



Environment & Society Portal

Suggested citation: Foreman, Dave, ed., *Wild Earth* 4, no. 3 (Fall 1994).
Republished by the Environment & Society Portal, Multimedia Library.
<http://www.environmentandsociety.org/node/5686>.

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

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

WILDEARTH



Fall 1994



\$4.95 US



4 3

THE CORNUCOPIA SCAM
CANADIAN FORESTS AT RISK
CENTRAL APPALACHIAN FOREST ACTIVIST'S GUIDE
THE GREAT PLAINS: AMERICA'S BEST CHANCE FOR ECOSYSTEM RESTORATION

Around the Campfire

Let me apologize for my non-appearance in this spot last issue. The hard-working gnomes who put out this magazine finally got us on our seasonal schedule (you're supposed to receive *Wild Earth* close to the equinoxes and solstices). That deadline came at a bad time for me, what with eight college and prep school speeches in April, five weekend vision map workshops during spring, promotion work for the *Clearcut* book, and various other speeches and conferences. We plan to stay on schedule now, and I plan to write this column (and other essays) in time to make the deadlines.

I appreciate your responses to the query in my last Campfire (Spring 94) about whether we should switch from publishing four to publishing six times a year. You strongly favored sticking with our quarterly schedule, and the *Wild Earth* staff also felt that was best for both amount of work and finances.

Speaking of my last Campfire, *High Country News* reprinted the Babbitt editorial. But let me apologize for saying our expectations for Al Gore were like those for a date with the prettiest cheerleader. I'm sorry for the gender-challenged language. Replace that line with this: "The expectations for Gore as vice president were akin to those of a five-year-old waiting by the chimney for Santa Claus."

Sibling organizations *Wild Earth* and The Wildlands Project are working to bring the principles of conservation biology into the conservation movement and to encourage other groups to adopt Dr. Reed Noss's core reserve-biological corridor-buffer zone model for the design of nature reserves. It's encouraging to see that happening. At the recent Society for Conservation Biology convention in Guadalajara, the World Wildlife Fund described how they had adopted that model for their work in Latin America. The Sierra Club has launched an "Ecoregions" campaign, and The Wilderness Society a "LifeLands" project, both drawing from conservation biology. Defenders of Wildlife has been at the forefront of promoting biological corridors, and recently sponsored the publication of the definitive book on applying conservation biology to land management: *Saving Nature's Legacy* by Reed Noss and Allen Cooperrider.

In their recent vision document for the Yellowstone region, the Greater Yellowstone Coalition applied conservation biology concepts and identified biological corridors. American Wildlands has launched a "Corridors of Life" campaign to encourage protection of biological corridors between core wilderness areas.

The Northern Rockies Ecosystem Protection Act (NREPA), the first Wilderness legislation to be based on conservation biology and to propose biological corridors, continues to draw support. Cosponsors in the House of Representatives stand at over 60. Hearings were finally held this spring on NREPA, and Debbie Sease, chief lobbyist for

continued on p. 3

Wild Earthlings

Dave Foreman, *Executive Editor*

John Davis, *Editor*

Tom Butler, *Art Director*

Marcia Cary, *Business Manager*

Reed Noss, *Science Editor*

Kathleen Fitzgerald, *Outreach Director*

Mary Byrd Davis, *Associate Editor*

Erin O'Donnell, *Adm. Assistant*

Eva-Lena Rehnmark, *Intern*

Rowan Jacobsen, *Proofreader*

Contributing Artists

Chris Billis, Gerry Biron, Darren Burkey, Suzanne DeJohn, Patrick Dengate, Mary Elder, Gary Eldred, Bob Ellis, Amy Grogan, Anna Guillemot, Sandy Hogan, Sky Jacobs, Lia Kass, L.J. Kopf, Heather Lenz, Rob Leverett Jr., Peter Lucchetti, Peggy Sue McRae, Rob Messick, Douglas Moore, Kirsten Nielson, Jim Nollman, Chuck Ouray, Susan Pedicord, Robin Peterson, Celeste Poulin, Eva-Lena Rehnmark, Rosemary Roach, Nancy Roy, Kurt Seaberg, Robert Smith, Jay Tatar, Davis TeSelle, D.D. Tyler, Mark Wagner, R. Waldmire, Jennifer Wiest, Brush Wolf

Poetry Editors

Gary Lawless, Art Goodtimes

Editorial Advisors

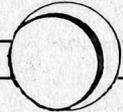
Rick Bonney, David Brower, Michael P. Cohen, Bill Devall, Michael Frome, David Johns, Ron Kezar, Dolores LaChapelle, Christopher Manes, Bill McKibben, Gary Nabhan, Arne Naess, Roderick Nash, George Sessions, Kris Sommerville, Gary Snyder, Michael Soulé, Howie Wolke, Margaret Hays Young, Nancy Zierenberg

Correspondents

David Abram, Justin Askins, Joe Bernhard, David Burks, Jasper Carlton, Dan Conner, Sandra Coveny, Michael D'Amico, Barb Dugelby, Jim Eaton, Paul Faulstich, Roger Featherstone, Mitch Friedman, Trudy Frisk, Keith Hammer, Cindy Hill, Monte Hummel, Lynn Jacobs, Mat Jacobson, Leslie Lyon, Mollie Matteson, Roz McClellan, Stephanie Mills, Andy Molloy, Rod Mondt, Ned Mudd, R.F. Mueller, Doug Peacock, Tony Povilitis, Jamie Sayen, John Seed, Dale Turner, Paul Watson, Terry Tempest Williams, George Wuerthner



WILD EARTH



FALL 1994

VOLUME 4, NUMBER 3



Around the Campfire...inside front cover

- 2 It's What We Do... *WE* staff
- 4 The Wildlands Project Update *by David Johns*

Viewpoints

- 7 The Metolius River *by Kathleen Dean Moore*

Letters...10

Biodiversity

- 13 Natural World News: Sea Shepherd; Black Hills NF; Cove-Mallard
- 15 Red-Cockaded Woodpeckers Near Extinction in KY *by Chris Schimmoeller*
- 17 Raincoast Wilderness *by Cameron Young*
- 21 Algoma Highlands *by Brad Cundiff*
- 24 Nova Scotia's Best (Kept) Secret *by Charles Restino*
- 27 Helping Protect Canada's Forests *by Colleen McCrory*
- 29 Seabird Restoration Succeeds *by Pete Salmansohn*
- 31 The Great Plains, Part 2 *by Daniel S. Licht*
- 37 Central Appalachian Forests *by R.F. Mueller*
- 50 Reconsidering Fish Stocking of High Wilderness Lakes *by Michael P. Murray*
- 53 Wombats Bat Last! *by Faith Walker*

Strategy

- 56 Southern Utah Wilderness Alliance *by Mike Matz*

- 58 Using General Land Office Survey Notes in Ecosystem Mapping *by Douglas R. Cornett*

- 61 Finding Your Own Lawyer *by Ned Mudd & Ray Vaughan*

- 64 Sowing Seeds With Biocentric Broadcasting *by Traci Hickson and Dennis Hendricks*

- 66 Citizen Involvement in Mining Issues *by Doug Hawes-Davis*

Wilderness Proposals

- 69 Thoreau Regional Wilderness Proposal *by Jamie Sayen & Rudy Engholm*

Population Problems

- 73 The Cornucopia Scam, Part 1 *by Sandy Irvine*

Reviews

- 82 Book Reviews
- 88 *For Everything There is a Season* (excerpt)
- 89 Other recommended titles

Announcements...90

Poetry

- 23 When the Rivers Are Flooded *by Patti D'Angelo*
- 63 Tortuga *by Marilyn Spitz*
- 72 September *by Peter Gurnis*

Species Spotlight...inside back cover

- American Badger (*Taxidea taxus*) *illustration by Robert Smith*

WILD EARTH (ISSN 1055-1166) is published quarterly by the Cenozoic Society, Inc., POB 455, Richmond, VT 05477. The Cenozoic Society is a non-profit educational, scientific, and charitable corporation.

Cenozoic Society Board: Tom Butler (VT), John Davis (VT), Dave Foreman (AZ), David Johns (OR), Reed Noss (OR), Kris Sommerville (CO).

Membership in the Cenozoic Society is open to the public and includes a subscription to *Wild Earth*. Non-membership and institutional subscriptions are also available. The basic rate for individual membership subscriptions is \$25; low income membership is \$15; library/institutional subscriptions are \$30. Subscriptions to Canada and Mexico are \$30 per year, overseas subscriptions are \$35 (surface mail) or \$40 (air mail).

Second class postage paid at Richmond, VT.

POSTMASTER: send address changes to *Wild Earth*, POB 455, Richmond, VT 05477.

All editorial and membership correspondence should be sent to *Wild Earth*, POB 455, Richmond, VT 05477. Submissions of manuscripts and artwork should be sent to the Editor or Art Director. Writers who use computers should include a 3.5" disk (we prefer Mac to MS-DOS) as well as paper copies. Queries in advance of submission are recommended. Writers and artists who want their work returned must include a stamped, self-addressed envelope. *Wild Earth* assumes no responsibility for unsolicited materials.

Wild Earth accepts a limited amount of advertising that is compatible with the policies and goals of the Cenozoic Society. For rates/information contact Marcia Cary or Tom Butler at (802) 434-4077.

Copyright © 1994 by Cenozoic Society, Inc. All rights reserved. No part of this periodical may be reproduced without permission.

Permission to photocopy items for personal use, or the internal or personal use of specific clients, is granted by the Cenozoic Society, Inc., provided that the base fee of \$5 per copy of the article is paid directly to the Copyright Clearance Center, 27 Congress St., Salem, MA 01970. For those organizations that have been granted a photocopy license by CCC, a separate system of payment has been arranged. The fee code for users of the Transactional Reporting Service is: 1055-1166/92 \$5.00.

Wild Earth is available on microfilm from University Microfilms, Inc., 300 North Zeeb Rd., Ann Arbor, Michigan 48106-1346.

Articles appearing in this journal are indexed in ENVIRONMENTAL PERIODICALS BIBLIOGRAPHY. *Wild Earth* is printed on recycled paper.

Cover art: Whooping Crane by Amy Grogan

Marcia Cary, Dave Foreman, Michael Soulé, Barb Dugelby, Jim Eaton, myself, and about ten other friends of *Wild Earth* and The Wildlands Project enjoyed a float trip through Desolation and Gray canyons on Utah's Green River this July. The trip gave us the opportunity to discuss The Wildlands Project's and *Wild Earth*'s growing roles in the New Conservation Movement, as well as affording us numerous wildlife sightings (Peregrine Falcon, Golden Eagles, Side-blotched Lizards, Tiger Whip-tailed Lizards, Black Bear, Gray Fox, Badger...). The trip also gave me the opportunity to reduce by 5% or so my pile of "must-read" books. Several of these books are outstanding, and I wish to call readers' attention to four:

The Biophilia Hypothesis, which David Petersen favorably reviews in this issue, should inform future conservation efforts worldwide. The volume raises more questions than it answers, naturally, but it makes clear that wildland advocates need to learn about psychology and sociology and learn how to use to Nature's advantage people's inherent attraction to wildlife and wild places.

Saving Nature's Legacy is an equally important tome. Reed Noss and Allen Cooperrider have provided the conservation biology synopsis that conservation activists have long needed. We ran in *Wild Earth* (spring 94) most of their chapter on aquatic ecosystems. Now wildland proponents can read the rest of the book. Calling *Saving* ... "the most important book since Sand County Almanac," Dave Foreman recently expressed his intent to offer the book to activists at a reduced rate. (Contact Ned Ludd Books.) Island Press deserves accolades for publishing both *Biophilia Hypothesis* and *Saving Nature's Legacy*.

A third book I encourage all to read is *The Human Nature of Birds*, by Theodore Xenophon Barber (Penguin Books 1994). Though I think the title (and occasional use of loaded language) is unfortunate (birds don't have a human nature; humans have an animal nature—which is a complex blend of instinct and intelligence), the book

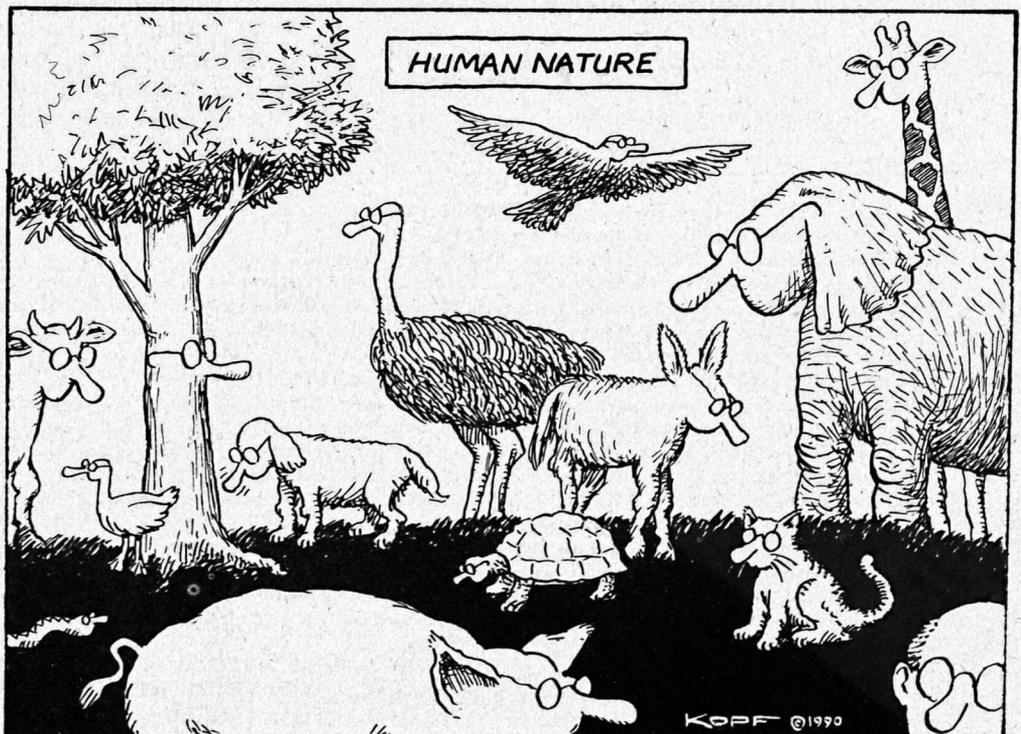
convincingly argues that birds and other animals are intelligent, individualistic, loving, feeling, playful beings. Birds, in particular, surpass humans in certain types of intelligence. If wildlife proponents could show other people that other creatures are similarly intelligent and caring, we might be able to turn the tide in favor of wildlife.

A fourth landmark book, ten years old now but perhaps more timely than ever, is Terry Tempest Williams's *Pieces of White Shell*. These stories paint a poignant portrait not only of a landscape—Colorado Plateau—and two cultures there—Navajo and Mormon—but also of the very importance of stories. Storytelling, Terry shows, may be the deepest way (along with actually getting people outside) to reconnect people with the land.

—John Davis

The presence of summer intern Eva-Lena Rehnmark has precipitated a veritable aesthetic windfall for *Wild Earth*. Though readers will see herein several of her smaller illustrations, we have been privileged to view a prolific output of paintings and drawings ranging from excellent to foudroyant. As she leaves us to complete her final year at the Rhode Island School of Design, the *WE* staff is grateful for her good spirits, fine vegan cooking, and prodigious artistic talents.

—Tom Butler



Thanks to my co-workers, I was able to jump at an opportunity to sail from St. Maartin to Ibiza, Spain, for the month of May. Watching the changing moon and sun reflecting on the translucent water, gazing at the stars shimmering in the sky, observing the color and motion of the mighty sea, and sailing the boat was my way of life. The sea air filled my lungs and the salt water cleansed my body.

Dolphins and whales became my companions. One afternoon a group of dolphins swam by the stern of the boat with five Pilot Whales. Different species, swimming together. Gliding through the water with their own unique movements, yet heading in the same direction. Respecting each other's presence and space. Playing, not interfering. It is humbling watching these strong mammals swimming amiably together. We must take home the lessons of the wild.

Taking time in the wilderness—oceans or forests, deserts or seas—is not a luxury in the conservation business; it is a necessity. We must renew often our ties to the wild. Fax machines, computers and telephones slowly kill our wild spirit. Meetings become unproductive and smiles become frowns. We become wrapped up in what is politically acceptable. In fighting for the preservation and restoration of Earth we need to keep alive the wild fire in our hearts. For if the flame within dies, it is not we who lose; it is Earth.

—Kathleen Fitzgerald

continued from inside front cover

the Sierra Club, offered a very strong statement of support which emphasized biodiversity values and argued forcefully for corridors between Wilderness Areas.

A revolution is brewing in the way we see nature, in the arguments we use for protecting landscapes and wildlife, and in the design of nature reserves. Before we can see the model of core reserves, connecting corridors, and buffer zones applied on the land, though, we must bring various groups into the fold: conservation and other public-interest groups, academic biologists, agency biologists, agency managers, media people, politicians....

It's a long row to hoe, but as conservation groups and university biologists come over, agency biologists become more convinced, and managers, media, and politicians begin to pay attention. Our work is lobbying—whether we're trying to convince a national conservation group to endorse NREPA, or cajoling a committee chair in Congress to move beyond traditional "rocks and ice" concepts of Wilderness to biological diversity; whether we're informing a reporter that the issue is not "jobs versus owls" but ecosystem health, or pressuring a forest supervisor to protect a wild corridor between Wilderness Areas for Wolverines and Grizzly Bears.

We succeed by standing firm, by not compromising too readily, but also by not alienating those we hope to bring to our new ideas. When you want a conservation group or a forest supervisor to change position, you don't rub their noses in the past; you give them the opportunity to save face. We convince people through our steadfastness, public pressure, and the strength of our arguments, yes, but we make it easy for them to be convinced by not being shrill or condemning. The role of those pushing the edge of what is politically realistic is not to castigate others who are not as far along, but rather to make it inviting for them to move farther along. When we attack people who are not yet beside us, we make it very difficult for them to ever come alongside us. In this crazy world, getting crazier every second, we need all the friends we can get.

One of my real disappointments with today's conservation and environmental movements is the way they have shied away from the hard questions of overpopulation and carrying capacity. Twenty years ago, virtually every group recognized overpopulation as a root cause of the ecological crisis and supported serious measures to deal with it. Today, most groups still recognize the problem of overpopulation—but quietly. Too many are afraid to get out-front on the issue.

Why? We've been terrorized. Fetus-worshippers on the right and neo-Marxist cornucopians on the left have vilified as baby-killers or as racist Malthusians anyone or any group that dares to speak on overpopulation. This crossfire has made a lot of us weak in the knees.

When we launched *Wild Earth* we were determined not to cave into such intimidation. We promised that our new magazine would regularly show the links between destruction of biodiversity and overpopulation. Because of that, we've just received a generous grant from the Weeden Foundation—one of the main entities in the movement determined to bring the overpopulation issue to the forefront of the resources and quality of life debate. I'd like to thank them very much for their good work and for their encouragement and financial support of *Wild Earth*.

We have also recently received generous grants from the Peradam Foundation and REI's National Trails Coalition; I thank them for their support as well. Weeden, Peradam, and REI join the Foundation for Deep Ecology in making this magazine possible. (Believe me, subscriptions and advertising don't come close to covering our expenses even with the starvation wages paid the Vermont crew!)

○

When you read this, I'll have moved back to Albuquerque, New Mexico. My wife, Nancy, has better job opportunities in the Duke City than in Tucson, and Albuquerque is my home town. We've lived in Tucson for ten years and have great memories (a couple of really bad ones, too) and many fine friends. We'll be back regularly. Thanks to all of you dear desert rats for making the last the best decade in my life.

Happy Trails.

—Dave Foreman, Pecos Wilderness

The Wildlands Project

Update

The Society for Conservation Biology meetings held in June in Guadalajara provided a unique opportunity for North Americans from Mexico, the US, and Canada to discuss conservation problems and strategies. There is growing recognition of the need for transnational solutions and protecting large landscapes.

Another effort being undertaken by TWP to support regional conservation efforts is the Wildlands law project. Unlike the Biodiversity Legal Foundation, which is in the vanguard of conservation litigation efforts, this effort will compile conservation laws throughout the continent at the national and subnational (states, provinces, etc.) levels, to make activists aware of the full range of legal tools available and give them models of legislation working (or not working) elsewhere. Most states in the US provide tax breaks and other subsidies for despoiling the natural world ("improving the land"). Some states, however, have laws that treat protected or restored privately owned land as if it were no longer a commodity; i.e., they do not tax it.

Good laws will be critical for conservation. Protection and restoration of public lands will never be adequate to ensure ecological health. Nor is acquisition of lands by the public always the best or even a possible solution. Laws removing subsidies for ecological destruction and providing incentives to maintain lands in a natural condition will play a significant role.

Two extremely important books related to The Wildlands Project must be noted. In *Saving Nature's Legacy*, published by Island Press, Reed Noss and Allen Cooperrider describe the biological crisis, the failure of existing conservation strategies, and what we must do to restore landscapes to health. *Place of the Wild*, an anthology edited by David Clarke Burks (to be published by Island Press in the fall), addresses one of the most contentious issues in conservation: the place of humans in the wild. *Place of the Wild* is the first in what TWP plans as a series of books addressing wildland conservation issues.



It is a shopworn cliché that a picture is worth a thousand words... but it is often true. Perhaps even more powerful than a picture is a map—at least for conveying the principles of conservation biology. Maps have a power to engage and stimulate people. No words demonstrate more clearly what island biogeography means to Jaguars, parrots and Bison than maps.

One of the first steps in designing wildland proposals is vision mapping. Vision mapping transforms the information people in a region have into tentative



The Wildlands Project

and preliminary lines on a map. This spring four more regions started creating such maps: the Southwest Deserts, Great Lakes Northwoods, Pacific Northwest and the Great Basin.

The maps produced in this way will — after several stages of review at the regional and continental level — be used to create a poster of North America that conveys to the public what is needed to protect biodiversity and ecological processes. Produced at a very large scale and not intended to portray a peer-reviewed conservation proposal, the poster will stimulate involvement in the much longer process of creating scientifically defensible proposals.

Publication of this vision map poster is tentatively scheduled for next spring or summer and will be the focus of a special issue of *Wild Earth*; as part of a major educational effort coordinated with the regions. WQED, the Pittsburgh public station responsible for excellent nature programming, will broadcast a *Web of Life* documentary on this stage of the wildlands process.

Vision mapping is not only a tool for reaching a broader public; it is also an educational tool for those of us in the conservation movement. It is a way to assess what we know and what is happening in each region of North America. What is safe and what is lost? What are we losing? What is most critical to protect immediately? In 100 years where do we want to be, and how do we get there?

I talked last issue about the importance of having a positive vision — of knowing where we need to go. Vision mapping helps us see what we need to do to move from such preliminary maps to maps based on rigorous science. In this issue I want to briefly run through the steps beyond vision mapping.

Before looking at the steps, I want to stress an element that is part of every step: participation. However good our science, it will do us little good unless people understand it and are willing to demand that related conservation goals be implemented. Throughout the designing of regional wildland reserve systems it is important to involve environmental and conservation groups, teachers, students, scientists, agency people, Native Americans, the media and citizens generally. Our mapping, writing and research are parts of an educational process. Being inclusive does not mean we compromise our principles; it means we work to communicate the values of biodiversity and wildlands.

A major problem confronted by conservationists is that “practical” solutions to the extinction crisis are failing. Solutions that will work, that the best science tells us we need to pursue, are still considered impractical. We must make what is right also practical. That means involving as wide a range of people as possible throughout the process.

An assessment of the region, both biologically and strategically, is an important early step in the reserve design process. Such an assessment would provide information on areas protected by law, ownership and land use patterns, and trends in development that threaten remaining biodiversity. This as-

NEW TWP PHONE / FAX / ADDRESS

The Wildlands Project has opened a new general office in Oregon, combining the administrative and science offices. The Tucson office remains open. The division of responsibilities between Oregon and Tucson involves mostly differences in regional emphasis, as both offices work on coordinating wildlands reserve work. If you don't know whom to call, or if you have questions that are administrative or have to do with science and mapping, start with the general office in Oregon and we will get you to the right folks.

The Wildlands Project
117 East Fifth Street, Suite F
PO Box 1276
McMinnville, OR 97128
Ph: 503-434-9848
Fax: 503-434-2781

The Wildlands Project
1955 W. Grant Rd, Suite 148A
Tucson, AZ 85745
Ph: 602-884-0875
Fax: 602-884-0883

assessment would also include initial identification of key species and biological communities, both existing and extirpated, around which a wildlands reserve system should be built. The assessment will be subject to revision as data are collected and analyzed.

The assessment should also include a review of current conservation work and strategies. Wildlands work supports not just a biologically-based vision of where we want to be in 200 years, but also what we must do on the way — from how and what to comment on forest plans, to identification of areas in need of protection now. Regional wildlands efforts can help bring groups together on other matters of shared concern.

The next step is determining what sorts of data are needed to design a system of protected areas that meets conservation goals of ecosystem representation, biodiversity protection, and ecological integrity. Ultimately the types of data used will need to have consistency across the continent. As work proceeds at the regional level, TWP will coordinate communication and bring people from all regions together to resolve these issues.

Related to what data we need is what data we can afford and what data we can obtain within reasonable timelines. We do not have fifty years to study ecosystems as they are destroyed. Nor do we have limitless resources to collect data. Much information that we need already exists — some in computer format — and is in the possession of government agencies, universities or other institutions. In a later *WE*, I will discuss what kinds of data we need and how to obtain it.

Once gathered, information must be analyzed and the results used to map the reserve proposal. Maps will be accom-

panied by narratives explaining goals, priorities for implementation and other elements. This process was described by Reed Noss in the 1992 issue of *WE* devoted to The Wildlands Project. Experiences on application can be found in his new book, *Saving Nature's Legacy*, and his report on the Oregon Coast Range Proposal published in *Natural Areas Journal* (Vol. 13: 276, 1993).

Proposals should be created from the ground up, at the local and regional levels. TWP's role is to provide and help coordinate scientific, mapping and other support for the regions, as well as insuring that conservation goals, scientific rigor and technical consistency are maintained. Development of maps and narratives will be an iterative process, with TWP facilitating sharing between the regions and peer review of proposals.

Following review, proposals will be published, often in *Wild Earth* or magazines of environmental groups. Scientific journals reach another important audience as well as providing peer review.

Upon completion of all regional proposals, TWP will work with groups to integrate them into a North American Wildlands Reserve System that sets out where we need to go. In cooperation with regional groups, TWP will produce a range of books,

Ask Dr. Conservation

Dr. Jim Strittholt formally joined The Wildlands Project staff in July. (He's been "informally" helping us for some time.) We welcomed Jim, after telling him he's already behind in his appointments. On the move to Oregon from Ohio, he stopped along the way to consult with groups in Colorado and elsewhere.

Jim will have primary responsibility for working with regional groups to develop scientifically defensible long-term plans for biodiversity protection. In addition he will provide advice on the application of conservation biology to near-term proposals for protection. Of course, no one person is a substitute for groups acquiring regional scientific knowledge—indeed, the latter is essential for the long-term success of conservation efforts, just as important as building broad popular support.

Jim will work with Dr. Reed Noss, TWP's Science Director. Jim has extensive GIS mapping experience using ARC software. To contact Jim, call the Oregon office.

pamphlets, slides, videos and press briefings to bring this vision before the public.

Even final proposals are not final. Over the decades they will be revised as we learn more and as the reality of the land changes.

How will groups be able to undertake these efforts in addition to their ongoing work? TWP will assist groups in finding the resources needed to complete the tasks of reserve design. Our clearinghouse database, for example, lists various experts who can offer services on a volunteer or reduced fee basis.

These are the major steps in the development of a scientifically defensible vision for a wild, vibrant, diverse and ecologically resilient North America. This vision will be created and implemented on local and regional levels—where people know, love and can work most effectively to protect wild lands and waters—even though the scope of the project is necessarily continental. TWP's role is primarily to coordinate the process. In each region local groups will need to form, where they have not already done so, a structure to accomplish reserve design. These structures will vary widely, depending on the needs of the region. What's important is that groups within each region work effectively together and are part of a common effort to define a vision for the future as well as to wed conservation biology with ecocentrism in the near term.

TWP will continue to work with regional groups and scientists to update and refine reserve designs based on new information and understanding. Research into buffer activities will be particularly important—studying what human activities are compatible with protection of cores and corridors, as well as non-human life and processes in the buffers themselves. Implementation of reserve proposals will take decades and will require creative solutions to many sorts of problems. How do corridors cross barriers like major highways? How is land to be protected? Public ownership and regulation is one obvious means, but clearly inadequate. Private land solutions, too, based on broad public support, will be needed to implement protection and restoration efforts on a massive enough scale to reverse the fall into extinction crisis. TWP is working to gather and make available information on conservation easements, conservation zoning, combining private ownership with public protection, and similar legal regimes.

We must rekindle the fire in the souls of people; rekindle the fire that ties them to earth, to our fellow voyagers. A vision mapped in all colors of the rainbow can help do that.

—David Johns



The Metolius River

by Kathleen Dean Moore

Two years ago, on one of the dark, shiny, rain-slick nights that we get in Oregon, I ran over a possum with my truck. I saw it just at the edge of my vision, jerked the wheel to get out of the way, and hit it dead on. Dead possums are about as common as stop signs along the roads in my town, but this was my roadkill possum; and to make it all unspeakably worse, a baby no bigger than the palm of my hand was nosing around the body that lay open and steaming across the fogline. I gathered the baby up in my cupped hands and took her home to raise as if she were my own child.

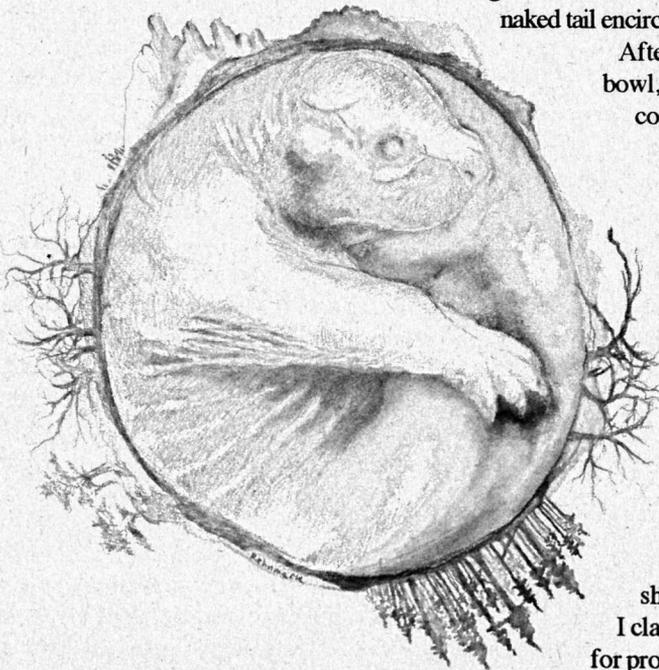
At first I fed her warm milk mixed with Karo syrup, squirting it into her mouth with an eyedropper every four hours all through the night. I stroked her hindquarters with a warm, wet cloth to make her defecate, washed her tail in soapy water, and carried her with me, clean and sweet in her refuge under the hair at the back of my neck. When

I thought she was tired, I put her to bed in a box of rags and watched her doze, a naked tail encircling her body, milk dried around the edges of her possum grin.

After we weaned her to cat food and taught her to drink from a bowl, the time came for the ceremony of healing, the time when she could be returned to the sunny thicket where she was born. Brimming with the damp hope and sorrow of a mother on the first day of kindergarten, I lifted her out of her box of rags and set her in warm grass under blackberry canes tangled in an ancient tree. Faster than I could lift my eyes, she charged up my arm, jumped onto my neck, and sank her teeth into my throat. I grabbed her with both hands and yanked her away. Her teeth raked through my skin. I held her away from my body to keep her from biting again, but she drooped in my hands, limp, insensible, as if she were dead.

I swiped at the blood with my T-shirt. Stupid to think I ever stood a chance of undoing what I did to the possum mother, to think I could find redemption in good works. I held the heel of my hand hard against my neck. Stupid to think that one mother is as good as any other. The hurt was sharp, as if there were dirt or acid on a possum's teeth. How can I claim to be a mother, when I slap away a baby who comes to me for protection?

In the end, I left the possum in an abandoned barn with a bowl of water and a week's supply of cat food. That's all I know about what happened.



Last spring, I saw a student on campus in a T-shirt that said, "Love Your Mother," and showed some astronaut's photo of the cloud-splashed Earth. To be honest, the T-shirt irritated me, and so did the student. I wondered if he ever wrote to his mother or remembered her birthday. I wondered if the student had figured out what it means to think of the Earth as a mother: Mother Earth, Magna Mater. I wondered if he had even thought about it, if he had any idea how complicated the analogy is, if he was ready to take a stand as to exactly how—in what particular way—we are supposed to understand the connection between the Earth and a mother, what difference that connection makes for the way we live, what obligations it imposes.

Maybe he's pointing out that the Earth, like a mother, is productive, reproductive, and that we humans are born of the Earth, just as the Earth is born of star-matter spinning in long spirals from the explosion of the Big Bang. But what difference does that relationship make? Humans may be made of Earth-matter, but so are Oldsmobiles, and that doesn't make the Earth into the Mother of Oldsmobiles, and it doesn't explain the source of our obligations.

Sometimes I think the Earth-mother analogy is just wishful thinking. It's comfortable to have a mother around the house. Mothers can usually be counted on to clean up after their children. Mothers provide for their children; they cook regular meals and pack healthy snacks. Mothers are warm-hearted and forgiving; they are the ones who follow crying children to their rooms and stroke their hair, even if the child's sorrow is shame at his treatment of his mother.

What great good fortune it would be for us if the Earth were a mother like this. If people are going to bury glass cylinders of strontium-90 inside sacred desert mountains, if we are going to poison Coyotes and hang their corpses on barbed-wire fences, if we are going to send sulfur into the sky until the needles fall off conifers, if we are going to poison the water we drink and the fruit we eat, then I suppose it is nice to think that the Earth is a mother who will come behind us and clean up the mess and protect us from our mistakes, and then forgive us for the monstrous betrayal.

Or is the college boy's T-shirt really saying something important about our obligations, telling us to treat the Earth as lovingly as we would treat our own mothers? The thought made me uneasy; I wanted to run after the student and warn him to be careful, to learn more about history, to study Europa or the Sabine women, to think about how he treats his own mother, before he gives such reckless advice.

Analogies, once drawn, are powerful, magical, impossible to control. This one cuts in ambiguous and dangerous ways.



When I was a teenager, my mother's dying was part of everyday life. I didn't understand why she had been singled out to die, but the scientific explanation was clear enough: bronchiectasis was destroying her pulmonary cilia, so her lungs couldn't clean themselves. Over time, they would get dirtier

and dirtier, overflowing with dead cells and phlegm and the gritty buildup of tar from the cigarettes my father used to smoke, and she would not be able to breathe any more. We learned this. And then we tried not to think about it, tried not to let it make a difference in the way we lived.

I can remember the steel feeling in my own lungs each time I woke in the dark and heard my father's tread on the stairs as he came up to tell my older sister that he was taking our mother to the hospital again, that he would be back as soon as he could, that she should make everybody help. Then I remember lying in the dark bedroom, listening to the frozen gravel crunch under the car backing out of the driveway, listening to my sister's jagged breathing, wondering how children could continue to live after their mother died.

While my mother was in the hospital, my father insisted on constructive responses. "It's not a problem, really," he would tell the neighbors when they offered to help. "I have three other little women in the house and we will get along fine. Nancy, the orderly one, can keep the house clean. Kathy, the hungry one, can cook. And Sally, the cheerful one, can make us laugh." So we cleaned and cooked and laughed, while the airborne detritus of ordinary life hardened in my mother's chest.

We tried as a matter of policy to postpone all crying until after she died, because every time any of us cried, she held us close and sobbed herself, and choked on the mold in her lungs and started to cough. We would pull away and stare at her as she struggled, terrified that we had killed her, killed her by not being strong enough, by loving her too much, by letting her understand that we were not sure we could live if she died. Because we knew that sorrow was too dangerous to indulge, we forced our mouths to tell a funny story—a kid fell off his seat in algebra, a bird flew in the window during second period—and after a while it got easy just to tell the stories and never say what needed to be said.

I was away at college when my mother died, so I don't know for sure what the end was like, but I have always imagined my mother retreating slowly into a private world as cloud-wrapped as Venus—perpetual deep twilight red-tinged at the edges, steamy with carbon dioxide, the hot, still air too thick to breathe. But my father says it wasn't like that. All the week before she died, he says, her hands were cold. Each morning, he would put another blanket on her bed, trying to take off the chill, and each evening he would read aloud from Thoreau's journals. She died when they were deep into the days of November: "a still, cold night. The ground is frozen and echoes to my tread. So far have we got toward winter."



Now I look back in grief at events beyond my power to repair. When I think of the Earth, when I think of my mother, desperately damaged and then wronged again by silence, it is the power of mothers to forgive that holds my attention, and the terrible questions of redemption and regret.

When the Earth is whole, it is forgiving, resilient, cover-

ing burned-over land with blankets of fireweed, then alder thickets, then cold pine forests; filtering water through wetlands bright with sky; creating oxygen in every sun-washed cell; again and again transforming death into life. But once it is damaged, profaned, the power of the Earth to heal itself seeps away, and with it goes Earth's power to nurture us. In a weakened world, we children of the Earth may turn against the land, cut the last steep slopes for firewood, pour chemical fertilizers onto worn-out fields, sanitize wastewater with poisons, dam more rivers, burn more oil, bear more children— not out of malice, but out of fear of the future in a world that may not have the strength to help us. We turn our faces away, willfully separating ourselves from the Earth, never acknowledging that there may be no chance for healing, refusing to remember what we have done and what we have failed to do. Then, who can forgive us?



In the Ponderosa Pine forest just north of Santiam Pass in the Oregon Cascades, the Metolius River flows full-bodied out of a crack in the hillside. If you stand near the base of Black Butte, you can watch the river's birth—50,000 gallons of ice-cold water pouring out each minute, an entire newborn river surging from the boulders into the forest and flowing north along the base of the peaks, around the back of Green Ridge, and down through a canyon 1500 feet deep. For twelve more miles, the river flows between basalt bluffs and then, it stops dead, dammed into an impoundment enclosed by raw cliffs: the Bureau of Land Management's "Lake" Billy Chinook.

I have stood under the bluff at the south end of the reservoir and looked back up the inlet where the Metolius River comes to its end. Through the sweet mist of mockorange, under a canopy of Lodgepole Pines, between the roots of willows, the river slides clear and cold down stair-stepped boulders to the impoundment. At the base of the canyon, the river plows into the gray surface of the reservoir, slows to a stop, clouds at the edges, and drowns in the warm and silt-choked water.

A few years after my mother died, I brought my father to the headwaters of the Metolius. It was his idea to come on a winter night, timing the trip so that the full moon

would light the shining river and the broad face of Mt. Jefferson across the meadow. The path to the river was treacherous with patchy ice, so I picked my steps carefully, supporting my father by the arm, warning him about ice under his cane, terrified that he would fall and break a cancer-brittled bone.

When we came to the edge of the water, a heron jumped into the air, lifted itself with one beat of its heavy wings, and disappeared. Scalloped clouds blew across the face of the moon, their edges glowing, then dissolving back into the dark. Barely visible in the shadow of the hill, boulders spread apart and the river rushed out, full and frothing, alive with oxygen, pouring downhill as if it could flow forever. I helped my father brace himself against a tree and slowly scrape the snow off a bench. We sat side by side, looking into the darkness, pulling cold, pine-drenched air deep into our lungs, saying nothing. ■

Kathleen Dean Moore is the chair of the Philosophy Department at Oregon State University (Corvallis, OR 97331). She has recent essays also in North American Review, Northwest Review, and Willow Springs.



L e t t e r s

ECOSYSTEM MANAGEMENT AN OXYMORON



Robert Zahner's article on Forest Service assaults upon Cove Forests illustrates the folly in expecting the agency to reverse its lugubrious history of ecosystem abuse. It's an excellent and informative piece, though Zahner taints it a bit by implying that "better guidelines

for ecosystem management" are possible or desirable.

"Ecosystem Management" may be a new phrase, but most national forest ecosystems have existed since the end of the Pleistocene or before. The Forest Service has managed these ecosystems—poorly—since 1906. So "ecosystem management" is nothing new; we've had 88 years of it and it's been mostly bad. What's new is the phrase and its implication of reform. But those who follow the agency know better. To illustrate, Forest Service Chief Jack Ward Thomas recently told Cove-Mallard Coalition activists, "We're going in," referring to roadless areas in the northern Rockies and elsewhere. Thomas sees roadless areas, especially those in the northern Rockies, as a pressure valve for the badly overcut Pacific Slope forests. He told the activists that roadless area incursions will increase. And you can bet they'll be called "ecosystem management." Like "multiple use," "ecosystem management" means more roads, clearcuts, erosion, noxious weeds, noxious ATV enthusiasts, poachers, miners, and other vermin.

Unfortunately, some conservationists are accepting the euphemism and discussing it as something for which to strive. To suggest that "ecosystem management" might save the national forests under some improved scenario legiti-

mizes and limits debate to within the Forest Service's parameters. Those parameters define only the various scenarios of losing more wild country. Accepting their contorted euphemism is naive, and it diverts us from serious attempts to overhaul or disband these bureaucratic outlaws.

The challenge for conservationists is to divert the debate into the arena of ecosystem protection and restoration. There's been too much "ecosystem management." Forget that term. (When one challenges a skunk to a pissing match, one always winds up smelling bad.) Instead, let's hammer 3 key words into the collective consciousness of the body politic: Protect, Restore, and Connect. Only then might we regain a balanced batch of biodiversity for the America that was, once, great.

Howie Wolke, Darby, MT

EXCLUSIONARY LANGUAGE

As supporters of *Wild Earth*, we are writing to bring to your attention an important matter that is part of a larger problem: the alienation of many women from active wilderness advocacy.

In the Spring 1994 issue of *Wild Earth*, Dave Foreman's "Around the Campfire" contains the following: "The expectations for Gore as Vice-President were akin to those for a prom date with the prettiest cheerleader. We

Statement of Purpose

Wild Earth is a non-profit periodical serving eco-centric grassroots groups 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.

should have been smarter.”

In fact, the expectations of many women are that wilderness advocacy will focus on men and women working as equals and not on women as easy marks. We don't have to tell you the importance of language; if this sounds nitpicky, then think about why so few women are in traditional leadership positions within the movement.

We would like to continue to support, as well as promote, your journal, but will not be able to if we must regularly weed out the discriminating language in order to digest the information. We ask that you give this matter your attention both in the long-term by not using sexist concepts to promote environmental wisdom, and immediately by printing this letter in the next issue of *Wild Earth*.

It is our vision, and we hope it is yours, to build the wilderness movement by mobilizing more scientists, key policy makers and citizens, including women, to act on behalf of the world's threatened species and wild lands.

Cyndi Lewis, Light-Hawk, Seattle, WA

Mary O'Brien, Ph.D., Hells Canyon Preservation Council, Eugene, OR

Bryony Schwan, Craighead Wildlife Institute, Missoula, MT

Karen Wood, Env. Studies Dept., University of MT

[Editor's note: See Dave's replacement wording in his Campfire this issue.]

ANOTHER PLEA FOR BIOLOGICAL HONESTY

Steve Trombulak's "Plea for Biological Honesty" (Winter, 93/94) struck a responsive chord for me because it is from science that I gained an interest in the natural world. There are a couple of facets of what we call science that I believe have been overlooked or misconstrued in the present western culture.

The first is burden of proof or more specifically, who should bear the burden. Within the context of science as usually practiced, a conjecture is tested against a null or original hypothesis, or some other relatively stable standard of comparison. The conjecture is accepted or rejected according to the conclusions of the comparison.

In the grand experiment that humanity is now performing on the planet, the condition set for the null hypothesis is not the projection of the status quo into the future, but something closer to the way things were at the outset of the human emergence. Biological and geological changes occurring naturally are vanishingly insignificant in comparison to and over the same time scale as human alterations of the environment. This should be obvious, but is most emphatically denied by many people who should know better.

Through some twisted

perversion of logic our society has placed the burden of proof on those who are skeptical of the tacit assumption that humanity's grand experiment will have benign consequences. This is quite opposite the usual method. We should insist on rigorous adherence to proper procedure.

The second is the idea of truth; what do we mean, what are we searching for when we are looking for truth?

When we seek the truth about the natural world, what we are looking for, I believe, are logically true statements and facts about a whole and integral nature, or at least a nature not significantly disturbed. We are not looking for the truth about what remains of nature after radical alteration. For such a radically altered nature, "truth" becomes artificial, a construct of human cleverness rather than an honest description of the laws and character of nature.

Thus honest science requires a commitment to maintaining the integrity of the object of study, in this case the natural world. That commitment is, roughly speaking, a generalized Hippocratic oath. It is false science, a debased science, that pretends to seek truth about nature while scientists consent to its diminution and degradation.

When prompted, the scientist can give good practical reasons for preserving things like biological diversity. But

I think the underlying reason to preserve the integrity of the natural world is something like a spiritual commitment to the quest for truth, together with a disciplined insistence on following accepted methods.

Science is one of humanity's most noble endeavors. But it will be reduced to triviality as nature is further compromised.

Henry Bruse, Wisconsin Rapids, WI.

KENAF CORRECTION

Thank you for including the letter from SWAN in the Announcements section of *Wild Earth*, Spring 1994 (Volume 4, Number 1). Tree-free paper is one of the most important changes we can make to save our forests. Changing *how* we cut trees is not enough. We must change the reasons *why* we cut them. Low value use such as paper just does not make sense.

One correction regarding SWAN's letter; the kenaf plant is a native of Africa, and the TRAILBLAZER kenaf tree-free paper we offer (which SWAN uses) is made from kenaf grown in the United States, not Central America. Nothing about the product is imported.

Thomas A. Rymysza, President, K.P. Products, Inc., Albuquerque, NM

BUGS APLENTY

I'm takin a second to tell y'all how much I enjoyed seein all them bugs in the Summertime issue. Me and some of the boys down at Hobart's Feed and Tackle got a big hoot outta that critter on page 7. What the Hell is that thing, anyway? Did somebody forget to finish paintin its butt? Is it good for fish bait?

And that there moth on the back cover's inside. Now that's a bug to be proud of! Boy, y'all got some arty types workin for that magazine.

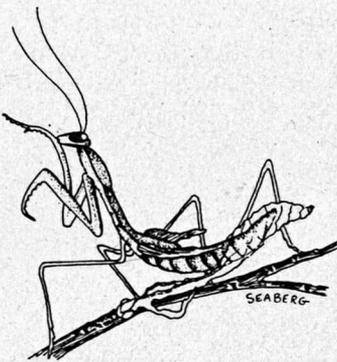
By my reckonin, that summer mag's got bugs in 5 different places. Plus, there's what y'all call bug habitat on page 4, 9, 10, 17, 20, 22, 25, 28, 30, 31, 39, 44, 50, 51, 53, 65, 66, and 68. AND, on top of that, there's at least 7 places where y'all show us stuff that eats bugs.

Lemme just say, y'all need to add one more reason for folks to look at that *Wild Earth*: cause y'all got the best bug pictures anywher!

Pete Jones

ps. Y'all outta try sleepin to that bunch of catydids out backa my trailer. Got any pictures of them things?

[Art Director: Sorry, Pete. The files are plum out of katydids. Will a praying mantis suffice?]



SKIPPER CLARIFICATION

While reading your Summer 1994, Vol. 4 (2), issue I came across a "half-truth" that warrants clarification.

The "Species Spotlight" on the back page states that the Dakota skipper is "native to wet prairies" of the Midwest. As written, the article implies that the skipper is found only in wet prairies. In reality the skipper is found at both "wet mesic and dry mesic" sites (Royer, R. AA. and G. M. Marrone. 1992. *Conservation Status of The Dakota skipper (Hesperia dacotae) in North and South Dakota*. Unpub. rep. submit. to U.S. Fish & Wildl. Serv.). The drier sites of mid-grass prairie are more common in the western portion of the species range, i.e., the Dakotas. Many of these western populations persist on remnant tracts along the Missouri Coteau which were too hilly to be plowed. In the central portion of the species range, i.e., western Minnesota, the "wet low prairie" and "dry high prairie" sites exist in close proximity to each other.

This clarification does not diminish the precarious status of the skipper. The insect is one of the best known indicators of undegraded northern tallgrass and mid-grass prairie. The skipper, because of its limited vagility, is also an excellent example of the perils of habitat fragmentation.

Other than my above-mentioned clarification, I commend you on another excellent issue. Keep up the good work.

Daniel S. Licht, 4350 Howard Lake Dr., Forest Lake, MN 55025

GENDER ISSUES CENTRAL

Richard Bowers writes in *Wild Earth* (Summer 1994) that efforts to bring human population growth under control at the upcoming International Conference on Population and Development (ICPD) may be derailed by, among others, feminists. "Extremists," he writes, "might put their priority on education for women, equal rights, and better medical treatment, ignoring ending population growth." In a world in which the pressure on women to have children is so acute that the infertile may legitimately be abandoned or murdered (South Asia, Sub-Saharan Africa), Bowers' comments seem dramatically out of touch with the social roots of the population crisis.

Motherhood is not a matter of choice for most women—and this is the central problem. Bearing more children than they desire, and with no control over their own bodies, women around the world are left in an inferior economic, social and political position. And this process begins early. Half of all children born in Latin America, for example, are to unwed teenagers. Teenage pregnancy, in the words of Worldwatch researcher Jodi Jacobsen, "limits a young woman's educational opportunities, thereby curtailing her future economic opportunities, which, especially in developing countries, reinforces the low status of women." So begins a spiral of poverty and population growth.

For married women, the situation is no easier. Married women frequently have little or no control over the number of children they bear. The United Nations estimates that 300 million married women worldwide would like to prevent pregnancy but have no access to birth control, often for cultural reasons.

There is a broad consensus among population researchers, activists and aid workers that improving the status of women—including substantially raising the quality and availability of education and health care—is the most promising approach to combatting overpopulation. This is not speculation, but deduction. According to Perdita Huston, author of *Third World Women Speak Out* (1979), "if women could have the number of children they want, the number of births would fall by 35 percent in Latin America, by 33 and 27 percent in Asia and Africa respectively." Everywhere, higher levels of women's education have meant lower population growth rates.

Gender issues are not peripheral to the population problem. Nor are they the domain of a few extremists. Rather, they are basic questions which must be addressed before any meaningful progress can be made on lowering the number of births worldwide.

Steven Krolak, 2206 West Islay Street, Santa Barbara, CA 93101

SEA SHEPHERD STANDS DOWN NORWEGIAN NAVY

The war to save the whales escalated dramatically this summer as the *Whales Forever*, flagship of the Sea Shepherd Conservation Society, approached the northern coast of Norway. On board the whale protection ship was the 30-foot two-person yellow submarine *Mirage*. The crew of 34 included 15 members of the media.

On July 6, in international waters close to the Norwegian Lofoten Islands, north of the Arctic Circle, the Norwegian naval warship *Andenes* attacked the unarmed conservation ship. Captain Paul Watson was ordered to place his ship under arrest. When he refused to submit to this unlawful demand, the warship made three close passes in an attempt to foul the props of the *Whales Forever*. Captain Watson was able to outmaneuver the warship each time. On the fourth pass, the frustrated commander rammed the bow of Watson's ship at 24 knots, ripping the steel like paper. This time, the rope fouled the props and brought the whale saving ship to a halt. Frantically, the Sea Shepherd crew members cut the thick rope away and freed the engines in time to prevent a boarding by the Norwegians.

Over the next 18 hours, the Norwegians pursued the *Whales Forever*, firing two 57mm shells and threatening to sink her. The *Andenes* commander radioed Captain Watson to state that he had the authority from the highest office in Norway to do whatever it would take to seize the *Whales Forever*. When Captain Watson asked if Norway was prepared to sink the ship and risk killing crew members, the Commander replied, "whatever it takes."

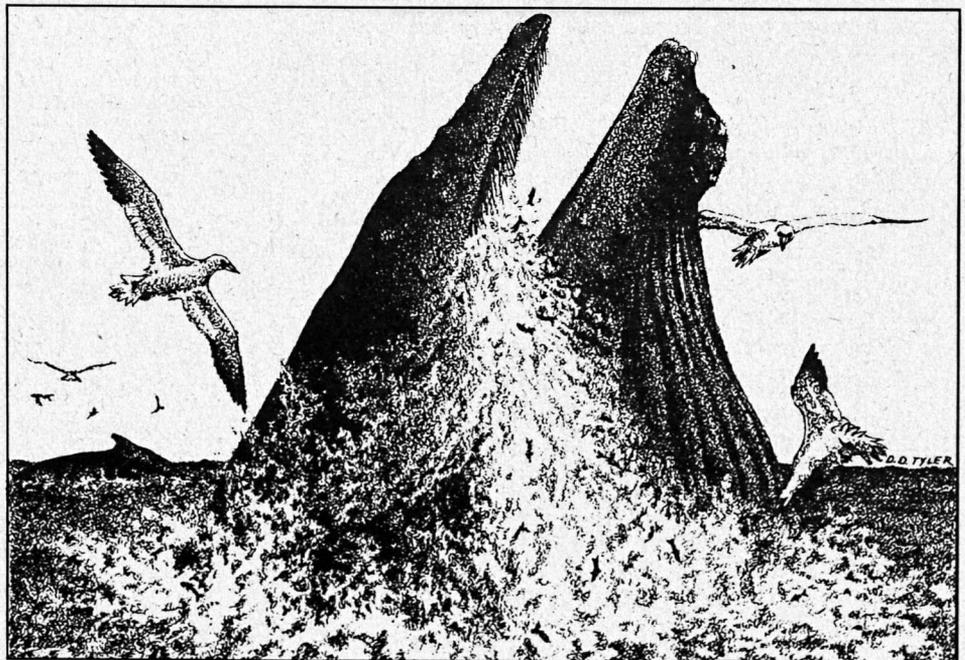
In a last desperate move, the Norwegians dispatched commandos in a small attack boat. The commandos dropped four depth charges beneath the conservation ship, rupturing fuel and water tanks and causing extensive hull damage. Finally, when Captain Watson told the commander that he would have to sink his ship to stop him, the Norwegians backed down and the *Whales Forever* was able to escape, arriving in the Shetland Islands two days later.

For the second year in a row, the Sea Shepherd Conservation Society has made the Norwegians pay more in security and increased insurance premium costs than what the hunt has made. Additionally, the confrontation guaranteed extensive media coverage worldwide. The overreaction by the Norwegians against Sea Shepherd dramatically underlined the defensive nature of Norway regarding its illegal whaling activities.

After the confrontation, the Norwegians claimed that Sea Shepherd had rammed their warship, despite film evidence to the contrary. Captain Watson responded: "Do you mean to say that our unarmed vessel with a top speed of 12 knots was able to ram your best warship with a top speed of 30 knots...? I would think that this would be an embarrassing admission."

The *Andenes* commander was relieved of his command for failing to apprehend the Sea Shepherd ship. As the Norwegians turned away, Captain Watson radioed to them: "We'll be back."

—Sea Shepherd, 1314 2nd St., Santa Monica, CA 90401



FIRST FOREST TO BE CUT; FIRST FOREST TO BE LOST?

The Black Hills National Forest (BHNF)—located in western South Dakota and northeastern Wyoming—was the first National Forest in the US to have a commercial timber sale, in 1897. The Black Hills was also the first National Forest to get a forest plan in 1983. As with most of the first-round forest plans, it was bad—emphasizing resource extraction (particularly timber harvesting) above all else. That outdated plan is about to expire, presenting the FS with an opportunity to implement a revised forest plan to correct past ecological mistakes; sadly, however, the agency is resisting doing anything new.

That the Forest Service is adamant to perpetuate an unacceptable status quo is evident throughout its draft revised plan and DEIS:

Currently the Black Hills have only one small Wilderness Area (9824 acres, less than 1% of the National Forest; and the only Wilderness Area in all of South Dakota). In the new draft plan no additional wilderness is proposed.

No Wild and Scenic Rivers have been designated or proposed.

No changes are proposed in livestock grazing. All parts of the Forest now suffer from cows, including the lone Wilderness Area.

The new plan keeps 80% of Forest opened to motorized travel and **sets no limits on road density.**

The new plan would make only a token reduction in ASQ, to 87 mmbf/year, and would sacrifice the few remaining roadless areas to meet demands of the local logging industry.

In 1992 Friends of the BOW (FOB) submitted a conservation biology-based Forest Plan Alternative and asked the Forest Service to give it full and fair consideration with the other alternatives to be included in the Draft EIS. In what amounts to a full abrogation of an earlier promise, the FS is refusing to give equal consideration to this ecosystem management alternative.

Write or call the FS. Advocate protection of the Forest's remaining biological diversity and more Wilderness. Demand a supplemental DEIS to give full and fair consideration to forest plan alternatives—including FOB's alternative.

Send your comments by October 24, 1994 to:

Black Hills National Forest
USDA Forest Service
RR 2 Box 200
Custer, South Dakota 57730
(605) 673-2251

If you have questions contact Friends of the Bow, Don Duerr & Leila Stanfield, (307) 745-7776; POB 6032, Laramie, WY 82070 or Dakota Chapter Sierra Club, Brian Brademeyer, (605) 574-2651.

COVE-MALLARD UPDATE

As *Wild Earth* goes to press, the federal injunction to temporarily halt logging and road building in the Cove-Mallard area of Idaho's Nez Perce National Forest (see Howie Wolke's *Butchering the Big Wild*, *WE* summer 1994) is still in effect. However, Judge Ryan, who issued the injunction, is believed to be fighting cancer and the lawsuit may be given to another judge.

Fifteen recent charges have been filed against activists in connection with logging protests in the Cove-Mallard area last summer. Two activists, including *Wild Earth* contributing artist Peggy Sue McRae, are already incarcerated; several others may serve time in jail based on these charges. McRae was charged with a violation of probation for refusing to pay \$550 restitution to Highland Enterprises, the road construction company that she and others blockaded on the Noble Road last summer. McRae told the court, "Highland Enterprises was contracted by the US Forest Service to proceed with a project in violation of federal environmental law. Clear-cutting virgin forest is a crime of global significance. It is a crime against nature and against the future generations of the earth."

For more information contact The Cove/Mallard Coalition at POB 8968, Moscow, ID 83843, (208) 882-9755, FAX 883-0727. To assist with Peggy Sue McRae's legal bills, send contributions to Friends of Cove Mallard, POB 1004, Friday Harbor, WA 98250.



Colorado Wildflower by Peggy Sue McRae

Red-Cockaded Woodpeckers Near Extinction in Kentucky

by Chris Schimmoeller

Brownie Newman and I scrambled down a limestone outcrop into a stand of old-growth pines. They rose like sentinels over the cliff above us, the blooming azaleas and oak around us, and the hemlock and beech budding upward from the cove below us. All spring we'd been tracking pending timber sales of pine forests in Kentucky. Here, as in the other sale sites, the mature pines were marked for cutting.

Our interest in this rare forest type in Kentucky's Appalachian Mountains is connected to the fate of the Red-cockaded Woodpecker (*Picoides borealis*), an Endangered species whose population in Kentucky has crashed as its habitat has been decimated. Over the last three decades the Forest Service's systematic logging in the historic range of the Red-cockaded Woodpecker (RCW) has eliminated over half of the mature pine forests that are crucial to the woodpeckers' survival. Only 8% of the Shortleaf Pines on the Daniel Boone National Forest are 100 or more years old; RCWs require pines at least that old for cavity trees (Kalisz and Boettcher 1991). Since 1985, nine of 11 RCW colonies have been abandoned. Only six birds survive on the Daniel Boone National Forest (Feltner, pers. communication, 1994).

Red-cockaded Woodpeckers in Kentucky are distinct from populations farther south. Pure pine stands, considered to be the optimum habitat for the RCW, are rare on the Daniel Boone National Forest — only 35% of the Forest provides adequate habitat for the RCW. The steep ridges, ravines, and cliffs on the Cumberland Plateau in southeastern Kentucky create conditions favorable to hardwood-dominated communities. Pine here occurs mostly in mixed stands, although patches of pine-dominated forest persist on dry ridgetops.

RCWs in Kentucky have adapted to the habitat conditions presented by this deeply dissected landscape, the northern edge of their current range in the southeastern United States (Kalisz and Boettcher 1991). Research in Kentucky indicates that the RCWs on the DBNF, unlike populations to the south, rely significantly on hardwoods for foraging (Hines, unpublished thesis, 1993). In fact, during the nesting season, RCWs foraged on hardwoods 30% of the time, with some colonies displaying a preference for hardwoods over pines. Even in winter, the woodpeckers foraged 15% of the time on hardwoods. Opportunistic, tenacious birds, the Kentucky RCWs take advantage of insect population fluctuations. In 1992, for example, caterpillars of the Lettered Moth (*Deidmia inscripta*; Sphingodae) experienced a population explosion on sourwoods; that year, RCWs foraged significantly on sourwoods (Hines 1993). In short, Kentucky's RCWs have adapted to the mixed pine/hardwood habitat in Kentucky's Appalachian forests.



Red-cockaded Woodpecker

D. BOONE BLUES

The RCW is just one victim of mismanagement on the 670,000-acre Daniel Boone National Forest. With virtually no citizen involvement in the creation of the Forest Plan and no active citizen monitoring of the Forest until 1991, the DBNF has been gouged by 2286 miles of roads as well as numerous gas and oil wells and now-abandoned mines.

This extraction management has affected other species besides the RCW: Fourteen percent of freshwater mussel species native in Kentucky—once ranked third in the nation for its bivalve diversity—are now extinct, with another 37% considered rare. Over half of Kentucky's nesting bird species have declined in the past decade. Only 25 plant and animal species in Kentucky have federal protection, yet 554 are considered threatened, endangered, or of special concern. No regular surveying of nongame species is conducted, and the state has no official list of species considered rare in Kentucky (State of Kentucky's Environment 1992).

A recent genetics study conducted by Haig, Rhymer, and Heckel (US Fish and Wildlife Service Research Unit at Clemson University; Martoglio 9 Nov. 1993) emphasizes the uniqueness of Kentucky's RCW population as "geographically, ecologically, and genetically distinct from the others examined."

Since Kentucky's RCWs are now completely isolated from other RCW populations, their survival hinges on the adequacy of their local habitat. On the Daniel Boone National Forest, this habitat has been leveled by clearcutting and road building.

The US Forest Service started "managing for" the RCW in 1987-8. Instead of following recommendations to study and monitor the woodpeckers (Kalisz, pers. communication, 1994), however, the Forest service began to systematically remove midstory hardwoods, prescribe burns, and implant artificial cavities in RCW areas. In other potential or historic RCW areas, the agency continued to log mature pines without assessing the effects of the activity on RCWs. In fact, despite the decline of the RCW to only six birds in 1994, DBNF managers never formally consulted with the U.S. Fish and Wildlife Service about the effects of timber removal on the woodpeckers.

Management decisions based on research of RCWs in the Southern pine savannahs did not address the distinct needs of the RCW in Kentucky. Pursuing a biologically-uninformed strategy of habitat alteration, the FS ignored scientific and agency recommendations to "Cease harvest of shortleaf pine, Virginia pine, or pitch pine trees that are older than 60 years of age until analysis is done ..." (Martoglio, Nov. 9, 1993).

Kentucky Heartwood learned of the plight of the RCW and the FS's repeated violations of the Endangered Species Act

through a series of intra-agency memos received as a result of a Freedom of Information Act (FOIA) request. The memos reiterated the need to halt logging in light of the RCW population decline; like previous recommendations, they were ignored.

In response to this blatant disregard of the law, Kentucky Heartwood, Heartwood, and the Southern Appalachian Biodiversity Project united in their efforts to save the RCW. On 10 May 1994, this coalition, represented by the Sierra Club Legal Defense Fund and local attorney Todd Leatherman, filed a 60 Day Notice of Intent to Sue if the Forest Service did not halt logging in the pine habitat of the RCW.

Statewide press coverage and public support from 221 local and regional citizen groups intensified pressure on the Forest Service, and on the eve of the expiration of the 60 day period, Forest Supervisor Bradley Powell announced a complete cessation of all logging on the southern half of the Daniel Boone National Forest until consultation with the Fish and Wildlife Service was conducted.

Our campaign has temporarily, at least, protected approximately 300,000 acres of public forest. We expect 100,000 acres of RCW habitat to be permanently protected from commercial logging.

This unprecedented victory on the DBNF is marred by the biological reality of the fragmented forest. The political realities are just as intense, with backlash from the timber industry already reaching Washington DC. Please help continue the momentum in Kentucky. Write Kentucky Congressmen, urging them to reauthorize a strong Endangered Species Act, co-sponsor the Forest Biodiversity and Clearcutting Prohibition Act (H.R. 1164), and demand that the Forest Service in Kentucky observe its agency guidelines and our country's conservation laws. **WERF**

References

- Felter, Kim, USDA Forest Service. Wildlife Technician, London District, DBNF, personal communication, June 30, 1994.
Hines, Martina. 1993. "Some aspects of foraging behavior of RCW on the DBNF in Kentucky." Univ. of Kentucky, unpublished thesis.
Kalisz, Paul J. University of Kentucky Forestry Dept., personal communication, May 26, 1994.
Kalisz, Paul J. and Susan E. Boettcher. 1991. "Active and Abandoned RCW Habitat in Kentucky." *Journal of Wildlife Management* 55 (1):146-154.
Kentucky Environmental Quality Commission. *State of Kentucky's Environment*, 1992. Frankfort: Kentucky Department for Library and Archives.
Martoglio, Larry, USDA Forest Service. Wildlife Staff Officer, DBNF, memo to Forest Supervisor Bradley Powell, Nov. 9, 1993.

Addresses:

- **Senators McConnell and Ford**
US Senate
Washington, DC 20510
- **Representatives Baesler, Rogers, Barlow**
US House of Representatives
Washington, DC 20515
- **Bradley Powell, Supervisor**
Daniel Boone National Forest
1700 Bypass Rd.
Winchester, KY 40391

Chris Schimmoeller of Kentucky Heartwood (660 Mt Vernon Rd., Frankfort, KY 40601) coordinates monitoring of the DBNF from her log cabin north of Frankfort, Kentucky.

Raincoast Wilderness

by Cameron Young

There are more than five million acres of unprotected, rugged forest and mountain wilderness hidden away on Canada's west coast, in the province of British Columbia. Largely unknown and unexplored, this spectacular domain fires the passions of a small but growing band of conservationists who want to protect it from the onslaught of clearcut logging.

This Pacific Coast wilderness encompasses a labyrinth of deep-water fjords and offshore islands. It is a roadless world where granite peaks shoot straight out of the ocean and steep, narrow valleys wind their way down from glistening alpine ice fields to the ocean.

Clinging to the steep slopes of the meandering inlets and squeezed into the narrow river valleys are corridors of ancient temperate rainforest, primarily Western Hemlock, Pacific Silver Fir, Sitka Spruce, Yellow-cedar and Western Redcedar. Some of these forested valleys suddenly open wide onto sedge-filled estuaries where Grizzly Bears converge to scoop up the abundant salmon thrashing upstream to spawn. Everywhere you turn, cascading waterfalls tumble over sparkling granite.

How do you compare this wilderness to landscapes people might recognize? One spectacular region called Ellerslie Lake, which contains a high concentration of rainforest, is carved out of a veritable sea of granite. It reminds the John Muir in all of us of the wild walls and rolling domes of Yosemite. (At night the serenade of wolves echoes off the stone walls across the water.) A granite-lined inlet adjacent to the Ellerslie, the Roscoe, is reminiscent of Alaska's Misty Fjords.

BC's fog-shrouded coastal wilderness is tucked up against, and penetrates into, the Coast Mountain Range. At its northern end, this coastal landscape nudges up against southern Alaska. With few towns of any size and far removed from most people's awareness, this landscape doesn't have a name of its own. The best suggestions have been variations on the word "coast": The north coast, the central coast and the south coast. (The so-called south coast does not include the most southerly coastal region of British Columbia, called the Lower Mainland, which has the bulk of the province's population and industry.)

Many of the outer islands of this coastal wilderness are carpeted in muskeg. Where the islands do support forests, the trees are usually old and stunted. The trees of the inlets and valleys, though, attain large sizes; the grandest Sitka Spruce grow to 250 feet. Overall, about 25 percent of this rugged land mass contains commercially valuable forests.

This Pacific coast wilderness encompasses a labyrinth of deep-water fjords and offshore islands...a roadless world where granite peaks shoot straight out of the ocean and steep, narrow valleys wind their way down from glistening alpine ice fields to the ocean.

One study showed over 200 primary watersheds along the British Columbia mainland coast greater than 12,000 acres. About 60 of these are essentially undeveloped, although it's tough to find any watershed that didn't lose many of the biggest trees to the hand loggers of bygone eras. Commercial logging in the remaining 140-plus watersheds has been intense but uneven. Certainly, many of the more productive forests that once lined the major inlets have been logged, and today, when the price is high enough, helicopter logging takes ancient Yellow-cedars off the steep valley walls.

Virtually every commercially valuable tree along the coast grows on public (Crown) forestland administered by the British Columbia Ministry of Forests, which has issued licences — or intends to issue licences — that will see virtually every one of those valuable trees cut down. Any wilderness valley or inlet with significant stands of timber likely will be roaded in three to five years.

The logging in these inlets and islands is a rough and tumble affair; enforcement of even the most basic logging standards is virtually non-existent. Some select coastal forests may be spared the chainsaw as the Ministry develops a Protected Area Strategy for the region, but if history is any guide, the only areas likely to be protected are scenic locations where few rainforests grow at all.

For the past four years it has been a driving passion of Peter McAllister, founder of the Raincoast Conservation Society, to bear witness to this coastal wilderness, to map it, and to bring it into the conservation arena before the timber industry clearcuts the remaining forested valleys. McAllister is an environmental activist/businessman who originally came to Canada's westernmost province to join one of his family-owned tug boat companies. This one hauled logs up and down the B.C. coast. Today McAllister plies those same coastal waters in

a 45-foot cutter, poking into lonely inlets, then bushwacking his way up remote river valleys.

"This one river, the Johnson, was listed on the map as pristine, so we decided to explore it," recalls McAllister. "It had no estuary to speak of, and to get into it we had to scramble up a well-worn bear trail to higher ground. The trail had been used by hand loggers decades earlier to drag out large Western Redcedar trees. Suddenly, right in front of us, was this breathtaking serpentine river system weaving through chest-high sedges. There were bear trails everywhere; you could hear the Grizzlies thundering around us."

About the only people McAllister meets on his wilderness expeditions are logging company crews, a handful of fish-



ing resort owners who entice well-heeled salmon fishermen to fly into these remote inlets, and Native people, mostly commercial fishermen, whose ancestors once knew these rainforests like the backs of their hands.

Temperate rainforests — predominantly evergreen forests that receive at least 90 inches of rain a year distributed over a minimum of 100 days — are extremely rare. Outside of western North America, which accounts for roughly two-thirds of the temperate rainforests in the world, they occur primarily in parts of Australia, New Zealand, Norway and Chile.

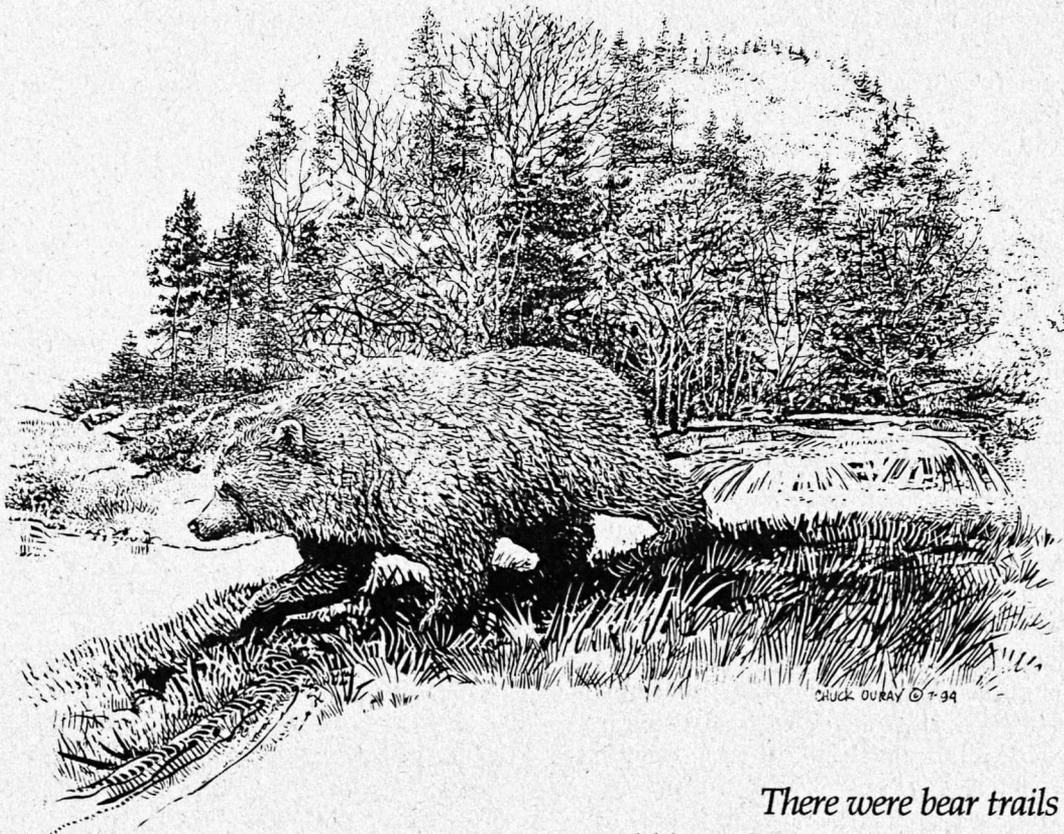
North America's temperate rainforests extend south from Alaska, down the coast of British Columbia and through Washington and Oregon. These temperate rainforests often surpass tropical rainforests in tree size and total forest biomass. In a typical temperate rainforest, the dominant trees easily live from 300 to 800 years; some individuals grow much older. The coastal rainforest is characterized by a wide range of tree sizes and ages, a multi-layered canopy, and a wealth of epiphytes.

By far the largest concentration of these ancient temperate rainforests is in British Columbia, where they divide into two distinct parts — the southern and northern forests. In the extreme southern part of British Columbia bordering Washington, the rainforest soils have a volcanic or limestone composition, unlike the more acidic granite-based soils farther

north. Base minerals in the southern soils help reduce acidity, and provide a wider range of nutrients for the trees. This combination of basic soil and warmer weather in southern BC helps foster some of the most prodigious forest growth on Earth.

Sadly, much of this southern rainforest has been logged, and a major struggle is under way on the west side of Vancouver Island to protect the best of what's left of the ancient forests. Not to be confused with the Lower Mainland city of Vancouver, Vancouver Island, 285 miles long, is a 24-mile ferry ride from the Lower Mainland coast. Last year, in a region of Vancouver Island called Clayoquot Sound, some 850 protesters were arrested and jailed in a summer-long exercise of non-violent civil disobedience in support of the Island's largest remaining tract of ancient temperate rainforests. In contrast to the heightened public support for the southern rainforests, very little public attention has been given to the northern coastal rainforest, even though this cool, moist forest zone comprises most of the mainland coast, including the so-called south coast, central coast and north coast. The northern rainforest soil is largely acidic, which is why the landscape is often dominated by large expanses of muskeg and stunted trees.

McAllister's vision of wilderness focuses not on individual watersheds, but on clusters of wild watersheds, linked north-south across mountain glaciers and stretching eastward over



*There were bear trails everywhere;
you could hear the Grizzlies thundering around us.*

the Coast Mountains into the wild plateau country of interior British Columbia.

If Aldo Leopold wanted us to think like a mountain, Peter McAllister wants us to think like a Grizzly Bear. How many mountain ranges does a Grizzly wander in a year; what rainforest trails does it follow down to the estuaries to grub for roots and feast on salmon? How many of these coastal rivers still run thick with salmon? What is the status of the Gray Wolves in these hills, of the Marbled Murrelets nesting in the big old trees?

Some information on these basic ecosystem questions already exists, but not much. McAllister is anxious to scout out this vast territory and do the basic inventories before it is too late. The Grizzly-salmon connection is crucial for McAllister; he says any conservation decision should be rooted in that relationship.

McAllister wants to bring the images of BC's wild valleys and forests into the homes of North Americans everywhere. Consequently his boat is full of photographic and video equipment. A friendly pilot has wing-mounted a film camera on a bush plane to film low along the wilderness valleys.

Today McAllister has a rough idea of what coastal rainforest areas are still pristine. For the moment he has lumped them into seven groups totaling about five million acres, but this is still a very preliminary assessment of the region's wilderness potential. This represents roughly 40 percent of the coastal region under study. To map these forests more accurately, McAllister is getting expert help from the Western Canada Sierra Club's highly acclaimed eco-mapping service.

The largest single block of coastal wilderness straddles the north and central coasts. It includes the Kitlope watershed, an area where Ecotrust, an offshoot of Conservation International based in Portland, Oregon, has been working with the local Haisla people to secure the full protection of a wildland roughly three-quarters of a million acres in size.

McAllister would like to see protection of the Kitlope linked to protection of a string of neighbouring pristine watersheds. Included in this unified, 2.5 million-acre wilderness vision are the exceptional landforms embracing Lake Ellerslie.

This summer a group of instructors and students from Round River Conservation Studies set up camp by Ellerslie to begin inventorying rainforest flora and fauna. With administrative offices in Salt Lake City and Sante Fe, Round River is a project-based, credit-granting conservation studies program established in the early 1990s "to preserve and restore wild nature." [See *WE* Vol. 3 #2.]

The Ellerslie is part of the ancestral lands of the Heiltsuk Native people, most of whom now live in the coastal village of Bella Bella. They hold the Ellerslie in high regard, and this has delayed logging plans for the Ellerslie (*Wild Earth* Spring 1993, "Genocide..." by Susan Zwinger). Round River sought and received permission from the Heiltsuk to set up camp in the Ellerslie, and project leader Chris Filardi says they plan to use their findings to assist the conservation agenda of the Bella Heiltsuk Band.

The ecological values of the rainforest coast are diverse. While many rivers are rich in salmon and sea-run trout, others whose access to the sea is impeded have evolved unique subspecies of land-locked salmonids. A rare, white subspecies of Black Bear called the Kermode lives in select coastal locations, mainly on Princess Royal Island. A river system in the mid-coast called the Koeye (pronounced "kway") and situated close to the open ocean is particularly rich in Grizzly Bears, old-growth rainforest and estuary life.

Peter McAllister wants to complete a comprehensive description and analysis of these diverse elements and present them in a coherent conservation strategy. He sees his work as consistent with the wilderness protection objectives of The Wildlands Project.

McAllister has the ear of the British Columbia government, but only barely. To be heard more clearly he plans to step up his exploration and research, and publish his findings. McAllister is looking for allies to help him get the word out across the continent, and the Sierra Club of Western Canada, of which McAllister is a board member, has become involved.

"The challenge to human beings is to reach out and embrace a wilderness few people will ever actually see and enjoy," says McAllister. "This is a case where we want to protect nature for its own sake. But, to convince the British Columbia government to do the right thing, we'll have to make this coastal wilderness vision a matter of international concern and attention." **WERT**

CONTACTS

Raincoast Conservation Society
#9 - 416- Dallas Road
Victoria, British Columbia
Canada V8V 1A9
tel. 604-361-3402

Sierra Club of Western Canada
1525 Amelia Street
Victoria, British Columbia
Canada V8W 2K1
tel. 604-386-5255

BIBLIOGRAPHY

- Alaback, P. (1990). *Comparative Ecology of Temperate Rainforests of the Americas Along Analogous Climatic Gradients*. USDA Forest Service, Juneau, Alaska.
- Dorst, A. and C. Young. (1990). *Clayoquot: On The Wild Side*. Western Canada Wilderness Committee, Vancouver, British Columbia.
- Moore, K. (1991). *An Inventory of Watersheds in the Coastal Temperate Forests of British Columbia*. Earthlife Canada Foundation, Queen Charlotte City, British Columbia, and Ecotrust/Conservation International, Portland, Oregon.
- Pojar, J. and A. MacKinnon (1994). *Plants of the Pacific Northwest Coast*. Lone Pine Publishing, Vancouver, British Columbia.
- (1993). *Ancient Rainforests At Risk: Final Report of the Vancouver Island Mapping Project*. Sierra Club of Western Canada, Victoria, British Columbia.

Cameron Young is a freelance environmental journalist in Victoria, British Columbia.

Algoma Highlands

by Brad Cundiff

At the northern edge of the great deciduous forests that once blanketed eastern North America lie the Algoma Highlands. Here, rugged granite ridges and steep-sided valleys have kept the loggers mostly at bay, leaving forests of uncommon size and beauty lining quiet crystalline lakes and tumbling headwater streams.

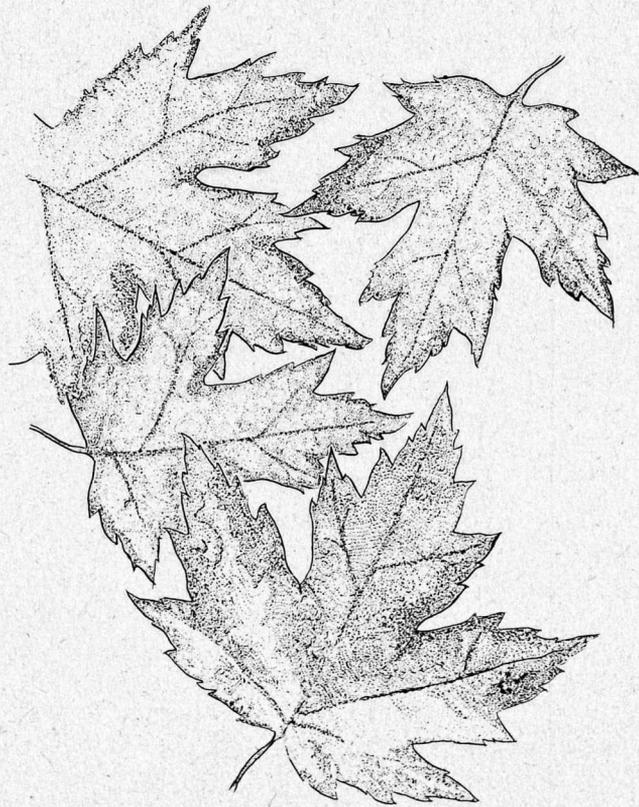
But having cut almost all of the virgin forest in watershed after watershed, the timber industry of Ontario is now pushing into the Highlands, 100 kilometres northeast of Sault Ste. Marie. If current plans proceed, road-building and clearcutting will destroy the Highlands forests.

The Highlands have high biological value. Lying at the meeting point of the deciduous forest to the south and the boreal forest to the north, they represent a prime genetic reserve that intermingles deciduous forest species adapted to life at the northern edge of their range with boreal species adapted to life at their southern extreme. The value of such diversity in the face of threats such as global warming can, at this point, only be guessed.

Two core wild areas survive in the Highlands: the Ranger North White Pine-Sugar Maple old-growth stand to the west, and the Megisan Lake White Pine-Red Pine and Jack Pine forests to the east. These two areas are currently joined by an arching band of mostly undisturbed forest.

The Ranger North stand can only be described with superlatives: the stem sizes of the White Pines, which are mixed here with maples and Yellow Birches, are among the largest recorded in Ontario. Measures such as tree density, canopy height and plant diversity place the 6000 hectare stand in the top three for all known old-growth pine forests in the province. The tree association itself—the mix of mature Sugar Maples and Yellow Birch with sentinel White Pines towering above the rest of the canopy—is all but gone from North America.

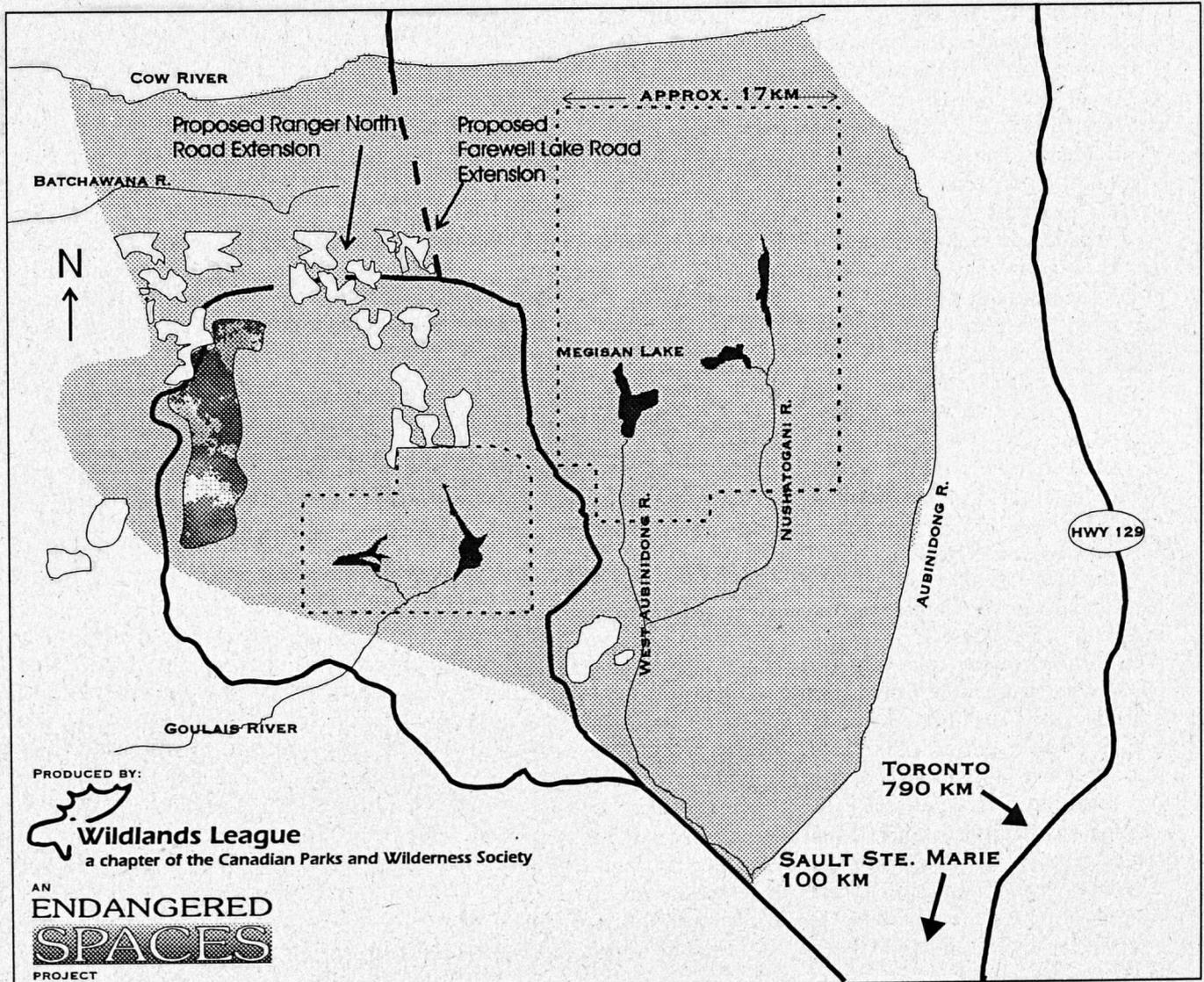
To the east, the mature forests of the Megisan Lake area have helped sustain remote tourism operators as well as local trappers. The impact of cutting in the area is already being felt by the Megisan outfitters, and they have begun to fight back. The first ever site-specific environmental assessment of logging operations in Ontario is now under way for a 538 square kilometre area around Megisan Lake, thanks to the persistence of business owners such as George Nixon.



...the mix of mature Sugar Maples and Yellow Birch with sentinel White Pines towering above the rest of the canopy—is all but gone from North America.



. . . MEGISAN LAKE ENVIRONMENTAL ASSESSMENT AREA
 RANGER NORTH OLD GROWTH FOREST
 PLANNED LOGGING 1995-2000
 EXISTING ROAD
 PROPOSED LOGGING ROADS
 WILD ALGOMA STUDY AREA



But Nixon and his fellow outfitters are unhappy with the assessment's terms of reference. The EA process will only address the impacts of proposed logging activities on tourism operations. There will be no consideration of the impact of clearcutting on genetic diversity, and Nixon for one doubts that the Ministry of Natural Resources is truly interested in exploring protection options. He notes that the "preferred option," already released for public comment by the Ministry, leaves 70 to 75 percent of the area open to logging.

The story for Ranger North is a little brighter. The area was recently declared protected as part of the Ontario government's response to recommendations made by an old-growth advisory committee. What form this protection will take—including whether motorized access will be banned—is yet to be determined. Meanwhile, clearcutting continues on all sides of the stand and plans call for a permanent access road to be built along the western edge of the area. The result would be an isolated island of protection.

The need for large, ecologically functional protected areas in the region is clear: The Ministry of Natural Resource's own analysis of protected areas in the province has identified the two natural regions that include the Highlands as only partially or not at all represented.

Yet, the provincial government recently approved the construction of an enormous oriented-strandboard mill near Wawa just to the northwest of the Highlands. Algoma represents a rare chance to study pristine old-growth forest, and this hasn't been lost on scientists from the Ontario Ministry of Natural Resources and Forestry Canada. Among the studies currently under way in the area is research on the genetic diversity of White Pine in an undisturbed forest and after logging. Early results seem to indicate, not surprisingly, that clearcutting has a large detrimental effect on genetic diversity.

Of course, a forest is more than just trees. The Algoma Highlands also boast a wide diversity of animals. Among the significant species found in the Highlands are the Three-toed Woodpecker, the Smoky Shrew, Sandhill Crane, Cougar and Lynx. Recently, Wood Turtles were discovered in the Ranger North area. These reptiles require undisturbed woodland and riverine habitat and their populations have become rare and isolated elsewhere in the province. In Ranger North, the turtles are thought to be at the northern limit of their range.

The Algoma Highlands need protection. Tim Gray, executive director of the Wildlands League, warns that the Ontario government's plan is to log the area before anyone has even had a chance to see what it contains.

For more information, contact the Wildlands League, Suite 1335, 160 Bloor St. E., Toronto, Ont. M4W 1B9 Canada; (416) 324-9760. **WERE**

What You Can Do

Letters to Ontario Premier Bob Rae urging permanent protection for the Algoma Highlands are urgently needed. Write Hon. Bob Rae, Premier of Ontario, Legislative Building, Queen's Park, Toronto, Ontario, M7A 1A1, Canada.

illustration by Jay Tatara

When the Rivers Are Flooded

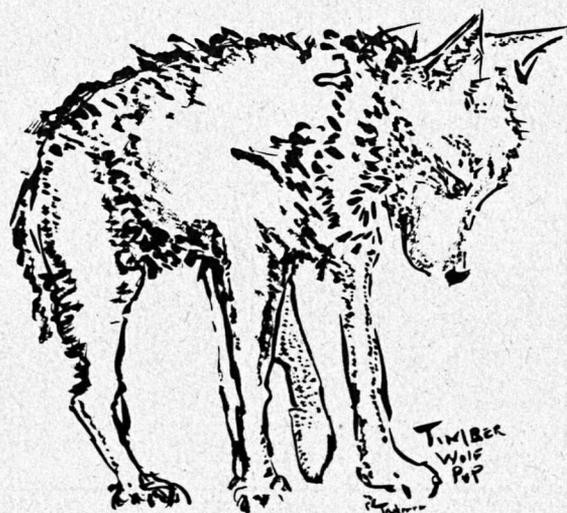
Leave the carcass on the rounded granite.
The bones will whiten while the flesh
is taken by the hands
and into the bodies of hunters and their families:
wolves and ravens, and men.

Leave the bones in a scratchy pit of sand
beneath a thin mat of roots and lichen.
Protect them from the digger's spade.

Bury the bodies on high ground.
When the waters come, they will still see
the tracing of water where none should be,
the indented shorelines of rivers
spilling over paths once travelled with many steps.

Bury them high so they may see,
so you may sit in the wind
and listen to the bones hum,
watching the sun never set.

—Patti D'Angelo
(Great Whale River, Quebec)



Nova Scotia's Best (Kept) Secret

The Old-Growth Acadian Hardwood Forests of Cape Breton Island

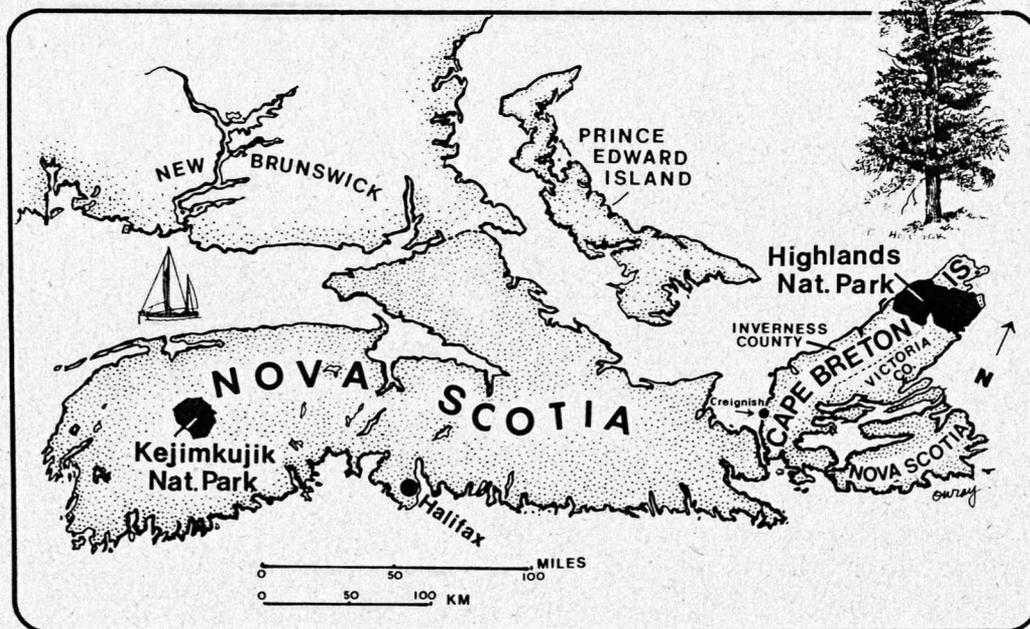
by Charles Restino

As I write, I can hear a bulldozer moving down a steep slope at the north end of the Baddeck Valley in central Cape Breton, giving logging companies access to yet another tract of Nova Scotia's disappearing old-growth forest. Given the scarcity of unexploited old growth in eastern North America, one might assume governments would protect any forest retaining old-growth conditions.

Yet this forest access road owes its very existence to provincial government grants given to private "group venture" logging companies throughout Nova Scotia, even though the *Sustainable Development Strategy for Nova Scotia* publicly commits the provincial government to protecting "all existing old-growth forest" left in the province. In the last decade, Nova Scotia's Department of Natural Resources has subsidized access to hundreds of square kilometers of old-growth forest. During the same time less than 1500 hectares of the province's dwindling old-growth forest has been given protected status. Out of a total forest land base of 4,000,000 hectares, roughly 64,000 hectares has been identified as "old forest" based on timber inventory data. About half the

old growth identified thus far is protected. Almost all of this is in Cape Breton Highlands and Kejimikujik National Parks, at opposite ends of the province and more than 600 kilometers apart.

Whether through mere neglect or an active strategy to accommodate industrial users of the forest, contradictory government forest management policies continue to threaten old-growth stands throughout Nova Scotia, including one of North America's largest old-growth temperate hardwood areas, on Cape Breton Island. No systematic inventory has been undertaken of Nova Scotia's old-growth resource.



BACKGROUND

Nova Scotia's forests have a diverse mix of floral elements representing both boreal northern forests and temperate Alleghenian forests to the south. Within this "great tension zone," intense competition between northern and southern species continues. This blending of species over a wide variety of glaciated landscapes has shaped the unique diversity of the region's Acadian forests. Over two hundred plants more common elsewhere live within these forests at the limits of their various ranges. Many of these are rare and threatened.

Nova Scotia's native population of American Pine Marten is now found only in the old-growth forests of Cape Breton's Highland Plateau. The Plateau was formerly within the range of Woodland Caribou and Timber Wolf and is the location for numerous recent Cougar sightings. The plateau's rivers continue to be prime breeding areas for Atlantic Salmon. The East Coast's largest population of Bald Eagles lives here.

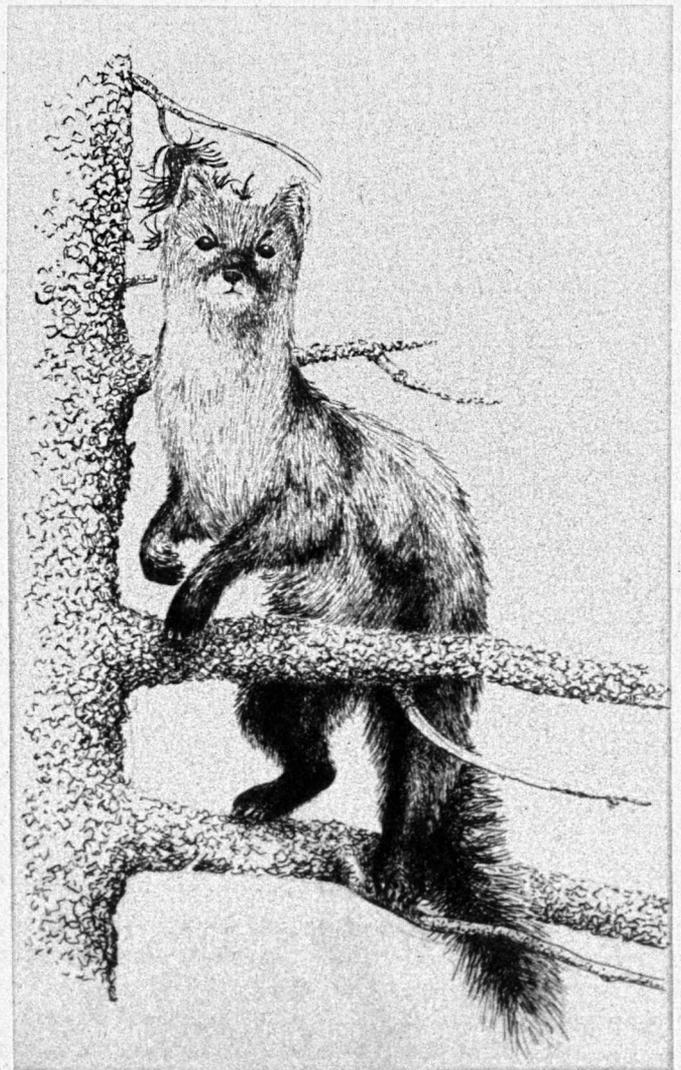
Early European explorations of Cape Breton Island reported White Pine, Eastern Hemlock, White Spruce, Northern Red Oak, American Beech, Sugar Maple, Yellow Birch and ash in abundance over much of the island. In 1763, following the Treaty of Utrecht, Cape Breton was declared a British Crown Timber Reserve. Early settlement had been limited to the island's coast and floodplains of some of the larger streams. Scottish immigration, which began in the 1840s, resulted in the settlement of most of the remaining accessible land on the island by 1870.

A number of factors, however, limited the impact of this final wave of immigration on the native Acadian forest. The need to provide livestock feed for as long as six months each year prevented any rapid expansion of stock raising. Forest clearing was limited mostly to areas suitable for agriculture cultivation. A lack of quality timber stands and difficulties transporting logs also limited exploitation of the forest. Timber harvesting generally selected trees that had high enough commercial value to justify overland hauling or could be used on the homestead itself.

Moreover, in the late 19th century, Cape Breton's rural settlements entered a period of decline and emigration. This resulted in the abandonment and consolidation of many of the early homesteads, with forests reclaiming land after less than one generation. Forest resource inventories conducted by B.E. Fernow reported more than 40 percent of Cape Breton's original forest still in a "virgin" condition in 1912. Forest production figures since show the annual harvest of hardwood species averaged less than 15,000 cubic meters over the past 80 years, or less than five percent of the island's current annual allowable cut for hardwood species.

The availability of coal in many areas of Cape Breton provided an economical fuel alternative to wood. Until the recent introduction of access road subsidy programs, hardwoods harvested for fuel usually came from second-growth forest stands which reclaimed farms abandoned before the turn of the cen-

...contradictory government forest management policies continue to threaten old-growth stands throughout Nova Scotia, including one of North America's largest old-growth temperate hardwood areas...



ture. The terrain of Cape Breton's highlands proved a formidable obstacle to intensive exploitation. As a result, much of the gnarled and decadent hardwood forest of Cape Breton's "backlands" remains today a relatively intact continuum evolved from the last glaciation more than 10,000 years ago. Nevertheless, while much of the original hardwood forest has escaped intensive logging, other human influences have had impacts. Before European colonization, native human inhabitants used the forest for food and other materials. A decline in the occurrence of ash and Northern Red Oak in areas never logged may indicate the early use of fire by native inhabitants. The Canada Yew (*Taxus canadensis*), a common understory plant in mature forests eighty years ago, has been virtually eliminated by introduced White-tailed Deer which have replaced native herds of Woodland Caribou. Much of the climax beech forest has fallen prey to beech scale diseases thought to have been introduced to North America on ornamental trees donated to the Halifax Public Gardens by Queen Victoria.

OLD-GROWTH TERMINOLOGY

Nova Scotia's Department of Natural Resources currently maintains that virtually all Nova Scotia forests "have been relentlessly disturbed for over four centuries." This may be the case for some areas of the province, but very little evidence supports such a claim for all areas. The department's own photo analysis reveals that 42% of the province's forested areas are natural landscape, "in which ecological changes had been brought about predominantly by natural processes." Nonetheless, many foresters still adhere to the romantic notion that old-growth forests are those "untouched" by man, having achieved some hypothetical stable state condition.

In their widely accepted academic text *Forest Ecology*, Spurr and Barnes argue that virgin forest, unaffected by human activity, simply does not exist. The outdated "virgin" criterion for measuring old growth has effectively prevented the conservation of many relatively undisturbed and valuable old-growth ecosystems throughout Nova Scotia and elsewhere. Assessments should take into account degrees of disturbance and late successional characteristics, including coarse woody debris, snags, soil structure, hydrological cycles, and forest interior species. Large areas with viable species populations and representative old-growth characteristics should be given priority for protection over isolated small sites, even if through some miraculous good fortune, they appear to have stood still in time. That moderate disturbances may have altered something as dynamic as old-growth age structure does not diminish an area's full ecological value.

NON-GOVERNMENT CONSERVATION EFFORTS

Official ambivalence toward old-growth conservation has not prevented environmental groups from raising the issue throughout Nova Scotia. On Cape Breton, the Margaree Environmental Association (P.O. Box 617, Margaree Forks, Nova Scotia, B0E 2A0) has provided support for the identification

and conservation of old-growth forest. The group's efforts have led to the recognition of old-growth wilderness throughout the highlands and designation of the province's largest protected hardwood area, in the Creignish Hills. The Association has raised public awareness, coordinated surveys, and mapped more than 60,000 hectares of unlogged old-growth Acadian Forest. Much of this area is located along the steep slopes that ring the Highland Plateau in northern Inverness and Victoria counties for more than 200 kilometers, forming perhaps the most extensive contiguous unlogged temperate hardwood forest remaining in eastern North America. Its proximity to extensive unlogged boreal forest on the plateau provides a unique successional interface between widely different boreal and temperate forest ecosystems.

CONCLUSION

Government reluctance to publicly discuss current forest management policy or define realistic old-growth criteria with interested groups has prevented consensus on the issue of old-growth protection. However, the Parks and Recreation Division of the province's Department of Natural Resources recently unveiled a long awaited *Systems Plan for Parks and Protected Areas*. The Plan proposes protection of 287,000 hectares of representative examples of 26 of the 77 distinct Nova Scotia landscape types thus far identified by Parks and Recreation. The proposed plan would give protected status to 19% of Nova Scotia's Crown land base. Combined with existing National Parks and wildlife management areas, the plan would protect 27% of all public lands in Nova Scotia. While the Protected Areas System Plan is by far the most ambitious provincial government effort yet proposed in Canada to protect biological diversity, it fails to provide any mechanism for natural landscape and old-growth protection on privately owned lands in Nova Scotia. These account for over 70% of the province's forested area.

Old-growth areas are clearcut under government subsidized private lands timber programs each year. As a result, remaining natural forest areas throughout the province are being rapidly fragmented. Large industrial landowners such as Irving, Bowater and Scott paper companies have yet to commit more than token areas for protected status. Until current forest subsidy programs are amended to recognize the conservation of contiguous large areas of private forest as a valid land "use," within an overall provincial strategy that includes forest protection incentives for private landowners, the viability of over fifty unique natural landscapes in Nova Scotia will remain in jeopardy. Comments and questions regarding Nova Scotia's Protected Areas Systems Plan can be sent to Parks and Recreation Division, N.S. Dept. of Natural Resources, P.O. Box 68, Truro, Nova Scotia, B2N 9Z9.

Charles Restino works with Canada's Future Forest Alliance (national headquarters, Box 224, New Denver, BC, Canada VOG 1S0) and the Greater Laurentian Region Wildlands Project.

Helping Protect Canada's Forests

by Colleen McCrory

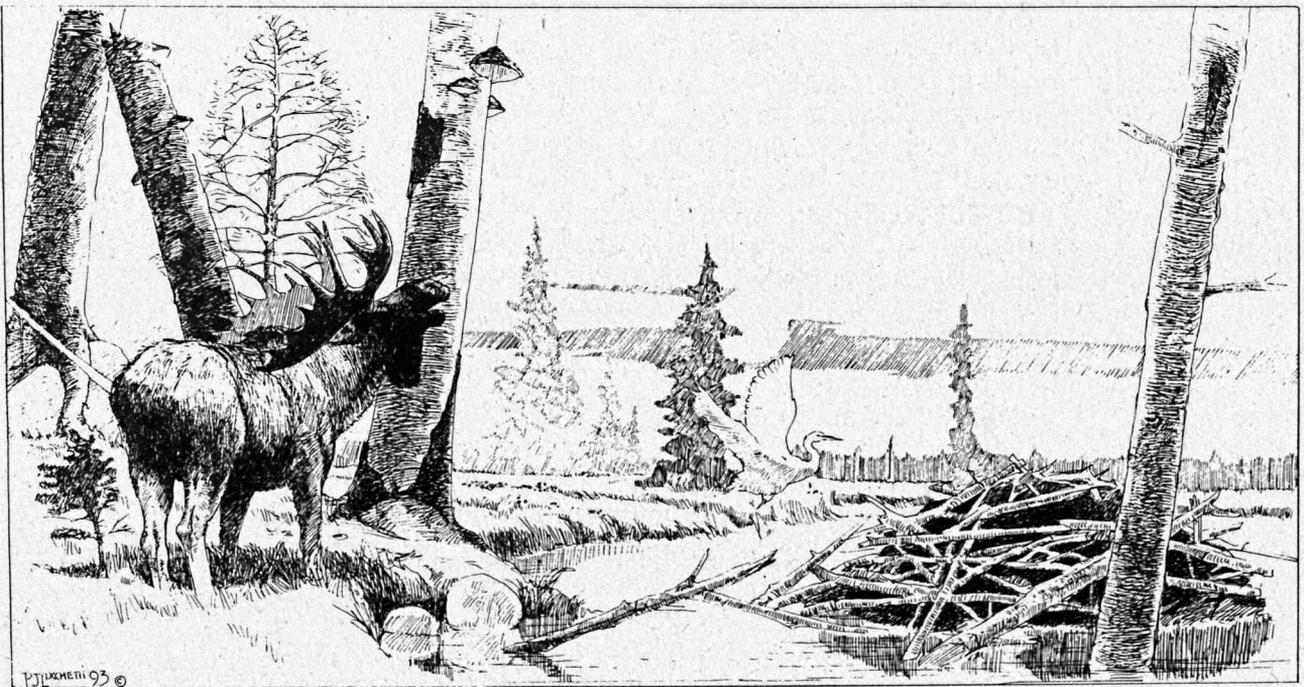
The state of Canada's forests is now of international concern. In spite of community and environmental groups working to change forest practices in the various provinces, our watersheds and wilderness areas are being clearcut.

Just as the transnationals travel the world delivering our wood products to foreign suppliers, we too must now travel the world to garner support for our forests.

With the expansion of pulp mills across the northern boreal forest and large-scale clearcutting in all of our provinces, the environmental community declared a state of emergency in the forests of Canada in 1990. Since then the federal and provincial governments have spent millions of dollars on PR campaigns on behalf of the large multinational companies. The United States has cut approximately 90% of its old-growth forest. Tropical countries like Malaysia and the Philippines are being stripped bare of trees. As the forest is depleted in these countries, pressure will increase on the last great forested areas of Canada.

Across Canada, grassroots groups are working to bring about changes in forest management, provide support for indigenous communities, and preserve more wilderness. Nonetheless, we are still losing and must now ask the world for support.

Just as the corporations market their products world-wide, we must spread the truth of the impacts left behind in our communities and environment so that consumers around the world will buy only products from sustainable logging practices. We must tell consumers in Japan, Europe, and wherever Canadian wood products are exported, what is really happening.



In Europe, groups such as Greenpeace are running effective consumer campaigns. In Germany four out of the six top paper suppliers, accounting for over one billion tons of pulp and paper from Canada, are insisting that they be supplied with clearcut-free paper. Taiga Rescue Network has formed to strengthen cooperation between individuals, non-government organizations, and indigenous people and nations concerned with the protection, restoration, and sustainable use of the boreal forest. The Taiga Rescue Network has hosted international conferences bringing together experts and activists on the boreal and temperate forests of the world.

We must also move our international campaign to the United States. Canada is one of the world's largest exporters of wood products to the US, yet we have among the lowest stumpage rates [fee charged per tree harvested] in the world. Most of the old-growth south of the border has been liquidated and the new feeding frenzy for the pulp mills and lumber industry is in Canada. At the present rate of clearcutting, the destruction of Canada's forest is not many years away from the US situation. We need active support from the US environmental movement. We need everyone to only buy clearcut-free or tree-free paper. We need support for research, consumer campaigns, and funding. We need magazine articles and public

education campaigns. We need US legislation to bring about the changes we can't convince our own government to implement.

Canada's forest is the great lung of North America. Its trees provide the very oxygen we breathe and shelter for wildlife on both sides of the border. It is time for the citizens of both Canada and the US to see the connection—that many of the paper products they consume come from clearcutting Canada's wilderness.

The recent decision of the BC government to log 74% of Clayoquot Sound underscores the need for international support. Because this government lacks political courage, we may well have more success getting legislation for Canada's forests through legislatures in other countries. Only a large public outcry in this nation and abroad will bring about the protection of Canada's forests.

For information on how to help protect Canada's forests, contact The Valhalla Society (POB 224, New Denver, BC, VOG 1SO) and Canada's Future Forest Alliance (POB 224, New Denver, BC VOG 1SO). Contributions are appreciated. **WFF**

Colleen McCrory is the founder of Canada's Future Forests Alliance and the Chairperson of The Valhalla Society. In 1992, she received the Goldman Award, which recognizes outstanding environmental achievement in North America.

You can help protect Canada's forests. Express your views to:

Hon. Jean Cretien, Prime Minister
Parliament Buildings
Ottawa, Ontario K1A 0A6
Canada
1-800-667-3355 (ask for 992-4211)

Hon. Anne McLellan, Minister of Natural Resources
House of Commons
Parliament Buildings
Ottawa, Ontario K1A 0A6
Canada
1-800-667-3355

Hon. Mike Harcourt, Premier
Parliament buildings
Victoria, B.C. V8V 1X4
Canada
1-800-663-7867 ask for 387-0886

Other ways you can help: volunteer for an environmental group and/or make a donation to one, start a petition, try to get media attention on the issues, join campaigns in your area, ask friends to help. Addresses of environmental groups can be found in *The Green List: A Guide to Canadian Environmental Organizations and Agencies* from your library or CEN, Box 1289, Stn. B, Ottawa, Ontario K1P 5R3; (613)563-2078.

Seabird Restoration Succeeds

by Pete Salmansohn



Here's good news on the Maine coast. Seabird biologists working for the National Audubon Society are succeeding in their twenty year effort to restore an important component of species diversity to the state's island archipelago. Atlantic Puffins and three species of terns—once hunted nearly to state-wide extirpation for their feathers, eggs, and meat—have reestablished breeding colonies on several islands; and Common Murres, a penguin-like mem-

ber of the Auk family, may be close to nesting in Maine for the first time in 150 years.

The Audubon Society's work began in the summer of 1973 when ornithologist Stephen Kress came up with the novel idea of transplanting Canadian puffin chicks to a former breeding site in mid-coast Maine, Eastern Egg Rock. Puffins had historically bred on six Maine islands, but were reduced to one pair on one island by the beginning of the twentieth century.

With the cooperation of the Canadian Wildlife Service and a rugged team of research assistants, Kress eventually transplanted 954 puffin chicks (1973—1986) to artificially-dug sod burrows on the treeless seven acre island. Daily deliveries of thawed herring, and careful monitoring of the "colony" paid off. Nine hundred and fourteen chicks successfully fledged and the very first subadult puffin returned in June of 1977, guided there by an innate sense of natal geography, and also perhaps lured by the wooden puffin decoys placed around the island. (Individual puffin chicks leave their underground burrows at around six weeks of age, paddle off into the surf and don't return to land until they're two or three. They usually begin breeding at age five.)

In 1981 the first puffin was seen carrying fish in its bill, an unmistakable sign that somewhere underneath the jumble of granite boulders which rim the island there waited a newly hatched and hungry chick. That year five pair nested on Eastern Egg Rock for the first time in a century. Since 1981, the colony size has averaged about 15 breeding pair.

A second puffin colony was restored on Seal Island National Wildlife Refuge, a sinuous 100 acre island located 20 miles out to sea from Rockland, in Penobscot Bay. From 1984 to 1989 Kress brought down 950 chicks from Newfoundland, and seven pair nested in 1992. Fifteen pair raised young in 1993, and hopes were high for a further increase in 1994.

Seabird biologists... are succeeding in their twenty year effort to restore an important component of species diversity to the state's island archipelago.

Kress also began working with tern populations in the late 1970s and has achieved outstanding results. Terns lost much of their historic nesting grounds to Herring and Great Black-backed gulls, who eat tern eggs and chicks, and harass the adults. Gull populations along the Atlantic coast have exploded during the past 60 years due to legal protection afforded them and other species by the Migratory Bird Treaty Act of 1916, and to an enormous free food supply, in the form of fishing industry wastes and garbage. The US Fish and Wildlife Service intervened on several historic tern nesting islands with gull control, making those sites safe for the reintroduction of the beleaguered terns.

Arctic Terns, Common Terns, and Roseate Terns, the last a federally-listed Endangered Species, were then enticed back to former breeding sites through the use of wooden decoys and tape recordings of courtship vocalizations. It took three summers before the terns actually laid eggs on Eastern Egg Rock, a time in which the birds slowly built up toward the social "critical mass," as Kress calls it. In 1980, after a 43 year absence, 80 pair (mostly Commons) bred. In 1994 more than 1300 pair bred, including 65 pair of Roseates, making Eastern Egg Rock the second largest tern colony on the Maine coast.

Kress took the techniques he perfected to other Maine islands and reestablished terns on Seal Island National Wildlife Refuge (964 pair in 1994), Jenny Island (500 pair) in Casco Bay, and Stratton Island (207 pair), also in Casco Bay. Through active management, his team enhanced breeding habitat on Matinicus Rock in Penobscot Bay, and tern numbers subsequently increased.

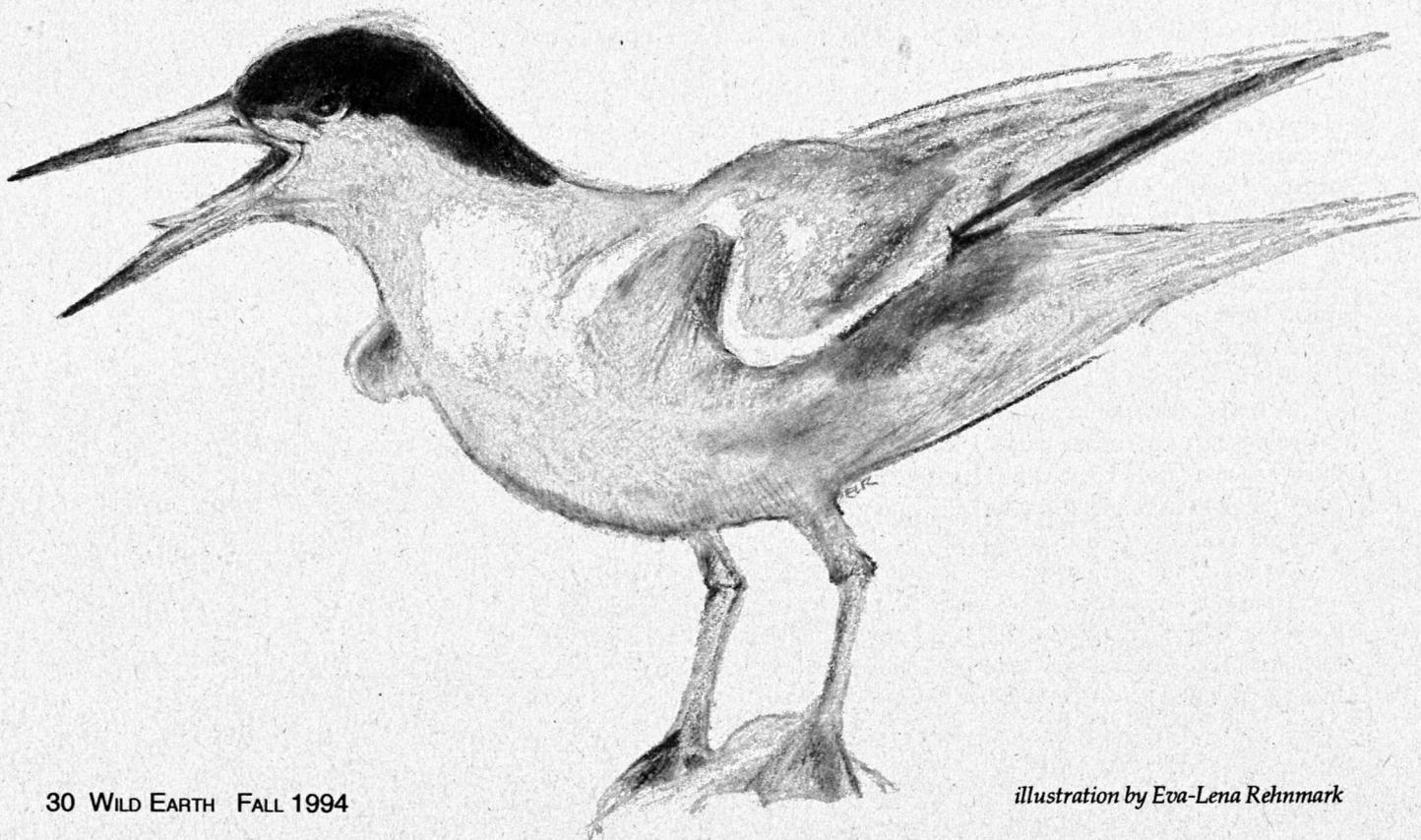
Kress's latest project has been to lure Common Murres to the cliffs of Matinicus Rock, with the use of 17" high, life-size decoys, taped vocalizations, and ceramic eggs. In 1993 murres were observed on 38 of 40 days, with 24 individuals seen at one time—a four-fold increase in sightings over the first year's efforts in 1992. Courtship displays were frequent and included billing, mutual preening, and copulation.

Because murres nest above the ground, unlike puffins, they were among the first of Maine's seabirds to disappear during earlier days of eggging and market hunting. The summer of 1994 saw additional decoys, new recordings of murre chick calls, and hope by staff members for the first real murre eggs to be laid there since 1840.

Steve Kress received the Rolex International Award for Enterprise in 1987, and most recently was selected to win a 1994 Chevron-Times Mirror Conservation Award. His methodologies are being applied by scientists in the Galapagos Islands, in Hawaii, and off the Japanese coast. In a world of great ecological challenges and oft-times gloomy headlines, Steve Kress and his associates are pioneering a bright and hopeful chapter in the history of seabird conservation.

For more information write Seabird Restoration Program, National Audubon Society, 159 Sapsucker Woods Road, Ithaca, NY 14850.

Pete Salmansohn works with the Puffin Project and writes on wildlife issues. He is co-author of Audubon Field Guide to Natural Places of the Northeast (Pantheon, 1984).



The Great Plains

*America's Best Chance for
Ecosystem Restoration, Part 2*

Key words: Great Plains, prairie, grasslands, Conservation Reserve Program, CRP, fragmentation, restoration, reserves

by Daniel S. Licht

In Part I of this two-part series we discussed the exorbitant costs and limited biodiversity benefits of the federal government's Conservation Reserve Program. One of the more salient points from that discussion is that the American taxpayer is paying fee-title prices to temporarily retire 35 million acres of farmland from agricultural production. Most of that acreage is in the Great Plains and prairies. We concluded Part I by suggesting that a much more cost-efficient and beneficial land-retirement strategy would be to permanently restore large areas of the grassland biome.

In Part II we will identify and discuss some potential ecological reserves for long-term conservation of grassland biodiversity. We will also discuss two case studies, one from the northern Great Plains and one from the tallgrass prairie, which will further elucidate the feasibility and benefits of the proposed reserves.



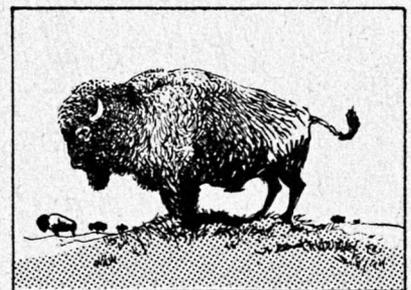
The Omernik (1987) ecoregion classification delineates a 650,000 square mile area of contiguous grassland in the central United States (excluding ecoregions of grassland/forest mosaics and savanna, e.g., Illinois and northwestern Missouri: Figure 1). This enormous grassland ecosystem is commonly known as the Great Plains and true prairies. In many ways this vast region is America's most distinctive landscape, and also its most damaged.

I propose that a series of large ecological reserves be established throughout the Great Plains and prairies to conserve grassland biodiversity, provide recreational and scientific opportunities, restore cultural values, create new economies, and reduce farm surpluses. I have identified 12 sites that could be converted to large ecological reserves (Figure 1). The sites I identified were based on 1) ecological uniqueness, 2) presence of public or other protected lands, 3) human demographics, 4) recreational opportunities, and 5) miscellaneous other factors.

These reserves correlate fairly well with the various grassland ecoregions described by Omernik (1987). They also tend to be evenly distributed across the grassland states, a distribution that is politically "fair." The establishment of such reserves could conserve in perpetuity almost all grassland species. Just as important, the reserves are large

While I know the standard claim is that Yosemite, Niagara Falls, the Upper Yellowstone and the like afford the greatest shows, I am not so sure but the prairies and Plains last longer, fill the esthetic sence fuller, precede all the rest and make North America's characteristic landscape.

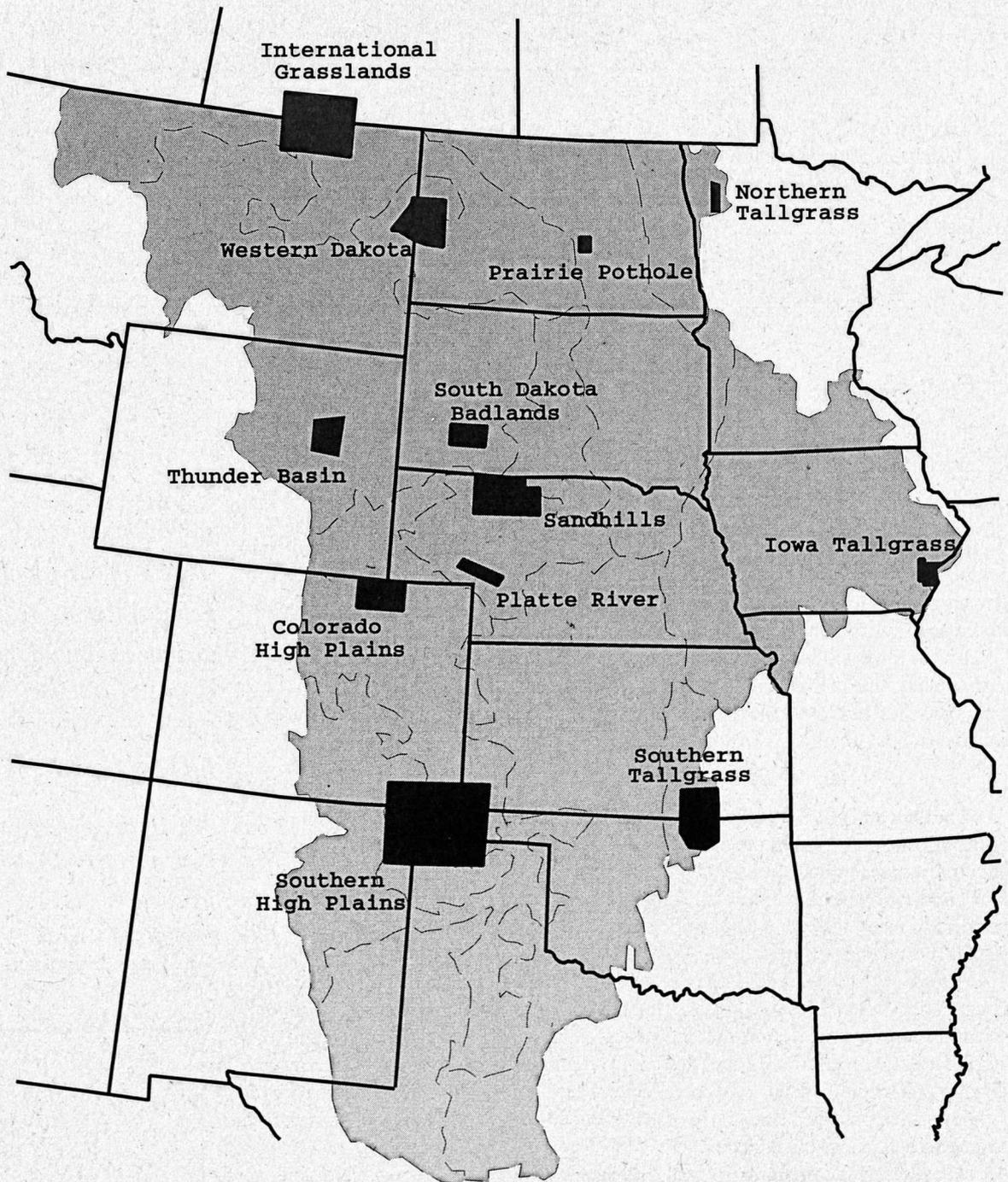
—Walt Whitman
America's Characteristic Landscape, 1882



Potential Reserves in the Grassland Biome

(Does not include savanna type ecoregions)

 = Grassland ecoregions (Omernik 1987)



enough to restore the ecological processes necessary for sustaining these species.

Many recent studies, including some in grassland ecosystems, have described the benefits of large tracts of land and the deleterious effects of fragmented habitats (Kantrud 1981, Samson and Knopf 1982, Boettcher and Bragg 1989). Most of these studies are limited to birds, but the causative factors and underlying principles can be applied to the entire grassland biota. The destruction and alteration of natural processes eventually leads to the decline and extirpation of many grassland species.

For example, Gray Wolves (*Canis lupus*), along with Bison (*Bison bison*) and prairie dogs (*Cynomys sp.*), were among the major biotic influences on the grassland ecosystem. The presence of wolves in the grassland community had a ripple effect on many other species. Wolves tend to displace Coyotes (*Canis latrans*: Carbyn 1982, Fuller and Keith 1981) which, in the absence of wolves, can be severe predators on Black-footed Ferrets (*Mustela nigripes*) and Swift Fox (*Vulpes velox*). The successful restoration and conservation of these latter species is uncertain in degraded ecosystems.

The largest of the reserves proposed here is the 5365 square mile Sandhills reserve in north-central Nebraska. The proposed reserves in northern Texas, western North Dakota and north-central Montana are all over 4000 square miles. In addition, the Montana reserve could be substantially enlarged by merging it with a similar reserve in Canada.

These reserves are large enough to support viable self-sustaining populations of ferrets, Swift Fox and most other grassland species. They can also support small populations of Gray Wolves.

Of course, the proposition of wolves and Bison roaming wild in the middle of the Great Plains seems politically impossible now. Yet there may be solutions that, while not perfect, are workable. For example, in the relatively flat and treeless Great Plains and prairies, large-animal proof fences could be established around even the biggest reserves. This may seem an abomination to some conservationists, but the unfortunate truth is that animals within the proposed reserves are already surrounded by artificial barriers, including private fences. Such restrictions may be politically necessary if grassland reserves are ever to become reality. Moreover, if the reserves are large enough, then perhaps most of the animals within would never make contact with the perimeter fences (which begs the philosophical question, are the animals really fenced in at all?).

The size of the 12 reserves proposed in this article represents only 4.2 percent (27,655 miles²) of the contiguous grassland biome. The acreage of these proposed reserves is only 50 percent of the nation's CRP acreage.

As explained in Part 1, by modifying agricultural set-aside programs, the nation could conserve grassland biodiversity while reducing federal farm expenditures. More than for any other similar-size region in the United States, the argument for establishing a series of large reserves in the Great Plains and



prairies can be made in economic terms that can be comprehended by the average citizen.

Other researchers have also observed this possibility. The geographer Bret Wallach (1985) wrote, "a prairie-restoration proposal, in other words, sounds outrageous until it is compared with what we've already got."

Frank Popper observed that, "like every other Plains state, this (Oklahoma) is a subsidized, exporting economy. People, oil, farm products stream out, federal subsidies for petroleum, lead and zinc, welfare, agriculture, and defense pour in" (Matthews 1992). The Poppers (1987) concluded that a wiser use of the arid Great Plains would be to restore it to a "buffalo commons."

CASE STUDY 1: SOUTH DAKOTA BADLANDS

The Badlands of South Dakota are a landscape set apart, not only in space, but also in time. The movie "Dances With Wolves" immortalized the region by using it as a panoramic backdrop. Of all the places in the lonely Great Plains, this most exemplifies solitude.

I propose that a large ecological reserve be established in southwest South Dakota that includes the northern 1/4 of Shannon County, the western part of Pennington and Custer Counties, and a small portion of northwest Jackson County. Essentially, a 70 mile east-west by 35 mile north-south rectangle that encompasses the existing Badlands National Park, much of the Buffalo Gap National Grasslands, and the northern portion of the Pine Ridge Indian Reservation, would be protected.

The area within the proposed reserve is already 40 percent public land. Sixty-one percent of this public land is comprised of the Buffalo Gap National Grasslands, lands which the government acquired during the resettlement programs of the 1930-40s. At that time the federal government acquired large amounts of Great Plains farmland (although only a fraction of what some recommended) because of crop surpluses, environmental degradation and failing economies—not unlike the current situation.

The remainder of the public land is Badlands National Park. This land is already protected from cattle grazing, mining and other uses that compromise the integrity of the National Grasslands. Unfortunately, the Park is currently unable to assure the long-term conservation of the shortgrass ecosystem because it is too small and has too high a perimeter-to-area ratio.

That leaves only 940,800 acres of private land within the proposed reserve boundaries. The total market value of this land, including buildings, is only \$140 million (approximately \$150 per acre: US Bureau of Census 1989). To put this in perspective, the federal government spent \$87.4 million for 2.1 million acres of CRP in South Dakota in 1991 alone (US Dept. of Agriculture 1992). The total cost of CRP to taxpayers will be over \$800 million in South Dakota over the life of the program.

Assuming that the federal government pays 1.5 times the

market value of the private lands (an incentive which is necessary and fair), the total cost to acquire a 2450 square mile reserve in southwest South Dakota would be only \$210 million. The establishment of a large-animal proof fence would cost another \$4.2 million (estimated at \$20,000 per mile). These amounts are trivial compared to current farm program expenditures. Farm subsidies for the state of South Dakota alone for 1991 were \$286 million.

State politicians will, of course, object to the federal government acquiring more land in their state. The 768,000 acres of fragmented National Grasslands and Bureau of Land Management properties in South Dakota outside the proposed reserve could theoretically be divested by the federal government in exchange for land acquisitions within the reserve; however, such an exchange would not be in the best interest of the nation since it would not reduce crop surpluses.

Considering what such a reserve can do for biodiversity conservation, outdoor recreation, scientific study, and economic development, the cost to the nation is a bargain. Just as significantly, the benefits it could produce for Native Americans would be enormous.

The present condition of the Pine Ridge Indian Reservation is deplorable. The high rate of economic and emotional poverty is the result of generations of well-chronicled injustices against Native Americans. Although many of these wrongs are irreversible, efforts can still be made to improve the living conditions of the people. They have no sense of purpose. Current welfare approaches only exacerbate feelings of irrelevance and helplessness.

I propose that a South Dakota Badlands reserve be administered cooperatively by the US Government and the people of the Pine Ridge Indian Reservation. The nation would benefit because of the environmental, educational and recreational benefits of such an arrangement, while Native Americans would benefit materially as well as spiritually. Administering and maintaining such a reserve could restore a sense of direction and pride to the Sioux tribe. Employment as tour guides, wildlife managers, service providers, etc., would create economic independence and stability for the people. Perhaps most important, the restoration of a large naturally functioning grassland ecosystem, with all of its indigenous flora and fauna, could restore a Native American spirituality that has been missing since the last Bison disappeared.

Just about every species associated with the shortgrass region of the Great Plains could be conserved in such a reserve. A population of perhaps 50-100 Gray Wolves could exist in the area. Twenty-thousand Bison could live there, a large enough population to allow for limited human harvest (as was the case historically). Bighorn Sheep (*Ovis canadensis*), Elk (*Cervus elaphus*), Pronghorn (*Antilocapra americana*), and Mule Deer (*Odocoileus hemionus*) would also be abundant. Coyotes would still be present; but because of the wolves, they would be less numerous, mostly restricted to the rugged buttes and draws. Because Coyotes would be rare on the vast plains,

Black-footed Ferrets and Swift Foxes could exist at historic densities. Ferruginous Hawks (*Buteo regalis*) could again successfully nest on the ground. Black-tailed Prairie Dogs could prosper in large complexes, in contrast to the present situation where the towns are isolated and persecuted.

CASE STUDY 2: IOWA TALLGRASS

Because of its proximity to the metropolitan areas of Chicago, Kansas City, St. Louis, Minneapolis/St. Paul, and Des Moines, a tallgrass reserve in east-central Iowa would likely receive more human use than any other of the proposed reserves. This is significant. According to the US Forest Service (1990), "close-to-home open space, which is the most heavily used and demanded recreation source, is most severely threatened by development." And as Aldo Leopold (1966) pointed out many years ago, "recreation is valuable in proportion to the intensity of its experiences, and to the degree to which it differs from and contrasts with workaday life."

I propose that a 400 square mile reserve be established in eastern Iowa, approximately 15 miles north of Burlington. The reserve could restore and conserve a functioning tallgrass prairie, and provide excellent outdoor opportunities. The reserve would protect the canoeable Iowa and Cedar rivers, before they empty into the Mississippi.

The creation of a large reserve in Iowa would go a long way toward reducing the nation's crop surpluses. In 1992, almost 2 million acres in Iowa were in federal agriculture set-aside programs (1.3 million in CRP and .6 million in annual set-asides: US Bureau of Census 1994). The proposed reserve would permanently relieve the American taxpayer of at least 164,417 acres of cropland (US Bureau of Census 1994).

Granted, the establishment of a reserve in central Iowa will be much more challenging than elsewhere in the prairie states. Land values are higher (\$1097 per acre, including buildings: US Bureau of Census 1994) and the area is much more densely populated (11,592 people in the proposed reserve: US Bureau of Census 1993). In addition, the land is more degraded, so restoration will be more costly and time-consuming. Yet, that should not remove the area from consideration. Economically and socially, Iowa is suffering as much as the other grassland states.

Iowa lost 5 percent of its population between 1980 and 1990; most of this loss occurred in rural areas. Agriculture, the traditional mainstay of the state's economy, continues to falter despite huge government subsidies (in 1987, subsidies to Iowa farmers were \$1.2 billion, about \$16,000 per farmer). The number of farms in the proposed reserve has declined 13 percent between 1987 and 1992, to 554. Meanwhile, tourism, an industry that continues to grow in other parts of the country, is comparatively insignificant in Iowa in large part because there are no noteworthy tourist attractions.

Bison and wolves could both be restored to such a reserve. Elk, which probably reached their highest historic densities in tallgrass prairies, could be reestablished in their "preferred" habitat. Endangered, Threatened, and candidate species to be conserved include prairie fringed orchids (*Platanthera sp.*), Meade's Milkweed (*Asclepias meadii*), Dakota Skipper butterfly (*Hesperia dacotae*), Regal Fritillary butterfly (*Speyeria idalia*) and many others.

A large reserve would also restore the sometimes subtle processes necessary for species sustainability. For example, skippers are a primitive group of butterflies that have limited vagility. The long-term viability of skipper populations depends on the presence of numerous subpopulations in close proximity to each other such that individuals can recolonize nearby sites should the populations become extirpated or reduced in number. Such interchange within a metapopulation also enhances the genetic variability of the species.

Small tracts of native prairie, several thousand acres or less in size, do not provide the conditions necessary for long-term skipper survival when they are isolated within agrarian landscapes. That's one reason why several grassland skipper species will likely be listed under the Endangered Species Act in the near future.

In the long run, the establishment of big reserves is an efficient and politically-judicious conservation strategy. Americans are willing to protect endangered mammals, birds and other charismatic species, even if there is a cost to society; but they do not feel the same way about invertebrates, reptiles, mollusks and other less "desirable" species (Kellert 1993). When conservation for invertebrates and other non-charismatic species becomes front page news, especially when it conflicts with development or jobs, the public's level of support for the Endangered Species Act decreases. When that happens all endangered species are further threatened. The creation of large reserves can preclude these "endangered species train wrecks."



In summary, the establishment of a series of large reserves can benefit both the American taxpayer and the grassland environment. For the nation as a whole, it's a win-win situation.

The United States must come to grips with land-use in the Great Plains and prairies. Staying the present course would cost taxpayers billions of dollars annually, and lead to a vast wasteland of brome grass (*Bromus sp.*), dilapidated buildings, unmaintained roads, and dying communities. A wiser alternative would set aside large tracts of land within the grassland biome as ecological reserves. Such reserves will not only conserve grassland biodiversity for future generations, they will also educate, entertain, and inspire. ■

Author's note: Informal discussions on the 1995 Farm Bill are under way. Conservationists are again 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 propose prior to the 1995 bill's enactment, land adjacent to large public tracts should be recommended for permanent removal from agricultural production and return to the public domain.

We landed, ascended the bank, and entered a small skirting of trees and shrubs, that separated the river from an extensive plain. On gaining a view of it, such a scene opened to us as will fall to the lot of few travellers to witness. This plain was literally covered with buffaloes... The males were fighting in every direction, with a fury which I have never seen paralleled, each having singled out his antagonist. We judged that the number must have amounted to some thousands, and that there were many hundreds of these battles going on at the same time... I shall only observe farther, that the noise occasioned by the trampling and bellowing was far beyond description. In the evening, before we encamped, another immense herd made its appearance, running along the bluffs at full speed, and although at least a mile from us, we could distinctly hear the sound of their feet, which resembled distant thunder.

—John Bradbury, 1811



LITERATURE CITED

- Boettcher, J. F., and T. B. Bragg. 1989. Tallgrass prairie remnants of Eastern Nebraska in T. B. Bragg and J. Stubbendieck (eds.), *Proceedings of the Eleventh North American Prairie Conference, Prairie Pioneers: Ecology, History, and Culture*. Lincoln NE 292 pp.
- Carbyn, L. N. 1982. Coyote population fluctuations and spatial distribution in relation to wolf territories in Riding Mountain National Park, Manitoba. *Can. Field-Nat.* 96:176-183
- Fuller, T. K. and L. B. Keith. 1981. Non-overlapping ranges of coyotes and wolves in north-eastern Alberta. *J. Mammal.* 62:403-405
- Kantrud, H. A. 1981. Grazing intensity effects on the breeding avifauna of North Dakota native grasslands. *Canada Field Naturalist* 95:404-417
- Kellert, S. R. 1993. Values and perceptions of invertebrates. *Conservation Biology* 7(4):845-855
- Lang, R. E., F. J. Popper and D. E. Popper. 1994. "Progress of the nation": the settlement history of the enduring American frontier. *Urban Studies Dept., Rutgers Univ.* 39 p.
- Leopold, A. 1966. *A sand county almanac*. Sierra Club/Ballantine Books. New York. 295 pp.
- Omernik, J. M. 1987. Ecoregions of the conterminous United States. *Annals of the Association of American Geographers.* 77:118-125
- Popper, D. E., and F. J. Popper. 1987. The fate of the Plains. *Rutgers Univ., NJ* 36 pp.
- Samson, F. B. and F. L. Knopf. 1982. In search of a diversity ethic for wildlife management. *Transactions of the 47th North American Wildlife and Natural Resources Conference.* pp 421-431.
- US Bureau of Census. 1989. 1987 Census of Agriculture: Part 41 South Dakota.
- US Bureau of Census. 1993. in: *The World Almanac and Book of Facts 1994*. Funk & Wagnalls, Mahwah NJ. 976 p.
- US Bureau of Census. 1994. 1992 Census of Agriculture: Part 15 Iowa.
- US Dept. of Agriculture. 1992. *Agricultural Statistics 1992*. US Gov. Print. Off. Washington.
- US Forest Service. 1990. *An analysis of the outdoor recreation and wilderness situation in the United States: 1989-2040*. General Technical Report RM-189.
- Wallach, B. 1985. *The return of the prairie. Landscape.*

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.

Swainson's Hawk (*Buteo swainsoni*) by Darren Burkey

Central Appalachian Forests

A Guide for Activists

by R.F. Mueller

ABSTRACT

An on-the-ground and literature survey of the Central Appalachian forests is presented from the perspective of an activist. Ecological characteristics of forests and associated vegetation types are discussed in terms of geologic setting, climatic zonation and variation with time, shade tolerance, and disturbance regimes. New site-specific observations and interpretations of rare and disjunct plant communities, fire history, succession, and regeneration are included. Silvicultural and wildlife management practices, particularly of the US Forest Service, are evaluated in terms of the observed ecological characteristics.

INTRODUCTION

The Central Appalachians are a meeting ground of opposites, of cold-loving northern floras and plants with origins in the deep South, of sublime mountain expanses marred by garish developments. Taking a page from Vice President Al Gore's book, we may say that these are mountains in the balance, but it is a balance precariously unstable in an ecological sense.

Our struggle to protect and restore Appalachian ecosystems resolves into a confrontation between a growing body of knowledge in the field of conservation biology, and the resistance, if not downright hostility, of land management agencies to this knowledge. These agencies, led by the US Forest Service, operate as sources of deceit and pseudo-science, refusing to break with the special interests they have so long favored.

Details are important here, and we need to know the ecosystems well in order to save them. Noss (1992a) stated that, "No substitute exists for detailed on-the-ground knowledge of the ecology and natural history of the region." We need to study the biologic communities and apply this knowledge to scoping notices, environmental assessments, and other project and program level planning documents. In many cases citizens will find it easy to "get ahead" of experts employed by the agencies in knowledge of the biologic communities and the latest theories.



The Forest

GEOLOGIC SETTING

The Central Appalachians consist of linear ridges and valleys, deeply dissected plateaus, bold escarpments, wet and dry glades and numerous other landforms that defy easy classification. They form parts of four geomorphic (landform) provinces and reflect a long geologic history (Press and Siever 1985; Dietrich 1970). Their oldest rocks are 600-million-year to 1.8-billion-year-old crystalline granites, gneisses and metamorphosed volcanics of the eastern Blue Ridge. Faults separate the Blue Ridge from the slightly younger rocks of similar nature in the Piedmont Province. By contrast the western Blue Ridge is largely comprised of far younger (500 to 600-million-year-old) rocks of the Cambrian Period, which are dominantly quartzites of sedimentary origin as well as other sediments and volcanics. These sediments are part of the eastern exposed edge and oldest members of a thick sequence of limestones, dolomites, shales and sandstones of the Paleozoic Era which form the adjacent Valley and Ridge Province. They are the roots of fold mountains and form the long, roughly parallel ridges and valleys that characterize this province. They are also the products of stream erosion which has left the ridge tops capped by resistant sandstones and quartzites and the valleys underlain

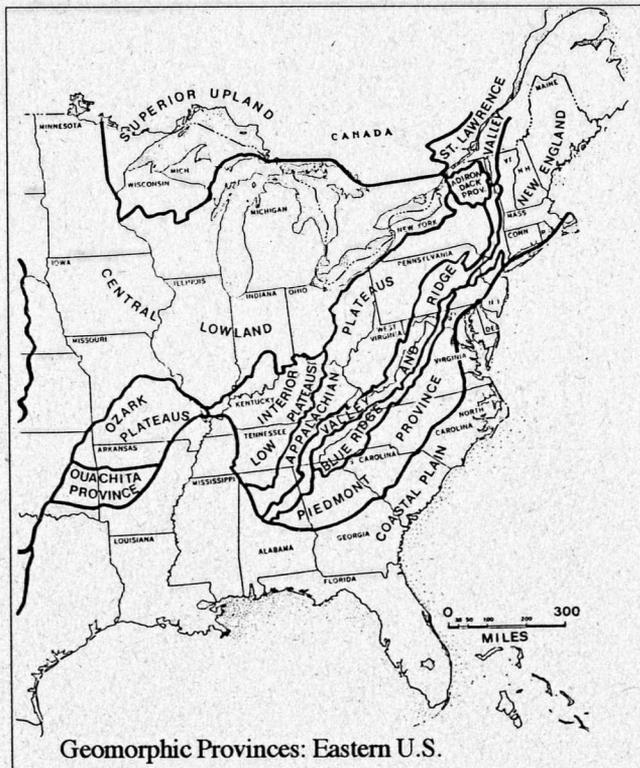
by less resistant shales and limestones. Immediately to the west of the Valley and Ridge the folds become less pronounced and the major escarpment of the Cumberland and Allegheny Front marks the eastern edge of the flat-lying and only slightly folded rock of the Appalachian Mountain and Plateau Province.

These landforms have a direct bearing on the nature and distribution of the various forest and other vegetation types. The eastern Blue Ridge, with its variety of nutrient-rich igneous and metamorphic rocks, is more hospitable to plant growth than is the western Blue Ridge and most of the Valley and Ridge. The latter province, except for certain areas such as limestone valleys, has nutrient deficient sandstones and quartzites or shales which yield subsoils less amenable to moisture circulation and root penetration. The dry, stony and frequently leached and acid (podzol) soils of these mountains favor xeric oak and pine forests with ericaceous shrubs and ground cover, whereas the better soils favor more mesic forests. Water storage capacity of many Central Appalachian soils is severely restricted due to high rock content (Armson 1979). This not only leads to xeric conditions but promotes rapid water runoff and consequent flash flooding and bank erosion as part of the normal hydrologic regime in this region.

CLIMATE

As important as geology are the factors of moisture, temperature and cloud distribution. There is a fairly strong orographic effect in the Central Appalachians: most precipitation falls on the western slopes of the plateau; the Valley and Ridge receives far less. The average yearly precipitation at Pickens, West Virginia, on the western Allegheny Plateau, exceeds 60 inches (152 cm.) while Moorefield, West Virginia, 80 miles (130 km.) to the northeast, in the Valley and Ridge, gets only 25 inches (64 cm.) (Strausbaugh and Core 1977). However, precipitation increases again east of the Great Valley of Virginia with a sharp peak of 50 inches (127 cm.) over the Blue Ridge (Hayden 1979).

Temperature variations in the Central Appalachians have three major components which affect forest type: latitude, elevation, and continentality. Latitudinal variation is expressed in the geographic limitations of northern and southern species ranges. For example the southern limit of Black Spruce is in central Pennsylvania's Valley and Ridge while the Southern Appalachian plant *Galax* (*Galax aphylla*) ranges only as far north as Preston County, West Virginia and western Maryland. Elevation counters latitude, causing isotherms to loop southward along the mountains. On daily weather maps this loop often extends 150 miles (240 km.) or more south in the Central Appalachians. The decrease in temperature with elevation



Geomorphic Provinces: Eastern U.S.

(lapse rate) is approximately 3.4 degrees Fahrenheit per 1000 feet (6.4 degrees Celsius per 1000 meters), and mean temperatures may vary at least three times this F value as a function of elevation. However the lowest temperatures are usually attained in high mountain valleys where cold air drains down from the peaks and collects. Continentality, or distance from the ocean, tends to align the isotherms parallel to the coast with the lowest winter and highest summer temperatures farthest from the water. The interplay of elevation, topography and continentality gives a fine structure to the effect of latitude so that many northern species are confined to selected high elevation sites or local lower elevation "frost pockets,"¹ with the result that the Central Appalachians are rich in species at their extreme southern limits.

Bearing some relation to precipitation, but partly independent of it, is cloud cover. Cloud cover is important because it affects photosynthesis, air and soil moisture and temperature. The Allegheny Mountains are the locus of a remarkable cloudy day maximum of more than 160 days per year compared to 120 days or less immediately to the southeast in the Valley and Ridge and Piedmont (Reifsnyder and Lull 1965). This variation in cloudiness may be the defining characteristic of the Central Appalachians since the variation in forest type corresponds more closely to it than to rainfall. The distribution of cloudiness is consistent with the dominance of shade tolerant and other mesophytic species in the Alleghenies as contrasted with the less tolerant and xeric species that dominate the sunnier forests to the southeast. The relatively cool summer climate of the cloudy Allegheny Highlands and the western Appalachians in general favors cold climate species that would not ordinarily be associated with the relatively mild winter temperatures of these mountains.

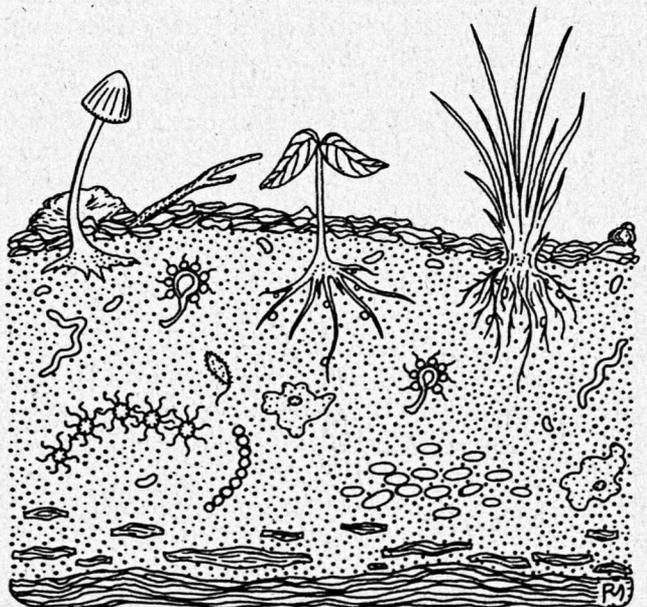
Precipitation, cloud cover and temperature in the Central Appalachians have probably all differed from their present distributions much of the time during the last 18,000 years since the ice sheets were at their maximum southward advance in northern Pennsylvania and central Ohio. Pollen data (Delcourt and Delcourt 1981) indicate that around the glacial maximum a boreal Jack Pine/spruce parkland (as distinguished from a closed canopy forest) extended as far south as Tennessee, and tundra probably occupied the highest Appalachian elevations. At that time deciduous forest of the types now covering these mountains lay far to the south along the Gulf and lower Atlantic coastal plains, with the mixed mesophytic component probably confined to dissected major river system bluffs. However, even before the ice sheet reached its points of greatest advance, a warming trend set in. When the temperature reached a maximum (the hypsithermal interval) some 7000 years ago, existing forest types were temporarily displaced northward perhaps 200 miles (300 km.) and to several hundred meters higher elevation. Similar displacements of this type probably have occurred a number of times in the last 10,000 years (Pielou 1991). Thus there emerges a picture of a geographically dynamic forest that was able to migrate hundreds

of miles and reconstitute itself on a time scale of several thousand years or less.

As is well known, the end of the last glacial ice advance (Wisconsinan) was succeeded by great megafaunal extinctions. It is also inferred that in the Appalachians there was a transition from a complex habitat mosaic (plaid pattern) of open parklands to a simpler habitat of closed canopy forest. Guthrie (1984) speculated that the megafaunal extinction episode with associated loss of floral diversity was related to the onset of greater continentality and a less equable climate than in previous interglacials. This latest interglacial has also seen the end of the apparently worldwide coexistence of cold and warm climate species usually described as "disharmonious." Remnant communities of mixed cold and warm adapted species are still fairly common in the Central Appalachians and may be a sort of microcosm of Pleistocene diversity.

SOIL AND FOREST TYPES

As was emphasized by Lucy Braun (1950), the most widely recognized authority on Appalachian forests, there is a strong relation between topography, soil and forest type. The Central Appalachians are the locus of a salient of acid and leached podzol soils that extends down from the boreal region of Canada where they are widespread and associated with coniferous forests. In the Appalachians they grade into other shallow, rocky soil types common to many mountain regions. However, there also are substantial areas of gray-brown forest soils that culminate in the rich mull and melanized types characteristic of our most diverse forests, the mixed mesophytes.



By contrast the rocky and acid podzols favor coniferous, xeric oak-chestnut, or oak-pine forests. Conifers generally prevail on cold plateaus; the latter two types generally prevail on dry sandstone ridges. Although the better soils once covered extensive mountain slopes, as in the Cumberlands and Alleghenies, continued logging, fires and poor agricultural practices have degraded the entire region to the extent that such soils are now largely confined to topographic concavities such as coves and riparian zones. This condition is especially characteristic of the Valley and Ridge Province where precipitation is low, and dry rocky ridges are the norm.

The most complex forest and presumed parent forest of the Central Appalachians is the mixed mesophytic. This type derived from similar forests that occupied eastern North America and other centers such as Europe and East Asia in Tertiary times (Braun 1950), although subject to climate-induced migrations. Many species of the European forests were eliminated when ice sheets forced them against inhospitable east-west mountain ranges and seas. However, those of East Asia survived and many close relatives of eastern North American species still live there. The mixed mesophyte forest shows its most characteristic development in the Cumberland Mountains and in the Alleghenies of West Virginia below 2500 feet (760 meters) asl. It extends northward with attenuated diversity into Maryland, Pennsylvania, and Ohio where it is increasingly confined to stream valleys. Eastward in Virginia it is largely restricted to topographic concavities such as coves, ravines and riparian zones, usually of the latest erosion cycle (Braun 1950).

The mixed mesophyte forest is diverse with a number of species each of magnolias, oaks, hickories, walnuts, elms, birches, ashes, maples, basswoods, locusts and pines. There is also Tuliptree, Black and Sweet Gum, Black Cherry, American Beech and Canadian Hemlock (*Tsuga canadensis* [also known as Eastern Hemlock, but the latter common name doesn't as clearly distinguish it from the Carolina Hemlock]). The most characteristic type indicators are White Basswood and Yellow Buckeye. However Yellow Buckeye does not generally occur in the Valley and Ridge. American Chestnut, once a major component, now survives only as stunted, disease-ridden sprouts.

These major canopy species are accompanied by even more diverse understory tree, shrub and herbaceous layers as well as many fungi and mosses. Typical components of the understory are the small trees Musclewood (*Carpinus caroliniana*) and Sourwood (*Oxydendron arboreum*), shrubs such as Spice Bush (*Lindera benzoin*) and Paw Paw (*Asimina triloba*), and the herbs Ginseng (*Panax quinquefolium*) and Goldenseal (*Hydrastis canadensis*). Mesophytic plants, including the trees, tend to have soft, juicy leaves that on death rapidly decompose and, as distinguished from those of xeric oak forests, form only light litter but contribute to building rich soils.

Coinciding roughly with the Virginia-West Virginia boundary, the eastern edge of the mixed mesophyte region forms a

broad ecotone of transition to the oak-chestnut forest type of the Valley and Ridge. With the temporary (hopefully) decline of the American Chestnut, which once flourished on its dry ridges, the oak-chestnut region is now characterized by the dominance of five oaks—Black, Scarlet, Northern Red, White and Chestnut—and on the driest sites, by Virginia, Pitch, Shortleaf and Table Mountain pines. Other prominent species are White Pine, Black Gum, Black Birch, Pignut Hickory and Red Maple. The understory tree layer is usually dominated by Service Berry, Flowering Dogwood and White Pine, and in the shrub and ground layers by Mountain Laurel, Fetterbush, huckleberries, blueberries, azaleas (deciduous rhododendrons), Teaberry (*Gaultheria procumbens*) and other acid loving plants. Slope concavities may contain Tuliptree, White Ash, Cucumber Magnolia, Basswood and other mesic species.

Still farther to the east a second ecotone marks the transition to the oak-pine forest of the Piedmont. Since the Piedmont generally lies below 1000 feet (300 meters) asl, it contains a number of species such as Loblolly Pine, Sweet Gum and Southern Red Oak not found at higher elevations.

On ascent to the highest elevations and northward into Maryland, Pennsylvania, and Ohio, southern species in the mixed mesophyte forest gradually drop out; northern species such as Yellow Birch and Mountain Maple (*Acer spicatum*) appear and Sugar Maple, American Beech, and Canadian Hemlock assume dominance. American Basswood replaces White Basswood. This is the hemlock-White Pine-northern hardwood forest of Braun (1950). It has a distinctly northern quality in its shrubs and herbaceous flora and may appear identical to forests of the Adirondack foothills or New England. However, it frequently contains traces of typically southern and Central Appalachian species such as Cucumber Magnolia, Frazer Magnolia, and Black Locust giving it a greater diversity. In some places Great Rhododendron (*Rhododendron maximum*) forms heavy understory thickets, a feature uncharacteristic of the northern forest.

Above 3500 feet (1000 meters) in West Virginia and at lower elevations in Maryland and Pennsylvania, the northern hardwoods yield gradually to Red Spruce montane forest of boreal appearance. In this forest, circumpolar flowering plants such as Mountain Oxalis (*Oxalis montana*) and Goldthread (*Coptis groenlandica*) vie with lycopods, liverworts and mosses in the ground cover while shrubs are rare because of dense shade. Southward this forest type occurs only in a few isolated and climate-modified stands as at Mountain Lake Wilderness and Beartown Wilderness in the Valley and Ridge and in the Balsam Range in the Mount Rogers National Recreation Area of the Jefferson National Forest. At Mountain Lake is a small isolated stand of old growth consisting of Red Spruce, hemlock, Sugar and Red Maple, Black and Yellow Birch, White Ash, Northern Red and White Oak, Black Cherry, Cucumber Magnolia and Tuliptree. Mountain Maple and rhododendron form the understory and the ground cover contains intergrowths of the boreal species *Maianthemum canadense* and the South-

ern Appalachian *Gaylussacia* *aphylla*, all at about 3600 feet asl. In the Balsam Range this forest, which here is mostly restricted to elevations above 5000 feet (1500 m), assumes the character of the southern spruce-fir type with the accompaniment of Red Spruce by Frazer Fir, the Southern Appalachian endemic. Even the most northern appearing Central Appalachian spruce forests, as on West Virginia's Allegheny Plateau, contain an admixture of Southern Appalachian species such as Mountain Holly (*Ilex montana*) and Southern Mountain Cranberry (*Vaccinium erythrocarpum*) which are out of the range of boreal forests.

In the oak-chestnut type forests of the Valley and Ridge and Blue Ridge provinces, the effects of elevation are more subtle, even cryptic. This is due in part to the different species segregates that result from lower precipitation and/or cloud cover and continentality as compared with the Allegheny highlands. Effects take the form of higher temperatures and influence of the nearby ocean on day to day weather, which tends to be somewhat erratic. In the vicinity of latitude 38 degrees north Tuliptree generally grows below 2500 feet and Chestnut Oak below 3500 feet asl. The mountains of the Valley and Ridge have very little spruce montane forest. Instead "orchard" type Northern Red Oak stands with gnarled, thick-trunked and widely spaced trees dominate the highest elevations. On the most exposed peaks trees are greatly stunted and contorted by the wind. Many show long, thick limbs growing at right angles to the trunk as an adaptation to the weight of ice and wind stress. At elevations where rocky, acid soils or other inhospitable conditions are intensified, there are "barrens" of low heath shrubs, Sweet Fern (*Comptonia peregrina*) and Bear Oak (*Quercus ilicifolia*). These shrub expanses are punctuated by taller wind-contorted (banner) Pitch and Table Mountain pines, or in some cases, shrubby hemlock. Above 3500 feet, low elevation shrubs and herbaceous flora are replaced by such northerners as American Mountain-ash (*Pyrus americana*), Mountain Maple, *Clin-tonia borealis*, and *Maianthemum canadense*, as in the Alleghenies. Perhaps because of relatively high precipitation there, the northern Blue Ridge is favored by a number of rare disjuncts. On it are found Virginia's only known occurrences of Bearberry (*Arctostaphylos uva-ursi*) and Balsam Fir (*Abies balsamea*), the latter at its southern-most station on the planet. It is confined to the summit regions of Hawksbill and Stonyman Mountains, which reach 4000 feet in elevation, and is a minor component of oak forest. It must have passed through a rather narrow thermal bottleneck during the hypsithermal interval.

Changes in vegetation with elevation are not solely due to lapse rate. The restriction of Tuliptree below 2500 feet in the Valley and Ridge at 38 degrees N and its occurrence above 3000 feet at the same latitude in cooler West Virginia requires another explanation. The survival of seedlings frequently depends on the interaction of temperature, soil and air moisture and light intensity. Although the Valley and Ridge and the Blue Ridge are less continental than the Allegheny Plateau, their weather varies greatly from day to day. Warm spells that acti-

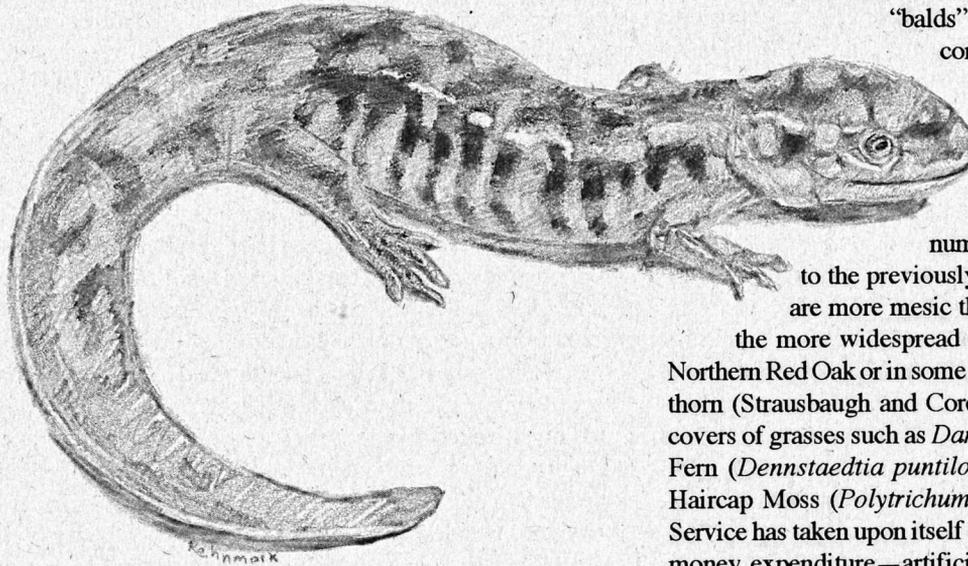
vate buds are frequently followed by hard frosts and frost heaving that damage buds and roots. These conditions are more prevalent in the Valley and Ridge and Blue Ridge than on the Allegheny Plateau, with its greater snowfall and cloud cover.

UNUSUAL BIOLOGIC COMMUNITIES

Within the areas of the major Central Appalachian forest types are many smaller biologic communities with special characteristics. These communities have resulted from geologic, topographic or climatic conditions that are unique in their details. Most widespread are the glades or natural openings that result from such conditions as interrupted drainage or bedrock-imposed moisture or drought conditions. In terms of area the most common glades are the high-elevation bogs, fens, swamps and other wetlands of the Allegheny Mountains and Plateau. There are also many small forested wetlands, usually associated with floodplain topography, artesian springs, perched water tables or sinkholes. Many of these communities, both large and small, contain rare, frequently disjunct, species. An example is the famous Cranberry Glade complex that covers 750 acres (roughly 300 hectares) on West Virginia's Allegheny plateau. Lying at 3400 feet elevation, its boreal type bogs, fens, marshes, and swamps are rich in acid soil disjuncts such as Bog Rosemary (*Andromeda glaucophylla*) and Small Cranberry (*Vaccinium oxycoccos*) as well as some with greater soil tolerance ranges such as Buckbean (*Menyanthes trifoliata*), a circumpolar member of the gentian family (Core 1955). Of similar nature is the 7000 acre Canaan Valley complex, the largest wetland in the Central Appalachians. At 3200 feet elevation and lying just north of the Monongahela National Forest, Canaan Valley is under consideration for National Wildlife Refuge status.

Some of the smaller wetlands are also great centers of diversity. An example occurs alongside Folly Mills Stream in the Shenandoah Valley. This small wetland, at only 1580 feet asl, is home to an impressive array of northern disjuncts as well as southern species, many of which I first identified less than a decade ago and which are still being inventoried. As in the Cranberry Glades, Buckbean occurs here, but in an almost acid-neutral environment of a calcareous marsh and fen. Here also are such indicators of this environment as Prairie Loosestrife (*Lysimachia quadri-flora*) and Swamp Lousewort (*Pedicularis lanceolata*). Other northerners include Glaucous Willow (*Salix discolor*), in its only known Virginia occurrence², as well as a number of rare sedges³. Southern species which form a melange⁴ with these northerners are Purple Gerardia (*Gerardia purpurea*) and the rare Large-leaved Grass of Parnassus (*Parnassia grandifolia*) which is a member of the saxifrage family. This complex community owes its origin and continued existence to cool artesian springs and location in a "frost pocket" by virtue of air drainage from sur-





rounding hills. These factors have combined to provide a refugium for species that we may infer were originally driven south by the climatic conditions brought about by ice sheets to the north. However, unlike northern type communities at higher elevations, this refugium is confined to the wetland while the surrounding hills are covered by Appalachian type oak-hickory forest which contains such southerners as Post Oak and Persimmon but no species of northern affinity.

Sinkhole ponds along the western edge of Virginia's Blue Ridge harbor such rare disjuncts as White Buttons (*Eriocaulon septangulare*), and the two-county endemic Virginia Sneezeweed (*Helenium virginicum*), as well as Eastern Tiger Salamander (*Ambystoma tigrinum tigrinum*). Other, even rarer, small ponds and wetlands occur at various elevations, some on perched water tables, and provide habitat for long isolated populations of salamanders and other species. All are under threat of poor management practices and roads that expose them to ORVs (Mueller 1991).

Dry cedar glades and limestone and shale barrens contain assemblages of drought, cold and heat resistant plants and animals. Some of the most outstanding examples occur in West Virginia's Smoke Hole region in the Valley and Ridge Province (The Nature Conservancy 1991). There limestone barrens and cedar glades support a number of Midwestern and Western species, some of which, like Prairie Flax (*Linum lewisii*), are disjunct from west of the Mississippi River. The floras of the more common shale barrens have received considerable attention in recent years and are known for rare species such as Shale Barren Rock Cress (*Arabis serotina*; a federally listed Endangered species) (Wieboldt 1991).

Other special habitats on exposed ridges and peaks, frequently on rocky terrain, harbor montane and boreal plants such as Michaux's Saxifrage (*Saxifraga michauxii*), Greenland Sandwort (*Arenaria groenlandica*) and Three-toothed Cinque-

foil (*Potentilla tridentata*). However, natural "balds" with extensive grass and shrub communities in place of trees, such as characterize high elevations in the Southern Appalachians, are rare in the Central Appalachians. The Central Appalachians do, though, have numerous small openings in addition

to the previously described heath barrens which are more mesic than the latter. These merge with the more widespread orchard type summit forests of Northern Red Oak or in some cases American Beech and Hawthorn (Strausbaugh and Core 1977). These may have ground covers of grasses such as *Danthonia compressa*, Hay-scented Fern (*Dennstaedtia punctilobula*), sedges and cushions of Haircap Moss (*Polytrichum*). Unfortunately the US Forest Service has taken upon itself to create—with great energy and money expenditure—artificial balds and "savannas" which only clash with the local ecosystems and fragment the forest.

More common than the conspicuously novel communities discussed above are some that are merely unusual in the forest type in which they occur. Frequently they involve only slight disjunction of common or rare species in combination with the dominant regional flora. Thus distinctly northern species may occur in a mixed mesophyte forest with dominantly southern species. An example is the occurrence of northern herbs such as Wild Sarsaparilla (*Aralia nudicaulis*) and the grass *Millium effusum* with Tuliptree and Black Walnut as in the lower Back Creek drainage of Virginia's Valley and Ridge, or Canadian Yew (*Taxus canadensis*) and Mountain Maple at less than 2500 feet asl in certain steep sided northeast facing gorges that cut through the Allegheny Mountains in West Virginia.

The occurrences of melange communities and the sequence of types reflect the so-called "disharmonious" Pleistocene communities which they resemble and of which they may be relict. According to MacArthur (1975) there is an inverse relation between species diversity and climatic variability as measured by winter-summer differences in mean temperature. That is, stabler climates tend to accommodate more species. A striking case is the small isolated Folly Mills wetland where the effects of seasonal fluctuations in growing conditions are moderated by the artesian springs and salubrious chemistry. Thus although the surrounding forest, which is more subject to climatic variations, is typically Southern Appalachian, the wetland is a melange of many northern and even Arctic species with other species of wide as well as decidedly southern distributions.

With markedly less disjunction, and not separated from the regional forest like the Folly Mills wetland, are sites with northern mesic species such as *Aralia nudicaulis* and *Millium effusum* in a Southern Appalachian mesic forest type. The cited occurrence in the Back Creek drainage is an example.

Finally, most common among melange communities is

the occurrence of rare and common northern species—some disjunct, some not—in high elevation wetlands such as the Cranberry Glades or in the surrounding forest with which the wetlands harmonize in climatic type. However, as pointed out earlier, all Central Appalachian northern type communities also have admixtures of Southern Appalachian species.

Accompanying the disjunct and other northern flora of the cooler Central Appalachians are many animal species, ranging from the Canadian zone Pink-edged Sulfur Butterfly (*Colias interior*) to the Northern Flying Squirrel. This northern fauna also includes such rare Pleistocene holdovers as the Rock Vole (*Microtus chrotorrhinus*) which is regarded as disharmonious with the Eastern Woodrat (*Neotoma floridana*; Graham and Lundelius 1984). This mutual incompatibility underscores the difficulty in meeting the complex needs of all native species in any limited reserve system (Mueller 1992).

SHADE TOLERANCE

In the Central Appalachians the most shade tolerant species of trees are those that characteristically occur in the medium moisture, or mesic, regimes. They are Canadian Hemlock, American Beech, Sugar and Black Maple, Red Spruce and Balsam Fir, as well as a number of small understory trees among which Flowering Dogwood, Eastern Hophornbeam and Striped Maple are most common. The basswoods and Yellow Buckeye are also quite tolerant. Most oak species are of intermediate tolerance. However Scarlet Oak shows low tolerance of shade, as do Tuliptree, Black Cherry, and most of the birches. Shagbark Hickory, a tree of rich mesic environments, is moderately tolerant but other members of this genus and the related walnuts are relatively intolerant. Some species, such as White Pine and White Ash, are very tolerant when young but become intolerant with age.

Red Maple, which is of intermediate tolerance, but more tolerant than any oak, has a special role. Red Maple is at home in habitats ranging from southern swamps to the driest mountain ridges and the fringes of the boreal forest. Because conditions exclude the most tolerant species such as American Beech and Sugar Maple, Red Maple, along with Striped Maple, is frequently the most tolerant species in xeric oak-chestnut forests of the Central Appalachians. As a consequence it has become a prime scapegoat and cover for a multitude of silvicultural sins perpetrated by the US Forest Service and other industrial foresters.

Virgin mixed mesophyte forests have an abundance of species of all shade tolerance levels. Thus Tuliptree and intolerant oaks are major components even of many stands where shade tolerant species frequently dominate. In the dry oak-chestnut forests, intermediate and intolerant oaks (White, Chestnut, Black, Red and Scarlet) dominate in stands undisturbed by humans since the most tolerant species are excluded by soil and climate. This fact is a source of embarrassment to the Forest Service which steadfastly maintains that the commercially desirable but intolerant oaks need the help of large openings

such as clearcuts to reproduce and prevent takeover by Red Maple and other undesirable species. The prominent ecological forester Leon Minckler has repeatedly made the point that large openings are not necessary for reproduction (e.g. Minckler 1974). It is becoming increasingly clear that a major mechanism of forest reproduction in mature deciduous forests is the formation of tree fall gaps which allow sufficient light to encourage even the least tolerant species.

ROLE OF FIRE

Next to tree fall gaps, usually formed by windthrow, fire was probably most responsible for natural forest openings. While the role of fire in the Central Appalachians is still poorly understood, extensive observations by Virginians For Wilderness have revealed surprising effects of this agent. Quite obviously fire was most common in the dry oak-chestnut and oak-pine uplands before human suppression became routine. However, many trees in moist coves also show fire scars. This is probably a consequence of the relatively thin bark of many cove species such as Shagbark Hickory, beech, and Tuliptree, as compared with thick-barked Chestnut Oak for example. Although the virgin high elevation spruce forests of the Allegheny Plateau presumably had substantial fire potential, it appears that the prevailing high moisture levels prevented many fires until logging and land clearing produced incendiary slashings and ignition sparks.

In addition to charred wood, evidence for forest fires frequently takes the form of inverted U-shaped basal trunk scars or cavities. These scars are usually confined to a single (lee?) side of the trees for any given fire. Also evidencing fire are sprout clumps in which the sprouts of individual clumps are widely spaced. In contrast to logging, fires tend to kill stumps so that sprouting is from surrounding roots. Where such sprouting occurs, it points to high fire frequencies in the past since trees in excess of 100 years of age seldom sprout much. Such evidence has a bearing on the identification of primary and old-



growth stands. Contrary to some opinions, however, fires set by indigenous Americans or otherwise were not required to protect Appalachian oak forests from invasion by more shade tolerant species.

Although oaks are fairly resistant to fire—particularly Chestnut Oak with its thick bark ridges—they are not as all-around fire adapted as Shortleaf, Pitch and Table Mountain pines. Examination of these pines reveals multi-layered and hence highly insulated bark. Consequently, although oaks in a burn area may show fire scars and even high mortality, coexisting Pitch Pine and Table Mountain Pine show only blackened lower trunks with no visible damage to living tissues. As a result of this fire resistance, pines may be the oldest and largest trees on some dry sites. Also, since they have serotinous cones and, in the case of Pitch and Shortleaf pines, sprouting ability, they are ever ready to renew themselves should an intense fire occur. By contrast White Pine is not nearly as fire-adapted.⁵

Other Disturbances

Exposed ridges most subject to fire are also most vulnerable to high winds and ice storms which result in the common high elevation forms of orchard type deciduous trees and the one-sided banner forms, particularly of conifers such as pine and spruce. Although large blowdowns are not as common in the Central Appalachians as in boreal forests, wind does sometimes have widespread effects, as in the case of Hurricane Hugo.

Disturbances that involve insects and diseases are, unfortunately, exploited by special interests. An example is the current rash of salvage timber sales attributed to Gypsy Moth defoliation, particularly in the George Washington National Forest, at the leading edge of the southward advance of this insect. The FS makes sporadic vain attempts at suppression. Here I espouse the diametrically opposite view, namely that insects and diseases are a part of normal forest evolution and that they can be accommodated as long as forest tracts are large, healthy, and diverse enough to harbor the seeds of resistance and recolonization. Although the Gypsy Moth, Chestnut Blight and Dutch Elm disease are all particularly virulent in part because of their human vectors, such virulence is not unknown in nature.

In addition to disturbances clearly attributable to well identified insects and diseases is a vaguely defined condition known as "oak decline" which is said to be ravaging the Southern and Central Appalachians. I say "condition" because it is not at all clear that oak decline is a disease within the conventional meaning. It is said to be characterized by symptoms such as chlorosis, limb dieback and epicormic branching, mostly in the red oak group. Forest Service experts have yet to find a solid explanation for the condition and are forced to fall back on a broad spectrum of insects and diseases triggered by such factors as drought and poor site quality (Stark et al. 1989). In his discussion of oak decline in the Southern Appalachians, Zahner (1992) proposed "benign neglect" as a proper curative agent.

He attributed many of the symptoms to normal senescence of comparatively short-lived species such as Scarlet and Black Oak in the process of replacement by longer-lived Chestnut and White Oak. Certainly the public agencies make little effort to find causes of oak decline in past management practices which have brought about changes in soils, moisture regimes, and even forest types over wide areas. As Lucy Braun recognized long ago, many rich mixed mesophyte forests have been degraded through cutting to depauperate and xeric oak-pine stands, consisting mostly of the short-lived species referred to by Zahner. Oak decline may manifest a healing process of reversion to a more complex forest type through succession from simple, excessively oak-rich stands that have resulted from human activities. In many areas where the Forest Service has identified oak decline in the Central Appalachians, they have used a heavy dose of imagination and have failed to distinguish it from normal limb shedding and mortality in a healthy forest.

SUCCESSION AND SECULAR CHANGE

The result of natural and human-induced disturbances is succession, the progressive change of biological habitat from one occupied by pioneering species to some form of "climax" community. In forests this progression is usually from shade intolerant to tolerant species, since many intolerant species are adapted to the high light intensity and degraded soils of forest openings. However many tolerant species also do well in openings, especially if they originate from sprouts, or, like Red Maple, are adapted to harsh conditions. It was once rather naively thought that eastern North American deciduous forests inevitably progressed toward a beech-maple climax, an idea that gained credence chiefly in the Northeast, where this climax is common because of the climate and limited species richness (and where many foresters lived). However, it was subsequently learned that the climax community of the mixed mesophyte forest includes many common intolerant species. Also, as stressed by Lucy Braun, some major forest types, such as oak-chestnut, are *physiographic* climaxes consisting of shade intolerant species like oaks and pines. In all these Eastern forest types, treefalls, fires, blowdowns, and other disturbances are frequent enough to perpetuate intolerant species.

Associated with the great forest migrations after the glacial maximum were, in all probability, corresponding changes in soil types. Evidence comes from studies in glaciated regions in which all soil changes occurred less than 10,000 years ago (Armson 1979). The speed with which such changes can occur was illustrated by Langmaid (1964) who showed that earthworms could obliterate upper horizons of podzol in as little as three years. In their studies of soils in a forest-prairie ecotone in Minnesota, Severson and Arnemann (1973) found that transformation of mesic deciduous to pine-hardwood forest was accompanied by alterations of the soil profile to one meter depth in less than 2000 years. These results lead one to believe that soil adjustments could easily have kept pace with changes in

vegetation type in the Central Appalachians during the last 18,000 years.

Soil transformations, which depend on favorable kinetics in chemical and micro-organic reactions, appear to be far more rapid than secular genetic adjustments since the glacial maximum. Genetic inertia seems to perpetuate certain Pleistocene characters in the flora (Mueller 1990). Such appears to be the case in the persistence of conspicuously thorned trees such as the hawthorns (*Crataegus*) which may have developed thorns as a defense against the Pleistocene browsing megafauna in eastern North America. In support of this conclusion, since the disappearance of this megafauna, virtually the only browser in much of the region has been the White-tailed Deer, a species that easily browses between the large thorns. In the Central Appalachians these thorny ice age holdovers still occupy a great variety of niches including the understory of closed canopy deciduous forests and the most exposed mountain peaks.

Old Growth

Old growth is the touchstone of ecological forestry. Foresters who fail to recognize its importance can only claim to be industrial woodcutters. Zahner (1989) gave the following simple definition: "Old Growth forests are forests having a long uninterrupted period of development." Note that this definition says nothing about the ages of individual trees but says a great deal about their habitat. This definition fits the Central Appalachians well because, while easily identifiable old growth with obviously old, large trees, is scarce, many stands seem undisturbed by humans, and may qualify despite a scarcity of old trees. In many forest types—cove, mixed mesophyte, northern hardwood, spruce montane, and various dry oak forests—large old trees are still being discovered. An old stand was recently found in cutting unit one of the proposed Stillhouse Timber Sale—even though the George Washington National Forest officials had attempted to conceal its existence. However, in the driest oak-chestnut and oak-pine forests on inaccessible ridges we find ambiguity. Many such areas burned frequently in the past. Thus although, except for the loss of chestnut, such stands may be primary and even virgin, they may contain few old trees and so are difficult to distinguish from stands disturbed by humans.

The ages of tree species have considerable significance with respect to their classification by industrial foresters. The US Forest Service regularly twists normal tree mortality data to justify timber sales. They attempt to conceal that, as a healthy forest matures, most, indeed more than 99 percent, of its trees must die before it reaches maturity, to say nothing of old growth. And this mortality is entirely independent of species longevity. Most of this mortality occurs while the forest is still young. Industrial foresters would have us believe that 80-90 year old stands are "decadent," "overmature" or "falling apart" because they contain dead trees. In this distortion they ignore their

own literature (e.g. Fowells 1965) which gives the following commonly attained ages for Eastern forest trees: White Oak 600 years, Northern Red Oak 200-300 years, Black Oak 200 years, Sugar Maple 400 years, American Beech more than 360 years, White pine 450 years and Canadian Hemlock 900 years. These data show that survivors in a healthy maturing forest have the capability of attaining far greater ages and larger sizes than those classified as mature by industrial foresters.

The greatest significance of old growth lies in the now-rare habitat niches it contains. Features such as large standing (frequently hollow) snags, abundant large woody debris, stream debris dams, pit and mound topography, and canopy gaps that result from large tree falls are some of the criteria for old growth. Recently edaphic macropores, large elongated openings in soils due to root decay or burrowing by animals, have been stressed by Martin (1992) in his discussion of old-growth mixed mesophyte forests. Such features combine to form a complex horizontal and vertical structure that can accommodate a great diversity of sensitive forest interior species. Examples include most salamanders, small mammals, neotropical migratory birds, and large raptors like the Coopers Hawk. Old growth also hosts abundant arthropods; some, like the millipedes, striking in appearance, some endemic (Hoffman 1991).

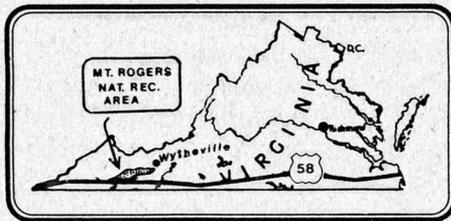
Steve Krichbaum has stressed the importance of the regional setting and area required to sustain old-growth conditions and species (personal communication). Martin (1992) also stressed the need to protect old growth on a watershed scale. In the small "stands" of old growth now being proposed by the Forest Service as adjuncts to their destructive timbering and "wildlife" operations, stochastic effects, from storm, fire, insects or pathogens, will soon profoundly degrade, convert to "all edge," or extirpate these stands.



Human Impacts on the Forest

KILLER ROADS

Virtually all forest destruction begins with roads. Forest roads are the loci of many evils: erosion; sedimentation; drainage interruption and diversion; barrier formation; wildlife entrapment, exclusion, and concentration; and as conduits of alien pests and diseases like Spotted Knapweed and the Gypsy Moth (Noss 1992b). Roads may even capture streams when their eroding beds cross natural channels. The Forest Service and other agencies rely on "water bars" to prevent erosion of the road surface by deflecting the water to the side. However, these structures only add to the impact of roads since they require ditches and disturbed areas in the surrounding forest. In the Central Appalachians, Forest Service road-building has degraded many riparian zones as along the North River in the proposed Shenandoah Wilderness. Roads to the tops of mountain peaks, such as Reddish Knob in the Shenandoah Range



and White Top in the Mt. Rogers National Recreation Area, have sparked recent controversies and a flurry of appeals. Like their

Western counterparts these peaks are "sky islands" that harbor assemblages of rare and disjunct species which the Forest Service is prepared to sacrifice in the name of "driving for pleasure," "scenic vistas" and even "star gazing."

TIMBER MADNESS

While roads fragment and open the forest to development, industrial timber management devastates the mountains in massive blocks. Easily the worst of timbering methods is clearcutting, in which all trees down to seedling size are felled and the forest floor is churned under the tracks of bulldozers. Clearcutting has been the focus of opposition to logging (Fritz 1989). In its response to this threat to its image the Forest Service has, with fanfare, been shifting to shelterwood, seed tree and other generally more benign *sounding* methods. However, all alternative methods now in use fall under the dominant category of *even-age management* and depend on the same heavy equipment abuse as clearcutting even if they allow some trees to stand awhile. All are implicated in recent studies by Duffy and Meier (1992) who have shown that herbaceous understory vegetation probably takes hundreds of years to recover and recolonize in such abused forest. Analogous studies by Petranka

et al. (1993) indicate equally devastating effects on salamanders, with recovery times of 50-70 years for these sensitive animals.⁶ Research by Raymond and Hardy (1991) established that populations of Mole Salamanders are significantly affected by clearcutting even in land adjacent to the clearcut.

Some activists propose selective logging of small groups (group selection) or of individual trees as more benign alternatives to even-age logging. Others (e.g., Noss 1992c) maintain that selective logging may be as damaging as clearcutting because of the larger area impacted for the same volume harvested and the frequency of entry (every ten years or so). I have personally observed that selective logging can have far less impact on the forest floor than clearcutting. However, to attain equal volume this mild damage must be spread over a far larger area. Negative effects of selective logging probably correspond to the short rotations (time between successive harvests) usually employed. Given a minimum rotation period of 150 years and selective logging without entry for this long, many, but not all, detrimental effects would likely vanish. Notwithstanding any conceivable advantage of selective logging, however, serious damage accompanies any type of industrial scale logging in the mountainous sections of the Central Appalachians. Most serious is the inevitable degradation any form of logging brings to the region's fragile, nutrient poor soils and the fragmentation by the many required roads.

Deciduous forests have the capability to regenerate (form anew) by either seeding or by sprouting from the stumps and roots of cut trees. Trees in excess of 100 years in age seldom sprout much, which allows us to determine the recent history of the forest by the presence or absence and type of sprouts. Although logging-induced sprouts are common in agricultural areas such as the Shenandoah Valley and the Piedmont, where immature trees have been cut repeatedly, they are less common in the mountains where large areas are recovering from the turn-of-the-century logging of the primary forest. There are exceptions, of course, particularly in mountain areas that have been repeatedly burned. On average, however, the result of natural regeneration is stands of 80-90 year old single-stemmed trees which contrast starkly with the young stands of multiple sprout clumps in recent clearcuts. The sprouts of clearcuts frequently produce inferior trees, because they originate either high on the stump and thus rot, or low on the stump or from the roots, where they bow outward (Mueller 1992b).

Short rotations and even-age management also cause poor regeneration and forest health due to loss of nutrients associated with cutting and extracting many small trees from the site. Since most nutrients are bound in the cambium, small trees

bear a greater proportion of these nutrients than do large trees, leading to excessive soil depletion. Robinson (1988) discussed this factor, as well as the relatively greater expense per board foot of harvesting small timber.

"Forest Health"

Presumably everyone is for forest health, but this term has a different meaning for the Forest Service than for the rest of us. Whereas the enlightened regard a naturally evolving forest as the epitome of health, benighted industrial loggers focus on the dead and dying components and call for salvage and even pre-salvage logging, the latter a preemptive strike on healthy trees seen as threatened by disease or insects. In the Central Appalachians concern is largely with oak decline and the Gypsy Moth. Playing the roles of first and second violins, "oak decline" is orchestrated as making the forest more susceptible to the moth. The stage is then set for replacement of mature trees with more "vigorous" trees of even-age cuts before the moth strikes. Despite the FS's use of this argument in numerous timber sales in the George Washington NF, we have yet to find evidence of oak decline that goes beyond expected dieback and mortality in a normal, healthy forest (Jones 1992, Krichbaum 1992). Stands singled out as declining in the White Rock Sale, for instance, fail to show even the minimal criteria of chlorosis, limb dieback and epicormic branching. Not surprisingly the Forest Service conducted no quantitative surveys for oak decline in these sale areas; by their own admission, they used only a qualitative "eyeball" determination to identify oak decline.

WILDLIFE MANAGEMENT DISASTERS

The US Forest Service and the state agencies still promote logging as a benefit to wildlife. Not only is even-age logging said to have this side benefit, but expressly designed "wildlife openings" are standard elements of commercial sales these days. In the White Rock Sale extensive new even-age cuts are slated for 2255 acres that already contain more than 35 "wildlife openings" of several acres each as well as extensive recent clearcuts. The area, typical of the more accessible parts of the Central Appalachians, is thus already so fragmented and contains so much edge habitat that, although its forest tracts are connected, it contains no real forest interior habitat. In addition, habitat of many forest species such as salamanders has been reduced through the destruction of the forest floor in these fertilized, mowed, and grass covered openings.

In many areas the abundant edge-loving species—deer, Raccoons, cowbirds, etc.—have had a profound effect on forest interior species. One victim is the Canadian Yew (*Taxus canadensis*), a northern evergreen shrub once common at higher elevations and even on some cool low elevation sites in the Central Appalachians. Today this plant has been virtually extirpated over much of its range by severe deer browsing and survives only on steep rocky sites less accessible to deer. Also many rare, disjunct species are suffering, as for example in the boreal plant communities of Blister Swamp, which lies partly

within the Monongahela National Forest (Mueller 1992c). In this diverse wetland no Balsam Fir between the size of minute seedlings and three inch diameter saplings have escaped the deer; reproduction has halted. Twinflower (*Linnaea borealis*), Alder-leaved Buckthorn (*Rhamnus alnifolia*) and other rare disjuncts are also at risk. A recent inventory (Miller *et al.* 1992) of plants disturbed by White-tailed Deer revealed that more than 40% occur in the Central Appalachians.

Even apparently benign wildlife, such as Ruffed Grouse and Wild Turkey, may have profound negative impacts when promoted as game species. Wildlife openings and constructed waterholes may encourage a local over-abundance of these birds. The result will be intensified foraging for small amphibians and reptiles, including rare salamanders, snakes and lizards. These "game" birds may also eat neotropical migratory bird eggs and young, since many songbirds, especially warblers, are ground nesters. In addition water holes may bring water breeding salamanders that may compete with or prey upon rare woodland salamanders.

PROPOSED ENDANGERED, THREATENED AND SENSITIVE (PETS) SPECIES

Roads, timber sales, wildlife management and general development pressures have resulted in a hefty burden of Threatened, Endangered and sensitive species. Many additional species are proposed for listing as Threatened or Endangered. Sensitive species are "those plant and animal species identified by the Regional Forester for which population viability is a concern, as evidenced by (a) significant current or predicted downward trends in population numbers or density and (b) significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution." (Forest Service Manual 10/26, Amendment 52, Title 2600). Canadian Yew fits this definition better than many designated sensitive plants and in addition is conspicuous and easily identifiable. Yet neither managers of the Monongahela nor of the George Washington National Forest, both of which fall in its historic range, have adopted it as sensitive. In the Monongahela, where the plant was once common, its catastrophic decline in numbers is a source of Forest Service embarrassment.

Most Forest Service lists of sensitive species fail to include a significant number of deep woods species since this would slow down timber sales. Instead these lists are heavy on very rare, but not necessarily declining, components of unusual communities of restricted occurrence. Listing such species as sensitive is prudent, but more common and conspicuous species in decline in representative forest types also need listing.

In some cases PETS species lists are even used to divert attention from threats to biodiversity. Examples are PETS lists prepared by the Monongahela National Forest for the High Top and Douthat Creek Opportunity Areas in which species such as the Cheat Mountain Salamander from other parts of the Forest appear but species of high occurrence and probability, such as Jefferson Salamander, are not mentioned. Such bogus

lists make it easy to eliminate habitat considerations and get on with the timber sales.

GENERAL ABUSES

The failure to protect PETS species in our National Forests and other public lands is grounded in more general derelictions. Primarily is a reluctance to recognize that a forest is more than trees. Consequently no systematic inventories are done of even the most visible elements of diversity, the herbaceous plants, shrubs, and trees other than commercial species. Similarly the lavish concern devoted to "game" species is not accompanied by anything like equal attention to sensitive "non-game" animals. The FS rarely conducts site-specific surveys, as we found on the notorious California Timber Sale (Mueller and Hammond 1990) and many others, and tends to ignore unique habitats if they occur in timber sale areas. When frustrated in their destructive designs, the FS makes every effort to stonewall protection. Thus although Virginians For Wilderness managed to save a rare mountain pond from the Mill Mountain Timber Sale (Mueller 1992a), the Forest Service still fails to recognize the pond in its newly released Forest Plan and again threatens nearby areas with roading and development.

To frustrate the public's right to know, the Forest Service routinely omits monitoring and record keeping of ecosystems under its care as well as its own actions in them. In 1986 the FS carried out a "prescribed burn" on Signal Corps Knob next to a clearcut. When we inquired about this burn, they could find no record and could only date it to the year and season by asking around in the District office. Here in the late 20th century, the Forest Service still keeps some of its records in the oral tradition! Thus any ecological or management information that might conceivably have been gained was lost along with many large high quality Red and Chestnut oaks.

The Forest Service frequently employs faulty logic and science to accomplish its ends. In their analysis of the Big Flattop Opportunity Area in the Jefferson National Forest, Forest Supervisor Joy Berg made the following statement:

During harvesting activities, the various wildlife species that utilize the area would be displaced to adjacent stands or drainages. In my judgment this displacement would be acceptable, short term, and would not result in measurable population reductions or overcrowding within the Opportunity Area.

This reasoning flies in the face of population dynamics. It fails to consider that adjacent like drainages in all probability are already occupied so that overcrowding *would* result. It also fails to take into account the immobility and limited recolonization ability of many herbaceous species and animals such as woodland salamanders, as documented by Duffy and Meier and Petranka *et al.*

In its numerous environmental assessments, the FS often makes the spurious argument that forest fragmentation occurs only in isolated woodlots of agricultural terrain and not in continuous forest interrupted by wildlife openings and even-age

timber cuts. This conclusion has been refuted by David Wilcove and other authorities (Young 1992).

The ecological indictment of the US Forest Service extends to the highest levels. Nothing illustrates this better than the illegal and deceitful responses of the Regional Forester to citizen appeals of timber sales and other actions taken by his agency. In his finding on the Big Flattop Opportunity Area appeals, Region 8 Forester John Alcock refused to consider the impacts of timber sales and road building on PETS species that were not discussed in the scoping process (Bamford and Mueller 1992). This same finding was also applied to the issue of wildlife displacement and crowding resulting from habitat destruction. In addition, Alcock bluntly stated that herbaceous species need not be considered in the environmental assessment. All this is in violation of the Forest Service Manual (Title, 2600). Alcock's decision was so sloppily concocted as to conclude that "no PETS species of arthropods [sic!] are found on the JNF." If we translate to "arthropods," the beetle *Sphaeroderus schauvi* proves him wrong. In a final insult to the public, Alcock threw out all literature references in the appeal on grounds that the actual papers and volumes referred to were not sent to his office in Atlanta, thus ignoring literature easily accessible in his library down the hall. Such arrogance is made generic in most appeals as questions issued by the appellant are simply reworded as answers by the reviewing officer. Thus the chain of mismanagement and corruption is complete from the Chief in Washington to managers of the most remote biologic communities, threatening these communities with bureaucratic extirpation.

EPILOG

There is an inspiration in the rolling blue ridges that triumphs over their glum prognosis. Now and then, discouraged by the juggernaut, our little band of Virginians feels the forest's healing influence even while surveying clearcut wastelands, knowing that paths also lead to groves we might yet save. We think of our vision of the future as proactive, leaping ahead of the bureaucratic destruction we fight each day to the wilderness reserves we know are the only feasible salvation of these mountains.

Knowing that every one can help, we dare reach into the cogs of the machine itself, hoping to find kindred spirits to aid our cause. We appeal to those active and potential moles in the agencies, particularly in the US Forest Service, who may have knowledge of hatched plots of illegal roads, timber sales (or give-aways) or other law circumventions. We'll keep your confidence. Try Virginians For Wilderness, and feel good about the mountains next time you get up.

ACKNOWLEDGEMENTS

I appreciate the association in the field and numerous discussions with Steve Krichbaum, Mike Jones and Gus Mueller. Consultation with Dr. Robert Hunsucker has been most productive, particularly in identifying rare plants of the Folly Mills

wetland. In addition I'm indebted to Steve Krichbaum for calling some literature to my attention, and to Gus Mueller for his able word processing.

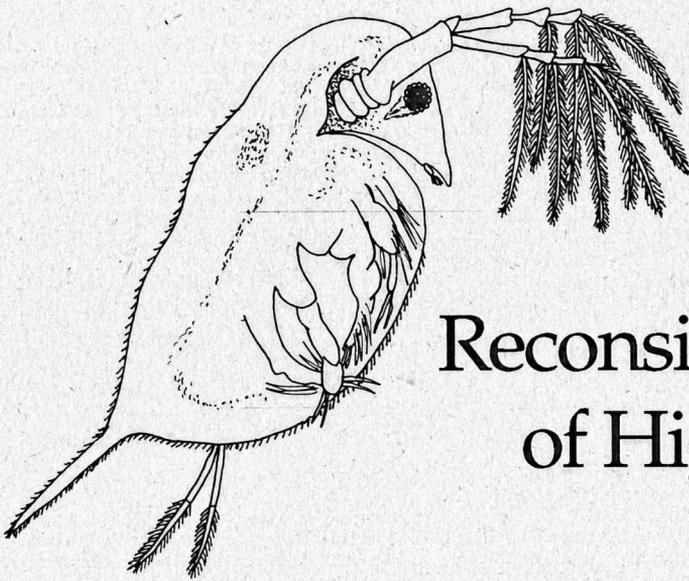
REFERENCES

- Armson, K.A. (1979), *Forest Soils: Properties and Processes*, University of Toronto Press, Toronto, Ontario.
- Bamford, Sherman and R.F. Mueller (1992), *Appeals Before the Regional Forester, Region 8, Big Flattop Opportunity Area, Jefferson National Forest*.
- Braun, E. Lucy (1950), *Deciduous Forests of Eastern North America*, Macmillan, New York.
- Core, Earl L. (1955), *Cranberry Glades Natural Area*, Contribution No. 74 from Herbarium of West Virginia University, *Wildflowers* 31, pages 65-81.
- Davis, Margaret Bryan (1981), "Mid-Holocene Hemlock Decline: Evidence for a Pathogen or Insect Outbreak," page 253 in Robert C. Romans, editor, *Geobotany II*, Plenum Press, New York, New York.
- Delcourt, Paul A and Hazel R. Delcourt (1981), "Vegetation Map for Eastern North America: 40,000 Years Before Present to the Present," pages 123-165, in Robert C. Romans, editor, *Geobotany II*, Plenum Press, New York, New York.
- Dietrich, Richard V. (1970), *Geology and Virginia*, University Press of Virginia, Charlottesville, Virginia.
- Duffy, David Cameron and Albert J. Meier (1992), "Do Appalachian Herbaceous Understories Ever Recover from Clearcutting?" *Conservation Biology* 6 (2), pages 196-201.
- Fowells, H.A. (1965), *Silvics of Forest Trees of the United States, Agriculture Handbook*, 271, US Department of Agriculture, Washington, D.C.
- Fenneman, N.M. (1938), *Physiography of the Eastern United States*. McGraw-Hill, New York, NY.
- Fritz, Edward C. (1989), *Clearcutting, A Crime Against Nature*, Eakin Press, Austin, Texas.
- Graham, Russell and Ernest L. Lundelius, Jr. (1984) "Coevolutionary Disequilibrium and Pleistocene Extinctions," pages 223-249 in Paul S. Martin and Richard G. Klein, editors, *Quaternary Extinctions, A Prehistoric Revolution*, University of Arizona Press, Tucson, Arizona.
- Guthrie, R. Dale (1984), "Mosaics, Allochemicals and Nutrients, an Ecological Theory of Late Pleistocene Megafaunal Extinctions," pages 259-298 in Paul S. Martin and Richard G. Klein, editors, *Quaternary Extinctions, A Prehistoric Revolution*, University of Arizona Press, Tucson, Arizona.
- Hayden, B.P. (1979), *Atlas of Virginia Precipitation*, University Press of Virginia, Charlottesville, Virginia.
- Hoffman, Richard L. (1991), "Millipeda," pages 190-193 in Karen Terwilliger, editor, *Virginia's Endangered Species*, McDonald and Woodward, Blacksburg, Virginia.
- Jones, Mike (1992), *Appeal Before the Regional Forester, Region 8, White Rock Timber Sale, George Washington National Forest*.
- Kitteredge, Joseph (1948), *Forest Influences*, McGraw-Hill, New York, New York.
- Krichbaum, Steven (1992), *Appeal Before the Regional Forester, Region 8, Chip Shot Timber Sale, George Washington National Forest*.
- Langmaid, K.K. (1964), "Some Effects of the Earthworm Invasion in Virgin Podzols," *Canadian Journal of Soil Science* 44, pages 34-37.
- MacArthur, J.W. (1975), "Environmental Fluctuations and Species Diversity," pages 74-80 in M.L. Cody and J.M. Diamond, editors, *Ecology and Evolution of Communities*, Harvard University Press, Cambridge, Massachusetts.
- Martin, William H. (1992), "Characteristics of Old-Growth Mixed Mesophyte Forests," *Natural Areas Journal* 12 (3), pages 127-135.
- Miller, Scott G., Susan P. Bratton and John Hadidian (1992), "Impacts of White-tailed Deer on Endangered and Threatened Vascular Plants," *Natural Areas Journal* 12 (3), pages 67-74.
- Minckler, Leon S. (1974), "Prescribing Silvicultural Systems," *Journal of Forestry* 72 (5).
- Mueller, R.F. and Crickett Hammond (1990), "The California (Virginia) Timber Sale, A Case Study of Mismanagement," *Earth First! Journal* 10 (7), page 9.
- Mueller, R.F. (1990), "Floral Legacies of the Megafauna," *Earth First!*, 10(3), page 23.
- Mueller, R.F. (1991), "Central Appalachian Wilderness In Perspective, The George Washington National Forest," *Wild Earth* 1 (3), pages 62-67.
- Mueller, R.F. (1992a), "Victory on Mill Mountain," *Wild Earth* 2 (1), page 36.
- Mueller, R.F. (1992b), "Appalachian Clearcutters Flunk Silviculture," *Wild Earth* 2 (1), pages 69-70.
- Mueller, R.F. (1992c), "Central Appalachian Wilderness In Perspective, The Monongahela National Forest," *Wild Earth* 2 (3), pages 56-60.
- Mueller, R.F. (1992d), "Forest Service an 'Out-law Agency,'" letter, *News Virginian*, 5-8, Waynesboro, Virginia.
- Mueller, R.F. (1992e), "Roads Threaten World Class Biodiversity Centers," *Paving Moratorium Update*, Issue No. 4, Arcata, California.
- Nature Conservancy, The, West Virginia Field Office (1991), *Characterization and Conservation of Rare Species and Special Habitats of the Eagle Rock and Smoke Hole Opportunity Areas in the Monongahela National Forest*, Charleston, West Virginia.
- Noss, Reed (1992a), "The Wildlands Project Land Conservation Strategy," *Wild Earth Special Issue*, pages 10-25.
- Noss, Reed (1992b), "The Ecological Effects of Roads," *Preserve Appalachian Wilderness*, Special "Obliterate! Revegetate!" Issue, pages 14-25.
- Noss, Reed (1992c), "Ancient Forest Legislation Dialogue, Science Editor's Response," *Wild Earth* 2 (2), page 47.
- Petranka, James W., Matthew E. Eldridge and Katherine E. Haley (1993), "Effects of Timber Harvesting on Southern Appalachian Salamanders," *Conservation Biology* 7 (2) pages 363-370.
- Pielou, E.C. (1991), *After the Ice Age*, University of Chicago Press, Chicago, Illinois.
- Press, Frank and Raymond Siever (1985), *Earth*, W.H. Freeman and Co., New York, New York.
- Raymond, Larry R. and Laurence M. Hardy (1991), "Effects of a Clearcut on a Population of the Mole Salamanders, *Ambystoma talpoideum*, in an Adjacent Unaltered Forest," *Journal of Herpetology* 25 (4), pages 509-512.
- Reifsnnyder, William E. and Howard W. Lull (1965), *Radiant Energy in Relation to Forests*, Technical Bulletin Number 1344, US Department of Agriculture, Forest Service.
- Robinson, Gordon (1988), *The Forest And The Trees, A Guide to Excellent Forestry*, Island Press, Washington, DC, 257 pages.
- Severson, R.C. and H.F. Arnemann (1973), "Soil Characteristics of the Forest-Prairie Ecotone in Northwestern Minnesota," *Soil Science Society of America Proceedings* 37, pages 593-599.
- Starkey, Dale A., Steven W. Oak, and George W. Ryan, Frank H. Tainter, Clair Redmond and H. Daniel Brown (1989), *Evaluation of Oak Decline Areas in the South*, Protection Report R8-PR17, September, 1989, US Forest Service, Southern Region.
- Strausbaugh, P.D. and Earl L. Core (1977), *Flora of West Virginia* (second edition), Seneca Books Inc., Grantsville, West Virginia.
- Wieboldt, Thomas F. (1991), "Shale Barren Rock Cress," pages 108-110 in Karen Terwilliger, editor, *Virginia's Endangered Species*, McDonald and Woodward, Blacksburg, Virginia.
- Young, Buck (1992), Toothless Wonders, Government Programs and Neotropical Migratory Songbirds: A Reply to Bonney, *Wild Earth* 2 (2), page 40.
- Zahner, Robert (1989), "Bringing Old Growth Back to the Southern Appalachians," *Earth First!* 10 (2), pages 18-19.
- Zahner, Robert (1992), "Benign Neglect Management: An Old Model for Restoring Health to the Southern Appalachian National Forests," *Wild Earth* 2 (1), pages 43-46.

ENDNOTES

- ¹ An extreme case is Ice Mountain, West Virginia where a boreal community occurs only 700 feet (214 meters) above sea level (asl) associated with permanent ice collected in a talus slope (Stausbaugh and Core, 1977).
- ² Fruit orchardists know this form to be most stable in bearing heavy loads of fruit.
- ³ This plant is considered rare even on the Allegheny Plateau.
- ⁴ These and a number of other rare plants were identified by Dr. Robert Hunsucker only recently.
- ⁵ I use this term to distinguish such assemblages from mixed forest.
- ⁶ An excellent example of this differential effect of fire may be seen on the mountainside just east of the Hone Quarry Campground in the Dry River Ranger District of the George Washington National Forest.
- ⁷ Many trees also have quite subtle fire adapted or resistant characteristics. These include rock accumulation rings concentric about the tree base that build up by diameter growth, and greatly thickened bark on the lower and hence most fire-exposed sides of leaning trunks.
- ⁸ Pollen data indicate that some pathogen or insect brought about a catastrophic decline in Canadian Hemlock over wide areas of eastern North America about 4800 years ago (Davis 1981).
- ⁹ Such features are present in the stand of large Chestnut and White oaks of the proposed Stillhouse Timber Sale mentioned earlier. In addition a complex fire history is displayed in this stand.
- ¹⁰ Most logging contractors today possess only heavy equipment so they are almost incapable of gentler logging methods.
- ¹¹ Steve Krichbaum points out that the data of Petranka *et al.* do not include the numerous salamanders that die immediately while timber operations are occurring.
- ¹² An example is Butternut (*Juglans cinerea*), a federal C2 species but ignored quite generally in Forest Service actions.

Robert Mueller (Rt.1 Box 250, Staunton, VA 24401) is a retired NASA scientist, naturalist, and leader of Virginians For Wilderness.



Reconsidering Fish Stocking of High Wilderness Lakes

by Michael P. Murray

High elevation lakes are a common feature in western US wilderness. Their aesthetic lure, catching the attention of conservationists, has guided congressional pens in drawing Wilderness boundaries. Indeed, high elevation lakes are among the few ecosystem types that may be adequately represented in our Wilderness system. But representation means little if the ecosystem of concern is not adequately protected. Wilderness designation, perhaps the best chance at retaining wild functioning ecosystems on federal holdings, has not prevented the breakdown of lake ecosystems.

NATURAL HISTORY OF ALPINE LAKES

High elevation lakes support dynamic biotic communities. Highly susceptible to disturbance, their youth and distribution expose them to external threat. Most are the result of recent glacial activity which carved bowl-shaped depressions, called cirques, out of the bedrock at valley heads. About 11,000 years ago, the recession of these glaciers slowly revealed a new mountain habitat. Dotted the rugged landscape were thousands of small isolated bodies of water.

The first life forms to settle these growing puddles were probably aeolian plankton (algae and small invertebrates blown in by wind). These organisms could have provided a nutrient base for such larger lifeforms as water fleas, copepods, roundworms, and bristleworms. Accumulating sediment may have supported rooted plants in some lakes. Predacious insects such as water boatmen and diving beetles could then have colonized the lakes, in turn attracting frogs and salamanders.

Such organisms are common throughout Western high elevation lakes today. Lake habitats do differ, however, generating various compositions of species among different lakes. Controlling factors include lake depth, temperature regime, nutrient content, sun exposure, inlet/outlet configuration, and age. The age factor is clearly illustrated by contemporary active glaciers supporting newly formed bodies of water with very simple biotic communities in mountains such as the Cascades. Conversely, a more developed lake may support a more complex food web such as in Figure 1.

An important distinction between high elevation lakes and those lower is that nearly all high elevation lakes share a natural absence of fish. This is due to several factors: 1) establishment has been hampered by natural barriers to immigration; 2) mountain lake habitat is relatively poor, i.e., low nutrient content, small prey base, short growing season, and; 3) reproduction is low under such conditions. More than 95% of high elevation lakes were historically fishless (Bahls 1992).

Water Flea (Daphnia pulex), driven to extinction in subalpine lake soon after fish introduction; illustration by Martha Robin Murray.

These pristine lakes—nearly 16,000 sparkling gems throughout the high country—became popular destinations for recreationists. Beginning in the 1940s, the West's high elevation lakes were extensively "improved" by introducing trout species. This management practice continues today on a grand scale, usually under the direction of state fish and game agencies.

IMPACTS OF STOCKING

The introduction of fish in high elevation lakes represents the placement of a highly effective alien predator in a vulnerable prey community. Native organisms have not co-evolved with fish, thus lack sufficient defense mechanisms. Severe impacts are beginning to be identified by the few scientists who have studied these lakes.

Researchers studying wilderness lakes of the North Cascades have observed apparent reductions in salamanders (Liss and Larson 1991). Bradford and others (1993) recently discovered populations of Mountain Yellow-legged Frog likely being driven to extinction in Sequoia and Kings Canyon National Park Wilderness. Perhaps most dramatic is the rapid pace at which fish can reduce invertebrates. Reimers (1979) studied a Sierra Nevada lake originally stocked in 1951. Surveys in 1952 revealed that two crustaceans (a water flea and a copepod), an arachnid (water mite) and two insects (a diving beetle and a mayfly) all became extinct during the first year of fish establishment. Other species (water boatmen, caddisflies, and beetles) declined but remained.

This evidence might suggest that fish establishment results in dramatic initial extinctions followed by decreased but sustained presence of alternate prey. In other words, the damage has been done. Is our concern too late to save the native species? For some lakes, this may be so. However, as lake communities exhibit varying structures, impacts will differ; and since very little research has focused on the problem, we are left to postulate.

Prey may exhibit various life stages, with differing physical forms perhaps varying in vulnerability to predation. Environmental factors altering the procession of stages may increase or decrease predation in certain years. Predator populations, too, exhibit varying age structures, and these may translate into varying impacts. Where fish populations are of multiple ages due to successful reproduction, Liss and Larson (1991) suggest greater predation rates caused by higher fish density. Additionally, populations of a single age cohort may progressively prey on larger organisms as the fish cohort grows in body size. In alpine lakes that are especially nutrient-poor, fish do not grow well and might select smaller prey their entire lives.

Other factors affecting fish introduction impacts include abiotic (non-living) habitat parameters. Bradford (1989) found that amphibians living in lakes too shallow for fish escape predation. He also noted that in shallow lakes fish and frogs are more susceptible to winterkill (from oxygen deprivation) than tadpoles.

In short, the pathways of decline and extinction may vary considerably. Due to the many complex factors involved, we can not say with confidence that fish introductions have already caused all the extinctions possible.

VIOLATING WILDERNESS

Several years ago fisheries biologist Peter Bahls began an investigation of the current stocking programs in high elevation lakes (Bahls 1992). He interviewed dozens of agency fishery managers throughout the US West.

He found few wilderness lakes to have ever been surveyed to determine the status of stocked fish populations. Most state fish & game agencies stock high elevation lakes every one to four years. They often use aircraft to get the stock to these remote lakes. Helicopters and airplanes swoop down over target lakes, dropping up to a few thousand young fish into each. The most popular species are Rainbow, Cutthroat, Brook, and Golden Trout. This practice seems to be done with little concern for the environment or the wilderness users it's aiming to please, according to Bahls. As of 1991, no management agency had conducted formal surveys of high country anglers; a few states have cursory information on fish populations in stocked lakes (Bahls 1992).

Bahls declared managers "have little concern...for maintaining representative pristine lakes, and no consideration of the effects of trout stocking on indigenous fauna, aquatic ecosystems, and lakeshore recreational impacts."

Designated Wilderness Areas are currently given little or no spe-

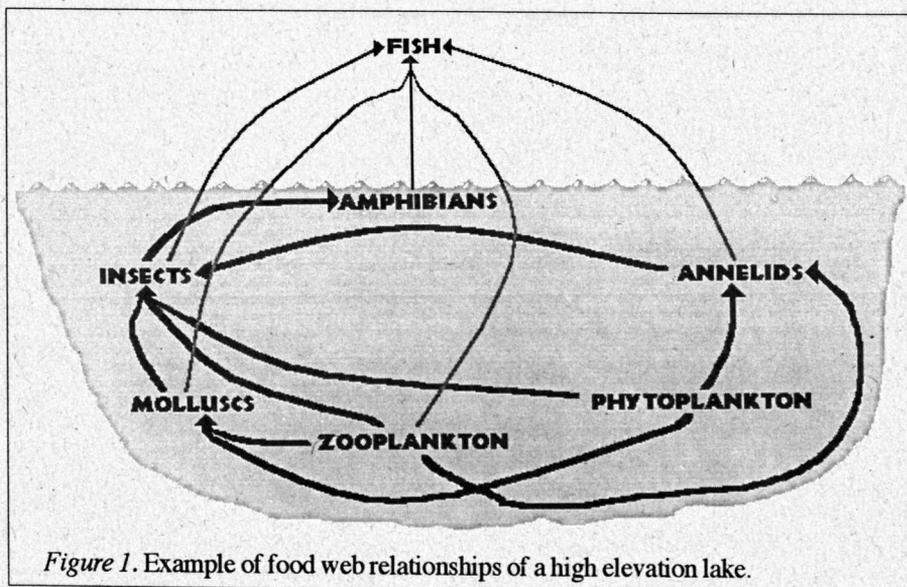


Figure 1. Example of food web relationships of a high elevation lake.

cial protection from this practice. Yet the 1964 Wilderness Act mandates agencies to "preserve natural conditions...with the imprint of man's work substantially unnoticeable." Further, the Forest Service Wilderness Management Handbook (USFS 1986) warns that stocking can only occur "if there is...no appreciable loss of scientific values or adverse effects on wilderness resources."

Clearly, a breach of policy is occurring. It is fueling a quiet, yet extensive debate among Forest Service wilderness managers—generally a group of ecologically concerned individuals, known to be critical of state fish stocking programs. Cooperation between state and federal agencies is virtually nonexistent.

CONCLUDING REMARKS

The stocking of fish in historically fishless lakes is an on-going and extensive abuse of federal Wilderness Areas of the western U.S. The loss of aquatic biodiversity due to stocking is in conflict with federal policies and laws.

To stem the loss of wilderness biodiversity the conservation community needs to make fish stocking an issue. Several approaches could be taken. Regional groups concerned with biodiversity can spearhead opposition to fish stocking in wilderness by adopting Wilderness Areas. Through pressuring local National Forests or Parks to follow their own stated guidelines and the intentions of the Wilderness Act, stocking might be stopped.

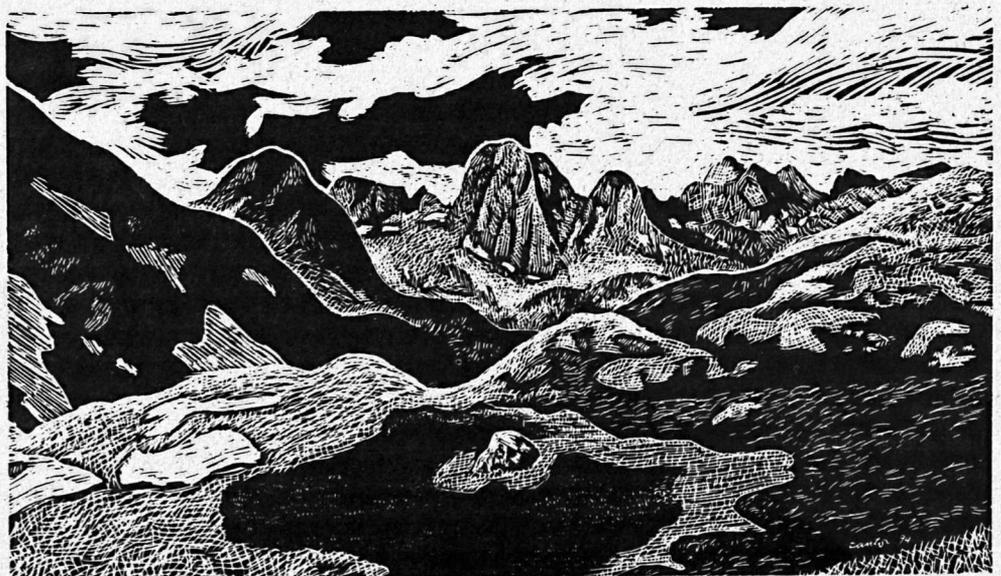
The Moscow Chapter of the Idaho Conservation League (ICL) has taken an initial step by formally presenting concerns to the Bitterroot, Clearwater, and Nez Perce National Forests regarding stocking of the Selway-Bitterroot Wilderness Area. The ICL aims to reclaim wild functioning lake communities from their present status as fish farms.

Moscow ICL offers concerned regional organizations a bibliography of fish stocking impacts and other information upon request. To continue these efforts, Moscow ICL needs funding and legal assistance. To donate or seek help, please write: Idaho Conservation League, Managing for the Preservation of Wilderness Project (MPWP), POB 4031, Moscow, ID 83843.

CITATIONS

- Bahls, P. 1992. The status of fish populations and management of high mountain lakes in the western United States. *Northwest Science*. 66(3):183-193.
- Bradford, D.F. 1989. Allotopic distribution of native frogs and introduced fishes in high Sierra Nevada lakes of California: implication of the negative effect of fish introductions. *Copeia*. 1989(3):775-778.
- Bradford, D.F., F. Tabatabai, and D.M. Graber. 1993. Isolation of remaining populations of the native frog, *Rana muscosa*, by introduced fishes in Sequoia and Kings Canyon National Parks, California. *Conservation Biology*. 7(4):882-888.
- Liss, W.J. and G.L. Larson. 1991. Ecological effects of stocked trout on North Cascades naturally fishless lakes. *Park Science*. 11(3):22-23.
- Reimers, N. 1979. A history of a stunted brook trout population in an alpine lake: a lifespan of 24 years. *California Fish and Game*. 65(4):196-215.
- USFS. 1986. Wilderness management handbook. Washington, D.C.: U.S. Department of Agriculture, Forest Service (USFS).

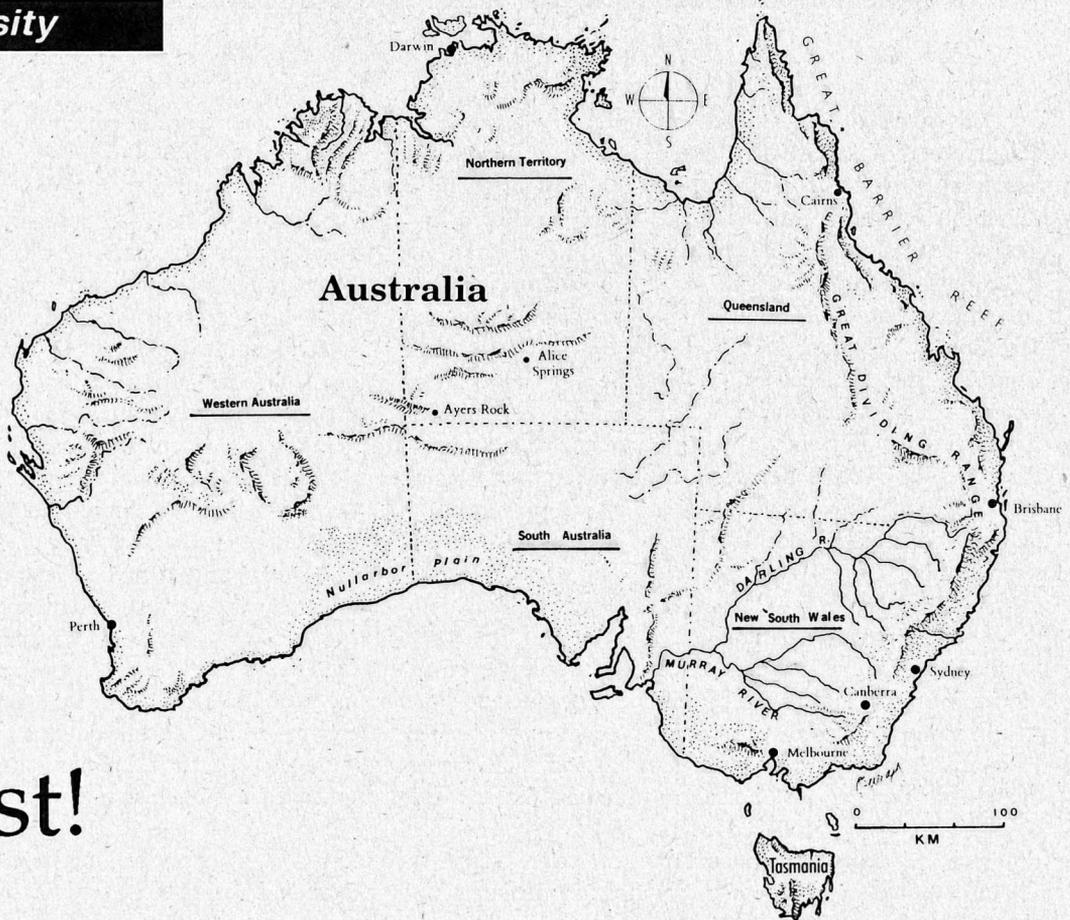
Michael Murray is a Graduate Research Assistant in the Department of Range Resources at the University of Idaho, Moscow. He earned an M.S. in subalpine ecology at Humboldt State University, Arcata, CA, and is now working on a Ph.D., studying the relationships between Whitebark Pine, fire suppression and small wilderness areas.



W
o
m
b
a
t
s

Bat Last!

by Faith Walker



Here in the South Australian bush amongst roo, emu, and homebrew, I am prying into the social lives and habitat constraints of a creature known as the Southern Hairy-nosed Wombat (*Lasiorhinus latifrons*). This marsupial is in the family Vombatidae, which comprises three species, one being among the most endangered mammals in the world. Hairy-nosed wombats are quite unlike their closest relative, the Koala: wombats are 40 pound, semi-fossorial inhabitants of semi-arid areas that look somewhat like a cross between a hamster, a javalina, and a bulldozer. Curiously, they form clusters of burrows, called warrens, despite active avoidance of each other above ground and an apparent lack of prehistoric predator pressure. The Southern Hairy-nosed Wombat has a discontinuous range across southern South Australia; and according to satellite imagery (which can detect warrens) and surveys, is not threatened. The Northern Hairy-nosed Wombat (*Lasiorhinus krefftii*), however, is limited to one population of 70 individuals in Epping Forest, Queensland. This is up from 20-30 individuals in 1981. Currently a hands-off conservation effort is under way to exclude cattle, monitor the population by running genetic profiles on single hairs left at burrow entrances, and understand the feeding ecology and population biology of the species. In the future an effort may be made to establish a second population nearby (*Recovery plan for the northern hairy-nosed wombat*, 1991). However, little is known of the basic biology of *Lasiorhinus*, which is where I hope to shed some light.

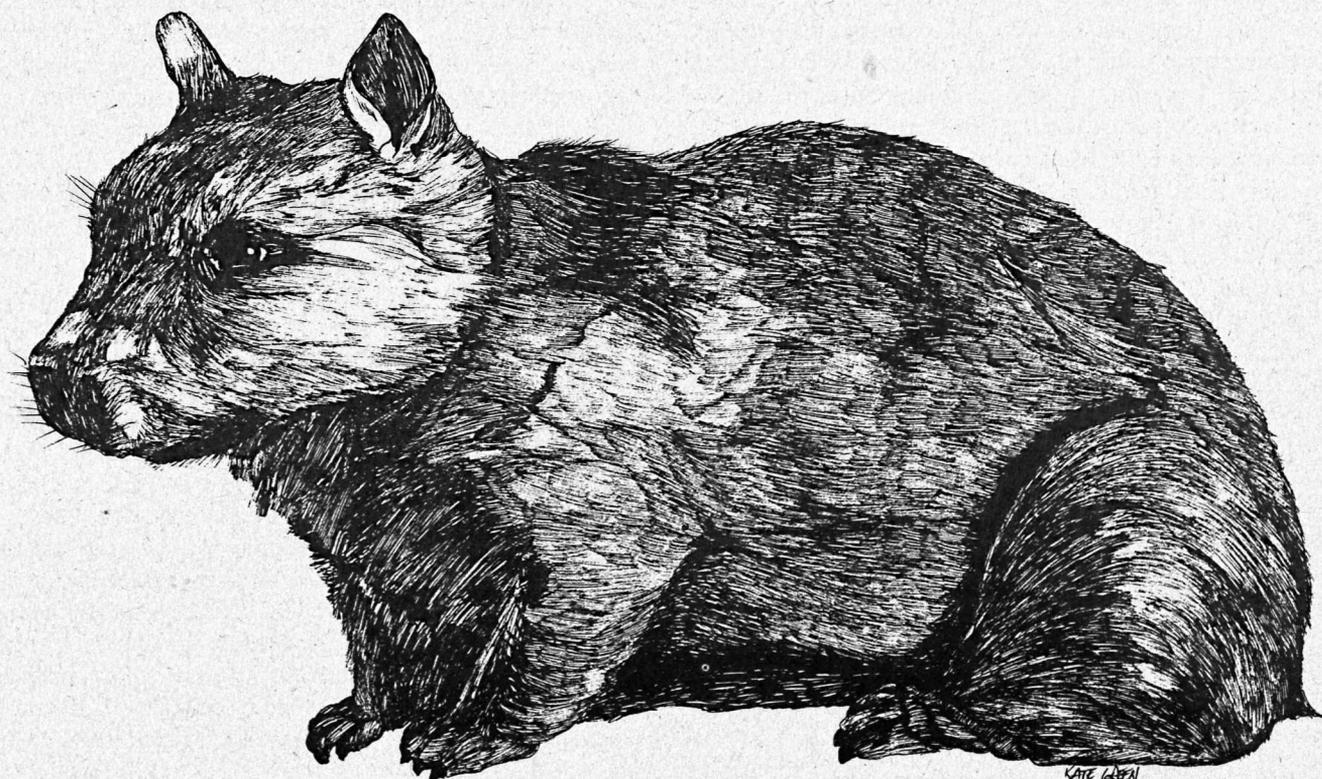
Speaking of light, daytime is not when you'll see the wombat. Like typical marsupials, they are nocturnal—and extremely elusive. (So elusive, that I fancy them to be elves in their multi-tiered underground playgrounds.) Their predators these days are humans and dingoes. Aboriginal people hunt them for food, and farmers and ranchers knock them off to placate wombat nightmares. Wombats allegedly bulldoze their way through fences and build leg-breaking booby traps for cattle. (All this is hearsay. Each wombat acts individually, is not responsible for the actions of others, and is not affiliated with any environmental group. Future wombat affinity groups may, however, hang banners reading “Wombats Bat Last!”).

The pressures facing hairy-nosed wombats are typical of those facing marsupials of semi-arid and arid Australia on a broad scale, and thus provide a good introduction to the extinction crisis down under. In South Australia 80% of native Murray mallee forest has been replaced by farms and the remaining 20% has been periodically grazed (Menkhorst and Bennett 1990). Three hundred and forty-seven native plant taxa in this habitat type are rare or threatened and 38 species are extinct. Thirty-six percent of Australian landbirds live at least seasonally in South Australian mallee habitats, which harbor Australia's second highest concentration of rare and endangered avifauna. Eleven species are extinct and 36 are of “high conservation significance” (Menkhorst and Bennett 1990). Of the 37 mammalian species recorded in mallee at European settlement, 14 are now absent, 10 of which are presumed extinct (Bennett et al. 1989).

This South Australian trend is mirrored on a larger scale. Ten percent of Australia was forested and 23% wooded when Europeans arrived 200 years ago. Now 50% of all forests, 75% of rainforests, and 35% of woodlands have been cleared. Tax incentives for clearing were removed only in 1983. Sheep and cattle grazing are the main land use for over 60% of Australia, amounting to around 50 million sheep and 15 million cattle. Two-thirds of Australia is arid and semi-arid; half of this land is grazed. Unlike the economically (and ecologically) disastrous grazing practices on public lands in the western U.S. (which provide only about 2% of forage for American beef; Jacobs 1991), ranching in arid and semi-arid Australia generates 20% of the annual meat yield. Soil alterations caused by land-use practices include salinization, topsoil loss through wind erosion, nutrient depletion, acidification, and soil structural decline. One-fifth of Australia suffers from human-induced soil salinity, which in some areas is forcing farmers and ranchers to abandon their land or leases. The consistent flow of people from rural to urban areas is due to land degradation.

In addition to English ideas of land-use, Europeans sailed with alien flora and fauna on their ark. Mammalian exotics include pig, buffalo, goat, horse, camel, rabbit, fox, cat, and dog. The 12 rabbits introduced for sport in 1859 by an English gentleman now span the continent (they breed like humans!). The effect of feeding competition by rabbits on marsupial herbivores is as detrimental as that of stock grazing. Also, because marsupials evolved largely in the absence of predators, introduced carnivores have had a heyday munching natives. Less obvious but equally detrimental are introduced plant species, which are significantly altering native habitat in many areas.

To understand the pattern of extinction in arid Australia it is necessary to examine the region's ecology and the conflict between ecosystem characteristics and European settlement. Arid Australia differs from North American deserts in many respects. Mammalian diversity and abundance is lower, whereas that of reptiles and birds is higher. Invertebrate species, many of which are social insects, outnumber vertebrates by far. This is due to a suite of ecological parameters. Perhaps most fundamental, the length and severity of drought is unpredictable. Spacial and temporal variability in rainfall is pronounced as compared to other deserts worldwide. For example, 80% of the median annual rainfall in Alice Springs fell on one March day in 1988 (Smith and Morton 1990). Sporadic big rains are key to the structuring of soils and plant communities. The land of arid Australia is ancient (up to 500 million years old) and very poor in nutrients, and heavy and light rains lead to a high degree of soil sorting. Levels of phosphorous and nitrogen are less than half those of other deserts around the globe and these nutrients tend to be in the upper five to ten centimeters of soil. This contrasts with the much younger North American deserts where nutrients are deeper and thus more protected against erosion. The result in arid Australia is abrupt changes in soil type. Run-on areas are high and run-off areas low in nutrients and soil moisture content. The flatness of the landscape, which appears strikingly homogenous to human observers, actually contributes to the fine mosaic of differentiated soil and, in turn, vegetation types. A wide variety of plant life-history strategies deal with the random rainfall schedule and soil moisture extremes. (Succulent tissue is not one of them, as this requires predictable rehydration.) In general, areas of



low nutrient levels and little water are dominated by long-lived perennials. Shorter-lived ephemeral species predominate only in areas of high nutrient levels and continuous water, and only following disturbance such as fire.

In contrast to many other deserts, here plants are usually more constrained by nutrient availability than by water availability and consequent ability to manufacture carbohydrates through photosynthesis. Therefore, many plants produce fleshy fruits, extra-floral nectaries, and arils, which are loaded with energy. Because carbohydrate production is relatively cheap, many areas in arid Australia have high perennial biomasses, but slow decomposition due to the low nitrogen content of soils. Thus, fire is important for biodiversity: It makes room for ephemeral species by killing perennials and freeing their nutrients. Although rainfall is unpredictable, inexpensive carbohydrate manufacturing means that perennial plants have regular phenologies and continuous growth, leading to consumer stability. Populations of consumers are more robust than one would predict based solely on rainfall.

Because arid zone herbivores obtain their water, energy, and nutrients from food, plants, not water, are key to survivorship. Low nutrient levels in soils yield plants high in chemical and structural defenses, such as tannins and lignin, which are difficult for herbivores to digest. Although plant biomass is high, vegetation here is far poorer nutritionally than that of other deserts. This contributes to the low diversity and abundance of mammalian herbivores. Herbivorous mammals in poor soils are either opportunistic, foraging for nutritious ephemeral plants, or they are persistent, foraging for poorly nutritious perennial plants in bulk.

So, enter the termite. Infertile areas abound with these colonial insects. Much of the high plant biomass goes straightway into the detritivorous pathway. Termites have gut symbionts (bacteria) able to live off forage low in nitrogen. The diversity of social insects in these habitats is among the richest in the world (Crawford 1981). Secondary consumers prey on termites and by necessity have low metabolic rates. Thus, infertile areas have a diversity of lizards and termite-eating spiders but not birds or mammals. In more nutrient rich regions birds and mammals are more prevalent. Australia's areas with relatively rich and continuous production (e.g., riparian)—which are now favored by the rabbit and cow—have or did have diverse and abundant mammalian herbivores.

It is now easier to understand how European activities interrupted the ecological functioning of arid Australia. Thin topsoil made it particularly prone to erosion. Eroded regions can no longer support the plant communities they had prior to pastoralism. The absence of vegetation, and thus transpiration, results in raising of the water table. Salts are carried to the surface, resulting in soil salinity. The fine mosaic of plant communities becomes more homogenous due to altered fire regimes and grazing by introduced herbivores. The small burns that were employed by Aborigines have been replaced by large and infrequent lightning-caused fires. This inhibits ephemeral plant

establishment and nutrient-cycling, and is detrimental to animal species that depend on dense perennial vegetation for cover and ephemeral species for forage. In pre-European times local extinction of native mammals was likely common due to severe drought, yet so was recolonization of suitable habitat after drought. Presently suitable habitat patches are few, due to human land-use, and what remain are recolonized following drought by stock and rabbits *en masse*. After each severe drought, fewer habitat patches with native species survive because the distance between patches is greater than dispersal capabilities and because suitable patches are overrun by invaders (Morton 1990). Mammals suffered greater extinctions and range contractions following European settlement than did other arid zone vertebrates. Species inhabiting arid Australia, particularly medium-sized (0.35-5.5 kg) herbivorous mammals, were impacted more heavily than species in mesic environments. This was primarily due to habitat alteration by introduced herbivores, and was augmented by altered fire patterns, introduced predators, and drought (Morton 1990).

What next for arid Australia, Land of the Ant, of much country and few humans? Some vigorous efforts are belatedly being made in Australia to control the exotics—including government-run killing programs and the Anti-Rabbit Research Foundation (promoting "Bilbies not Bunnies"). Land reform is a different matter, and is in its infancy (Morton 1993). Pastoralists are by necessity becoming interested in doing things differently, and Landcare groups are sprouting up across the country. However, in Australia as in the United States, changes in worldview are fundamental for large-scale landscape recovery.

May the wombat remain dweller of Castles-in-the-Earth and with secretive deviltry outlast the human primate!

LITERATURE CITED

- Bennett, A. F., L. M. Lumsden, and P. W. Menkhorst. 1989. Mammals of mallee vegetation in south-eastern Australia. IN: *Mediterranean Landscapes in Australia: Mallee Ecosystems*. J. C. Noble and R. A. Bradstock (eds.). CSIRO, Melbourne. pp. 191-220.
- Crawford, C. S. 1981. *Biology of Desert Invertebrates*. Springer-Verlag, New York.
- Jacobs, L. 1991. *Waste of the West: Public Lands Ranching*. Jacobs Publ., Inc.
- Menkhorst, P. W. and A. F. Bennett. 1990. Vertebrate fauna of mallee vegetation in southern Australia. IN: *The Mallee Lands*. J. C. Noble, P. J. Joss, and G. K. Jones (eds.). pp. 39-53.
- Morton, S. R. 1990. The impact of European settlement on the vertebrate animals of arid Australia: a conceptual model. *Proc. Ecol. Soc. Aust.* 16:201-213.
- Morton, S. R. 1993. Changing conservation perceptions in the Australian rangelands. *Rangel. J.* 15:145-153.
- Recovery plan for the northern hairy-nosed wombat. 1991. ANPWS Endangered Species Programme, Queensland Dept. of Environ. and Heritage.
- Stafford Smith, D. M. and S. R. Morton. 1990. A framework for the ecology of arid Australia. *J. Arid Environ.* 18: 255-278.

Faith Walker (POB 2, Viola, ID 83872) continues to boomerang between her love in life, the Colorado Plateau, and spots in Africa and Australia where she hangs out with elusive mammals. In her spare time she is a doctoral student at the University of Idaho.

Southern Utah Wilderness Alliance

1471 South 1100 East, Salt Lake City, UT 84105

by Mike Matz

Thronges of tourists in their homes-on-wheels and off-road vehicles invade southern Utah each spring and fall. The Bureau of Land Management, lord over 40 percent of Utah's land mass, turns its fiefdom over to the grazing and mining barons. The Forest Service makes the same kind of offer to a voracious timber industry. County governments bulldoze roads across wilderness, and swelling communities plan to dam and divert the last of the state's free-flowing rivers.

Canyon country is under attack. The Southern Utah Wilderness Alliance (SUWA) aims to stop the mauling, and our successes have the bad guys—in the governor's mansion and the government agencies—more than a little riled. They don't like us, and don't invite us to the parties where they try to reach consensus on how to cut up the pie. They call us radicals, and whip up local sentiment against us.

In the 11 years of our existence, a SUWA employee has been hung in effigy, an activist has had his home shot at, and the cafe in Escalante has sold T-shirts and bumper stickers sporting the slogan "SUWA SUCKS." That we are reviled is, we figure, a good measure of our effectiveness at defending the land and the wildlife that depends upon it.

We have a lot of help. Our 10,000 members nationally are some of the most dedicated letter-writers and ardent meeting-attenders a grassroots advocacy group could hope to have. Our members' activism, coupled with aggressive legal actions, keep the federal and state agencies from getting away with what they ordinarily do under the guise traditionally of "multiple use" and now of "ecosystem management."

SUWA's mission is the preservation of wild lands at the heart of the Colorado Plateau through uncompromising wilderness advocacy. We direct our activities toward ensuring that all wilderness in southern Utah remains viable for eventual designation under the 1964 Wilderness Act. Along with other members of the Utah Wilderness Coalition, we formulated a 5.7-million-acre proposal* that is now embodied in H.R. 1500, legislation sponsored by Representative Maurice Hinchey of New York.

*Wilderness designation is
essential to protect the
biological diversity of the
Colorado Plateau.*



*Write SUWA for a detailed map of the Utah Wilderness Coalition proposal. Send a donation if you can.

Threats to this natural heritage and its diversity of desert species are numerous in part because a sham inventory of potential wilderness conducted by the Bureau of Land Management left many suitable lands at risk. In its 22 million acres, BLM could only find 3.2 million acres to include in Wilderness Study Areas under the Section 603 process required by the Federal Land Policy Management Act (and it only arrived at that figure after several successful appeals by wilderness proponents). The agency then decided only 1.9 million acres were worth recommending to Congress for designation. Any spot with a hint of development potential for oil and gas or coal was dropped. Other places were excluded because of subjective biases, such as "lacking outstanding opportunities for solitude" or "without unique characteristics"—often after only whizzing over the area in a helicopter.

SUWA "has been conducting for several years a major legal campaign to limit energy development in southern Utah, particularly in or near wilderness candidate areas," as *Public Lands News* has reported. We are now working to block a proposed coal mine on top of the majestic Kaiparowits Plateau. We challenge every permit for oil and gas drilling in both Wilderness Study Areas and areas proposed in H.R. 1500, so often prevailing that now BLM omits from its leasing schedule any H.R. 1500 areas.

We have been at the forefront of the battle with the Interior Department over regulations it proposes for managing grazing practices on public lands. We will likewise battle Interior Department over its regulations concerning road right-of-ways across public lands asserted by the state and counties under Revised Statute 2477, an antiquated law signed by President Ulysses Grant.

Our activities extend beyond the red rock country of canyons and plateaus to the forest lands under assault by the Forest Service. Because of a woefully small Forest Service Utah Wilderness bill passed in 1984, less than 80,000 acres is protected from timber sales. The Forest Service finds any excuse it can to log more timber; the latest is to save the forests from spruce bark beetles by cutting the trees down. The Forest Service plans to slice its way through the Dixie National Forest on the Aquarius Plateau and on Boulder Mountain above the Escalante River with a network of roads for timber sales which will disrupt corridors for wildlife movement from winter to summer ranges. We are also badgering the Forest Service to include several additional rivers in its upcoming round of Wild and Scenic studies. These rivers could also provide corridors for wildlife and protection for endangered species, if protected from

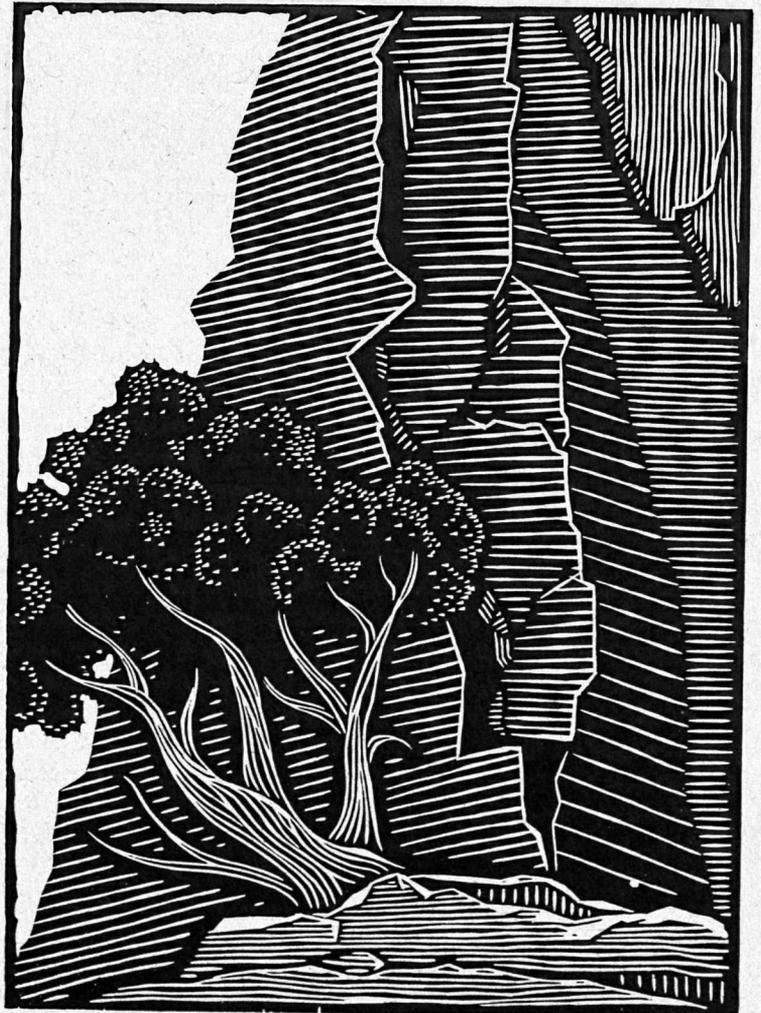
the myriad dams county water conservancies would like to see built.

Waging these battles is a small and underpaid but extraordinarily committed and capable staff in three offices. Our issues director, one staff attorney, and a rivers coordinator work in Salt Lake City; another staff attorney holds down the fort in southern Utah at Moab; and we have a representative working in Washington, DC. For the past several months a roving staffer has taken a slide presentation around to targeted districts to drum up national support for our Wilderness legislation.

H.R. 1500 is the focus of our efforts for one very important reason: Wilderness designation is essential to protect the biological diversity of the Colorado Plateau. Utah ranks last among Western states in the number of acres of designated Wilderness—Minnesota and Florida have more designated Wilderness despite fewer acres under Federal management—and Utah wildlands need all the defense we can muster.

Readers who want to join the battles to protect the integrity of the canyons ecosystem on the Colorado Plateau can subscribe to SUWA's quarterly newsletter by becoming a member. Write SUWA, 1471 South 1100 East, Salt Lake City, UT 84105.

Mike Matz is Executive Director of SUWA. He was formerly public lands representative for the Sierra Club in Washington, DC.



Using General Land Office Survey Notes in Ecosystem Mapping

An Example from Mulligan Creek, Marquette County, Michigan

by Douglas R. Cornett

INTRODUCTION

Historical accounts of native vegetation are useful in establishing baseline information for ecosystem mapping and study (Noss 1985). The General Land Office (GLO) Survey notes provide an early record of the North American landscape as it appeared at the time of European settlement. The GLO notes represent the first systematic record of the physical characters of an area, listing features such as tree species composition, presence of grasslands, type of terrain, geology, water quality, and other information deemed necessary to facilitate white settlement.

Ecologists have used the GLO notes for decades in ecosystem study, though the information has limitations. Bourdo (1956), addresses possible bias in the species of trees the surveyor blazed (e.g., beech might be favored over hemlock because its smooth bark was easy to blaze with a hatchet) and also notes that fraud occurred in some of the surveys conducted. Noss (1985), cautions against relying too much on any single method of reconstructing pre-European vegetation, and advocates using all sources of knowledge available. Nonetheless, GLO notes are often the best and sometimes only source of information available to the researcher.

The survey notes have been used in various ecosystem studies in Wisconsin and Michigan, including research on forest composition, occurrence of native grasslands, and the transition of grasslands to forested ecosystems. Curtis (1959), in the definitive work *Vegetation of Wisconsin*, reconstructed the original vegetation of Wisconsin as it appeared at the time of European settlement through the use of the survey notes and systematic sampling of the vegetation. The use of the land survey records in forest research is discussed at length by Bourdo (1956). Stearns (1949) compared the composition of virgin northern hardwood forest fragments with the survey records in a northern Wisconsin study. The edge of the range of beech forests in eastern Wisconsin was examined and compared with the Land Office surveys in a phytosociological study (Ward 1956). Nowacki et al. (1990) used original survey records in a study of the composition and development of Northern Red Oak forests in north-central Wisconsin.

In North America, native ecosystems and changes in those ecosystems can be better understood and studied by establishing baseline data of vegetative patterns that occurred at the time of European settlement.

Changes in the composition of "oak openings" and succession of these openings to forest, due to fire suppression and other factors, were studied by Cottam (1949) along the prairie-forest border in southwestern Wisconsin. Recently, the Hiawatha National Forest, in the eastern Upper Peninsula of Michigan, has used the survey notes to relocate Jack Pine savannah, for the purpose of ecosystem restoration utilizing prescribed fire, in the Raco Plains (USFS 1992) and Rapid River area. The Michigan Department of Natural Resources has undertaken restoration of the Shakey Lakes oak-pine savannah in Menominee County, Michigan through the use of prescribed fire (MDNR 1991). The Shakey Lakes savannah is believed to be the largest oak-pine savannah ecosystem left in the United States. Use of the original survey records has been instrumental in delineating the extent of this savannah ecosystem (D. Henson pers. comm.).

The Mulligan Creek area in Michigan's Upper Peninsula contains scattered fragments of original forest, has a low density of roads, and provides a continuous canopy cover of climax forest associations. Also, the abrupt changes in elevation and unique pre-Cambrian geology of the area provide many microhabitats indicative of rare plant occurrences. These attributes, coupled with the close proximity of the Cyrus McCormick Wilderness Area, make the Mulligan Creek area an excellent candidate for natural area designation. "Corridors" connecting these two "core" areas with the Huron Mountain Club to the north, the Craig Lake State Park and Sturgeon River Gorge Wilderness Area to the west, and the Little Presque Isle tract to the east, would encompass a variety of habitats needed for preservation of the biological integrity of the region (Cornett 1993, see Noss 1990, 1992 for discussion on nature reserve design).

I recently examined the General Land Office survey

records for portions of three townships in northern Marquette County (T49N R27W, T49N R28W and T50N R28W) that encompass much of the Mulligan Creek and Clark Creek watersheds and a portion of the Yellow Dog River system (Wood 1852a, 1852b, 1854). I sought to determine the original vegetation composition from the survey records and the Marquette County Soils Survey (1959).

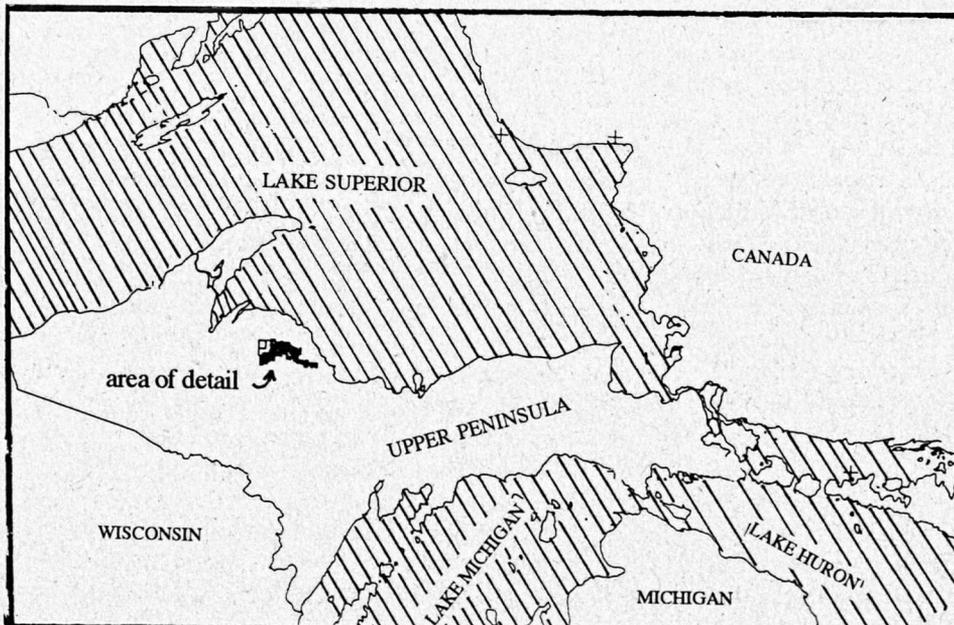
STUDY AREA

Mulligan Creek is located in northern Marquette County, Michigan, approximately 25 kilometers northwest of the city of Marquette. Two major river systems, the Yellow Dog and Dead Rivers, flow through the region. Two second order streams, Clark and Mulligan Creeks, flow south to the Dead River, draining much of the area.

Glacial sandy outwash plains predominate the low-lying areas through which the Mulligan and Clark creeks flow. The Yellow Dog Plains, another glacial sandy outwash, is found in the northern part of the study area, bordered to the south by the Yellow Dog River. Escarpments tower 100 meters over the Mulligan and Clark creeks, and have thus far been an effective barrier to human development.

METHODS

I examined General Land Office survey notes at the Marquette County Clerks Office in Marquette, and transcribed portions of the notes concerning vegetation and major landscape features for reference. A Mylar overlay was placed over USGS topographic maps for the Silver Lake Basin and Negaunee NW quadrangles. Tree species recorded in the survey notes were plotted on the overlay along the township and section lines and charted according to species and diameter class. Soil types were also mapped on the overlay.



RESULTS

Twenty-nine sections, or 18,560 acres (approximately 7454 hectares), were examined to determine composition of the vegetation at the time the surveys were conducted, ca. 1850. Twenty-two species of trees and shrubs were recorded. The most common species were Sugar Maple, spruce, Northern White-cedar, Yellow Birch, Balsam Fir, and Eastern White Pine.

The hemlock-northern hardwoods association was the major forest type in the study area. This covered most of the upland area and is found mainly within the Vilas-Rock Knob soil association. Sugar Maple (*Acer saccharum*) and Yellow Birch (*Betula lutea*) were the most abundant tree species in the hemlock-hardwood stands. Eastern Hemlock (*Tsuga canadensis*) occurred only 18 times on the section lines but was listed in the general descriptions found in the notes as being a major component of the upland forests. In the eastern section of the study area, American Beech (*Fagus grandifolia*) frequently occurred. Beech associations in the area are a component of a disjunct population at the western edge of its range in the Upper Peninsula.

The spruce-fir association was another major forest type found both in the upland areas and at the edge of the sandy outwash plains. Most of the upland area has the Vilas-Rock Knob soil association, while the outwash areas are of the Rubicon-Omega association. The majority of the spruce listed in the notes occur on the drier soils and were probably White Spruce (*Picea glauca*), although Black Spruce (*Picea mariana*) would be expected to occur on the wetter sites.

Pine associations occurred most commonly on the outwash plains where Jack Pine (*Pinus banksiana*) dominated the Rubicon-Omega soils. White Pine (*Pinus strobus*) and Red Pine (*Pinus resinosa*) occurred at the edges of the outwash plains on the more fertile sites. Also White and Red Pine occurred frequently on south facing slopes and escarpments. White Pine was a prominent component of the upland forests, with individual trees scattered throughout the spruce-fir and hemlock-hardwoods associations.

Northern White-cedar (*Thuja occidentalis*) was also common and occupied a variety of habitats. It was found on all soils except the Rubicon-Omega association, which is the driest and sandiest of the soils in the area. Cedar occurred as a dominant species in lowland areas with muck soils and was also common in the upland forest.

Red Maple (*Acer rubrum*) occurred most often in the upland forest and was also present in wet

habitats. Early successional forest was found only at the southern line of sections 13 and 14 in T49N R28W, with White Birch (*Betula papperifera*), aspens (*Populus* spp.) and White Pine dominating. The only occurrence of fire noted for the study area was in the southern portion of section 14 and might account for the early successional species being dominant.

DISCUSSION

Forest ecosystems of the Upper Peninsula common at the time of European settlement included the hemlock-northern hardwoods, 45%; spruce-fir, 25%; conifer swamp, 12%; and pine, 12%. The hardwood forests were a mixture of Sugar Maple, Eastern Hemlock, American Elm (*Ulmus americana*), American Basswood (*Tilia americana*) and American Beech, with occasional small islands of White Pine occurring. The major components of the spruce-fir forest were Balsam Fir, White Spruce, Northern White-cedar, Red Maple, poplars (*Populus* spp.), with Eastern Hemlock, Tamarack (*Larix laricina*), pines, Yellow Birch and American Elm occurring as minor components. The conifer swamp forests were made up largely of Black Spruce, Tamarack and white-cedar occurring on peaty soils. The pine forests were found on sandy soils and consisted of White Pine, Red Pine and Jack Pine (Cunningham and White 1941).

Composition of the forest in the Upper Peninsula has been radically altered from its pre-European state by logging over the last century. The hemlock component of selectively managed hardwood stands is being rapidly depleted and is not being regenerated. White-cedar is having problems with regeneration, and along with hemlock, is being over-browsed by deer (Alverson et al. 1988). Yellow Birch is also showing a marked decline in abundance (G. Erdman 1993 pers. comm.). Sugar Maple has become the dominant species in many selectively managed forests.

Clearcutting has profoundly affected the forest. Many clearcut areas have regenerated to aspen and White Birch. The stands converted to these species earlier in the century are now being clearcut again. Hardwood stands that have been high-graded several times are now being clearcut, in response to the degradation that occurs with each successive thinning. White, Red and Jack Pine forests are also being clearcut. These forests are often replanted to pine monocultures or are allowed to succeed to early successional types such as aspen. Spruce-fir forests are in a marked state of decline due largely to salvage efforts aimed at Spruce Budworm (*Choristoneura fumiferana*) infestations. The White Spruce of the spruce-fir association does not regenerate well after clearcutting operations.

CONCLUSION

This study was an attempt to create a qualitative description of the Mulligan Creek area and to provide a data base for future studies comparing present vegetation with that of the past. A quantitative assessment of the area was not within the scope of this study because of the small sample size. Grass-

lands and tree species such as elm, basswood and aspen were sparsely distributed across the study area and could not be accurately assessed quantitatively. Expanding upon the existing study to incorporate more samples of ecosystems and species that are currently under-represented would provide a better baseline for future work. Also, the soil survey used for this study was insufficient in comparing tree species composition to soil type. Marquette County Soil Survey is currently conducting a more comprehensive examination of soils in the area, and results should soon be available.

The human-caused destruction and alteration of native forests, grasslands and wetlands of the planet is occurring at a rate never before witnessed. Many species have become extinct and others are faced with certain extinction because of current human land use patterns. Preservation and restoration of native ecosystems is perhaps the only way that most sensitive species will be retained within the landscape. In North America, native ecosystems and changes in those ecosystems can be better understood and studied by establishing baseline data of vegetative patterns that occurred at the time of European settlement. General Land Office survey notes and other historical records can provide some of the information needed to piece together the past. **WERE**

LITERATURE CITED

- Alverson, W.S., D.M. Waller and S.L. Solheim. 1988. Forests too deer: edge effects in northern Wisconsin. *Conservation Biology* 2(4): 348-59.
- Bourdo, E.A. Jr. 1956. A review of the General Land Office Survey and of its use in quantitative studies of former forests. *Ecology* 37:754-768.
- Cornett, D.R. 1993. Research proposal. Michigan Highlands ecosystem mapping project: phase I. Unpublished Report. 4p.
- Cunningham, R.N. and H.G. White. 1941. Forest resources of the Upper Peninsula of Michigan. USDA Misc. Pub. 429. USGPO Wash. D.C. 32p.
- Curtis, J.T. 1959. The vegetation of Wisconsin. An ordination of plant communities. University of Wisconsin Press. Madison WI. 657p.
- Michigan Department of Natural Resources. 1991. Escanaba River State Forest comprehensive resource management plan. Final draft. Escanaba, MI. 163p. + appendices.
- Michigan State College of Agriculture and Applied Science. 1959. Marquette County on-site wastewater disposal data base. Lansing, MI. map + text.
- Noss, R.F. 1990. Indicators for monitoring biodiversity: a hierarchical approach. *Conservation Biology* 4 (4):355-64.
- Noss, R.F. 1992. Designing an evolutionary reserve. *PAW Journal* 1 (3): 26-7.
- Nowacki, G.J., M.D. Abrams and C.G. Lorimer. 1990. Composition, structure, and historical development of northern red oak stands along an edaphic gradient in north-central Wisconsin. *Forest Science* 36(2): 276-92.
- Stearns, F. 1949. Ninety years change in a northern hardwood forest in Wisconsin. *Ecology* 30(3): 350-358.
- USDA Forest Service. 1992. Raco Plains Jack Pine Ecosystem Project. Unpublished report. Hiawatha National Forest. Sault Ste. Marie, MI. 15p.
- Ward, R.T. 1956. The beech forests of Wisconsin—changes in forest composition and the nature of the beech border. *Ecology* 37(3): 407-419.
- Wood, A.B., Jr. 1852a. Copy of U.S. field notes of town 49 north range 28 west of principal meridian of Michigan. General Land Office Survey.
- _____. 1852b. Copy of U.S. field notes of town 50 north of range 28 west of principal meridian of Michigan. General Land Office Survey.
- _____. 1854. Copy of United States field notes of town 49 north range 47 west Michigan. General Land Office Survey.

Doug Cornett (POB 122, Marquette, MI 49855) is Research Director of Northwoods Wilderness Recovery, a non-profit organization dedicated to the preservation and restoration of native ecosystems in the Upper Peninsula of Michigan.

Finding Your Own Lawyer*

by Ned Mudd II and Ray Vaughan

Before we get you into a lawyer's office, we remind you again: you must have standing. No lawyer in the world can win your case if you get thrown out of court because you do not have legal standing. It is mandatory that you establish standing prior to beginning any part of any potential legal action. Filing suit over the pollution of a river and then later going out to the river and canoeing on it won't work. (See Part One of the Gonzo Guide to Environmental Law, *Wild Earth* Fall 1993.)

Once a project is under way with full government approval, your options for grassroots citizen involvement shrink dramatically. Without legal action, a project with all necessary permits is almost certain to proceed. With most federal and state permits, you must go through an administrative appeals process before you can enter court. Essentially, an administrative appeal is sufficiently similar to a court trial that to try one without a lawyer is sure defeat.

Lawyers are slippery things. Trying to get a grip on one or on what one is saying can be difficult. Of course, the whole point of this chapter is to give you the ability to know when you need an attorney and how to find one smart enough to handle your case. It doesn't hurt to have a lawyer ahead of time. When negotiating with politicians, there is nothing like a lawyer at your side to signal you are serious about playing the litigation card. Politicians, industrialists and developers don't take the public seriously. But no matter how peachy an industry's situation may be, litigation is always a crap shoot, with the possibility of stopping the best-laid plans of destruction. Also, because permit decisions must be appealed or legally challenged in court within a set amount of time, having a lawyer already retained avoids the nasty scene of trying to find one on short notice.

What do you look for in a lawyer? Obviously, for purposes of environmental protection, one who is committed to the environment would be best. Sometimes, you may be able to get a major environmental group interested in fighting for you. The well-known national eco-wars are already populated with the Big Ten groups. But what if your fight is more local in nature? A call to these groups can't hurt; they may take your case, and if they don't, they may be able to recommend someone in your area. There are also regional environmental law groups such as the Southern Environmental Law Center in Charlottesville, Virginia. Don't hesitate to put them on the spot.

*Necessity knows no law; I know
some attorneys of the same.*

—Benjamin Franklin,

Poor Richard's Almanac (1734)

Part Four: The Gonzo Guide to Environmental Law, © 1994 by Ned Mudd II and Ray Vaughan

*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 fact situation, no book, article or anything else can substitute for legal advice from an actual attorney familiar with the facts of your case.

More often than not, you'll need to find your own lawyer. Most of the lawyers who specialize in environmental law work for industry or for big law firms that work for industry. Don't waste your time on these crooks. Check at your local county law library for books called Martindale-Hubbell; these contain resumes of lawyers and law firms throughout the country. The big firms will be in these, and their main clients will be listed. Some lawyers, though, are not in these books, particularly sole practitioners, and the solo artists will probably be most inclined to support your cause.

Ask around. Call your local and state bar associations to see if they know any attorneys in your area willing to work on environmental or other *pro bono*** cases. Contact state and local environmental groups to see if they know of any lawyers who might help. Look in the yellow pages; many lawyers advertise like every other business does, and one may actually be so bold as to put environmental law as an area of their practice.

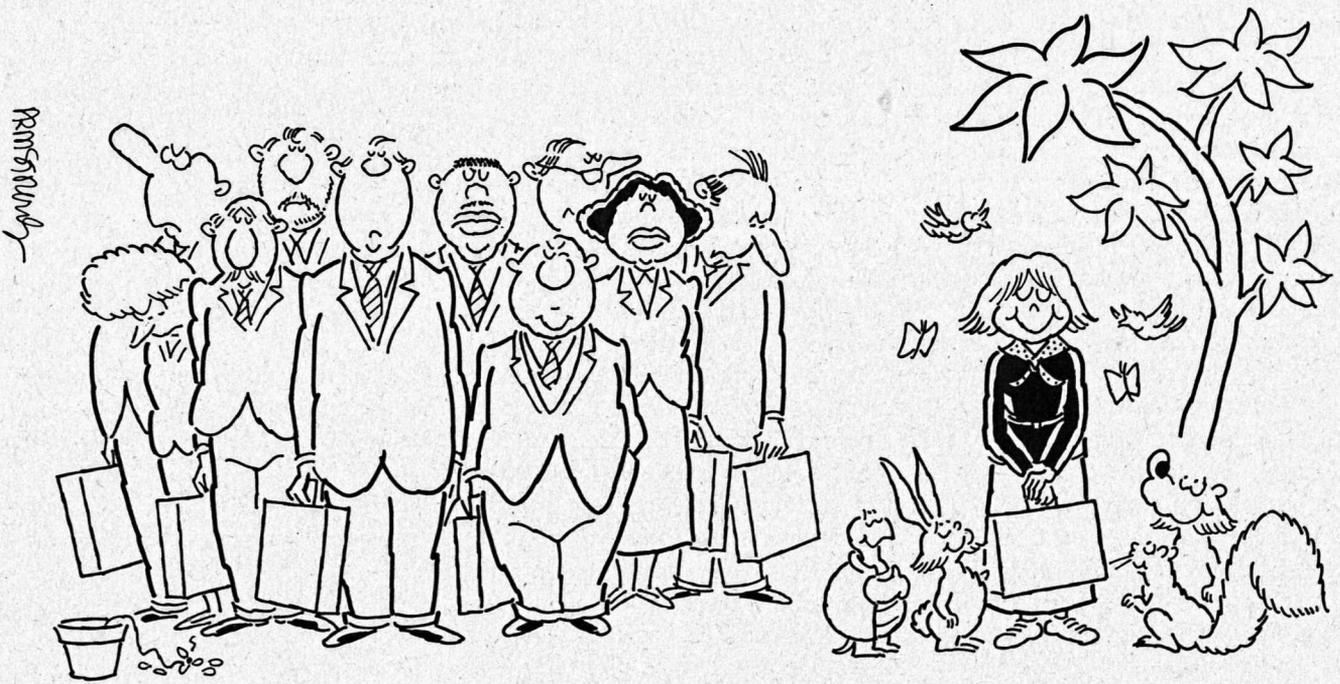
Lawyers with expertise in environmental law and with a desire to help people rather than business are few and far between. If you find one, you may need to hire him or her whether or not you like him or her. Remember, your lawyer is not your friend, mother, confidant or therapist; he or she is there to counsel you on legal matters. So whether you like a lawyer personally should not be a deciding factor in whether to hire him or her. Of course, avoid known sleazes. Environmental cases look complex even if they are not, and most attorneys will run from any environmental lawsuit.

Contact as many attorneys as you can about your case; go meet with those who express an interest. At these meetings,

the lawyer will be deciding whether to take your case, so you need to be cordial and friendly, but also remember that you are interviewing the person for an important job. Here is a list of things to check; if the lawyer is less than frank with you or does not want to share all this information with you, walk out immediately.

Things to look and ask for:

- knowledge of environmental laws, particularly those relevant to your issue;
- experience with environmental law cases, particularly ones similar to yours;
- knowledge of the agency and/or corporation involved in your situation;
- commitment to the cause of the environment in general and to your cause in particular;
- involvement with local environmental groups, either on a personal or professional level;
- whether he or she might have a conflict of interest; make sure the lawyer has no ties to the industry or government agency involved in your situation;
- references from environmental groups or persons that you know and trust; talking to present or former clients of your prospective lawyer is important for making your decision; if he or she is uncomfortable with this, look out;
- fees, costs and contract terms; you want to know everything you are getting into with this person before you do so; ask if they will take the case *pro bono* (not likely), and if not, find out exactly their billing system and how they can stretch your money as much as possible;



**"Pro bono" means "for the public good." To you, it means a free lawyer. To most lawyers, it means "run like hell."

- assuming the lawyer takes the case, how far is he or she willing to go with it; some attorneys will take a case through an administrative appeal but will not go on to court or will go through trial but not through an appeal;
- is the attorney financially solvent and stable; don't ask for detailed financial records but do get some kind of assurance; a lawyer that goes out of business can leave clients up a creek;
- get a copy of the attorney's standard contract form and review it prior to hiring him or her; read it in its entirety; ask if there would be any different clauses for your case; read everything before signing it, and do not be afraid to discuss and negotiate over clauses or anything in the contract; have the lawyer explain anything you do not understand;
- has the lawyer had any disciplinary problems with the state bar association; call the bar association to double check what the lawyer tells you.

Even cheap lawyers can run \$75 to \$100 per hour, and a single deposition of your opponent can cost a thousand bucks or more. Plus, if you need to have experts on your side of the case, unless they volunteer their time and expertise, you are looking at costs of up to and even beyond a thousand dollars per day per expert for expert witness testimony. No doubt about it, litigation, even simple litigation (which environmental cases usually are not), can be very expensive; count on at least a few thousand to initiate even the simplest environmental lawsuit.

Make sure that your lawyer understands all the consequences of what may happen to you and that he or she knows what to do about those things. A good lawyer can protect you from the various forms of legal harassment that the lawyers on the other side can, and will, engage in. The other side will dig up your past in an effort to embarrass you. That includes painting you as a radical in the media and in court. They will investigate your finances; they will contact your employer and try to get you fired.

Your opponents may try to infiltrate your group or to buy off your members. Many a fight over the wild has been lost when a grassroots group split over a disagreement regarding a big cash payment offer from the bad guys. Your lawyer should be able to shelter you from such a tactic, but only somewhat.

Your lawyer should keep you regularly informed of what is happening with your case and should promptly return your calls. Always have one person in your group be the contact person with your lawyer. Attorneys will bill you for all time spent jawboning with you or anyone connected with you. Your lawyer should give you detailed billing accounts every month; don't tolerate an attorney who withholds information about your case or about how he or she is spending your money.

Finding the right lawyer is never easy or painless. If you find a good one, congratulations. If you don't, take the best you can find and fight anyway, assuming you are prepared for the financial and personal tribulations of litigation. Law and litigation are not for everyone, but they are necessary for protecting the beautiful places of this Earth.

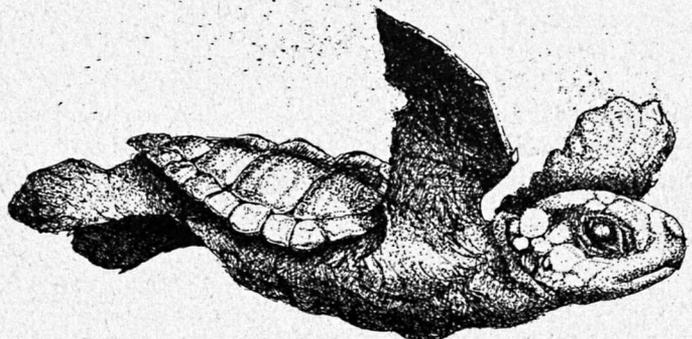
In any event, litigation is a tool. Lawyers are necessary evils. If you have to dance with the devil to get the job done, so be it. Your attitude is the key — have confidence. Be competent in your own right, a worthy adversary in defense of the wild. You can gather data, build files and communicate with lawyers and judges. One person *can* topple the babbling tower. So, get busy, and good luck!

Ned Mudd and Ray Vaughan are environmental attorneys based in Alabama. They work with Friends of the Alabama Surgeon (POB 130411, Birmingham, AL 35213) and the Alabama Wilderness Alliance (POB 223, Moulton, Alabama 35650).

Tortuga

Giant Goddesses of the sea
Backs glistening in the moonlight
Make a silent approach
To the beaches of their birth
While their sisters' babies
Erupt from nearby cooling nests.
Miniature replicas of their giant mothers
These intrepid young
Push up through their sandy beds.
With flippers gathering strength
They pull themselves toward shimmering seas
At whose lapping edge
They have their first luxurious swim.

—Marilyn Spitz
January 1990, Playa Grande, Costa Rica



Sowing Seeds With Biocentric Broadcasting

by Traci Hickson and Dennis Hendricks

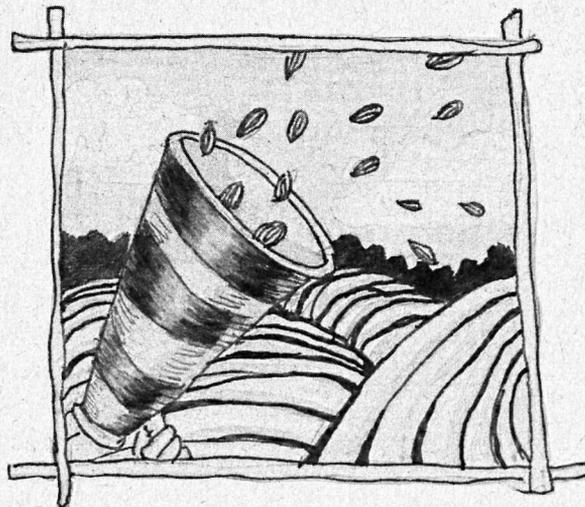
United in a belief of biocentric responsibility, wilderness activists need to be heard. Although we have sufficient scientific data and see intrinsic value sentiments striking chords of resonance in mainstream circles, we have no public voice. Our clarion calls for wilderness and biocentric values should be ringing through every available avenue of change. Radio broadcasting is a means of access that we have so far failed to explore. It is true that grassroots activists are discussing electronic media more and more, but the discussions are generally conducted in the context of how to get someone, somewhere, to say something ecologically responsible. If we believe in what we say, then we must become the media.

In pursuit of direct grassroots involvement with radio, we offer the following facts and suggestions for potential broadcasters.

Given the wealth of available material, grassroots broadcasting can be technically easy and creatively magical. Books on tape by authors including John Muir, David Brower, Edward Abbey, Dave Foreman, Wendell Berry, Gary Snyder and Henry David Thoreau can be used to complement an ever growing list of eco-music.¹ Broadcasters can also obtain permission to air entire shows or selected interviews from the nationally syndicated environmental shows.² Adding broadcaster produced commentary, readings, and live interviews to the preceding options, it is easy to see that there is plenty of material to build eco-programs, once air time has been secured.

COMMERCIAL STATIONS

In a random sampling of commercial stations, we found that many are willing to sell time for ecological programming. The hourly rate varies widely from \$20 to \$450, depending on



the time of day, geographical location, strength of the station, and frequency of broadcasts.³ Some stations also sell public announcement spots by the minute. Although it may sound ludicrous to consider spending money for radio air time when nearly every activist is financially broke, we feel commercial radio offers a unique possibility as an avenue for ecological change. Eco-activists could actually make money for other projects by selling advertising time on their programs. Coffee houses, music stores, health

food stores and book stores are the natural candidates, but all businesses have funds set aside for advertising and many are actively trying to be "Green." Should we care who gives us money as long as no one tries to tell us what to say? Is there a higher priority than to be heard? Each activist considering commercial broadcasting will need to answer these questions.

NON-COMMERCIAL STATIONS

Approaching non-commercial stations, activists should leave any anger at home. Within the broadcasting guidelines and mission statements of the stations, individuals can find references to responsibility, education and information, which will provide adequate grounds for initiating meaningful dialogue. The ecological programming you offer should be seen as beneficial by the station, not as a potential problem.

Ultimate authority for programming lies with the license holder (often a Board of Directors or Community Advisory Board) which delegates authority to the General Manager, who in turn delegates authority to the Station Manager and the Program Director. The Program Director is the first person to contact, but frequently this person will not have the authority to make the changes suggested. In dealing with these stations,

progress will be proportional to the success an individual or a group has in identifying the real decision maker and in educating this person in the basics of biology, the current nature of the crisis, and the necessity for ecological responsibility.

Activists promoting ecological programs on non-commercial stations should be prepared to stand their ground against the "providing an equal opportunity for a diversity of views" argument, which places ecological programming in the same category as entertainment or social issues. Nothing is fair or equal when 99% of the views are anthropocentric, especially since similar anthropocentric programming is abundant on other area stations. Stations that resist becoming ecologically responsible may be open to an organized effort to affect their funding or even lawsuits.

National Federation of Community Broadcasters (NCFB) Stations

There are currently 100 NCFB stations, with an additional 75 associate member stations, reaching approximately 75% of the United States. Community participation, support, and control are cornerstones of these stations. Management is local and accessible; programming should reflect the make-up of the community. An individual's access to these stations has been described as both a right and a privilege.⁴

National Public Radio (NPR) Member Stations

These are the stations we grew up thinking were the voices of positive change, and therefore, in our estimation, represent the biggest disappointment. One look at the low percentage of air time devoted to ecological issues and the prominence of corporate support explains the euphemism "NCR" (National Corporate Radio). Unlike the approach to NCFB stations, an activist will not be trying to affect programming on a local, accessible, low-budget station. Therefore creating positive change on these stations may well require a concerted effort by a number of individuals or a coalition of regional or state-wide environmental groups. Some NPR stations provide an opportunity for individuals to speak out through commentaries. Activists can contact their local station and request a copy of the guidelines for commentators.

College Stations

These stations are the most accessible. There is little reason other than lack of will on the part of activists why ecological programming does not fill a major part of the schedule on college stations. A Program Director/Station Manager/General Manager can give no adequate defense for choosing mindless entertainment over ecologically responsible programming. The

stations are most often viewed as training grounds for future broadcasters or as places for exercising young egos, with little emphasis placed on ecological matters. Colleges, supposed learning centers and bastions of progressive thought, must be held to the highest programming standards. We should strive for 100% of the air time on these stations.

GRASSROOTS BROADCASTERS: SEPARATE AND TOGETHER

Some broadcasters will choose a soft approach, some a no-compromise orientation, while others will use a full spectrum of material. Imagine airing and commenting on the idiotic babble of a "wise" user. Imagine a governor, state senator, or local politician stuttering stupidly over questions about biological integrity and true costs. Local, regional, or national in flavor, soft, hard, or full spectrum, the variety of approaches taken would represent a welcome diversity of life-centered voices.

A loose affiliation of grassroots broadcasters could aid each other by exchanging information and taped shows. A library of interviews and 3-5 minute informational sound modules from biocentric groups (which would include a mission statement, address, etc.) could be established. Broadcasters could serve as contact points within a concert network—liaisons between musicians, local activists and possible venues.

How high should we set our sights? One person who knows Ned Mudd Jr. and Jasper Carlton has suggested them as prime candidates for their own syndicated radio talk show. Discussions we have had with American Public Radio (now Public Radio International) lead us to believe that they would be receptive to a high quality biocentric program. We must not underestimate the strength of our message and the value of grassroots broadcasting.

The preceding has been written in the most general way to initiate discussions and promote networking among activists. Many of us have begrudgingly accepted attorneys, money, computers, telephones and fax machines as *temporary* tools needed to change the dominant paradigm. It would be easy to blame the management of radio stations or the "system" in general for the lack of biocentric broadcasting, but besides being counter-productive, this attitude would be wrong. The primary responsibility for the lack of "our" programming lies with "us." The untapped potential of the "Media Wasteland" beckons. **WERE**

Traci Hickson and Dennis Hendricks are the producers and hosts of Stump Creek Radio, a weekly eco-program, which has aired in Central Appalachia for over two years. They can be contacted at POB 127, Cass, WV 24927.

¹ All of this material and more is available in the Stump Creek Radio Audio Eco-inventory.

² Nationally Syndicated Environmental Programs: The Environment Show (800)323-9262; Environmental Directions (310)559-9160; Living on Earth (617)868-8810.

³ Thanks to Elise Spranek at The Wildlands Project for the research she did on commercial radio stations in Tucson, AZ.

⁴ To locate the nearest NCFB Station call (202) 393-2355.

Citizen Involvement in Mining Issues

by Doug Hawes-Davis

The mining, smelting and refining of mineral ores are among the most devastating industrial processes to the Earth's ecological systems. Mining has left tens of thousands of miles of streams and rivers sterile with acid drainage. Countless piles and ponds of waste rock, or "tailings," laden with heavy metals threaten still more watersheds. Smelters have left permanently contaminated soil for miles in every direction and continue to send toxics into the atmosphere. At active and abandoned mine sites, hillsides have been stripped of vegetation and soil cover. In many mining districts, hills and mountains have been *removed entirely*.

Although mining law and regulation are far from adequate to protect environmental quality, there are a number of federal and state laws that concerned citizens can use in fighting mineral development projects. Unfortunately, no single law deals with all forms of mining.

Because of the many facets to mining processes and the several major types of mineral resources, mining law and regulation are extraordinarily complex.

The two major types of mineral deposits, as defined by federal law, are energy and hardrock deposits. Separate federal laws govern the development of public mineral deposits based on the ownership history of the land. Most federal lands in the West are "reserve" lands that have been publicly owned since European settlement. National Forest lands in the East that have been purchased by the fed-

Concerned citizens can use a number of federal and state laws in fighting mineral development projects...

eral government from private landowners over the last century are known as "acquired lands." There are separate mining laws for "reserve" and "acquired" lands.

The Mineral Leasing Act of 1920 created a separate "leasing" system for federal energy mineral deposits in the West. Uranium is the only energy mineral subject to the Western hardrock mining law. All other energy minerals, including coal, oil, gas, and oil shale, are subject to the 1920 law under which a company leases the federal surface property and pays the government a royalty on the value of the minerals extracted. Nation-wide, coal strip mining is regulated under the Surface Mining Control and Reclamation Act (SMCRA) of 1977. SMCRA requires the Forest Service and Bureau of Land Management (BLM) to deny permits for strip mining on federal lands deemed "unsuitable" for mining operations and requires companies to file an approved reclamation plan for all new surface coal mining projects.¹ SMCRA also gives the nation's coal producing states the authority to regulate strip mining and mine reclamation on both public and private lands to standards set in the law.

Hardrock minerals like gold, silver, lead, zinc and copper underlying federal lands in the West are subject only to the General Mining Law of 1872, which allows corporations to "patent" a mineral deposit and actually purchase the property at nineteenth century prices. The Mineral

Policy Center (1612 K St., Suite 808, Washington, DC 20006) estimates that the federal government has given away no less than \$231 billion (\$472 billion in 1994 dollars) in land and minerals through the patenting process and subsequent hardrock mining.²

It is virtually impossible to stop patenting of hardrock deposits under the 1872 law. After obtaining exploration permits, if a prospector can show a "valuable deposit" exists, the BLM is required to patent the claim. A patent carries no stipulation that the claim be mined, however. The patenting process only deals with the transfer of property from the federal government to a corporation. As a result, real estate development often follows patenting of mining claims. Still, both exploration and full-scale mining (should a patent holder decide to mine the claim) are subject to other environmental laws.

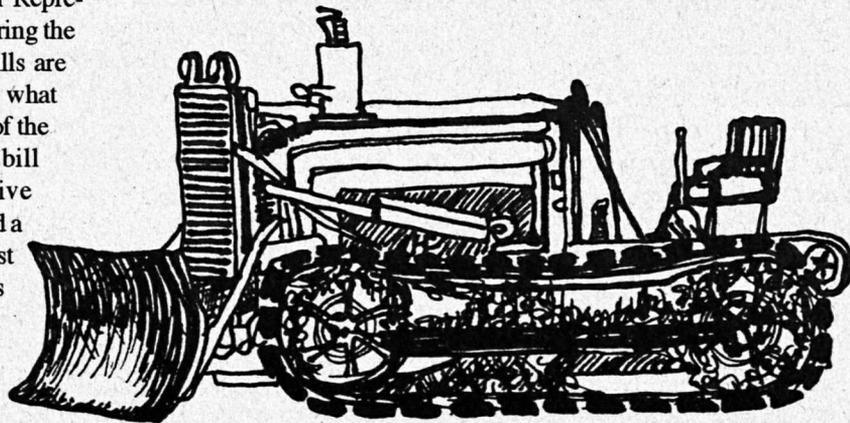
Mineral development under both the Mineral Leasing Act and the General Mining Law must comply with other federal and state environmental laws. If a proposed exploration or mining project would potentially violate the Clean Water Act, the Endangered Species Act, or state water quality laws, for example, permits for exploration or mining can be denied. Although the subsurface mineral rights are controlled by the BLM, proposed exploration and mining projects on Forest Service property must comply with the National Forest Management Act (NFMA). Activists have sometimes been successful at stopping mining projects using NFMA to deny access to an exploration site or a patented claim. For example, if a prospector requests a permit to conduct placer testing on a stream in a roadless area, the Forest Service need not agree to build a road to the site. A permit may be granted with the stipulation that the prospector ride horse back or walk to the site. Such a stipulation would certainly make mining uneconomical for the nation's largest mining companies, like Pegasus Gold, Homestake Mining, and ASARCO. Not surprisingly, the Forest Service has gone to great lengths to accommodate the mining corporations.

To protect Western wildlands from the abuses of mineral development, it is essential that the archaic General Mining Law of 1872 be reformed. Bills that would reform Western mining law have passed both the United States House of Representatives and the US Senate during the 103rd Congress, but the two bills are very different, and it is unclear what degree of reform will come out of the conference committee...if a bill comes out at all. Representative Nick Joe Rahall (D-WV) pushed a strong bill through the House last year, but the Senate version does little to reform the 122 year old law. Rahall's bill, the Mineral Exploration and Development Act (HR 322), would impose

an 8% gross royalty on minerals taken from federal land, end the patenting process which allows companies to buy public land for as low as \$2.50 an acre, provide authority to the government to deny mining applications, establish environmental and reclamation standards, establish enforcement and inspection requirements, and create an abandoned mine reclamation fund.³ Senator Bumpers (D-AR) was unsuccessful at passing a strong companion bill to HR 322 in the Senate. In lieu of the Bumpers bill, the Senate adopted a "reform" bill sponsored by Senator Larry Craig (R-ID). Craig's bill (S. 775) would impose only a 2% net royalty on federal minerals and would leave the patenting process intact.⁴

A bill that does not end patenting of mining claims is not a reform bill. As long as mining companies are guaranteed a "right" to purchase federal land if they can show evidence of a "valuable deposit," activists will not be able to stop most mining projects regardless of environmental concerns. Usually, concerned citizens can, at best, hope for forced compliance with the Clean Water Act, Clean Air Act, and other federal and state regulatory laws. Even when a proposed mining project would likely violate several environmental laws, the BLM and Forest Service generally use only "mitigating measures" to lessen environmental impacts. Mitigation and regulatory efforts cannot bring back wilderness once a mine has been developed. And with fines for violations relatively small and enforcement chronically under-funded, many mines regularly operate out of compliance.

Federal law governing mining on National Forests in the East is somewhat more progressive than Western mining law. The Acquired Lands Act of 1947 placed all federal mineral deposits (including hardrock deposits) in the eastern United States under a leasing system that allows the Forest Service to deny the right to mine a deposit if the proposed operation would compromise surface uses.⁵ Because federal law has generally been interpreted as requiring the Forest Service and BLM to permit mining in some form once the company has shown there is an economically viable deposit, the agency has rarely used that authority.⁶



During the public review process for mining projects on acquired lands, the Forest Service maintains there is no connection between exploration and development. This has been a major problem for activists in the Missouri Ozarks, which has the greatest concentration of hardrock minerals in the East. Fifteen citizen appeals filed with the BLM against an exploration plan submitted by the Doe Run Company (the world's largest lead producer) were dismissed on the grounds that the exploration alone would have few environmental consequences.⁷ But, the Interior Board of Land Appeals (IBLA) decision stated, "Should the exploration now authorized discover lead of commercial quality, in commercial quantities, and in a place that permits economical extraction, BLM will be required to issue a lease and then to permit mineral development in some form."⁸ Mining operations for coal, oil and gas, and other minerals on the eastern National Forests are also developed using this logic.

Because it is extremely difficult to stop most mining projects, activists often need to pursue a measure that removes all future mineral development potential for areas threatened by mining. A mineral "withdrawal" removes all federal minerals underlying the area specified from potential development under the relevant mining laws. Withdrawals can be granted for specific areas either administratively, by Congress, or by Executive Order of the President. The BLM may issue an administrative withdrawal for any federal mineral holding. Administrative withdrawals usually come up for review after two to twenty years. Any administrative withdrawal over 5000 acres may also be reviewed by Congress.

Mineral withdrawals initiated by Executive Order of the President or by an Act of Congress are permanent. A number of Congressional land designations include a permanent mineral withdrawal. Among them are Wilderness Areas, National Parks, and rivers designated Wild under the Wild and Scenic Rivers Act. After losing appeals to further exploration for hardrock minerals on the Mark Twain National Forest in Missouri, local activists asked Senator Bumpers of Arkansas to introduce legislation to withdraw the Eleven Point District from any future mineral development. The Ozark Rivers Protection Act of 1994, introduced by Bumpers in April, contained language similar to that in all laws that grant a mineral withdrawal from federal lands:

Subject to valid existing rights, after the date of enactment of this Act, all Federal lands within the Eleven Point District of the Mark Twain National Forest are withdrawn from entry, location, or patent under the general mining laws, the operation of the mineral and geothermal leasing laws and the mineral material disposal laws.⁹

Grassroots lobbying to get the attention of a sympathetic member of Congress may be the only solution to the threat of mining on a National Forest or BLM District.

It is possible to stop mining projects by forcing the federal agencies to follow the procedural guidelines of the National Environmental Policy Act (NEPA). But the administering

agencies are not required to prepare an Environmental Impact Statement on operating plans for hardrock mining and patenting of mining claims unless they are "large or controversial" projects.¹⁰ Public education and involvement at an early stage in mineral development projects often proves critical in forcing NEPA review.

Because the commodities produced from minerals are so prolific in our society, federal policy encouraging mineral development is unlikely to change anytime soon. As the Missouri Mining Industry Council slogan claims, "If it can't be grown, it has to be mined." Citizens must continue to fight for protection of wild areas with minerals and for responsible mining practices where it is deemed necessary. Activists should continue to approach Congress and demand reform of our outdated mining laws and request permanent withdrawals for our most important ecological areas. Only with significant reform measures will citizens have power to stop large-scale mining on public lands.

ENDNOTES

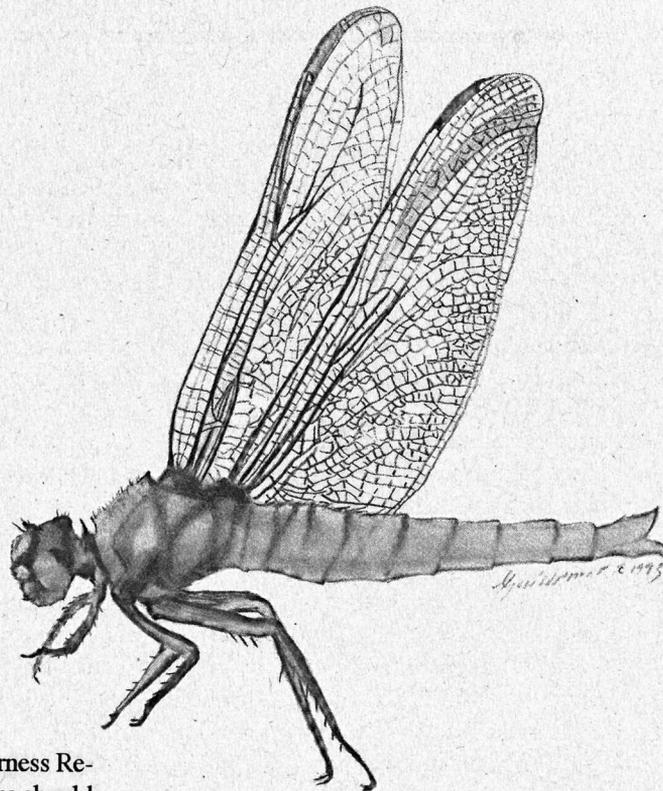
- ¹ Charles F. Wilkinson and H. Michael Anderson. *Land and Resource Planning in the National Forests*. (Washington: Island Press, 1987). The Wilkinson text explains each of the various federal laws pertaining to mineral development and management of federal lands.
- ² Thomas J. Hilliard, et al. *Golden Patents, Empty Pockets*. (Washington, DC: Mineral Policy Center, June, 1994), 4.
- ³ Congress, House of Representatives, *Mineral Exploration and Development Act of 1993*, 103rd Congress, 1st Sess., HR 322, (20 November 1993).
- ⁴ Congress, Senate, *Hardrock Mining Reform Act*, 103rd Congress, 1st Sess., S 775, (5 April 1993).
- ⁵ Charles F. Wilkinson and H. Michael Anderson. *Land and Resource Planning in the National Forests*. (Washington: Island Press, 1987), 249-250.
- ⁶ Vince Vogt, interview by author, Rolla, Missouri, June 1992. Vogt is the Division Chief for Solid Minerals at the Eastern States office of the Bureau of Land Management. He could think of only a single case where a mine plan was denied by the Forest Service after exploration was complete. According to Vogt, a permit for a proposed phosphate mine on a National Forest in Florida was denied to avoid likely impacts to surface and ground water.
- ⁷ Doug Hawes-Davis, "Heavy Metal Madness," *Z Magazine*, January 1993, 39-42.
- ⁸ United States Department of the Interior, Office of Hearings and Appeals, Interior Board of Land Appeals, (Missouri Coalition for the Environment et al. IBLA 92-392 et al. Decided October 23, 1992). Appeals from a decision of the Assistant District Manager, Division of Solid Minerals, Milwaukee District, Eastern States, Bureau of Land management, approving a mineral exploration plan. ES-19219 and ES-19220.
- ⁹ Congress, Senate, *Ozark Rivers Protection Act of 1994*, 103rd Congress, 2nd Sess., S. 2035, *Congressional Record*, (20 April 1994), S4569.
- ¹⁰ Charles F. Wilkinson and H. Michael Anderson. *Land and Resource Planning in the National Forests*. (Washington: Island Press, 1987), 266.

Doug Hawes-Davis can be contacted at The Ecology Center, 101 E. Broadway, Rm. 602, Missoula, MT 59802 (406) 728-5733.



Thoreau Regional Wilderness Proposal

by Jamie Sayen & Rudy Engholm



We propose the establishment of a Thoreau Regional Wilderness Reserve (TRWR) in the northern Maine woods. This wilderness reserve should encompass the greater Baxter State Park bioregion, including the East Branch and West Branch Penobscot and the St. John and Allagash River watersheds, and extend toward the Flagstaff and Rangely Lakes region.

Northern Maine offers an ideal opportunity to begin to reverse centuries of destruction of North America's native forest ecosystems. Economic, social, and ecological factors make Maine ripe for reserves:

- Northern Maine contains eight million acres of undeveloped forest land owned by a small number of absentee corporations and families.
- Much of that land has recently been sold, is for sale, or is likely to be offered for sale in the next couple of decades.
- The future of the paper industry in Maine is uncertain. It is certain that the paper industry will no longer be the dominant force. Bowater and S.D. Warren recently reduced the capacity of their paper mills, eliminating hundreds of jobs. Given the advanced age of many Maine mills, some will probably shut down permanently in the next decade or so and more paper industry land will be offered for sale. Maine's overcut forests face shortfalls of spruce and fir—the most valuable tree species for paper-making.
- Some of the current land owners—Bowater and Boise-Cascade, for instance—are vulnerable to hostile takeover because their assets are worth significantly more than the value of their outstanding stock. The traditional corporate response to the threat of takeover is to clearcut the land (as Champion did in the Northern Rockies in the 1980s) or sell off “non-strategic” holdings (tracts far from mills or tracts containing tree species not desired by the land owner's mill). Timely public acquisition may be our only hope of rescuing these lands from yet another round of unsustainable logging.
- After long absence, Moose have returned to the Maine woods. Wolves and Cougars appear to be returning.
- The public increasingly supports initiatives to restore river and forest ecosystem integrity, including native Atlantic Salmon and large carnivores.

It is all mossy and moosey. In some of those dense fir and spruce woods there is hardly room for the smoke to go up. The trees are a standing night, and every fir and spruce which you fell is a plume plucked from night's raven wing. Then at night the general stillness is more impressive than any sound, but occasionally you hear the note of an owl farther or nearer in the woods, and if near a lake, the semi-human cry of the loons at their unearthly revels.

—Henry David Thoreau, *The Maine Woods*

Editor's note: In a future issue of *Wild Earth*, Michael Kellett and David Carle of RESTORE: The North Woods (POB 440, Concord, MA 01742) will present a slightly different plan for saving Maine's North Woods. RESTORE is advocating a large National Park for the region encompassing Baxter State Park. Dialog on these two different approaches—a whole new system of reserves vs. America's great ideal, the National Park—could advance wildland work everywhere. Send your thoughts to *Northern Forest Forum* for possible publication, as well as to RESTORE and *Wild Earth*. See back cover of this issue for information on *Northern Forest Forum*. RESTORE and the *Forum* welcome and need donations. —JD

- The Northern Forest Lands Study and Northern Forest Lands Council have highlighted the regional, national and global importance of the Northern Forest region.

Today, National Parks, National Forests and National Wildlife Refuges fail to adequately meet conservation objectives. National Parks are geared toward recreation and tourism; National Forests to multiple use and resource extraction; and National Wildlife Refuges to exploitative activities including oil drilling, clearcutting and grazing. Even the largest parks are not big enough to assure the survival of large, wide-ranging mammals such as Cougars and Gray Wolves.

The crisis is particularly acute in northern New England because it has very little public land to provide refugia for native biota that require large, unmanaged, wild areas. The meager public land base—White Mountain National Forest in New Hampshire and Maine, Nash Stream State Forest in New Hampshire, and Baxter State Park in Maine—is literally being loved to death by excessive recreation demands.

The Northern Forest region continues to suffer grave losses:

- Wide-ranging native predators like Gray Wolves, Cougars, Lynx, and Wolverines have been extirpated.
- Populations of many songbirds and ducks are in precipitous decline.
- Atlantic Salmon are under study for Endangered species protection.
- The vast bulk—probably more than 99 percent—of the native forests of the Northern Forest region have been cut at least once. As a result, species and communities associated with old-growth forests have declined.
- Because we cut down the region's old-growth forests before extensive scientific inventories were conducted, we do not know what species, associations, and natural processes we have lost or irreversibly disrupted.

Much of this region's public land base was selected for its scenic beauty and lack of value to resource extraction industries (rocks and ice). Less spectacular but biologically richer low and mid-elevation forests and fertile river valleys (not to mention free-flowing, wild rivers) are largely absent from the public land base.

A Thoreau Regional Wilderness Reserve (TRWR) must be at least five million acres in size (perhaps much larger) if it is to support viable populations of native predators such as Gray Wolf, Wolverine, Cougar and Lynx, as well as patterns of natural disturbance. It should build upon existing public lands, mainly Baxter State Park and the Allagash Wilderness Waterway and portions of the West Branch Penobscot. The TRWR should also include Maine's wildest river—the St. John.

A little over a century ago, Thoreau described the region: "What is most striking in the Maine wilderness is the continuousness of the forest, with fewer open intervals or glades than you had imagined. Except the few burnt-lands, the narrow intervals on the rivers, the bare tops of the high mountains, and the lakes and streams, the forest is uninterrupted." Today, much

of this region has been subjected to huge industrial clearcuts, often followed by herbicide spraying.

It will take time, probably decades, to acquire the land and make a smooth economic transition from the current regime of industrial forestry to a wilderness reserve system. Because so much of the forest has been degraded, ecological restoration will be necessary to break up the vast, even-aged stands which are susceptible to insect infestation and fire. Ecological restoration will create many jobs.

A Thoreau Regional Wilderness Reserve will need to be buffered from industrial forestry and development. It will need to be connected to other reserves in Maine and northern New England as well as to coastal reserves in the Gulf of Maine and reserves in eastern Canada.

Conservation biologists and activists need to conduct additional map and field research to determine optimal boundaries for the reserve cores, habitat corridors, and buffer zones.

Given that a vast network of ecological reserves is necessary if North America's biodiversity is to be saved, rather than merely tinker with existing public land management philosophies, we need to establish a new public lands agency to oversee a Regional Wilderness Reserve System (RWRS). Located in the US Department of the Interior, the RWRS would be designed to protect and restore native biotic communities and all their natural processes. The new federal agency would operate as an equal partner with regional wilderness reserve agencies to achieve the appropriate mix of local, regional, and national representation and expertise.

A Regional Wilderness Reserve System would represent a new federal/regional partnership. Funding for land acquisition and associated regional economic revitalization would necessarily come largely from the federal treasury. The new federal agency would also help coordinate Regional Wilderness Reserve Systems throughout the United States, and, hopefully—in cooperation with Canada and Mexico—the entire continent. Each RWR would be governed by a regional agency consisting of representatives from federal, regional, state and local constituencies. Absentee bureaucracies would not manage the RWRs.

Wilderness Reserves would be managed under a "Forever Wild" philosophy. Non-motorized recreation would be permitted—and encouraged—provided it not compromise the RWRS mandate to protect biodiversity.

Making the Thoreau Regional Wilderness Reserve the first designated RWR would be fitting. Henry David Thoreau was one of this country's earliest poets of wilderness. Already in his lifetime, because the native forests of Concord, Massachusetts had been cleared, he had to travel to northern Maine to experience what the pilgrims called the "howling wilderness." This fearful response to the great North American wilderness by the early Europeans amused Thoreau. "Generally speaking," he wrote, "a howling wilderness does not howl: it is the imagination of the traveler that does the howling."



As part of the enabling legislation to establish the Thoreau Regional Wilderness Reserve, we propose that a study commission composed of conservation biologists, landowners, public lands managers, and concerned citizens identify the most ecologically significant tracts of land, lands currently or likely to be for sale, and regional social and economic issues that must be addressed. Ecological health is the basis of economic health. Current economic trends on these lands—raw log exports, job loss in the woods and mills, projected spruce-fir shortfalls, profits going to corporations and stockholders from outside the region—do not benefit northern Maine communities. A regional economy designed to complement large, connected reserves of unmanaged lands will actually lead to healthier, more diverse, more stable communities.

Pressures from recreation and tourism are great enough that people are finally discussing a ban on motor vehicles in Baxter State Park. Demand is high for ecologically benign recreation opportunities in this region. A large reserve in Maine

could provide quality jobs in guiding, natural history studies, and ecological research and restoration.

The Regional Wilderness Reserve System should give citizens of the region meaningful representation in the development and implementation of management plans, economic redevelopment and other critical regional issues. At present, 18 corporations and families own over 75% of the Maine woods. This proposal is designed to help restore control of the region's destiny to the region's citizens.

Establishment of large Regional Wilderness Reserves in the Northern Forest would not displace local residents. Currently the area for the proposed TRWR has *no* year-round human communities, *no* local land owners. So much land is currently for sale from willing sellers that there is no need even to contemplate eminent domain. Hunting could continue in the region so long as it is consistent with the objectives of the RWR System.

As paper mills close over the next couple of decades, millions of acres will go on the market at very affordable prices

September

(\$100-200 per acre for much of Maine's industrial forest). We could purchase the land necessary to establish a five million acre TRWR for about one-half the price of a Sea Wolf submarine—which the Navy admits it doesn't need, but is currently in the Pentagon's budget, to preserve jobs and the infrastructure of the submarine building industry.

A proposal of this nature, which represents a dramatic departure from a failed status quo, is bound to stimulate support, opposition, concerns, fears and questions. We welcome your ideas and proposals. This idea is not new, however. Thoreau proposed the establishment of a wilderness reserve before the Civil War:

The Kings of England formerly had their forests "to hold the king's game," for sport or food, sometimes destroying villages to create or extend them; and I think that they were impelled by a true instinct. Why should not we, who have renounced the king's authority, have our national preserves, where no villages need be destroyed, in which the bear and panther, and some even of the hunter race, may still exist, and not be "civilized off the face of the earth,"—our forests, not to hold the king's game merely, but to hold and preserve the king himself also, the lord of creation,—not for idle sport or food, but for inspiration and our own true recreation? or shall we, like villains, grub them all up poaching on our own national domains? ■

Jamie Sayen (POB 6, Lancaster, NH 03584) is editor and publisher of the Northern Forest Forum. Rudy Engholm is a pilot with the Environmental Air Force.

I keep a photograph
in my desk, Mount
Katahdin. I walk thru
spruce to an erratic
boulder big as a house.
I want to live in that
house, not in my desk.
And teach glaciers to walk
in my door yard.

Who listens
to a hole in the ice?

The one who follows caribou
in his dreams.

Who looks in the scat
for tiny teeth?

The book looks like a finch.

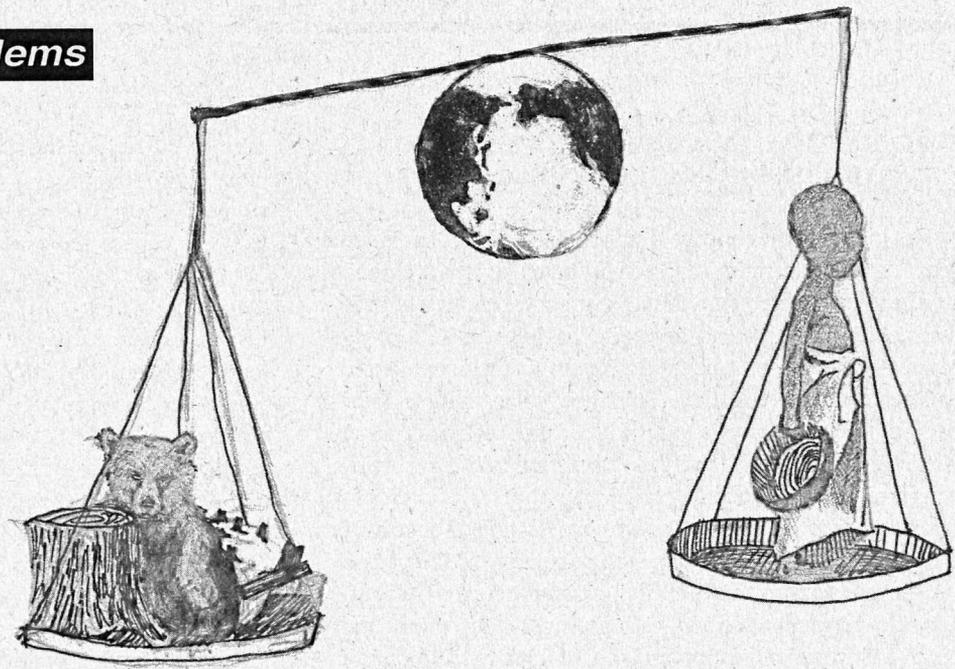
I give you
a purple thistle.

I have snowshoes instead of curtains.

I'll poach,
build fires in the rain
and never live in a house.

—Peter Gurnis





The Cornucopia Scam

Contradictions of Sustainable Development

ABSTRACT

This paper [to be run in three parts] is a critique of current debate on sustainable development and of related practical initiatives such as Agenda 21. It argues that the shift in vocabulary from 'sustainable growth' to 'sustainable development' amounts to no more than a change of words: there is still no deep questioning of the values, structures and policies at the heart of the ecological crisis. Different strands in the debate, including a more radical one that talks about 'liberation ecology', all fail to link today's environmental, economic and social problems to a general crisis of overdevelopment.

The Brundtland Report, widely praised in many quarters, is analyzed and the case is made that the Report was little more than a touch of green gloss on business-as-usual. The paper then outlines the main elements of limits-to-growth theory, arguing that it holds the key to an understanding of the world's major problems and identification of measures that really will move society toward sustainability. The paper identifies a number of common fallacies about environmental problems, including a widespread tendency to focus only on pollution.

The argument is developed with an analysis of the three major pressures on environmental systems—human population growth, increasing per capita consumption, and technological choice. Mainstream sustainable development thought is criticized for, variously, denying the problems or advocating false solutions. Reasons are presented for thinking that the only sustainable way is one of reduction, not expansion, of human demands.

The paper criticizes the widespread tendency to blame every problem 'on the system' ('capitalism' etc.). It suggests that concepts like the 'tragedy of the commons' and 'social traps' are critical tools of analysis.

The paper also questions the ideology of many of the Earth's new-found friends. It suggests that initiatives like Agenda 21 are firmly rooted in an anthropocentric worldview in which the future of life forms other than humans will never be given adequate priority. Finally, it proposes an alternative to sustainable development, one based on a more deeply ecological approach, outlining the nature of a 'conservers' society.

Part 1:
**Ignoring
the Limits
to Growth**

by Sandy Irvine

INTRODUCTION: FROM SUSTAINABLE GROWTH TO SUSTAINABLE DEVELOPMENT

Not long ago, the concept of sustainable growth dominated discussion about the interlocking environmental, economic and social problems facing humanity. Now, another notion, that of 'sustainable development', has come to the fore. Yet it conjures up two distinct and, beyond a certain point, incompatible meanings. One word, *sustainable*, suggests durability and stability; but the other, *development*, is used most often to denote changes in land use, especially the construction of new buildings and other infrastructure. It is also used in some circles to suggest less tangible things, particularly relating to quality of life and 'inner' growth. Perhaps the popularity of the phrase lies in its capacity to mean all things to all people. Unfortunately, close examination suggests that most of the values and policies found under the umbrella of sustainable development will not reverse the present slide toward ecological meltdown.

Swirling around the slogan of sustainable development are a host of currents. They range from 'red-greens', 'Third Worldists' and other radical writers (many of whom are in the burgeoning army of non-governmental organizations) to quite conventional groupings like Business in the Environment and The Environment Council in the UK. In British and probably most other government circles, sustainable development and programmes like new motorway building are still perceived to be compatible. In 1992, the UNCED Earth Summit in Rio brought together the major players who proclaim themselves in favour of a new sustainable world order. In terms of practical activity, perhaps the work of local governments under the banner of UNCED's Agenda 21 represents both the strengths and weaknesses of sustainable development. (A representative selection of sustainable development thought and its proponents is in two volumes edited by Steve Lerner, *Earth Summit and Beyond the Earth Summit*, 1991 & 1992, both Common Knowledge Press.)

This mix of varying motives, ideas and policies makes it difficult to produce a balanced critique. Nevertheless, despite all the differences, certain common threads can be seen. The most distinguishing feature is the gulf between all these different currents and what might be called the classical ecological tradition: The *Blueprint for Survival* and an older generation of writers like Aldo Leopold, William Vogt, and Fairfield Osborn. Sustainable development ideas also can be contrasted with the more recent eight point platform of Deep Ecology produced by Arne Naess and George Sessions.

Allowing that the following do not apply with equal force to all the sustainable development tendencies, it seems that a number of blind spots can be distinguished:

- A failure to take into account environmental and social limits to growth;
- An unwillingness to address the unsustainability of current human population levels, let alone their projected growth;
- A reluctance to face fully the implications of the lifestyles of

average citizens of the richer countries for ecological sustainability;

- An overly-optimistic belief in the potential of 'alternative' technologies, institutional reform, and wealth redistribution;
- An exaggerated distinction between 'qualitative' and 'quantitative' growth;
- A naive tendency to blame social and environmental problems solely on 'the Establishment' and 'the System';
- A one-sided and excessive faith in decentralism and personal empowerment;
- A failure to recognize adequately the claims of other species to their share of the planet's resources.

The following critique does not deny that much good work is being done by supporters of sustainable development. However, it does argue that any achievements will be cancelled out unless the goal of ongoing physical growth is abandoned and a new Earth-based ethic developed.

THE NEW BANDWAGON

As suggested above, the concept of sustainable development is difficult to pin down. It provides a veritable treasure chest of rhetoric about empowerment, enablement, needs satisfaction and personal liberation. Such phrases can breathe seemingly fresh life into the tired thinking of traditional ideologies like socialism, whilst adding a veneer of apparent environmental friendliness to otherwise unchanged priorities. Individuals and organizations that fiercely rejected or simply ignored the *Limits to Growth* Report in 1972 now sit comfortably with the concept of 'global environmental change', presumably because it conjures up vistas of new business opportunities and big research projects.

Generally, sustainable development thinking treats both society and environment as open and malleable systems, capable of yet more expansion. Social development and environmental conservation are perceived as a twin track. It is assumed that there is a single issue called 'environmentalism' which can be simply bolted to other campaigns such as 'world development' and poverty relief.

Furthermore, it is naively deduced that if we care for people, we will care for the environment. Part of this argument rests upon the fallacy that environmental problems are simply the external side-effects of exploitation within society. The issue of what constitutes social development merits closer scrutiny, in particular the way it is equated with more individual rights and entitlements.

NEVER SAY NO

Particularly since 1945, there has been an explosion in the number of entitlements claimed to be human rights. The most famous statement is, of course, the UN Universal Declaration of Human Rights, but since its publication even more items have been added to the list, usually without any thought to the demands they must place on the environment. For example, most supporters of sustainable development endorse the right

to move and settle freely. Yet in the United States, current immigration policy has led to the largest inflow of immigrants in entire US history. Immigration accounts for almost 50% of US population growth, which overall adds some 7500 persons each day! Such movements magnify most, if not all, social, economic, and especially environmental problems.

More generally, it has become almost automatic, particularly in left-wing circles, to treat human 'wants' as 'rights'. As a result, the sustainable development lobby finds itself committed to the maximisation of just about every good thing—housing supply, recreational opportunities, welfare services, educational provision, health care, jobs, mobility, and other demands raised by what are deemed to be disenfranchised or excluded groups. At times, it seems as if society is expected to facilitate any personally set goal, as illustrated by the newly proclaimed freedom for women to bear children after menopause.

Such programmes for social improvement assume that, with appropriate reform, social and environmental systems can sustain those choices. Those who dare to dissent are quickly labelled 'elitists', 'ecofascists', or even, to use a novel piece of abuse, 'biocrats'. Sometimes, they are pilloried for 'blaming the victim' when they brazenly suggest, for example, that population growth amongst the poor will not make the resolution of their poverty any easier. At the same time, facile rhetoric (e.g. 'poverty is pollution') frequently drives out sound reasoning (affluence is actually far more 'polluting'). Personal attacks also appear frequently (one advocate of 'ecosocialism', Martin Ryle, for example, dismisses the well-known ecologist Paul Ehrlich as a 'middle class wine drinker' who, therefore, had no right to comment on poorer people).

LIBERATION ECOLOGY?

This preoccupation with personal and community empowerment is having some strange consequences among radical writers on sustainable development, who, otherwise, are very critical of both mainstream and reformed development theory. In the debate about parenthood, for example, many 'social ecologists', 'ecofeminists', 'liberation ecologists' and the like are now proclaiming the slogan 'reproductive rights', arguing that a woman should choose how many children she has (rather than stressing the importance of small families and the right to free contraception and sex education). Farida Akher's *Depopulating Bangladesh* even postulates a sinister plot by family planners to depopulate that country. The special issue, "Whose Common Future," of the leading green journal *The Ecologist*, implied that overpopulation was a myth put about by white, male technocrats, contradicting the perspectives argued by the magazine throughout most of its history.

Another example of this flight from the limits-to-growth framework is provided by the volume *Global Ecology*, edited by Wolfgang Sachs, a trenchant critic of organizations like the World Bank and the IMF. Some of the contributors are so critical of the poverty caused by conventional development policy that they suggest that resource scarcity is simply a social con-

struction, not a biophysical reality. In this and similar publications, the accusation is made that much environmental thinking in the past missed the 'human' element, yet it seems as if the stick is being bent so far the other way that the ecological dimension is being omitted.

In some ways, there has been a rebirth of the 'Third Worldism' which swept intellectual circles in the 1960s. Some readers might remember, for example, the writings of people like Herbert Marcuse and Régis Debray. In their work, the masses of the Third World and their leaders were portrayed as the agents of global liberation, who would surround and overthrow the citadels of imperialism. (The phrase, 'Third World', is used simply for convenience: as an analytical tool, it is as useless as another cliché, the 'South', to describe the uneven pattern of industrialization and social change across what are also called the G77 countries.) Now, as then, it seems that only the hopelessly politically incorrect could criticise Third World cultures.

Many "politically correct" people are quick to condemn measures such as 'debt-for-nature' swaps as racist interference in the affairs of non-white peoples. The 'Third Worldists' in the rich countries frequently complain as well of a conspiracy by the affluent to rob the rest of the world of its chance to share the spoils of affluence via fairer terms of trade. They also dismiss proposals for nature and tribal reserves as the creation of 'theme parks', to quote Colin Hines, anti-GATT campaigner and Greenpeace leader. Generally, a very one-dimensional view of reality mars most discussion of problems of 'developing' countries.

In "Whose Common Future," for example, Larry Lohmann mocks those 'western eyes' which are unable to see the 'moral and environmental order' of the streets of Bangkok. Yet, in 1990, a million residents there had to be treated for respiratory problems, while lung cancer is three times more prevalent there than elsewhere in Thailand. The city is also a major centre for child prostitution and traffic in endangered species. The pursuit of western-style development by the Thai élite may have played a role in the creation of this moral and environmental disorder both in the city and the countryside.

However, Lohmann's account gives no hint that what he calls the 'ordinary people' and their preferred activities might have at least some connection with Bangkok's terrible problems, not least the two million vehicles clogging the streets. Bangkok's predicament would be even worse if not for a vigorous family planning programme, which *The Ecologist* now scorns but which reduced the average number of children in Thai families from 6.4 in 1960 to 2.4 in 1993.

It is undeniably true that the world trade system, 'development' projects funded by the World Bank, and indebtedness due to past loans have caused great poverty and associated environmental degradation across Latin America, Africa and Asia. However, the sustainable development lobby treats the less developed countries simply as victims, not recognising the active part they often have played in their own maldevelopment. There is no straight correlation between indebtedness and de-

forestation—the Brazilian assault on Amazonia, for example, commenced back in the 1930s. More generally, phenomena such as materialism, militarism, machismo values, and contempt for wildlife are not confined to white middle class males.

Among Third Worldists, it has become commonplace to argue that the real issue is power in society. Much just criticism was made, for example, of the Brundtland Report, with its faith in technocratic management and especially its evasiveness about the role of powerful élites in big business and central governments. Unfortunately, this focus has led such critics to play down the fundamental issue. They neglected to question whether the pro-growth orientation of the Brundtland Report constitutes a sustainable and worthwhile goal, regardless of who actually holds power. Even the most decentralised and democratic society could still set unsustainable and sullied objectives. In the whole debate about sustainable development, the realities of limits to growth have been marginalised, ignored, or rejected.

GOING FOR GREENER GROWTH

In the early 1970s, the concept of limits to growth was widely publicised by two documents—the *Report to the Club of Rome* (recently updated as *Beyond the Limits*) and the *Blueprint for Survival*. The former, particularly, caused great controversy. Its authors were accused of ignoring in their computer models the power of knowledge and of technological innovation. The notion grew that these works were grossly simplistic and that a more ‘sophisticated’ view would see that conservation and ‘development’ could be combined.

The idea of sustainable growth embodies an inability to break with business-as-usual. The concept was popularised by the World Commission on Environment and Development and quickly taken up by elites in business, political and academic circles. The focus was the ‘fine-tuning’ of production systems to mitigate some of its more undesirable side-effects, particularly those that are interfering with the goal of greater consumption.

The subsequent Brundtland Report (1987) specifically advocated more physical output, proposing a target of 3-4% ‘new growth’ for countries like Britain and higher figures for less developed ones. It advocates ‘an expanding world economy’. It claimed that the combination of economic incen-

tives, technological innovation and managerial expertise could make increasing production cleaner and more efficient in its use of resources.

The Brundtland Report has been widely lauded. Its basic framework is echoed in fine-sounding declarations from leading business corporations such as the so-called Valdez Principles, issued after the Alaskan oil spill. Many textbooks and conference papers on global problems are based on the Brundtland perception of sustainability. Its message, which did not play down the extent of human suffering or the degree of environmental damage, was nevertheless congenial since it did not demand too many changes to the status quo. Its combination of timidity and myopia is nowhere better illustrated than in its description of nuclear power as ‘clean’ energy.

Far from being the conceptual breakthrough many proclaimed, the Report regurgitated the gospel of efficient resource management developed in the US some 80 years before, especially by Gifford Pinchot and the US Forest Service—the very hands that have been liquidating America’s old-growth forests. Brundtland environmentalism might be an improvement on the ‘smash and grab’ mentality, but it is still firmly rooted in a worldview that treats Mother Earth as an inefficient and disorderly bitch to be tamed and worked to the full.

Brundtland’s economic policies are variations on old and discredited themes of ‘comparative advantage’ and export-led expansion. These are precisely the ‘cures’ that made so many countries ill in the first place. They led to investments that were environmentally destructive and irrelevant to the needs of the poor. In the case of Brazil, food exports rose by 15% between 1977 and 1984, but domestic consumption fell to a point where around 50% of the nation’s people suffer from malnutrition. The same strategy helped to create pollution hell holes like the Brazil’s Cubatao Valley, and the Carajas scheme the aluminium smelters and iron furnaces of which may destroy some 900,000 square kilometres of rainforest in the next 20 years, and cause equally gross levels of air and water pollution—mainly for the benefit of countries like Japan.

Another cost of development investments has been massive debt burdens. In sub-Saharan Africa, for example, total debt is some three and a half times that of export earnings. This increased pressure to liquidate environmental assets and to



Population Problems

undertake national austerity programmes (tightening the belts of the citizens with the thinnest stomachs). Yet the Report advocates more of the same, with more trade, more roads, bigger harbours, bigger airports, etc. The trade trap is not just unfair prices for primary products. It is the pattern of dependence and vulnerability for importers as well as exporters. It creates inherently insecure situations; any instabilities reverberate around the global economy.

The WCED was careful not to peer too deeply into the structures, vested interests and values beneath the problems it documented. The Brundtland Report evades the problem of a few individuals and organisations monopolising control of the world's resources. When the Report does address such realities, it concentrates on problems like land reform in the 'Third World', where inequalities are so blatant they cannot be ignored. In contrast, the Report maintains a discrete silence on maldistribution in the rich countries. Yet, there too, inequalities are marked — and, in many cases, growing. In the UK, for example, less than 10% of the population owns over 80% of the land. In the US, some 95% of the country's productive assets are in the hands of only 5-6% of the people. Neither the malign role of multinational corporations nor the unsustainability of current financial structures figure prominently in the Report. It also exhibits a naive faith in the capacity of mainstream politicians to change their ways.

The problems with the Brundtland Report, however, go much deeper. The very direction it points is fundamentally flawed. The strategy of sustainable growth cannot be successful even in its own limited terms. The idea is a contradiction in terms. The thinking behind the Brundtland Report was based on a fantasy — that it is possible to invent the equivalent of perpetual motion machines. The rules of life on Earth are different.

THE OUTER LIMITS

The *Blueprint* and *Club of Rome Report* authors got to the heart of the human predicament. They cut through the fog created by the widespread assumption that 'man-made capital' and 'natural capital' are, for most practical purposes, equivalent and interchangeable. Actually, human production systems do not create anything: they consume. They transform what is taken from environmental systems, back to which the

wastes inevitably generated must return and be assimilated. There are very real limits to all parts of the process.

Contrary to most theories of 'wealth creation', the real 'means' of production and conditions for production are the Earth's ecosystems: its waters, atmosphere, soils, flora and fauna, minerals, and the inputs of solar energy which power the whole. The frequently made statement that 'the economy and ecology are interdependent' is, then, absurd since the former is totally dependent upon the latter.

In a geologically finite, entropy bound and ecologically interconnected system, sustaining more of one thing must mean sustaining less of something else. The finitude of the Earth limits not only the amount of energy and raw materials available for economic activity but also the environment's capacity to absorb the waste generated by production and consumption. These losses from the economy to the 'sink' of air, land and water are not simply products of bad management but rather products of the basic laws of energy and matter, in particular the entropy law. Against these constraints, there is no technological appeal.

According to the entropy law, every process, from the generation of electricity to the refining of raw materials, inevitably must create wastes, as available energy and matter are disordered and dispersed. What the press and TV news programmes tend to call 'acts of god' — devastating forest fires, floods, avalanches, pest and disease infestations — are often consequences of human disruptions of ecological cycles, checks and balances.

It is now fashionable to mock ideas about the 'balance of nature' as a Bambi-esque fantasy. It is certainly true that ecosystems and the lifeforms they sustain are characterised by constant change. The crucial characteristic, however, is the direction of that movement. The history of the Earth is one of evolution toward greater complexity and stability. Threatening disturbances are either damped down or absorbed, such is the resilience of nature. For example, land devastated by volcanic eruption is soon healed by fresh growth of vegetation. Individual species may come and go but the ecological whole survives, tapping solar energy to maintain optimum conditions for life.

These life-support systems, however, cannot ride every human blow. The synthesised compounds created by technolo-



gists in recent decades are not just another set of chemicals. Nature has no evolutionary experience with the amounts and kinds of substances now in use and, for that reason, damage usually follows in their wake. Chemicals like mercury do, of course, occur without human intervention, but they are not normally consumed by living things. Similarly, different species of tree are not interchangeable, do not necessarily perform the same ecological role wherever people prefer to plant them. In Britain, newly introduced fir trees provide food for only 16 different insect species, whereas the long-established oak sustains 284. Again, the crucial factor is co-evolution through the ages.

All living species, of course, affect their surroundings. Beavers, for instance, create dams across rivers; but their impoundments scarcely change hydrological systems or eliminate other species in the manner of human interventions in the water cycle. The impacts of most species—and of people, too, for the bulk of their history—have been muted by a variety of limiting factors, which protect the health and productivity of ecosystems. Since the dawn of agriculture, however, human land uses and technologies have transformed Earth's surface. Unlike the patterns of diversity and succession characteristic of evolution, human-caused changes have left grossly simplified and unstable environments.

RESOURCE SCARES AND REALITIES

In the early 1970s, there was a rash of media speculation about resources running out. Queues at petrol filling stations after the Arab oil embargo seemed to confirm these fears. However, the real environmental crisis is not so much the absolute shortage in the near future of specific resources, though, already, there are signs of conflicts to come over the sheer availability of sufficient water in some regions and of certain key minerals. In the short-term, greater efficiency and the substitution of more abundant resources for scarcer ones mean that factories probably won't run out of raw materials.

The more formidable resource barrier is the depletion that would result from attempts to spread across all countries the lifestyles prevalent in the US, Japan and western Europe. If the rest of Asia, for example, were to achieve the same ratio of cars to people as Japan (not high compared to America), the

number of cars in the world would double. Yet the Earth is already choking in vehicular exhaust.

Furthermore, the frequently made distinction between non-renewable and renewable resources is not as significant as many people think. At present, the renewable resource base is actually under the greatest pressure. In 1993, for example, the price of a single large tuna was 5000-odd times greater than that of a barrel of oil (though, it must be stressed, the true cost of the latter is scarcely reflected in its market value). Eventually, geologically finite and non-renewable resources must run out or become too expensive to tap, but we are now 'mining' supplies of freshwater, fish, forest and fertile soil to such an extent that we will exhaust them long before we are short of coal.

The side-effects of resource extraction, processing, and manufacture are fundamental ecological problems, along with the impacts of consuming and discarding those products. The real concern about coal, for example, is not the size of untapped deposits but the consequences of burning them. Computer-aided mapping and drilling techniques may reveal enormous new reserves of other fossil fuels and mineral ores. Within the Earth's crust may be vast quantities of all kinds of useful minerals. The crunch would come from an attempt to tap them.

Already, the extraction and processing of mineral and energy deposits is causing great damage to soil, water systems, wildlife and human health around the world. The production of 1 tonne of copper, for example, creates over 500 tonnes of waste. World annual production of just gold and silver produces some 900 million tonnes of rock waste. The annual fueling of a typical nuclear reactor with uranium requires 100,000 tonnes of rock to be brought to the surface, most of which is dumped as waste tailings, where 90% of the original radioactivity in the rock remains.

As future supplies of fossil fuel and mineral ore will have to come from less accessible and poorer grade sources, these problems will increase, as will the vast amounts of energy required to exploit them. Mineral processing consumes vast amounts of energy and water whilst producing equally enormous amounts of pollution. Already, 'dead zones', in which vegetation has been destroyed, surround many smelters, with the one around Sudbury nickel smelter in Canada covering some 10,400 hectares.



Population Problems

At the other end of the resource cycle—disposal—huge and increasing amounts of waste are being dumped on the environment. In the main, they are not the products of mismanagement but the entropic by-product of energy and material throughput in the human economy. In the US, manufacturing industry annually generates on average 6.5 billion tonnes of waste on average (142 lbs. per person per day).

In many areas, this torrent of waste is overwhelming the capacity of landfill sites, around which are serious and growing soil and water contamination problems. Dumping at sea has also proved an unsustainable option. Given the toxic nature of many of these wastes, the other conventional alternative, incineration, poses grave hazards, particularly air pollution. The limits of recycling are discussed later; for now, it is reasonable to conclude that the limited waste absorption capacities of the environment constitute a formidable limit to growth.

LIFE-SUPPORT SYSTEMS IMPERILED

For most of history, the small human population of hunter-gatherers lived in comparative equilibrium with the environment. The major exceptions to this rule occurred when people migrated to new environments such as the Polynesian settlement of the Pacific. In such cases, they had not co-evolved with their environments and damage was done before a balance was struck.

However, the explosion in both people and human-created artifacts is now decreasing the free 'life-support' functions provided by ecosystems: breathable air, fertile soil, potable water, amelioration of weather extremes, water retention, breaking down and recycling of wastes, pollination, photosynthesis, etc.

The planet's tree cover is among Earth's primary 'life-support' systems. Forests act as buffers against excess carbon dioxide in the atmosphere and stabilise climate; they enhance rainfall; they protect soil and act as sponges against excess downhill flow of water; they purify and cool the air; they absorb noise; they provide habitats for an incredible variety of wildlife; they convert solar energy into a host of specific resources of which lumber is just one...and, to many eyes, they are beautiful. The more these natural, large-biomass, diverse and multiple-age forests are replaced or cleared by single-species, even-aged and short-rotation plantations, the more these

irreplaceable life-support functions are lost. Wetlands also play a critical role. They are nature's kidneys, processing the nutrients in waterways. Furthermore, they protect shorelines, recharge groundwater, moderate flooding and climate whilst, of course, providing habitat for many other species, including, in the US, over 180 Endangered species.

Human activity is now decreasing the self-renewing, self-regulating and self-repairing capacities of ecosystems. Sometimes, the destruction happens on a large scale, as with the destruction of rainforests to make way for cattle ranches and mines. More often, though, it is the cumulative consequence of a myriad of seemingly insignificant developments, from new housing and hospitals to new marinas and ski resorts.

Many of these land and hydrological transformations are related to the supply of the bare necessities of life — the provision of drinking water, food, shelter. Even growth in the number of, say, the most frugal monks and of the most austere monasteries to house them eventually would cease to be sustainable. Most populations and their governments have more material ambitions and these would encounter environmental limits much sooner. The whaling, plantation forestry, and hydroelectric development pursued in Mrs Gro Harlem Brundtland's own homeland, Norway, illustrates the inevitable conflicts between the expansion of human demands and the conservation of non-human species and environmental systems as a whole.

THE INNER LIMITS

The limits-to-growth concept is not only based on the external constraints of surrounding ecosystem. It also acknowledges limits found within the fabric of society as a whole and within the physical and psychological tolerances of individuals. A growing society generates increasing problems of coordination and manageability. Lengthier and more complicated decision-making processes have their own 'entropic' overheads in terms of decreasing resilience, responsiveness to democratic control, flexibility, and overall satisfaction of the purposes they are meant to serve.

At a more individual level are other social limits to growth. Rapid change in society, for example, often overwhelms the capacity of its members to cope and adjust, producing disori-



entation and alienation. Even if limitless increases in material affluence were physically possible, the objective depends, as Fritz Schumacher argued, upon 'cultivating such drives of human nature as greed and envy, which destroy intelligence, happiness, serenity and thereby the peacefulness of man'.

Growth also tends to increase dependency and vulnerability to outside forces, over which individuals and communities retain less and less control. In contrast to claims that growth will increase individual choice, Ghandi's prediction that the expansion of the 'industrial machine' would dictate to people 'what and how they should eat, wear, dress, sing and dance' seems closer to the mark. Cultural diversity is as much at risk as biodiversity. A massive contraction in linguistic diversity is taking place, with some 3000 languages worldwide on the endangered list. There also seems to be an impoverishment in communication skills, of which today's political leaders provide stark testament. (Neil Postman's *Amusing Ourselves to Death* provides analysis, particularly of the role of media and computing technologies, which many people hail as the basis of a new information society.)

Social limits to growth can be seen in the way that personal and social well-being have often decreased with greater physical affluence. Instead of greater contentment is a rise in dissatisfaction, a constant craving for innovation and novelty, paralleled by disdain for continuity and stability. Consequently, our society is wracked by an impetuous and impulsive consumption of commodities and therapies in a never-ending search for happiness.

This, in turn, keeps the economy expanding—and destroying more of the Earth. Much has been written on the process whereby social stability as well as individual self-reliance and self-esteem decline, for example, Christopher Lasch's *The Culture of Narcissism* and Paul Wachtel's *The Poverty of Affluence*. Most sustainable development thinking, by contrast, has failed to see social and environmental problems as a whole, with common causes and cures.

We need not romanticise the past to recognise something deeply worrying in today's incidence of mental illness, of physical illnesses like cancer and heart disease, of crime, loneliness, indebtedness, addictions, and assorted family disorders in affluent countries, despite their extensive education, health care

and other services. Ironically, in societies full of labour-saving devices, people forever complain of being short of time. Moreover, sociologists have found that the number of Americans who describe themselves as happy has not changed significantly over the past 50 years, even though, in that period, the country as a whole has consumed more fossil fuels and minerals than all other peoples in the whole of history.

Of course social problems are so complex that it is difficult to identify specific causes and effects; but it is reasonable to link many of today's ills to the decay of family and community bonds. Their erosion stems from many factors, but the greatest would seem to be the pressures generated by a growing population and an expansion-oriented economic system. Together they sunder the social structures that give individuals a sense of security, identity, and purposefulness. It happens in many ways—the sense of 'anomie' and facelessness felt by inmates of big organisations and large housing developments, the devaluation of personal skills by rapid technological change, the disruption of family life by long-distance commuting and by the work patterns required to keep the wheels of industry and commerce turning, the stresses of life in the fast lane of the '24 hour day', the worries created by personal indebtedness, the physical break-up of communities by roads and other developments—but all are symptoms of growth.

Economic Limits

Such negative social developments underlie the fiscal crisis in the contemporary welfare state. The various social welfare services can be seen, to some extent, as enormous repair kits, trying to provide surrogates for the family and community structures undermined by industrial expansionism. As the American writer Hazel Henderson points out, government budgets are being strained by the bills for all the ill-health and other social costs generated by our production and consumption patterns and by the bureaucracies necessary to manage welfare, health care, education, and law enforcement services.

Many people are well aware, of course, of the links between social disorder and unemployment, but they generally do not suspect that in more stable communities, economic depression did not usually produce crime and anti-social behaviour to the same extent as today. Nor do they realize that



economic growth is likely to exacerbate, not lessen, the shortage of well-paid and secure employment. Given the current pattern of technological development, any increase in economic output is likely to lead employers to invest further in labour-saving machinery.

Most, supporters of sustainable development also favour greater global integration. This will lead to more job losses. A recent survey of 10,000 firms in Germany revealed that 33% of them planned to relocate some of their operations to regions like eastern Europe and Asia, enticed by low wages and fewer 'barriers' such as trade unions, safety regulations, and environmental protection measures. Yet the alternative policy of limiting world trade and capital movement only rarely finds expression in writings on sustainable development.

ETHICAL LIMITS AND THE LONG-TERM

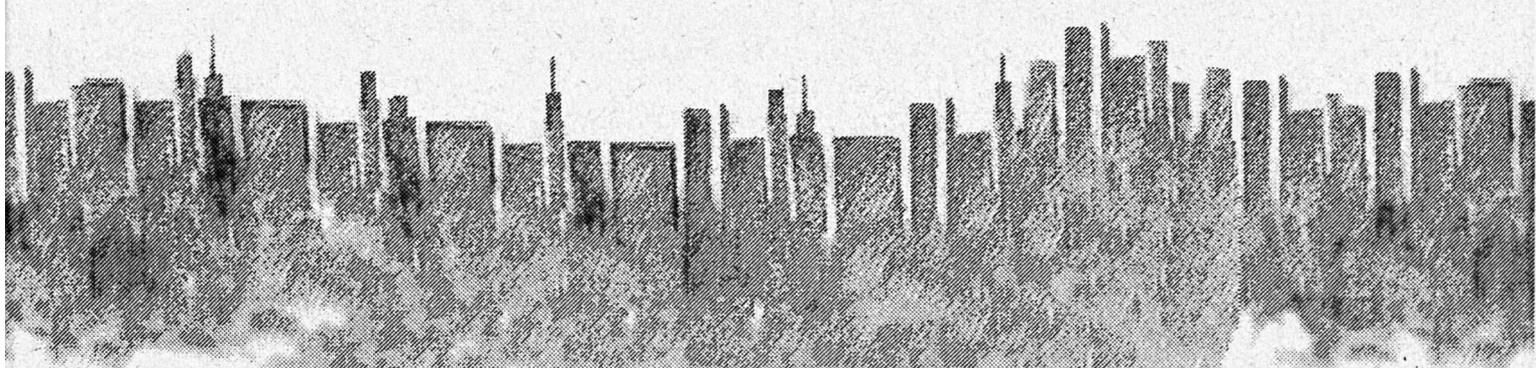
The final group of 'inner' limits are ethical. They prescribe morally unworthy actions such as placing risks on third parties from polluting technologies; the robbing of future generations of their resource needs by selfish and wasteful behaviour; inflicting suffering upon non-human species and destroying their habitats. Of all the limits discussed, the ethical ones are where the issue is mostly of desirability rather than feasibility. Regarding biodiversity, it might be possible to eliminate this or that species, without direct human risk; but it is simply wrong to do so.

For many people, however, limits are synonymous with oppressive restraints. Many critiques of the *Blueprint for Survival*, for example, claimed that it was prescriptive, if not downright authoritarian. Indeed, in the framework of 'post-modernism', a popular intellectual fad in recent years, the very notion of standards and values has been thrown overboard, leaving a world-view in which everything is relative and transitory. In the canon of political correctness, it is deemed impermissible to make judgements on the behaviour of others, especially if they belong to the 'disadvantaged' groups. Some writers even celebrate mass consumerism and popular culture, as in TV game shows and 'top twenty' music, as expressions of resistance to what, it is claimed, are elitist standards of excellence.

The concept of limits, by contrast, suggests yardsticks and implies judgements. Actually, the concept of limits provides a positive framework for decision-making. It provides guidelines for long-lasting fulfillment. The limits to growth should be seen as brakes and safety barriers. Any system—plant, animal, community, institution, machine or ecosystem—must have limits to its functioning. Otherwise it would cease to be an ordered entity. As veteran ecologist Eugene Odum puts it, 'growth beyond the optimum is cancer'.

The key challenge for human society is to learn to think in terms of sufficiency rather than growth. The Science Council of Canada rightly noted, with respect to agriculture, that 'a sustainable food system implies frugality—the willingness to live within physical and social limits for the long-term benefit of all'. The general failure of sustainable development analysis and policy to accept the concept of limits is paralleled by a similar pattern of evasion and denial regarding the different constituents of growth in the pressure being put upon environmental and social systems. Part 2 of this article will explore these constituents—human overpopulation, overconsumption, and harmful technology. ■

Sandy Irvine (Environmental Policy Unit, University of Northumbria, 22, Ellison Place, Newcastle Upon Tyne, NE1 8ST) is working on secondment as the Environmental Curriculum Development Officer at the University of Northumbria, seeking ways to introduce green issues into the curriculum. He co-authored A Green Manifesto (London: Optima, 1988) and subsequently wrote Beyond Green Consumerism (London: Friends of the Earth, 1989). With Helen Manns, Environmental Policy Officer at the University of Northumbria, he wrote Towards A Greener Curriculum (Newcastle: University of Northumbria, 1994). He also contributed a chapter on population and environment to S. Parkin, ed., Green Light on Europe (London: Heretic Books, 1991). He co-edits a quarterly ecopolitical magazine Real World and is an associate editor of The Ecologist.



Book Reviews

Reviewed in this issue:

The Biophilia Hypothesis
Regarding Nature: Industrialism
and Deep Ecology
The Sheep Look Up
American Nature Writing 1994
Battle for the Elephants

THE BIOPHILIA HYPOTHESIS

edited by Stephen Kellert and Edward Wilson; Covelo, CA: Island Press, 1993; 484 p.

Why do so many urban folk, at every opportunity, drive hundreds of miles and spend hundreds of dollars just to lounge for a few days on a beach, hike through a forest or desert, or camp by a mountain lake?

Well, obviously, because we want to. Because we like such eye-pleasing, restful scenes.

Granted. Yet, why do we find beaches, mountains, lakes and forests restful and eye-pleasing? And why do certain animals—the so-called “charismatic megafauna” such as Grizzly Bears, big cats, eagles, and whales—evoke in many of us such powerful feelings of awe and respect? Conversely, how do we explain humanity’s widely shared phobias for certain elements of nature—spiders, snakes, dark woods?

The twenty contributors to *The Biophilia Hypothesis* think they may know the answer: We can’t help ourselves; these traits are in our genes and basic to the human condition.

Edited by Stephen Kellert, Yale professor of environmental studies, and E.O. Wilson, Harvard professor of science and two-time winner of the Pulitzer Prize for nonfiction, *The Biophilia Hypothesis* expands on Wilson’s decade-old premise (see *Biophilia*; Cambridge: Harvard University Press, 1984) that humans embody an instinctive, genetic bond with, love of, need for wild nature—thus, “biophilia.”

The 18 essays in *The Biophilia Hypothesis* explore biophilia, and biophobia, in voices ranging from conversational to pain-

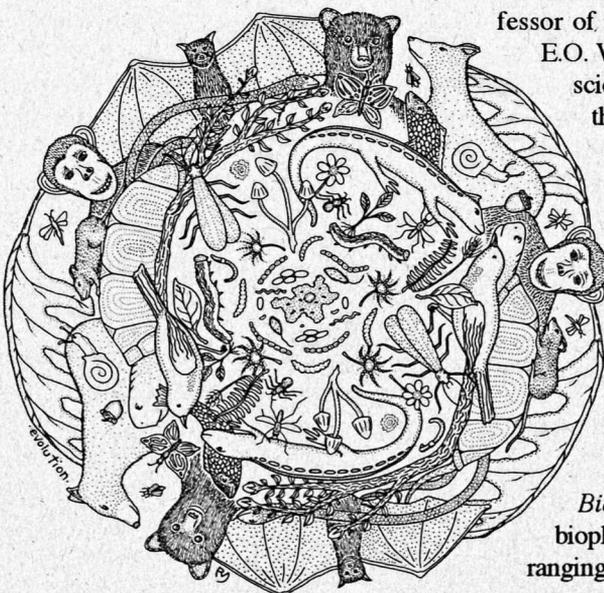
fully academic—although probably not too painful for the select readers of *Wild Earth*. Among the most satisfying of the essays is “The Loss of Floral and Faunal Story: The Extinction of Experience,” by Gary Paul Nabhan and Sara St. Antoine, wherein the authors equate the diminishment of Sonoran Desert biodiversity—via livestock overgrazing, alteration of natural hydraulics, and other unnatural influences—to the loss of both the traditional affinity with nature and the oral tradition (storytelling) which transmitted that affinity across countless generations of southern Arizona Indians. Thus, say Nabhan and St. Antoine, environmental impoverishment leads to cultural impoverishment leads to personal impoverishment.

Nabhan and St. Antoine write:

Biophilia has been described as the innate human need for contact with a diversity of life-forms (Wilson 1984). Therefore, the expression of biophilia should be possible in any individual. Yet if this phenomenon called biophilia is the genetic affinity for other life, why is it expressed in some people and cultures more than others? At least three answers are possible.

First, perhaps biophilia is not genetically determined but is a set of learned responses. Or, second, biophilia could be a set of behaviors based on a number of genes, for which any particular individual may have some but not all of the genes. In other words, some human genetic lineages may have been selected for biophilic responses more than others. The third possibility, which we believe is consistent with Wilson’s original hypothesis, is that a child’s learning environment greatly conditions the expression of any genetic basis for biophilia. Unless the appropriate environmental triggers are present in a certain cultural/environmental context, biophilia is unlikely to be fully expressed.

Another outstanding contribution is



"Searching for the Lost Arrow: Physical and Spiritual Ecology in the Hunter's World," in which Alaskan anthropologist Richard Nelson recapitulates the "primitive" worldviews he so poignantly elucidates in his 1991 John Burroughs Medal-winning *The Island Within* (San Francisco, North Point Press, 1989). Traveling a line of thought parallel to that of Nabhan and St. Antoine, Nelson tells us:

In the brief passage of five centuries, European culture and technology have radically overturned an order that prevailed in North America for thousands of years. Perhaps, at some level, Euro-Americans also carry inside them a deep affinity for life; if so, it has been subservient to other values and motivations. Compared with their Native American predecessors, Euro-Americans have exploited the living community with an utter disregard for restraint or moral concern.

Of course, there are signs of change. Ecological perspectives that emerged during the past century are now spreading beyond the scientific enclave into the population at large. Environmental ethics and related bodies of thought are also diffusing outside the academic sphere. But for the most part, our society remains embedded in the Western worldview, which isolates us from the natural community and leaves us spiritually alienated from nonhuman life. We have created for ourselves a profound and imperiling loneliness.

And so on through 484 thought provoking pages.

In an age when human overpopulation, institutionalized materialism and greed, and consequent environmental degradation threaten our peace, happiness and, ultimately, our very survival, *The Biophilia Hypothesis* offers food for meaningful rumination.

Reviewed by David Petersen, Durango, CO; editor of *Confessions of a Barbarian: Selections from the Journals of Edward Abbey, due out this fall from Little Brown; currently writing a book on the ghost Grizzlies of Colorado, to be published by Henry Holt.*

REGARDING NATURE: Industrialism and Deep Ecology

by Andrew McLaughlin; SUNY Press, Albany, NY; 1993; 280p.

Andrew McLaughlin's *Regarding Nature* is a superb attempt to explain deep ecology and why it is important, to the socially progressive audience, which has been alternately lukewarm or hostile to its message. *Regarding Nature* can be seen as the third installment of a trilogy along these lines. It started in Tasmania with Warwick Fox's *Toward a Transpersonal Ecology* (1990), then Robyn Eckersley's *Environmentalism and Political Theory* (1992), and now across the oceans to New York City, where McLaughlin teaches at Lehman College.

Each new contribution in this informative series seems to get better. Whereas Fox sometimes sounded a little too "new age," Eckersley started to lay down a radical ecocentric framework which she brilliantly called "Emancipation Writ Large." Now McLaughlin comes along and fills in large portions of the erstwhile sketchy platform. After reading *Regarding Nature*, no critic of deep ecology—no matter how snide—will ever be able to reasonably claim deep ecology lacks political sophistication or social awareness. Unfortunately, *Regarding Nature* has not gotten anywhere near the attention it deserves.

The subtitle of McLaughlin's book is "Industrialism and Deep Ecology," and he "argues that industrialism is a primary reason for our current ecological misfortune." The book is very evenhanded; it spends as much time criticizing socialism as it does capitalism:

Formal ownership of the means of production and the rest of nature by "the people" does not by itself resolve the ecological problems of industrial society....

Marx ... envisions a general material abundance as the substratum of communism. Marxism, as well as capitalism, is under the spell of the idea that material production is the key to human social development.... For Marxism,

there is simply no basis for recognizing any interest in liberating the rest of nature from human domination.

Advanced capitalism requires a culture which identifies the good life with consumerism. Equating the good life with material possessions is one of the few compensations left once mass society becomes the dominant way of life.... People in industrial societies have become helpless and mostly passive victims of systems that they neither understand nor control.... Lacking any form of transcendent meaning, or meaningful participation in community life, all that is left are the satisfactions available in material consumption. Industrial people literally surround themselves with concrete, which both causes and reflects a psychic and sensual numbing.

He goes on to write of "the illusion of control," so prized by ideologues of both the left and right:

Both capitalism and socialism require planning on an increasing scale and depth.... Our ability to control parts of nature supports the illusion of control.... Thomas Birch argues that one of the important functions of wilderness areas is keeping open the possibility of seeing beyond the illusion of control fostered by the "imperial story of Western civilization"... Who, when gazing into the starred night, sensing its vastness, can believe that we are in control?

McLaughlin discusses the various forms of environmental ethics that have led to deep ecology. He then gives an excellent point by point analysis of the deep ecology platform, discussing both strong and weak links. On point #4:

Once recognition is given to other forms of life, then it is clear that we humans are too many already. We have already jostled many species out of existence.... The continuing increase in human numbers also condemns many humans to a life of suffering.... we should collectively recognize that an increase in human numbers is not even in the best interest of humans, much less the rest of life....

To claim that overpopulation is the only problem is simple-minded.... A per-

son living in an industrial area places far greater stress on the biosphere than does a person living in the Third World. But it is also simplistic to ignore that there are over five billion of us ... Solutions to the population problem will vary with location and culture, but the problem must be addressed by anyone interested in progressive social change....

As a social worker-cum-deep ecologist, I strongly concur with McLaughlin's conclusion:

Deep ecology is to be commended for giving priority to the population problem, and for putting forth the claim that the flourishing of nonhuman life requires a substantial decrease in human population.

The last chapter, "For a Radical Ecocentrism," is especially good. In answering Third World critics like Ramachandra Guha, McLaughlin writes: "To change industrialism, radical ecocentrism must make common cause with the oppressed of the world." An ecocentric position involves identification with all life, so there is no reason to suppose an ecocentric position cannot include social activism (Bill Devall's books address this theme.)

It is far less clear that the anthropocentric position can be broadened to adequately embrace the biosphere, given its miserable track record over the past several thousand years. Ironically, the human-centered ethic hasn't even begun to meet human needs; there are far more absolutely miserable people today than ever before. Anthropocentrism has had its 5000 year day in the sun, and has left things in an utter shambles. It is time to shift the focus toward a radical ecocentrism, and Andrew McLaughlin has admirably advanced us toward this goal.

Reviewed by Bill McCormick, Charlottesville, VA

THE SHEEP LOOK UP

by John Brunner, 1972; Brunner Fact and Fiction, Ltd.

Most avid fiction readers will remember *Atlas Shrugged*, Ayn Rand's big doomsday novel. Rand's smokestack huggers go on strike against government regulation, bringing on a new dark age. It's great reading, but with nature lovers cast as fools, not satisfying. Science fiction has since answered Rand with forecasts like David Brin's well-researched *Earth*.

Nuclear cataclysms are a dime a dozen in this genre, whereas few authors ponder the more likely specter of environmental ruin. As I lately discovered, this kind of speculation peaked with John Brunner's perceptive 1972 novel, *The Sheep Look Up*.

Why unearth such ancient tomes now? Because dated speculative novels help us see who got it right—the cheerleaders of industrial society, or its critics. Were the warning signs of yesteryear plausible, or were they as silly as optimists promised they'd be?

John Brunner's tour of the American closet finds a myriad of skeletons, from our pesticide legacy to environmental racism to the Third World export economy back to the colonists who gave smallpox-infected blankets to Indians. Brunner foresaw the rise of radical en-

vironmentalism, along with the crusade to vanquish the movement.

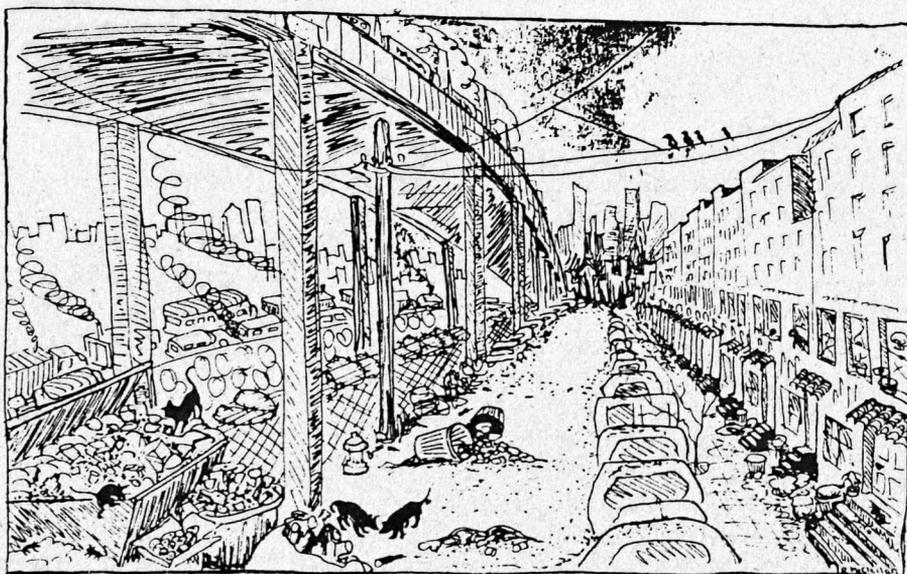
Brunner's doomsday scenario relies more on consumerism's by-products than on consumption itself. The author uses his vast knowledge of chemicals to conjure a society choking on pesticides and toxic waste.

Like John Galt in *Atlas Shrugged*, *Sheep's* leading man is a brilliant scientist driven underground to escape state assassins. Eschewing Rand fever-dreams of a government down on right-wing industrialists, Brunner draws more realistic feds who gun for "enemies of progress."

The author further parodies Rand by naming his protagonist Austin Train (a play on the railroad heroes of *Shrugged*) and employing him as an itinerant garbageman. Train, a Caronesque chemical expert, gathers a flock of disciples devoted to a low-impact lifestyle.

Brunner's future is fraught with harrowing diseases, lethal food and water, and bugs that laugh in the face of DDT. It's truly an alarmist "what if," still thankfully overdrawn 22 years later. *Sheep* does, however, make astute predictions which must have drawn chuckles at the time.

Example: in 1972, ecology was a fashionable idea, taken seriously enough to sweep in the Clean Air Act, Clean Water Act, and Endangered Species Act. Brunner knew those heady days



wouldn't last, foretelling the persecution to come for anyone telling truths others cannot stand. When hit men bomb Trainites out of their homes, the media blame the victims—shades of Judi Bari.

Whistle blowers die mysteriously on the eve of going public (Karen Silkwood). Brunner's conservationists are vilified as traitors and communists. Not until the 1990s, and the loss of the Soviet bugaboo, did red-baiting tree huggers really hit its stride.

Deadly drugs and chemicals wreak havoc among Brunner's characters. Some of the heaviest damage is done by Trainites who run amuck, destroying what they profess to hold dear. It's a grim reminder that insanity isn't limited to the military-industrial complex, but a danger lurking for all modern humans.

Brunner's road to ruin is paved by greedmongers who wreck the planet for profit. In the end, though, ignorance does more harm than evil design. When African food aid and Denver's water supply are laced with a psychotomimetic drug, Trainites get the blame. They in turn reveal that the chemical leaked from forgotten canisters at the Rocky Mountain Arsenal.

Brunner does skim over some of today's hot issues, like deforestation, wilderness preservation, and range wars. His predicted drop in American life expectancy has yet to hit the news. Gonorrhea is his worst sexually-transmitted disease, but what author envisioned AIDS? In the early 70s, environmental poisons were the leading public environmental issue—and still are.

When Brunner's answer to Ayn Rand came out, the Clean Air and Clean Water acts were new. This book conveys how important these legislative acts are to both human survival and wilderness affected by rainfall and human waste.

Let's remember that powerful forces are trying to gut these, along with the Endangered Species Act. Modern activists must work as hard not to lose ground as to win new victories. We could still end up like sheep in John Brunner's nightmare vision.

Reviewed by Leslie Lyon, Cedar City, UT

American Nature Writing 1994

selected by John A. Murray; Sierra Club Books; San Francisco, 1994; 229 p.; \$12 paper

Does nature writing have a future? If, like John A. Murray, you are the editor of the first volume in an annual collection of American nature writing, then you are almost obliged to think that it does. "One has the sense," Murray writes in his introduction, "that nature writing is poised at the beginning of a period of wonderful exuberance. All of the excitement that attends the beginning of a new century, and the start of a new millennium, together with a growing awareness of the interdependence of nature and culture, cannot help but fuel this historic genre."

In "Writing Wild," an essay that appeared nearly twenty years ago in *Red Wolves and Black Bears*, Edward Hoagland was not so sanguine. Sent off to "wildlife refuges and salt swamps" to write about nature, he was startled to see how few other people he met tramping around in the wild.

How long will these readers continue to miss walking in the woods enough to employ oddballs like me and Edward Abbey and Peter Matthiessen and John McPhee to do it for them? Not long, I suspect. We're a peculiar lot: McPhee long bent to the traces of The New Yorker, Matthiessen an explorer in remote regions that would hound most people into a nervous breakdown, Abbey angry, molded by what is nowadays euphemistically called "Appalachia."

Edward Abbey is dead, but his presence is everywhere in this new volume, most obviously in an entry from his own journal that describes his misadventures on a bighorn sheep count, and in David Petersen's account of a pilgrimage to his hidden desert grave. Abbey's spirit is alive, too, in Rick Bass's scalding jeremiad on the destruction of the Montana wilderness (which comes complete with the addresses of Senators and Congressmen for those who are moved to join his protest).

This collection inevitably displays some of the qualities that have made American nature writers, at least since Thoreau, unpopular with many readers: not just their crankiness and anger, but their claim to the moral high ground,

their sanctimoniousness, their insistence on the transcendent value of this pond or that forest, and their sometimes overheated paeans to the beauty of a praying mantis or a drop of pond water.

Outweighing such lapses are the accurate, graceful, quietly moving observations that illuminate many of the other selections, including Kenneth Brower's loving catalogue of island beaches he has known. "The damp sands low on Galápagos beaches," he writes, "are marked everywhere by the hieroglyphics that ghost crabs leave in feeding"—the dashes, periods, and exclamation points created as they scrape and sift the sand. "The commentary of ghost crabs can cover a whole beach, between each erasure of the tide. The messages are all exclamatory, like those notes fifth-grade girls pass among themselves in class."

In another essay, Sherry Simpson tells of accompanying a trapper and a wildlife biologist on a project to research bears, "so I can touch with my own hands what frightens me most." Her opportunity comes when she is invited to feel the paws of a sedated bear. "I press my palm against the leathery pad. The curving ebony claws stretch longer than my little finger. Heat radiates into my skin." It's a marvelous moment, but Simpson is honest enough to acknowledge that there is something too easy about it. "I smooth the black pelt, then ruffle it again. I'm taking liberties I haven't earned. I know that." Nature subdued is not really nature anymore.

What does it mean to be a nature writer during the age of the "end of nature?" Now that the very existence of nature and the natural has been called into question—now that we have tampered with the air and water, even the climate itself, beyond the earth's ability to repair our damage—nature writers will have to redefine what they are doing. As they work out answers that satisfy themselves, nature writing—never a tidy category anyway—will become more and more intertwined with philosophy, psychology, history, and religion. This book provides some clues about the directions it will take.

Reviewed by Geoffrey Wisner (12 Suffolk St. Apt 2, Cambridge, MA 02139)

BATTLE FOR THE ELEPHANTS

by Iain & Oria Douglas Hamilton; New York: Viking Penguin; 1992; 368 p., \$30

In 1991 I spent a month sitting in a tree beside a water-hole in northern Kenya, with a camera, waiting for elephants. I worked for World Wildlife Fund on the Gallman Memorial Ranch and my job was to photograph African Elephants for identification.

Although I had already seen numerous elephants during my seven month stay in Kenya, each time the awesome creatures emerged from the trees, my heart pounded with excitement. Their enormity, strength, grace and affection were overwhelming. That month, I watched elephants, dreamt about elephants, talked to elephants and read anything on elephants I could get my hands on, including Iain and Oria Douglas Hamilton's first book *Among the Elephants*.

Among the Elephants recounts Iain's and Oria's five year stay with the elephants of Manyara, Tanzania. The couple studied the elephants and grew intimate with the herds. In fact, Iain and Oria were able to physically greet Virgo, their favorite matriarch, hand to trunk. After leaving Manyara to campaign for the elephants, Iain and Oria returned in 1987 to find the population of the herds down from 485 to 198. Similar depletion was occurring throughout Africa.

Battle for the Elephants, Iain's and Oria's second book, tells of the elephants' struggle for survival and how the world reacted. Going back to 1969, Iain and Oria take readers through Africa and explore the issues they see as responsible for the massacre of the elephants: political agendas, arms trade, money & greed, deforestation, human over-population, and western civilization's corruption of Africa's land and people.

In 1976 David Sheldrick of Kenya's Tsavo Park announced that 15,000 elephants had been killed in two years, a 44% drop in population. On the north bank of the Nile in Uganda in 1980, 2200

live elephants were found, compared to the 4000 counted in the 1960s. In the 1970s, 200-300 tons of ivory was leaving Zaire each year, an average tusk weighing 4-10 kilograms. In 1984 Iain and Oria found 7900 dead and 4300 live elephants in Central African Republic.

Despite the astonishing figures, conservation groups, government officials, and scientists refused to take action and continued to rely on CITES, the Convention on International Trade in Endangered Species. CITES was enacted in 1975 as an attempt to regulate the trade of rare wildlife products. It has proved inadequate. Iain writes, "Even now I am consumed with anger at the sluggish reactions of most of the elephant scientists and the conservation establishment to the unmitigated slaughter of the elephants. And while they argued among themselves, the elephants died..." (p. 31)

Iain and Oria had been following the ivory trail across Africa since 1969. They found in each country a different but similarly grim story. During the 70s Uganda and Rwanda were among the nations culling elephants because they felt the populations were high and the creatures would destroy woodlands. Iain and Oria believed, "By playing God, man was pushing these ecosystems and the elephant's way of life even further away from any natural state." (p.123) The conservation movement was distinctly divided on the issue of culling.

In Zaire, government soldiers were shooting elephants for meat and ivory.

The South African parks were managed like giant game ranches. Wardens and researchers felt this was the only way to preserve wildlife in this populous nation.

Human population had a major impact on the elephants in Mauritania. Oria writes, "As the people grew more numerous there would come a time when the fragile soils of Africa could no longer support them. In some countries that breaking point had already been reached." (p.141) Livestock grazing caused similar problems in Mali: "With the fragile habitat already stretched to

breaking point, the spread of domestic animals in the Gourma was leaving even less room for these elephants of the farthest north." (p.150)

Forests were being depleted rapidly. The Ivory Coast lost more than seven million hectares in 20 years. Oria lamented, "Once the Ivory Coast was a densely forested country with masses of elephants. Now the elephants and the great forest trees, the giants of Africa, were both going to their graves." (p.152) Iain and Oria found the elephant range throughout all of Africa broken into "small islands surrounded by seas of humanity." [Sound familiar?] (p.152)

In Cameroon, the native hunter-gathers, to whom killing elephants was a sacred ritual, were corrupted with the introduction of guns. European and wealthy African gun-owners received the ivory and the Pygmies were given meat. Once Pygmies were taught the financial value of elephants, their life style would never be the same.

Out of the 1230 elephants Iain counted in Uganda in 1976, only 150 remained in 1980. The weapon used to shoot them was the AK-47. The Ugandan head of state had been replaced by a provisional military government, and hell had broken out. Iain trained a poaching patrol and monitored the land by foot and plane. Flying at night, he saw the air alight with the flair of poachers' guns. Dead elephant and human bodies were scattered across the land. Uganda was lawless; children were starving as the Ugandans became enamored of the sound and power of automatic weapons. Oria writes, "Wherever we went the sound of bullets sang in the wind and guns had become as common as bananas." (p.228)

Although each country's story varied, the conclusion was the same: they were all losing great numbers of elephants to poaching. Iain claims, "If the bodies had been human, what happened would have been called genocide." (p.183) Upon returning to Kenya from Uganda in 1982, Iain and Oria realized they were in a different struggle, a new war: the division of the conservation

Readings

movement. Iain and Oria wanted to expose all the illegal traders, companies and officials involved in poaching; encourage a united, international campaign; instate police patrol against poachers and impose a ban on all ivory commerce. Other "conservationists" did not see a crisis and wanted to work with and understand the traders.

Iain writes, "I came away from Uganda believing that if elephants and wild places mattered, no half-measures were going to keep them going." (p.249) By exclaiming the truth and advocating the necessary drastic measures, Iain's reputation as a radical trouble maker grew. Malicious rumors of Iain running guns and buying ivory were spread to discredit him. WWF, whose position was to impose a tax on ivory, pulled all financial support from Iain and Oria. The Douglas-Hamiltons kept fighting.

Finally, in a meeting in 1988, a scientist named Graeme Caughley predicted the imminent collapse of African Elephant populations from overkill: precisely what Iain and Oria had been saying for years. This time the warning shocked people into action.

People afraid to help in the past began to emerge, offering help and information. Documents which had been concealed from the world were released. Reports revealed that CITES organizers, staff, supporting scientists and general expenses had been partially funded by the ivory trade.

At long last in 1989, 91 of the 103 CITES signatory countries sent representatives to join NGOs and scientists in Switzerland to decide the fate of African Elephants. The CITES members voted into effect a worldwide ban on the commercial trade in ivory. The incentive

for poaching was taken away and elephant populations could begin to recover.

Today, the ban is still in effect, but with the continuous threat of being lifted. Although elephants can roam the land of Africa free from poachers, they still face desertification, human overpopulation and loss of habitat. The battle continues.

Battle for the Elephants is an enthralling story, teaching valuable lessons about the tangled world of wildlife and conservation politics. Elephants and elephant lovers can be grateful that Iain and Oria loyally followed the ivory trail and dared to speak honestly and courageously to an all-too moderate conservation movement.

*Reviewed by Kathleen Fitzgerald,
Wild Earth staff*



FOR EVERYTHING THERE IS A SEASON: The Sequence of Natural Events in the Grand Teton-Yellowstone Area

by Frank C Craighead Jr, 1994; Falcon Press (POB 1718, Helena, MT 59624; 800-582-2665); 206p., color photos; \$16.95

Editor's note: Frank Craighead may have engendered a new genre. All bioregions deserve popular phenologies; may naturalists everywhere commence seasonal sequence accounts like Craighead's, and may they be as scientific and artful as his! The following excerpt (from p.37-39) hints at the richness of The Sequence of Natural Events in the Grand Teton-Yellowstone Area. — JD

May 1-7

By the first week in May, Jackson Hole is usually clear of snow except for lingering cornices and deep drifts, but in some years snow still blankets much of the valley in the vicinity of Moose, Wyoming. When this delayed melting of snow cover occurs, flowering plants are late in appearing and there is considerable variation in time of first bloom from one year to the next. Nevertheless, raven eggs are hatching, and ospreys, sandhill cranes, and red-tailed hawks are incubating. Yellow-headed blackbirds and even comma and red admiral butterflies can be seen against a background of snow. White phlox will now be observed frequently on warm, southeast-facing slopes receiving direct sunlight. Under the lodgepole pine (*Pinus contorta*), elk sedge (*Carex geyeri*) is flowering. Aspen, narrowleaf cottonwood, and some willow catkins are quite conspicuous with developing aspen leaves providing a warm, yellow-green tinge to wooded slopes. The leaves of shrubs such as currant (*Ribes* sp.), river hawthorn (*Crataegus rivularis*), chokecherry (*Prunus melanocarpa*), and snowberry (*Symphoricarpos oreophilus*) are slowly enlarging.

The green coloring of the vegetation is due to chlorophyll, a pigment that enables the plant, through the process of photosynthesis, to utilize the energy of the sun in manufacturing carbohydrates from water and carbon dioxide while releasing oxygen during daylight hours. Chlorophyll is the most important organic compound on earth. Almost all life forms are directly or indirectly dependent upon chlorophyll for their existence. When young Canada goose goslings hatch or young ground squirrels leave their burrows, the green grass and herbs are present for their immediate consumption. The goslings or squirrels, in turn, may eventually provide a meal for a hungry coyote, badger, mink or raven. This is the season in the northern hemisphere for the conversion of light energy to chemical energy. The light green coloring of the landscape is a sign of the production and use of new stores of energy for new plant and animal life.



OTHER RECOMMENDED TITLES

IN OUR HANDS: A Strategy for Conserving California's Biological Diversity; by Deborah Jensen, Margaret Torn, and John Harte, UC Press, 1993, 300p.

Here is a good overview of what is arguably the most biologically diverse and anthropogenically threatened state in the US. California has already lost 70 known species and subspecies of plants and animals. It leads the United States in Threatened and Endangered species. California's ecosystems range from sub-sea level desert to alpine mountain tops. These two extremes are fairly well protected in parks and Wilderness Areas. Most of what lies in between remains vulnerable to exploitation. Jensen, Torn, and Harte skillfully summarize California's full range of ecosystems and threats thereto.

This book deserves very high marks overall, but also a few minor criticisms. My primary criticism is that it's not bold enough. It doesn't clearly enough call for large-scale wildland recovery. Also, I've a complaint about the authors' use of the word 'wildlands'. They put 80% of the state in this category by equating wildlands roughly with lands not yet completely converted to human uses. I fear this is misleading. At this perilous point in history, a pragmatist would admit that California is much less than half wild. Eighty percent wildlands is a good short-term goal for California, and would entail taking livestock out of grasslands; ending commodity extraction on public lands; somehow—through a massive labor-intensive effort—eradicating the exotic annual grasses on the state's grasslands and replacing them with the native perennial grasses; renewing oak regeneration ...

Notwithstanding the above criticism, *In Our Hands* is necessary reading for all defenders of California. Even those few Americans who have never and will never live in California should read this excellent overview. —John Davis

FIRE ECOLOGY OF PACIFIC NORTHWEST FORESTS, by James Agee; 1993; Island Press (1718 Connecticut Ave NW, Suite 300, Washington, DC 20009); 490p.; \$50

This fact, theory, and hypothesis laden tome will benefit forest advocates throughout North America, especially in the Northwest. Many wildfire principles can be generalized across landscapes, so every one living in a bioregion that burns will benefit from the information here conveyed.

The book explains, for instance, the differential volatilization of nutrients, edaphic effects of fire, erosional consequences of burns, hydrological effects of blazes, vegetational responses to conflagrations, faunal responses to flames (fauna flee), and other environmental effects of fire. Also explored is

the controversial topic of "cultural fire"—Native Americans' use of fire to clear land and improve hunting and foraging opportunities. (Which exploration prompts this reviewer, at least, to wonder if Native Americans' use of fire is now being exaggerated and overemphasized, as the pendulum swings away from the previously prevailing view of Indians as plain members of the biotic community. It seems all too fashionable these days to criticize as naive past historical accounts of Indians having little effect on the landscape, and to trumpet the new notion that Indians manipulated landscapes throughout the continent. This historical revision is going too far, methinks.)

Agee provides case studies of Sitka Spruce, Coast Redwood, Western Hemlock, Pacific Silver Fir, Red Fir, Ponderosa Pine, Lodgepole Pine, and subalpine forests, which have fire frequencies orders of magnitude apart despite their geographic propinquity. Extremes are Sitka Spruce, with a fire return interval that may exceed a thousand years, and Ponderosa Pine, with an interval that may not spread ten years.

Most important, perhaps, is Agee's discussion of policy and future fires, which in many places will be unnaturally severe due to fuel accumulation resulting from past fire suppression. An excerpt from the Ponderosa Pine part of the discussion will give the flavor of the author's recommendations:

Reintroduction of fires into Pinus ponderosa forests of park and wilderness areas needs careful prescription. First, it is unlikely that any such forests can absorb the shock of naturally occurring fires during the summer months, given the altered fuel and forest structure due to fire exclusion. The fires will generally be far too intense, consume too much fuel, and cause the death of many of the older, presettlement forest trees. Although some researchers argue that prescribed fire in wilderness is unnatural, a natural fire in such significantly altered forest structure is even less "natural."

Books like this are needed for all regions with wildfire, including Eastern. Even the transition forests of the Northern Appalachians and Adirondacks deserve a written fire history and prognosis, though they burn less often than any but the most fire-proof of Northwestern forests.

In future fire books, authors would do well to explain the current and varied fire management practices of private and public land managers. How many of us even know the fire policies on our nearest public lands—three or four, maybe? Agee didn't summarize present policies as fully as he might have, but he did make clear that land managers need to gain much better understandings of the fundamental role fire plays in most Western ecosystems. The author and publisher of *Fire Ecology of Pacific Northwest Forests* have produced a book that should greatly advance such understanding. —John Davis

Second Eastern Old-growth Conference

The second Eastern old-growth conference will be held October 29-30 in Massachusetts. The conference will focus on the status and management of old-growth forests in the Northeast. The conference features lectures, discussions and field trips.

The conference is being sponsored by Massachusetts Audubon Society and co-sponsored by MA Department of Environmental Management, Harvard Forest, Massachusetts Division of Fisheries and Wildlife, Western North Carolina Alliance, *Wild Earth*, and Williams College.

To register (\$35) and obtain more information please contact The Massachusetts Audubon Society, 208 South Great Road, Lincoln, MA 01773 (617-259-9500).

Primer on Protecting National Forests

Ecosystems and Habitat: Defending our National Forests is a 20 page primer for forest activists. It includes a brief history of the Forest Service and National Forest System, information on the FS's revised administrative appeals process, public participation strategies and tactics, and much more. Although intended primarily for activists unfamiliar with the FS's public participation mandates and new appeals regulations, it is also a good resource for anyone concerned about the abuse of our NFs by the FS. To obtain a copy contact Minnesota Ecosystems Recovery Project, c/o Forest Watch Project at POB 293, Red Wing, MN 55066-0293; (612) 385-0848 (ph.); or e-mail mbiltonen@igc.apc.org. A donation of \$3 is suggested.

World Population Awareness Week

The Population Institute is launching World Population Awareness Week 1994 to foster awareness of the environmental, economic, political and social consequences of rapid worldwide human population growth. WPAW will be held October 23-30.

WPAW 1994 will focus on implementing the results of the United Nations Conference on Population and Development. To get involved write or call the Population Institute, 107 Second St., NE, Washington, DC 20002; (202) 544-3300.

Seeds Of Change Sixth Annual Conference

Seeds of Change Sixth Annual Conference, The Bioneers: Practical Solutions For Restoring The Environment, will take place October 21-23 at The Palace of Fine Arts in San Francisco. The Bioneers is sponsored by the Gila International Center of Diversity, a project of Recuros de Santa Fe.

The Bioneers will focus on biodiversity, addressing in particular the loss of the genetic building blocks of life itself, and bioremediation, the cleansing of pollutants from the world's waters. Leading-edge innovators will share solutions for a future environment of hope. Speakers include Vandana Shiva and Paul Hawken. To register or receive more information contact: Bioneers Conference, 369 Montezuma #334, Santa Fe, NM 87501; 505-986-0366.

Non-commercial Reforestation of Earth

Enlist the power of the seed. Free tree shelters and assistance. Reforest your world. Contact the Bishnois, 3120 High St., Sacramento, CA 95815, 916-922-9319.

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 micro-flora especially prized. Representational drawings should include common and scientific names.

Articles and letters should be typed or neatly hand-written, double-spaced, and include a return address and word count on the title page. 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 scores 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. Do not affect a breezy manner (Strunk & White 1959).
3. Watch your antecedents (Davis 1988).
4. Thou shalt not verbalize nouns (Abbey 1988).
5. **Include a goddam floppy** (Butler 1992).
6. Mix drinks, not metaphors (Davis 1993).

CLEARCUT: The Tragedy of Industrial Forestry

published by Sierra Club Books and Earth Island Press

Wrenching.
Inspiring.
Get it!



Centerpiece in the continental campaign against industrial forestry, *Clearcut* may be the most important coffee-table book ever published.

Contact Clearcut Education Project, 450 Sansome, Room 700, San Francisco, CA 94111; (415) 398-4404.



**ANNA'S
GIFT OF TIME ORIGINALS**

Watercolor • Pen & Ink
Carbon Dust • Book Illustration

Anna Guillemot
503•223•8953
PO Box 9265 • Portland Oregon 97207



**BOB ELLIS
Watercolors**

P.O. Box 91
Wendell, MA 01379

413-659-3512



MARK ARMSTRONG

Freelance Artist

Box 56
Harrisville, NH 03450
603-827-3985

Advertising • Cartoons • Spot Drawings
• Novelty Art to your specifications •



**PATRICK DENGATE
FINE ART & ILLUSTRATION**

Woodcut Prints
& Other Works on Paper

436 W. Maplehurst
Ferndale, MI 48220
(313) 398-2251



Evan Cantor
910 Miami Way
Boulder, Colorado 80303
303-499-1829

cards, letters, graphics

Eva-Lena Rehnmark
Illustrator



34
Lakeview
Circle,
Skaneateles,
NY 13152
315 685
7434

Nancy Roy

PROFESSIONAL PENCIL ARTIST
WILDLIFE • LANDSCAPES • PORTRAITS

RR1, BOX 535
EDEN, VT 05652
(802)635-3464

To receive timely action requests for wildlands
protection nationwide, subscribe to:

Earth Spirit Calls: a newsletter for action



\$10/year, 6 issues
Send your subscriptions to:
Earth Spirit Calls, P.O. Box 4359, Bellingham, WA 98226



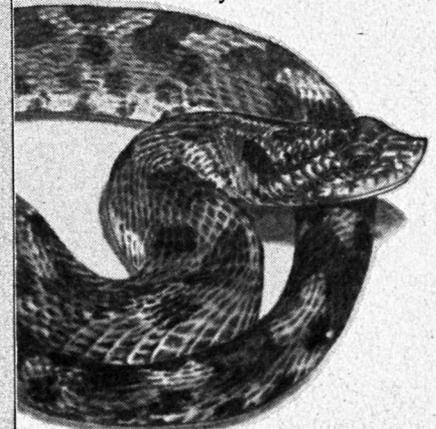
AMY GROGAN

Linocuts, Woodblocks, Collagraphs
Illustrations

1035 E. 4th Ave., Durango, CO 81301
(303) 382-0571

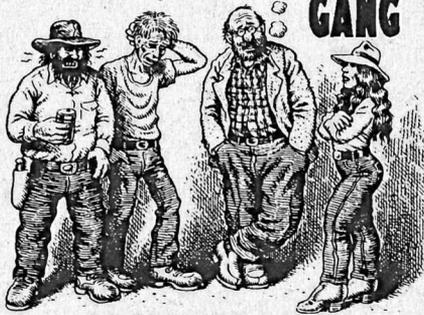
Robert M. Smith

brushed charcoal
watercolours
acrylics



Box 39, Site 1
Callander, Ont.
Canada POH 1H0
705-752-4432

THE MONKEYWRENCH GANG



BY EDWARD ABBEY

ILLUSTRATED BY R. CRUMB

HARDBOUND BOOK.....\$21.95

R. CRUMB T SHIRTS.....\$15.00

• THE GANG • WRENCH • HAYDUKE •
• BONNIE • DOC SARVIS • SELDOM SEEN •

SET OF SIX.....\$75.00

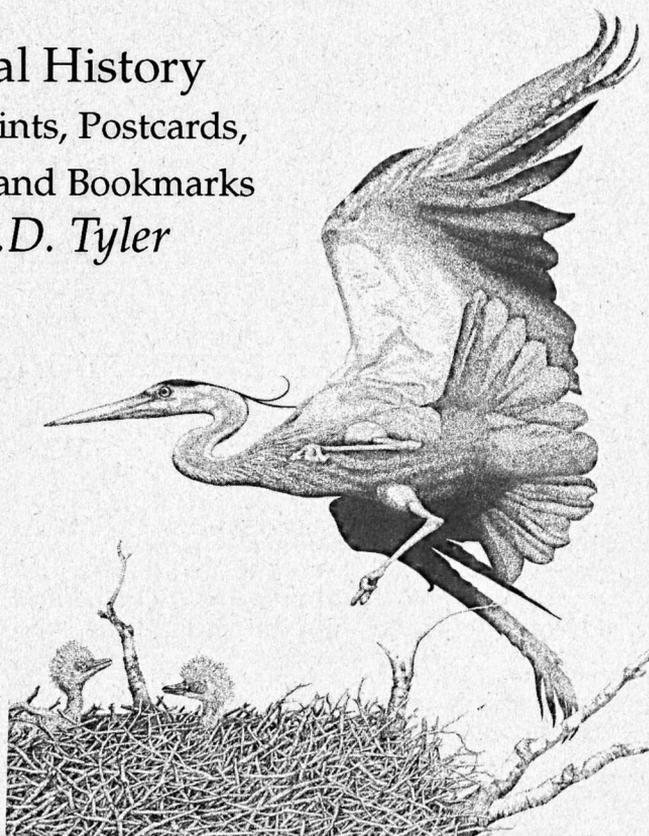
ADD \$3.00 SHIPPING PER ORDER

Send for free catalog of rare & first edition
books, including Edward Abbey



Ken Sanders/Dream
Garden Press
P O Box 27076
SLC UT 84127

Natural History Posters, Prints, Postcards, Notecards and Bookmarks by D.D. Tyler



pricelist:

Tyler Publishing
P.O. Box 243
Augusta, ME 04332
phone: 207-622-7379
fax: 207-623-8781

ISLAND PRESS *The Environmental Publisher*



Reinventing Nature? Responses to Postmodern Deconstruction

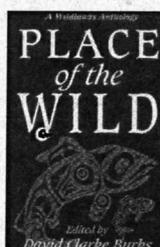
Edited by Michael E. Soule and Gary Lease

*How much of science is culturally
constructed? How much depends on
language and metaphor? How do our
ideas about nature connect with
reality? Can nature be "reinvented"*

*through theme parks and malls, or through restoration?
Reinventing Nature? is an interdisciplinary -
investigation of how perceptions and conceptions of
nature affect both the individual experience and
society's management of nature. Leading thinkers from
a variety of fields address the conflict between
perception and reality of nature, each from a different
perspective. 176 pages*

Hardcover: \$34.95 Paperback: \$17.95

Available October 1994



Place of the Wild A Wildlands Anthology

Edited by David Clarke Burks

*Is the goal of preserving biodiversity
across the landscape of North America
compatible with contemporary Western
culture? **Place of the Wild** brings
together original essays from an
exceptional array of contemporary writers presenting
in a single volume the most current thinking on the
relationship between humans and wilderness. A
common thread running through the volume is the
conviction that everyone concerned with the natural
world-academics and activists, philosophers and poets
- must join forces to re-establish cultural narratives
that sustain life on this planet. 288 pages*

Hardcover: \$29.95 Paperback: \$16.95

Available October 1994

To Order call 1-800-828-1302, or (707) 983-6432
Island Press, Box 7 Dept. 4WE2, Covelo, CA 95428

T-SHIRTS



© 77 Maplewing/Jim Morris

Support wildlife by wearing env. t-shirts
10% of profits go to environmental groups
45 BEAUTIFUL DESIGNS
heavyweight 100% cotton
t-shirts, sweats, totes, etc
QUANTITY DISCOUNTS FREE CATALOG
GREAT FUNDRAISER
JIM MORRIS ENVIRONMENTAL T-SHIRTS
P.O. 18270 DEPT WE63
BOULDER CO 80308
(303)444-6430
SATISFACTION GUARANTEED
Share the Earth!

Ask your Senators and Reps. to save old growth
forests and their wildlife...including salmon.
Congressional switchboard:(202) 224-3121

Support NREPA

At Treecycle, we support the
Northern Rockies
Ecosystem Protection Act.
It just may be the best piece of
wilderness legislation introduced
since the Wilderness Act.
We encourage you to support
NREPA, HR 2638, ask your
representatives to support it, and
work with your local conservation
groups to get them to support it.

We offer papers high in post-consumer content:
100%pcw legal pads & toilet tissue, unbleached.
50%pcw envelopes bleached w/ peroxide.
50%pcw unbleached copy paper.
100%pcw non-deinked stationery & envelopes.

Call or write for a catalog!



TREECYCLE
RECYCLED PAPER
the other half of recycling

P.O. Box 5086 Bozeman, MT 59717
(406) 586-5287

RESTORATION FORESTRY

An International Guide to Sustainable Forestry Practices

Michael Pilarski, Editor

New for 1994!
A manual for ecological forestry worldwide!

"Bringing together so many great resources under one cover will help us all put the concepts and philosophy of sustainable forestry into practice. **Restoration Forestry will move ecoforestry forward by leaps and bounds!**"

—Tracy Katelman, Board of Directors, Tree Foundation, Vision 2020 Project

"I look forward to this book. We do not have enough data on forest restoration. There is a lot of restoration forestry to be done."

—Bill Mollison, Director, the Permaculture Institute

Restoration Forestry reviews over:

780	organizations
120	universities/colleges
90	government agencies
100	companies
230	journals/periodicals
800	books
100	directories
80	conferences
100	model projects

Addresses, telephone and fax numbers are given for the majority of these references.

512 pp/paper/\$21.95
Illustrated, bibliog., index
ISBN: 1-882308-51-4

Affirming the ties that connect our bodies, communities, and ecosystems. Providing practical strategies for healing and renewal



Dave Foreman's

Books of the Big Outside



Free mail-order catalog of over 300 hard to find, important conservation books selected and described by one of America's leading conservationists. Categories include:

- Wilderness Preservation
- Wild Rivers & Dams
- Conservation Biology
- Overpopulation
- Eco-Philosophy
- Land Ethics
- Forest Issues
- Wildlife Protection
- Conservation & Ecological History
- Fiction
- Rainforests
- Natural History
- Sustainability & Bioregionalism
- Paleontology & Anthropology

Also calendars, ecological music, maps, and more.

Books of the Big Outside

POB 85190 • Tucson, AZ 85754-5190
1-(602)628-9610 • Mastercard/Visa/Diner's Club



Buy Back The Dacks

Wild Earth magazine invites individuals and businesses to support Adirondack conservation through its Buy Back The Dacks fund.

Buy Back The Dacks is a dedicated fund working to help keep the Northeast's crown jewel Forever Wild. All money raised by the fund is transferred to The Nature Conservancy's Adirondack Chapter to purchase imperiled lands. Contributions to Buy Back The Dacks go directly toward land acquisition/preservation—not to support the other important work of either TNC or *Wild Earth*.

Buy Back The Dacks...working to protect wild habitat for all Adirondack natives.

Send contributions to:
Buy Back The Dacks Fund
Wild Earth
P.O.B. 455
Richmond, VT 05477

Keep it wild. Buy it.

Stump Creek Radio

A one-hour weekly environmental program:

music, narratives, interviews, commentary

Recording Artists; Broadcasters; Activists—
for information regarding syndication or the
S.C.R. audio eco-inventory,
contact Traci or Dennis

POB 127, Cass, WV 24927
304-456-3426



CANADIAN RIVER MUSIC

4106 TYLER STREET
AMARILLO, TX 79110 USA

Your mail order source
for today's finest folk music.

Our environmental artists include:

EILEEN MCGANN "Turn It Around" with
"Requiem (for the Giants)" for Old Growth
forests. Cassette \$10.00 CD \$16.00
WALKIN' JIM STOLTZ "The Visit," "A Kid
for the Wild," & "Listen to the Earth," each:
Cassette \$10.00 CD \$14.00
(Also his other titles, some LPs, inquire.)
CATHY WINTER "Next Sweet Time"
Cassette \$ 9.00 CD \$14.00
MAGPIE "Circle of Life" Cass \$9 CD \$15
MAGPIE "Living Planet" Cass \$9 CD \$12
PEG MILLETT "Gentle Warrior" Cass \$10
JUDITH KATE FRIEDMAN "Count Me In"
Cassette \$10.00 CD \$15.00
(and lots more!)

US Shipping \$2.00 first item, \$.75 each
additional item. Foreign, write for rates.
Write for free complete list!



Poems For The Wild Earth

from the poetry editors of *Wild Earth*.

Slow Rising Smoke by Art Goodtimes \$3
First Sight of Land by Gary Lawless \$7.⁵⁰
Sitka Spring by Gary Lawless \$5

Available from:
Blackberry Books
RRI, Box 228
Nobleboro, ME 04555

W
E

Available: *Wild Earth* issues 1-14
and The Wildlands Project Special Issue

\$8/each (Cenozoic Society members)
\$10/each (non-members/institutions)

back.issues

Mapping Support

Environmental Systems Research Institute operates conservation support programs that assist non-profit organizations in acquiring and using GIS and computer mapping systems.

For information contact:
Charles Convis, ESRI, 380 New York St., Redlands, CA 92373.
phone: 909-793-2853 x1529
FAX 909-793-5953



The GreenDisk™

Paperless Environmental Journal
Box 32224, Washington, DC 20007
EcoNet <greendisk> Internet <greendisk@igc.apc.org> Phone 1-800-484-7616-DISK

"The single most innovative new resource on the environment -- it is useful in my teaching and in my research."
- Dr. Star Muir, George Mason University

"You folks are choosing some good writings to put in your journal."
- John Davis, *Wild Earth*

"Continuing features on the environment, jobs, college programs and other nuggets you could waste your life looking for on the nets are provided here in a concise, resource-friendly package."
- Michael Potts, *Real Goods News*

For a **free** sample in Mac or IBM format, call, write or email today!

Wild Earth and the Wild Earth Research Fund
gratefully acknowledge the support of these generous foundations and individuals:

Foundation for Deep Ecology
Weeden Foundation
Peradam Foundation
REI's National Trails Coalition

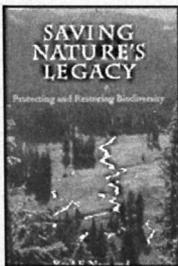
DAVID & EVELYNE LENNETTE
BERNIE VANDENBELT
BRYAN FEYOCK
DAVID RAACK
PAUL & MARY BUHLE
DANIEL SMITH
E.D. FENOGLIO
DR. MARY POSS
T. HOGAN
MARK MOVIC
J.R. DRAFFAN
M. & M. BILTONEN
STEVE HOWE
VERONICA EGAN
RODGER CLARKE
AL TINSLEY
ROBERT GUILD
JOHN LOVAAS
GEORGE B. SCHALLER
WILLIAM J. HAFNER
RICKY G. LANHAM
J.M. & BRENDA BRENNAN
ROBERT PRYOR
CHUCK NEAL
RONALD HORN
HABIB RATHLE
RON GOLDMAN
DEENA METZGER
JOAN ZIMMERMAN
ASSOC. FOR TREE OF LIFE
GREG SLATTER
MIKE MCCLELLAN
DENNIS CARBONI
PAULA WILLOQUET
JOSEPH BOGAARD
NICK FLANN

CHARLEY BAER
JAMES C. ROWE JR.
LINDA EWALD
JOHN P PARKER
BILL MENDAT
SCOTT BLUM
VICTORIA MILLS
CARLOYN MERCER-MCFADDEN
JOHN GARESCHÉ
MORGAN VARNER
RICK VANDER VOET
DON MCKENZIE
DOUG MEREDITH
CLAUDIA MCCUE
JAN FOWLER
TONY MERTEN
KATE WEST
RICH. & LOIS COLE
STEVEN BLOOMSTEIN
RICHARD K. SCHEIBULE
BIOPAC, INC.
NANCY ZIERENBERG
BO ANDERSON
ALAN GREGORY
DUNCAN MCDONALD
BONNIE JOHNSON
MR & MRS JIM BRICKER
RICHARD DANIELSON
LINDA OCHSNER DURANT
NADINE MARSHALL
LAURA HUGHES
ELIZABETH HARTLINE
HOWARD WILSHIRE
GEORGIA STIGALL
JURI PEEPRE
F. MARK STANLEY
TOM WOOD
BRENDA & MIKE BRENNAN
PETER NIELS HELLER
JOHN M. PASTOR
TOBI VAN DYCK
GEORGE RECTOR & JOAN BYRD
JIM MORRIS ENVIRONMENTAL T SHIRTS
PAT MARTIN

ST. LAWRENCE UNIVERSITY
DAVE & LAUREN NAGLUND
DENIS JONES & KAREN PELHAM
JOHN & JOAN PERRY
DAVID & MARY LUEDERS
JIM & E. KRICKETTE
DENNIS FRITZINGER
CATHERINE REED
DAVID FALLOW
C. HOUGHTLIN
RONALD KEZAR
SHIERRY NICHOLSEN
A.H. & LOLA J. BLANK
STEVE FALKOWSKI
JERRY & CAROLE PACKARD
D. COULES & B. NEWMAN
TINA ARAPKILES
JIM MALUSA & SONYA NORMAN
ROBERT DYNKO
LINDA WOOD & JAMES PUTNAM
STEVE OVENDEN
STEVE MIKALS & CAROL FURPAHS
DOWN TO EARTH
ROBERT DYNKO
HENRY JAMES
RICHARD WILSON
JOEL DESPAIN
SUSAN LOESSER
DOUG CORNETT
STEVEN SILBERBERG
LUANNETTE & JOHN L. BUTLER
SCOTT FELKER
MALCOM K. CLEVELAND
SANDY CHAMY
SABRINA RUSSO
PETER MACHUSLAND
GARY MACFARLANE
DAN CANEATER
MARK PEARSON
MATTHEW RIBIN
JOAQUIN GARCIA
MATTHEW P. BROWN
JASON HALPERT
RF KRAWIEC

BROOKS & JENIFER MARTIN
CHERYL HARLING
JULIE WOODS
JIM NOTESTINE
JOEL DESPAIN
KENT HEUER
SANDRA HUISING PERRY
JONATHAN & ROXANNA LAHR
ROANNA BOSTWICK
LOWELL DODGE
SUE TENTHOREY
LARRY HOLBROOK
MAC & SOPHIE EHRHARDT
LIBERTY SEAT CRIMES
ANDY STUBBLEFIELD
STEPHEN WILDER
MARIE C. DAVIS
CHARLES H. CEHOVIN
ROBERT M. DAVIS
ELAINE I. WOODRUFF
BARBARA ULLIAN
R. DE WITT LUFF & BARBARA LUFF
COCO RUTH GORDON
GEORGE SCHINDLER
ELIZABETH HARTLINE
K.C. SHANKLAND
HERB BEATTIE
LYNNE BUTLER
DONNA & JAKE CARPENTER
STEVE WANDRUS
TODD CARBONI
ERIK ALBERT
DANIEL & KATHERINE HESS
RICHARD BROWN
SANDY SCOTT
JULES BLOOMENTHAL
CHRIS ELIOT
PAUL BROOKSHIRE
ROBERT HANSEN
NICK MORGAN
BO ANDERSON
CRAIG BENKMAN
JOHN SCOTT

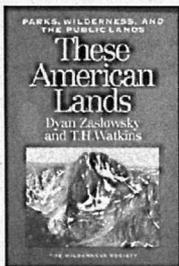
ISLAND PRESS *The Environmental Publisher*



Saving Nature's Legacy - Protecting and Restoring Biodiversity
Reed F. Noss and Allen Y. Cooper
Foreword by Rodger Schlickeisen, President, Defenders of Wildlife

Written by two leading conservation biologists, *Saving Nature's Legacy* is a thorough and readable introduction to issues of land management and conservation biology. It presents a broad, land-based approach to biodiversity conservation in the United States, with the authors succinctly translating principles, techniques, and findings of the ecological sciences into an accessible and practical plan for action. 380 pages • 1994

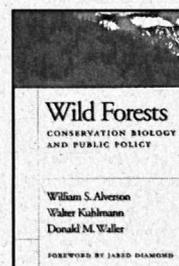
Hardcover: \$48.00 Paperback: \$27.50



These American Lands - Parks, Wilderness, and the Public Lands
Revised and Expanded Edition, Dyan Zaslowsky and T.H. Watkins
The Wilderness Society

Over 634 million acres of the United States-nearly a million square miles-are federally owned. *These American Lands* is a celebration of that inheritance. First published in 1986, the book was hailed by Wallace Stegner as "the only indispensable narrative history of the public lands." This completely revised and updated edition is an unsurpassed resource for everyone who cares about, visits, or works with public land in the United States. 420 pages • 1994

Hardcover: \$45.00 Paperback: \$22.00



Wild Forests Conservation Biology and Public Policy
William S. Alverson, Donald M. Waller, and Walter Kuhlmann

Wild Forests presents a coherent review of the scientific and policy issues surrounding biological diversity in the context of contemporary public forest management. The authors examine past and current practices of forest management and provide a comprehensive overview of known and suspected threats to diversity. 300 pages • 1994

Hardcover: \$49.95 Paperback: \$29.95

To Order call 1-800-828-1302, or (707) 983-6432
Island Press, Box 7 Dept. 4WE1, Covelo, CA 95428

Visage of a "Varmint" or Countenance of a Carnivore

American Badger (*Taxidea taxus*)

illustration by Robert M. Smith

North America's is one of nine badger species in seven genera in the family Mustelidae (weasels and kin). All continents except South America and Antarctica enjoy at least one native badger species. The American Badger's original range extended from southwest Canada, throughout the US West and Midwest, and into northern Mexico. Fossorial, the badger lives in burrows, and dines frequently on chipmunks, ground squirrels, mice, and other rodents and lagomorphs that it digs out, as well as on fruits, roots, and carrion. American Badgers apparently form with Coyotes individual hunting associations (though, unfortunately, they are not yet represented in Congress). A little-known yet titillating taxonomic tidbit is that *Taxidea taxus* is closely related to *Suillotaxus marche*—the Palawan Stink Badger, which provides olfactory enhancement to several southeast Asian islands. Moreover, "Like all mustelids, badgers have well developed anal glands." (*The Encyclopedia of Mammals*)

Most badgers are nocturnal, though the American Badger will hunt and forage during daylight in areas relatively free of human intrusions. A bit like its distant relative the Common Raccoon in coloration, the American Badger generally sports gray, black, and white over its husky frame, which may reach 80 centimetres in length and weigh up to 12 kilograms.

Agribusiness interests, including welfare ranchers and the USDA's Animal Damage Control squad, have long persecuted the American Badger, eliminating it from much of its original range. Conservationists, in contrast, consider the badger a key carnivore in healthy grassland ecosystems, as proposed in this issue's Great Plains article.—JD

Canadian artist Robert M. Smith (Box 39, Site 1, Callander, Ont., POH 1H0) is a self-taught painter who works in watercolor, acrylic, and a unique technique he dubbed "brushed charcoal." He shows in Ontario galleries, and illustrates for several publications including the noteworthy Canadian periodical *Wildflower*. His work appears also on p.33, and will be seen in the winter 1994/95 issue of *Wild Earth*.—TB



**Wild
EARTH**

POB 455, Richmond, VT 05477

Do You Want to Restore Big Wilderness in Maine?

Read *The Forum*

Six times a year we bring you the work of our region's most talented artists, photographers, writers and activists. They will tell you how you can help restore cougars, wolves, wolverines and Atlantic salmon to the Northern Appalachians.

The Forum regularly features articles on:

- Wilderness Restoration
- Paper company land sales
- The fight to end abusive forestry
- The search for regionally-based sustainable economic opportunities
- Cultural Restoration

The Forum is published by the Northern Appalachian Restoration Project (NARP) of Earth Island Institute.

Subscriptions are \$15 per year (US) or \$25 per year (Canada).

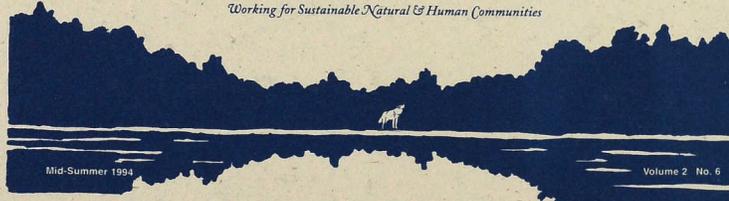
Please consider making a larger donation to NARP to assure that the work of our many talented & underfunded activists can continue to hasten the day when wolverines again prowl the Northern Appalachians.

Thoreau Wilderness Reserve

Rudy Engholm and *Forum* Editor, Jamie Sayen, proposed the establishment of a five million acre Thoreau Regional Wilderness Reserve for Northern Maine in the Spring Equinox 1994 issue of *The Northern Forest Forum*. Reprinted in "Wilderness Proposals" Department of this issue of *Wild Earth*.

The Northern Forest Forum

Working for Sustainable Natural & Human Communities



Mid-Summer 1994

Volume 2 No. 6

Maine Woods Up for Grabs—Again

Scott Paper Wants to Unload 910,000 Acres & Two Mills in Maine

by Jym St. Pierre

CHAINSAW Al Dunlap doesn't know much about Maine. But he knows he wants to unload close to a million acres of timberland in the state, as well as a couple of paper mills.

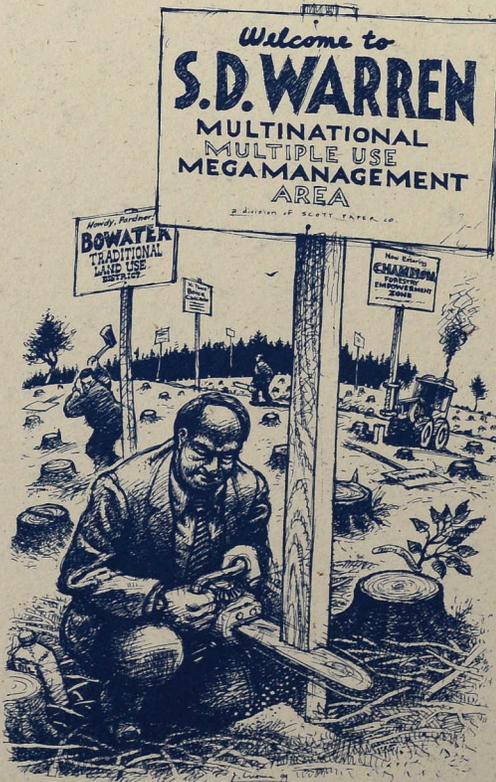
In 1988, when Dunlap sold almost 800,000 acres of forest in Maine—along with 200,000 acres in New Hampshire, Vermont and New York—on behalf of Sir James Goldsmith, he triggered an avalanche of public interest in the future of the wildlands of the region greater than any seen in over half a century.

Today, with the impending sale by Scott Paper Company of more than 900,000 acres and two large paper mills in Maine, it is about to happen again. Yet, after seven years and millions of dollars of study the public interest is no better protected now than in 1988 against massive sales of forest lands and mills. And this time almost no one seems to be paying attention.

Much of the "Diamond" ownership that Al Dunlap sold in 1988 was quickly resold to speculators who promised to fragment and develop extensive areas.

(Continued on page 5)

Printed on Chlorine-Free Paper



Contributions to NARP & *The Forum* are Tax-Deductible

Please send subscriptions & other donations to: Forum, POB 6, Lancaster, NH 03584. Please make checks payable to: Earth Island Institute, earmarked for Project 44.