossible due to radically different world-views and interfering government agencies. Meanwhile, those who would see the subspecies extinct continue business as usual. The Greater Gila Biodiversity Project seeks the recovery of the Gila Trout, and has petitioned for designation of Critical Habitat over nearly 1.5 million acres of its former range in Arizona and New Mexico.

CLASSIFICATION

Currently considered a subspecies of a genus native to many headwaters of the Gila River drainage, the Gila Trout was described as *Salmo gilae* by ichthyologist Robert Miller in 1950. Current theories indicate that the Gila Trout, along with the Apache Trout of Arizona and the Golden Trout of Mexico, evolved from a common ocean-going ancestor in what is today the lower Colorado River basin. In 1989, the generic name of Pacific trouts was changed from *Salmo* to *Oncorhynchus* to reflect common evolutionary lineage of Pacific salmon and trouts as distinct from the Atlantic Salmon and Atlantic trouts, and *Oncorhynchus gilae* was born. And in 1992, Robert Behnke, a revered western North America trout expert, described both the Apache Trout and the Gila Trout as subspecies of *O. gilae*, thus the Gila Trout became *Oncorhynchus gilae gilae*. Many names, same endangered fish.



DISTRIBUTION

The Gila Trout was once relatively abundant above elevations of 4500 feet or so in the Verde River drainage of Arizona, portions of the San Francisco River drainage of Arizona and New Mexico, and the Gila River of New Mexico. When Miller first described the subspecies, it was already nearly extinct. To get a feel for the historic, pre-European settlement distribution of Gila Trout, he conducted interviews with several "old-timers" in the Gila bioregion of New Mexico. His findings revealed much about the fish:

In 1896 Salmo gilae ranged as far down the Gila River as the mouth of the box canyon, which is about 7 miles north-east of Cliff (New Mexico).... "speckled trout" were once so abundant in Gillita and Willow Creeks (tributaries to the Middle Fork of the Gila River) that it was possible to catch them at the rate of about one a minute. The usual weight of these fish varied from one-half to 1 pound and they averaged about 12 inches in length.... Native trout fishing was good on South Diamond Creek and Black Canyon.... but on certain parts of Mogollon Creek ...there was an over population of native trout and these fish were dwarfed. The largest fish caught by one "old timer" in the early days weighed 2 pounds and was taken at the junction of the Middle and West Forks of the Gila, just west of the Gila Cliff Dwellings National Monument. In 1898, the Gila trout was found in all of the Gila headwaters and was generally referred to as "mountain trout." ...In 1915, trout were caught as far down the Gila as Sapillo Creek.... At the present time the water is generally too warm in that section of the Gila River for any subspecies of trout. (Miller 1950)

Early on, questions arose about the indigenous presence of Gila Trout in the San Francisco River drainage. Some of the old-timers interviewed indicated that the San Francisco River drainage was barren of trout until "natives" (Gila Trout) from just over the Mogollon Mountains were introduced in the early 1900s by miners. Current information, however, seems to indicate that Gila Trout were in several tributaries to the San Francisco River. Hybrid Rainbow Trout x Gila Trout have been collected in Eagle Creek, an eastern Arizona tributary to the San Francisco River. Also, a population of Gila Trout was still present in Spruce Creek, another tributary to the San Francisco River near Glenwood, New Mexico, when Miller did his research. Slight differences in physical characteristics between the fish in Spruce Creek and those remaining in other Gila River tributaries caused several experts to conclude that the Spruce Creek population had been there much longer than fifty years, thus supporting the indigenous presence of Gila Trout in the San Francisco River drainage.

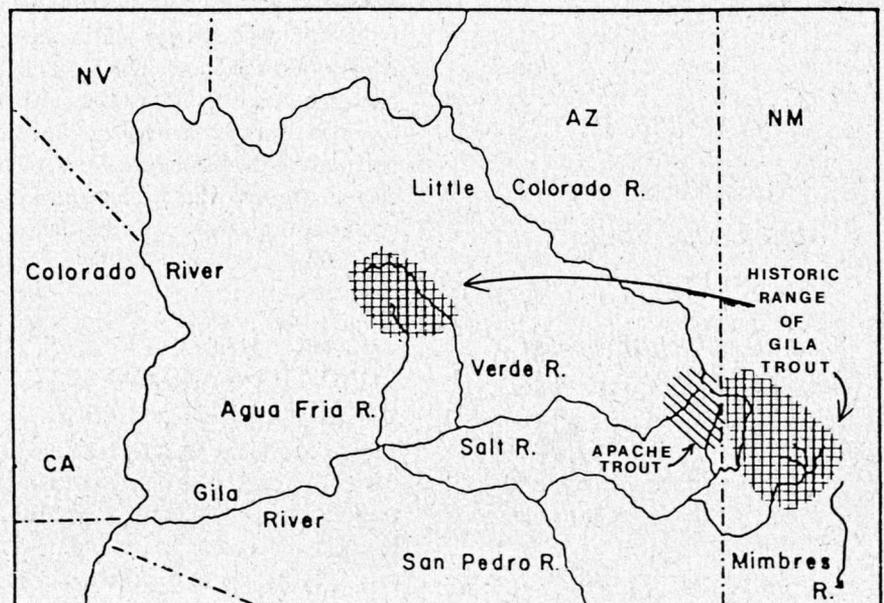
Proof of the native presence of Gila Trout in the Verde River drainage of central Arizona seems solid. Trout specimens collected from Oak Creek near today's Sedona in 1888 were identified by Miller in 1972 as Gila Trout. Specimens collected downstream within the Verde drainage in West Clear Creek about the same time were identified as Gila Trout, but these were lost in the early 1900s.

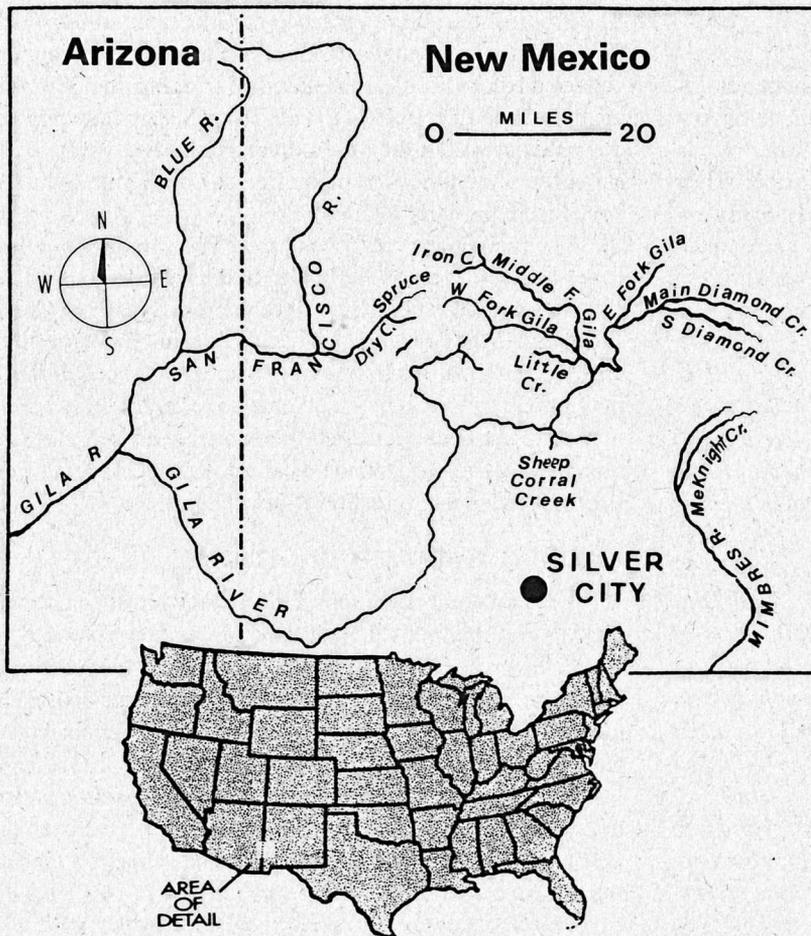
The indigenous presence of Gila Trout in the Agua Fria River drainage west of the Verde River is also fairly well accepted. Rainbow x Gila Trout hybrids from Sycamore Creek, a tributary to the Agua Fria, were collected in 1974. Questions arose recently when a trout expert pointed out that Gila Trout may have been stocked in the Verde River in the early seventies. Arizona Game and Fish personnel searched stocking records, however, and found no indication that Gila Trout were ever stocked in the Agua Fria River drainage.

NATURAL HABITAT CONDITIONS

Under natural conditions, Gila Trout were not extremely picky about the foods they ate, the places they spawned, or where they rested. In fact, they were almost "weedy" in pre-European settlement times, occupying whatever ecological niche was available within a fairly wide range of aquatic habitat conditions. Note the past-tense wording. Although Gila Trout historically tolerated a wider range of habitat conditions than many other native fish of the Southwest, they have been unable to tolerate the drastic changes in aquatic habitats that humans have caused over the last hundred years.

Gila Trout evolved to prefer cool, clear water, with relatively stable temperatures year round. They like to lurk in the shade of undercut stream banks, sometimes darting quickly out to snatch a hapless insect that has fallen into the water from dense, overhanging riparian vegetation. Ponds are their favored aquatic habitat, and are frequently found along the tributaries





...more than ninety percent of the indigenous range of the Gila Trout has been rendered unfit for the subspecies.

and mainstem waters of the Gila River thanks to dense populations of Beaver. Spawning takes place in deeper waters, either ponds or riffles, in the early spring as water begins to warm. Females build redds and deposit eggs under stream banks or downed terrestrial vegetation. Newly hatched fry favor deep riffles (cobbed river or stream habitat between pools where the water makes most of its elevation drops) with overhanging vegetative cover and stream debris, allowing them to find cover quickly in case an enemy appears.

CURRENT HABITAT CONDITIONS AND CAUSES OF DECLINE

As with many animals threatened in the 1990s, more than ninety percent of the indigenous range of the Gila Trout has been rendered unfit for the subspecies. Key factors in the decline of the subspecies include the widespread intro-

duction of non-native salmonids and resulting hybridization, habitat fragmentation, livestock grazing, fire suppression, and elimination of Beaver. When Miller described the subspecies in 1950, only five indigenous populations remained. These populations were found in extreme headwaters of the Gila and San Francisco River drainages, and remained uncontaminated by hybridization only because of downstream barriers, such as waterfalls, to the upstream spread of Rainbow and Cutthroat Trout. Although isolated pure populations remained in the headwaters of the Gila in today's Gila and Aldo Leopold Wilderness Areas, it seems that no Gila Trout remained in Arizona by 1950.

Habitat fragmentation

All sorts of bad things start happening to artificially isolated populations of rare species and subspecies. Because of the presence of Rainbow Trout and other non-native salmonids between the few remaining populations of Gila Trout, no genetic interchange takes place between the widely separated populations. Once stochastic, but now primarily human-induced disturbances such as fire and flood could lead to the elimination of any isolated population pretty much at any time. In fact, one of the five populations remaining when the subspecies was described (and until the late eighties, the one FWS considered the "most stable and secure population of Gila trout") has been eliminated due to the effects of an unnaturally hot, stand replacement fire, and two other populations were severely reduced by the effects of this fire. Isolated Gila Trout populations also likely suffer from inbreeding depression.

Introduction of non-native salmonids

In his infinite arrogance, man decided that there must be better species of trout for general exploitation than those already occupying aquatic habitats in the Southwest. Thus, the Rainbow, Cutthroat, and Brown Trout were introduced to much of the former habitat of the Gila Trout during the early 1900s. Brown and Cutthroat trouts compete

with the Gila Trout for food and space. The impacts of Rainbow Trout are much more serious. In only a few years, depending on how far the introduced trout can travel, Rainbow Trout may interbreed with native trout and completely eliminate native stock through the resulting hybridized offspring. It's a one way process. Probably less than twenty years of annual stocking of Rainbow Trout in the Gila River basin sufficed to completely eliminate Gila Trout from Arizona, and reduce New Mexico populations to a few isolated localities.

Only the introduction of non-native salmonids to the range of Gila Trout has caused more damage to the subspecies as a whole than livestock grazing.

Livestock Grazing

Only the introduction of non-native salmonids to the range of Gila Trout has caused more damage to the subspecies as a whole than livestock grazing. Ranchers are responsible for most of the worst impacts to Gila Trout habitat, as their livestock have degraded the formerly clear, cold, higher elevation waters of the Gila River basin. Cows, in particular, denude riparian vegetation, then move on to feed upon terrestrial grasses, shrubs, and seedling trees. In the process of grazing uplands, livestock trample cryptogamic and other soil holding crusts which were once common throughout arid lands. The resulting unnatural flash flooding and massive siltation washes out Beaver dams, creates cutbanks, lowers the water table, and eliminates lush bottom land vegetation. Fallen debris that would normally create ponds is also swept away. Silt fills in remaining ponds, and increases water turbidity. Populations of insects, critical food for the trout, plummet with the elimination of riparian vegetation and rotting debris. The flooding, as well as the stomping of thirsty livestock, destroys deeply overhanging stream banks necessary for trout cover and spawning.

Redds containing developing trout fry are trampled, and newly hatched fry are left without shaded and covered riffle habitat. Water temperatures increase as stream banks are carved down and widened and more water is exposed to solar radiation. All of these impacts continue today throughout the indigenous range of Gila Trout.

Suppression of fire

Natural fire has been virtually eliminated within the indigenous range of Gila Trout. The Gila Trout historically

occurred predominantly at elevations supporting Ponderosa Pine forest habitats. These forests evolved with fire and have been severely impacted by years of fire suppression. Experts estimate that fire burned through Ponderosa Pine forests in the Southwest once every three to ten years, usually following summer lightning ignitions. Since the disruption of the fire cycle through suppression efforts starting in earnest in the thirties in the Southwest, fires have burned much hotter than natural, sometimes killing virtually every living thing over many square miles of forest. The resulting lack of cover, and of course, continued livestock grazing, results in floods which devastate favored trout habitat.

Elimination of Beaver

Trappers came early to the Gila headwaters. Some of the first serious impacts to Beaver populations within the indigenous range of Gila Trout were described by Coblenz's (1961) *The Swallowing Wilderness; The Life of a Frontiersman: James Ohio Pattie*:

How numerous these creatures (Beaver) were, and how they were hunted, is revealed in some of Pattie's reports.

For example, on their first night on the "Helay," or Gila, River of New

Mexico they caught thirty beavers. A little later, on a branch of the Gila, the San Francisco, they took no less than thirty-seven in one night.... Not long afterward, on another tributary of the Gila, to which they gave the name Beaver River (San Pedro River), they gathered another two-hundred skins and only ceased the slaughter when their pack animals had all the furs they could carry.

Severely reduced populations of Beaver meant fewer ponds favored by Gila Trout. The decline of Beaver contributed to the decline in aquatic habitat diversity critical to all Southwestern fishes.

Thus, the subspecies is in bad shape. Federal agencies such as the US Fish and Wildlife Service (FWS), which listed the Gila Trout as endangered in 1967 before the passage of the Endangered Species Act, and the US Forest Service (FS) have accomplished little toward the recovery of the subspecies. Currently, the Gila Trout is listed as Endangered by the FWS without Critical Habitat.

AGENCY NEGLECT AND FUTURE PROSPECTS

Starting in the early 1970s, Gila National Forest biologists began transplanting Gila Trout in an effort to duplicate genetic stock. For twenty years, efforts were made to "reclaim" portions of formerly occupied Gila Trout habitat, as well as areas outside the indigenous range of the subspecies. Trout representing possibly unique genetic stock from each of the five remaining isolated streams were reintroduced to at least one other stream each. Several new (reintroduced or introduced) populations were created, but no concurrent effort was made to stem the destruction of habitat. Several reintroduced populations have already been eliminated and others remain unstable.

The process of reclaiming a stream is problematic. Only one method exists to make stream habitat currently occupied by Rainbow Trout truly suitable for the reintroduction of Gila Trout, and it involves poison. An isolated stream with some sort of barrier to upstream migration of non-native trout (either natural as

in the case of a waterfall, or constructed, as in the case of a stream drop structure) is selected for reintroduction. Jugs of poison are hauled in and set up along certain points to drip continuously into the stream over the course of a day. Downstream, some kind of neutralizer is dripped into the creek below the portion of the stream targeted for fish eradication. In the seventies, heavy duty poisons such as rotenone were used for this purpose. Today, shorter lived toxins are used; but it's still poison, and long-term impacts to the aquatic habitat haven't been well studied. The method is thus controversial. Unfortunately, no other method is known to *completely* eliminate Rainbow Trout from a stream identified for Gila Trout reintroduction. Which brings us to a choice. We either admit that, as humans, we've blown it, and let the Gila Trout go extinct, as it surely will without human management in its remaining headwaters habitat, or we try to restore self-sustaining populations throughout a significant portion of its former range through the reclamation of streams currently occupied by Rainbow Trout.

The Greater Gila Biodiversity Project has taken a stand for reintroduction of the Gila Trout to a significant portion of its former range by whatever means necessary. We insist, however, that all options be explored before widespread reclamation is approved for this effort. Obviously, in addition to stream reclamation, massive habitat restoration must be the goal. Numerous efforts are essential to bring this about:

The stocking of all non-native salmonids must be discontinued in all watersheds currently supporting Gila Trout and those identified for reintroduction efforts. Cows and all other livestock must be removed from all watersheds with streams supporting Gila Trout or identified for reintroduction efforts. Mining must be discontinued. After a few years have passed, allowing regeneration of riparian vegetation, Beavers must be reintroduced. In watersheds currently supporting Gila Trout or identified for reintroduction, the suppression of natu-

ral fire must be discontinued, and where forest fuel has accumulated to dangerous levels, control burns must be carried out at the appropriate time of year to reduce the chances of complete stand replacement fires.

"Noble goals," you may mutter, "but how does one go about returning a significant portion of the Southwest to pre-European settlement conditions?" Well, it's risky to place much faith in Federal law, but the Endangered Species Act (ESA) and the Administrative Procedures Act mandate protection of Critical Habitat for listed Endangered species and subspecies. The situation for Gila Trout is ambiguous because this fish was listed before passage of the ESA, so the FWS doesn't feel any obligation to list Critical Habitat for it.

By petitioning for designation of Critical Habitat for the Gila Trout, including entire watersheds millions of acres in size, the Greater Gila Biodiversity Project is setting a national precedent. Although it is painfully obvious that the health of upland habitats closely corresponds to the health of riparian and aquatic habitats, no one has ever formally requested Critical Habitat designation for entire watersheds to protect a fish. With the submission of a detailed status review and conservation recommendations in Critical Habitat petition form, the Greater Gila Biodiversity Project, in cooperation with the Southwest Center for Biological Diversity and

the Biodiversity Legal Foundation, is demanding that government agencies place the needs of endangered wildlife over the needs of extractive industry.

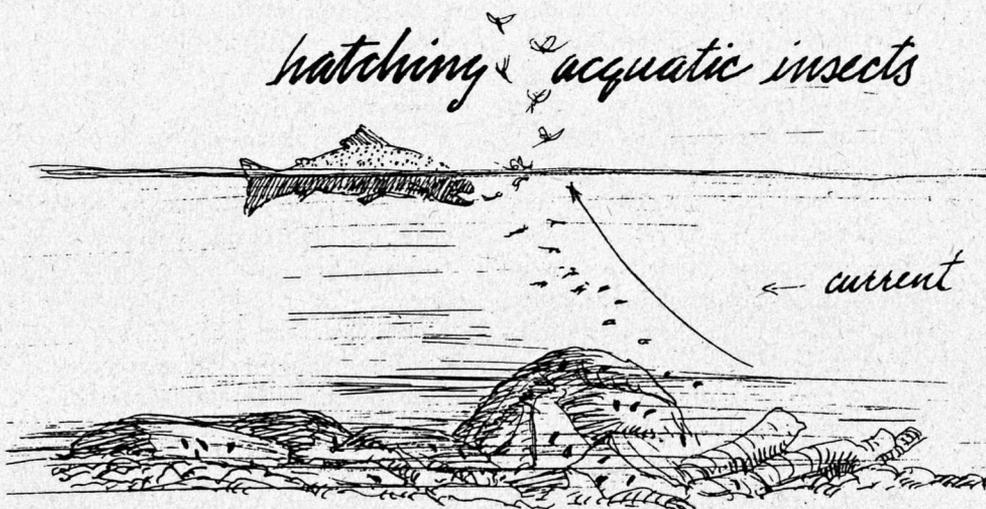
WHAT YOU CAN DO

Please write letters encouraging the designation of entire watersheds throughout the Gila River drainage in both Arizona and New Mexico as Critical Habitat for the Gila Trout. Indicate that historic and current recovery efforts are inadequate to prevent the extinction of the subspecies. Send to US Fish and Wildlife Service, Attn: Jennifer Fowler-Probst, State Supervisor, Ecological Services, 3530 Pan American Hwy, Suite D, NE, Albuquerque, NM 87107.

You can support the Greater Gila Biodiversity Project with your donations of cash or office equipment. Our wish list currently includes an industrial copy machine and a graphics scanner for the computer. Donations can be mailed to POB 742, Silver City, NM 88062.

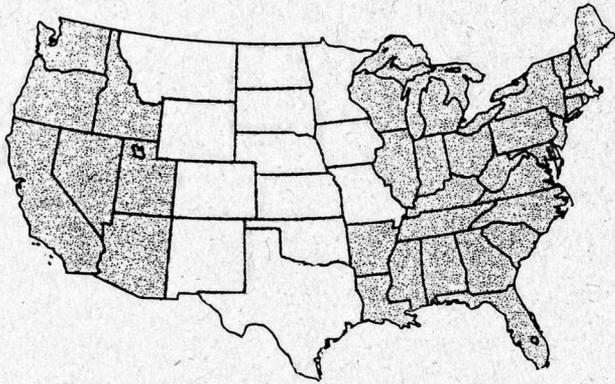
If you live in the Southwest and have a few days a week to spare, consider adopting a rare species of your choice, learning everything known about the critter, and advocating its protection through the creation of a detailed status review and continuous hassling of whichever government agencies are responsible for its decline.

David Hogan is staff ecologist and "fishhead" for the Greater Gila Biodiversity Project.



The Great Plains

*America's Best Chance for
Ecosystem Restoration, Part 1*



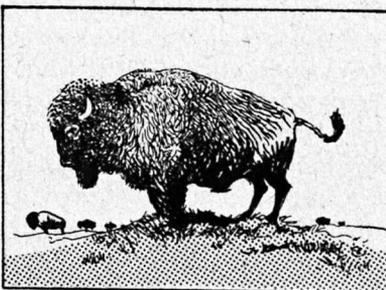
Key words: Great Plains, grasslands, Conservation Reserve Program, CRP, fragmentation, farm program, agriculture

*by Daniel S. Licht
illustrations by Chuck Ouray*

We believe that over the next generation the Plains will, as a result of the largest, longest-running agricultural and environmental miscalculation in American history, become almost totally depopulated.

—Frank and Deborah Popper 1987

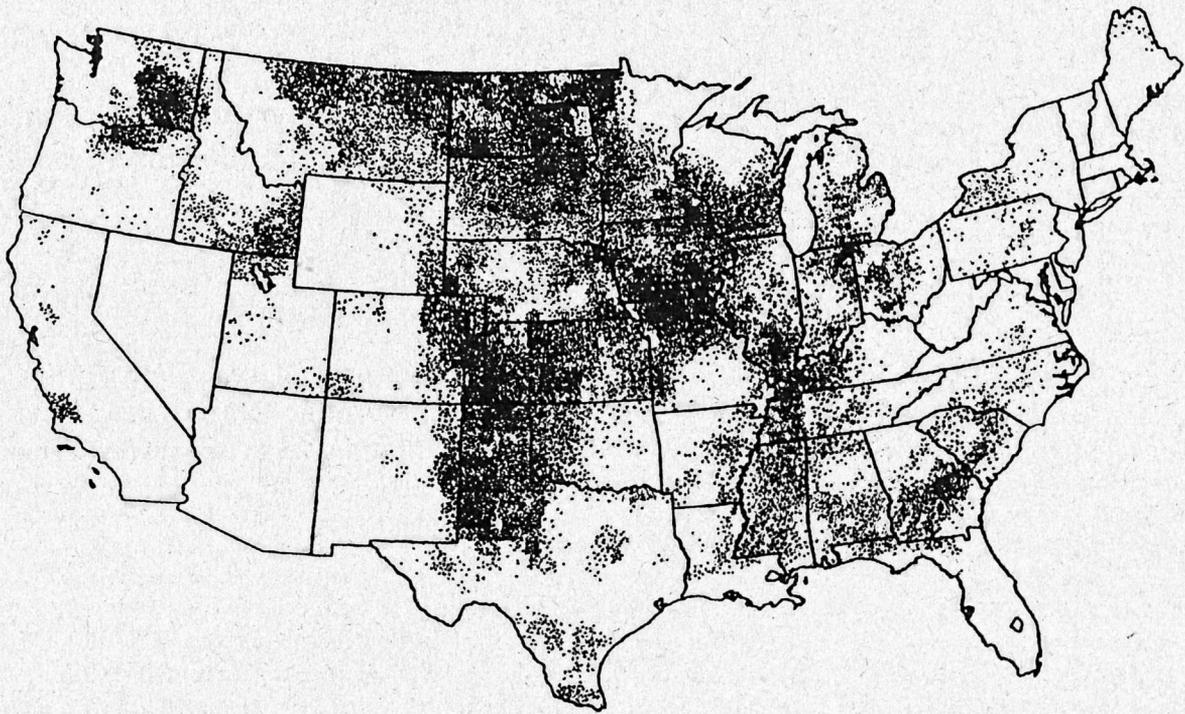
Because of its failing rural economies and declining population base, the Great Plains provides the greatest opportunity the people of the United States have ever had to restore a functioning ecosystem.



Frank and Deborah Popper's prediction of a mostly depopulated Great Plains—from their controversial thesis, "Fate of the Great Plains," (also known as the "Buffalo Commons" proposal; Popper and Popper 1987)—would probably have occurred decades ago had market forces dictated land use in the region. Instead, the Great Plains economy, and more specifically, Great Plains agriculture, endures at its present level because it is supported by the annual infusion of billions of government dollars. The American taxpayer has, in the form of agricultural subsidies, slowed the Poppers' predictions of human depopulation and a return of the American Bison (*Bison bison*) to the vast grasslands of central North America. Regrettably, what taxpayers have gotten for their money is continuing habitat fragmentation, ecosystem deterioration, species declines, soil erosion, water sedimentation, depleted aquifers, crop surpluses, rural decay, and demands for more government subsidies. There is a better way.

Because of its failing rural economies and declining population base, the Great Plains provides the greatest opportunity the people of the United States have ever had to restore a functioning ecosystem. The region is ripe for radical reform in how its land is used and allocated.

In part one of this two-part series I will discuss current farm policies in the Great Plains, specifically cropland set-aside programs. Although many other issues and angles could be discussed (e.g., fragmentation of public lands), I will concentrate on one particularly costly set-aside program. In part two I will discuss a more cost-efficient and ecologically sound alternative to current set-aside programs. What I am proposing would restore and conserve the Great Plains ecosystem, as well as benefit farmers and ranchers, the Great Plains economy, and American taxpayers.



CRP enrollment as of 1992 (each dot represents 250 acres: U.S.D.A. Economic Research Service)

In the 1985 Farm Bill (Food Security Act of 1985: P.L. 99-198) Congress once again acknowledged that the country had a surplus of agricultural commodities, especially arid-land crops such as wheat and barley. This in itself was not a revelation since the country has had agricultural surpluses since the early part of the 20th century, due mainly to 1) an excess of land in production, 2) increased yields per unit area (due to technological improvements), and 3) increasing production in other countries. In response to the surplus, Congress once again implemented a cropland set-aside program whereby it would pay farmers not to grow crops. This also was predictable since US taxpayers have been subsidizing farmers for almost as long as we've had surpluses. What was noteworthy about the new set-aside program, the Conservation Reserve Program (CRP), was its scope in terms of acreage, cost, and duration, and the intent of the program to produce environmental benefits. Because farmland in the arid Great Plains is some of the most marginal in the United States, it was especially well-suited for such a program. But has the set-aside program produced environmental benefits commensurate with its costs? It does not appear so.

As of July 1991, 35,395,289 acres of land were set aside under 10-year CRP contracts (U.S. Dept. of Agriculture 1992). (Final projections are for 36-40 million acres nationwide.) Approximately 73% of this land, or 25,962,997 acres, is in the 13 Great Plains states (defined for this discussion as Montana, Wyoming, Colorado, New Mexico, Texas, Oklahoma, Kan-

sas, Nebraska, South Dakota, North Dakota, Minnesota, Iowa, and Missouri; several of these states are partly outside the Great Plains, but most of the CRP occurs in the Great Plains ecosystem). For perspective, this area of surplus Great Plains cropland is larger than the state of Kentucky. For an ecological perspective, it is 193 times the size of Isle Royale National Park, a fully functioning ecosystem.

Imagine what conservationists could do with 26 million acres. Even the most wide-ranging species could be protected, along with the rest of the region's biodiversity (with, of course, appropriate actions that address wintering grounds, global warming, etc.). But that is not the case. Indeed, the 26 million CRP acres in the Great Plains have produced very few biodiversity benefits and in some places may have done more harm than good. The reasons are numerous, and they all have to do with ecological principles and processes.

The average CRP contract with a landowner is for 99.2 acres (U.S. Dept. of Agriculture 1992), meaning that the typical tract is even smaller (i.e., one contract may include several tracts). This smallness diminishes the value of CRP lands to biodiversity. Many animals, especially those of greater body mass, need areas significantly larger than 100 acres for their life requirements. A 100-acre tract of "habitat" in an agrarian landscape will not suffice for many species.

Moreover, even if individual organisms can survive on less than 100 acres, that does not mean a viable population of the species can persist at the site. For example, tallgrass prairie

species like the Dakota Skipper Butterfly (*Hesperia dacotae*) are characterized by unstable populations and low vagility (they appear incapable of dispersals over a mile). Should a population become extirpated on a 100-acre tract in a fragmented agrarian landscape due to a catastrophic event (e.g., fire, haying, pesticides), it is unlikely that the species could recolonize the site.

Even if a population did manage to persist on a small tract for an extended period of time, it would likely experience the negative genetic consequences suffered by small inbred populations. Lack of genetic exchange between populations—especially of prairie-dependent invertebrates—is a significant concern in fragmented agrarian landscapes.

Lastly concerning size, the small area of CRP tracts can indirectly affect the recruitment and survival of species that at first glance appear to be habitat-size independent. For example, ground nesting waterfowl generally have higher nest success and recruitment rates

on larger tracts of habitat (Greenwood et al. 1987). These larger tracts often support wider ranging upper level carnivores such as Coyotes (*Canis latrans*; Sargeant et al. 1987). In contrast, small tracts of habitat in agrarian landscapes are conducive to smaller carnivores and

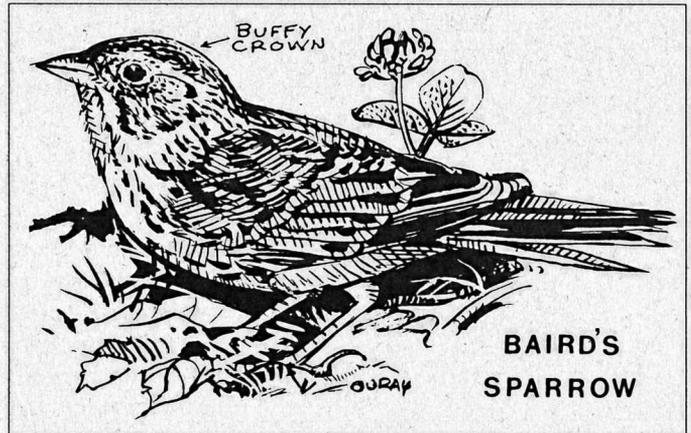
omnivores with small home ranges and high densities, such as Red Fox (*Vulpes vulpes*) and Raccoons (*Procyon lotor*). The proliferation of these smaller predators

throughout the fragmented northern Great Plains, where they were historically absent or rare (Sargeant 1982), is believed to be a major cause of the decline in waterfowl populations (Cowardin et al. 1985). Raccoon and Red Fox commonly depre-

date ground nests, while larger predators such as Coyotes generally do not; and Coyotes are known to reduce Red Fox populations (Voight and Earle 1983, Sargeant et al. 1987). Large tracts of land that can support Coyotes will have fewer Red Fox, hence higher waterfowl recruitment.

In addition to the issue of size is the matrix issue, or the juxtaposition of CRP tracts within a fragmented agrarian landscape. Faunal species that attempt to use CRP tracts are greatly influenced by habitat features

and species assemblages outside of the established "habitat." A hostile matrix is often detrimental to rare or declining species.

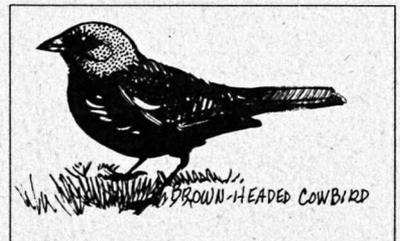
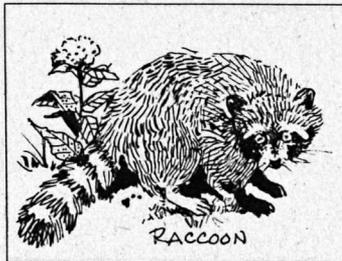
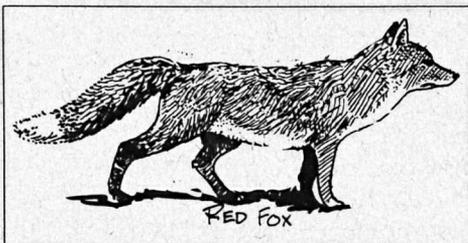
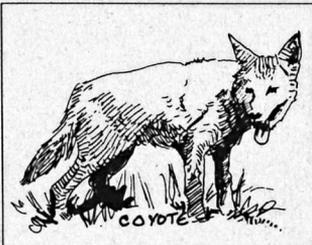


For example, Baird's Sparrow (*Ammodramus bairdii*) is a declining grassland nesting bird (and a candidate for the federal Endangered and Threatened species list; U.S. Fish and Wildlife Service 1991) that occasionally uses CRP land. But if the CRP tract is adjacent to a shelterbelt, the bird becomes susceptible to un-

naturally high levels of predation from hawks, owls, or crows perching or nesting in nearby trees. In addition, nearby farmsteads and cropland may provide supplemental food sources that can sustain artificially high numbers of other predators—such as Red Fox (Sargeant et al. 1986), Raccoon (Greenwood 1981), and skunks (*Mephitis*

sp.)—that would not typically persist through the environmental extremes of the Great Plains. Edge effects also favor ecological generalists such as the Brown-headed Cowbird (*Molothrus ater*; Davis 1993, Peter-john and Sauer 1993), a nest parasite thought to be partly responsible for the decline of many passerines. In es-

sence, CRP may provide suitable "habitat" for Baird's Sparrow, but not a favorable ecosystem. The area may even become a population sink, thereby doing more harm than good. This highlights why species richness



counts for CRP tracts can be misleading (unfortunately, species richness is still commonly confused with biodiversity, even by practicing biologists). Samson and Knopf (1982) found that although prairie birds were observed in small relicts of tallgrass prairie, only the sites larger than 395 acres were able to maintain stable prairie bird communities from year to year.

In addition to the problems of size and juxtaposition, CRP also fails to deliver biodiversity values because of the floral species selected for the set-aside plantings. What to plant for a cover crop is often left to the discretion of the landowner, who typically plants what is least expensive;

that usually means exotic species such as brome (*Bromus* sp.), Crested Wheatgrass (*Agropyron cristata*), and sweet clover (*Melilotus* sp.). Native grasses are rarely used and native forbs are almost never used (e.g., native grass plantings comprise 0.04 percent of the

CRP acreage in North Dakota [U.S. Dept. of Agriculture 1992]). Essentially, the government is subsidizing the spread of exotics even though many exotic species are known to be harmful, including some that were originally thought to be "good" for wildlife and were widely planted in the Great Plains (e.g., Russian Olive [*Elaeagnus angustifolia*]: Olson and Knopf 1986).

Several studies suggest that many bird species indigenous to the Great Plains prefer native grasses; in contrast, very few if any seem to prefer exotics (however, it should be noted that stand structure rather than composition may be an overriding factor). For example, the Marbled Godwit (*Limosa fedoa*), Upland Sandpiper (*Bartramia longicauda*), Common Snipe (*Gallinago gallinago*), Wilson's Phalarope (*Phalaropus tricolor*) and Willet (*Catoptrophorus*

semipalmatus) appear to prefer to nest in native prairie versus areas containing a high percentage of exotic plants (Kantrud and Higgins 1992). Waterfowl nest initiation (Klett et al. 1984) and waterfowl nest success (Klett et al. 1988, Luttschwager 1991) are as high or higher in grasslands with a big percentage of native grass. One reason that many birds, especially early-spring ground-nesting birds, seem to prefer native grass is that native perennials provide better residual cover the following spring. Hays et al. (1989) found that CRP stands of native grass provided higher persistent cover than plantings of tame (exotic) grass. Native grass mixtures appear to provide greater long-term environmental benefits (e.g., soil stabilization) than do non-natural grasses (Farris and Cole 1981).

Also, even though dozens of endemic or indigenous plant species in the Great Plains are on the federal Endangered, Threatened, or candidate species lists, CRP completely ignores the preservation and restoration of these species. Of special concern are forbs associated with tallgrass prairies such as the Western Prairie Fringed Orchid (*Platanthera praeclara*), Prairie Bush Clover (*Lespedeza leptostachya*), and Mead's Milkweed (*Asclepias meadii*).

A fourth shortcoming of CRP, one pervasive in almost all agricultural set-aside programs, is its short duration contracts. Congress has legislated one set-aside program after another, but they have all failed to provide ecological values equal to their costs because they were short-term (Miranowski and Bender 1982). Many of these programs just start producing biodiversity benefits when the program terminates. For example, it was found that small mammal populations became more diverse in CRP tracts over time in North Dakota, and that Meadow Voles (*Microtus pennsylvanicus*), a preferred prey source of many predators, did not start becoming abundant until late in the life of the CRP contracts (Lysne 1991). Schwartz and Whittson (1986) found that new prairie plantings were suboptimal habitat for small prairie mammals because of low forb abundance, low diversity, and high phytomass.



Common Snipe



BROME GRASS



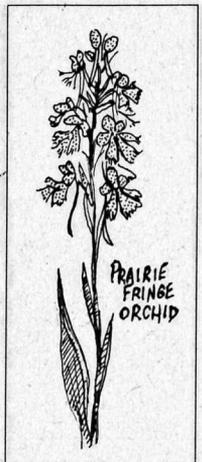
CRESTED GRASS



Yellow Sweet Clover
Melilotus officinalis



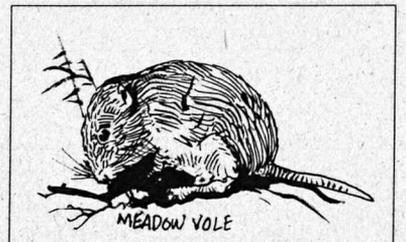
Russian Olive



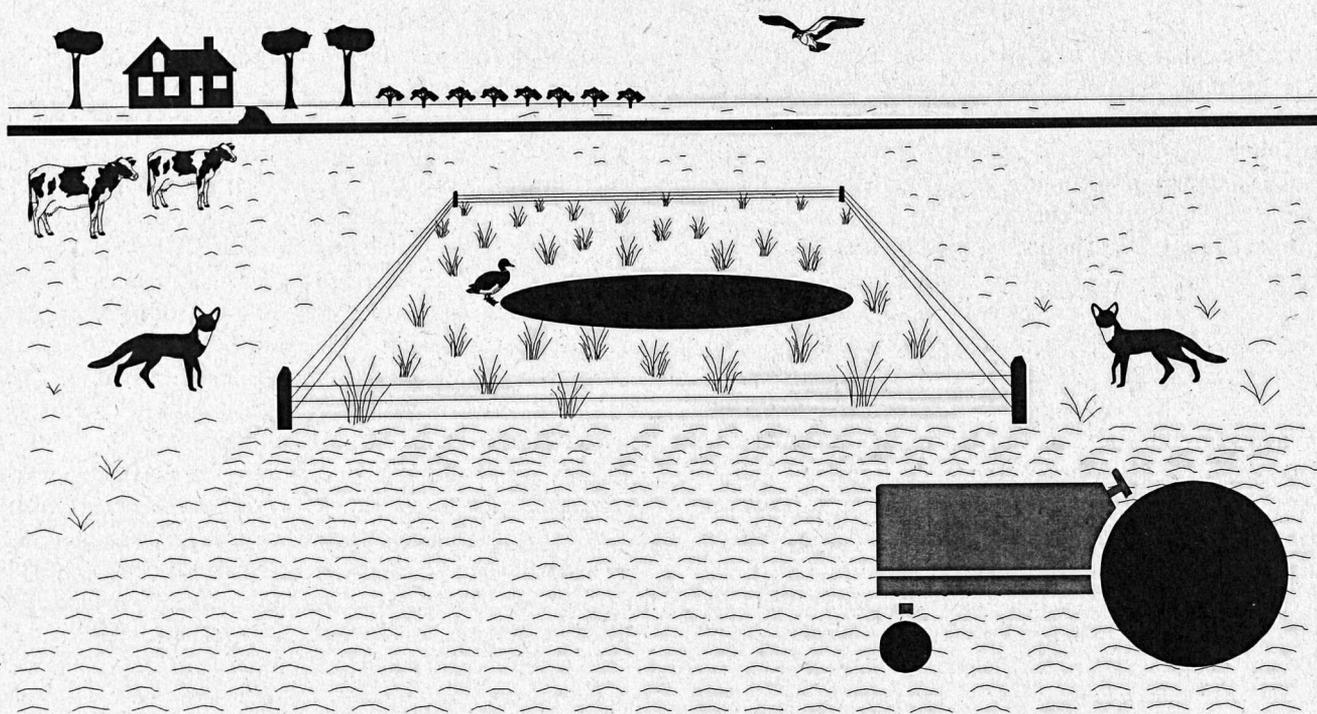
PRairie FRINGE ORCHID



Upland Sandpiper



MEADOW VOLE



Small, isolated tracts of "habitat" in an agrarian landscape can become deathtraps for ground-nesting birds.

Finally, any potential benefits of CRP to biodiversity are reduced even more as CRP land is frequently opened for haying during drought and/or flood "emergency" declarations (Hays et al. 1989, Luttschwager 1991). Haying early in the year can cause direct mortality to ground-nesting birds and other species; haying late in the year diminishes the habitat value (in the following spring) by removing residual cover critical for early nesting species such as the Northern Pintail (*Anas acuta*). Another problem with haying is that CRP contracts state that a certain amount of the CRP field remain unharvested during emergency declarations, usually 10 to 25 percent (this stipulation is often violated, with many farmers haying greater than 75 percent of their fields [Hays and Farmer 1990]). The hayed portions of the CRP tracts provide perfect (and highly unnatural) travel avenues for mammalian predators hunting the unmowed portions. CRP tracts thus become deathtraps for ground nesting birds (Luttschwager 1991).

Despite its enormous cost, few Americans receive tangible benefits from the CRP. This is because CRP occurs on private lands with no provisions that allow the American taxpayer to enjoy the few fruits produced by the program. Even if public access were stipulated, it seems unlikely that many non-consumptive users would be enthusiastic to visit small patches of exotic grasses.

Perhaps the most startling fact of all concerning CRP is the cost. The American taxpayer pays, on average, \$49.29 annually per acre for land enrolled in CRP (U.S. Dept. of Agriculture 1992). In the Great Plains the state weighted averages range from \$81.44 per acre in Iowa to \$37.38 per acre in Montana. Since CRP contracts are for ten years, that means the

American taxpayer pays an average of \$374 to \$814 per acre for CRP land in the Great Plains over the life of the program, plus the government administrative costs.

Yet the value of land and buildings in the Great Plains ranges from only \$138 per acre in Wyoming (shortgrass prairie) to \$358 per acre in North Dakota (mixed-grass prairie) to \$1178 per acre in Iowa (tallgrass prairie) (U.S. Dept. of Agriculture 1992). The truth is self-evident. The American taxpayer could have bought many of these lands (and the buildings on them) for less than the costs of the CRP contracts. Indeed, CRP and the rest of the farm program subsidies artificially inflate land values; without CRP, the market value of these lands is even less (Shoemaker 1989). Without the farm program, non-government conservation organizations like The Nature Conservancy could have done more to protect and restore prairie ecosystems.

If CRP was a one-time market correction, it could be accepted; but it isn't. Set-aside programs were first initiated in the 1930s; the Agricultural Conservation Program of 1936 by itself retired 42.6 million acres at its peak. (Another 11 million acres in the Great Plains was permanently retired at about the same time through the Bankhead-Jones Farm Tenant Act; the land was subsequently converted to National Grasslands.) In recent years, set-aside programs have included the Soil Bank, Water Bank, Cropland Adjustment, Feed Grain, Wheat, Acreage Adjustment and Payment-In-Kind programs.

Even with these costly set-aside programs we still have agricultural surpluses, as evident each time farmers get deficiency payments for their crops when the market price doesn't meet the government established target price. In addition to deficiency payments are a myriad of other subsidies for Great

Plains farmers, ranging from special low interest loans to disaster payments in drought years (a regular occurrence in the Great Plains). All of these subsidies exacerbate the surplus in agricultural commodities. These surpluses are costing the American taxpayer \$5.1 billion annually in the Great Plains states (U.S. Dept. of Agriculture 1992). Meanwhile, the CRP program alone will cost an estimated \$21 billion over the life of the program (U.S. General Accounting Office 1993). Clearly, we need to permanently correct the imbalance in farm production, and just as clearly, CRP is not the answer. The U.S. General Accounting Office (1993) stated that "CRP postpones rather than resolves environmental problems associated with agriculture. Additional costs may be incurred to maintain the program's objectives when the contracts begin to expire in 1996." It's an ominous thought that the American taxpayer will have to pay another \$21 billion-plus every decade to keep surplus cropland out of production.

In the final analysis it will be seen that the current CRP program has not even helped the American farmer. A 1990 survey by the Soil and Water Conservation Society (cited in Minnesota Extension Service 1993) found that the typical CRP contract holder gets less than half of his or her income from farming, so these recipients of federal money are not really "typical" farmers. The report also found that the average CRP contractee is 57 years old and, hence, nearing retirement.

From a biodiversity perspective, the CRP program has been a dismal failure. Its benefits are limited to a few ecological generalists that are already common throughout the Great Plains (e.g., Ring-necked Pheasant [*Phasianus colchicus*]—another exotic), and even those benefits are often compromised by the size, distribution, and maintenance of CRP tracts.

Although many biologists now recognize that CRP has not lived up to its potential for providing quality wildlife habitat (Hays and Farmer 1990), there are some proponents of the program who will fight to see that it is reauthorized in its current form. In the coming controversy, several points need to be kept in mind.

First, biologists who support the CRP either deliberately or uncognitively define "wildlife" to include only game species. They argue that CRP is good for "wildlife" based on their narrow consumptive definition of wildlife.

Second, unlike most Wildlife Management Areas administered by state agencies, or Waterfowl Production Areas administered by the U.S. Fish and Wildlife Service, CRP is funded from general revenue, not hunting-generated revenue. So it behooves the U.S. Department of Agriculture to implement cropland retirement programs that provide values for all of society. Decisions concerning how best to utilize land removed from agricultural production should involve conservation biologists, ecologists, and others in holistic disciplines as well as game biologists.

Third, the small number of published studies that argue CRP is good for wildlife use as baseline data either cropland or a mythical zero condition in which no species are present.

Hence, the presence of a single bird implies that CRP is "good" for "wildlife." No studies have ever reported that CRP produces more biodiversity benefits than would a large restored native prairie.

Many biologists and some environmental groups feel that the CRP program could benefit biodiversity with just some tinkering around the edges. They argue that CRP is a good program, it just needs to be modified a tad; make the tracts a bit larger, use a few more native grasses. I view these proposals as piecemeal, short-sighted, and symbolic. Any modification that results in a long-lasting significant improvement for biodiversity will have to be so radical that the result will have nothing in common with the old program.

Why spend all this time criticizing the CRP program? Because there is a better way. A way that can solve the Great Plains' farm crisis and ecological crisis at the same time. A way that will continue to save topsoil and protect water quality (Ribaud 1989). A way that can substantially reduce the burden on the American taxpayer. A way that will relieve the federal government of renting 25,962,997 acres of Great Plains farmland to grow exotic grasses. A way that can boost the Great Plains economy via tourism. And a way that can lift the soul and imagination of Americans everywhere.

It will take enlightenment, determination, and hard work. It will take a new vision and a new paradigm. It will take what Aldo Leopold called "thinking like a mountain" (Leopold 1966).

Throughout most of North America the argument to preserve or restore natural ecosystems must rely on the complex and nebulous arguments of ethics, potential utilitarian goods, and "existence values." Such abstract rationales carry little influence with politicians, policy makers, and the general public. Thus their chance of success is marginal at the present time.

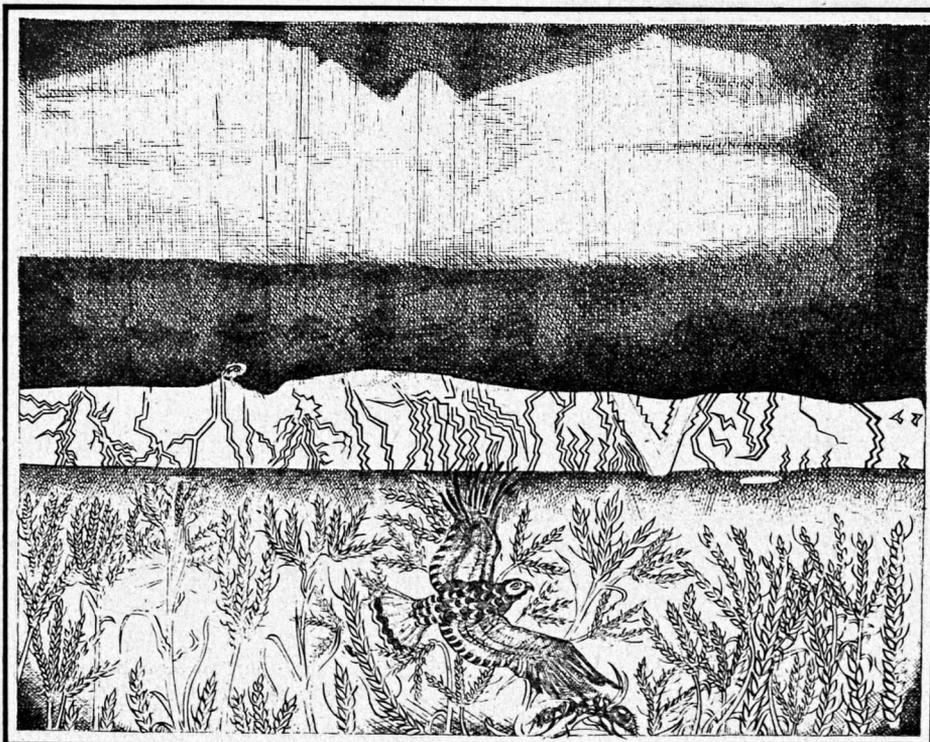
But in the great grasslands of central North America a persuasive economic argument can be made to permanently take land out of agricultural production and use that land to restore functioning ecosystems. The Great Plains may be the one place in North America where budget-minded conservatives can find common ground with preservation-minded conservationists. The prairies offer America's best chance to restore a fully functioning natural ecosystem.

Author's note: Informal discussions on the 1995 Farm Bill are just beginning. The first draft bills will probably begin circulating in the summer of 1994, with final legislation being signed in 1995. Conservationists are urged to contact their congressional delegation and the Clinton administration and demand that a component be implemented into the 1995 bill that permanently takes some cropland out of production. Although a comprehensive ecosystem reserve strategy for the Great Plains would be difficult to design prior to the 1995 bill's enactment, a good rule of thumb is that land adjacent to large public tracts should be targeted for permanent removal from agricultural production and returned to the public domain. In the next issue I will identify several such areas.

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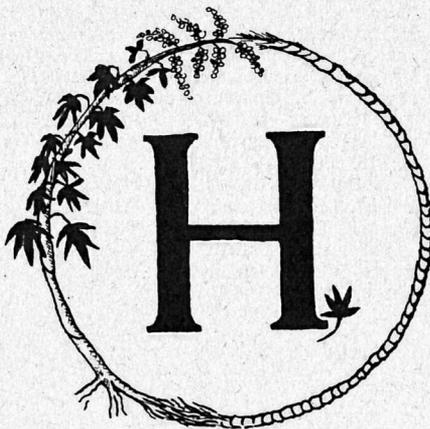
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Daniel Licht worked as a wildlife biologist in North Dakota before recently transferring to Forest Lake, Minnesota. He is currently preparing a book describing Great Plains biodiversity, current land-use practices in the region, and proposals for restoring the Great Plains ecosystem.



Hemp to Save the Forests

by Andy Kerr



*The forests shouldn't
all be cut down
because some people
have hang-ups.*

Hemp is a potentially sustainable replacement for what is definitely unsustainable forest consumption. We should grow hemp to save and restore our forests.

People used to get most of their fiber from farmlands. We also used wood, for burning and building, but before the chainsaw and the population explosion, humans were not able to go through forests very fast.

In this century, technological developments which allow paper to be made efficiently from wood pulp have allowed us to consume great amounts of wood fiber at levels far above sustainability. We have developed very efficient methods to mine fiber that nature has been storing for centuries, even millennia.

We've gone through most of the world's forests, and for the first time in a century, northern industrial humans are thinking seriously about *growing* fiber, not just *mining* it. We're "discovering" that farmlands are more productive of fiber than are forests. Plus, we have an excess of farmland in this country; we do not have an excess of forests.

When ONRC (Oregon Natural Resources Council) started examining the fiber problem, we looked for a plant that: a) could replace wood; b) didn't require lots of fertilizers and pesticides; and c) would be truly sustainable.

We looked at kenaf, which may work in the South, but not in the Pacific Northwest. We looked for anything but hemp; anything but marijuana. But our wanderings and wonderings kept leading back to hemp. We looked for a plant with long fibers in order to produce paper that could be recycled numerous times or pressed into strong construction products. Hemp fibers can be as long as the plant is tall. Douglas-fir fibers only reach about three-quarters of an inch in length, no matter how tall the tree.

Of course, there is a problem. Hemp is basically—although not totally—outlawed in this country. Most people refer to it as marijuana and have very strong opinions about it, which has made it unavailable for industrial use, even though the cultivars for industrial use and those for personal use are very different.

Hemp is outlawed because some versions of it contain significant quantities of THC, a compound with psychoactive properties. These versions are marketed as marijuana.

Because of the political problems associated with marijuana, ONRC kept looking and hoping for other fibers. We simply haven't found any as good as hemp. Nor has the USDA or the pulp and paper industry in their research.

Finally, we had to conclude that if hemp was good enough for Thomas Jefferson to grow and make the paper on which he drafted the Declaration of Independence, then it's good enough for ONRC. The forests shouldn't all be cut down because some people have hang-ups.

(By the way, in the interest of full disclosure, I want to state for the record that, yes, I did inhale. Twice. The first time was with an elected official. [I figured it could later be useful to have passed a joint with him.] The second time was with a woman with whom I was seeking carnal relations. I don't recall getting off [from the dope] either time as, in addition to the THC, the mood altering variables of sleep deprivation and sexual lust, respectively, were significant.)

We can look backward to a long-cultivated plant for our future fiber needs, because of significant new technological advances in two areas: construction and chemistry. Regarding technological advances in construction, it is now technically feasible to make beams out of waste paper. It is not currently economically feasible, but that is simply a function of price. As the price of wood-based building products goes up, the attractiveness of alternative building products goes up as well.

Raising the price of wood is good. To borrow a term from Oil War One (some called it the Gulf War), a "collateral benefit" of locking up the last of the virgin forests is that the price of wood chips will rise and send paper-makers scrambling for new fiber sources. They are now looking to our waste stream and beginning to look to the farm.

Regarding technological advances in chemistry, chemists are learning to crack the hemp oil molecule, as they did the earth oil molecule. Anything humans now make from an unsustainable hydrocarbon could be made from a sustainable carbohydrate. The main problem is that we've bred generations of petrochemists instead of carbochemists. We can probably even make the glue to bind together hemp fibers for building products from compounds in the hemp plant itself, rather than from toxic formaldehyde-based petrochemicals.

Despite twice inhaling, I came to realize the joys of industrial hemp in a fully rational way. I was not aided in such enlightenment by THC, as some others have been. Unfortunately, the campaign to legalize hemp for personal use has been mixed in with the campaign to legalize it for medicinal, industrial, religious and nutritional uses.

Certain individuals — yes, they may have small minds but those small minds are numerous — are turned off to some potential uses of hemp because they fear misuses of hemp. Politically, environmentalists must keep industrial hemp issues separate from those of marijuana legalization and/or decriminalization, just as it is politically wise to separate the medicinal use issue from the personal use issue.

Taxonomically, hemp and marijuana may be the same species, but hemp for fiber and marijuana for THC are quite different organisms. Your lungs will fail before your brain attains any high from smoking industrial hemp.

Hemp, if we play it right, can provide significant relief to our forests. Our forests don't have time for us humans to work out all our hang-ups about *Cannabis sativa*. Let us begin to sow that hemp now.

...in the interest of full disclosure, I want to state for the record that, yes, I did inhale. Twice.



Andy Kerr is Conservation Director of Oregon Natural Resources Council in Portland. This article was adapted from a speech to the Public Interest Environmental Law Conference, "Land, Air, Water," in Eugene, March 1994.

Wilderness Watch

Stewards of "Protected" Wild Lands and Rivers

by Bill Cunningham

"Your group should not exist until we've completed the Wilderness System!" asserted a nationally prominent conservationist to an equally adamant Jim Dayton, Executive Director of Wilderness Watch. The setting was a major environmental gathering in May of 1989 at Idaho's Sawtooth National Recreation Area. Wilderness Watch had just been born, with the purpose of creating a citizen force to monitor management of existing units in our nation's Wilderness and Wild & Scenic River systems. The group had decided to stay clear of the politically-charged issue of allocation — that is, they would not address the question of how much land should be given legislative Wilderness designation. The founders of Wilderness Watch agonized over another question: whether the designation of Wilderness really does protect as envisioned by Congress when it passed the landmark 1964 Wilderness Act.

The three founders of Wilderness Watch were University of Montana law student Bobbie Hoe, Selway-Bitterroot Wilderness ranger Jim Dayton, and Bill Worf, retired director of recreation & wilderness for the Northern Region of the Forest Service. All were alarmed by the undermining of the Wilderness System through bad Forest Service management decisions. Case in point: agency approval in 1988 of a private hunting lodge on public land along the Salmon—an untamed river within both the Wilderness and Wild & Scenic River systems. With virtually no public notice and review, the Forest Service gave the green light to a resort 23 miles inside the Frank Church-River of No Return Wilderness (RNR) in Central Idaho, complete with kitchen and bar facilities, cabins on concrete foundations, flush toilets, an electric generator, jet boats and a driveway for ATVs.

GUIDING PHILOSOPHY

The guiding philosophy of Wilderness Watch is that there should be no deliberate, avoidable, human-caused impacts in Wilderness. Biocentrism aimed toward preserving ecological integrity is the cornerstone of this conviction. Today, more than 300 Wilderness Watchers are scattered across 35 states. Much remains to be done—this modest but growing membership doesn't yet equal the number of units in the two federal systems: 564 Wildernesses totaling 96 million acres and more than 120 Wild & Scenic Rivers in the United States. (Over half of this acreage and river mileage is in Alaska. In addition to the federal systems, several states have much smaller wilderness and wild & scenic river systems.)

*There should be no deliberate,
avoidable, human-caused
impacts in Wilderness.*



Many wilderness warriors assume—myopically—that we need not worry about “wilderness management,” at least not until all the wilderness is safely tucked away. The overriding priority is to get as much wild country into the Wilderness System as possible, where it would then be “taken care of.” Some activists even regard “strict biocentric wilderness management” as a threat to the expansion of the Wilderness System, fearing such stringency would reduce political support from outfitters, ranchers and sportsmen, whose interest in wilderness is often more utilitarian than “purist.”

But “management” and “allocation” are not mutually exclusive. We do not have to give up one to have the other. The best way to convince people of the need for more Wilderness protection is to have the protection itself stand for more. It’s instructive to examine the basic definition and purpose of designated Wilderness.

The idea is to assure that an increasing population does not *occupy* and *modify* every last wild niche of the United States. Wilderness is the last place where humans are able to test and rely on their own skills, strengths and resources. The comforts of home and ease of access are the antithesis of wildness.

With these principles in mind Wilderness Watch sued the Forest Service (FS) in 1991, seeking to reverse the decision that allowed construction of the Salmon River resort at Smith Gulch in the RNR. Predictably, the Forest Service denied Wilderness Watch’s charge that it had “illegally authorized the building of the resort on one of the most highly protected and visually sensitive shorelines in the United States.” Wilderness Watch won the procedural portion of the lawsuit in 1993—meaning we proved the FS had violated the procedural requirements of the National Environmental Policy Act (NEPA). As a result, the Forest Service must now prepare an environmental impact statement (EIS) to determine the proper level of commercial services for the designated Wild segment of the Salmon River inside the Wilderness. A decision on the substantive claims is pending in federal district court (will likely be heard in June).

NO CACHES

The group’s efforts to keep the wild in wilderness have addressed less dramatic threats as well—outfitter caches, for instance. Again, in the vast River of No Return Wilderness, six National Forest plans were amended to allow outfitters to retain permanent caches. Citing a clear violation of the Wilderness Act according to the agency’s own lawyers, Wilderness Watch sued. The Wilderness Watch position on caches is simple: “Pack it in, pack it out for everyone, including outfitters. No caches!”

Last year a D.C. district judge ruled that caches, permanent structures, water systems and reserved camps are illegal under the Wilderness Act. A structure can only be allowed if it is the minimum necessary tool to protect Wilderness. This decision represents a significant victory, which can logically be extended system-wide.

Wilderness Watch is monitoring proposed dam reconstruction in the nearby Selway-Bitterroot Wilderness to insure that only the minimum tool is used. The group has recently filed a lawsuit to stop waterfowl hunters from using motorboats in the Red Rock Lakes National Wildlife Refuge Wilderness in southwest Montana.

Wilderness Watchers have even taken on the military, by providing expert testimony in support of lawsuits to force defense agencies in Minnesota and New York to file environmental impact statements on training flights. In response, the national guard has phased out flights under 18,000 feet above the Boundary Waters Canoe Area Wilderness, and the Air Force has canceled plans for low-level flights of B-52s and F-111s over Adirondack State Park.

Dollars seem to drive everything in our money-oriented society, and the stewardship of Wilderness by federal agencies is no exception. Concern about lack of funds spurred Wilderness Watch to launch a study of where scarce Wilderness dollars are going. Its report to Congress prompted Representative Bruce Vento (D-MN), Chairman of the House Subcommittee on Parks and Public Lands, to request a full-scale investigation by the General Accounting Office (GAO).

In 1991 GAO concluded that half of the Wilderness funds for the prior fiscal year were spent on non-wilderness activities, such as timber sales, roads and campgrounds. Congressman Vento described the use of Wilderness dollars for timber sales as “...the most perverse use that could occur.” Although Congress earmarked 20 percent more for Wilderness in 1990, the Forest Service actually spent four percent less. “Wilderness has always been the poor cousin in terms of the Forest Service,” lamented Vento. “It is badly undercut by this misuse of funds.”

Wilderness Watch continues to lobby for more money for on-the-ground stewardship of Wilderness. In 1989 the Forest Service national Wilderness budget was 12 million dollars, half of which was spent for non-wilderness purposes. In fiscal year ’94 the budget is 27.7 million dollars—effectively a five-fold increase in as many years.

So now more dollars are going into perhaps the greatest oxymoron of all time: “wilderness management.” Noted Montana author Dick Manning writes, “the proper approach to wilderness is not to manage it but to have it manage us, to let its unbridled, capricious and just-plain-wild hand slap us around until it knocks some of those human kinks out.” If wilderness is the epitome of natural chaos, at least in terms of our inability to understand nature’s design, then to “manage” wilderness is to destroy it. The reality is that those desperately needed funds to manage Wilderness are actually for managing the people who use the Wilderness. As we escape to the Wilderness in ever increasing numbers, compacted ground, denuded campsites, blighted shorelines, and trails closed from over-use all too often relegate the “no trace” camping ethic to an empty platitude.

SENSITIVITY TRAINING

Solutions to these problems lie in education. Wilderness Watch advocates an indirect approach to sensitize wilderness visitors—as opposed to strict on-site enforcement. This includes user education in the no-trace ethic along with continuing education for teachers. Wilderness Watch has also conducted workshops across the country for Forest Service managers, including upper echelons, about the meaning of wilderness and its physical, social and cultural values. A related concern is the need to establish agency career ladders that will reward a cadre of high-quality professional wilderness managers.

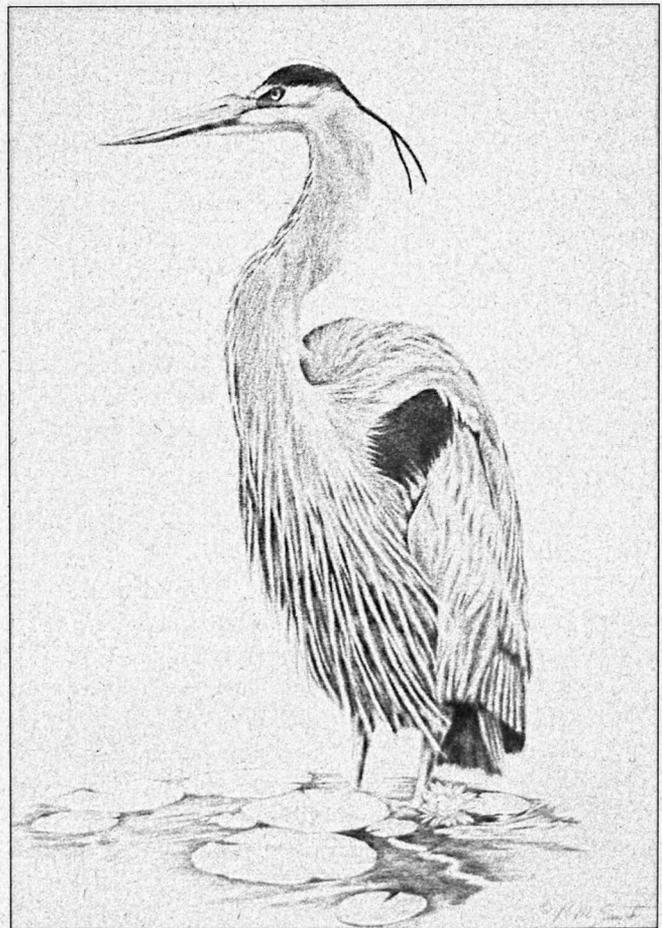
ADOPT A WILDERNESS

The most important long-range program of Wilderness Watch is “Adopt a Wilderness.” The idea is to build a citizen network with watchdog groups organized into chapters covering each of the nearly 700 federally designated Wilderness Areas and Wild & Scenic Rivers. A handful of Wildernesses are relatively well monitored, such as the Frank Church-River of No Return, Selway-Bitterroot, Alpine Lakes and Glacier Peaks (the latter two in Washington). But most of our wild legacy is in serious need of “adoption” by concerned citizens who understand that agencies need both public support and scrutiny if wild processes are to endure. The goal is to insure that there are no “orphan” wild lands and rivers in the two great systems.

Wilderness Watch has a tough assignment: to develop a strong national constituency for existing Wilderness, and to create a sense of national pride in our Wilderness. Questions of management are not nearly as exciting as allocation, so the group finds it harder to attract activists. Yet Wilderness Watch is filling a unique, vitally important niche in the ecological web of citizen groups. It is the only national wilderness organization exclusively dedicated to taking care of what we've got. In the words of Bill Worf, “if we don't pay attention to management, 20 years from now the (Wilderness) system won't be worth saving.”

Please become a Wilderness Watcher. Send \$20 or more (or \$10 if low income) to Wilderness Watch, Box 9175, Missoula, MT 59807, (406) 542-2048.

Bill Cunningham is a seasoned wilderness activist, author of Montana Wildlands, and Wilderness Watch board member.



Great Blue Heron (Ardea herodias) by Robert M. Smith

Building a File

What to Do Till the Lawyer Arrives¹

by Ned Mudd II and Ray Vaughan

You don't have to be Perry Mason to deal with environmental law. Fact is, most certified lawyers and judges don't understand the intricacies of so-called environmental statutes any more than you do. So you need not worry because you've not memorized the Clean Water Act. Only a fool with a tin can for brains would want to commit such an act to memory.

It is important to get a basic grip on how you can operate within the legal system, achieve a reasonable amount of success, and have fun doing it. Consider this a simplified primer on what to do before the lawyer arrives. It will save you time, money, and a few brain cells.

Much of the building of a case can be done, and often must be done, by the regular folks fighting to save the wild. If you depend upon a lawyer to build and win a case for you while you sit on the sidelines, you will fail. As shown in the first part of this guide (*Wild Earth* Fall 1993), you must have standing to sue in court on behalf of the wild. You must be personally and intimately involved with the subject matter of any lawsuit you want to prosecute.

Many environmental problems go through stages. In the initial idea stage, some industry or government department comes up with the idea to exploit some portion of the planet. You will not be privy to this stage. Only once the plans are made public as required by law will you become involved. With projects that involve the federal government in some way, the feds must give the public notice of what they plan to do and allow you to comment. (That is, if you ever see the announcement in the tiny print of the legal section of the newspaper.)

Often, the word leaks about nasty imminent environmental threats, and people organize around stopping the project. By this stage, the bureaucrats and their friendly developers are set on carrying through their nefarious plans. For getting people together and informing them of the plans, no legal assistance is needed. Use your imagination; call meetings; have petition drives, picnics, and bake sales; speak insistently and incessantly (but politely) to every elected official you can find who may have an influence on the forces behind the project you oppose. Study and use Captain Paul Watson's techniques for manipulating the media.² During

*The animals are not so
stupid as is thought:
they have no lawyers*
—anonymous

grassroots organizing and motivating, speak the truth, avoid reckless behavior, and be careful if the other side shows signs of violence.

It's possible to kill a project even during the late stages of the government-approval process. A room full of hundreds of sign-carrying voters exercising their rights of free speech has been known to make sleazy politicians vote against bad projects they had previously pledged to support.³ You must make your votes and anger mean more to the politicians than the industry's money and power. Sometimes you win; more often you don't. Money usually outweighs votes.

Most of us don't know at the outset of a controversy whether or not things will get litigious. Simple problems usually end up resolved without need for a dash to the nearest court house. But always we harbor the suspicion that things might get nasty when developers, the state, or the feds are involved. Then we expect to end up before the judge.

In EVERY environmental dispute, no matter how seemingly small, the intrepid eco-warrior plans ahead. That means, first and foremost: KEEP GOOD FILES!

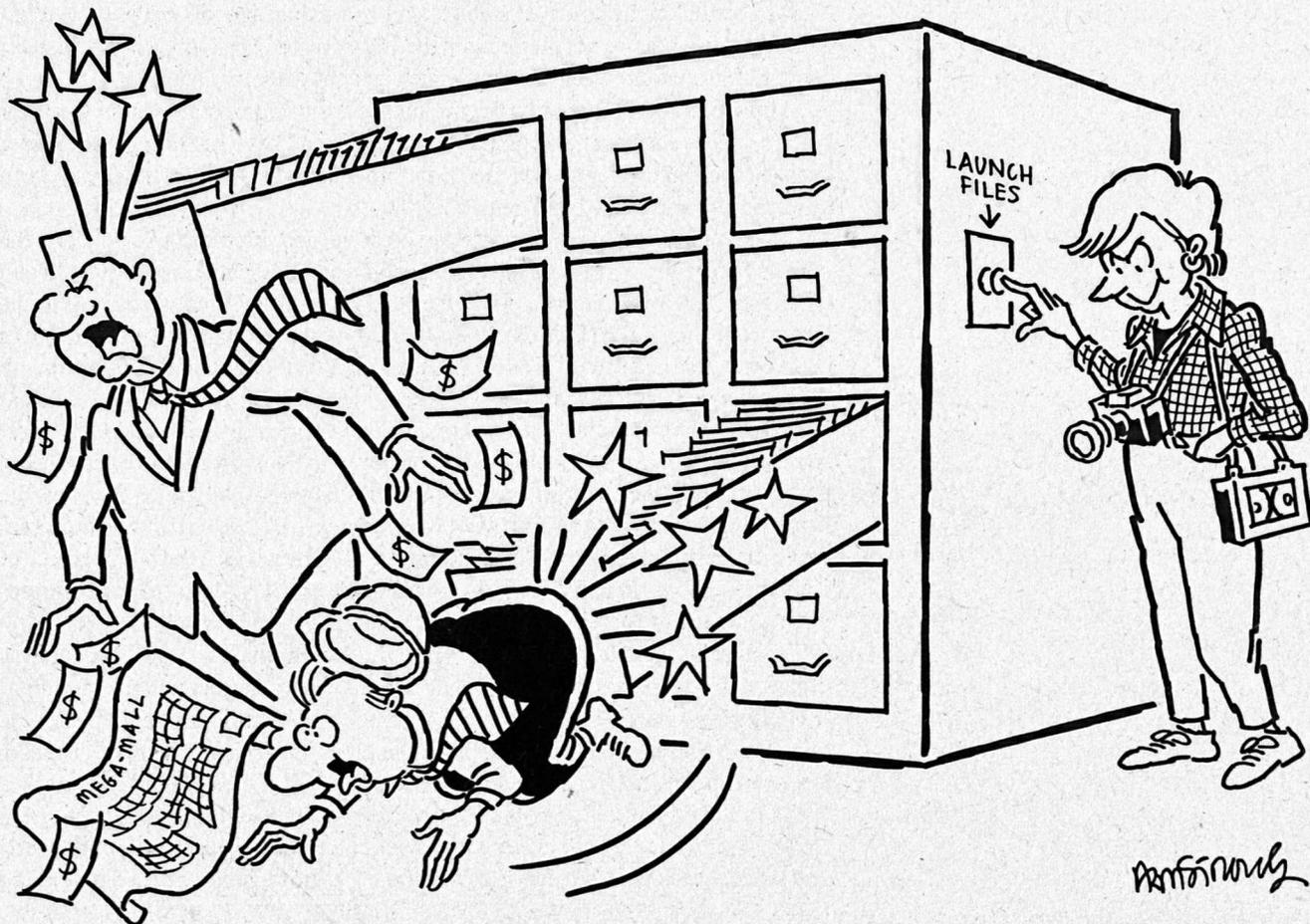
Mudd is notoriously disorganized. Vaughan is the opposite. Mudd's files are known to be the most disarrayed in the business. Vaughan's tend to be a reflection of his innermost brain—neat and orderly. In the end, neatness rules.

Keep a box of manila file folders handy. They're cheap and will simplify your task. Recycled file folders are readily available.

Keep a separate file for every facet of your issue. Let's say you are defending an endangered species from a proposed development. Create a file for biology, broken down into taxonomy, habitat requirements and locations, reproduction, etc. Create other files for such things as adverse impacts to the species, famous quotes, photographs, historical news regarding the species. Get on federal mailing lists for all announcements, press releases, and notices of hearings. It sounds like a pain, but is easy once your "system" is tweaked.⁴

The point is to order your files in such a way that other folks—like a lawyer—can easily make sense of them. In essence, by paying attention to detail from the beginning (long before the word lawsuit materializes), you will be doing what lawyers call "discovery." This is an essential, yet often neglected aspect of environmental law. When you enter the funky halls of justice on behalf of the wild, YOU must be ready to prove your case. That requires EVIDENCE!

We have seen too many decent lawsuits lost for want of credible evidence. You do not win a lawsuit because you are right; you win or lose based on whether the evidence you present persuades the judge to follow the law. If you keep good files, your case will be way ahead of where it would be otherwise.



People who are not aggressive are at a distinct disadvantage in litigation. They are at the mercy of lawyers, either their own or someone else's. Passive behavior gets expensive.

Aggressive types have the advantage in discovery. They do not sit back and see what evidence turns up in the mailbox; they go out and discover the facts.

Long before you hire a lawyer, you should be involved in the events that affect the wild you want to defend. As part of your participation in rallies, public hearings, meetings with bureaucrats and politicians, and confrontations with your opponents, you will acquire documents related to your issue. Keep copies of every piece of potential evidence to prove your standing and to supply the legal basis for a lawsuit. As shown in part two of this guide (*Wild Earth* Winter 1993/94), use of the Freedom of Information Act can open previously locked doors.

Gather other evidence yourself. Photograph everything that might have significance to protecting the wild. Tape record all telephone and in-person conversations with anyone who has anything to do with the project.⁵ Attend public hearings and get copies of the transcripts, if you can afford them; if you cannot, tape record the hearing yourself.

Gathering facts can be fun. We've had folks waltz in our offices (a tiny bar in Birmingham for Mudd, a heavily fortified, impregnable room at home for Vaughan — watch out for the dog!) with armloads of amazing stuff. The really dedicated and savvy eco-warriors will dig until they turn up gold.

For example, back to our endangered species: You have been put on notice that the proposed development is en route. First, contact the US Fish and Wildlife Service, the State Department of Conservation, and the State Natural Heritage Program. Use a simple "request for information" letter. Be sweet, no weird eco-rhetoric.

Next, corroborate all incoming data with knowledgeable folks willing to assist you. Visit the library to read old clipping files. (You'd be surprised what you can learn about your local judges from library clipping files.)

Of course, being a hip eco-warrior, you already frequent the habitat of our endangered critter, taking snazzy photos and communing with nature. Thus you have legal standing. (Again see: *Gonzo Guide Part One*, *Wild Earth* Fall 1993.)

You are placing this fabulous array of facts in your file folders under appropriate headings. Now you are ready to become an "expert" on your subject.

It is essential to comprehend what your files can tell you. You must assimilate "the facts." Spend time learning your material.

Once you have gotten to the bottom of things and your files burgeon with juicy facts, evaluate your options. Ask these questions:

1. Can this issue be settled amicably and out of court?
2. Are things so greed-locked as to necessitate legal action?

The astute reader now realizes the process outlined above is designed to save you a wad of cash. If you do your own research, your lawyer doesn't have to do it. Lawyers charge a

bundle for gathering the facts. Clients are often shocked at how fast their retainers disappear during the "discovery" stage of their case. ["Retainers" are fees paid to engage the services of a professional.]

Don't overlook leads that may not seem directly related to your issue. Video tapes can help. Catching an evil developer with his banker's wife makes for good leverage.

In sum, be creative but thorough. Make friends with those who came before you. Ask them to help you. We've found university professors willing to duplicate their files for us.

Never neglect the social aspects of your issue, including the seemingly innocuous web of personal connections involved. The neighbor's mother might turn out to be our evil developer's secretary. Good source!

If you've assessed the situation and are sure that the only option is judicial intervention, ask yourself these questions:

1. Am I smart (or stupid) enough to trot into court and act as my own lawyer?
2. Do I need to get a lawyer to defend my critter?

If you answered "yes" to number 2, tune in next time for Part Four of the *Gonzo Guide to Environmental Law: Finding Your Own Lawyer*.

¹ First, the mandatory legal disclaimer: nothing in this article is intended to be legal advice to you. Due to the complexities of the law and of each individual situation, no book, article or anything else can substitute for legal advice from a real attorney familiar with the facts of your case.

² Captain Paul Watson, *Earthforce!: An Earth Warrior's Guide to Strategy* (Chaco Press 1993).

³ A landfill planned for the middle of a suburb of Birmingham, Alabama was killed when several hundred angry citizens waving signs showed up at the city council meeting where the permit was to be voted on. Although a majority of the council had already said they supported the dump, they voted it down 6-to-1 after they heard from their constituents.

⁴ Perhaps, one day, the great file freak of all time, Jasper Carlton of the Biodiversity Legal Foundation, will reveal the secrets of his impeccably organized filing routine. Until then, you're on your own. Be creative!

⁵ Check your state laws on recording telephone conversations before doing so. Federal law requires that you obtain the consent of one of the parties to the call before you may record it. Of course, if you are one of the parties, then you have your own permission, but if you are not on the line, get permission from one of the parties before recording. Some state laws have identical requirements; some may have more restrictive ones.

Besides being extraordinarily good looking specimens of southern manhood, Alabama-based barristers Ned Mudd and Ray Vaughan are tireless defenders of natural diversity.

Mapping the Terrain of Hope

Editor's note: This article introduces the area Doug Aberley covers at length in his new book *Boundaries of Home: Mapping for Local Empowerment* (New Society Publishers, 1993). This important work will benefit wildland and bioregional mappers. —JD

by Doug Aberley

Bioregion mapping can be completed in a great variety of ways. Maps can be stitched, woven, danced, sung, or acted. They can also be drawn. Whatever the form of expression chosen, bioregion mapping should be able to explain three important aspects of how localized, sustainable cultures would exist. First, it will define the external boundaries of your "life place," or bioregion. Second, it will help describe the forces of energy within the bioregion which will shape rooted societies. Third, it can begin to hint at the productive capability of the bioregion to supply sustainable harvests of renewable resources.

A BIOREGION MAPPING PROCESS

The following process has been created in a manner that allows a picture of a bioregion to evolve from a number of relatively simple steps. A commitment of time is involved, as is the requirement to learn how to use basic research skills and simple drawing equipment.

EXTERNAL BIOREGION BOUNDARIES

Base Map. Find a map of a scale that allows you to frame an area that you know is larger than the region you consider to be home on an 11" x 17" piece of tracing paper. This should be a planimetric map that shows rivers, settlements, coastlines, and mountain top elevations. Make 20+ copies of this base map. As you progress with these exercises don't be alarmed if you have to change your base map. Mapping a bioregion is very much a trial and error process. Sources of information necessary to complete the various maps can usually be found in university map or geography libraries.

Development of the status quo. Before describing bioregion borders, you need to understand the evolution of existing borders that divide your home region. By understanding how these limits have changed, and how they are presently arbitrarily defined, you will be constantly reminded of the status quo that bioregionalism will change. Draw each on a separate base map:

- historic political boundaries (colonial, military, parish, feudal)
- current political boundaries (nation state, state/province, county/region)
- internal administrative boundaries (tax, electoral, social services, etc.)

Biophysical bioregion definition. To begin to understand the biophysical attributes of your bioregion, mark each of the following on a separate base map:

- Watersheds (largest basin marked first, tributaries in dotted lines)
- Physiographic regions (areas of common elevation and slope)
- Climate regions (as defined by Koppen Classification)
- Vegetation types (pre-industrial distribution best if available)
- Biomes/biogeoclimatic zones/ecoregions (biophysical associations)
- Wildlife (list major species and habitats)
- Geology/geomorphology (rock by origin, type, fault zones)
- Seabed (subsurface features that might logically divide bioregions)
- Major soils (by type or agricultural capability)

Cultural bioregional definition. Bioregionalism is as much about human culture as it is about relationships between other natural phenomena. On separate sheets, draw:

- Aboriginal/traditional territories (ancient territories of tribal peoples)
- Current human use patterns (where population works, uses services)
- Special locations (power spots, vistas, scenic natural features)
- Architectural and construction style (locally common patterns)
- Language/dialect (where the sound of speech changes)
- Bioregion human settlement patterns (historic changes in land use)
- Aboriginal (pre-European in North America, pre-Roman in Europe)
- Pioneer/pre-industrial (before automobiles)
- Industrial (present urbanization)

Bioregion definition process. Sit at a light table and begin to overlay the different maps you have drawn. Use a blank base map sheet to trace all the different demarcations in different colours. Spend a couple of days trying to decipher the biocultural logic of the image that results. Trace a final map with a single boundary that acknowledges as many of the component boundaries as possible. Share this map with friends, and change it as your perceptions of home territory evolve. Bioregion boundaries can include areas that would be shared between neighboring bioregions, so don't despair if divisions are indistinct.

Now simplify the above map.... Welcome home!

INTERNAL CARRYING CAPACITY

A bioregion of particular land, water, climatic, and ecological characteristics will only be able to support so many humans on a sustainable basis. Even though wise use of intermediate technology can boost the sustainability quotient higher, fundamental natural constraints to growth will be respected by bioregional cultures. The following will help show constraints:

- Bioregion climate station key (summary table by station name, latitude and longitude)
- Bioregion microclimate profiles (summary table of reporting station data)
- Bioregion growing seasons (summary table of frost free seasons)
- Bioregion solar income (summary table of average wind speed and degree days)
- Bioregion river discharge cycles (graph of annual water cycle)
- Bioregion human population (graph growth or decline as far back as possible)

SUSTAINABLE ECONOMY

One way to gain an understanding of the productive capacity of your bioregion is to look back at what resources have been historically wrested from the land and sea. This investigation should be completed for the most important resources in your area on a yearly basis as far back in time as you can go. If possible, also put a monetary value on the total amounts of fish, wood, minerals, and agricultural resources extracted. Although the yearly figures will not be totally indicative of what a bioregion economy would provide, they will show where

detailed sustainability research might be focused.

- Fishery extraction (by species numbers and weight)
- Forestry extraction (by species type and volume)
- Mineral extraction (by type and volume)
- Agriculture extraction (by major category and volume or weight)

A FINAL EXHORTATION

The goal of the bioregion vision is to relearn perceptions of land, life, and culture that have been taken or forgotten over the past 200 years of global industrialization. Mapping is a powerful tool that can help achieve this reintegration. Whether or not you undertake the bioregion mapping process outlined here, there is a simple way that mapping can be introduced into your life. Go out and purchase enough 1:50,000 scale Ordnance maps (1 inch of image = 1 mile) so that when they are trimmed and taped together your home is in the centre of a circle approximately 50 miles in circumference. Using coloured pens, mark where streams and trails run, and where settlements are located. Shade in elevation changes, mark historic sites and water and waste systems. In the margins list early and late frosts, or the seasonal sighting of animals. Shade in where agricultural allotments could be placed, or where small hydro or wind powered generators might be sited. Put this map up on a wall in your home where it can be seen, discussed, and marked with new information. You will be amazed at the comments and interest the image you have made will receive. Welcome to bioregional mapping. Welcome to the terrain of hope.

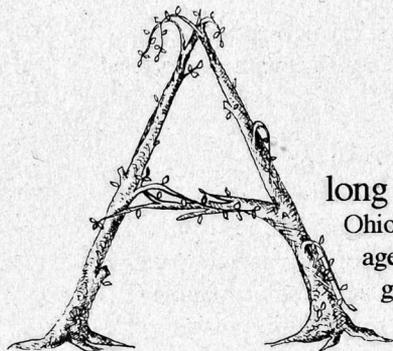
FURTHER RESOURCES

For a more detailed description of bioregional mapping, including references, please see *Boundaries of Home: Mapping For Local Empowerment* (New Society Publishers, c/o IN Book, POB 120470, East Haven, CT 06512).

Doug Aberley is from the valley of the Skeena River in northwest British Columbia. He has worked as a town and regional planner, and is active in the North American bioregional movement. He is editor of Boundaries of Home, and in 1994 will edit a companion volume tentatively titled Futures By Design: The Practice of Ecological Planning.

The Dilemma of Wendell Berry

by Eric Freyfogle



Along the steep banked Kentucky River, not far from where it joins with the Ohio, lies a small, hilly farm of some 75 acres. The farm is uncommonly diverse in this age of specialized agribusiness. There is an orchard and large garden, a woodlot and ground tilled for tobacco, and varied livestock in the pasture and old barn. In the morning the sun rises over the river and the distant hills to bathe the farm in light. From the hilltop, the north-flowing river sprawls on for miles.

This subsistence-level farm is the home of writer-farmer Wendell Berry and his wife Tanya. Berry is a decidedly controversial man, both because of how he lives and what he says. As farmer he tills his ground using draft horses and hand tools — methods that, to the modern mind, appear anachronistic if not downright recalcitrant. As writer he seems to stand equally at the backward edge, for he is a staunch agrarian moralist, with a message that is as anti-modern as it is anti-urban.

Berry's cultural criticism is both profound and sharply barbed, yet he is a rare kind of critic, a refreshing kind, for he is out to build up where he has torn down. He has an alternative culture and economy to offer, which he has described in more than two dozen volumes of essays, poetry, and fiction. It is an alternative based on localism, small scale, independence, thrift, and a hard-working life so close to nature as to blend into it; it is an alternative that appears, not just in his writing, but in his life on the farm, in the eroded hills and sagging society around his north Kentucky home.

*What bond have I made with the earth,
having worn myself against it?*

—Wendell Berry¹

If we were to take a single photograph of Berry, just one picture to size up the man, we would be tempted to catch him behind his horse, plow in hand, tilling his garden or tobacco patch the old way. The shock value would be high, in this day of eight-ton tractors and \$200,000 combines. We would come closer to capturing him, however, with a far different picture, a more reflective, somber one, a picture of Berry standing up on the ridge above his farmhouse, looking out at the river as it moves slowly and powerfully toward the Ohio. In his hand would be a clod of dirt, the clay-laden soil of the hillside. His gaze would be on the river, heavy with silt from strip mines and ill-tended farms upstream. We might catch him watching a powerboat cruising the river, symbol of the noisy, consumptive, high-tech leisure that he disdains. Here and there would be the ever-present trash that the river must bear, product and proof of the throw-away age. We would see in his face what we sense in his writing, a man saddened by what he sees, and determined to have no part in it.

Editor's note: This essay is excerpted from a lengthier piece to be published in the fall of 1994 by *University of Illinois Law Review*. The author offers to send copies of the larger article, free, to readers who request it. Write Eric Freyfogle, 504 E Pennsylvania Ave., Champaign, IL 61820. —JD

¹ *Farming: A Handbook* (New York: Harcourt Brace Jovanovich, 1970), p.4. Wendell Berry

It is hard to figure out how to deal with a man like Wendell Berry for he is so contrary yet so persuasive, so combative yet so peaceful, so dreary yet so full of hope. Berry's concern is with how a man can go about living on earth without degrading it. We could place him, then, in the large and familiar category of environmental writers. But he fits poorly with this group and chafes at the label. We could shift him a bit and call him a writer on sustainable agriculture, one of the new breed of farmers who seek to use the land without sapping its vitality. Here we are on safer ground, for Berry is good friends with Wes Jackson, the pioneering researcher at the Land Institute in Kansas who works to find new field crops that nourish the soil. Yet even here Berry is not at home.

Berry is no botanist or biologist or soil scientist or any other breed of researcher, however much he knows of organic farming. His terrain as writer is the human heart and mind, the ways that people imagine and inhabit the land, the ways that people and land come together. Farming is part of what Berry is about, but there is far more than farming to the problems he attacks and to the stern solutions he prescribes.

Berry's writing carries the tone of a man

of great confidence, a man who believes he has uncovered true wisdom and is ready to share it. But stress lies close beneath the surface, aided if not brought on by the jarring clash between Berry's Southern, hill-country heritage and the greed-driven motives of the modern age. Like moralists before him, Berry has worked hard to live a principled life, as free as possible from ethical taint. But what can the moral life

mean in an age of widespread environmental decline, when the structures of human society are so divorced from the natural order, when nearly every act of producing and consuming ties us into an economic system that fouls and diminishes the land? A moral life was challenge enough when it meant living right with fellow humans and with God. But as Wendell Berry sensed even before returning to his home country, living right with nature must now be part of the moral order, and it must mix together with the other parts of that order in a way that makes division seem unthinkable.

As Berry has sought to create a moral life, he has faced a troubling choice. How can a person live in society and be part of it, helping in some small way to steer a more sensible course, without being morally diminished by its evils? How is a person to give shape to a life upon realizing that the societal changes needed are not incremental, but fundamental and radical? To work within a system is inevitably to acquiesce in small steps and in the vocabulary and metaphors of the age. When new modes of thought become essential, is it right for the individual to stay within the ailing culture and push for change all the harder, or is the better approach, the salvational approach, to cut all ties from it and pursue a separate, purer way? Indeed, is it possible that the push for incremental change might only postpone the day of collapse and hence the beginning of a second chance?

Puritan colonists confronted a version of this persistent dilemma in seventeenth century Massachusetts, as they cast off from corrupt England and sought moral purity and new life in a distant land. (The story of the early Puritan settlement is told in Edmund Morgan's *The Puritan Dilemma*; Boston: Little Brown, 1958, from which I have borrowed the idea for the title of this chapter.) In varying terms the dilemma would haunt later generations of American moralists, as public religion faded from the scene, as slavery took its toll, as the engines of industry cut a swath through the traditional rural order. Wendell Berry shouldered this dilemma as his own, as he confronted the physical decline of the natural world around him and the spiritual estrangement of its human inhabitants.

Lanes Landing Farm, the Berrys' home, is a place Wendell Berry knew as a youth,



Where Thoreau
went for a visit,
Berry has gone
to stay...

though it had never been owned by any of his ancestors. By the time he became its owner and caretaker, years of poor farming—tilling land that should never have been tilled—had sent much of the farm's topsoil down the river. The land had largely been abandoned from productive use. "Where yellow clay is at the surface now," Berry would later observe wistfully, "five feet of good soil may be gone." (*Recollected Essays: 1965-1980*, San Francisco: North Point Press, 1981) This loss—the accumulated fertility of the ages—rarely leaves Berry's mind, even now. The loss has helped account for the melancholic, elegaic, at times angry tone that is a hallmark of his writing. As he would put it: "If a people in adding a hundred and fifty years to itself subtracts fifty thousand from its land, what is there to hope?" (Ibid.)

Not far up the hill from Lanes Landing Farm sits the small town of Port Royal. The town never was much of a port and today even lacks a respectable landing at the river. Like many small towns across the rural countryside, Port Royal just barely hangs on, trying its best to survive the economic forces and social fashions that seem determined to knock it down. Once a place of many stores, few now remain; once a place where people gathered, cars now head down sturdier roads to larger towns and regional malls.

Although Berry deviates from the Southern tradition in many ways—he rejects, for instance, the paternalistic, chivalrous, militaristic strands—he retains a native focus on the local and particular, on his own small town and patch of dirt. In one essay he challenges the popular environmental slogan, "think globally, act locally," because it conflicts, he states, with the essential need to focus on the particular. ("Out of Your Car, Off Your Horse," *The Atlantic*, Feb. 1991, p.61.) The local-action half of the slogan is sound. But global thinking yields generalizations that are detached from any particular acre, and hence useless for all acres everywhere. The care of the earth must begin at the bot-

tom level, in every household and neighborhood, with local, practical answers. "A man who is willing to undertake the discipline and the difficulty of mending his own ways," he contends, "is worth more to the conservation movement than a hundred who are insisting merely that the government and the industries mend *their* ways." (*A Continuous Harmony*, p.81.)

Many observers have drawn parallels between Berry and Thoreau, portraying Lanes Landing Farm as a kind of Southern, hill-country Walden. But the comparison is largely inapt, or at least misleading in a way that clouds the peculiar drama that has been Berry's moral quest. Where Thoreau went for a visit, Berry has gone to stay; where Thoreau went to dabble with real nature—caring more for its metaphysics than its physics—Berry has gone for practical advice, for lasting ways of living that foster health for the body, fertility for the land, and a sense of connection and contentment for the human soul.

Berry highlights this difference—and shows just how contrary minded and strong willed he can be—in a short poem in his collection, *A Part*. There, he criticizes the message of Robert Frost's beloved poem, "The Pasture." Frost tells the reader that he is "going out to clear the pasture spring" and "out to fetch the little calf." "I sha'n't be gone long," Frost invites, "You come too."

Berry's invitation to his readers is as different as he can make it, in message and in tone. His trip to the fields and the woods is a lasting one, no temporary, romantic jaunt for rejuvenation, for these are the places where he lives and where he will die. Berry will wait in the fields, he tells us, "to see how well the rain/ brings on the grass"; he will stand in the woods to watch the old trees move "with the wind/ and then with gravity."

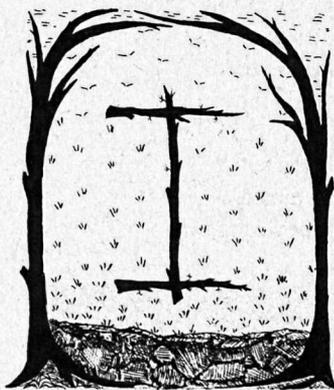
"Don't come with me," he warns. "You stay home too." (*A Part*, San Francisco: North Point Press, 1980, p.3.)

Eric Freyfogle is a law professor at the University of Illinois at Urbana-Champaign. His book Justice and the Earth was published in 1993 by the Free Press, and his essay, "The Language of Owning" was published in Vol. 2, #2 of Wild Earth.



A Walk Down Camp Branch

by Wendell Berry



start down from one of the heights of the upland, the town of Port Royal at my back. It is a winter day, overcast and still, and the town is closed in itself, humming and muttering a little, like a winter beehive.

The dog runs ahead, prancing and looking back, knowing the way we are about to go. This is a walk well established with us—a route in our minds as well as on the ground. There is a sort of mystery in the establishment of these ways. Any time one crosses a given stretch of country with some frequency, no matter how wanderingly one begins, the tendency is always toward habit. By the third or fourth trip, without realizing it, one is following a fixed path, going the way one went before. After that, one may still wander, but only by deliberation; and when there is reason to hurry, or when the mind wanders rather than the feet, one returns to the old route. Familiarity has begun. One has made a relationship with the landscape, and the form and the symbol and the enactment of the relationship is the path. These paths of mine are seldom worn on the ground. They are habits of mind, directions and turns. They are as personal as old shoes. My feet are comfortable in them.

From the height I can see far out over the country, the long open ridges of the farmland, the wooded notches of the streams, the valley of the river opening beyond, and then more ridges and hollows of the same kind.

Underlying this country, nine hundred feet below the highest ridgetops, more than four hundred feet below the surface of the river, is sea level. We seldom think of it here; we are a long way from the coast, and the sea is alien to us. And yet the attraction of sea level dwells in this country as an ideal dwells in a man's mind. All our rains go in search of it and, departing, they have carved the land in a shape that is fluent and falling. The streams branch like vines, and between the branches the land rises steeply and then rounds and gentles into the long narrowing fingers of ridgeland. Near the heads of the streams even the steepest land was not too long ago farmed and kept cleared. But now it has been given up and the woods is returning. The wild is flowing back like a tide. The arable ridgetops reach out above the gathered trees like headlands into the sea, bearing their human burdens of fences and houses and barns, crops and roads.

*Editor's note: "A Walk Down Camp Branch" is from *Traveling At Home* by Wendell Berry, ©1988 by Wendell Berry. It is reprinted by permission of the author and North Point Press, a division of Farrar, Straus & Giroux, Inc.*

Looking out over the country, one gets a sense of the whole of it: the ridges and hollows, the clustered buildings of the farms, the open fields, the woods, the stock ponds set like coins into the slope. But this is a surface sense, an exterior sense, such as you get from looking down on the roof of a house. The height is a threshold from which to step down into the wooded folds of the land, the interior, under the trees and along the branching streams.

I pass through a pasture gate on a deep-worn path that grows shallow a little way beyond, and then disappears altogether into the grass. The gate has gathered thousands of passings to and fro that have divided like the slats of a fan on either side of it. It is like a fist holding together the strands of a net.

Beyond the gate the land leans always more steeply toward the branch. I follow it down, and then bear left along the crease at the bottom of the slope. I have entered the downflow of the land. The way I am going is the way the water goes. There is something comfortable and fitfeeling in this, something free in this yielding to gravity and taking the shortest way down.

As the hollow deepens into the hill, before it has yet entered the woods, the grassy crease becomes a raw gully, and along the steepening slopes on either side I can see the old scars of erosion, places where the earth is gone clear to the rock. My people's errors have become the features of my country.

It occurs to me that it is no longer possible to imagine how this country looked in the beginning, before the white people drove their plows into it. It is not possible to know what was the shape of the land here in this hollow when it was first cleared. Too much of it is gone, loosened by the plows and washed away by the rain. I am walking the route of the departure of the virgin soil of the hill. I am not looking at the same land the firstcomers saw. The original surface of the hill is as extinct as the passenger pigeon. The pristine America that the first white man saw is a lost continent, sunk like Atlantis in the sea. The thought of what was here once and is gone forever will not leave me as long as I live. It is as though I walk knee-deep in its absence.

The slopes along the hollow steepen still more, and I go in under the trees. I pass beneath the surface. I am enclosed, and my sense, my interior sense, of the country becomes intricate. There is no longer the possibility of seeing very far. The distances are closed off by the trees and the steepening walls of the hollow. One cannot grow familiar here by sitting and looking as one can up in the open on the ridge. Here the eyes become dependent on the feet. To see the woods from the inside one must look

and move and look again. It is inexhaustible in its standpoints.

Whenever one goes along the streams of this part of the country, one is apt to come upon old stonework. There are walled springs and pools. There are the walls built in the steeper hollows where the fences cross or used to cross; the streams have drifted dirt in behind them, so that now where they are still intact they make waterfalls that have scooped out small pools at their feet. And there used to be miles of stone fences, now mostly scattered and sifted back into the ground.

Considering these, one senses a historical patience, now also extinct in the country. These walls were built by men working long days for little wages, or by slaves. It was work that could not be hurried at, a meticulous finding and fitting together, as though reconstructing a previous wall that had been broken up and scattered like puzzle pieces. The wall would advance only a few yards a day. The pace of it could not be borne by most modern men, even if the wages could be afforded. Those men had to move in closer accord with their own rhythms, and nature's, than we do. They had no machines. Their capacities were only those of flesh and blood. They talked as they worked. They joked and laughed. They sang.



The work was exacting and heavy and hard and slow. No opportunity for pleasure was missed or slighted. The days and the years were long. The work was long. At the end of this job the next would begin. Therefore, be patient. Such pleasure as there is, is here, now. Take pleasure as it comes. Take work as it comes. The end may never come, or when it does it may be the wrong end.

Now the men who built the walls and the men who had them built have long gone underground to be, along with the buried ledges and the roots and the burrowing animals, a part of the nature of the place in the minds of the ones who come after them. I think of them lying still in their graves, as level as the sills and thresholds of their lives, as though resisting to the last the slant of the ground. And their old walls, too, re-enter nature, collecting lichens and mosses with patience their builders never conceived.

I have already passed the place where water began to flow in the little stream bed I am following. It broke into the light from beneath a rock ledge, a thin glittering stream. It lies beside me as I walk, overtaking me and going by, yet not moving, a thread of light and sound. And now from below comes the steady tumble and rush of the water of Camp Branch—Whose nameless camp was it named for?—and gradually as I descend the sound of the smaller stream is lost in the sound of the larger.

The two hollows join, the line of the meeting of the two spaces obscured even in winter by the trees. But the two streams meet precisely as two roads. That is, the stream *beds* do; the one ends in the other. As for the meeting of the waters, there is no looking at that. The one flow does not end in the other, but continues in it, one with it, two clarities merged without a shadow.

All waters are one. This is a reach of the sea, flung like a net over the hill, and now drawn back to the sea. And as the sea is never raised in the earthly nets of fishermen, so the hill is never caught and pulled down by the watery net of the sea. But always a little of it is. Each of the gathering strands of the net carries back some of the hill melted in it. Sometimes, as now, it carries so little that the water flows clear; sometimes it carries a lot and is brown and heavy with it. Whenever greedy or thoughtless men have lived on it, the hill has literally flowed out of their tracks into the bottom of the sea.

There appears to be a law that when creatures have reached the level of consciousness, as men have, they must become conscious of the creation; they must learn how they fit into it and what its needs are and what it requires of them, or else pay a terrible penalty: the spirit of the creation will go out of them,

and they will become destructive; the very earth will depart from them and go where they cannot follow.

My mind is never empty or idle at the joinings of streams. Here is the work of the world going on. The creation is felt, alive and intent on its materials, in such places. In the angle of the meeting of the two streams stands the steep wooded point of the ridge, like the prow of an upturned boat — finished, as it was a thousand years ago, as it will be in a thousand years. Its becoming is only incidental to its being. It will be because it is. It has no aim or end except to be. By being, it is growing and wearing into what it will be. The fork of the stream lies at the foot of the slope like hammer and chisel laid down at the foot of a finished sculpture. But the stream is no dead tool; it is alive, it is still at its work. Put your hand to it to learn the health of this part of the world. It is the wrist of the hill.

Perhaps it is to prepare to hear some day the music of the spheres that I am always turning my ears to the music of streams. There is indeed a music in streams, but it is not for the hurried. It has to be loitered by and imagined. Or imagined *toward*, for it is hardly for men at all. Nature has a patient ear. To her the slowest funeral march sounds like a jig. She is satisfied to have the notes drawn out to the lengths of days or weeks or months. Small variations are acceptable to her, modulations as leisurely as the opening of a flower.

The stream is full of stops and gates. Here it has piled up rocks in its path, and pours over them into a tiny pool it has scooped at the foot of its fall. Here it has been dammed by a mat of leaves caught behind a fallen limb. Here it must force a narrow passage, here a wider one. Tomorrow the flow may increase or slacken, and the tone will shift. In an hour or a week that rock may give way, and the composition will advance by another note. Some idea of it may be got by walking slowly along and noting the changes as one passes from one little fall or rapid to another. But this is a highly simplified and diluted version of the real thing, which is too complex and widespread ever to be actually heard by us. The ear must imagine an impossible patience in order to grasp even the unimaginableness of such music.

But the creation is musical, and this is a part of its music, as bird song is, or the words of poets. The music of the streams is the music of the shaping of the earth, by which the rocks are pushed and shifted downward toward the level of the sea.

And now I find an empty beer can lying in the path. This is the track of the ubiquitous man Friday of all our woods. In my walks I never fail to discover some sign that he has preceded me. I find his empty

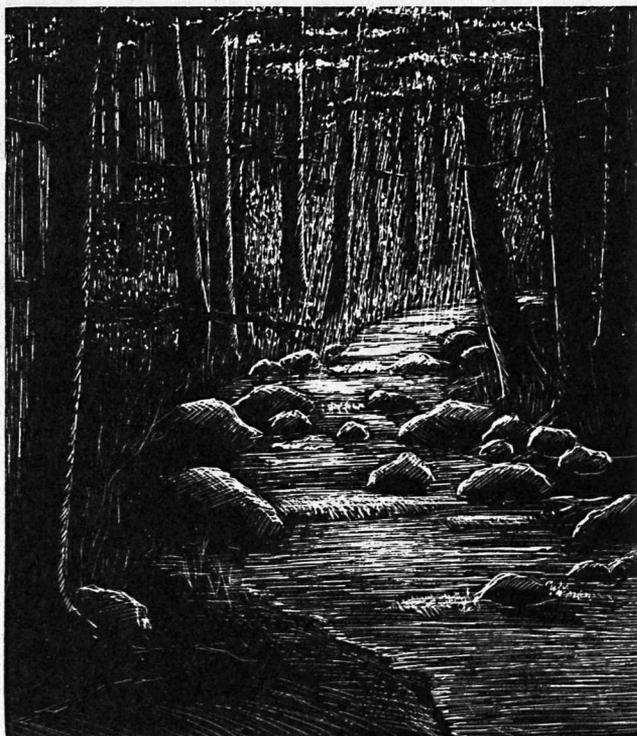
*The thought
of what was
here once and
is gone forever
will not leave
me as long as
I live. It is as
though I walk
knee-deep in
its absence.*

shotgun shells, his empty cans and bottles, his sandwich wrappings. In wooded places along roadsides one is apt to find, as well, his overtraveled bedsprings, his outcast refrigerator, and heaps of the imperishable refuse of his modern kitchen. A year ago, almost in this same place where I have found his beer can, I found a possum that he had shot dead and left lying, in celebration of his manhood. He is the true American pioneer, perfectly at rest in his assumption that he is the first and the last whose inheritance and fate this place will ever be. Going forth, as he may think, to sow, he only broadcasts his effects.

I stoop between the strands of a barbed-wire fence, and in that movement I go out of time into timelessness. I come into a wild place. The trees grow big, their trunks rising clean, free of undergrowth. The place has a serenity and dignity that one feels immediately; the creation is whole in it and unobstructed. It is free of the strivings and dissatisfactions, the partialities and imperfections of places under the mechanical dominance of men. Here, what to a housekeeper's eye might seem disorderly is nonetheless orderly and within order; what might seem arbitrary or accidental is included in the design of the whole; what might seem evil or violent is a comfortable member of the household. Where the creation is whole nothing is extraneous. The presence of the creation here makes this a holy place, and it is as a pilgrim that I have come. It is the creation that has attracted me, its perfect interfusion of life and design. I have made myself its follower and its apprentice.

One early morning last spring, I came and found the woods floor strewn with bluebells. In the cool sunlight and the lacy shadows of the spring woods the blue-

*I go out of
time into
timelessness.
I come into
a wild place.*



Though as a man I inherit great evils and the possibility of great loss and suffering, I know that my life is blessed and graced by the yearly flowering of the bluebells.

ness of those flowers, their elegant shape, their delicate fresh scent kept me standing and looking. I found a delight in them that I cannot describe and that I will never forget. Though I had been familiar for years with most of the spring woods flowers, I had never seen these and had not known they were here. Looking at them, I felt a strange loss and sorrow that I had never seen them before. But I was also exultant that I saw them now — that they were here.

For me, in the thought of them will always be the sense of the joyful surprise with which I found them — the sense that came suddenly to me then that the world is blessed beyond my understanding, more abundantly than I will ever know. What lives are still ahead of me here to be discovered and exulted in, tomorrow, or in twenty years? What wonder will be found here on the morning after my death? Though as a man I inherit great evils and the possibility of

great loss and suffering, I know that my life is blessed and graced by the yearly flowering of the bluebells. How perfect they are! In their presence I am humble and joyful. If I were given all the learning and all the methods of my race I could not make one of them, or even imagine one. Solomon in all his glory was not arrayed like one of these. It is the privilege and the labor of the apprentice of creation to come with his imagination into the unimaginable, and with his speech into the unspeakable.

Farmer and writer Wendell Berry is the author of numerous books of essays, novels, and poetry, including The Unsettling of America, The Gift of Good Land, What Are People For? and Nathan Coulter. His latest book, a collection of poems, is Entries. He recently received the Orion Society's John Hay award for his writing.

Regenerating Bush and Soul in Australia

by John Seed

A method has been developed in Australia for regenerating native bush. It is named the Bradley Method after the two sisters, now deceased, who devised it.

Should it be our wish to bring back the native vegetation that once covered a particular piece of Earth, the Bradley sisters found no heroic tree planting measures are needed. Rather, we must simply remove all foreign influences while causing the minimum possible disturbance to whatever native vegetation still exists.

Thus, the first step may be to fence off the area we have chosen, to keep out cows or goats. It may also be necessary to take steps to prevent fire from invading the land. We must then identify all species of plants that we encounter, both the exotics and those native to the area. We need to recognize them not only in their mature form but also when their seedlings first poke out of the ground. Then the method is simple: remove the exotics without treading on the natives. Encouraged in this way, the native species begin to come back, growing stronger each ensuing season.

The other basic rule is, start from the strength. Deep scars may be in the area we wish to heal, erosion gullies perhaps, and we may wish to immediately tend to these. We must resist this temptation and start from the strongest expression of native vegetation in our management area.

If our area is an inner-city park that has been lawn for a century, we may begin with a tiny patch that the mower couldn't reach and where a few native weeds flourish. If a forgotten corner has a few pioneer tree seedlings, we start there. Carefully stepping backwards, removing exotics as we go, we invite the bush to follow. It is painstaking work; but each year, the process accelerates as the native intelligence of the place emerges and the life-force quickens.

More and more species emerge as the conditions necessary for their growth are recreated. As one species of pioneer completes its work in, say, repairing the soil with shade and leaf mulch, it becomes fewer and is succeeded by the next. The microclimate slowly changes and after perhaps seven years of this patient rewarding service, we find to our astonishment a seedling emerging of a climax species that has not been seen here in the city for 100 years. Was the seed dropped by a bird alighting in the branches of a pioneer now reaching 100 feet above? Is it possible that the seed lay dormant in the ground once the area was cleared, waiting for suitable conditions? We will never know.

And when the accelerating advance of the native bush finally reaches that erosion gully, the bush now has the vigor and the necessary species to recolonize and reintegrate the site.

There is something very spiritual about the Bradley Method. Encoded within it is a deep trust in the native intelligence of the Earth: She knows what is to grow in this place and also knows, unerringly, the particular stages of succession that will best take us from the present state of degradation back to the original Nature of the place.

In my travels, I have encountered systems akin to the Bradley Method in several different countries. I found one example as I traveled around India in 1987 lecturing on rainforest conservation and deep ecology. In Bhopal I visited an enlightened forester named Chaturdevi, who was a professor at the new school of forestry, established in that city a few years before. His school had been granted a couple thousand acres; and the first thing he had done, before the first brick was laid for the school buildings, was to fence the land. It was at that time a desolate thorny desert denuded by goats and recurrent fires set by the goat herders to encourage succulent new growth.

A longer version of the following is to be published in the anthology, *The Soul of Nature*, from Earth Trust Foundation (EarthWays Spirit and Nature Book Project, c/o Georgianne Cowan, 2120 Balsam Avenue, Los Angeles, CA 90025). The book's content will be culturally diverse, exploring our spiritual connection to nature.

Chaturdevi hired armed guards to keep these at bay. The first task he gave his students was to inventory the vegetation growing there. In the beginning, they discovered stunted remnants of a few tree species which had managed to survive the former regime.

By the time I saw the land four years later, more than 80 species had re-emerged and vegetation was accelerating back toward climax status. The armed guards were still there.

In many other places, from Russia to the United States, I have found understandings akin to the Bradley Method emerging independently and unbeknownst to each other. Perhaps it should come as no surprise. Perhaps this phenomenon is itself a manifestation of the Bradley Method, only working here on the level of the human psyche rather than the biology of a landscape—we ourselves grow from the soil, are made of the soil. The most appropriate metaphors for understanding the psyche are biological. Techniques that facilitate the return of native vegetation may also help us understand how wild common sense can return to the denuded mind. The spontaneous emergence of the Bradley Method in different places around the world can be seen as an expression of the return of a trust in Nature after centuries of human arrogance.

What I first learned of by the name "Bradley Method," then, may be one stage in the succession of the return of native wisdom and humility to the clearcut modern mind. The rejection of anthropocentrism has been termed "deep ecology."

One of the understandings of deep ecology is that the sense shared by most modern humans of being isolated, alienated and separate from Nature is illusory. In fact, we are Earthlings. We have evolved on this planet for 4000 million years of organic life and are made of earth.

Our soul, too, our psyche, is Earth-born, emerging from the exquisite biology of this planet, continuous with it. The ubiquitous illusion of separation springs from the false ideas of human "otherness" and superiority that thousands of years of Judeo-Christian and other traditions have created within us.

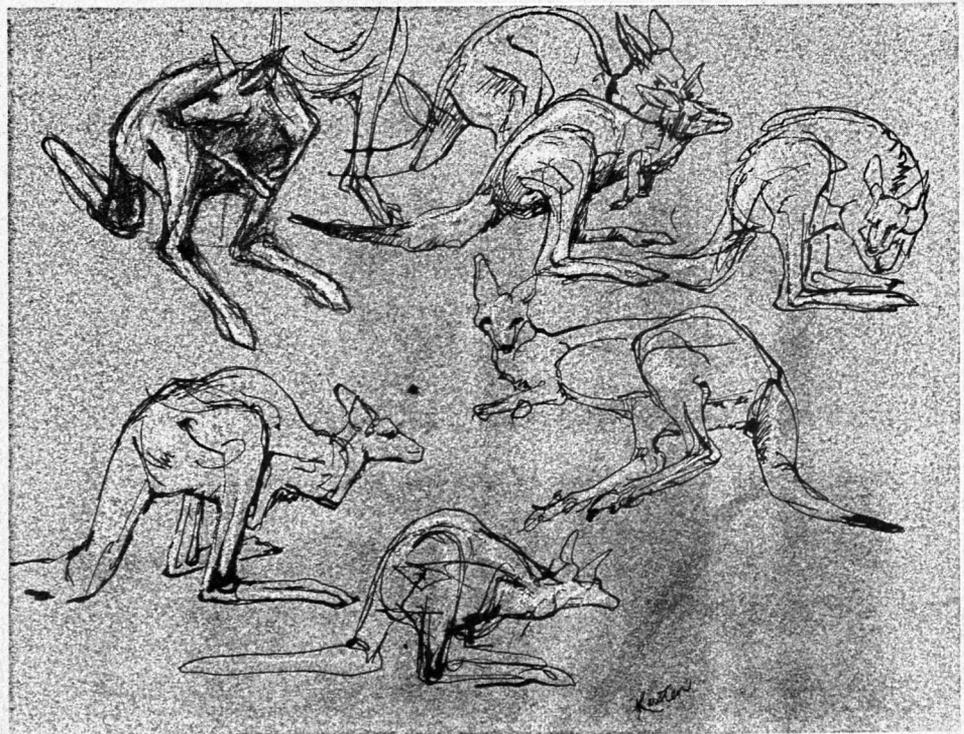
As we root out these pernicious false ideas of our own grandeur and importance, we "fall in love outwards" (Jeffers), and the truth spontaneously emerges of who we really are, "plain members of the biota" (Leopold). As the exotic influence of the dominant paradigm recedes, we realize that "Nature knows best" (Commoner).

When we see the Bradley Method as being equally appli-

cable in the reawakening of Native human intelligence and the re-emergence of a biological ecosystem, several corollaries suggest themselves. First, we don't need to plant new ideas in each others' minds. If we can root out the alien ideas, ecological insight springs forth spontaneously. We need to know ourselves, to create an inventory of our mind, to learn to recognize the ideas, feelings, habits, blockages that prevent us from experiencing our unity with Nature. Which parts of us are harmonious with our larger system? How can we compassionately root out destructive habits and conditioned ideas without unnecessary disturbance and self-hatred?

Second, start with the strength: there's nothing wrong with preaching to the choir. In fact, it is more important to strengthen the experience of deep ecology among those who already love Nature and work for the Earth than to waste energy trying to convince the CEO of Exxon about the importance of a biocentric ethic. Strengthening ecological empathy and insights within the conservation community will make it ever stronger and more capable of making inroads into corporate culture, the Vatican, and other bastions of anthropocentrism.

John Seed is the founder of Rainforest Information Centre (POB 368, Lismore, NSW 2480, Australia), and a global leader in Councils of All Beings. For more information on the Bradley Method, read Bringing Back The Bush — The Bradley Method Of Bush Regeneration, by Joan Bradley, published by Lansdown Press, Sydney, 1988.



Carrying Capacity and the Death of a Culture

A Tale of Two Autopsies

by William R. Catton Jr

ABSTRACT

Issues associated with the phrase "sustainable development" are clarified by careful analysis of the meaning of carrying capacity. In their impressions of carrying capacity's effects, two explanations for the death of a memorable culture (Easter Island) differed fundamentally. One explanation was captive to a premature notion of a carrying capacity ceiling no population growth could ever penetrate. For the other, population was seen as having grown until it did exceed the maximum sustainable load, thus having inflicted environmental damage that reduced carrying capacity. The former view had to imagine a geological catastrophe to account for the death. In the latter view, it was a case of excessive success proving fatal. A proponent of the latter view regarded Easter Island as a "preview in microcosm" of what may be happening globally. As such, the Easter Island experience would have important implications for the social sciences.

INTRODUCTION

The phrase "sustainable development" transcended mere buzzword status to become the theme for 180 national delegations convening in June 1992 at the United Nations Conference on Environment and Development. This Earth Summit in Rio de Janeiro brought together more heads of government than had ever gathered for any previous purpose. It issued *Agenda 21*, an 800-page plan for pursuing sustainable development, and adopted a 27-point Rio Declaration of sustainable development principles (Abramson 1992).

While the conference was hailed as both a success (Yulsman 1992) and as a "massive failure" (Irvine and Ponton 1992; Sharma 1992), it is evident that sustainable development had different meanings for different people (see, for example, Smith 1992). It was thus possible for ethnocentric myopia to persist. In the industrialized countries, governments continued to regard sustainable development as a practice not obligatory for themselves but necessary only for nonindustrial nations (Herstgaard 1992).

Can development or "industrialization" ever really be sustainable? Ecologically speaking, is the phrase an oxymoron (Stone 1992, p. xi)? For sociologists, these questions should bring to mind Herbert Blumer's contention that inadequate concepts are the main difficulty in attaining a "close and self-correcting relation" between social theory and the empirical world. Relying on ambiguous concepts, he wrote, "keeps theory in [an] unrealistic realm" (Blumer 1954, p. 9)

*Overshooting
carrying capacity
can destroy a flourishing
culture. Collapse can be
imminent just when the culture
seems most successful.*

Editor's note: A longer version of this article appeared in *Sociological Inquiry*, Vol. 63, No. 2, May 1993 (published by University of Texas Press, POB 7819, Austin, TX 78713). The longer version includes endnotes, elaborating on some of the ideas and sources in this paper. —JD

OVERCOMING CONCEPTUAL AMBIGUITY

Crossing disciplinary boundaries sometimes enhances clarity. In regard to sociology, Wisniewski (1980) traced biological scientists' development of an ecological concept having sustainability as its core element; he called it a "time-dependent carrying capacity concept." Its discernment has been difficult even for the giants upon whose shoulders we can now seek to stand. It is a concept that became essential for comprehending the major change in our time.

Human loads that exceed carrying capacity stress ecosystems. Ecological stresses translate into economic problems. These, in turn, produce social stresses such as hunger, demoralization, forced migration, higher infant mortality, and reduced life expectancy (Brown 1981, p. 132) or sharpened group conflict, sometimes leading to repressive government (Milbrath 1989, p. 37). Accordingly, the relevance of the concept of carrying capacity in the social sciences has begun to be recognized (see Burch 1971, p. 49; Boulding 1978, pp. 63, 97; Dunlap 1980, p. 7; Humphrey and Buttel 1982, p. 42; Campbell 1985, pp. 140-48; Milbrath 1989, p. 37).

But the usage of carrying capacity in the social sciences has often been seriously flawed. The time dimension—sustainability—is often neglected. This is the flaw the present study will address. Campbell (1985, p. 12), for example, defined an environment's carrying capacity as "the use level beyond which no major population increase will occur." Plausible as that definition may seem, the fact is that growing population loads do sometimes overshoot their environments' capacities to sustain them (Catton 1980). Moreover, Campbell's definition fails to make explicit the problem of anthropogenic damage to the ecosystems upon which human societies depend. Such damage induces eventual load-reduction processes, even including die-off. As Wisniewski (1980, p. 55) lamented, when social scientists neglect carrying capacity's time dimension, it changes the meaning of the concept, depriving it of an essential component as developed among biological scientists. Instead of "the maximum population that a given resource base can sustain *indefinitely*, sociologists have focused," he said, "on the maximum that can be achieved in the short run." The aim of this paper is to demonstrate how fundamental that difference can be.

CULTURAL MORALITY

The social sciences have, in effect, practiced "a denial of the possibility that humans might *fail* to adapt to changing environmental conditions, including changes brought about by human impact" (Dunlap 1980, p. 7). Cultures *have* died. According to Feshbach and Friendly (1992), "When historians finally conduct an autopsy on Soviet Communism, they may reach the verdict of death by ecocide." A culture's death should challenge social scientists to try to understand what caused the once-flourishing institutions to fail. Why and how did the culture perish? Even if only in quest of reassurance that this need

not happen to us because our culture is "different" and our society "stronger," an earnest mind will occasionally produce an epic cultural autopsy. A classic example appeared just when the United States was emerging as the first new nation: *The Decline and Fall of the Roman Empire* (see Gibbon 1946, pp. 1221-22).

What we believe caused a culture's death could usefully influence the way we pursue our own culture's goals, just as a relative's death from lung cancer may change one's tolerance of cigarette advertising. Autopsies of cultures can be enlightening, especially if we depart from Durkheim's (1950) rules and recognize that it is not just *social* facts that can be external and coercive. Ecological facts can also be extremely important for a cultural autopsy.

Two very different published autopsies for the dead culture of Easter Island are compared in the following pages. They were published almost half a century apart, and it would be pointlessly superficial merely to declare the later one more methodologically sophisticated or ethnologically better informed. That sort of difference is not the focal concern of this comparison. It is much more instructive to examine the particular difference in ecological insight that distinguishes the two accounts. Both authors recognized that Easter Island's territory implied limited population-supporting resources. Neither account was constrained by Durkheim's (1950, p. 145) insistence that "a social fact can be explained only by another social fact" (because their authors did not happen to be sociologists) so each saw that major social consequences could flow from resource limits. It was in their understanding of the then inchoate carrying capacity concept that the two differed fundamentally. One author saw carrying capacity as an impenetrable population ceiling; the other author saw it as a threshold that could be unsustainably overshoot.

Because of this difference, one of the autopsies offered no guidance to non-Easter Islanders for avoiding an equivalent demise, whereas the other autopsy could be significant as a warning to the world today (and a validation of the need for that Earth Summit). An implicit conception of carrying capacity devoid of the sustainability-over-time element made implausible to one investigator what became evident to the other—that a population sufficiently numerous to have done prodigious amounts of monument construction could have inhabited the island for a while, at the cost of destroying its later capability of even supporting much reduced numbers.

CARRYING CAPACITY: The Essential Concept

Before looking into the autopsies, let us strive for the clearest possible understanding of carrying capacity. Consider first some of the sentences by an unorthodox contemporary economist, Herman Daly; they are based on simple but fundamental physics and express principles that ought to be more obvious to more people than they have been:

Since matter and energy cannot be created, production inputs must be taken from the environment, which leads to

Population Problems

depletion. Since matter and energy cannot be destroyed, an equal amount of matter and energy in the form of waste must be returned to the environment, leading to pollution. Hence lower rates of throughput lead to less depletion and pollution, high rates to more.... A definite limit to the size of maintenance flows of matter and energy is set by **ecological thresholds which, if exceeded, cause a breakdown of the system.** (1980, pp. 16-17, emphasis added)

Rates of throughput depend on both the number of users of the environment and their per capita level of use of its resources. But the "definite limit" Daly mentions is not a limit on population; it is a limit on maintenance flows of matter and energy. Note, too, that Daly speaks of ecological thresholds, not ceilings. They can be exceeded, but at a dire price (breakdown of the system).

On a global scale today, important thresholds are being exceeded. In the words of the head of the Worldwatch Institute:

*Overfishing, overgrazing, and deforestation have become widespread. As demand exceeds **the sustainable yield of biological systems**, we begin to consume the productive resource base itself, engaging in the biological equivalent of deficit financing.* (Brown 1981, p. 6, emphasis added)

The sustainable yields of fisheries, pasturelands, and forests alluded to by Lester Brown are examples of the ecological thresholds mentioned by Daly. So the italicized phrases in both of these quotations express the carrying capacity concept.

In explaining the concept to sociology students, I have found it useful to begin by stating a very general axiom:

For any use of any environment there is a use-intensity that cannot be exceeded without reducing that environment's future suitability for that use.

This axiom is merely a condensed, more abstract, restatement of those sentences from Daly. Restating the idea this way enables me to convey then a completely general and explicitly time-dependent definition of carrying capacity:

General definition: Carrying capacity is the maximum use of a given kind that a particular environment can endure year after year without losing its suitability for that use.

Carrying capacity was "originally" defined in less general terms, however, because it was defined by people with an occupational focus on the capacity of rangeland or pastures to support game or livestock. Within any such animal species (other than *Homo sapiens*), the inter-individual variation in adult resource demands and environmental impacts was usually so minimal that it was reasonable to take a headcount of the user population as the scale upon which to measure carrying capacity. So it was defined (for ranching or range management) generally as follows:

Bioscience definition: Carrying capacity is the maximum population of a given species that a particular environment can support indefinitely.

The word "indefinitely" meant without degradation of the environment's quality, that is, without loss of essential life-supporting characteristics. Carrying capacity was seen, in short, as the maximum level of a user species's "sustainable harvest" of some limiting resource, but it was stated as the maximum number of users, since one user was essentially interchangeable with another. I have called this the bioscience definition because this is the form the definition took in the literature of ecology and related biological sciences, applied as well as pure.



For humans, however, with culture (including highly varied technologies and remarkably diverse forms of social organization), per capita demands and impacts can easily differ from one social class to another or from one culture to another by ratios of 100 or more to 1 (see Lenski and Lenski 1982, pp. 256, 323, 325). Accordingly, human-carrying capacity has to be defined so as to take such inter-individual or inter-cultural differences into account:

Human carrying capacity definition: Human carrying capacity is the maximum population equipped with a given technology and a given type of social organization that a particular environment can support indefinitely.

Since the "load" a human population imposes on a supporting ecosystem involves all three dimensions—population, technology, and organization (Ehrlich and Ehrlich 1990, p. 58; Duncan 1961)—the definition would reduce to:

Short general definition: Carrying capacity is the maximum sustainable load.

This short definition returns us to the high level of generality from which I started by stating that axiom—and we see the bioscience definition (rancher/range manager's definition) as well as the human-carrying capacity definition as special cases.

The hard part of the concept has been the element of sustainability—the idea that what matters is the load an environment can endure long term, not just for a short period in which depletion and pollution have not yet made the environment unresponsive. Emphasis on sustainability has eluded not only social scientists but sometimes even biologists. According to Odum (1989, p. 158), "Biologists generally define carrying capacity as the number or biomass of organisms that a given habitat can support." Conspicuously absent is the important additional word "indefinitely" with which the definition would be complete. So even among biologists the importance of specifying a time frame has not been in sharp focus; until recently their textbooks have not typically been explicit about sustainability.

Further, even those authors of biological texts who are best known for sounding alarms about overpopulation and environmental damage have had difficulty addressing the question of sustainability in such a way as not to leave the impression of carrying capacity as an impenetrable ceiling. For example, Ehrlich, Ehrlich, and Holdren (1977, p. 99) defined carrying capacity just as "the maximum number of individuals that can be supported in a given environment."

COMPARING TWO AUTOPSIES

Now back to finite Easter Island, separated by some 2000 kilometers of Pacific Ocean from the nearest other human habitat. Modern scholars, impressed by the immensity of human effort represented in the hundreds of giant stone statues and platforms arrayed along its perimeter, have wondered how there could have been a sufficiently numerous labor force on this island to have done all that work. Our two cultural autopsies inferred very different answers to the puzzle because they differed in awareness of the issues of sustainability in thinking about carrying capacity.

The Geological Event Autopsy

Te Rangi Hiroa (Sir Peter Buck) called it "the greatest compliment ever paid to an efficient stone-age people." Certain Western scholars had attributed Easter Island's monument-building culture "to a mythical people who never existed" (Buck 1958, p. 245)—a people presumed to have been at least more numerous, and perhaps better equipped, than the Easter Islanders were thought to have been. That implicitly complimentary hypothesis formed the core of our first "autopsy report" on the death of Easter Island's culture. By supposing the work force had to have been more numerous than the island could ever have supported and then attributing the abrupt end of their work to a geological event, this earlier interpretation missed seeing this cultural demise as an ecological omen. (The later autopsy, aided by further scientific discoveries and working from sounder ecological assumptions, found, as we shall see, that the culture had died from its own success.)

Easter Island's "geological event autopsy" appeared in *The Riddle of the Pacific*, a book from the prolific and eloquent pen of John Macmillan Brown (1924). Were the civilization of Europe to vanish through climate change and land submergence, said Brown (1924, p. 1), leaving only a fragment of the south of England standing out solitary as the "island of Westminster with its Abbey, we should have an Easter Island of the Atlantic." If the memory of the British Empire had faded to "a mere shred of tradition" then a visitor from elsewhere looking at the ruins would have, he suggested, a task of description and explanation comparable to that facing visitors to Easter Island.

Essential resources, he also supposed, had had to be imported. Easter Island "has never had a forest tree upon it till this past half century," Brown (1924, p. 258) mistakenly wrote,



"and those that now grow on it are shorn low by the winter winds. It is inexplicable how the beams could have been got on it for the levering of the great stone or for making sleds large enough to keep the gigantic statues intact in transit." When Brown spent five months on the island near the end of his academic career it was indeed virtually treeless, but instead of *assuming* it had always been thus, it is unfortunate (as we shall see) that he did not consider deforestation by past human use as an explanation for the environmental condition so evident to his eyes.

His own previously robust health declined, apparently from malnutrition, during his stay on the island; he had to do without fruit and green vegetables, subsisting mainly on the local mutton from the sheep that were grossly undernourished because the local rancher was, in Brown's words, "running far too many sheep for the acreage" (Brown 1974, p. xxx). As this observation suggests, Brown's decades of residence in pastoral New Zealand had nurtured a general awareness of something akin to carrying capacity. For sheep, at least, he seemed to realize the flock could be too numerous for its own good. His implicit criterion of "too numerous," however, was the harm suffered by the present sheep, not the damage inflicted by them on the pasture, diminishing its ability to nourish future sheep. So his outlook reflected something closer to the concept later denoted by the phrase "optimum population" than to the concept of carrying capacity.

Despite Brown's opinion of the sheep, it did not occur to him that human sculptors and other workers might likewise have subsisted for a time on quantities of sustenance materials the island could temporarily but not permanently supply. So he supposed the hundreds of statues (*moai*) and huge masonry platforms (*ahu*) represented the work of a labor force drawn from a now-vanished hinterland. For him, this supposition seemed consistent with visible evidence of a very sudden stoppage of the monument construction. There being now no hinterland in existence, he posited submergence of a former archipelago, a thoroughly non-anthropogenic cause of death for the culture. Had a sprawling Polynesian empire indeed sunk beneath the sea, the drama might be intensely fascinating and worthy of much study, but few of us would have much need nor any ability to take evasive or preventive measures against the remote possibility of any such submergence of the lands on which we live.

The Overshoot Autopsy

On the other hand, careful consideration of the repercussions of "running far too many sheep for the acreage" could have practical policy implications, cautioning us to prevent damage to our habitat (and our posterity's lives) corresponding to what the excessive sheep were inexorably doing to theirs.

More appropriate assumptions underlie the subsequent alternative explanation for the termination of the Easter Island culture. The "overshoot autopsy," as I shall call it, is an account supported by accumulated evidence from various disciplines since Brown's time. Its useful assumptions can be glimpsed in the following sentence by anthropologist William Mulloy (1970, p. 15): "In a typically human fashion their success appears to have carried with it the seed of its own destruction." This sentence appears in Mulloy's "Foreword" to a book about Easter Island by the resident Catholic priest, the late Father Sebastian Englert, who ministered for many years to its relict Polynesian population.

Englert and his friend Mulloy assumed that a population supported by this lone island had indeed produced the culture's material remains. Mulloy saw it as "typically human" that the success of that population in exploiting the island's resources to develop a flourishing culture had led to their downfall. He saw no need to invoke some unpreventable geological catastrophe. Because Mulloy saw cultural success sowing the "seeds of destruction," he could explicitly suggest Easter Island should serve as a warning to other portions of humanity. In the fate of its inhabitants, he thought we could "see a preview in microcosm of what may ultimately be the fate of the whole of mankind" (Mulloy 1967, p. 78), unless by careful contemplation of that preview we learn to avert its ultimate tragic recurrence.

Ecosystem constraints were obviously central to Mulloy's autopsy of Easter Island, for he explained that "an effective equilibrium between population and resources rarely lasts long in any culture." Further, he clearly did recognize that the human load could grow until it temporarily overshoot the island's sustainable ability to support it.

WHY SUCH DIFFERENT AUTOPSIES?

Mulloy's views developed in the course of almost twenty-three years of participating in archeological excavations on Easter Island. Brown's interpretation of the Easter Island saga had been based on decades of inquiry into the language and culture of other Polynesians elsewhere in the Pacific (see Brown 1907, 1911, 1920) plus a five-month stay on Easter Island dur-



ing which he absorbed much native lore and examined every visible platform and statue. His perceptions were those of a comparative linguist; Mulloy's were the product of direct experience with archaeological digging and reasoning. Archaeology has more occasion than comparative linguistics to encounter concepts and principles of ecology. Both Brown and Mulloy sensed the importance that Easter Island was a small environment with limited resources, but Mulloy's work elsewhere had more nearly sensitized him to issues of sustainability than had Brown's previous studies.

Brown evidently saw Easter Island's finiteness as an absolute limit to population growth. The idea that by destroying the future a load could temporarily exceed carrying capacity was inconceivable to him. To Mulloy it was conceivable.

IMPRISONED BY AN IDEA

Oddly enough, Brown was on Easter Island at a time when it was actually reported to have gone missing! In an introduction to his posthumously published *Memoirs*, his daughter wrote that she had been in London at the time and had seen "a report in the paper which said Easter Island had disappeared. A ship had passed where it should have been and it was not there. 'Fortunately,' she added, 'the ship was wrong'" (Brown 1974, p. xxx).

Why didn't this apparent navigational error, evidence of the fallibility of reports of island submergence, suffice to disabuse Brown of his belief in the former existence of a surrounding archipelago for which Easter Island supposedly had served as an imperial center? In view of long-standing knowledge that "the apparent sinking of the coast observed by the departing sailor simply results from the general curvature of the liquid sphere," as pointed out by Dante in a 1320 A.D. lecture in Verona (Suess [1885] 1906, p. 6), why had Brown, as a former professor of classics, not discounted Polynesian legends of islands sinking under the water as emigrant canoes departed from view? (See Brown 1924, pp. 39-41; Maziere 1968, p. 41).

It turns out that the submergence hypothesis had been a part of Brown's thinking for a long time. A cleverly satirical novel he had written (under the pen name Godfrey Sweven) entitled *Riallaro: The Archipelago of Exiles* was published in 1897 and followed in 1903 by an ingenious sequel, *Limanora: The Island of Progress*. Limonara was a fictitious island at the center of an extensive archipelago. Its citizens had tamed a volcano and used its energy to build a high civilization with sciences far advanced beyond those of the surrounding islands (or of real nations in the early part of the twentieth century),

but in the end the Limanorans were compelled by the submergence of their own island as well as the surrounding ones to flee from Earth to outer space.

Not only in these novels, containing imaginative anticipations of such modern technology as lasers and spacecraft, but also in his serious scholarship, Brown committed himself to the submergence idea years before his visit to Easter Island. In a paper read before the Wellington Philosophical Society, Brown (1911, p. 193) said that "some exceptional, if not catastrophic, goad of nature" was needed to explain why the Polynesians, lacking even a compass, had learned oceanic navigation. For Brown, that extraordinary stimulus consisted in "the subsidence, probably often slow, but probably as often sudden, of the central island zone of the Pacific that stretches southeast from the southern end of Japan across the Equator, even as far as Easter Island. This manifestly went on for hundreds of thousands of years; and any humans that got on to the islands of this zone would, time and again, have to go off the best way they could find in search of other standing places in the great flux of waters."

Brown believed that nowhere else in the world's history had any human population been goaded so forcefully into repeated emigration.

Why did he not embrace instead the idea that emigration might result from overpopulating a formerly ample habitat? His conviction that so many Pacific islands had been submerged after becoming humanly populated had grown from his frequent encounters with the idea as a common feature of Polynesian traditions (Barthel 1978, p. 5). Rather than discounting such traditions as unscientific hyperbole, Brown (1912, p. 47) was persuaded that "most geologists who study the whole surface and crust of the earth" believed in a former Pacific continent, now submerged. He reproduced two maps from the original French edition of Edmond Perrier's *The Earth Before History* ([1922] 1925) to illustrate the "foundering" of that hypothetical land mass. But Perrier was neither "most geologists" nor even one by profession; he was professor of comparative anatomy, and the geological assertions in his book were incidental to other matters indicated by its subtitle: "Man's Origin and the Origin of Life."

Brown appears to exemplify the following principle: "There is nothing more difficult than to disembarass the mind of a preconceived idea" (Huddart 1877, p. 26). As was pointed out by the great pioneer of experimental medicine, Claude Bernard ([1865] 1957, p. 148), a person can be "the prisoner of his ideas, if he does not learn to question nature for himself,



and if he does not possess suitable and necessary tools." What Bernard ([1865] 1957, p. 141) called "misconceived erudition" can be a major obstacle to the advancement of knowledge.

However, certain mistakes are, as Bernard ([1865] 1957, p. 42) wisely noted, "inherent in their period, so that only the subsequent progress of science can reveal them." In the sixty-odd years after Brown's visit, much has been learned about Easter Island, Polynesian migration, and so on, and this new knowledge has greatly reduced the "riddle" (Golson 1965; Emory 1972; Levison, Ward, and Webb 1973; Bellwood 1978; McCall 1979; McCoy 1979; Kirch 1979, 1989; Terrell 1986; Feinberg 1988; Heyerdahl 1989). Moreover, advances in earth science since Brown (1924) wrote *The Riddle of the Pacific* have greatly diminished the plausibility of submergence theory. Geologists no longer accept the nineteenth century analogy of the Earth to a wrinkled apple, whereby folded mountains were viewed as effects of a cooling and therefore shrinking interior disturbing the once smooth skin of a larger sphere (Dietz 1970, p. 129). Brown evidently accepted this view without misgivings. Today it is no longer assumed that the Earth began in a molten state, ripped by a passing star from the body of the sun. Instead, protoplanets are now believed to have resulted by condensation of cosmic clouds of dust and gas, with their internal temperature rising rather than falling as their density increased (Urey 1970).

In addition, since Brown's time much more has to come to be known about the ocean bottoms. In the 1960s it all took on coherent meaning with acceptance of the theory of plate tectonics (Stewart 1990, pp. 1-2), vindicating at last many parts of the hypothesis of "continental drift" set forth by a German scientist, Alfred Wegener (1924). A sunken Pacific continent is now known to be totally mythical. Easter Island lies on the East Pacific Ridge, the volcanic birthplace of new sea bottom material that drives the spreading ocean floors and thereby causes trenches to form adjacent to the continents by the subduction of oceanic plates under continental plates, thus raising up coastal mountain ranges and accounting for the concentration of earthquakes along ocean perimeters (Murphy and Nance 1992).

It is therefore clear that in all probability any such archipelago in the vicinity of Easter Island as Brown envisioned never existed and never could have drowned a human culture by submerging.

IRRUPTION AND CRASH

Therefore let us now turn to the alternative autopsy, reported principally in papers by Mulloy (1967, 1974), as well as in the book by Englert (1970). The Polynesian inhabitants of Easter Island were descendants of perhaps no more than a few canoe loads of refugees from other Polynesian islands far to the west, probably driven from their former home by conflict arising from population pressure (see Buck 1958, p. 99, who discerned population growth as the "goad of nature" Brown had supposed was due to submergence). Had these emigrants passed by this speck of land nearly twenty centuries ago, they would have starved in their canoes on an endless sea, for there was no inhabitable land beyond for some 3600 kilometers.

For perhaps sixteen centuries, the descendants of these colonizers became more and more numerous and gradually exploited the resources of Easter Island to their fullest extent. Using cultural techniques their ancestors had learned in their former home islands, the colonists learned to adapt their techniques to the special characteristics of this island's terrain and resources. As the human load increased, protective bush had to be cleared to put even the marginal land under cultivation. Human society came to dominate the once natural environment as effectively as it does in any modern nation (Mulloy 1974, p. 29). But even in their originally well endowed habitat, the people of Easter Island were subject to carrying capacity limits (McCoy 1979, p. 160), and population *crash* was the sequel to excessive population growth. In the crash process there was severe social conflict and the enormous and distinctive statues these islanders had been carving and erecting for generations were maliciously toppled.

Despite, or perhaps because of, their extreme isolation, the Easter Islanders developed an amazingly complex version of Polynesian culture. Following inferences by Mulloy and others, we might say it came to include a class structure with sufficient coercive power to bring together large crews of laborers who accomplished prodigious public works projects. An extensive network of roads was built to transport the huge *moai* from quarries in the crater of Rano Raraku to seaside *ahu* erected along the island's perimeter. Dwellings, refuges, crematory platforms, and masonry-walled agricultural terraces to conserve the limited soil were also built.

The number of person-years of labor represented by all of this was so enormous it made plausible Brown's hypothesis of workers coming from a surrounding archipelago to supplement



a supposedly insufficient local labor force. But in the actual absence of any such other lands, food for the burgeoning Easter Island labor force had to be grown on the volcanic land of just this island and harvested from the adjacent sea. If some people were to specialize in religious monument construction, as large numbers must have done, others had to specialize in food production. The necessary specialization could only have developed if social norms arose that required one group to support the other. But such norms would have been precarious (Blau 1977, pp. 185-242).

Brown (1924, p. 258) believed no timber had grown on Easter Island to provide beams large enough for engineering use. Analysis of pollen deposits in the island's bogs (Heyerdahl 1968, p. 134; Englert 1970, p. 29) has since shown that much of the 116-square kilometer surface was forested when people first arrived. The treeless condition observed by Brown was the result of the colonizers' increasingly numerous descendants cutting down and using even trees that needed to be left in place to stabilize soils and water supplies. A serious water supply deficiency was one result of this anthropogenic deforestation. A worsening wood shortage presumably not only disrupted the tasks of moving and erecting the multi-ton stone images, but also must have altered housing styles, and could have made such domestic functions as cooking increasingly problematic. Were Durkheim alive now to confront this information, either he would be obliged to regard the altered ecosystem as a social fact, or he would need to amend his dictum that only a social fact can explain another social fact.

More stringently limiting to further cultural progress than even the resource depletion itself was the fallibility of social organization under such ecological pressure (Durkheim again take note!). The population crash that began around 1680 A.D. (as shown by radiocarbon dating and genealogical evidence) started with a devastating war between two distinct groups into which the islanders had become socially differentiated, the Hanau Momoko and the Hanau Eepe. The latter were virtually wiped out (Metraux 1940, pp. 69-73; Heyerdahl 1989, pp. 198-200). After this episode of genocide, human numbers continued to decline due to repeatedly disrupted food-producing activities, mutual raiding by local bands of survivors, and disease. With the advent of European contact in the eighteenth century, the problems of disease were greatly aggravated and compounded by slave raids upon the island population (Englert 1970, pp. 129-52).

DISASTROUS OVERLOAD

Consider now the problem of estimating the maximum pre-crash population. First of all, it was presumably a good deal larger than the number still living at the time of Europeans' discovery of Easter Island, less than two generations after the genocidal war. In 1722 there were thought to be about 3000 to 4000 Easter Islanders (Mulloy 1974, p. 31). Suppose, therefore, that before the crash began, the population density on Easter Island was merely comparable to that of another country that underwent crash, one that already had reasonably good census procedures: peasant Ireland. There the sustenance base relied upon by so many people was also destroyed; it was eliminated in 1845 by the potato blight. Just by multiplying Easter Island's area by the pre-blight density figure for Ireland, we get an estimate of about 12,000 for the pre-crash Easter Island population. Can there be any real meaning for a figure arrived at so unconventionally? During my personal conversation with Professor Mulloy at the University of Wyoming in 1973, I learned that he had been deeply impressed by the enormous abundance of stone foundations of dwellings discovered all over Easter Island during his years of research there. He believed these indicated a population dense enough to have been conceivably that numerous before the crash.

An archaeologist with the Norwegian expedition in 1955-56 commented on the difficulty of believing all the architectural remains dotting the landscape so profusely could have been in use all at the same time. "For if they had, the island had certainly seen a period of overpopulation" (Ferdon 1966, p. 39). Therein lies the fundamental difference between the two autopsies we are comparing. Macmillan Brown supposed, in effect, that the island never could have been overpopulated. For him, the unspoken concept of carrying capacity was a ceiling; population could never have exceeded it. For Mulloy, the almost spoken concept of carrying capacity included implicitly the sustainability issue; it was possible for a population to overshoot its habitat's carrying capacity for a while by "consuming the productive resource base itself" (to use Lester Brown's phrase).

Here was the force that proved fatal to Easter Island culture. Following the genocidal war, communities scattered over the island are believed to have turned into predatory bands encroaching on each other's marked land areas and fishing zones, leading to swift and violent retaliation, and prompting escalation of probable previous ritual cannibalism into outright sustenance cannibalism. All this indicated to Father Englert



Population Problems

(1970, p. 138), despite his church's pronatalist tradition, that "the island was suffering from overpopulation."

Probably during the period of great public works a nicely balanced organization provided food for everyone. As this became harder to maintain, when the population grew, violence disrupted the balance. Much food-producing work became more difficult or impossible, with crops being burned or otherwise destroyed, and quite suddenly all the people suffered sharply increased deprivation. Attempts to alleviate this by more violence against neighbors further disrupted food production, and the situation became progressively worse.

Thus, to reconcile repeated estimations that Easter Island could support only 3000 or 4000 people and those indications of a much higher pre-crash maximum population, a clear understanding was needed of the way populations are affected by ecosystem constraints. Carrying capacity, understood as the largest load that will not degrade the environment and reduce its power to provide for the user population's needs, *does not denote an impenetrable ceiling*. As a number of authors cited by Wisniewski (1980) had shown, carrying capacity has a time dimension. There is an important difference between the maximum load that can exist briefly versus the load that can be supported indefinitely.

It is not really uncommon for populations (of various species) to overshoot their environment's carrying capacity. When they do, the ensuing environmental degradation causes them to die back to a much smaller number. Eventually their much less numerous descendants may oscillate around the reduced carrying capacity.

For Easter Island, then, perhaps the population it could have supported *permanently* "could never have exceeded three or four thousand" (Mulloy 1967, p. 76). Yet Mulloy may have been equally correct in suggesting that the load had once reached several times that magnitude. The evidence that the island had been heavily populated, suffered genocidal warfare and postwar chaos, and by various means become depopulated until there remained in 1877 no more than 111 souls (Mulloy 1974, p. 31) indicates very strongly the overshoot-crash sequence.

It becomes eminently understandable why the cultural remains found on Easter Island appeared under the first autopsy to be the aftermath of a geological catastrophe that deprived a central place of its once-extensive supporting hinterland. Any island that once had a human population several times larger than its carrying capacity, so that the depletion of essential resources (such as timber) would have been swift and severe, would be a place whose population would

have lost its means of support as inexorably as by the submergence of a hinterland archipelago.

Consider finally how these people might have put themselves in such a predicament. Suppose there were no more than fifty original colonists, free to begin raising their chickens and kumaras and exploiting the previously uninhabited island without competition, and suppose in responding to this opportunity they had increased in the first generation after settlement by no more than eight additional persons. A continuation of that unimpressive rate of increase (16 percent per generation) would have resulted after just 1000 years in an island population of nearly 19,000 persons.

Growth six times that rapid—100 percent per generation—is regarded by biologists as our species's "intrinsic rate of increase," the rate at which we are capable of multiplying if unimpeded (Birdsell 1957). The actual rate of population increase among modern-day Easter Islanders, "replenishing their earth" since the crash "bottomed out" in 1877, has run about 95 percent per generation, as can be readily calculated from the various head-counts reported by Mulloy (1974, p. 31).

Radiocarbon dates show that some of the huge *ahu* platforms were built about ten centuries (forty generations) before the genocidal war that terminated cultural growth around 1680 A.D.. Thus, even if we were to let those ten centuries serve as our estimate of the time between original settlement and the big war, it is clear that a very modest growth rate of only one-sixth of the "intrinsic rate" for our species would have sufficed to result in severely overshooting (and thereby seriously damaging) the island's human carrying capacity. A crash had to follow.

IMPLICATIONS

The rate of the increase per generation for the population of the world over the two centuries since the industrial revolution has been comparable to the rate imputed to Easter Islanders in the foregoing calculation; world population in the industrial era has grown, on average, at the ostensibly modest rate of a little over one-sixth of the intrinsic rate which would have doubled it each generation. (The rate of increase has increased beyond that average in the twentieth century.) But we have equipped ourselves in this industrial era with resource-consuming and environment-impacting technology so that the global ecological load (population times per capita resource appetite) has grown close to 100 percent per generation. To recognize this is to substantiate Mulloy's view that Easter Islanders' disastrous success can be regarded as a "preview in microcosm."



Even if we focus on the demographic dimension alone, our contemplation of Easter Island should clarify at least the following point. Phenomenal growth of human numbers and even the rise in living standards since the time of Malthus have not refuted his analysis, however many minds may have construed them as so doing. Loads can grow exponentially but carrying capacity may not.

Malthus was mistaken in quite another way, in asserting "that population must always be kept down to the means of subsistence" (Appelman 1976, p. 15). He was wrong to include the word "always," as if carrying capacity must operate as an impenetrable ceiling. As we must now understand, there can be temporary increases of population (or of load, as well) beyond ostensibly fixed "means of subsistence" if some users subsist on capital rather than income by overfishing fisheries, overgrazing pastures, "mining" farmlands with topsoil-depleting intensive agriculture, and generally relying on the use of nonrenewable resources and using renewable resources faster than their rates of renewal. These practices are, as some Third World delegates at Rio must have recognized, characteristic of industrial societies.

So there are a number of specific conclusions to be drawn from Mulloy's "preview in microcosm" and from comparison of the two autopsies:

(a) Carrying capacity has been an elusive concept, with the issue of sustainability being often neglected or distorted. When we use the phrase "sustainable development," emphasis must be on the adjective.

(b) Ignorance of sustainable carrying capacity limits, or of means for staying within them, is dangerous to human welfare.

(c) Surpassing what Malthus and Macmillan Brown supposed was a ceiling is cause not for celebration but for apprehension. Limits exceeded are not limits repealed. Overshooting carrying capacity can destroy a flourishing culture. Collapse can be imminent just when the culture seems most successful.

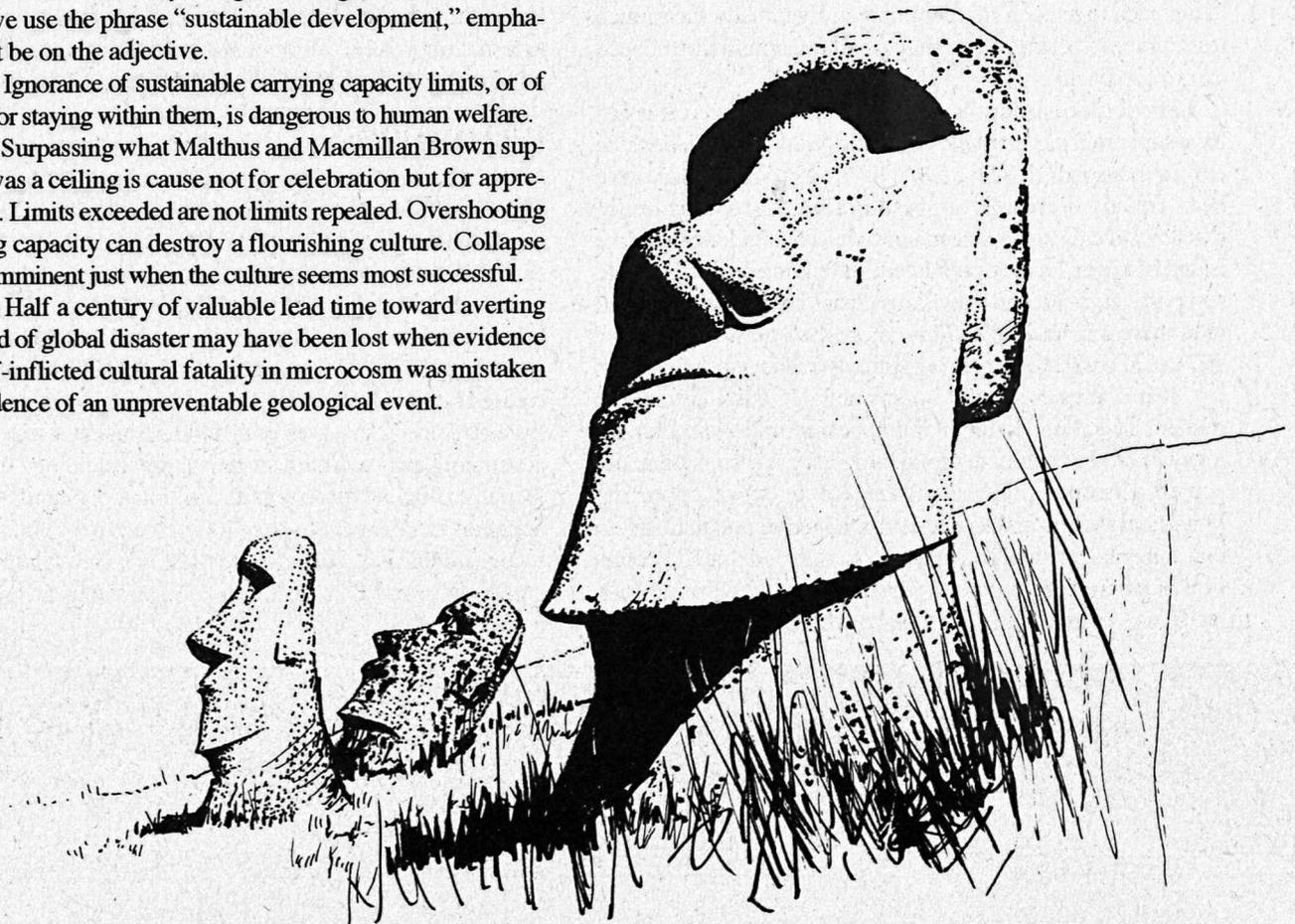
(d) Half a century of valuable lead time toward averting that kind of global disaster may have been lost when evidence of a self-inflicted cultural fatality in microcosm was mistaken for evidence of an unpreventable geological event.

(e) Discovery of valid knowledge about the life and death of human cultures can depend upon research and advancements in many different sciences, not just research within conventional boundaries of academic sociology or anthropology. In the real world, to remain as parochial as Durkheim's dictum unfortunately taught us to be can disable social science.

(f) Insofar as humans, no less truly than other animal species, are involved in (and dependent upon) ecosystem processes, the social sciences especially need familiarity with principles and concepts of ecology.

For at least the last decade, even among people who have accepted the idea of "limits to growth," there has been a tendency to assume that the load may be approaching but has not yet reached carrying capacity (see Smith 1992, p. 7). It has been commonplace to write or talk of a need to "slow" our rate of increase. Some who have come to feel more urgency than others are anxious to stop growth soon or, more euphemistically, they seek to "stabilize" population.

Just after the Earth Summit in Rio an organization called Carrying Capacity Network convened a "National Carrying Capacity Issues Conference" in Washington, D.C., drawing distinguished speakers from most regions of the United States who represented a wide assortment of disciplines. The issue of sustainability was clearly articulated in their presentations. There was near consensus among them that the world and the United



States have both already surpassed their respective human carrying capacities.

If we are in fact already living in the carrying capacity deficit era, then the second Easter Island autopsy serves not just as a warning to decelerate growth. It becomes instead an indication of an urgent need to devise the means to achieve an inevitable load reduction in some way that will be more humane than what occurred on Easter Island.

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The 1994 ICP&D

International Conference on Population and Development

The third world population gathering will be held in Cairo, Egypt, September 1994, with voting delegations from some 150 nations. These gatherings are sponsored by the United Nations. The first was in 1974 in Bucharest, Rumania. The second was in 1984 in Mexico City.

At 1974's, the basic human right to family planning information and materials was proclaimed. In part because of the US Reagan administration's anti-abortion views, the 1984 gathering did little more than repeat what happened in 1974. Though hopes are high that important goals will be proclaimed at Cairo, results may prove dangerously modest.

In July 1993 the US Clinton administration suggested adopting the modest goal of stabilizing global human population under ten billion. A major defect of prior conferences was procedural. Plenary sessions considered only matters upon which prior "consensus" had been reached. Will there be consensus on "...a stable world population of under ten billion people...?" (page 11 of the US delegation's 7/93 suggestions to the 1994 ICP&D).

As of mid 1994, world population is some 5.7 billion people. Our annual growth is nearly 100 million. Unless present trends change, we could exceed ten billion before 2035. Two groups that might block consensus are Vatican representatives and extreme feminists. The Vatican (or Holy See) is considered a nation. As a UN member, the Vatican will have a vote at the ICP&D. Extreme feminists are heard from in articles such as Ms. Chesler's in the Sunday *NY Times Magazine* of Feb. 6, 1994.

Most feminists, even many extremists, favor a goal of stopping human population growth. But ex-

tremists might put their priority on education for women, equal rights, and better medical treatment, ignoring ending population growth. Women's rights issues are important, all civilized persons agree. The difficulty is priorities. Which goals have priority if ranking becomes essential?

What should be humanity's number one global priority at this time in history is apt to be stonewalled. This need, of course, is to achieve less and less human birthing all over Earth. The Clinton administration, in its July 1993 twenty-nine pages of suggestions, was silent about couples stopping after a second birth. The widespread taboo against urging couples to birth less needs to be broken — this year.

Unless a time-goal is set by which to have global growth end (say, by the year 2003), the ICP&D will not be a success. Unless couples living birth-free are not only supported, but also praised, the ICP&D will be a farce.

These two, plus a statement that no one ought to birth more than twice, would constitute a mild success. Staying birth-free should be proclaimed best for all humankind while world births remain more than deaths. Proclaiming these four — 1) a time-goal to stop growth, 2) praise for being birth-free, 3) stop at two, and 4) birth-free being best for all — would be success. None require funding to proclaim.

Please write US President Clinton (White House, Washington, DC 20500) urging him to attend and make the above four goals his minimum agenda. For more information, write to GRB (Globally Responsible Birthing), Rt. 1, Box 28, DeLancey, NY 13752.

—Richard Bowers, GRB founder

Book Reviews

STAYING PUT

by Scott Russell Sanders, Beacon Press, Boston, 1993; 203p.

With his latest book, *Staying Put*, Scott Russell Sanders takes his place among the most notable writers of place working today, along with Gary Snyder, Terry Tempest Williams and Wendell Berry. Sanders place is the Ohio River watershed, which he has also written about in *The Paradise of Bombs* and *Stone Country*.

Sanders chronicles well the history of the region, from the early mound builders to the industrial boosters who have held sway of late. He writes of how Herbert Hoover opened a series of dams on the Ohio in 1929: "I am proud to be the President who witnesses the completion of its improvement..."

Scott is really at his best story telling. He writes of Mr. Sivvy, who used horses to collect maple syrup along the Mahoning River, because the noise of the tractor would disturb the trees. Of the fundamentalist preacher Jeremiah Lofts, who one day lay down his tools and gave up all work except preaching. It seems Lofts had been praying on Ledge Hill, and the Lord spoke to him from the stars, saying the world would end that July, "Because we have been wicked in our use of the earth, and the Lord means to start over with new creatures."

We'll close with a passage reflecting well Scott Russell Sanders's writing talent and concerns:

As I write this, I hear the snarl of earthmovers and chain saws a mile away destroying a farm to make way for another shopping strip. I would rather hear a tornado, whose damage can be undone. The elderly woman who owned the farm had it listed in the National Register, then willed it to her daughters on the condition they preserve it. After her death, the daughters, who live out of state, had the will broken, so the land could be turned over to the chain saws and earthmovers. The machines work around the clock. Their noise wakes me at midnight. The noise abrades my dreams. The sound is a reminder that we are living in the midst of a holocaust. I do not use the word lightly. The earth is being pillaged, and every one of us, willingly or grudgingly, is taking part. We ask how sensible, educated, supposedly moral people could have tolerated slavery or the slaughter of the Jews. Similar questions will be asked about us by our descendants, to whom we bequeath an impoverished planet. They will demand to know how we could have been party to such waste and ruin. They will have good reason to curse our memory.

Reviewed by Bill McCormick, POB 1729, Charlottesville, VA 22902

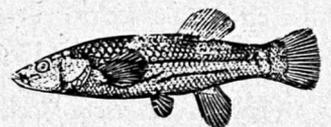
FISH: An Enthusiast's Guide

by Peter Moyle, U. of California Press (2120 Berkley Way, Berkeley CA 94720); 1993; 272p., \$25

Five years ago I stopped to visit a pond I had known well as a teenager. Two decades before, I had haunted the shoreline catching small creatures, observing larger ones, learning the intricate connections of their lives. Now, I found only the small stream that had fed the pond. The neighboring mill, which had dammed the stream, was out of business and the floodgate was dropped. Though the ecosystem had changed radically, I imagined I would still find the Three-spine Stickleback (*Gasterosteus aculeatus*), an ancient immigrant to the Great Lakes watershed. Before even beginning to search, though, I was stopped by a gruesome scene: the stream banks were littered with the bodies of Chinook Salmon (*Oncorhynchus tshawytscha*). My mind went blank as I wondered, what next—Kodiak Bears? Slowly an explanation emerged. The state of New York had been stocking salmon in Lake Ontario for several years, attempting to fit a predator into the role once filled by Lake Trout (*Salvelinus namaycush*), before the introduced Sea Lamprey (*Petromyzon marinus*) decimated that species. Another arrival—the Alewife (*Alosa pseudoharengus*)—boomed for decades and the salmon, it was hoped, would feed on them. The salmon had finally tried to spawn. I sat for a time, contemplating the fate of that pond, and realizing the largest freshwater lakes in North America had fallen victim to the same sort of tampering.

Awareness is increasing of the erosion of terrestrial biodiversity, but aquatic systems are under even greater stress. Besides the direct assaults on aquatic species by overfishing, random introduction of exotics, and hydroengineering, much of the trauma we inflict

Reviewed in this issue:
Staying Put
Fish: An Enthusiast's Guide
Critical Essays On Education,
Modernity, and the Recovery
of the Ecological Imperative
The Brave Cowboy
The Ecology of Commerce



on the land finds its way to the water. Water can suspend what it doesn't dissolve; so as it flows downhill, it carries pollutants and silt. The impact on the dominant form of aquatic life—fish—has been immense. Fish comprise more species than all other forms of vertebrate life combined, and twenty percent of the world's freshwater fish species are extinct or endangered. In the US, 343 of 950 species are in trouble in part of their range; an additional 93 are endangered or threatened throughout their range. In some states the crisis is particularly acute—only a third of California's native species are considered secure for now.

For marine species, information is hard to obtain because of the scale of research necessary to monitor even one species; but observations give clues. The world catch of commercially valuable marine species has declined for three years in a row, and non-target species that die in nets are not even counted. The Grand Banks fishery, for instance, has been exploited for its rich production of cod since the New World was first settled by Europeans. US and Canadian waters there are now closed indefinitely, though open ocean trawlers from various countries still catch what they can. Coastal estuaries, breeding grounds for numerous marine species, are threatened by pollution, development, and salinization because of reduced fresh water flow. Half of the US estuaries that have been assessed are in trouble. Coral reefs, the marine equivalents of rainforests in terms of diversity, are besieged by everything from oil spills and ship groundings to dismantling for the aquarium trade. Massive coral die-offs remain unexplained, but increased ultra-violet exposure and higher water temperatures (likely results of anthropogenic disruptions of the atmosphere) are possible causes.

Aside from occasional well-publicized stories such as the controversy surrounding the Snail Darter some time ago, the threat to piscine diversity is not an issue in our society. Most state agencies

focus completely on sport fish, and the federal government concerns itself only with species that have reached endangered status. Realizing that people familiar with local species might help to avert situations that threaten those species, or at least make their existence known, Peter Moyle has written *Fish: An Enthusiast's Guide*. Despite the title, this is not a guide book in the sense of a compendium of different species. It is, rather, a guide to the world of fish and their conservation, written by a professor of fish biology and intended for a general audience.

The book begins with chapters on anatomy, physiology, ecology, and behavior. Dry as this may sound, it is essential to understanding the way fish function in the aquatic environment, and what impairs that functioning. This section also relates the adaptation of fish to the habitat they occupy, and illustrates why species are not interchangeable, from one habitat to another. Moyle covers the variety of North American fish habitats from cold-water streams to the continental shelf—something will be local to any reader. Each chapter ends with suggestions for basic field studies the reader can begin. Moyle's scientific interest, however, doesn't obscure the pleasure he invites others to experience:

I have spent a great deal of time under water, watching fish. The observations I make are carefully recorded on special forms and converted into data. The data are analyzed, summarized, and eventually turned into one of the arcane documents known as a scientific paper. The publications enable me to call myself a fish ecologist but they do not convey how enjoyable the underwater excursions are. They also do not allow me to record the myriad of other experiences I have had, such as watching how light and water together create lovely, shifting patterns on a lake or stream bottom, how a larval mayfly scurries across a stone in fast water, or how a lamprey moves a large rock to excavate a nest.

Most compelling is the chapter on

conservation. Moyle would do well to devote a whole book to this subject. His ethics are well considered and clearly explained, and his anecdotes reveal the disquiet of someone who has observed the human influence and the consequent loss of familiar places and creatures. He perhaps expresses it most simply when he notes the loss of one species that no one cared enough to save, the High Rock Spring Tui Chub (*Gila bicolor* variety, actually a subspecies). In case studies, Moyle examines the varied ways that fish species are brought to endangered status, or lost forever. Some threats are agonizingly obvious; others, such as the introduction of exotic species, are more insidious. The story of the Great Lakes is here, but it does not include presently changing conditions. No book could describe all the latest problems—the momentum of change and the threats posed are too great. In fact, those personally involved will often be the only ones to know when local populations or obscure species have disappeared. Moyle tells of carrying the entire population of a species of pupfish (*Cyprinodon species*) in a bucket. Only by such individual efforts, and through joining together for larger ones, will the diversity of fish be protected.

One group mentioned in Moyle's book is the North American Native Fishes Association. This is a small, informal organization with a diverse membership who share an interest in native fish species for study, collection if appropriate, and breeding if possible. Membership is \$11 a year, which includes copies of a quarterly publication, *American Currents*. Their position on conservation issues is quite strong, and disparaging remarks on government "management" of our waters are common. People with any level of experience are encouraged to become active members. To join, contact Robert Schmidt, Simons Rock of Bard College, Alford Road, Great Barrington, MA 01230.

Reviewed by Brian Carter (34 Bow St., Concord, NH 03301)

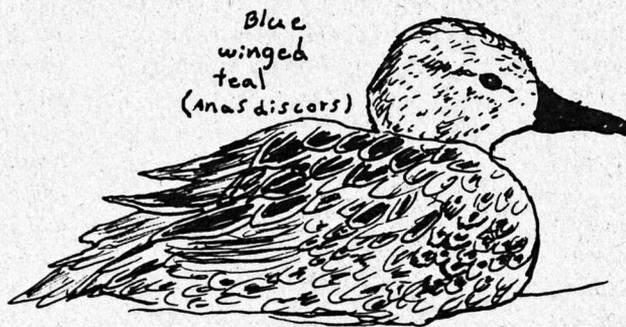
CRITICAL ESSAYS ON EDUCATION, MODERNITY, AND THE RECOVERY OF THE ECOLOGICAL IMPERATIVE

by C.A. Bowers, 1993, New York: Teachers College Press, 221p, \$18.95

Education is of critical importance as we seek to change the current relationship of the vast majority of humans with nature. Having taught in college environmental studies programs for the last six years, environmental education is the approach to the environmental crisis in which I am most fully involved. So, I read C.A. Bowers' recent collection of thirteen essays with much interest. They are full of interesting observations and perspectives, though the book is steeped in educational and social theory and the jargons of these fields. As someone unfamiliar with educational theory and not deeply familiar with social theory, I found the essays to be tough going at times. Hence, I would recommend this book to someone looking for more depth in the issue of education and the environment. For those seeking an introduction, David Orr's *Ecological Literacy* might be a more fruitful place to begin.

Bowers's essays are divided into three general topics: rethinking the foundations of modernism, the cultural mediating characteristics of educational computing, and recovering the ecological imperative in educational and social thought. The focus of the essays is often not on environmental concerns *per se*, but on the worldview that Bowers thinks is the root of the environmental problem (and many other problems). The first set of four essays seeks to demonstrate how the education process helps introduce students to, and then reinforce, the modernist worldview that is at the foundation of the environmental crisis. The key components of this worldview are that

time is linear and progress occurs over time, that the rational process is the primary source of power and knowledge, that individuals are autonomous beings, and that the universe is here for humans to use. Bowers stresses that this crucial socializing role of the schools must first be acknowledged (i.e., we need to make the relevant aspects of the cultural experience more explicit; we need to recognize that our metaphors carry ideology) and then these factors need to be challenged. He discovers no real help, from an environmental perspective, in the emancipatory educational approaches of Paulo Freire (author of *Pedagogy of the Oppressed*) because



Freire's approach is based on these problematic modernist assumptions. He further concludes that these modernist assumptions, and the role of the schools in reproducing them, makes it very difficult for us to fully understand traditional or native ways of knowing and to learn from them.

Bowers criticizes the unreflective use of computers in education in the second set of essays. He argues the computer can help us to know more things and know them faster, but this knowing is based on an Enlightenment/Cartesian/rational approach incorporated into computers. Bowers finds this most problematic, arguing that the computer is not just a tool, but rather helps to shape our way

of thinking, leading us to focus on a mechanistic view of the world and on a problem-solving approach to the environment, both at the expense of considering the importance of culture to the environmental crisis.

In the final set of six essays, Bowers uses the ideas of Gregory Bateson and Aldo Leopold to develop holistic approaches and critiques to educational reform that are sensitive to the environmental crisis by returning the individual to the larger cultural/ecological context; by putting humans back in nature. I found the final essay, "Toward a Deep Cultural Approach to Environmental Education," to be the most useful of the

collection. In it, he discusses what we can learn from such traditional cultures as the Hopi, Koyukon, Kwakiutl, Balinese, and Australian Aborigines. (He is careful to point out in a previous essay, however, that "The traditions of other cultures are not like products on a supermarket shelf that we can appropriate for our own use" (p. 140).) Bowers concludes by suggesting that there are four different levels of environmental education, and that we must pay attention to each of them: (1) providing information on the scope of natural

systems at risk (most common); (2) use of environmental information to question guiding cultural beliefs and practices; (3) recognizing analog forms of knowledge in mainstream and minority cultures that are ecologically sustainable; and (4) learning to experience and value ecologically sustainable patterns.

As we seek to move beyond identifying environmental problems to creative approaches of how to better inhabit this planet, the work of Bowers and other thinkers in fields of anthropology, sociology, and philosophy can be of great importance.

*Reviewed by Chris McGrory Klyza
(Political Science Department, Middlebury College, Middlebury, VT 05753)*

THE BRAVE COWBOY

by Edward Abbey; introduction by Kirk Douglas; Dream Garden Press (POB 27076, Salt Lake City, UT 84127) and Santa Teresa Press, Santa Barbara; 1993; 280 p.

First published in 1956, Abbey's second novel was little known until adapted for the screen in 1962 as the Kirk Douglas film *Lonely Are The Brave*. For the first time in nearly 40 years, *The Brave Cowboy* is again available in a hardbound version; this limited edition incorporates Abbey's later changes and corrections, photographs from the film, and is signed by Douglas.

While Abbey aficionados may revel in Cactus Ed's elegant early prose, and enjoy analyzing proto-Haydukian themes developed in his later work, and applaud the appearance of Jack Burns (who appears in form, if not name, in five of eight Abbey novels) most folks will just find *The Brave Cowboy* damn good reading. Standard cowboy novel elements are all here: a pretty young horse, an ugly young cowpoke, a bar-room fight, a sadistic jailer, a jailbreak, a sheriff in pursuit...

Along with Abbey's extraordinary vocabulary (what other cowboy novel contains words like 'incarnadine', 'sibilant', 'passacaglia', and 'tautologous'), what makes the novel such fun is the insertion of literary clichés into a contemporary setting; for instance, cowboy protagonist Jack Burns rides off a New Mexican mesa not into a dusty cowtown, but toward a sprawling, ugly city of the New West:

...until he came eventually to a barbed-wire fence, gleaming new wire stretched with vibrant tautness between steel stakes driven into the sand and rock, reinforced between stakes with wire staves. The man looked for a gate but could see only the fence itself extending north and south to a pair of vanishing points, an unbroken thin still line of geometric exactitude scored with a bizarre, mechanical precision over the face of the rolling earth. He dismounted, taking a pair of fencing pliers from one of the

saddlebags, and pushed his way through banked-up tumbleweeds to the fence. He cut the wire—the twisted steel resisting the bite of his pliers for a moment, then yielding with a soft sudden grunt to spring apart in coiled tension, touching the ground only lightly with its barbed points—and returned to the mare, remounted, and rode through the opening, followed by a few stirring tumbleweeds.

Burns's jailed compatriot Paul Bondi is not a horsethief awaiting the gallows but an academic philosopher who refuses to break out. His moral framework allows him to take files to their cell's window bars with Burns, but keeps him incarcerated when freedom beckons:

The difficulty was they wanted me to register as a conscientious objector. Conscientious objector to what? I asked them. To war, they said. But I love war, I said; my father got rich off the last one canning dogfood for the infantry; all Bondi's love war. Then what do you object to? they said. I object to slavery, I

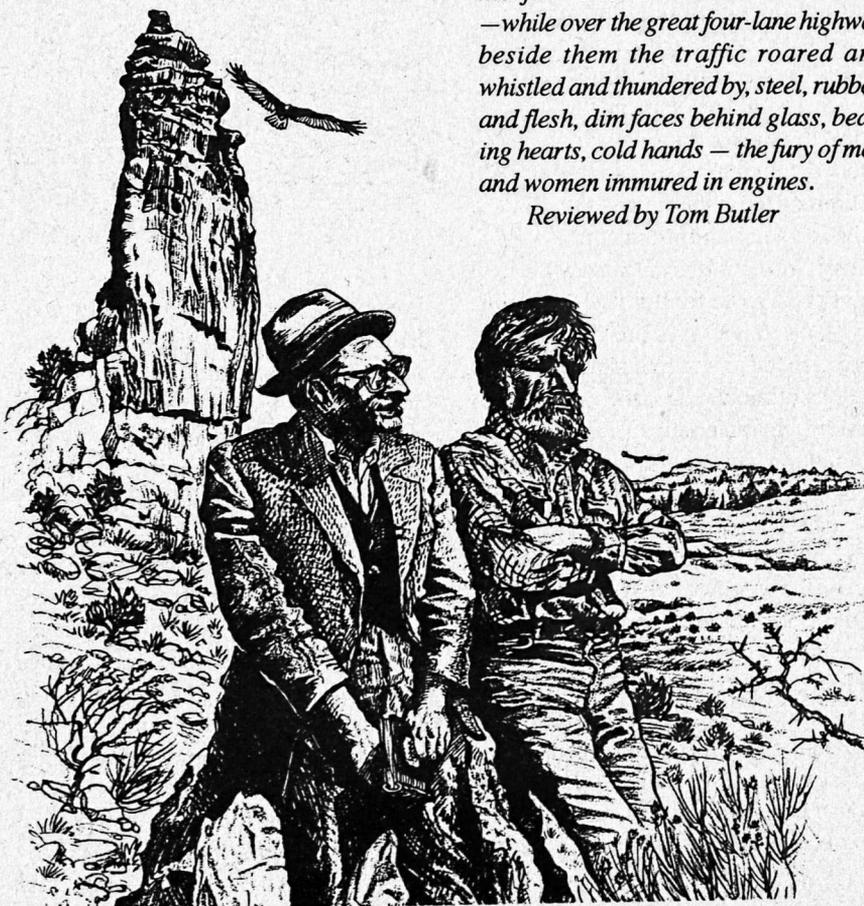
said; compulsory military service is a form of slavery.

Additional plot particulars need not be recounted here, but readers even slightly familiar with his later novels will recognize standard Abbeyesque themes in *The Brave Cowboy*: the clash of good and evil, love of freedom and contempt for Authority (as manifested by jailers, military men, developers, and others with parlous proclivities toward the natural world) and always, adoration for the landscape of the great American West.

Only 500 copies of this new edition of "An Old Tale in a New Time" (*The Brave Cowboy's* subtitle) were printed. Thus, Abbey fans need hurry to purchase a copy. It should be read aloud around many campfires this summer; many a toast should be raised to Jack Burns, to wild country and wild people, and to dear Ed Abbey whose love of place was complemented by a peerless talent for capturing wildness in words.

From the black arroyo came the scream of the horse, then the sound of the first shot and another scream;—while over the great four-lane highway beside them the traffic roared and whistled and thundered by, steel, rubber, and flesh, dim faces behind glass, beating hearts, cold hands—the fury of men and women immured in engines.

Reviewed by Tom Butler



THE ECOLOGY OF COMMERCE: A Declaration of Sustainability

by Paul Hawken; 1993; Harper Business;
New York, NY; 219p. plus bibliography
and index; \$23.

"Can we imagine competition between businesses that improves living and cultural systems?" Paul Hawken, entrepreneur and author of best-sellers *Growing a Business* and *The Next Economy*, not only imagines it, he outlines it in his latest effort, *The Ecology of Commerce*. His vision came from a seemingly simple epiphany which struck him during a "green" awards ceremony for corporate industrialists. Hawken realized that selling "green" products and recycling our beer cans and burrito wrappers will never lead to sustainability.

A successful businessperson, Hawken recognizes that a growth-oriented market economy, as we have today, will only continue to snowball into ecological and economic oblivion; no society consuming its capital will last. Hawken is the rare economist who believes the sustainable production capacity of ecosystems must be the limiting factor of human consumption. In determining the allocation of natural resources, he does not, however, cast aside the market system as intrinsically evil. Hawken recognizes the power of the market system. He points out as an example that the restaurants, delis and markets of New York City are always fully stocked with perishables and no more than a few days of inventory. This finely tuned process occurs with no regulation, because of the power of supply and demand generated in a market system. Hawken sees much more in this than the opportunity for an affluent urbanite to indulge in papaya during a blizzard. He sees the power of the market system to provide what we value. "Value is what we ascribe. Prosperity is what we make it to be. So what shall it be?" Hawken denounces economic growth for growth's sake, but encourages development, to improve peoples' lives qualitatively rather than quantitatively.

Hawken cites economist Herman Daly to enforce this distinction. "An economy can develop without growing, or grow with out developing." (p. 140) We are currently experiencing the latter.

Our global political economy has developed much like sprawling, poorly planned suburbs. Unexpected results from policies with good intentions and expected results from policies with bad intentions have created a political economy that is not ecologically sustainable. Hawken uses specific examples from industries ranging from health care to blue jeans to tobacco, pointing again and again to subsidies and incentives "to do bad" and disincentives "to do good." He does not blame corporations for taking the path of least resistance to profit; but he finds little evidence, given current population growth and public policy, to suggest that we as a species are any smarter than bacteria.

Hawken's plan for creating an ecologically sustainable economy means moving toward what he terms "restorative economics." This approach expands on Herman Daly's idea of a steady-state economy. Restorative economics is conceived to "achieve a market in which every transaction provides constructive feedback into the commons, as opposed to what we know today, when virtually every act of consumption causes degradations and harm." (p.89) Hawken's approach would internalize external costs of production, such as pollution, degradation, and resource depletion. Restorative economics relies on recalibrated green taxes to redirect the corporate paths of least resistance. Carbon and non-renewable fuel taxes would be phased in over 20 years. Coal would be the most expensive form of energy, not the cheapest. Taxes would be incrementally shifted from payroll and income taxes to pollution, degradation, and consumption taxes. Companies and consumers would have powerful incentives to constantly improve methods of production and choices of consumption. Competition between businesses will be for energy efficiency, waste minimization, and sustainably utilized resources.

A restorative economic system would be highly dynamic. After all, "the cash register is the daily voting booth in democratic capitalism." (p.212) We must shed those deeply imbedded feelings that we are "unequipped as citizens to participate in and mold the debate over critical issues." (p.218) Hawken places as much responsibility on businesses as he does on consumers to achieve sustainability. "Businesses must—must—be able to make money sustaining living systems, or global restoration will never happen." (p.89) He pleads for smaller scale bioregional commerce to allow people to be educated customers rather than simply faceless consumers.

While Hawken's approach to economics is refreshingly visionary, his ecological understanding is less sophisticated. He holds to the theories that ecosystem succession leads to a climax stage, and that diversity equates with stability. Such interpretations allow for a good analogy between businesses and natural systems, but reveal ecological naivete. Nevertheless, Hawken recognizes that the newly evolving fields of conservation biology and restoration ecology hold the keys to sustainability.

The *Ecology of Commerce* provides much cerebral fodder. With quotes from Wendell Berry, Jane Jacobs, Amory Lovins, Jerry Mander, Bill McKibben, Jeremy Rifkin, Gary Snyder, and E.O. Wilson, Hawken's proposal for a restorative, sustainable economy reads as a culmination of ideas waiting for a blueprint. With references from the *Wall Street Journal*, *Fortune*, *Harper's*, *In Business*, and *The Economist* as well as from *BioScience*, *The Ecologist*, *Wild Earth*, *State of the World*, and *Nature*, Hawken demonstrates the need to integrate economics and ecology. Hawken's book is must reading for everyone concerned about the natural and social flows of the world.

Reviewed by Andrea Freeman, U of WI Stevens Point.



OTHER RECOMMENDED TITLES

Books

State of the World 1994; by Lester Brown et al.; 1994; WW Norton; 265p; \$11.95; available from Worldwatch Institute, 1776 Massachusetts Ave NW, DC 20036.

State of the world 1994 is the worst yet. Not the book—this is the latest in the most influential international environmental book series now being published—the world, more beleaguered in 1994 than ever before.

This year Worldwatch Institute's top-notch researchers cover Carrying Capacity, including an especially useful section on Human-Induced Land Degradation Worldwide; Redesigning the Forest Economy; Safeguarding the Oceans; Cleaning Up After the Arms Race; Rebuilding the World Bank (a dubious proposition, methinks); Facing Food Insecurity (again, this reviewer would rather not); and other timely topics. All thoughtful readers will find much important information and many sound ideas in *State of the World*. Some thoughtful readers will like their general direction but question a few of their underlying assumptions, as this line from the carrying capacity chapter may hint: "The wiser use of technology can only buy time—and precious time it is—

to bring consumption and population growth down to sustainable levels and to distribute resources more equitably." Most *Wild Earth* readers would agree that no level of human population growth is sustainable at this time in history. Nonetheless, all will be edified by this book. — *John Davis*

Music

Songs For Kelly was released this year by the Jon Sirkis band. Composer and musician Jon Sirkis has devoted much of his work to wilderness. The new album is a dedication to Sirkis's friend Kelly, who spent the final years of her life working with teenagers who committed serious crimes as a result of being tragically abused. The powerful lyrics focus on the political and social injustices of our society and strongly advocate social change.

The music ranges from folk and bluegrass to rock, oftentimes within the same song. The harmony between Sirkis and vocalist Jenny Allen is compelling and reinforces the album's plea for social harmony. Sirkis evokes emotion from within the listener with songs varying from melodic and melancholy to fast and frantic. Performances

by guest musicians on the mandolin, banjo and penny whistles add diversity of sound.

For more information contact Boulder Folk Records, 2888 Bluff #492, Boulder, CO 80301. — *Erin O'Donnell*

Video

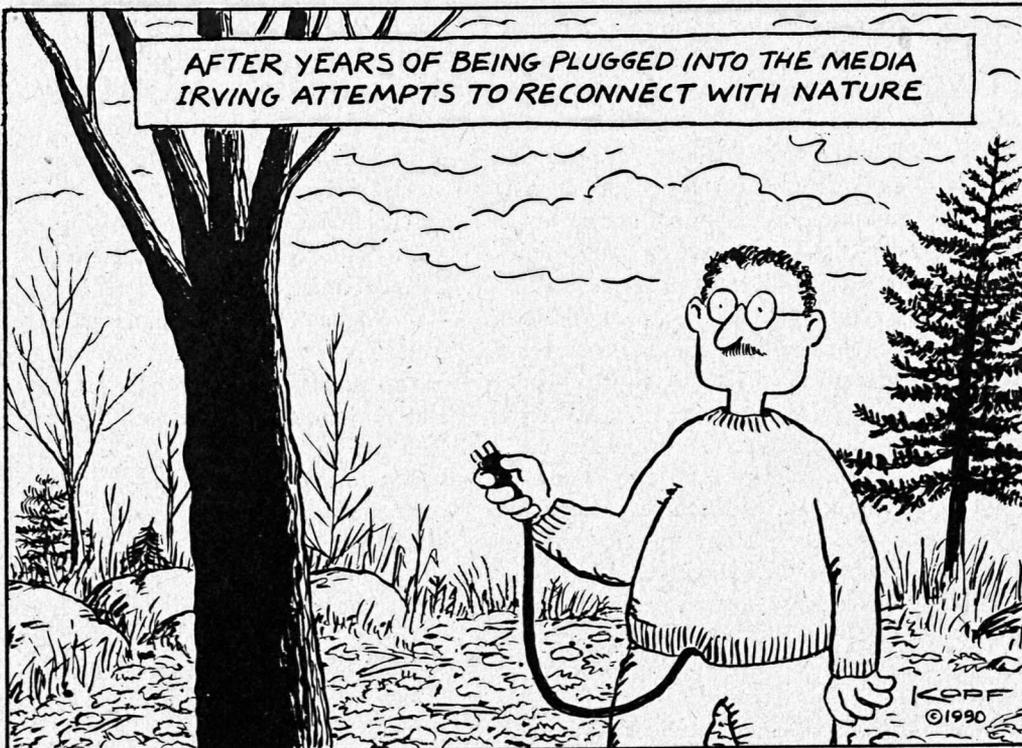
THE ELEMENT OF DOOM. Written, directed and produced by Doug Hawes-Davis. Videography by Anne Devine. Original music by Aaron Parret. The Ecology Center, Lead Mine Project (101 E. Broadway, Rm 602, Missoula, MT 59802), VHS 42 minutes; \$10.

The beauty of this film lies in its opening scene: a guided canoe tour through the Ozarks, accompanied by a bluegrass soundtrack. The remainder of the film reveals the horror of a region threatened by corporate mining.

This 1993 Merit Award-winning video documents the world's largest mining company's attempt to develop one of the few remaining wild areas in the Midwest. It contains footage revealing the Doe Run Company's destructive mining practices in the Ozarks. Also mapped out are the company's present plans to develop Missouri's Viburnum Trend, in the Mark Twain National Forest.

The video features interviews with representatives of all sectors: well spoken ecologists, conservative government officials, and angry locals. Questions raised include "How will the company dispose of the toxic waste to prevent it from entering the water table?" The ecological, political and social problems involved with mining the region are clearly presented.

The Element of Doom is a "cry for help" to protect this geographically unique region from destruction. It weighs the Ozark landscape and people against the profits of a big corporation, and draws the bottom line—the region cannot afford the "feast/famine" development that is typical of mining. — *Erin O'Donnell*



Earth Spirit Calls

Earth Spirit Calls: a newsletter for action is a creative approach to focusing political action (letters, generally) on important wildland and habitat issues across the US. The newsletter provides critical information to individuals so that they can effectively assist wildland protection efforts. Editor Emily Sweeney networks with groups nationwide (including many affiliated with The Wildlands Project) to identify issues. The newsletter presents the background, current situation, most important things to communicate, and to whom, in concise yet thorough "Action Requests." Each eight page issue includes two or three Action Requests, updates on previous actions, an Organizational Directory for further involvement, poetry (submissions welcome), and good news.

Earth Spirit Calls is currently making an introductory offer of \$7.50 for an annual subscription (6 issues); regularly \$10. Subscriptions should be sent (before June 30 to receive the introductory rate) to Earth Spirit Calls, POB 4359, Bellingham, WA 98227 (206-734-2781).

Boreal Forests Conference

The Taiga Rescue Network and Western Canada Wilderness Committee, Alberta will present the "Boreal Forests of the World II" conference 23-29 August 1994, in Edmonton, Alberta, Canada. The 2nd international conference will explore and combine indigenous, scientific and NGO perspectives to develop and shape action strategies to work at the local level within an international framework. For more information contact Claire Ashton, WCWC, Alberta #4 10121 Whyte Ave., Edmonton, Alberta, Canada T6E 1Z5; (403) 433-5323.

Native Forest Network Conference

The Second International Temperate Forest Conference will be held at the University of Montana in Missoula, 9-13 November 1994. Convened by the Native Forest Network, the intent of the conference is to bring together forest activists, indigenous peoples, conservation biologists, and non-governmental organizations

to develop strategies aimed at ending industrial forestry by multinational corporations and preserving temperate forests worldwide. Other topics of discussion will include indigenous/environmental alliance building, biodiversity, sustainable forestry, and the development of a temperate forest action plan.

Call For Papers: The NFN will publish the conference proceedings as a review of international temperate forest issues. Regional reports, scientific papers, economic analyses, public policy papers, corporate profiles, campaign updates, thoughts on strategy and philosophical rants are encouraged for submission. For more information on conference papers contact Tom Fullum, POB 1788, Silver City, NM 88062, (505) 538-0427. For further information on the conference contact Jake Kreilick, Ecology Center, 101 E. Broadway, Room 602, Missoula, MT 59802; (406) 728-0867.

University of Arizona

A binational conference, Biodiversity and Management of the Madrean Archipelago: The Sky Islands of the Southwestern United States and Northwestern Mexico, will be held 19-23 September 1994, in Tucson, AZ. The purpose of the conference is to bring together land managers, conservation biologists, ecologists, resource managers, and environmentalists to develop better understanding and management of biodiversity on these unique mountains rising out of the Southwestern deserts. It is sponsored by the University of Arizona, U.S. Forest Service, Bureau of Land Management, Soil Conservation Service, and several state agencies and organizations of the southwestern United States and northwestern Mexico. For information contact L. F. DeBano, Rocky Mountain Forest and Range Experiment Station, c/o School of Renewable Natural Resources, University of Arizona, Tucson 85721; (602) 621-2543, FAX (602) 621-8801.



ASEH Call For Papers

The American Society for Environmental History (ASEH) invites paper and session proposals for its next meeting 8-11 March 1995, in Las Vegas, Nevada. Please contact members of the Program Committee for information on desired topics: Theodore Steinberg, Program Chair, New Jersey Institute of Technology, (201) 642-4177; Linda Lear, Smithsonian Archives, (202) 357-2787 or (301) 229-1136; or Bill Riebsame, University of Colorado, Boulder, (303) 492-6310. Proposals should be sent to arrive no later than 1 September 1994 to Theodore Steinberg, at above address. For local arrangements contact Hal Rothman, University of Nevada, Las Vegas (702) 895-1012.

Voices of the Earth Conference

The Colorado Sacred Earth Institute will present an interactive conference examining spiritual awareness and social responsibility from an ecological perspective 29-31 July 1994 in Boulder, Colorado. Conference presenters include Noel Brown, Anita Roddick, Karan Singh, Hunter Lovins, Wes Jackson, and Matthew Fox. For registration information contact Colorado Sacred Earth Institute, 1120 Pine St., Boulder, CO 80302; (800) 442-6768 or (303) 442-6760.

Baca for Governor

Conservationists around the country were pleased to hear of Jim Baca's foray into electoral politics. To make donations or receive information about the campaign, contact Baca for Governor, 2400 Rio Grande Blvd. NW, Suite 1-211, Albuquerque, NM 87104; 505-262-BACA.

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ABOUT SUBMISSIONS

Artwork, articles and letters should be sent to the Art Director or Editor at our main address (POB 455, Richmond, VT 05477). *Wild Earth* welcomes submissions of original illustrations or high-resolution facsimiles thereof. Botanical/zoological/landscapes are eagerly sought, with depictions of enigmatic microflora especially prized. Representational drawings should include common and scientific names.

Articles and letters should be typed or neatly hand-written, double-spaced. Those who use a computer **should include a copy on disk**. We use Macintosh (3.5" disk) but can usually convert from PCs. Writers should enclose self-addressed stamped envelopes. Deadlines are two months before the changes in seasons (e.g., 10-20 for winter issue). *Wild Earth* has a large and growing backlog of accepted articles. Thus, unfortunately, authors of lengthy articles must expect a delay of a year or more before their article sees print, even if it is accepted.

Poems should be sent directly to our Poetry Editors, Art Goodtimes (Box 1008, Telluride, CO 81435) and Gary Lawless (Gulf of Maine Books, 61 Maine St, Brunswick, ME 04011). Poets should realize that we receive hundreds more poems each quarter than we can publish.

Articles, if accepted, may be edited down for space or clarity. Articles with significant scientific content (e.g., most biodiversity reports and wilderness proposals) will be reviewed by our Science Editor for accuracy and clarity. Wilderness proposals will also be reviewed by our Executive Editor, and controversial or complicated pieces may be peer reviewed. Lengthy biologically-based articles generally should include literature citations.

Wild Earth occasionally reprints articles; but due to the surfeit of submissions we receive, reprints will usually be low priority. If an article is being submitted to other publications as well as *Wild Earth*, the writer should indicate so. We usually try to avoid duplication. We generally welcome other periodicals to reprint articles from *Wild Earth*, provided they properly credit the articles.

In matters of style, we follow the *Chicago Manual of Style* loosely and Strunk's & White's *Elements of Style* religiously. Also, we suggest that authors remember several basic rules when writing for *Wild Earth*, since we always have far more material than we can print and we expect our writers to be lucid, perspicacious, and ineffably winsome.

1. Eschew surplusage (Twain 1895).
2. Thou shalt not verbalize nouns (Abbey 1988).
3. Do not affect a breezy manner (Strunk & White 1959).
4. Watch your antecedents (Davis 1988).
5. **Include a goddam floppy** (Butler 1992).
6. Mix drinks, not metaphors (Davis 1993).

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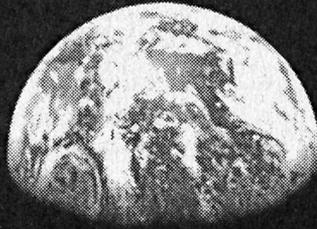
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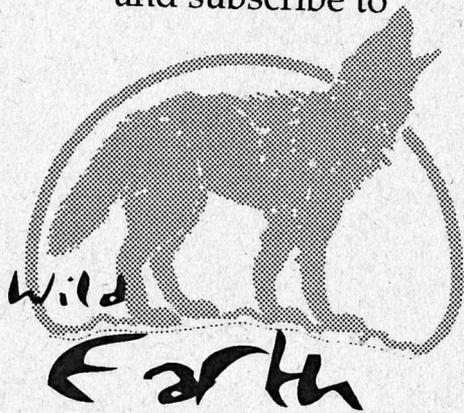
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To spill as these
over the once incendiary hills,
rich brimstone
of beauty,
purple as a cup
of blueblood —
this is what the body wants,
all haunch
like a cord of bucks
running —
there are no boundaries
in the dumb
animal heart,
there is only this
blossom after blossom.
How to believe in the quick
lithe earth
when the body is a mandate
of terrible wills,
how to wind and braid
over stone and leaf,
crash as veils do
ledge upon ledge
like a fission
of libations —
O purple world
of pulse and panicles,
the geese migrate
one by one,
the great blue heron
tempers the stream
with his shadow —
all ascension
and release.
What cumbersome bones
under our skins
we have,
what cells drone
in the wild escarpment
of our brains.

—Leonore Wilson, Napa, CA

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The Cenozoic Society is a non-profit educational, scientific, and charitable corporation which publishes *Wild Earth* magazine. With North American wilderness recovery as its overarching theme, *Wild Earth* focuses on biodiversity and wilderness issues from an ecocentric viewpoint. Through *Wild Earth* and other publications, the Society seeks to further its goals of wildlands restoration/protection, reversal of human overpopulation, and cessation of the global extinction crisis. Cenozoic Society Members receive an annual subscription (4 issues) to *Wild Earth* and discounts on back issues and other publications.

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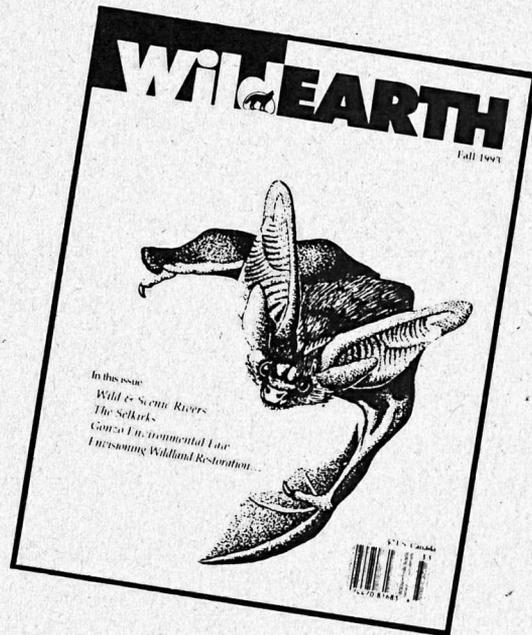
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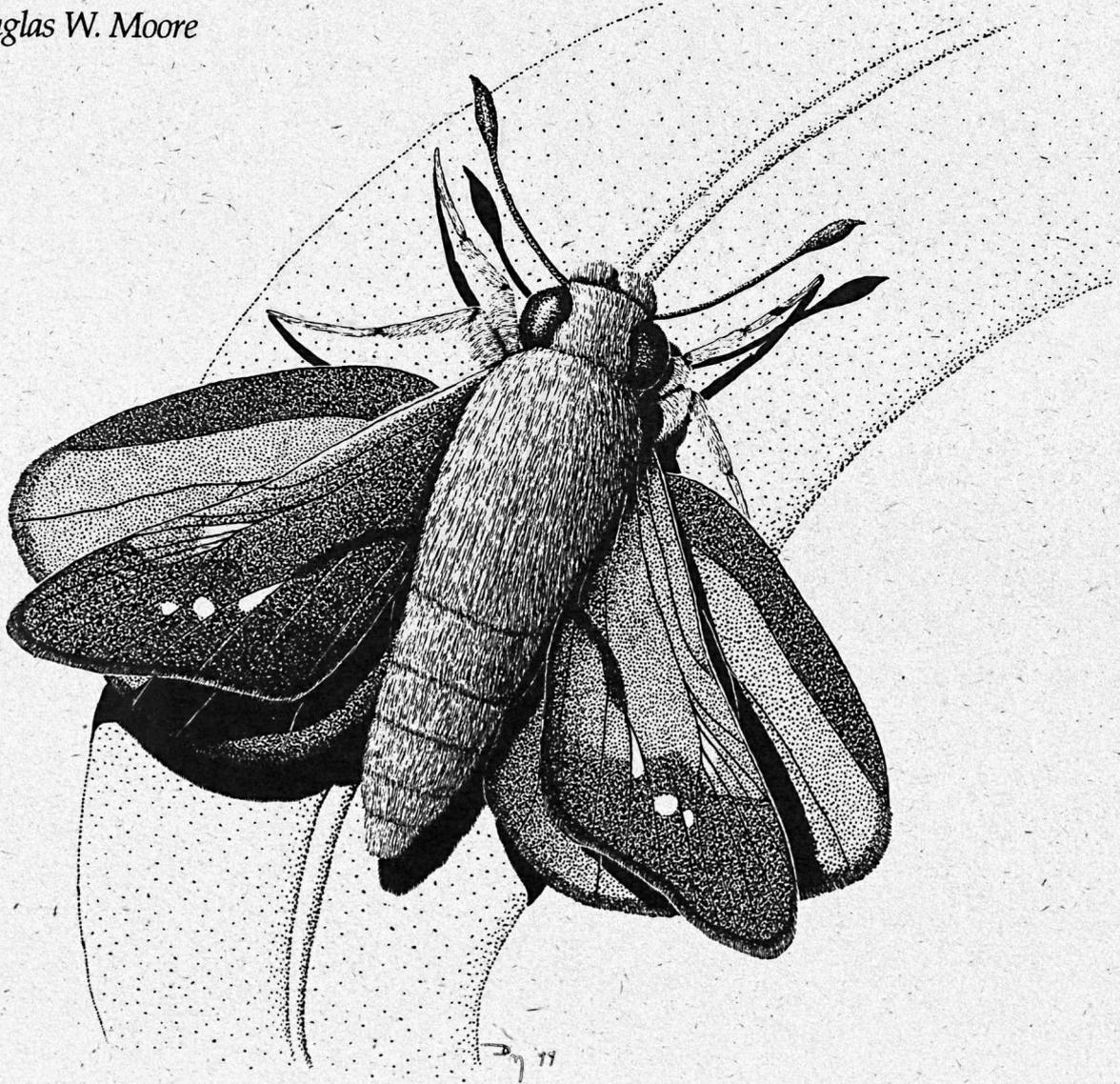
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Dakota Skipper Butterfly (*Hesperia dacotae*)

drawn by Douglas W. Moore



Though the name may sound like a train, the Dakota Skipper is a diminutive butterfly native to wet prairies of the Midwest. As reported by the Biodiversity Legal Foundation last issue, this butterfly has been reduced by agribusiness and other forms of habitat destruction to small isolated populations; and BLF has petitioned the US Fish & Wildlife Service to grant the insect protection as a Threatened species.

Skippers comprise a speciose family (Hesperidae) of small moth-like butterflies. They derive their common name from their low erratic flights (bringing to mind certain airlines).

As members of the order Lepidoptera, skippers naturally spend large portions of their lives in a stage not conducive to skipping. (Ever seen a larva with a large bulbous head *hop*?) The caterpillars eat wild grasses and legumes. Overwintering pupae hang upside down in cocoons attached to leaves. (Ah... the life!)

Next time you see a butterfly flutter by, recall that some North American species have already gone extinct and many others are in trouble. BLF delights in skippers, and will gratefully employ your donations to defend the Pawnee Montane Skipper (already ESA listed) and Dakota Skipper. Xerces Society also works for butterflies and other insects. See past *WE* issues (including Winter 93/94 and Special Issue on The Wildlands Project) for descriptions of groups benefiting butterflies, and contribute: BLF, POB 18327, Boulder, CO 80308; and Xerces Society, 10 Southwest Ash St., Portland, OR 97204. — JD

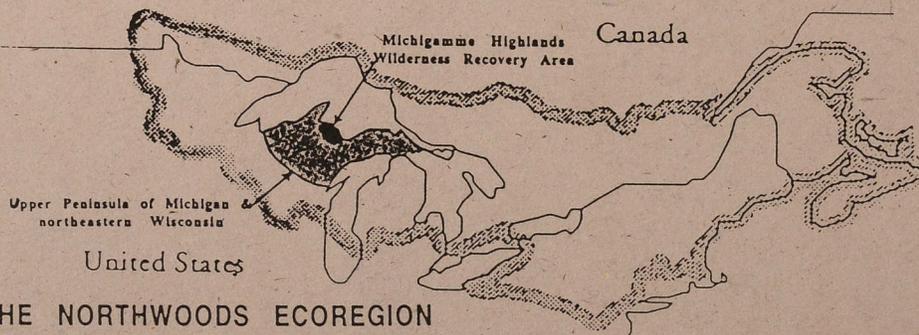
Artist Douglas Moore (7250 N. Meredith Pl., Tucson, AZ 85741) is a marine invertebrate ecologist and illustrator working in a variety of media. A graduate of the University of California, Santa Cruz, he returned there to complete the school's graduate program in Natural Science Illustration. He is a member of the Guild of Natural Science Illustrators whose work has appeared in numerous publications. — TB



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NWR has developed a wilderness recovery plan for the Michigamme Highlands, one of the largest unprotected wilderness areas (200,000 acres) in the Great Lakes Bioregion. A substantial portion of remaining old-growth forest in Michigan's Upper Peninsula occurs here. Establishing a core Michigamme Highlands wilderness reserve, with buffer zones and connecting corridors, is critical to restoring natural diversity in the Northwoods.

NWR has also initiated and is coordinating a land exchange proposal for protection of up to 10,000 acres adjacent to the Michigamme Highlands Wilderness Recovery Area's federally designated McCormick Wilderness (currently 16,850 acres). And, to get the whole Northwoods Wilderness back, we are coordinating our efforts with grassroots wilderness groups across the entire Northwoods ecoregion.

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