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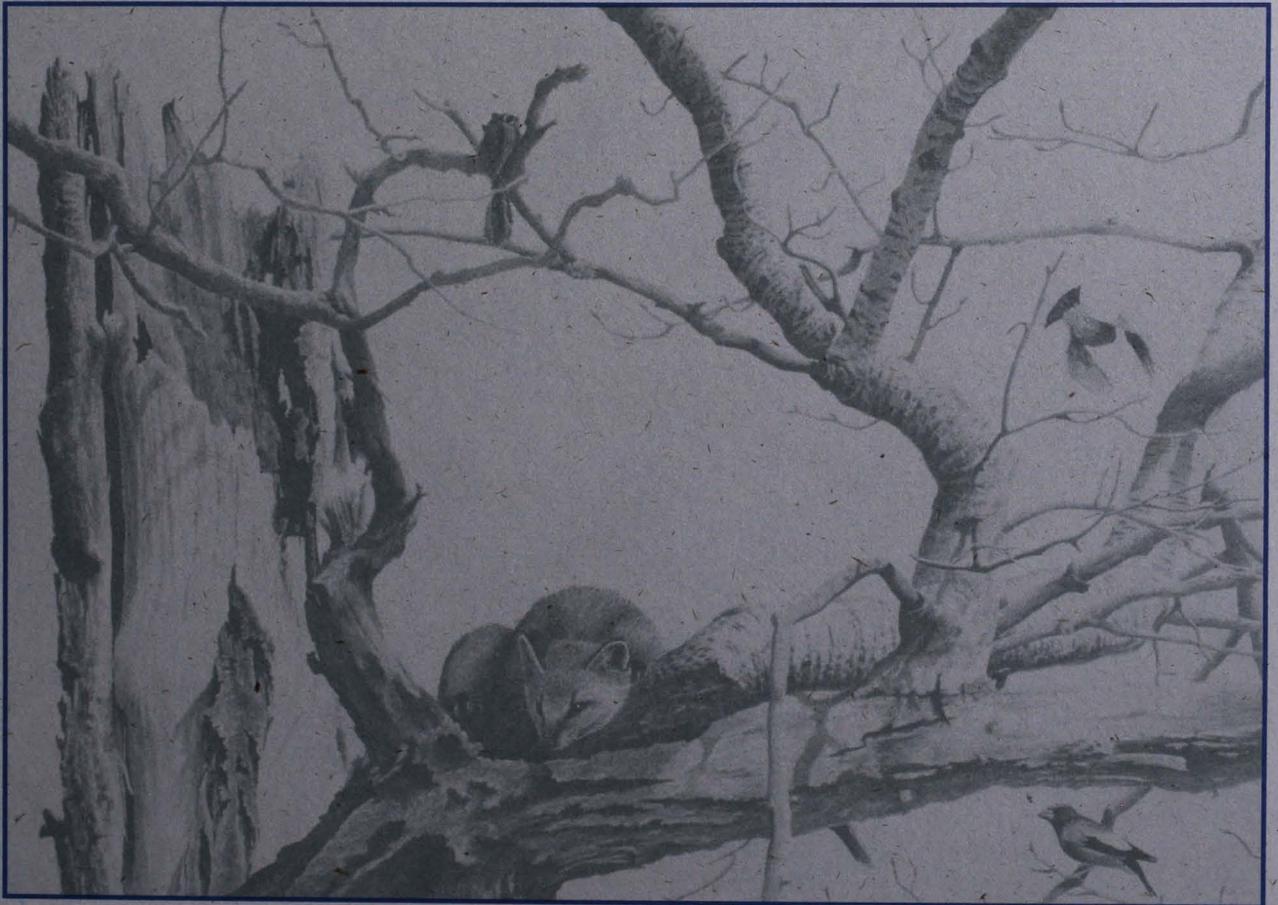
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WILDEARTH

Spring 1997



PERCEIVING the Diversity of Life

essays by

*David Abram, Stephanie Kaza
Connie Barlow, Christopher Manes*

\$4.95 US



Around the Campfire



READERS OF *WILD EARTH* have seen much talk about science-based Nature reserve design in these pages. There has been plenty of theorizing, but, so far, little on-the-ground doing. For a couple of years, I've been dancing with the puzzle of how to actually produce a science-based reserve design that will rewild a landscape and protect the diversity of life that inhabits it. Hard questions keep cutting in:

- Can a science-based reserve design be done on the limited funding available to The Wildlands Project and its cooperating groups?
- Can a science-based reserve design be completed in a reasonable period of time (one or two years) so that it can be used for current conservation issues?
- How can citizen conservationists be brought into reserve design so that they have a feeling of ownership and so that there is a grassroots constituency to help implement the proposed reserve network?
- Can such a reserve design pass scientific peer review?
- How the heck do we ever implement a science-based reserve design?

Michael Soulé has suggested that to meet these needs, a reserve design should be very specific in its stated objectives. This way the amount of data that needs to be gathered and analyzed is not overwhelming. And with clear objectives, peer reviewers have sure standards to use in measuring how well the reserve design meets them. With all this in mind, a number of us involved in the Sky Island/Greater Gila Project in the southwestern United States and northern Mexico have drafted a proposed plan of action that melds science-based reserve design with traditional Wilderness Area advocacy. Our approach may help other reserve design projects. On the other hand, it may need to be modified to meet the test of conservation biology. This rewilding approach does not replace a more comprehensive conservation strategy that has goals of protecting all native species and representing all native ecosystems. Indeed, we propose that this Sky Island/Greater Gila reserve design be tested to see how well it meets the goals of ecosystem representation and protecting all native plants and animals.

Our approach will follow the core area, buffer zone, connecting corridor model developed by Reed Noss and much discussed in these pages. For federal lands, core reserves will be proposed for Wilderness Act protection as new Wilderness Areas or as additions to existing Wilderness Areas.

Briefly, our region is the area in southwestern New Mexico, southeastern Arizona, northwestern Chihuahua, and northeastern Sonora where the Rocky Mountains and Sierra Madrean forests overlap (Nearctic and Neotropics). It ranges from the Gila and Apache National Forests south through the Coronado National Forest into the Rio Bavispe country of northern Mexico.

About Wild Earth and The Wildlands Project

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

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

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

The Wildlands Project (1955 W Grant Rd., Suite 148A, Tucson, AZ, 85745; 520-884-0875) is the organization guiding the design of a continental wilderness recovery strategy. Through advocacy, education, scientific consultation, and cooperation with many regional groups, The Wildlands Project is drafting a blueprint for an interconnected, continental-scale system of protected wildlands linked by habitat corridors.



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continued from inside front cover

We propose that the mission of the Sky Islands/Greater Gila Reserve Project is to protect habitat and landscape connectivity for representatives of the distinctive and wide-ranging species of the Sky Islands/Greater Gila region. These target species may include: Mexican Wolf, Grizzly Bear, Black Bear, Jaguar, Ocelot, Jaguarundi, Mountain Lion, Desert Bighorn Sheep, Mexican Spotted Owl, Northern Goshawk, tropical and Sierra Madrean birds, native fish species—higher elevation (Gila and Apache Trout) and lower elevation (Loach Minnow, etc.). By “distinctive,” we mean endemics (like Mexican Wolf) and tropical and Sierra Madrean fauna not found farther north in the United States.

We will consult with large carnivore specialists, ornithologists, landscape ecologists, and other biologists to identify from the above list a select group of target species that will best serve for designing a reserve system. We hope that protection of habitat for these species will protect most native ecosystems and the habitat for the majority of other species in the region. George Schaller, the foremost field biologist and wildlife conservationist in the world, says that he has focused on large animals in his work because, “A large animal needs a large area. If you protect that area, you’re also protecting thousands of other plants and animals.” Similarly, the Sky Islands/Greater Gila Project will focus largely on a few large or wide-ranging species. We can test the theory of umbrella species with this reserve system and find out which species are not covered by it.

Among the specific tasks to design a Sky Islands/Greater Gila Ecological Reserve System are the following:

- 1) We will better define the region to more accurately draw a coherent Sky Islands/Greater Gila Ecoregion. Earlier, we had included much of the Chihuahuan Desert to the east because of the possibility for Mexican Wolf release in White Sands Missile Range. Now that release is proposed by the U.S. Fish & Wildlife Service only for the Apache-Gila NFs, we are pulling back our boundaries to west of the Rio Grande. Our western boundary is the Sonoran Desert and White Mountain Apache Reservation. We include the Gila and Apache National Forests to the north because they are the northern limits of the Collared Peccary, Coatimundi, Mexican Wolf, and Red-faced Warbler. Careful boundary selection creates an ecologically more defensible region and makes the task of reserve design easier. (We still need to decide how far south into the Sierra Madre our region will go—perhaps as far south as the Black Bear ranges or to the headwaters of the Rio Bavispe.)
- 2) We will consult with biologists to identify a small group of target species that can act as umbrellas for the majority of species and their ecosystems in the region. (Note: some of the following parts of the action plan will be changed if different target species are selected.)
- 3) We’ll begin with a base map showing existing Wilderness Areas, BLM Wilderness Study Areas, National Forest RARE II (roadless) areas, and conservation groups’ previous Wilderness Area proposals.
- 4) Then, we’ll map important riparian areas (existing habitat for native fish, intact or semi-intact riparian vegetation, existing habitat for riparian dependent birds). We will consult with ornithologists to see if certain bird species can function as surrogates for the rest of the tropical and Sierra Madrean species. We’ll also map riparian areas important for restoration and for linkage of disjunct fish populations.
- 5) We’ll identify important Jaguar habitat. Carnivore biologists Brian Miller and John Terborgh tell me that, in this region, canyon bottoms characterized by Arizona Sycamore are the Jaguar’s primary habitat. We will inventory these canyons as roadless or roaded (including jeep trails). Our reserves will propose to close dirt roads in these canyons where reasonable and include the canyons and surrounding areas in expanded Wilderness Area proposals in the

Chiricahuas, Peloncillos, Santa Ritas, Pajaritos, and other mountain ranges. We will also map all Jaguar sightings and reports of sign for the last 25 years.

- 6) We'll identify important habitat for the Mexican Wolf (based on availability of deer and other prey) and corridors between potential core wolf areas (Apache and Gila NFs south into the Coronado NF and farther south into the Sierra Madre). The U.S. Fish & Wildlife Service proposes to reintroduce the Mexican Wolf into the Apache and Gila NFs this year.
- 7) In the high country, we will map old-growth forests, and Mexican Spotted Owl and Northern Goshawk habitat and incorporate these areas as much as possible in expanded Wilderness Area proposals, Wilderness Recovery Areas, and corridors. We'll use these data to argue for Wilderness designation of RARE II areas in the Apache and Gila NFs.
- 8) We will map precise boundaries of private ranches owned by those friendly to large carnivores, and property owned by The Nature Conservancy and National Audubon Society. We will also map protected state, county, and local government areas.
- 9) We will map existing Bighorn range and identify potential reintroduction or expansion areas, and existing or needed corridors.
- 10) We will map Mountain Lion occupied habitats and existing corridors between habitats.
- 11) We will map current ranges of special species such as prairie dogs and River Otter.
- 12) We'll consult with experts on what habitat types Ocelots and Jaguarundis would prefer in the region. We'll map such ecosystems and areas where the border cats have been reported or are suspected.
- 13) We'll encourage research on existing native border cat populations, occupied habitats, travel routes, and nearest population centers in northern Mexico.

Much of this information is already collected and available. Some of it will not be precise; we will use the best available information to design a reserve system.

We are also concerned with implementation of the reserve system proposal. Implementation is not separate and delayed, but is an ongoing process. Nor is implementation accomplished in a single piece of legislation, but includes many pieces—legislative, administrative, and cooperative agreements. Of course, not all implementation steps will be taken by The Wildlands Project or the Sky Island Alliance; a variety of groups will take the lead on different steps. Among the many steps to implementation are the following:

- 1) Congressional designation of the Blue Range-San Francisco and Baldy Bill Wilderness Areas (Apache and Gila NFs).
- 2) Congressional designation of additional Wilderness Areas on the Gila, Apache, and Coronado NFs (RARE II areas expanded to include crucial habitat).

- 3) Congressional designation of BLM Wilderness Areas in New Mexico.
- 4) Development of legislative or administrative protection standards for corridors and buffer zones on federal lands.
- 5) Forest Plan revisions for the Gila, Apache, and Coronado NFs that incorporate the proposal.
- 6) Coordination with New Mexico and Arizona state land offices to protect state lands included in reserves.
- 7) Successful reintroduction of the Mexican Wolf.
- 8) Eventual reintroduction of the Grizzly Bear.
- 9) Reintroduction of the River Otter.
- 10) Endangered Species Act listing for native border cats and drafting of recovery plans.
- 11) Riparian and stream restoration initiatives.
- 12) Reintroduction of the Black-footed Ferret and protection of prairie dog colonies.
- 13) Cooperation with conservationist ranchers on marketing organic, predator-friendly beef.
- 14) Cooperation with friendly land owners on management plans compatible with reserves.
- 15) Permanent retirement of key federal grazing allotments and acquisition of base properties.
- 16) Bringing other important grazing allotments under ecological management in cooperation with progressive ranchers.

Working with other conservation groups in the area, we'll identify additional implementation steps. Because it is highly unlikely that a Nature Reserve System cutting across agencies, property owners, states, and countries could ever be implemented in one fell swoop, it's important to outline steps like these that can be implemented piecemeal over several years.

Much remains to be planned for the Mexican portion of the region. The Wildlands Project has hired a staff ecologist for Mexico, Rurik List, who will pull together Mexican scientists and conservationists.

What we are doing in the Sky Islands/Greater Gila region may not be the only or even the best approach for other regions, but it is a practical beginning for getting reserve designs done. Let me again acknowledge that it is not a complete conservation strategy for the region, but it is a major part of one. Our reserve design can later be analyzed to see how well other conservation goals, such as representation of all ecosystems or plant communities, are accomplished by it and what gaps remain.

Happy Trails,
—Dave Foreman
Kaiparowits Plateau





Wild Earth Update

A FEW WORDS about our theme for this issue, Perceiving the Diversity of Life: it is broad and nebulous, yes. Underlying this nebulosity, however, is the conviction—so convincingly and magically conveyed in David Abram's book *Spell of the Sensuous*—that our environmental problems are largely perceptual. Our senses have been dulled, wherefore we overlook all but the largest or most charismatic of species—and we persecute them. The disparate yet conjoined articles in this issue should help all of us better perceive and appreciate and defend Earth's uncountable species. Maybe we lost the Passenger Pigeon Chewing Louse (a folly that our children will not soon forgive us, described by Peter Friederici herein), but we can still save the Pink Mucket Pearly Mussel (if we follow Dr. Windsor's prescription for maintaining our mussels, also in this issue).



WE now has an elected official among us: Poetry editor Art Goodtimes won a close and crucial election last November to become a San Miguel County commissioner. Art has been an ardent defender and bard of southwestern Colorado's San Juan Mountains and adjacent ranges for many years, and his victory should benefit wildlife throughout the region.



A bit more good news and another plea for help: *Wild Earth's* Adirondack land acquisition fund, Buy Back The Dacks, and the staff are assisting in a series of transactions that should soon result in a corridor of protected habitat from the eastern Adirondack foothills to Lake Champlain. Working with other Adirondack conservationists, we appear to be within a few months and \$15,000 of securing the previously unprotected half mile of forest that carnivores need to cross to reach the lake from the mountains. Already, one exceedingly generous *Wild Earth* reader has contributed \$2500 to this wildlands protection effort (and *Wild Earth's* editor has contributed his parents' pension fund—not without some muffled exclamations of surprise from this unusually supportive pair); we ask all of you who can afford to donate—from \$5 to \$5000—to do so now. For a relatively paltry sum, wildlife advocates can buy the last unprotected piece of this five-thousand-acre habitat puzzle, thereby accomplishing a state/private reserve system linking the mountains and the lake.

For information, please call John Davis or Tom Butler at *Wild Earth*, 802-434-4077. Please make checks payable to Buy Back The Dacks and send to BBTD, c/o *Wild Earth*, POB 455, Richmond, VT 05477. (Donations of non-perishable food items may be sent to the editor's parents, Robert and Mary Davis, 213 Westmoreland Court, Georgetown, KY 40324.)

—John Davis

ALTHOUGH a few final checks are still trickling in, we wanted to let you know that more than \$17,000 was raised by *Wild Earth's* end-of-year fundraising letter, with 14% of you responding to our urgent plea for funds. This is more than double the amount garnered by past annual appeals, and we were delighted by the response. Last year was a financially tough one for *Wild Earth*, and your donations came at a truly crucial time. Thank you.

We extend additional thanks to Bil Alverson and Kiva Adler for their generous offer of a Macintosh computer in response to our request in the last Update, and to former intern Jeff Cantara for his donation of a much-needed label printer. We owe all three great gratitude. Now, a related request: might we have a loyal reader willing to donate some frequent flier miles to *Wild Earth* so that a staff member can attend the Natural Areas Conference in Portland, OR, August 27-30? If so, we'd be much obliged.

We have developed a comprehensive strategy to increase the number of folks who read *Wild Earth*, and want to ask for your help with newsstand sales in particular. Please call your local independent bookstores, outdoor gear shops, and co-ops that sell magazines and ask them if they stock *Wild Earth*. If they don't, tell them you wish they would and why. Then send us the store's name and address and we will ship them a sample copy right away. Customer requests truly help increase sales—and every additional store that sells *Wild Earth* means we're a little closer to realizing our vision of protected habitat for all native species.

—Monique Miller

The Wildlands Project Update

by Steve Gatewood

The Wildlands Project started out on a fairly grim financial note in 1996, and this in turn generated some tough decisions that resulted in further organizational stress. As we start 1997, the financial situation has improved dramatically, which has allowed our decision making to return its focus to program building for protecting ecological integrity and biodiversity throughout North America. With available or committed new resources, TWP will: hire a Wildland Ecologist, half-time Mexico Program Coordinator, and Administrative Assistant this winter; hold a regional workshop this spring as a foundation for our continental "Grassroots Rendezvous" early next year; host a Science Policy Panel this fall to address many of the critical science issues facing conservation reserve design; expand our activities in several priority regions; and invest whatever resources it takes to have at least two peer-reviewed reserve design proposals developed through cooperating regions by year's end.

These proposed activities have been made possible by the increased support of the foundation community and major donors stimulated by the board's decision to enhance our development program. Through the guidance of Andy Robinson, our fundraising consultant, several funders have had their first real exposure to the wildlands vision and work. Although we have been quite successful from a financial point of view, as expected we have gotten mixed reviews on our programs. I want to use excerpts from two foundation response letters to reflect on our wildlands activities. Both foundations, one on the East Coast and one on the West, received a TWP grant proposal and a personal briefing by staff and board members.

The first response: We admire the boldness of your vision to establish wildlands on a vast scale. However, we find that your materials give little attention to easing the transition of communities that depend on resource use within the regions you target for protection. We are concerned that the project would tend to favor an approach to land set-asides similar to that employed in the Escalante-Grand Staircase designation, in which the concerns of affected communities in Southern Utah were essentially ignored. I continue to mull over our conversation last summer in which you all declined to consider retreating from environmentalists demands for a 5+ million acre Utah wilderness bill, even if hypothetically the conservation biology indicated that only a 4+ million acre expanse was needed. This sort of Browerist "no compromise" attitude seems doomed to incite virulent and paralyzing opposition.

If the Project were vigorously to incorporate an approach to conservation decision-making that stressed community education and consensus-building (as employed, for example, by the Sonoran Institute), we might take a different view regarding the possibility of support. Should the Project elect to move in this direction, we would be willing to reopen the conversation with you.

The second response: Our age faces its own singular set of problems and challenges. How we resolve these will affect not only the quality of our own lives but that of future generations. Will the world we leave to them be better off for all of our efforts? We believe so—and that your work will shape some of those trails to a better future.



Working strategically and with courage, the lean staff of the Wildlands Project strives, in cooperation with regional and national groups, to propose natural areas consisting of strictly protected core regions linked by biological corridors. Underlying this approach are well-supported biological tenets.... Of equal importance is the fact that if the "islands" of wilderness are connected by undisturbed corridors—natural arteries of life—the isolation, inbreeding, and possible extinction of many life forms can be slowed or halted. Such corridors allow the genetic endowment of the different fragments to "flow" between different areas of population concentrations.

Humanity utterly depends on a living, robust and undiminished biosphere. We appreciate that your work is devoted to maintaining an intact vital "skin" on this planet so that our species' development options not become harshly restricted. Overall, we applaud TWP's firm grounding in science, its transcending of political boundaries, and its commitment to thoughtful planning while engaging in the protection of biological integrity, ecological services and evolutionary processes....

These two responses, though quite different, have many common themes and give indications as to where wildlands work needs to go if we are to be successful over the long term.

1) Both funders received the same basic information and presentation, but came to vastly different conclusions. Clearly foundation attitudes and perspectives guide what they intend to fund; however, message development, packaging and delivery will have to be tailored to the audience. This is true whether we are trying to communicate with grant-makers, activists, scientists or different sectors of the general public.

2) Both responses have an anthropocentric aspect to them, the first clearly more than the second. "Humanity depends," "future generations," and "our species' development options" illustrate this for the second one. We must all recognize that a bias toward human needs exists and that different groups address it in different ways. For wildlands work, we must hold fast on restricting human use of wilderness core reserves and specifically emphasize the non-consumptive values and services they provide. Acceptable uses and sustainable activities in buffer areas that maintain or re-



store ecological integrity should be articulated and promoted. Social and cultural factors will continue to influence decision makers; we must improve our skills in those areas while forcing ecologic values into their lexicon.

3) There must be a concerted effort throughout the movement to document and promote the economics of resource protection and sustainable use vis-a-vis resource exploitation and consumption. A wildlands conservation reserve network will accrue benefits to society as a whole over the long term. Industrial extraction, on the other hand, concentrates short-term benefits in very few corporations, often at the expense of the integrity of public lands ostensibly held in trust for the people. Besides, most of the continent is already open to exploitation within current environmental laws.

4) Just as we strive to protect the ecological integrity of ecosystems, we should be willing to address the social integrity of local communities within, adjacent to, or otherwise associated with proposed wildland reserve networks. Some people will be displaced from critical areas and local economies will be affected. These same people form core local constituencies that can make or break a wildlands campaign. It is in our own best interest to assist with planning required to shift from industrial economies exporting raw materials on behalf of multinational corporations to sustainable economies with compatible place-based harvesting and export of value-added products.

The Wildlands Project will never lose sight of our primary goal—creation of the vision for a continental reserve design system—but we must also be ready to field challenges and respond to issues related to that vision. Impacts to local communities are among those challenges. Application of good science to the process is another. Crafting the appropriate language for a target audience is a common thread for all of our outreach and communication efforts. Only then can we expect our message to be received in the proper context and lead to a positive, productive response. ■

Steve Gatewood is executive director of The Wildlands Project. As always, for more information contact the TWP clearinghouse at 1955 West Grant Rd., Suite 148A, Tucson, AZ 85745; 520-884-0875.

Returning to our Animal Senses

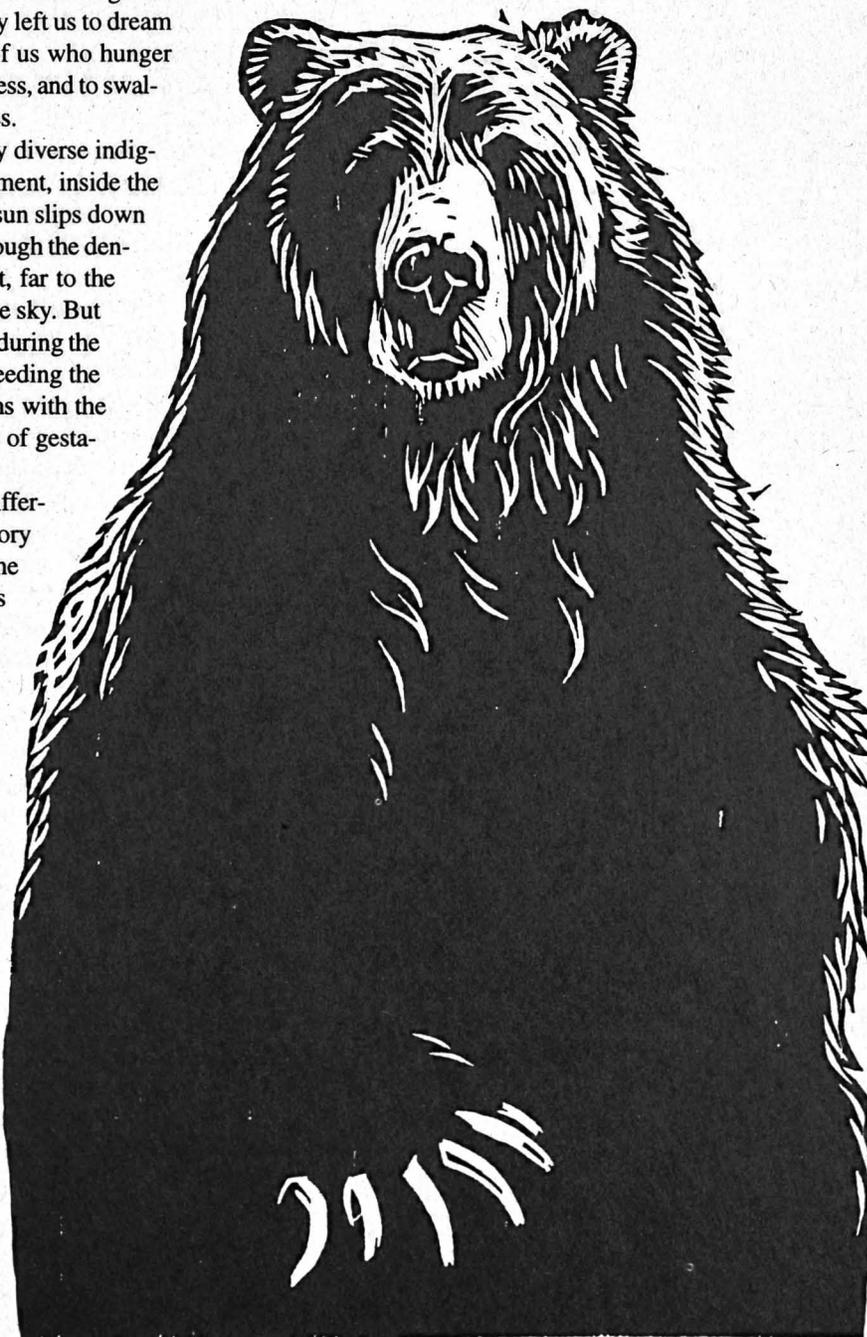
by David Abram

I'M BEGINNING these thoughts during the winter solstice, the dark of the year, during a night so long that even the trees and the rocks are falling asleep. Moon has glanced at us through the thick blanket of clouds once or twice, but mostly left us to dream and drift through the shadowed night. Those of us who hunger for the light are beginning to taste the wild darkness, and to swallow it—taking the night, quietly, into our bodies.

According to a tale told in various ways by diverse indigenous peoples, the fiery sun is held, at this moment, inside the body of the earth. Each evening, at sunset, the sun slips down into the ground; during the night it journeys through the density underfoot, and in the morning we watch it, far to the east, rise up out of the ground and climb into the sky. But during the long nights of winter, and especially during the solstice, the sun lingers longer in the ground, feeding the dark earth with its fire, impregnating the depths with the diverse life that will soon, after several moons of gestation, blossom forth upon the earth's surface.

It is a tale born of a way of thinking very different from the ways most of us think today. A story that has, we might say, very little to do with "the facts" of the matter. And yet the tale of the sun's journey within the earth has a curious resonance for many of us who hear it, despite our awareness that the events it describes are not literally true. For the story brings us close to our senses, and to our direct, bodily awareness of the world around us.

Our spontaneous, sensory experience of the sun is indeed of a fiery presence that rises and sets. Despite all that we have learned about the stability of the sun relative to the earth, no matter how thoroughly we have convinced our intellects that it is the *earth* that is really moving while the sun basically holds its place, our unaided animal senses still experience the sun as rising up from the distant earth every morning, and sinking beneath the ground every evening. Whether we are scientists or slackers, we all speak of the "rising" and the "setting" of the sun, for this remains our primary experience of the matter. Which is why I am pausing, at this moment, to feel the sun's fire nourishing the deep earth far below my feet.



GOING TO GRADE SCHOOL in the sixties and seventies, I was taught not to trust my senses—the *senses*, I was told again and again, *are deceptive*. This was a common theme in the science classes, at a time when all the sciences seemed to aspire to the pure precision of physics—we learned that truth is never in the appearances but elsewhere, whether in a mysterious, submicroscopic realm which we could reach only by means of complex instruments, or in an apparently disembodied domain of numbers and abstract equations. The world to which our senses gave us direct access came to seem a kind of illusory, derivative dimension, less essential than that truer realm hidden behind the appearances.

In my first year at college I had a rather inane chemistry professor who would periodically try to shock the class by exclaiming, wild-eyed, that the chair on which he was sitting was not really solid at all, but was constituted almost entirely of empty space! “Why, then, don’t you fall on your ass?,” I would think. And I began to wonder whether we didn’t have it all backwards. I began to wonder if by our continual put-down of the senses, and of the sensuous world—by our endless *dissing* of the world of direct experience—we were not disparaging the truest world of all, the only world we could really count on, the primary realm that secretly supports all those other “realities,” subatomic or otherwise.



The sensory world, to be sure, is ambiguous, open-ended, filled with uncertainty. There are good reasons to be cautious in this enigmatic realm, and so to look always more closely, to listen more attentively, trying to sense things more deeply. Nothing here is ever completely certain or fixed—the cloud-shadows darkening the large boulder across the field turn out, when I step closer, to be crinkly black lichens radiating across the rock’s surface; the discarded tire half buried in the beach suddenly transforms into a dozing seal that barks at our approach and gallumphs into the water. The world we experience with our unaided senses is fluid and animate, shifting and transforming in response to our own shifts of position and of mood. A memory from a hike on the south coast of Java: it is a sweltering hot day, yet a strong wind is clearly stirring the branches and leaves of some trees across the field. As I step toward those trees in order to taste the moving air, the wind rustling the leaves abruptly metamorphoses into a bunch of monkeys foraging for food among the branches. Such encounters, and the lack of certainty they induce, may indeed lead us to reject sensory experience entirely, and to quest for “truth” in some other, less ambiguous, dimension. Alternatively, these experiences might lead us to assume that truth, itself, is a kind of trickster—shapeshifting and Coyote-like—and that the senses are our finest guides to its approach.

It seems to me that those of us who work to preserve wild Nature must work as well for a return to our senses, and for a renewed respect for sensorial modes of knowing. For the senses are our most immediate access to the more-than-human natural world. The eyes, the ears, the nostrils catching faint whiffs of sea-salt on the breeze, the fingertips grazing the smooth bark of a madrone, this porous skin rippling with chills at the felt presence of another animal—our bodily senses bring us into relation with the breathing earth at every moment. If humankind has forgotten its thorough dependence upon the earthly community of beings, it can only be because we’ve forgotten (or dismissed as irrelevant) the sensory dimension of our lives. The senses are what is most wild in us—capacities we share, in some manner, not only with other primates but with most other entities in the living landscape, from earthworms to eagles. Flowers responding to sunlight, tree roots extending rootlets in search of water, even the chemotaxis of a simple bacterium—here, too, are sensation and sensitivity, distant variants of our own sentience. Apart from breathing and eating, the senses are our most intimate link with the living land, the primary way the earth has of influencing our moods and of guiding our actions.

Think of a honey bee drawn by vision and a kind of olfaction into the heart of a wildflower—sensory perception thus effecting the intimate coupling between this organ-

*Perception is the glue
that binds our separate
nervous systems into the
larger, encompassing
ecosystem.*

ism and its local world. Our own senses, too, have coevolved with the sensuous earth that enfolds us. Our eyes have taken shape in subtle interaction with oceans and air, formed and informed by the shifting patterns of the visible world. Our ears are now tuned, by their very structure, to the howling of wolves and the honking of geese. Sensory experience, we might say, is the way our body binds its life to the other lives that surround it, the way the earth couples itself to our thoughts and our dreams. *Perception is the glue that binds our separate nervous systems into the larger, encompassing ecosystem.* As the bee's compound eye draws it close to the wildflower, as a salmon dreams its way through gradients of scent toward its home stream, so our own senses have long tuned our awareness to particular aspects and shifts in the land, inducing particular moods, insights, and even actions that we mistakenly attribute solely to ourselves. If we ignore or devalue sensory experience, we lose our primary source of alignment with the larger ecology, imperiling both ourselves and the earth in the process.

I'm not saying that we should renounce abstract reason and simply abandon ourselves to our senses, or that we should halt our scientific questioning and the patient, careful analysis of evidence. Not at all: I'm saying that as thinkers and as scientists we should strive to let our insights be informed by our direct, sensory experience of the world around us; and further, that we should strive to express our experimental conclusions in a language accessible to direct experience, and so to gradually bring our science into accord with the animal intelligence of our breathing bodies. (I think of Howie Wolke's superb essay, a few years back in this journal, on how science that lacks a visceral connection is lousy science. He's right! For such science denies the scientist's own embeddedness in the very world that he seeks to study. Such science is not really Darwinian enough—it pretends that we humans, by virtue of our capacity for cool reason, can somehow spring ourselves free from our co-evolved, carnal embedment in a more-than-human web of influences.) Sensory experience, when honored, renews the bond between our bodies and the breathing earth. Only a culture that disdains and dismisses the senses could neglect the living land as thoroughly as our culture neglects the land.



Many factors have precipitated our current estrangement from the sensuous surroundings, and many more factors prolong and perpetuate this estrangement. One of the most potent of these powers is also one of the least recognized: our everyday language, our ways of speaking. What we *say* has such a profound influence upon what we *see*, and *hear*, and *taste* of the world! To be sure, there are ways of speaking that keep us close to our senses, ways of speaking that encourage and enhance the sensory reciprocity between our bodies and the body of the earth. But there are also ways of wielding words that simply deaden our senses, rendering us oblivious to the sensuous surroundings and hence impervious to the voice of the land. Perhaps the most pervasive of these is the habit of endlessly *objectifying* the natural world around us, writing and speaking of every entity (moss, mantis, or mountain) as though it were a determinate, quantifiable object without its own sensations and desires—as though in order to describe another being with any precision we first had to strip it of its living otherness, or had to envision it as a set of passive mechanisms with no spontaneity, no subjectivity, *no active agency of its own*. As though a toad or a cottonwood was a fixed and finished entity waiting to be figured out by us, rather than an enigmatic presence with whom we have been drawn into a living relationship.

Actually, when we are really awake to the life of our senses—when we are really watching with our animal eyes and listening with our animal ears—we discover that *nothing* in the world around us is directly experienced as a passive or inanimate object. Each thing, each entity meets our gaze with its own secrets, and if we lend it our attention we are drawn into a dynamic interaction wherein we are taught and sometimes transformed by this other being. In the realm of direct sensory experience, everything is animate, everything *moves* (although, of course, some things—like stones and mountains—move much



slower than other things. If while walking along the river I find myself suddenly moved, deeply, by the sheer wall of granite above the opposite bank, how, then, can I claim that the rock does not move? It moves *me* every time that I encounter it! Shall I claim that this movement is entirely subjective, a purely mental experience that has nothing to do with that actual rock? Or shall I admit that it is a physical, bodily experience induced by the powerful presence of this other being, that indeed my body is palpably moved by this other body—and hence that I and the rock are not related as a mental “subject” to a material “object” but rather as one kind of dynamism to another kind of dynamism, as two different ways of being animate, two very different ways of being earth?

If we speak of matter as essentially inanimate, or inert, we establish the need for a graded hierarchy of beings: stones have no agency or experience whatsoever; bacteria have a minimal degree of life; plants have a bit more life, with a rudimentary degree of sensitivity; “lower” animals are more sentient, yet still stuck in their instincts; “higher” animals are more aware; while humans alone are really awake and intelligent. In this manner we continually isolate human awareness above, and apart from, the sensuous world. If, however, we assume that matter is animate (or “self-organizing”) from the get-go, then hierarchies vanish, and we are left with a diversely differentiated field of animate beings, each of which has its own gifts relative to the others. And we find ourselves not above, but in the very midst of this living web, our own sentience part and parcel of the sensuous landscape.

If we continue to speak of other animals as less mysterious than ourselves, if we speak of the forests as insentient systems, and of rivers and winds as basically passive elements, then we deny our direct, visceral experience of those forces. And so we close down our senses, and come to live more and more in our heads. We seal our intelligence in on itself, and begin look out at the world only as spectators—never as participants.

If, on the other hand, we wish to recall what it is like to feel fully a part of this wild earth—if, that is, we wish to reclaim our place as plain members of the biotic community—then we shall have to start speaking somewhat differently. It will be a difficult change, given the intransigence of old habits, and will probably take decades of careful attention and experimentation before we begin to get it right. But it will also be curiously simple, and strangely familiar, something our children can help us remember. If we really wish to awaken our senses, and so to renew the solidarity between ourselves and the rest of the earth, then we must acknowledge that the myriad things around us have their own active agency, their own active influence upon our lives and our thoughts (and also, of course, upon one another). We must begin to speak of the sensuous surroundings in the way that our breathing bodies really experience them—as active, as animate, as alive. ■

David Abram is a philosopher, magician, and author who migrates between the Pacific Northwest Coast and the high desert of New Mexico. His book Spell of the Sensuous won the 1996 Lannan Literary Award for non-fiction and was reviewed in Wild Earth fall 1996.

Twilight

it is important

*to reach the forest before night
falls in the woods, to stand*

*where the stretched out shadows
of trees drape around*

*the rim of the earth and where
i can dance*

*with my own form
sprawled out too and to notice*

*where animals are hiding
by their distorted silhouettes,*

*the flowers, all of us spreading
the dark part of ourselves thin*

*over the curved dirt, over-
lapping until not even the mind*

*of the forest can distinguish
our shapes—*

*until the whites of the animals'
eyes turn into stars, and*

*my side of the world
begins*

*spinning
its own mysterious black hole*

to walk through

—Therese Halscheid
from *Poems for the Wild Earth*

Shedding Stereotypes

by Stephanie Kaza

New Year's Eve this year in California was a disaster. Not only did I and everyone else I knew have the flu, but our creek and everyone else's flooded. Three straight days of torrential tropical downpour and levees were breaking right and left. The confluence of the forks of the American River thundered with raging rapids. The Russian River spilled its banks; Napa River surged through town. Pouring down steep canyons of the Sierra foothills and central coast, the water jammed through narrow channels, cresting where inevitable. By the time the deluge hit the Sacramento Delta, there was no stopping it. What banks? What trees? The sheet of water from the "Pineapple Express" extended for miles across the valley.

In grappling with the situation, radio commentators referred to the "ravages" of nature, the "victims" of the storm, the terrible "tragedy" of the flooding. Beneath each of these words lay a set of assumptions about human-nature relations. Nature, in this case, was not simply "doing its thing"; it was doing it *to* humans and as an agent of damage and suffering was seen to be evil or at least problematic. No one said anything about "harmony" or "balance of nature." And certainly no one publicly exalted the impressive power of nature at its wildest.

Several days later the creek at our place had dropped five feet and seemed willing to remain in its channel for a time. Dry Creek Road was covered with landslides and debris from overflowing culverts. Pieces of asphalt had fallen away where the road was undermined by water. We tried to remember the isolated wading pools of summer, the leaf-filled channels of early fall, the gurgling trickles after the first rains. It was impossible. The swollen creek had erased even our own memories of its former self.

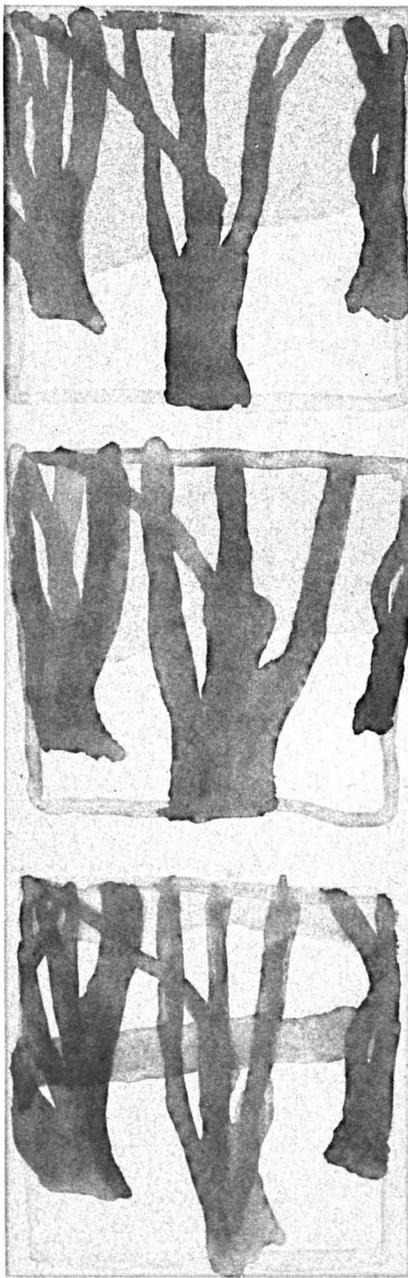
Over the next few weeks we wandered up and down the creek, noting the damage, recounting the losses. Some said it was a 50 or 100 year flood, but what does that actually mean for the creatures of the creek? Hidden behind the tidy hydrologic label was massive death and destruction. Millions of insects swept downstream, bankside burrows clogged, topsoil eroded, tree roots excavated. The creek life had been severely altered. I pondered the human inclination to assume landscape stability despite the obviously impermanent nature of landforms.

The radio commentators spoke primarily for the human experience of the flooding, reflecting a kind of shock and disorientation. What happened to the creek and river channels we counted on (in our animal psyches)? Quite naturally people rely on a cumulative set of perceptions, averaging them into an "idea" of what a creek is. This kind of shorthand is convenient for simplifying very complex landscapes and processes. All organisms need to recognize patterns in their ongoing orientation to the world. Animals must look for food, shelter, and water and have some reliable sense of what will yield the necessary requirements for sustaining life. Salmon recognize the chemical make-up of their native watercourses; herons recognize the still pools of water where small fish congregate.

Stereotypes are constructs in the mind, assembled from experience, cultural values, and limited information.

The great danger in stereotyping is the ignorance it perpetuates.

This article is adapted from a longer essay, "Mistaken Impressions of the Natural World" first published in *Whole Terrain* 4(5-11), 1995-1996.



Since it is impossible for any organism's perceptual system to process all the incoming information about a landscape on either a micro or macro scale, pattern recognition is essential for survival. Patterns simplify complex input into manageable bits reliable for the long-haul. Human ideas of place, plants, and animals grow out of this natural process. These ideas, however, are strongly influenced by our natural training to value things as good or bad. You might recognize the familiar shape of a drooping oak and think, "good for firewood." Someone else might see a sparsely vegetated desert and

curse its "barrenness." To another, a hawk swooping out of the sky to snare a small chicken is a "nasty predator." The value filter of bad and good further simplifies the complexity of the specific organism and its habitat according to human preferences. Thus we naturally fall into forming nature stereotypes—ideas of nature that are much more about human experience and mental conditioning than about the creeks or animals or trees themselves.

For some time now I have been investigating stereotypes of trees and forests. In writing *The Attentive Heart*, I spent time sitting with trees, seeking what Martin Buber called I-Thou contact. Like many, I had read *The Giving Tree* by Shel Silverstein, a well-known children's book which promotes the generosity of a tree in anthropocentric terms. First the tree provides fruit and shade; as it ages, it offers its branch as a perch for a swing, its trunk as wood for a boat. Finally, when it is cut

down, it willingly gives its stump as a seat for a tired man. This kind of intimacy was not what I had in mind. In fact, part of my task was taking apart the childhood stereotypes of trees, often unwittingly perpetrated by authors of children's books.

One of the problems with stereotypes is that they override the diverse conditions of place and history. All oaks are lumped together as craggy; all redwoods grow to be gigantic. Each tree I visited during my writing project had a very specific story of place and companions. Some had many human visitors, like the Giant Sequoias at Calaveras State Park, while others were mostly left alone to the woodpeckers and ants. Some showed a history of storm impact, with fallen branches and broken limbs, while others showed evidence of insect invasion or fungal rot. Each tree's experience was unique; it could not be summarized adequately by a shorthand stereotype. To overlook these particular stories was to be deprived of the potential for much richer relationships.

Species stereotypes can bear serious consequences when broad-scale decisions are based on them. For example, modern genetic research has shown that not all trees in a species carry the same genotype, or set of chromosomes. Some species like the Loblolly Pine have fairly plastic genotypes, with a range of configurations according to the habitat or latitude of the trees. Other trees such as Red Pine are relatively conservative and consistent in genotype no matter what the location or environmental conditions. This range in variability may explain why some trees have failed in replantings. Managers holding species stereotypes may also overlook critical differences in soil and associated mycorrhizae affecting tree survival.

In my work I wanted to go beyond stereotypes and aim for more authentic contact with the actual life of trees before me. I met a major challenge when I moved east in 1991 to teach Environmental Studies at the University of Vermont. Though I had been born in Cleveland and raised in Buffalo as a young child, I cannot say any understanding of northern hardwood forests had imprinted on my young mind. The eastern forest definitely shook up my West Coast stereotypes. Here the long cold winters and humid almost tropical summers select for hardwoods better suited for the long period of winter dormancy. The first year I noticed my mind forming very rough forest stereotypes based on scanty information and relatively little field experience. In brief: after the dancing colors of fall, there was the very long stretch when nothing seemed to happen; then finally everything turned green.

The second year I began to look for more subtle changes out of self defense. I knew I could not survive another six months of cold and snow under the oppressive stereotype of an endless unchanging winter. Sure enough, in early March birch trunks were photosynthesizing, lending a faint green tinge to the bark. With mud season the buds began to show signs of swelling. The so-called "explosion of green" actually stretched over several weeks from late April into May. The leaves came on quite gradually day after day, week after week from late April into May. They did not rush out full-grown and brilliantly

illustrations by Libby Davidson

green. After many cloudy days, the first extended stretch of sunlight activated photosynthesis, and within a few days, the pale yellow leaves turned green. My simplistic ideas were dismantled before me in a stunning display of beauty that did not match up to my old concepts.

Stereotyping is most often thought of as the categorization of humans into narrow repressive roles—e.g., the rabid environmentalist, the redneck logger, the yuppie environmental professional. Similar shorthand is used to stereotype animals: the playful dolphin, the mean rattlesnake, the graceful hawk. Stereotypes only reveal the limitations of someone's knowledge about a group of people, animals, or plants. For example, those who study dolphins know they can be quite aggressive in defending their young. Rattlesnakes are actually quite timid and would prefer to avoid encounters with people.

Stereotypes are constructs in the mind, assembled from experience, cultural values, and limited information. The great danger in stereotyping is the ignorance it perpetuates. A person tends to perceive trees, animals, and landscapes according to his or her currently existing ideas and beliefs which reduces the person's capacity to see things outside of human projection. The fundamental interference of projection tends to reduce respect for the Other. One sees only one's ideas of the plant or animal, which precludes glimpsing the full complexity of the organism's life.

You cannot get rid of stereotypes. They are too pervasive, subtle, supported by cultural tradition, and embedded in our own evolutionary conditioning. However, you can see how they work by careful observation of the mind. One can examine stereotypes that have been inherited from family values, such as prejudice against snakes and mice. One can look at stereotypes that form out of fear and disorientation or the desire to control a situation. One can also observe how groups tend to polarize in self-defense once stereotypes are used in debate. Very often environmental controversies become overheated because fundamental differences in values have crystallized into stereotypes. These are not always apparent at first glance. Sometimes what is required is a clear look at how the "other" has formed a stereotype about *you*. Environmentalists caught up in the very real urgency of their agendas have difficulty seeing how they could be perceived as aggressive and anti-human. But stereotypes are not about real people or real landscapes. They are about extracted characteristics chosen to suit the other's need for control and self-protection.

Grassroots bioregional organizing offers a terrific antidote to such reductionism. Friends of the Connecticut River, for example, focuses on the specific history, topography, and political culture of their watershed. The Green Mountain Club in Vermont addresses needs along the Long Trail in the Green Mountains; the Appalachian Mountain Club in Virginia helps take care of the Blue Ridge. By drawing attention to the particular attributes of the places they support, each group works to overcome stereotypes promulgated by the media, by agency managers, by uninformed locals. Stereotypes encourage the ten-

endency to look for a general solution that will fit diverse variations. The Army Corps of Engineers and Bureau of Reclamation have made a profession of this in damming river after river, east and west, with little review of biological consequences (on salmon, for example). Grassroots groups break through these universal approaches by addressing the specific natural history, geology, and hydrology of their area, as well as the cultural history. As real knowledge is shared about real landscapes and watersheds, stereotypes naturally lose power and bit by bit are discarded as non-functional.

The intimacy Martin Buber refers to requires going beyond fixed human ideas of nature. Shorthand patterns and conditioned thinking stop the mind from experiencing the full depth of what is not known. To penetrate stereotypes is to open the way to true mystery and recognition of the unknown. This is perhaps the primary task in environmental work—awakening to the very rich biological and geophysical world which is so profoundly affected by our limited ideas and beliefs. |

Stephanie Kaza is Assistant Professor of Environmental Studies at the University of Vermont where she teaches ecofeminism, radical environmentalism, religion and ecology, and nature writing. Stephanie is the author of The Attentive Heart (1993), a collection of meditative essays on trees. Her book in progress is Green Buddha Walking, an environmental interpretation of Buddhist philosophy and practice.



Re-Storying Biodiversity by Way of Science

by Connie Barlow

*...wider and deeper
awareness of the story of
life in its mythic majesty
offers enormous
opportunities for
fostering biocentric
ethics.*

T*he evolutionary epic is my creation story, and the diversity of life is its greatest achievement.* This is a credo in which intrinsic value of biodiversity is taken on faith, but a faith that has an element of logic to it and can be communicated. More precisely, the credo asserts that today's panoply of life is the glorious manifestation of four billion years of continuity and creativity. The living beings that grace this planet are the legacy of uncountable generations that came before and the precious heritage of those that will follow. The diversity of life thus fills the present with echoes of deep time.

Overall, this credo is a good deal more expressive than the simple refrain that species have intrinsic value. And it is a lot less likely to prompt a rational refutation than is the claim that species have a "right" to exist.

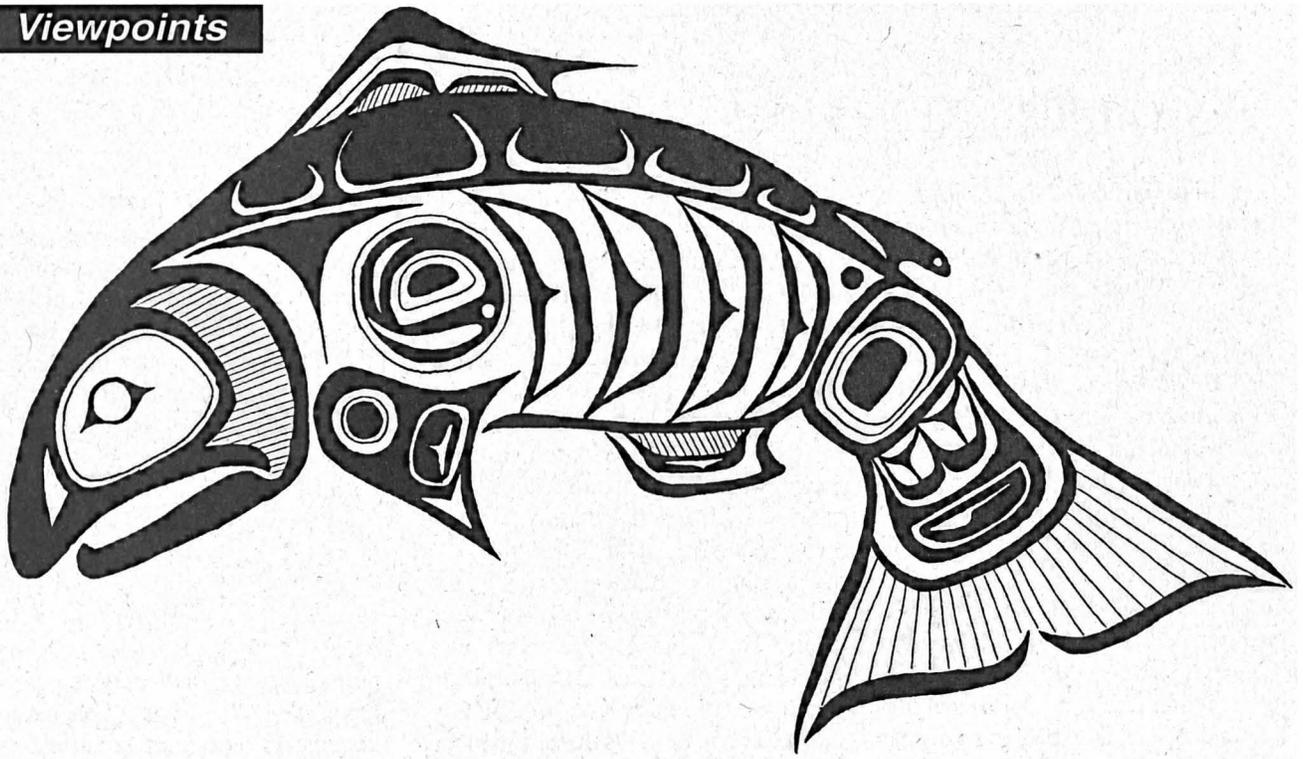
Biodiversity is sacred.

Why?

Biodiversity is sacred because it is my religion to believe so. The evolutionary epic is my creation story, and the diversity of life is its greatest achievement.

For many of us, the diversity of life is our scripture. It is through the study of living beings and their fossil forebears that the story of creation has been revealed and interpreted. To behold another species with reverence is no less a religious act than to read the Bible in a pious frame of mind. To lose a species through apathy or avarice is no less tragic than to tear a page out of every Torah or delete a passage from every copy of the Koran.

"The evolutionary epic is probably the best myth we will ever have." Edward O. Wilson made that statement nearly twenty years ago in his book, *On Human Nature*, and he stands by it today (see the box of conversation with Wilson). Myth as falsehood is not the usage intended here. Myth, rather, as a grand narrative that provides a people with a placement in time—a meaningful placement that celebrates extraordinary moments of a shared heritage. Those of us who have not only learned but embraced the scientific story of our roots know ourselves to be reworked stardust, biological beings with a multi-billion-year pedigree. We know these facts deeply, and for us the story evoked is as empowering as any tale that has ever come alive in the flames of a fire at the mouth of a cave or in the vaulting echoes of a cathedral. For us, the history of life and of the universe as told by science becomes more than a sequence of strange and arresting events. It becomes our personal and shared story, our creation story, our sacred story.



To call this story the “evolutionary epic,” as Wilson has done, is to leap from textbook fact into meaningful extension. The evolutionary epic, in the hands of a scientifically faithful storyteller, is not fiction or fantasy. It is nonfiction in the same way that Wilson’s exquisite books—*On Human Nature* and, more recently, *The Diversity of Life*—are nonfiction. The best nonfiction begins with a foundation of fact and then calls upon the mind to find a story in it, a compelling and beautifully rendered story.

Wilson, myself, and many others are convinced that wider and deeper awareness of the story of life in its mythic majesty offers enormous opportunities for fostering biocentric ethics. The evolutionary epic also offers as-yet unexplored possibilities for spiritual enrichment, foremost because it can re-story the natural world. I don’t have to disingenuously will my way into a Native American mind-set while I hear about Raven or Coyote creating this or that. I don’t have to put my intellect into cold storage or search for a strictly metaphorical satisfaction when I am told that a sky god created in his own image a fellow called Adam. And I don’t have to separate my spiritual rendering of the world from the frame that demystified thunder.

Instead, there is a story that is real to me, yet magical at the same time. And it can be told in many, many ways. The full story begins with a community of microbes working together for eons to develop the nutrient cycles that still run the biosphere. Biodiversity emerges. Eventually, some of those microbes merge into an altogether new way of being: ameba and kin. Biodiversity blossoms. Later, ameba and kin usher in all the jellyfish and starfish and worms and clams and crabs and fish and bryozoans of the sea. Biodiversity blossoms again. The scene shifts to the land, where lichen and isopod, amphibian and fern emerge—despite the hardships of survival in thin air. Conifer trees, reptiles, beetles, dinosaurs, ants, flowers,

mammals, butterflies, and finally grasses grace the earth. Biodiversity is in full bloom. Somewhere in this sequence, after the passing of the ichthyosaurs and mosasaurs (the “dinosaurs” of the sea), a bearlike creature slips back into the water and becomes whale. Somewhere along the way, a puff of silk is caught on a breeze and spider takes to the air.

The possibilities for story are endless. So those who would recount the scientific story of life in epic form must be masters of compression. They must select from the voluminous facts just those that can best reveal the saga of our coming into being and of the lush diversity all around. A drama of fortune and crisis unfolds. There are turning points, close calls, moments of grace or exceedingly good luck. There are ancestors and heroes galore.

The great work of transforming textbook fact into mythic story is just beginning. The best such storyteller I have encountered is the team of Brian Swimme and Thomas Berry. In their *Universe Story* they draw from both worlds—the plot derives from the various sciences, while the archetypes and even the names of the heroes are borrowed from time-tested stories in the humanities. Here, for example, is how Swimme and Berry convey the terrible richness evoked on Earth following the birth of the first predatory being. *Kronos* they call this being, after the character in Greek myth who swallowed his own children alive. *In the future, pale blue skies would shriek with the death terror of pteranodons seized by the quickly stabbing rows of knifelike teeth that lived in Kronos’s descendants’ mouths. Springboks would learn to eat with their ears ever attentive, lifting their heads silently at the slightest fluff of sound, the doe eyes perfectly still with fright, then exploding in a zigzag escape from the leap of a great cat who had learned its hunting skills from a long line of predators brought forth by the ancestral Kronos. Black eagles soaring with talons outstretched,*

A CONVERSATION WITH EDWARD O. WILSON

CB: In your 1978 book, *On Human Nature*, you wrote, "The evolutionary epic is probably the best myth we will ever have." Does that statement still hold?

EW: Yes it does.

CB: We normally think of myth and science in opposition. Why, then, your emphasis not just on the facts of evolution but on a mythic rendering of those facts into epic form?

EW: I believe that the epic is the human, narrative mode of thinking with the greatest grandeur. I believe that humanity must have an epic—must have its epics, plural. An epic is a grand narrative, usually in poetic form, that utilizes archetypes in explaining a theme that engages all of the nation or all of humanity. To give you an example of how deeply I believe in the epic narrative, I wrote *The Diversity of Life* in epic form. The archetypes include cataclysm, rebirth, the summoning of heroes to lead us out of this worldwide crisis in biodiversity. The book closes with the archetype of the new world discovered. It's written deliberately in epic form. I build a tension in the first chapters: a storm strikes the Amazon [near where he is working], but the forest bounds back. Krakatau explodes; one of the great volcanic eruptions of the century wipes out an archipelago, but the cinders are recolonized. Massive extinction events have occurred in the far more distant past, but they were not enough to destroy the crucible of evolution. Now the new menace, the sixth great extinction crisis is upon us.

CB: And in your books and public appearances, you are summoning the heroes to take on this new crisis—calling upon each of us to become a hero in some small way. I remember a wonderful public lecture by Norman Myers. After a thoroughly depressing assessment of ongoing species extinctions, Myers completely shifted the mood in that room. He predicted that whatever generation takes charge and puts an end

to the biodiversity crisis will be viewed as heroes for hundreds, even thousands of years to come.

EW: That's exactly right. We can make this into a heroic age.

CB: To launch a heroic age, do the writers and orators of the evolutionary epic need to employ a heroic style?

EW: Yes. There has to be a high, serious style developed for the evolutionary epic. Epic is, after all, a poetic form. It's an art form. This is why we prefer the King James version of the Bible and why Shakespeare resonates so. But we have to use a modern genre of style; it can't be archaic. It will not do to simply write a pedantic or a plainly worded book that tells the facts and the evidence. Because where does that leave you? It's only when you strike the inner chords, the mystic chords of emotion, that you are making it possible to transfer some of the energy and seriousness that defines provincial religious thought to a secular form. I don't see the poetry or literary style as just a contrivance to accomplish something—like moving a ton of earth or building a flying machine. I look on it as absolutely essential to the integrity of the human mind. So what we must have is poetry within the scientific, physical worldview.

CB: That means we need the humanities, too.

EW: The humanities could in effect continue to do their thing, but they would have vastly richer material to work with—grander themes—because the real world, the universe—from black holes to the origin of consciousness—offers far more complex and grander themes than does traditional theology.

CB: A telling of this science-based story must come out of a depth. It must come out of a depth in which there is no artifice because it is so *real*. It's not the storyteller thinking pragmatically that our culture has a need for the evolutionary epic and that therefore they'll have a go at creating it. It's rather: I'm a believer, you're a believer. We are abso-

lutely moved by this story.

EW: Right. And when readers encounter the story, they don't think to themselves, "Well, if I really need it, I guess this could be a substitute for such and such a core conception from religion." They *feel* it. And they *care deeply*.

CB: My own story is an example of that. I've been an environmentalist for a long time, since college days and intuitively since childhood. But until a few years ago, I never connected that commitment with anything. It was just an ethic hanging out there on its own. Even when I read Julian Huxley's great books promoting the evolutionary epic as a religious worldview, I didn't see the connection, in large part because Julian didn't see the connection either. He couldn't have, as the environment was not a big issue in the first half of this century, when he was writing. But during the last few years, especially since I've encountered the ideas of Thomas Berry, the evolutionary cosmology and my environmental leanings have merged in a big way. And it's not just general environmental concerns that do it for me. It's the biodiversity crisis.

EW: Building the evolutionary epic, telling the story: this is our best way to reanimate the deep emotions that are innate to the human mind, having evolved over thousands of generations in a religious context. The self-assembly of complex systems, the evolutionary process: this is the epic we can create by exploring the material world. And there's so much left to explore. It is of such profound and Olympian magnitude.

CB: What exactly is it about the history of life that prompts you to regard it as an epic?

EW: The flat, superficial answer is that components of evolution—the great quantum steps—can be shown to represent progress of a sort, and therefore can be construed like a story, replete with crises and emergence into new worlds—the sea, the land, the air—but that's the flat answer. The deep answer has to do

with the way the human mind has evolved to work. And that entails archetypes. It entails a compulsion to organize experience in terms of narratives. We cannot think without narratives. We have an urge to create transcendental narratives, which justify human life on Earth, which justify our tribe, our nation, which empower it by recounting heroic episodes of the kind that bound it together and will bind it again, that will meet any crisis. The adaptive significance of the propensity toward archetypes, epics, is clear. Overall, you cannot ask why the evolutionary story is an epic without rephrasing it as, Why do we wish to see the evolutionary history of the world as an epic?

CB: Teilhard de Chardin, Julian Huxley—they tried decades ago to get this thing moving. But back then an evolutionary cosmology was more an intellectual offering—an alternative religion that could give peace of mind to those who couldn't believe in the old stories anymore. But now a new push for embracing this worldview is desperately needed because it can infuse the emerging concern for biodiversity—which, at the moment is mostly an ethic without a mooring—with a sense of the sacred, and with all the zeal that that implies.

EW: We may be approaching a critical mass of literature and thought. With just enough people concerned, and kneading and pushing, something may finally happen. ●

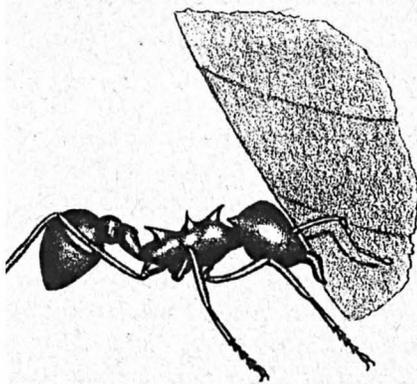


illustration by Douglas Moore

orcas circling and confusing before shredding the great whale and darkening the seas with its blood, bats whipping through the night to devour thousands of churning insects—none of these would have trembled forth had not Kronos dared to probe this path.

Told around a campfire, read to a child at bed-time, or dramatized and sung in a cathedral, the evolutionary epic offers endless possibilities for nurturing the generosity of spirit essential for putting an end to the sixth great extinction crisis. Some of us may come to identify so deeply with the continuity and creativity of this story that, as with Swimme and Berry, a celebration of the epic pours forth. To become celebrants of the universe story is, in fact, what these two seers offer as a species-wide image of ourselves. In a sense, the diversity of life stores the outline of the narrative of evolution in a planet-wide gene pool; but—as far as we know—only humans are *conscious* of that story. Only humans who have assembled and interpreted the fossil remains of trilobites and dinosaurs and giant ground sloths can celebrate the lines that have vanished—eons of particular stories exhumed from the grave. We can thus remember and honor those who came before. Eerily, too, we can look around today and know who among the finned and feathered and foliated are truly the Old Ones.

For example, encountering a flush of avocado-green *Equisetum*, I am apt to conjure a foot-long Carboniferous dragonfly perched on a stem. A forest of tall pines or firs calls up a memory of their long-gone partners in evolution: the snake-necked dinosaurs. The widely spaced thorns of a mesquite or locust or hawthorn still whisper of the times not so long ago when broad-mouthed mastodons and ground sloths roamed this continent.

Look! There goes an Old One. Possum. Possum gives birth to fetuses and suckles them in a pouch on her belly. She has no close kin in this land. Almost all of Possum's relatives live in Australia. But once upon a time, Australia and South America and Africa and even Antarctica were all joined in one great supercontinent: Gondwanaland. Throughout that vast landscape wandered Possum's ancestors. They crept out of the trees each night to hunt insects and worms while the dinosaurs slept. Notice how Possum still stops and listens for the footfall of a great beast.

Look! There stands an Old One. Ginkgo. Ginkgo has no close kin at all, the last of a long line. Many millions of years ago, Ginkgo lived everywhere. But then the climate changed and other trees came, and Ginkgo found refuge only on the other side of the world and finally in only a few temple gardens of China. Today we honor Ginkgo in cities everywhere because Ginkgo remembers how to breathe air heavy with carbon dioxide. Look carefully at the strange pattern of branches and twigs, and consider how much effort it took trees to learn the best ways to accept the gift of the Sun.

Look! There clings an Old One. Lichen. Lichen pioneered the land way of life. Lichen turned rock into soil, then ceded the landscape to the stems and roots of plants. Today Lichen lives only where nobody else will—as spots and rings on bare rock, as a crust coating the driest deserts, in patches on cold mountain peaks, on the rough trunks of trees. Contemplate the strength that such delicacy brings forth. Notice what comes of great patience.



By way of the evolutionary epic, this is how we can perceive biodiversity in the abstract, biodiversity in its particulars, and the biodiversity that came before. It is crucial, however, to realize that we are not the only species with a special take on perception. We may see stories in the landscape, but honeybees and kestrels can see in the ultraviolet, rattlesnakes in the infrared. We send missionaries into space to bring back a vision of the whole, magnificent Earth, but migratory beings of avian, reptilian, and even arthropod (as in Monarch Butterfly) lineages sense Earth's magnetic field as an everyday sort of thing. Nevertheless, let us not forget that it is by way of our own creation, science, that we have been humbled, learning something of the ways of these other realms, or other *nations*, as Henry Beston so beautifully described them decades ago.

The diversity of life in itself thus offers a diversity of perception. As Brian Swimme portrays the tragedy of extinction, the loss of a species is a loss to the universe of a particular way of *perceiving* a particular part of the cosmos. Gone with Ivory-billed Woodpecker is Ivory-billed Woodpecker's way of perceiving the Louisiana swamp forest, the buttressed cypress in that forest, the fat grub beneath the bark, the beauty of an Ivory-billed mate.

The history of life transformed into the epic of evolution: isn't this a dangerous path? If we start talking about evolution in mythic terms, won't that aid the creationists in their quest to rid high school biology courses of Darwin's dangerous (and blasphemous) idea? Maybe so. But frankly, from my own high school exposure and what I have seen of standard textbook fare today, I'm not sure the loss would be lamentable. How many believing Christians or Buddhists or Hindus or Muslims would there be if the traditions had been transmitted to children in vapid prose, in a classroom setting devoid of ritual and participation, and with the threat of a multiple-choice exam at the end of the week? Rather, how many adolescents and young adults might actually seek out *The Story* if it were in some way surreptitious, as Hermann Hesse and Lao Tzu and Black Elk were when I was in college?

Consider, too, that a goodly and growing portion of the Christian community, including fundamentalists, are natural allies of evolutionary epicists (or epicureans—the movement still lacks a name). The Christian Green hold biodiversity dear because it is God's creation. Godly creation or evolved creation: it matters not, so long as we agree on the sanctity of all that was created. Former foes can then join hands for a common cause passionately felt.

It is thus a time of both crisis and opportunity. The biological richness of this planet is at stake. And so we humans fortunate enough to be alive at this slice in time are summoned to become heroes. We can rely on the storytellers just now emerging and those yet to come to give us our bearings, to call forth our courage, and (just as important) to urge us to break from time to time into joyful celebration of all that is still here to behold. **I**

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Connie Barlow's Green Space Green Time: The Way of Science will be published this fall. The wildest part of this essay was written on a lichen-covered cliff overlooking a tributary of the upper Gila (Dave Foreman and Aldo Leopold's country).

illustration by Jonathan Blake

CONTACT and the SOLID EARTH

by Christopher Manes

THE THEME OF ESTRANGEMENT from Nature has a venerable history in the West, from Genesis to Rousseau to *Jurassic Park*. We could probably continue for a couple more millennia drawing inspiration for great literature and bleak philosophy from our sense of distance from the natural world, were we not rapidly running out of Nature to lament losing. The attitudes and actions of modern people toward the environment matter in a way that St. Augustine, looking out from his monastery window at a virtually pristine Mediterranean Sea, could never have imagined in his most troubled musings about the fallen state of the world. This generation's ability to restore a meaningful relationship with the wild may well determine whether anything wild, human or otherwise, survives the next century.

But just when we need to cultivate our sensibilities toward the nonhuman world, we have become estranged even from our estrangement. In his book, *The Abstract Wild*, Jack Turner makes the biting observation that the distress people feel over the abuse of Nature in most cases springs not from firsthand experience, but from viewing wildlife programs on television. Our sense of loss is often the emotion of sad entertainment, indistinguishable from the experience of melodramatic films, and just as powerless to change the way we live.

Some postmodern and conservative thinkers would even deny us the solace of this ineffectual anguish. They argue that Nature is simply a creation of culture and our estrangement nothing more than a nostalgic misbelief.

Serious thinkers know better. Like a Wagnerian leitmotif, alienation from Nature follows us around in every aspect of our lives, virtually defining what it means to be a modern person. David Abram's pioneering book, *The Spell of the Sensuous*, has helped rescue the problem from the trivializers by rigorously exploring how deeply human understanding, even the most abstract thinking, depends on our participation in the nonhuman world. According to Abram, it is not so much that we entertain wrong-headed ideas about Nature (though surely our society does), but rather the dazzling, all-encompassing power of literacy and texts has beguiled us into thinking that meaning belongs to humans and not to the world.

And it continues to beguile us. Like the optical illusion that makes a straight line look bent, explaining the trick does not make it go away. We are so embedded in a culture of texts displacing Nature that even the most enlightened ideas honoring the wild do little to end our sense of estrangement, since they cycle through the literate understanding that always holds Nature at bay. We cannot simply talk ourselves out of this problem with better philosophy. What Abram, Turner, and a few other innovative thinkers have done is raise the issue in a new way that goes beyond the search for better ideas to a more interesting question: What can we do to transcend our literate, abstract experience of Nature?

Of course, the immediate answer is, *no one knows*. But when in doubt, tell a story...

*At that moment, the
forest, river, and wildlife
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myself in relation to my
surroundings held my
future in the balance.*

I WAS HUNTING DEER

along the North Middle Fork of the Willamette River in Oregon's Cascades. As usual I didn't get any deer, but I did get lost. Very lost. I was alone and it started to rain so hard even my Marmot rain gear and Herman Survivors couldn't keep me dry. After flailing around in the muck for a couple hours looking for my camp, I concluded I was going to die of hypothermia unless I made it back over the river to my car—no mean feat, since the bridge washed out years ago and the only way in or out of the area was to shimmy over a fifty-foot trunk of the pine tree that had conveniently fallen from one bank to the next.

So I turned my back on my expensive equipment (ultralight down Goretex sleeping bag, ultralight tent, ultralight stove, etc.) and bushwhacked along the river, getting lashed and soaked. I was really attached to that fancy stuff. Ironically, I stumbled across the remains of an Elk calf carcass: the luckless denouement of my hunting talents. There were Mountain Lion tracks nearby. With the foreboding that I might be next on the menu, I continued my endless journey, taking a couple Elk teeth for luck (I still keep them in a box).

By the time I got to the serendipitous log, it was almost dark. The trunk had a crust of ice and the river roared with run-off. I wanted to tie a line, but I couldn't because my fingers were numb and my teeth chattered like castanets. I remember slamming my hands against a boulder to try to arouse the nerve endings, without success, and noticed they looked and sounded like pork chops on a cutting board. Half-frozen, I shimmied across the dead tree, holding on for dear life, while I balanced a pack and an aught-six on my back (like a fool I couldn't bring myself to leave my gun and oranges). The old wood sagged and creaked in the middle under my weight.

But I made it across. I found my car and drove to the moribund logging town of Oakridge, proudly trudging into my favorite restaurant wearing only my long-johns and a sweater, my last dry clothing. Once again, I beamed inwardly as I drank a pot of coffee; I had survived my own stupidity.

I can't remember what I ate for dinner last Tuesday, but I recall every minute of my costly excursion to the North Middle Fork. I also remember the solo trek I made across the interior tundra of Iceland, and the time I pulled a leg muscle alone in the Panamints above Death Valley. As to the hundreds of trips I've made with friends into wilderness or national parks, they all seem to run together.

The difference is, in the latter excursions, Nature really didn't matter. I was a tourist, and the landscape a spectacle. If push came to shove, and we got

injured or lost our supplies, civilization was just a phone call and a medevac helicopter away. We could always hit the panic button and end the ride.

Not so in the North Middle Fork. At that moment, the forest, river, and wildlife had my rapt attention, because they meant literally everything to me. How I comported myself in relation to my surroundings held my future in the balance. Every twig, every track, every twist in the landscape signaled meanings to me, while the abstractions of literate culture that could move armies across the world, dwindled into nothing.

I'm not suggesting that taking life-threatening trips into unforgiving country is the only way to revive a direct relationship with Nature. But I am convinced that participation in the world beyond civilization, real involvement that has something at stake (building a home, raising animals, climbing a mountain), is the precondition for overcoming our estrangement.

This conclusion is nothing new. It is simply a reprise, perhaps a more desperate one, of what Thoreau understood a century and a half ago. In "Ktaadn," an essay in *The Maine Woods*, Thoreau wrote: "Talk of mysteries! Think of our life in nature,—rocks, trees, wind on our cheeks! the *solid* earth! the *actual* world! the *common sense*! Contact! Contact!"

What we lack, Thoreau knew even back then, was not correct thinking *about* Nature, but contact, a life *in* Nature.

"But Thoreau didn't live in Nature," I can hear the critical philosopher in back shout. "He was a literate man, just like us, who saw the natural world through the lens of his culture."

Well, yes. Thoreau stayed only a couple years at Walden, just a mile or so from downtown Concord. And his trips to the woods were just that: trips. Like us, he always had in back of his head the whirl of American civilization, as a counterpoint, perhaps even a premise, to his contact with the solid earth.

This dual perspective is called irony. Sometimes irony in bad situations is the best we can do. But for however brief a moment, irony becomes moot when you reach the icy, groaning middle of a rotten log poised over a raging river. That's Thoreau's contact. It changes things. To what, we can't know, sitting as we do in the smug certainty of our literal civilization. Which is why Thoreau rightly called it a mystery. ■

Christopher Manes, an attorney and philosopher presently practising in southern California, is the author of Green Rage: Radical Environmentalism and the Unmaking of Civilization and Other Creations: Rediscovering the Spirituality of Animals, to be published by Doubleday this spring.

Technologies of Globalization

by Jerry Mander

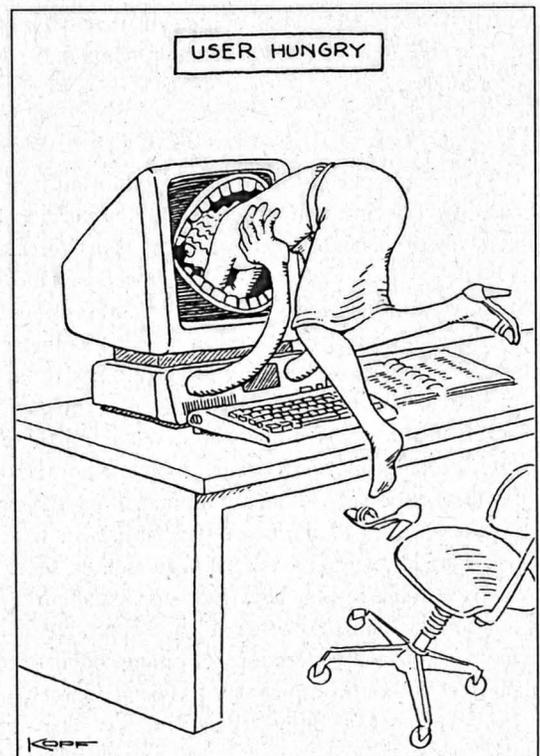
Why hasn't our society developed a process of articulating and evaluating the totality of the effects caused by technology and then voting upon them before they become so pervasive that they become extremely difficult to dislodge? Indeed certain technological inventions change society far more dramatically than any of the political figures we do vote for. Our total immersion in computers, for example, has and will continue to revolutionize our experience of life far more than whether our president is Republican or Democrat. But there is no congressional vote on this; there are no popular referenda. Even in this most democratic of societies, we have no process for decision making about technology and little practice in evaluating it. We have only the market to make our decisions for us, and that process is profoundly skewed.

How did things get this way? There are dozens of possible explanations, but I will only cite three main points.

The first has to do with the information climate about technology. It is a melancholy fact that in our society the first waves of descriptions about new technologies invariably come from the corporations and scientists who invent and market these technologies and who have much to gain by our accepting a positive view....

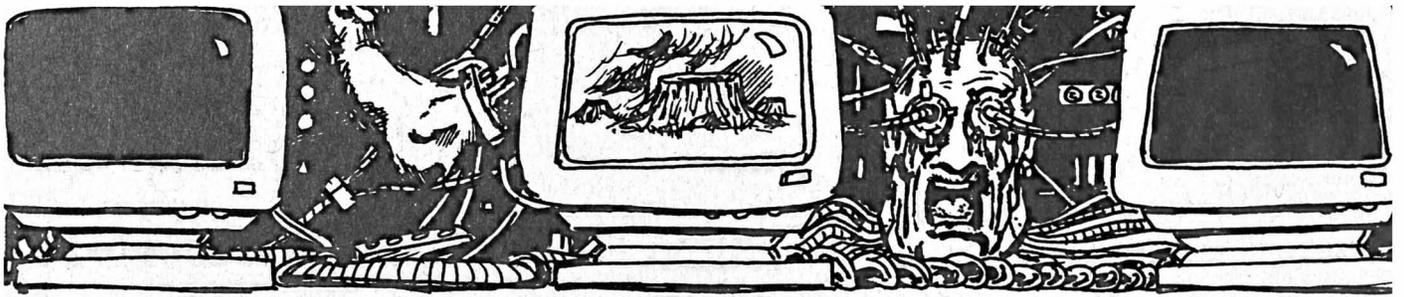
Over the century since the Industrial Revolution, wave after wave of techno-utopian visions have so immersed us in positive expectation that they have solidified into a paradigm that new technology is virtually synonymous with the general advancement of society. It is only long after a technology has entered into general production and may have gained an important role in everyday life that we begin to perceive its adverse effect upon humans or nature. Even then, the proposed solutions usually consist of creating new generations of technology designed to fix the problems of the old. Thus the wave rolls on to the next technical generation.

A second factor explaining our utter passivity to technology is that when we do attempt to analyze the virtues of a particular technology, we do so in personal terms. The car drives us where we need to go in relative comfort and convenience. The rifle brings down the animal at 300 feet. The television is often entertaining and informative. The airplane shrinks the globe; we can be anywhere on Earth in hours. The computer edits, stores data, hooks us to other like-minded people, speeds up our work, and permits us to "publish" our viewpoints to a potentially vast audience. On such observations are based our feeling that these technologies are useful, and indeed they are. In fact, all technology is useful or entertaining, or else we'd have no interest in it in the first place. But to base our ultimate conclusions about technology mainly on our personal experience leaves out the social, political and ecological dimensions; in other words, it overlooks the effects outside of ourselves. What else do guns do? What are the other consequences of high-speed travel? Is a smaller world better? Who else benefits from global computer networks?



This editorial is excerpted with permission from *The Case Against the Global Economy and for a Turn Toward the Local*, edited by Jerry Mander and Edward Goldsmith, 1996, Sierra Club Books (85 Second St., San Francisco, CA 94105).

cartoon by L.J. Kopf



In our individualistic society, we are not practiced in making judgments beyond our personal experience, but it is just that practice—seeking the systemic or holistic effects—that will help us evaluate the positive and negative aspects of specific technologies. The question then is not how or whether technology benefits us but who benefits most, and what does it cause to happen outside ourselves?

This brings us to the third and I think most important reason for our passivity about technology—the blinding notion that technologies are neutral, that the only thing that matters about them is who has access to their controls, that they have no intrinsic qualities that inevitably produce certain ecological or political outcomes. It may be one of the most important survival skills of our times to break with this idea. Every technology has a predetermined political drift, and it is critical that we perceive that and make our judgments and adjustments accordingly....

THE COMPUTER REVOLUTION

The computer revolution is an odd kind of revolution, because every corner of society, including those that disagree fiercely with each other on most issues, is in agreement on this one: They all think it's good. The engineers and the artists; the Al Gores and the Newt Gingriches; corporations and their anticorporate counterparts; conservatives and liberals—all are dazzled by images of computer-driven utopias, though it's possible they have slightly different utopias in mind.

Most of my own friends and colleagues share this utopian expectation. My writer friends wonder how it is even possible to write books without a computer, though several writers in history—from Shakespeare to Hemingway to Atwood to Illich—are known to have done it. Even now, there are those who write books by longhand (Edward Goldsmith and Wendell Berry among them). And there is the impressive fact that four hundred thousand generations of human beings got through their days without computers. It has been done.

"That is not the point," my friends say. They argue that I fail to appreciate how "empowering" computers can be (a popular way of describing them these days) and how they can help us organize against the corporate juggernaut. Computers bring real power back to the individual, and the cybernet helps us build new alliances with like-minded radicals sitting at their terminals, using e-mail and web pages to spread news and mobilize battles. By such analyses, computers seem clearly to be in service of "progressive," democratizing, decentralizing tendencies.

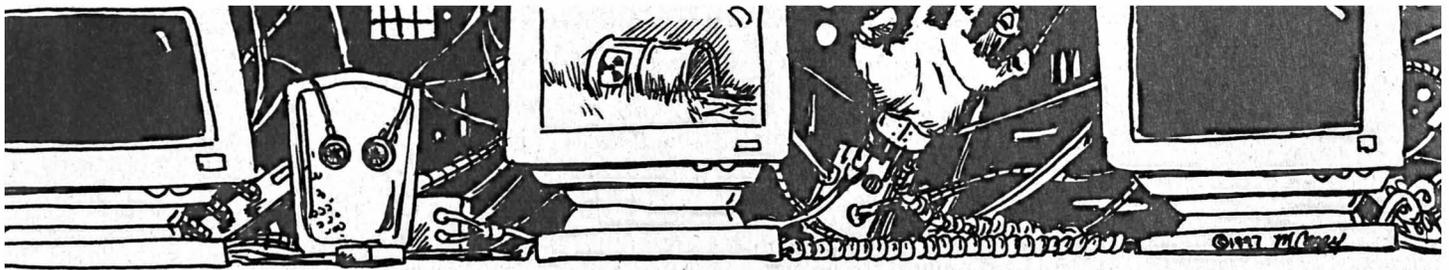
The more esoteric among my colleagues like to invoke the views of influential *Wired* magazine editor Kevin Kelly,

who has described a new "revolutionary" political structure that he feels microcomputation has wrought. "The correct symbol of today is no longer the atom," he says, "it's the net." The political center has been wiped out, and a revolutionary structure has replaced it. This is leading in turn to a new decentralized worldview that "elevates the power of the small player," and promotes heterogeneity. It also leads to a new kind of pure democracy and an "incipient technospiritualism" (Kelly 1994).

Kelly is right on the "technospiritualism" point, though frankly I preferred the old kind of spiritualism that required no meditation through machines. As for the main idea that the old political center has been eliminated and that our new net or web politics brings us computer-enhanced democracy run through cyberspace, let me ask: Should we call it *virtual democracy*? I think so, because someone forgot to tell the transnational corporations in Tokyo, New York, Brussels, or Geneva that the real power was no longer in the center. Centralized corporate and political power is accelerating more rapidly than ever, and the computer has had a critically important role in this. As Richard Barnet and John Cavanagh point out in their chapter on the casino economy, the giant financial institutions of today simply could not exist at their present scale if there were no computers. Computers are their global nervous systems; their way of keeping track of their billions of moving parts, keeping them synchronized and moving in the same direction for central purposes. Richard Sclove of the Loka Institute put it this way:

The emerging technical infrastructure makes possible a new level of deepening, widening and acceleration in global economic integration. Multinational corporations are decentralizing operations and jobs around the world, but at the same time, they are intensifying their centralized control over these decentralized operations...[Political leaders] cannot risk alienating the international financial community. This is doubtless why President Clinton, who refused to stand firmly for anything else in his first year as president, was willing to go to the mat for the passage of GATT and NAFTA. So for all the hype in the media about how the new technologies will enhance democracy, what we are getting is not individual empowerment but a new empowerment for multinational corporations and banks, with respect to workers, consumers, and political systems (Sclove 1994).

What kind of revolution, then, do we have here? To continue to use terms such as empowerment for on-line individual and democratic organizing is to deeply misunderstand real versus virtual political power. Computers may help individu-



als feel powerful or competent, and surely they are useful in many ways. But they do nothing to alter the rapid global centralization of power that is now underway; quite the opposite. In fact, it is my opinion that computer technology may be the single most important instrument ever invented for the acceleration of centralized power. While we sit at our PCs editing our copy, sending our e-mail, and expressing our cyber-freedoms, the transnational corporations are using their global networks, fed by far greater resources. They are able to achieve not only information exchange but concrete results that express themselves in downed forests, massive infrastructural development, destruction of rural and farming societies, displacement of millions of people, and domination of governments. In a symbolic embrace with other technologies of rapid economic development, they operate on a scale and at a speed that makes our own level of cyberempowerment pathetic by comparison. Speaking in traditional political terms, the new telecommunications technologies assist the corporate, centralized, industrialized enterprise (the "right"?), far more efficiently than the decentralized, local, community-based interests (the "left"?), which suffer a net loss.

So much for elevating "the power of the small player."



I have been describing a few macro effects of computers. It is relevant to at least mention a few other dimensions: the role computer production plays in creating the toxic crises of the industrial world and the Third World; the role of computer-based surveillance technologies in corporations to measure and objectify worker performance; and the manner in which microcomputation has sped up and amplified the power of the military technologies of the advanced industrialized nations. This was already obvious in the infamous "launch-on-warning" phenomenon of the old Cold War and the "smart bombs" of the hotter and more recent U.S.-Iraq war, where mass killing by automated bombs left human beings (save for those at the receiving end) free of dirty-handed engagement in the killing process.

Then there is the simple dimension of speed. E.F. Schumacher told us that small is beautiful, but one could also make the case that "slow is beautiful," especially in preserving the natural world. Computers speed up communications exchanges over long distance, a quality most advantageous to the large centralized institutions we have been describing in this book. Of course, it also offers a speedup for resistance movements, but that speedup is mainly to keep pace with the high-speed activity of corporations.

Has there been a net gain? In political terms, I think not. In environmental terms, surely not—to ensure the survival of nature, everything, especially development and especially people, must slow down and synchronize with the more subtle and slower rhythms of the natural world. In our cyber-walkman-airplane-fax-phone-satellite world, we are so enclosed within a high-speed technical reality that the values and concerns of nature tend to become opaque to our consciousness.



Portland State University Professor of Education C.A. Bowers has been focusing on the way computer usage affects the basic ecological and political values of the people who use them. Bowers makes the case that the advance of computers is contributing to a loss of ecological sensitivity and understanding, since the very process of using computers, particularly educating through computers, effectively excludes an entire panoply of ideas and experiences that heretofore had been the building blocks for a developing connection with the earth. Bowers opposes the use of computers in primary and secondary education, saying that they change the way children's minds process information and affect not only what they know but what they are capable of knowing—that is, computers alter the pathways of children's cognition. Newly immersed in data-based forms of knowledge and limited to information transmissible in digital form, our culture is sacrificing the subtle, contextual, and memory-based knowledge gleaned from living in a nature-based culture, meaningful interactive learning with other humans, and an ecologically-based value system (*Education, Cultural Myths and the Ecological Crisis: Toward Deep Changes*, 1993, by C.A. Bowers).

So by accepting computers so completely for schools, says Bowers, our society also accepts a massive cultural transformation, leaving human beings altered in predictable ways. McLuhan said that we turn into the technologies that we use. And so, says Bowers, the more we use the computer and the more it is used globally, the stronger its culturally homogenizing effects and the greater likelihood that our new globalized digital culture will be less concerned about the disappearance of nature.... ■

Jerry Mander, founder of the Public Media Center, is the author of Four Arguments for the Elimination of Television and In the Absence of the Sacred: The Failure of Technology and the Fate of the Indian Nations.

Population and Religion

Bill McCormick needs a special award for that marvel of a book review (*Wild Earth* winter 1996/97) of Betsy Hartman's book. I have not read *that* opus, but his review covers the whole vast ignorant fields of Cornucopia, that never-never land of eternal unlimited optimism, where unlimited food will forever grow to feed unlimited populations all watered by a fog of unlimited optimistic ignorance.

But it is a terribly difficult struggle to inform the public. Frances Moore Lappé

spoke here in Madison years ago, and no one—except me—was willing to take her on. When I, a biologist/ecologist, argued for wilderness preservation, she shot back, "what's more important, humans that suffer, or animals?" Almost exactly the same reply came at the 1970 Population Conference from none other than my former professor, Barry Commoner: "You worry about prairie flowers and tigers, when people are starving?" To these people population can never be a problem. I suspect a lot of the *depth* of the strength of these cornucopians' convictions comes from religion, whether Catholicism learned from the priest, or Marxism learned on Papa's knee (in the above two cases). In any case, his fine piece is a brilliant little victory in this fight, in which we all must take part, even though the big defeats are coming ever closer, year by year.

P.S. September 8 New York Times has a piece on Iran's Ayatolla—encouraging vasectomies, sex education, etc. Why has there been no publicity on this remarkable reversal?

—Hugh Iltis, University of Wisconsin-Madison, Dept. of Botany, 139 Birge Hall, 430 Lincoln Dr., Madison, WI 53706

Population

I am writing to you regarding Ken Wright's article, "Wild Child," from the fall 1996 issue. I find it exceedingly irresponsible of Mr. Wright to encourage environmentalists to reproduce. I hope that all *WE* readers are

well aware of the incredible environmental degradation caused by the growing number of humans (particularly those in the United States and other excessively consumptive nations). Even those of us who make every effort to reduce our personal consumption of resources have a large impact on Mother Earth. A world filled with 10 billion Earth-loving, tree-hugging, vegan environmentalists will as surely be bereft of wilderness as one occupied by ranching, logging, mining Republicans (although, obviously, not quite to the same extent). There is no way around it: HUMANS CONSUME NATURAL RESOURCES, even well meaning ones. More humans mean fewer spotted owls, wolves, douglas-firs, bears, white pines, salamanders, lynx, red oaks, wolverines, and other wild creatures.

I realize that most people, even environmentalists choose to have children. This decision is made, presumably, because they want children. This does not make them bad people. We all make selfish decisions in order to satisfy our own desires. What is very disingenuous is to try and justify one's own selfish decision by portraying it as altruistic and encouraging others to make the same selfish decision. I think Mr. Wright has done a great disservice to all the creatures of the wild by encouraging further reproduction. It is my hope that for the sake of Mother Earth others will not follow his lead.

—Richard York, 1014 21st NW #9, Bemidji, MN 56601

Religion

Although it is encouraging to learn of the religious community's increasing involvement in conservation, I would strongly advise conservationists against using the title of Connie Barlow's article, "Because It Is My Religion" (*WE* fall 1996), as an argument in favor of their views. Our public roles are largely those of advocates in debate over policy and legislation, and in a pluralistic democracy, religion should have no place in such debate. The problem with the religious "argument" is that it is really no argument at all, merely an unchallengeable statement of belief that adds nothing to discussion but the oppressive weight of prejudice. Undemonstrable values, of course, must underlie all of our beliefs at some level, but if it is our purpose to inform, educate, and persuade, we should emphasize to the utmost the more rational foundations of our cause. Our opponents' religious rantings should serve as a cautionary spectacle of religion misused; the enlightened response to such misuse is to argue on a secular plane, not to counter with obfuscations of our own. To me, the thought of invoking God or some sort of Nature Deity in pro-environmental rhetoric is as distasteful, as fundamentally *creepy*, as the ultra-conservative's invocation of God in support of his nefarious agenda. Both God and the environment deserve better.

—Jay Kardan, Route 1, Box 1890, Palmyra, VA 22963

WARD VALLEY

Ward Valley, located in the Mojave Desert, has been targeted for a national nuclear waste dump [see *Wild Earth* spring 1994]. The nuclear industry plans to bury radioactive wastes from nuclear reactors in trenches above an aquifer, in an area 18 miles from the Colorado River that is Desert Tortoise habitat and sacred Native American land. Ward Valley is on federal land and must be transferred to the State of California before construction can start. Legislation will soon be introduced in Congress to force a land transfer and exempt the dump from environmental regulations. Governor Pete Wilson has been pushing for the dump, and Vice-President Al Gore and Senator Dianne Feinstein have not taken a stand on this issue. Please contact them and ask that they stop the dump. For more information, contact Ban Waste Coalition at 415-752-8678.

Vice-President Al Gore
The White House
Washington, DC
202-456-1414 or 202-456-6224

Senator Dianne Feinstein
331 Hart Office Building
Washington, DC 20510-0504
202-224-3841; fax 202-228-3954

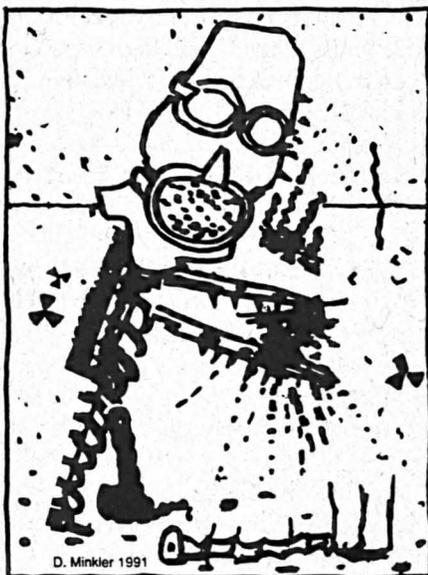
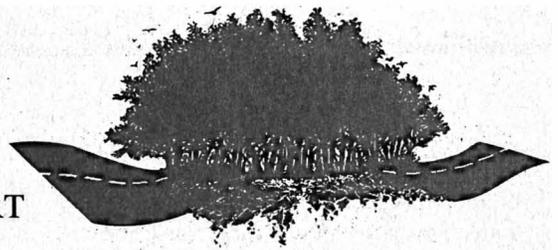


illustration by Doug Minkler



ROAD-RIPORT

Imagine living in a community spared the continuous whine of motor vehicles. You'll likely hear snow machines or other motors, but people generally travel on foot here. Places like this are scattered throughout the vast interior wildlands of Alaska. In many of these places, native people are struggling to preserve their traditional lifestyles—hunting Caribou, collecting and preserving food for winter, etc.—from the devastating changes that would occur if roads come to their villages.

This "last American frontier" is slowly and methodically disappearing under the weight of pavement. While the state of Alaska gears up to develop additional roads under mining regulations written in 1866, however, the people of Alaska are gearing up to stop this senseless degradation of wild country.

In November, ROAD-RIP held our fourth workshop of the year, *The Road Not Taken: Keeping Alaska Wild*, in Fairbanks. The workshop, locally cosponsored by the Northern Alaska Environmental Center and Stevens Village, focused on preventing new road construction in Alaska. We brought together representatives from 18 native villages and communities and over a dozen Alaskan environmental groups, in addition to the BLM, DOT, and other state and federal agencies, to listen to each other's perspectives on roads. There we formed a coalition of native people and environmentalists working to preserve the wildlands of Alaska and the traditional lifestyles of Alaskan native people by preventing new road construction.

In the rest of the country, ROAD-RIP primarily works to remove existing roads and restore wildland ecosystems; but in the Alaskan interior, we still have the opportunity to protect many intact ecosystems from being roaded at all. State and federal government agencies, of course, have development on their minds. Using the antiquated regulations of Revised Statute 2477 (RS 2477) of the Lode Mining Act of 1866, plans are being drawn for the construction of countless roads throughout the state. Although threats to the Tongass National Forest and the Arctic National Wildlife Refuge make national news, few people realize or challenge the incredible ecological destruction of roads in Alaska's other wildland ecosystems.

RS 2477 affects public lands throughout the country. This one-line statute states, "the right-of-way for the construction of highways over public lands, not reserved for public uses, is hereby granted." Though repealed in 1976 under Federal Land Policy and Management Act, pre-existing claims were grandfathered in. These pre-existing claims, as well as newer claims under a 1988 loophole illegally opened by then-Secretary of Interior Donald Hodel, threaten federally managed wildlands throughout the country with rampant road construction. Alaska and Utah are most at risk, with over 6000 claims combined across National Parks, Wildernesses and other public lands.

Because Hodel's policy was illegally implemented, discussion about RS 2477 continues in both the Interior Department and Congress. The 104th Congress placed a moratorium on all Interior Department rule-making, halting efforts to write and implement regulations for dealing with claims. In addition, several bills were introduced in the last Congress to solidify and expand Hodel's loop-

hole. If passed, such bills would allow right-of-way claims to be made and roads widened with no oversight or environmental review.

In September 1996, numerous counties in Utah engaged in a road-grading binge on disputed RS 2477 paths and trails to discount land from potential wilderness classification. Hundreds of miles of road were graded before a court order stopped the activity. This destruction occurred as a direct response to Interior Secretary Babbitt's call for a new survey of potential wilderness lands in Utah. Anger over the recently designated Escalante/Grand Staircase National Monument also fueled the fire.

Wildlands proponents need to pressure the Clinton Administration to promulgate strict and final regulations interpreting RS 2477 claims. If RS 2477 legislation is passed easing the requirements for right-of-way claims, the public will have virtually no legal ability to stop claims across important wildlands—like a salvage logging rider for roads, but permanent.

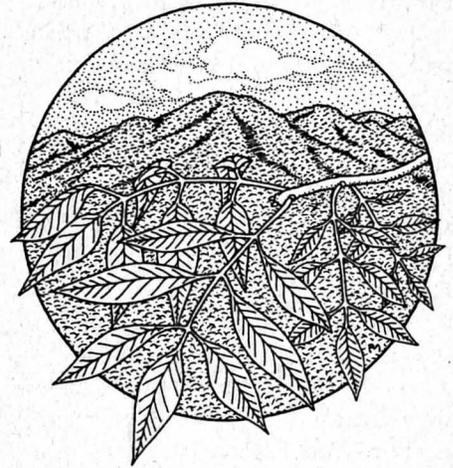
ROAD-RIP is working with groups around the country to fight RS 2477 claims across such important lands as Denali National Park, and to fight claims into many of Alaska's native villages, as noted above. But as of 1 January 1997 we are working under a new name, the Wildlands Center for Preventing Roads (Wildlands CPR). After much debate, we decided that it would be best to change our name to one accessible to a wider variety of people. We are not, however, changing any of the work we do, and will retain the name ROAD-RIP for certain publications and programs, such as our handbook and our Road-Rippers' workshops.

For more information about how you can fight proposed and existing roads in your region, or about how you can help out with Alaska road prevention or RS 2477, contact the Wildlands Center for Preventing Roads at POB 7516, Missoula, MT 59807; 406-543-9551; roadrip@wildrockies.org. Also, please write Interior Secretary Bruce Babbitt (Dept. of Interior, 1849 C St. NW, Washington, DC 20240) and ask him to rescind the Hodel policy on wildlands road claims. Urge him to support strict and final regulations interpreting RS 2477 claims. ■

—Bethanie Walder, director, Wildlands Center for Preventing Roads

Clearinghouse Report

by Mary Byrd Davis



NORTH CAROLINA

During the past three years Rob Messick, working with a small but dedicated crew, has identified 69 old-growth sites in the Grandfather District of Pisgah National Forest, North Carolina.

Mackey Mountain, east of Asheville, is a striking example of his discoveries. The mountain supports more unlogged forest than any other site in the district except Linville Gorge. Included are more than 3000 acres of class B+ old growth. (Class B sites may be of two types. One type has canopies dominated by old-growth trees and understories or canopies showing signs of human disruption, notably effects of the American Chestnut blight; the other type shows no signs of human disruption but has canopies dominated by younger forest, often as a result of fire or wind.)

The south side of Mackey Mountain, with some 2000 acres of uncut forest, harbors many of the mid-elevation mixed mesophytic forest types—from sub-mesic oak to mixed cove hardwood to acidic cove, rich cove and hemlock bottom. One cove is particularly spectacular, as it shows no signs of logging in its 2000 foot drop from Mackey Ridge to Mackey Creek. In the cove are White, Chestnut and Red Oak 200 or more years old. Among the Eastern Hemlocks near the bottom of the cove is a tree just over four feet in diameter.

American Chestnut was a major component of the forests on Mackey Mountain. One result of replacement dynamics was found at the head of Spring Branch where a fifth-acre plot had 18 tree species, many of them saplings or understory trees.

Messick points out that the old growth on the mountain is a legacy of the Weeks Act, passed by Congress in 1911. According to the US Forest Service's book *Mountaineers and Rangers*, nearly 30% of the lands acquired in the first five years after the act's passage were unlogged. The lower slopes of Mackey Mountain were part of the first purchase under the act in 1912. The mid and upper slopes of the south side were acquired in 1913.

A bird's eye view of Mackey Mountain can be obtained from the Green Knob overlook on the Blue Ridge Parkway. However, most of the mountain is within a larger 6000-acre roadless area.

illustration by Rob Messick

The major source of fragmentation in the Grandfather District as a whole is six paved and six gravel roads that connect the high escarpment to the valleys below. More recent Forest Service roads protrude into or next to many of the existing old-growth sites, evidence that the Forest Service cut old growth. Fortunately most of the highest quality old growth remaining is currently not in the timber base. The prospects for ecological recovery in the district are good, but recovery would necessitate closing some roads.

The Southern Appalachian Forest Coalition's Black Mountain Project is looking at exceptional lands in and associated with the Black Mountain Range as part of a pilot project for core reserves in the region. Since the Southern Appalachian Forest Coalition's area of interest includes the Grandfather District, it is funding the entry of Messick's sites into a GIS system.

Messick will present his final report on the Grandfather District at the Fourth Eastern Old-Growth Conference in Clarion, Pennsylvania June 5-8.

NEW BRUNSWICK

In New Brunswick's Christmas Mountains, one of the province's most extensive old-growth areas is being logged. The Christmas Mountains had 50,000 acres of unfragmented forest in 1992. In 1997 a core of only about 12,000 acres remains. No trees will be left by the year 2017 if plans for periodically logging blocks of forest continue to be implemented.

The Christmas Mountains are actually hills on top of a high plateau in north-central New Brunswick, 70 miles from Newcastle and from Bathurst. The forest can be characterized as Acadian with boreal qualities. The dominant tree species are Balsam Fir and Black Spruce. Eastern White Pine and White Birch are also present. Cooper's Hawk, Pine Marten, and flying squirrel are among the forest's inhabitants.

Although the forests have been treated with pesticide to control Spruce Budworm, they were long spared logging, because of their remote location and the low value of boreal species as lumber. Most of the trees cut today are pulped to make high-quality coated paper for US and Canadian catalogs and magazines, including *Time*, *US News* and *Reader's Digest*.

Repap has carried out the logging. Recently Repap was bought by Avenor, based in Montreal. The Christmas Mountains are crown land (the Canadian equivalent of public land, most of it assigned to the provinces for management.) The provincial Department of Natural Resources and Energy (DNRE) has leased a large portion of this land to timber companies, 25% of it to Repap. The unlogged land in the Christmas Mountains represents only about 3% of Repap's total license in the province.

Eastern US Old-Growth Forests: Pattern, Process, Value and Management

The fourth Eastern Old-Growth Conference will be held 5-8 June 1997 at Clarion University in Clarion, PA. Past conferences have brought together hundreds of professionals from academe, government, and the environmental community to share information on the latest research, site inventories, and management and restoration efforts; review threats to existing old-growth forests; explore methods of expanding the information network on eastern old-growth forests; and discuss the values associated with these forests from different perspectives. Events scheduled for this conference include poster and oral presentations, an exhibition of originals by wildlife artist Robert Bateman, a banquet with a guest speaker, and slide shows. For information, contact Robert Leverett, 52 Fairfield Ave., Holyoke, MA 01040; 413-538-8631; dbh.guru@chicopee.com.

The unlogged areas cross the territory of both the Micmac and Maliseet First Nations, and their chiefs have asked that the land be protected. A broad spectrum of conservation and other organizations is also opposed to the logging.

During the summer of 1996, protests included camps by Friends of the Christmas Mountains and the Warrior Society Peacekeepers. The latter set up a gate that stopped logging or road building. After police served an injunction obtained by Repap, the demonstrators removed the gate peacefully. Nevertheless, Repap sued four Warriors, seven Friends of the Christmas Mountains, and the Conservation Council of New Brunswick for \$200,000 to recoup losses.

The main industry activity in the 12,000-acre core in 1996 was road building. Loggers were largely involved elsewhere salvaging wood downed in a major windstorm in the Christmas Mountains in late 1994. The clearcutting of blocks of the core has been rescheduled for 1997. Environmentalists are uncertain how Avenor will respond to calls for protection.

To express your opinion, write to Premier Frank McKenna, POB 6000, Fredericton, New Brunswick E3B 5H1. For more information contact Roberta Clowater, Endangered Spaces Coordinator for World Wildlife Fund Canada at 506-452-9902 (e-mail: nbpna@nbnet.nb.ca).

ONTARIO

In 1996 conservationists protesting logging in the Temagami Wilderness succeeded in delaying but not preventing the planned destruction of more than 300

hectares of old growth. By November 29 when activists closed their camp, public awareness had been raised; and the issue had been brought to the attention of influential individuals, including David Suzuki, who filmed the protests, and of international organizations, most notably the International Union for the Conservation of Nature (IUCN), which voted unanimously at its October meeting for protection of the old growth (Canada abstained). Nevertheless, as of early January, authorities were considering allowing the logging of additional old growth in Owain Lake Forest later this year.

For more information, contact Earthroots, 401 Richmond St. W, Ste. 10, Toronto, Ontario M5V 3A8; 416-599-0152 or Friends of Temagami, POB 398, Temagami, Ontario POH 2H0; 705-569-3539.

MASSACHUSETTS

Pockets of old growth continue to be found in western Massachusetts. Based on four visits to Negus Mountain in the Berkshires, Robert Leverett has tentatively concluded that the south and southeast side support about 100 acres of old growth.

On the rugged mountain, elevation change comes abruptly, at an average angle of over 40 degrees in a series of rock pitches that are separated by narrow to fairly broad shelves. Many micro-environments exist, and fire has been a major factor in shaping the vegetation.

Big Sugar Maples, many of them very old, grow at the base of rock ledges. Red Oaks are everywhere abundant and many show signs of advanced age. Also in evidence are Hophornbeam, very mature and in places dense, and Black Birch, not especially old and probably grown back after the last major fire. Other tree species include Red and Striped Maple; Yellow, White, and Gray Birch; Quaking and Big-tooth Aspen; White Ash; Bitternut and Shagbark Hickory; White Pine; Black Cherry; American Beech, and basswood. Staghorn Sumac inhabits the talus slopes.

Most of the mountain was too rugged for logging, and there is no sign of human use of the upper slopes. However, below the ledges the terrain becomes gentle. Here parts of an old rock wall and a couple of boundary trees are evident. One single-stemmed Red Oak is 16 feet in girth, 75 feet in spread, and 80 feet tall.

"Negus is a significant old-growth site," Leverett reports. "Its heavy mix of Northern Red Oak, Bitternut Hickory, Hophornbeam and Black Birch is intriguing." Interestingly, only a scattering of White Oak appears, but the species is fairly prevalent on the top of an adjacent ridge. ■

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

Wood Anemone

(for the Pine Creek watershed)

*Only the winds of spring
can open the anemone
wrote Pliny*

*Windflower
mayflower
nimbleweed
Anemone quinquefolia
the wind god's
name in spring*

*Five white petals
three-part leaves—
the ancients picked them
chanting prayers*

*Help us
to protect these waters
these wild lands you open on
instill in us
the powers
to contain the ooze
of mines
the excrement of greed*

*Protect these
aquifers and springs
of highland rock
the breath of winds
we blossom by*

—Walt Franklin



CAUTION: Increment Boring Is Hazardous To The Health Of Trees

by Paul Kalisz and Amy Carrico

Activities such as forest inventories, surveys, and research experiments have generated technological innovations and new efficient methods of gathering ecological information. Conventionally accepted methods have developed from these many innovations as a way of standardizing procedures to allow the comparison of results. As in all aspects of life, conventional methods must be continually re-evaluated, especially in terms of unintentional but avoidable harm they may cause in the name of furthering science and knowledge.

Increment boring, the removal of a cylinder of wood of about 0.2 inch diameter and extending from the bark to the pith of a tree, has become standard operating procedure for determining tree age, examining patterns in annual diameter growth, determining site index, and developing chronologies of events such as fires that leave scars marking the year of occurrence. While the information provided by increment boring is important, common sense suggests that wounding a tree, like wounding a human, would invite infection, ultimately leading to ill health and a shortened life span. The scientific literature supports these common sense expectations.

Many pathological defects are caused by increment boring. The most important of these include discoloration and softening of the wood surrounding the wound, decay of the heartwood or sapwood, and infection of surface wounds by canker-causing organisms (1). The extent and type of discoloration is variable by tree species. American Beech (*Fagus grandifolia*), for example, exhibits a brown, watery discoloration, while Cucumbertree (*Magnolia acuminata*) is stained deep blue (2). In a study of 135 trees that had been bored, 100% of the trees exhibited discoloration (1). Open channels left by increment boring also provide infection courts for bacteria and fungi. Research indicates that decay from heart-rotting fungi in increment borer wounds may progress from year to year until the entire trunk is hollow (4). Bacteria and fungi colonizing surface wounds often cause cankers and retard or inhibit wound closure. In the Southern Appalachians, most of the diffuse-porous hardwoods that were bored developed cankers which slowed healing to such a degree that after ten years wounds were still open in four species (2). Similarly, increment boring of Trembling Aspen (*Populus tremuloides*) in Newfoundland (3) and of birch (*Betula pendula*) in Europe (6) always led to serious decay. In a comprehensive study, 85% of bored beeches and 57% of bored Sugar Maples (*Acer saccharum*) exhibited decay, and 100% of bored Red Maples (*Acer rubrum*), Sugar Maples, and American Basswoods (*Tilia americana*), had open surface wounds at the end of the first year of growth following boring (1). These statistics are overwhelming, and indicate that boring is truly hazardous to the health of trees.

While the information provided by increment boring is important, common sense suggests that wounding a tree, like wounding a human, would invite infection, ultimately leading to ill health and a shortened life span.

Increment boring does, however, provide information that is essential, or at least useful, to the preservation and management of forests, such as data describing a stand's age-distribution. But must we be so exacting? Must we accurately document that a tree is 254 years old, or can we accept an estimated age range of 220 to 290 years, that is, can we accept a 10 to 15% error? The authors believe this degree of accuracy is reasonable for most purposes, and recommend the following system for estimating tree ages and gathering growth information without harming living trees.

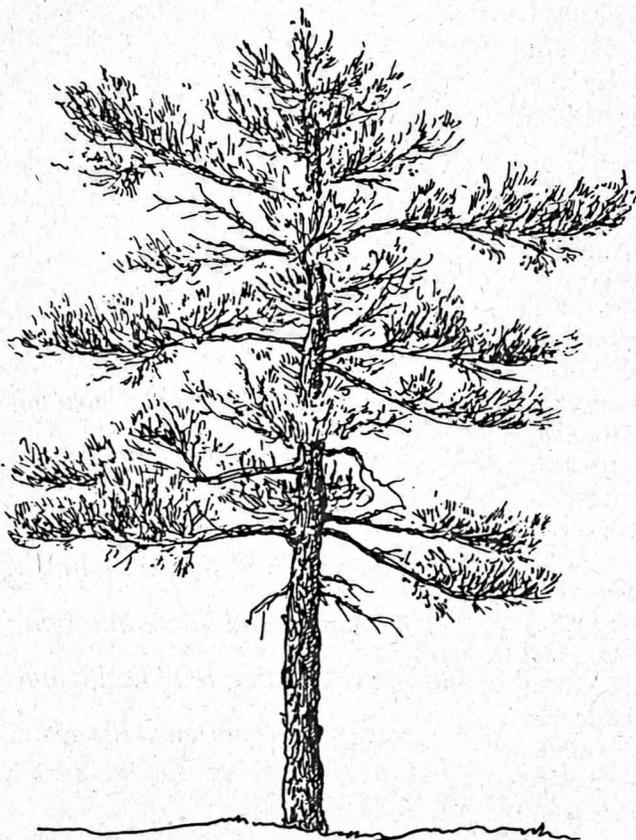
Trees that have recently died or that have been recently wind-thrown should be opportunistically increment bored as encountered. At the same time, these trees and the site on which they occur should be carefully examined to "train" the eye to associate age measure by increment boring with tree characteristics such as diameter and height and distinctive crown and bark features, and with site characteristics such as location in the landscape and soil depth and fertility. In other words, ages measured by boring dead and fallen trees should be used to teach us to recognize a 254-year-old White Oak on a dry south slope, or a 70-year-old Sugar Maple in a rich cove. Such education has been shown to be effective in a study where volunteers who initially estimated tree age with a 40% error reduced their error by one-half after a brief on-the-ground training session; the study concluded that with a little more training, errors <15% could be consistently achieved (5).

Human nature strives for knowledge and understanding. This natural tendency must be controlled and tempered by our moral obligation to minimize the impact of our activities on the ecosystems of which we are a part. Wholesale boring of living trees, especially rare species, old-growth trees, or trees on stressful sites, sacrifices the trees in the interest of gathering abundant and accurate information. Opportunistic boring of dead and fallen trees, combined with a continuing effort to develop an "eye" for tree age, renounces a dependence on a convenience and an exaggerated sense of accuracy in the interest of protecting the trees. ■

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Paul Kalisz is an Associate Professor of Forest Soils & Silviculture in the Department of Forestry, University of Kentucky, and is co-director of the Appalachian Sustainable Forest Center, Livingston, Kentucky. Amy Carrico is a seasonal employee of Appalachia—Science in the Public Interest (50 Lair St., Mt. Vernon, KY, 40456), and is a student at the University of Kentucky.



From Pearls to Perils— The Imperiled Freshwater Clams

by Donald A. Windsor

INTRODUCTION

Out of sight, out of mind. For the bivalves of North America, this is fast becoming out of sight, out of existence. Buried in the stream substrates, minding their own business, are the freshwater clams. Of all the animals in North America, they are the most vulnerable.

These benthic beasts are giving us a warning. Their extinctions and dwindling populations are telling us that our waterways are in big trouble. Sure, many of our rivers look good, with clear water and lush riparian vegetation. True, routine chemical analyses are often showing less toxic pollution in our rivers now than was typically found before passage of the Clean Water Act (1965). But underneath are some very sensitive environmental monitors, the clams, which would tell us about the state of our rivers, if we would heed them (Bedford et al. 1968, Nelson 1962). These remarkable animals are filter feeders, sucking in water through their siphons and filtering out food particles with their gills. Their constant activity places them as prime biological monitors of waterways, a mission that often costs them their lives. However, unlike canaries in coal mines, where the throes of death are visibly alarming, clams die as they live, in obscurity (from a human perspective, at least). Already buried in the bottom mud, they remain interred, resting in the peace of the place wherein they sunk their purchase.

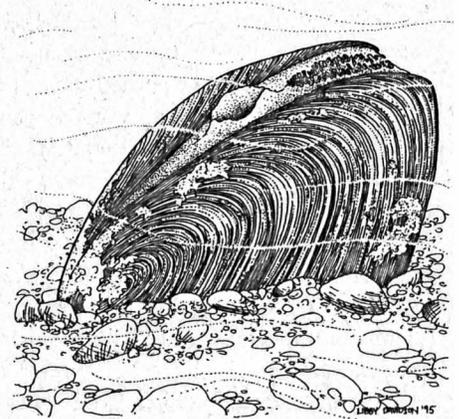
At first glance, the conservation of clams seems to be as straightforward as taking care of our waters, but the issue is much more complicated because high quality waters may contain no or just a few clam species. Clam conservation requires a recognition of their peculiar life cycles, with their dependence on fish, and their vulnerability to habitat disturbance.

If you walked into a coal mine and were up to your keester in dead canaries, you might be hesitant about continuing forth. However, walking through dead clams—that is, their postmortem shells—can sometimes be a good sign. Clam shells long outlast their soft carcasses. A healthy river has its shores and bottom littered with clam shells. The alarm should be sounded when a stretch of river does not have any. This absence is even more striking when you can remember finding many different kinds of clam shells in the same place years ago.

QUANTITATIVE DATA

A recent study by The Nature Conservancy (1996) documents the bad news. Of the 311 species of clams recognized in North America, 17 (5.5%) are presumed extinct, 14 (4.5%) are possibly extinct, 81 (26%) are critically imperiled, 53 (17%) are imperiled, 44 (14.1%) are vulnerable, 44 are apparently secure, 43 (13.8%) are secure, and 15 (4.8%) have not yet been rated. Of the 280 species still surviving, 178 (63.6%) are at risk. That is, two-thirds of our clam species are in trouble.

As a point of reference, of 759 species of birds breeding in North America, 23 are in the extinct categories (3%) and 113 (14.8%) are in the secure categories. The sharpest contrast is in the five at risk categories (the non-secure), where there are 106 species (13.9%) of birds and 209 species (67.1%) of clams. These two taxa represent both extremes of conservation in North America: the birds are the best off; the clams, the worst.



*Clam conservation requires
a recognition of their
peculiar life cycles, with
their dependence on fish,
and their vulnerability to
habitat disturbance.*

Furthermore, the bad news gets even worse. Crayfish, amphibians, and fishes are likewise being diminished. All of these animals are aquatic. A proper government response would be to strengthen our clean water laws. Instead, many legislators seem bent on repealing or weakening these laws. (I suppose their response to dead canaries in coal mines would be to outlaw canaries.)

The United States has the distinction of being the world's center of diversity for freshwater mussels, with the Mississippi watershed the hotspot (Pennak 1953). It could be argued that a clam should be our national symbol. (It might not have the powerful appearance of the Bald Eagle, but it certainly has the mussel!)

Admittedly, a clam is not a very dynamic creature. Despite the large size of some of them (as big as a soup bowl) and their past economic and cultural importance to the button industry, clams are never likely to be classed among the charismatic fauna. Pick up a live mussel and it clams up and even dribbles—not the kind of cute warm and fuzzy critter that makes appealing posters. Yet, clams play a central role in many aquatic ecosystems.

CLAMS NEED FISH

Those persons who would respond with a yawn to a view of a clam, might be surprised to learn that clams are parasites. Freshwater mussels spend their larval stages as parasites on the gills of certain species of fish. The advantage of this parasitic stage is quite clear. In fast moving currents, clam populations might eventually be pushed downstream. With their larval stages in fish, they have a means of transportation back upstream, as well as into new habitats.

A river that is dammed up could still have clams downstream, but if dams eliminate the fish, the clams will be doomed anyway. A sudden surge of hot water or poison may not hurt the clams directly because they can clam up, hunkering down in the cool bottom while the hot or polluted water passes over them; but if this toxic water kills the fish, the clams may still face extirpation.

North America has three families of freshwater clams: the Sphaeriidae, the Margaritiferidae, and the Unionidae. The Sphaeriidae, called "fingernail clams," are small, usually under 10 mm across, have no ridges on their umbo (the protuberance at the hinge where growth began), and live for only a year or so. They are found mainly in small streams and spring brooks. The Margaritiferidae have unique gills* and are rare. Most people will never see clams from these two families. The Unionidae, on the other hand, are the familiar clams, the ones often called mussels. They can attain large sizes and can live for many years, some over a decade. A washboard *Megaloniaias gigantea* can attain lengths of 250 mm (clams

with ridges on their shells look like old-fashioned washboards). The unionids are found in lakes, rivers, and large brooks (Pennak 1953). Many clams have common names, some rather picturesque, but one name may apply to several species. (A current listing of common and scientific names, as well as distribution by states, is found in Williams et al. 1993. A table of which clam species parasitize which fish hosts is found in Fuller 1994.) Although clams are fairly sessile, they can move, propelling themselves with their foot, which is extended into the substrate, securing a purchase by becoming larger at the tip and then pulling the body forward. In warm water on soft sand or mud, some clams are actually fast enough to escape capture.

Reproduction is very different in these families. The Sphaeriidae are hermaphroditic, whereas the Unionidae have separate sexes. In the Sphaeriidae, therefore, self-fertilization occurs. However, both families can discharge sperm through their exhalant siphons and can gather it with their inhalant siphons. In both families fertilization occurs internally and the zygotes develop in an expansion of the gills called "marsupia." The Sphaeriidae carry one to twenty young in various stages of development. The young may be almost one-third the size of the parent when released. In the Unionidae many zygotes are retained; up to three million.

The zygotes develop into glochidia, larvae that look like little bear traps or snap-clips. They float along until they are inhaled by the proper species of fish; whereupon they clamp down on the gill tissue and remain for several weeks, obtaining nourishment from their piscine hosts. When they attain the proper developmental stage, they secrete enzymes that decompose the capsule of fish tissue which has protected them. They then float away and settle on the bottom, where they develop into clams. Glochidia of a pocketbook, *Lampsilis anodontoides*, attach to the Gar Pike, *Lepisosteus osseus*; while glochidia of another pocketbook, *Lampsilis luteola*, attach to the Large-mouth Bass, *Huro salmoides*. Glochidia of a pearly mussel, *Hemistema ambigua*, choose an entirely different class, Amphibia; they attach to the Mud Puppy, *Necturus maculatus* (a salamander). Immunity to glochidia develops after the third consecutive infestation by the same species, leading to rejection. Parasitism on the Short-nosed Gar, *Lepisosteus platostomus*, by copepods (tiny crustaceans) causes a reaction that prevents glochidia of the Yellow Sandshell, *Lampsilis teres*, from attaching (Baer 1952). Perhaps the most remarkable example of a clam exploiting fish is the pocketbook *Lampsilis ovata*, which only discharges its larvae when fish pass over. To make sure they do, it has a life-like image of a small fish on the outer fringe of its mantle which jiggles in the current. When a fish is attracted and gets close, the pocketbook discharges its larvae (Williams et al. 1993).

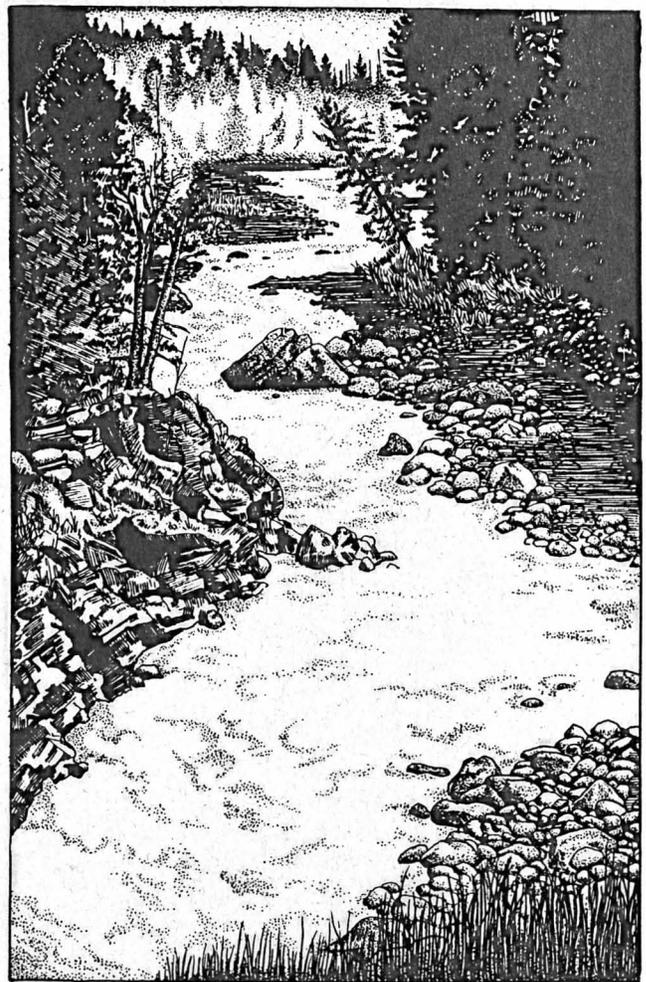
*For those of you who want a full explanation, here goes. There is no simple way to describe the distinction between the Margaritiferidae and the Unionidae. The main difference is the gill structure. The Margaritiferidae either lack distinct intralamellar septa, or when said septa are present, they are oblique to the gill filaments. The Unionidae have distinct intralamellar septa which run parallel to the gill filaments. Since this distinction is not germane to the main thrust of the paper, I tried to handle it with a single word, "unique." —DW

The life cycle described above only applies to freshwater clams of the family Unionidae, which are predominantly North American. Marine clams and many freshwater clams in other parts of the world do not have glochidial larvae and are not parasitic. They produce veliger larvae, which swim in the plankton. The notorious Zebra Mussel, *Dreissena polymorpha*, has a veliger larva. From the aspect of comparative embryology, the glochidia are modified veligers (Barnes 1963).

ECOSYSTEM INTERRELATIONS

North American freshwater mussels are not only parasites, they are also hosts for other parasites, as are all mussels. So, if you pick up a live clam, you are not looking at just one species; you are looking at several dozen. While it may be difficult to see all those inside, often many symbionts are attached to the outside—from the green cast of algae to small protuberances due to insect larvae, or perhaps a shiny slimy spot where snail eggs or a small leech may be attached. (Beckett et al., 1996, provide a current catalog of invertebrates that live on clam shells.) Inside the shells is an excellent habitat for parasites. *Aspidogaster conchicola* is a fluke that dwells in the pericardial and renal cavities of clams, such as *Anadonta grandis*. *Cotylaspis insignis* is a fluke that resides in the gills and suprabranchial cavities (Olsen 1974). An aquatic mite, *Unionicola ypsilophorus*, swims up toward the light, but when it is over its clam host, the Eastern Floater, *Anodonta cataracta*, it swims down toward the darkness on the bottom to enter the clam (Read 1970).

Clams are a staple in the food web. Muskrats are their most important predator, but other mammals such as Raccoon and Mink also prey upon them. The sphaeriids are eaten by a variety of fish (Pennak 1953). Small unionids provide food for waterfowl as well as fish. Gulls sometimes drop clams on rocks, or parking lots, to break the shells. Native Americans consumed large quantities of clams, and their settlements are recorded by middens of clam shells. A dying or sick clam relaxes its powerful adductor muscles which hold its shells shut. The hinge ligament, which fastens the two shell halves ("valves"), has a spring component that holds the valves open. When the adductor muscles relax, the shell opens slightly, a situation called "gaposis" by clam workers. Muskrats sometimes open clams by leaving them in the hot sun until gaposis occurs. Some fish, crayfish, and insects take advantage of this opportunity and nibble off what flesh they can. As the feeding continues, the valves open wider and more scavengers participate. Finally the microbes clean up and only the shells remain. Nothing is wasted in Nature, though, and the dead shells act as small habitats for other aquatic species. The shells are composed of calcium carbonate but are covered with a tough proteinaceous sheath. After the microbes digest the protein, the calcium carbonate framework is left behind, acting as a calcium reservoir and helping to buffer the acidity of the water.



THREATS TO CLAMS

The major threats to clams are essentially those facing aquatic ecosystems in general, namely dams, diversions, channelization, logging, livestock grazing, roads, urbanization, mining, pollution, and exotic organisms (Noss and Cooperrider 1994). Focusing on biodiversity, Allan and Flecker (1993) detail six major threats to running waters: 1) habitat loss and degradation, 2) exotic species invasions, 3) overexploitation, 4) secondary extinctions, 5) chemical and biological pollution, 6) climate change. While our society is beginning to recognize the evils of rampant clearcutting and wanton pollution, we tend not to notice human encroachment as degrading habitat. This insidious result of unrestrained human population growth is being felt by aquatic organisms, particularly clams, because a modest disturbance to a waterway can incur profound consequences downstream. Humans seem to be unable to leave shorelines undisturbed. Detailing a biodiversity crisis in one particular locale, Lydeard and Maiden (1995) proclaim the plight of clams in Alabama. They highlight this physiographically diverse state, which contains 60% of our mussel species, as "North America's neglected hotspot."

Another threat not often recognized is vehicular use of waterways as highways. Some drivers of trucks, motorcycles, and all terrain vehicles apparently enjoy tearing up our rivers



and streams. Egged on by irresponsible television commercials, this asinine practice chews up the bottoms and crushes, buries, or displaces clams and other benthic organisms. Moreover, the ensuing siltation causes suffocation even miles downstream (Ellis 1936). Wherever a road crosses a waterway, these vandals can gain easy access. This, of course, is yet another argument against building roads through natural habitats. If the roads already exist, additional damage may be averted by constructing vehicle barriers or allowing the woody vegetation to accomplish a blockade.

Pollution

The acidity of freshwater varies from a pH of 3 to 10, with a usual range of 6.5 to 8.5. Waters flowing through limestone contain high concentrations of calcium and other minerals and have alkaline pH values (above 7). Waters flowing through sandstones and granite contain less calcium and have acidic pH values (below 7) (Smith 1990). Clams are very sensitive to pH, so acid rain is another peril they face. As a general rule, unionids are not found in acidic waters, but some sphaeriids can tolerate acidity down to pH 6 (Pennak 1953). The softer waters, with lower calcium levels, are less able to buffer fluctuations in pH and are unsuitable for most clams (Harman 1969).

Clams are also sensitive to potassium. In fact, their natural distribution in the United States is correlated with the concentration of potassium in fresh waters. Unionid clams were reported from 28 of 39 rivers with less than 4 parts per million of potassium, but only 2 out of 10 rivers with 4-7 parts per million. Potassium gets into rivers from potash production, brines from oil wells, and agricultural runoff. Since potassium is a nutrient and usually not considered a toxic substance, these findings are surprising, but do confirm the old toxicological adage that dose makes the poison.

Sodium from road salt may be also be a problem, but clams seem to tolerate sodium concentrations 100 times as high as they do potassium (Imley 1973). Other forms of pollution pose additional hazards. Although some metals, such as zinc and copper, are nutrients at trace levels, they are toxic at higher concentrations. While zinc is not very toxic to humans, it is to mollusks; even more so are copper, mercury, and silver (Wurtz 1962). Chlorine is very poisonous to most organisms, but since it is volatile, it is not normally a persistent pollutant. However, when chlorine discharges are frequent or continuous, it can persist at dangerous levels. Raw sewage and manure can deplete the oxygen levels of water, leading to toxic conditions for many aquatic organisms. Dams, by impounding water, can also lower oxygen levels. Thus, turning streams into stagnant

lakes or ponds can have the same adverse effects as pollution. (Although over two decades old, a useful review of pollution and of untoward anthropogenic effects on clams is found in Fuller 1974.)

Exotic Species

Although most people recognize the evils of obviously alien species—such as the Japanese Beetle, *Popilla japonica*, the Gypsy Moth, *Lymantria dispar*, or the Common Carp, *Cyprinus carpio*—very few “sportsmen” seem to realize that stocking game fish, even native game fish, can be devastating to other organisms. Many waterways are officially evaluated in terms of their suitability for trout. Yet where they do not belong, trout do not deserve the halo of reverence that many people accord them. Waters holding trout are certainly high quality, in terms of cleanliness; but fisheries managers who stock trout generally ignore the intricate ecological interrelationships among native organisms in natural waters. Furthermore, the perverse policy of killing “trash fish” (usually meaning native species not favored by anglers) to establish what amount to trout farms is a logical sequel to the stocking program. However, giving credit where it is due, trout advocates have saved more watersheds, and more clams, than have malacologists.

Exotic species are plaguing America’s aquatic ecosystems, wreaking havoc with native species. There are two notorious species of alien clams here, the Asian Clam, *Corbicula fluminea*, and the Zebra Mussel, *Dreissena polymorpha*. Although both have been here for some time, the Zebra Mussel has achieved notoriety just recently (1988), with its penchant for plugging water pipes. While the Asian Clam has pushed out native clams by sheer dint of its superior competitiveness, the Zebra Mussel is a multifaceted warrior. It is a superb filter feeder, rendering even large bodies of water, such as Lake Ontario, much “cleaner.” This alleged cleanliness is due to its removal of plankton, the very food many native organisms, including clams, have been consuming for ages. As if this competition for nutrients were not enough, the Zebra Mussel is an outright deadly ectoparasite. A sedentary mussel, it fastens itself by byssal threads to solid substrates, much the way the common Blue Mussel, *Mytilus edulis*, does along both our sea-coasts. Zebra Mussels prefer clam shells to rocks or other available hard places (Mackie 1993). They can overwhelm a clam host—several hundred on one clam!—until it cannot move or close its valves, a permanent gapesis. Without shut valves the clam tries to pump water but cannot, and eventually succumbs.

However, just when everything seems so dismal, a ray of hope is emerging. Waterfowl and fish have discovered Zebra

illustration by Sarah Lauterbach

Mussels and the balance of Nature is underway. Five species of fish, those with pharyngeal teeth, are chomping down on the invaders. These fish are Freshwater Drum, *Aplodinotus grunniens*, Redear Sunfish, *Lepomis microphus*, Pumpkinseed, *L. gibbosus*, Copper Redhorse, *Moxostoma hubbsi*, and River Redhorse, *M. carinatum*. Also eating Zebra Mussels is the king of the invaders, the Common Carp (French 1993).

Overexploitation

Overexploitation of clams stopped for the most part when plastic buttons replaced clam shell buttons, a rare case of plastic being good for the environment. Now, however, overharvesting of clams is back in full swing, kicking them when they are really down. The new threat comes from Japan, where cultured pearls are a big industry. When a small irritant is placed between the mantle and the shell of a clam, usually an oyster, the nacreous material normally lining the shell is secreted around the irritant, producing a pearl. This industry operates like a farm, growing clams in cages in protected waters or in tanks. Unfortunately, the best irritants are ground up shells from native American freshwater mussels. (Is this a new Pearl Harbor or what?) Fetching \$6 a pound, this market is wreaking havoc on our native clam beds. Harvesting is done by brailing, the dragging of a dredging contraption which tears up the bottom and snags clams, indiscriminately. Only the choice specimens are taken; the others are discarded. Ripped up from their beds, traumatized, and then dumped, very few survive. The US has virtually no laws or regulations to stop this flagrant mining of our freshwater heritage (Williams et al 1993). Clams are able to endure natural displacements, but are quite sensitive to those caused by humans. Seasonality is one reason for this vulnerability; another is that clams grow so as to fit their domicile in the substrate. When displaced at the wrong time, such as in fall or winter, they may not be able to reestablish their proper fit (Imlay 1972).

CONCLUSION

In summary, any artificial disturbance of their natural habitat will affect clams adversely, which is why they are excellent environmental monitors. They will cease to be, however, if they are no longer present. A great irony should be mentioned here. Pick up books on ecology and look in their indexes under "clam" or "mussel" or even "mollusk." Most books will not have these entry terms. Valuable, highly sensitive monitors of ecosystems are being ignored. Out of sight, out of mind, out of existence.

Fortunately, some malacologists and conservation groups are now coming to the defense of our imperiled freshwater fauna. Concerned readers should support The Nature Conservancy (1815 North Lynn St., Arlington, VA 22209), Xerces Society (4828 Southeast Hawthorne Blvd., Portland, OR 97215), Alabama Wilderness Alliance (POB 223, Moulton, AL 35650), American Rivers (801 Pennsylvania Ave. SE, Ste. 400, Washington, DC 20003), Defenders of Wildlife (1101 Fourteenth St. NW, Ste. 1400, Washington, DC 20005), and local groups working to save watersheds. An exemplary watershed group in New York is the Boquet River Association (BRASS; Essex City Government Center, Box 217, Elizabethtown, NY 12932). ■

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Say No to the Sable Island Pipeline

by Tricia Griffith

Promoting natural gas as clean and environmentally friendly and promising jobs for Maritime residents while downplaying on- and offshore environmental degradation and safety concerns, backers of the Sable Island Pipeline propose to drill for natural gas off Sable Island, east of Nova Scotia, and build a 350 mile pipeline. This pipeline would run through Nova Scotia, New Brunswick, Maine and New Hampshire, terminating in the Boston area at an expected cost of \$583 million.

Public opinion is supposedly being sought at scoping meetings of the Joint Public Review Panel; but corporate proponents of the Sable Gas Project, Mobil Oil Canada Ltd. and Shell Canada Properties, have essentially set the agenda and contracts are being given out even as the Panel has the proposal under review. Environmentalists charge that the National Energy Board is a captive of the oil and gas industry.

The fundamental question of whether or not the project should go ahead is not on the table. The environmental review process has become an elaborate charade, with all investigations leading to predetermined conclusions. Justification for this project is solely in terms of available markets, with a 1 November 1999 projected start up date for delivery to the United States. The gas flow is expected to last for 25 years, though it might be extended if further gas discoveries are made in the Sable Island area.

Sable Island's unique environment includes The Gully, a submarine canyon, which is home to many marine mammals and a candidate for Parks Canada Marine Natural Area designation. Already, exploratory wells have been drilled right up to the edge of The Gully.

The plan is to build a gas processing plant in Goldsboro, and a gas liquids plant in Point Tupper on Cape Breton Island, with a 57 kilometer gas liquids pipeline connecting the plants. The onshore component, the Maritimes & Northeast Pipeline Project, includes an overland pipeline to carry gas when it comes ashore to the international border at St. Stephen, New Brunswick, 558 kilometers overland within Canada alone. A US section would then carry the gas through Maine and New Hampshire to its final destination of Dracut, near Boston.

On-land environmental destruction for this gas pipeline would be cumulatively massive. Nova Scotia and New Brunswick pipeline documents show that in the one kilometer corridor are 229 watercourses, 10 lakes, and a large number of wetlands; 90-95% of the corridor passes through forest. Access roads meant to be used by pipeline maintenance personnel would also open up the area to hunters and snowmobilers.

The construction disturbances for the wells, pipelines and processing plants, the inevitable pipeline leaks, well blowouts, release of toxic drilling muds from the 30 wells, and human

error would severely affect marine mammals, fish, seabirds, and the overall quality of life on the eastern shore. Fragmentation of the forest would harm mammals and songbirds that need undisturbed forest to survive. Potential US customers of Sable Island Gas need to know that fuel for their furnaces and industries may mean dead Canadian wildlife.

Mainstream environmentalists consider natural gas a bridging fuel, preferable to dirty coal and oil. If we consider only combustion, then natural gas does emit less carbon and sulfur. Yet natural gas is not replacing oil or coal but merely adding to fossil fuel consumption and an expanding industrial/consumer economy. Natural gas is therefore contributing to the release of greenhouse gases like carbon dioxide, from combustion, and methane, from leakage.

As with any natural gas pipeline, there is the risk of fires and explosions due to faulty equipment, as well as periodic blowdown—the venting of gas from a section of pipeline. The white clouds of sub-freezing natural gas sent hundreds of feet into the sky are lighter than air and inconspicuously dissipate into the atmosphere, as the gas does not yet contain the distinctive sulfur smell used to detect leaks. In the US every year, several hundred pipeline ruptures or leakages occur, often resulting in deaths and damage to the environment.

As for the promise of jobs for Maritimers, temporary construction jobs associated with the pipeline are expected to peak at 1768 people, 70% of which may go to non-Maritimers. Are a maximum of 263 final jobs, not all permanent and not all to be filled by Maritime residents, worth the cost to the environment?

The Sable Island Gas Project should be stopped. The North Shore Anti-Pipeline Group is asking environmentally conscious people on both sides of the border to help stop the Sable Island Gas Project. ■

Please contact The North Shore Anti-Pipeline Group:

Citizens Against the Sable Island Pipeline

POB 874

New Glasgow, Nova Scotia

Canada B2H 5K7

and

David Orton of Green Web

RR #3

Saltsprings, Pictou County

Nova Scotia, Canada BOK 1PO

e-mail: greenweb@fox.nstn.ca



Tricia Griffith, of Fletcher, Vermont, is a Wild Earth intern.

Passenger Pigeon Chewing Louse

(*Columbicola extincta*)

by Peter Friederici

IT IS the most famous extinction in North American history. From a continental population that may have exceeded three billion in 1800, the Passenger Pigeon (*Ectopistes migratorius*) declined to a handful of captive birds within a century. The last reputable sighting of a wild bird occurred in Ohio in 1900; the last captive specimen, dubbed Martha, died at the Cincinnati Zoo in 1914.

The well-known pigeon took with it an entirely unknown organism, the Passenger Pigeon Chewing Louse (*Columbicola extincta*), a creature whose scientific name reveals the melancholy fact that our knowledge of its existence has been defined by its extinction. The louse remained unknown to science until the 1930s, when Richard Malcomson, an entomologist at the University of Illinois, found several long-dead specimens clinging to a Passenger Pigeon study skin in the university's collection (Malcomson 1937). The study skin was collected in 1895 in Urbana, Illinois, and must have belonged to one of the last Passenger Pigeons shot in the wild. (In those days, collecting the last specimens of a dying species was typically a higher priority than attempting to save them.)

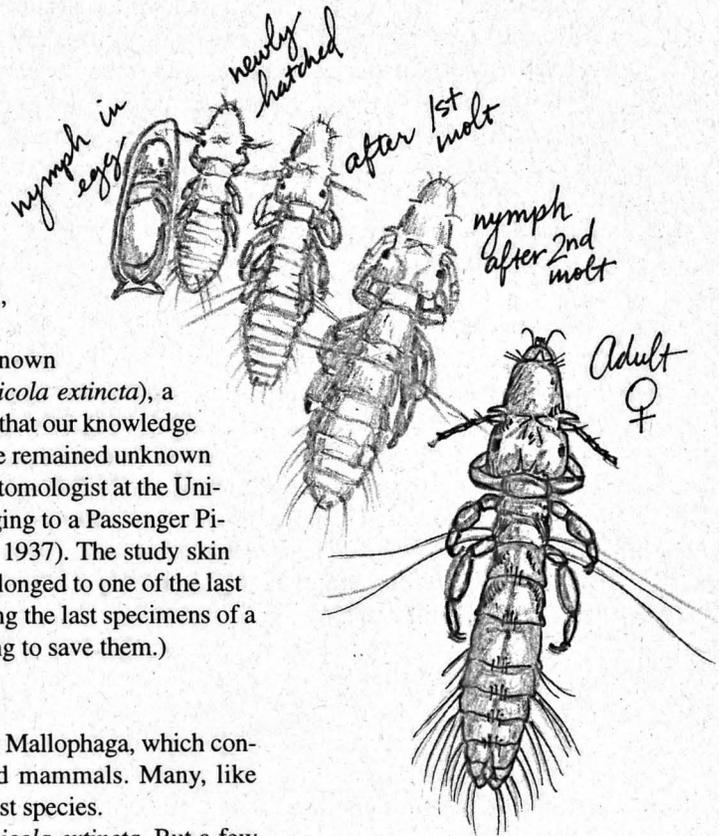
ECOLOGY

Passenger Pigeon Chewing Lice belonged to the order Mallophaga, which contains over 2000 species of lice that parasitize birds and mammals. Many, like *Columbicola extincta*, appear to be restricted to a single host species.

Almost nothing is known of the life cycle of *Columbicola extincta*. But a few entomologists have studied other Mallophaga, including the closely related *Columbicola columbae*, which parasitizes the common Rock Dove or urban pigeon (*Columba livia*) (Martin 1934). Such lice spend their entire life cycle within their host's substrate of feathers. Their biting mouthparts are not able to penetrate skin, and they feed almost entirely on feathers, to which they cling tenaciously.

Columbicola columbae nymphs hatch from eggs glued to feather shafts. They undergo incomplete metamorphosis and reach maturity about twenty days after hatching. Adults, which are between two and three millimeters long, have survived as long as 51 days in the laboratory. The insulation of feathers protects them from swings in temperature, to which they are quite sensitive. In response to changes in temperature, food availability, or mating needs, they run swiftly from one part of their host's body to another. In some species—especially, perhaps, in cold climates—Mallophaga appear to overwinter on their hosts in the egg stage (Foster 1969).

Parasitism rates of wild birds have varied widely in published studies. Foster (1969) found that just over 20 percent of museum specimens of Orange-crowned Warblers (*Vermivora celata*) showed evidence of Mallophaga parasitism. Ash (1960) reported that 95 percent of shorebirds banded during a study in Sweden were infested. Most infestations are light. Only in rare cases do Mallophaga detrimentally affect their hosts (Ash 1960). Lice do some damage to feathers, but old feathers are replaced anyway during regular molts. Typically birds control populations of external parasites through regular maintenance, including preening, dust-bathing, and perhaps rubbing ants over their plumage (Ehrlich et al. 1988).



Passenger Pigeon Chewing Lice must have been abundant. Like their hosts, they exploited an ecological niche that allowed their numbers to swell. Some researchers have speculated that Passenger Pigeons, before their population decline began, may have comprised as much as 40 percent of the total bird life of North America north of Mexico (Schorger 1955). Fantastically sociable, they thrived only in huge flocks that numbered in the millions and even billions. The early American ornithologist Alexander Wilson painstakingly estimated the size of one flock that passed overhead for four hours in Kentucky at 2,230,272,000 individuals. Pigeons fed, roosted, and nested in massive congregations. More than a hundred nests were often found in a single tree.

These conditions must have been favorable for the Passenger Pigeon Chewing Louse's transmission from one bird to another. When their host dies, Mallophaga individuals leave the cooling body and search for another living host. Some chewing lice also travel from one bird to another on Hippoboscid flies (also known as "louse flies"), which themselves are parasitic on birds. During large-scale Passenger Pigeon hunts at roost or nest sites, hundreds of thousands of birds were killed. The migration of *Columbicola extincta* individuals from freshly killed birds to still-living ones must have been a remarkable phenomenon that, alas, went entirely unobserved.

EXTINCTION

The Passenger Pigeon went extinct with breath-taking rapidity. In 1878 the bird's last great colonial nesting occupied an estimated 100,000 acres near Petoskey, Michigan. A decade later only small flocks roamed the shrinking patches of Eastern deciduous forest that provided them with food and roosts. Though biologists still debate the exact mechanism of the Passenger Pigeon's extinction, it is clear that the decline came through some combination of gross overhunting, habitat destruction, and disruption of the species's social structure. Individual pigeons may have been stimulated to breed only in massive flocks. Once flock sizes dropped below a certain threshold, the species was doomed—even though it might still have appeared abundant to observers.

The Passenger Pigeon Chewing Louse, of course, experienced the same quick decline. With diminished opportunities for spreading from one individual to another, it may have vanished even before the last of its hosts did.

LESSONS

Modern-day critics of endangered-species protection might label concern for such an unheralded species as literal nit-picking. But in fact the extinction of the Passenger Pigeon and its louse has important echoes. It is remarkable that not a single nineteenth century observer recorded the presence of Passenger Pigeon Chewing Lice,

considering that hundreds of millions of Passenger Pigeons were shot, trapped, knocked from trees with long poles, or captured when nest trees were set afire. For all the awestruck commentaries on the abundance of the host species, that oversight certainly bespeaks a lack of interest in the quotidian details of the life of individuals of the species.

It took almost as long for the import of the Passenger Pigeon's extinction to sink in as it did for the species to decline from abundance to vanishing. Throughout the early part of the twentieth century some Americans claimed that the pigeons had not been wiped out by humans: they had flown en masse to South America, or to Canada's boreal forest; they had all drowned while trying to cross the Gulf of Mexico; they would show up again somewhere. As late as the 1950s some observers believed they would reappear—somer evidence of a type of public denial that is surely instructive for those working to forestall today's extinction crisis (Shoemaker 1958).

Finally, the sad case of *Columbicola extincta* should remind us that the natural world is perennially more complex than we know. Not until more than 20 years after its host's extinction did the louse's existence—and extinction—become known. The louse's story is a reminder that we don't know what other creatures, or what intricate interrelationships, are lost when a known plant or animal disappears. ■

Acknowledgments

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Traveling The Logging Road/ Oregon Coast Range

by Kathleen Dean Moore

Like milk poured in water, morning fog moves through the trees and along the course of the narrow road. I am driving between high banks of forest duff, through a leafy tunnel lined with Swordferns and Foxgloves in full bloom. Where the road rises and the fog thins, rays of sunshine beam into the forest, spotlighting patches of moss that glitter with small birds dashing and disappearing in light and shadow. Then the road descends into a steep-sided valley, the light fades, and fog condenses on my windshield. I turn on the wipers and swerve to avoid a salamander. Huckleberry bushes and rhododendrons, Wood Sorrel and hemlocks grow thick under the enormous moss-blanketed trunks of spruce and cedar. I'm not sure how tall the trees are; they reach up and up into the fog and finally disappear. I don't know how old the forest is either, but along this road, I have seen scars on the uphill sides of ancient cedars, where Siuslaw people peeled off strips of bark more than three hundred years ago. In the thick undergrowth, in the fog, these are trees without beginning, trees without end: an eternity of forest.

The road has only one lane for most of its length, but every mile or so there's a wider space where a driver can pull over to let a log truck past. There are pink plastic ribbons dangling from branches here and there, and sometimes a mileage number on a plastic post. Thickly paved with asphalt and built to last, the road follows its white-painted fogline around the shoulders of mountains and along ridge tops in Oregon's Coast Range. It's surprisingly well built for a one-way road that, as far as I can tell from my topographic map, ends on the top of a hill in the middle of nowhere.



I crest a hill, startle, and hit the brakes. In front of me, the forest is gone. Bare hillside falls away on my left, bare hillside rises sharply to my right, nothing but mud, acres and acres of steep hillside stripped and sodden. A few blackened spars fall across the hill at odd angles, a few more stand upright—each a stake burned to its base. Far up the hillside, a bulldozer is working slowly. I can hear it shifting and wheezing and powering in low gear, gouging deep into the earth to tear at a root ball, then shoving the broken end of a tree into a windrow of slash. A single strand of smoke rises from a smoldering slash pile and spreads out brown against the bottom of the clouds.

I pull off the road onto a landing littered with tree bark. The tracks of heavy equipment have cut the ground into strips of mud and gray water. Through the clear fans of my windshield, everything I see is stripped to shades of gray except, far away, the dull orange smudge of the bulldozer. I have seen a landscape like this before, but it takes me a minute to search my memory. It isn't Central America; nothing I have seen in the slash-and-burn agriculture of third-world countries comes close to this kind of devastation, on this scale. Eventually, I pull back to mind a photograph of a scene from Europe—a cloud-shrouded moonscape of burned and broken snags, where even the ground is churned into craters and thrown into pressure waves of mud and slash. In the foreground, a burned-out tank, and below the photograph, the label: The Forest of Ardenne, 1945.

*Bare hillside falls away
on my left, bare hillside
rises sharply to my right,
nothing but mud, acres
and acres of steep hillside
stripped and sodden.*

The fog turns into rain and within minutes gullies are channeling gray water into larger gullies and digging ditches that spill a slurry of mud onto the road. The mud runs under my pickup, drops off the roadbed, and slides down a ravine toward the river where salmon are pooling up, waiting to move onto spawning beds.

Before I first saw men clearcutting the great Northwest forests, I imagined a romantic picture: lumberjacks come in and cut down trees, everyone has clean, sharp-smelling lumber for homes and schools, families have jobs and, where there had been a forest, there is a flower-filled meadow, which is nice for the deer and thus for the hunters; and after a time, the forest grows back and the lumberjacks can cut it again. Then I came to Oregon and saw clearcutting with my own eyes.

Do people know about the bulldozers? Do they know about the piles of slash and the fires and the poison sprayed from small planes? Do people know about the steepness of the bare hills and the crumbling edges of eroded ravines, the silt in the salmon's spawning beds? Do they know about the absolute, ground-zero devastation? Logging companies don't just cut the trees and haul them away. In clearcuts I have seen, not only the trees, but the huckleberries, the ferns, the moss, the fuss of the chickadees, the silver whistle of the Varied Thrush, even the rich forest duff that holds on to winter rains, the nourishing soil itself, are all gone—hailed off, sawed up, starved out, plowed under, buried, compacted, or burned. What is left after clearcutting are steep hillsides of churned-up mud, a few half-burned piles of slash, and a high-quality asphalt road.

The clouds had dissipated and I had decided to pull off the road and hike down a scrubland hillside to a stream where I could eat my lunch. But now that I have struggled half-way down the hill, it's clear that this is a mistake. Stranded on a stump in the middle of a briar patch, I look around carefully, shading my eyes with my hand. Hot light and harsh shadows make it hard to see. Nothing on this hillside is taller than I am. There are waist-high Salmonberry bushes, their stems fuzzy with thorns, Oregon Grape as sharp as English Holly, and thick tangles of blackberries reaching over everything, like cobwebs. I could try to walk along a log, but the only log within reach is pointing steeply down the hill, and if the bark breaks, I'll slip off and land in a thicket of nettles. I could plant a foot right on top of the tangle of blackberry vines, but that's treacherous too. I suppose I could sit here until somebody notices my empty truck.

Finally, I jump onto the root ball of a Swordfern and grab for a fir sapling. The fern's roots break free and the whole clump slides ten feet down the slope. I ride it down, landing on my back, my feet out in front of me, one arm wrapped in a blackberry vine that has scraped from my wrist to my shoulder. The hillside buzzes in the sun.

When I finally push through a last thicket and emerge, sticky and hot, wobbly, at the top of the slope, I sit down in the

only shade on the hillside, shade cast by a wooden sign. The sign reads, "TREES: A RENEWABLE RESOURCE. Planted in 1985."

I look around. Sure enough, I can see a few young Douglas-fir trees here and there, light green and frothy, about my height. I can also see every alien, invasive, thorned or poisonous plant that ever grew in hot sun on disturbed soil in this part of the country: Himalayan Blackberries, Scotch Broom, Poison Oak, Tansy Ragwort, Russian Thistles, nettles. I wonder if people understand that forests don't just grow back. Plants grow all right; plants always grow in Oregon. But what you get is not what you had before—not by a distance, not in a hundred years.

I pull over next to a grove where I can see nothing but Douglas-firs ranging off in all directions. They grow tall, straight and thin, closely spaced, evenly ranked, each almost the diameter of a fence post. For ten feet off the ground, the branches are bare spikes forming brittle ladders of reaching limbs. Then the trees leaf out into a canopy that exhales piney air and a slow drift of dry needles. There are no bushes or plants below the trees, so the forest has the feel of a park—the light dusty and even, the afternoon simple and silent. I walk deeper into the trees, brushing a few needles out of my hair.

I am well out of sight of the road, not thinking much, when the silence finally catches my attention. I stop walking to listen. Where are the chickadees, the bees, the flies? I look behind me. What happened to the hemlocks, the Big-leaf Maples, the low Salal? I take a step backward. Douglas-firs five inches across, everywhere I look. Ten feet apart. Three hundred trees per acre. I head for my truck. This isn't a forest. This is a farm. I am trespassing on a fence-pole farm. Plowed and poisoned and planted and fertilized as deliberately as a wheat field, this lumber will be harvested as routinely as wheat is cut and threshed. I feel like a grasshopper—nervous, scratching one leg against another, tiptoeing across dusty ground below tall yellow stalks.

It wasn't very long ago that trucks carried one-log loads through my town. Standing in line at the five-and-dime, customers would pass the word. "One-log load goin' by." We would crane our necks and peer past the fabric bolts and Valentine's candy, through the dusty window and, sure enough, a truck would rumble past carrying a section of log so massive, it was all the truck could haul on a single load. I try to remember now what I thought then, and it seems to me that I felt admiration for the log, but had no understanding that in the place where the tree had grown, another like it would not grow in my lifetime, nor my children's, nor my grandchildren's...not in fifteen generations.

The five-and-dime is a used bookstore now, and the trucks that come by carry thirty, forty logs in a load—thin logs, destined for pulp or fenceposts. Logs hang out the back and flap up and down whenever the truck hits a bump in the road.

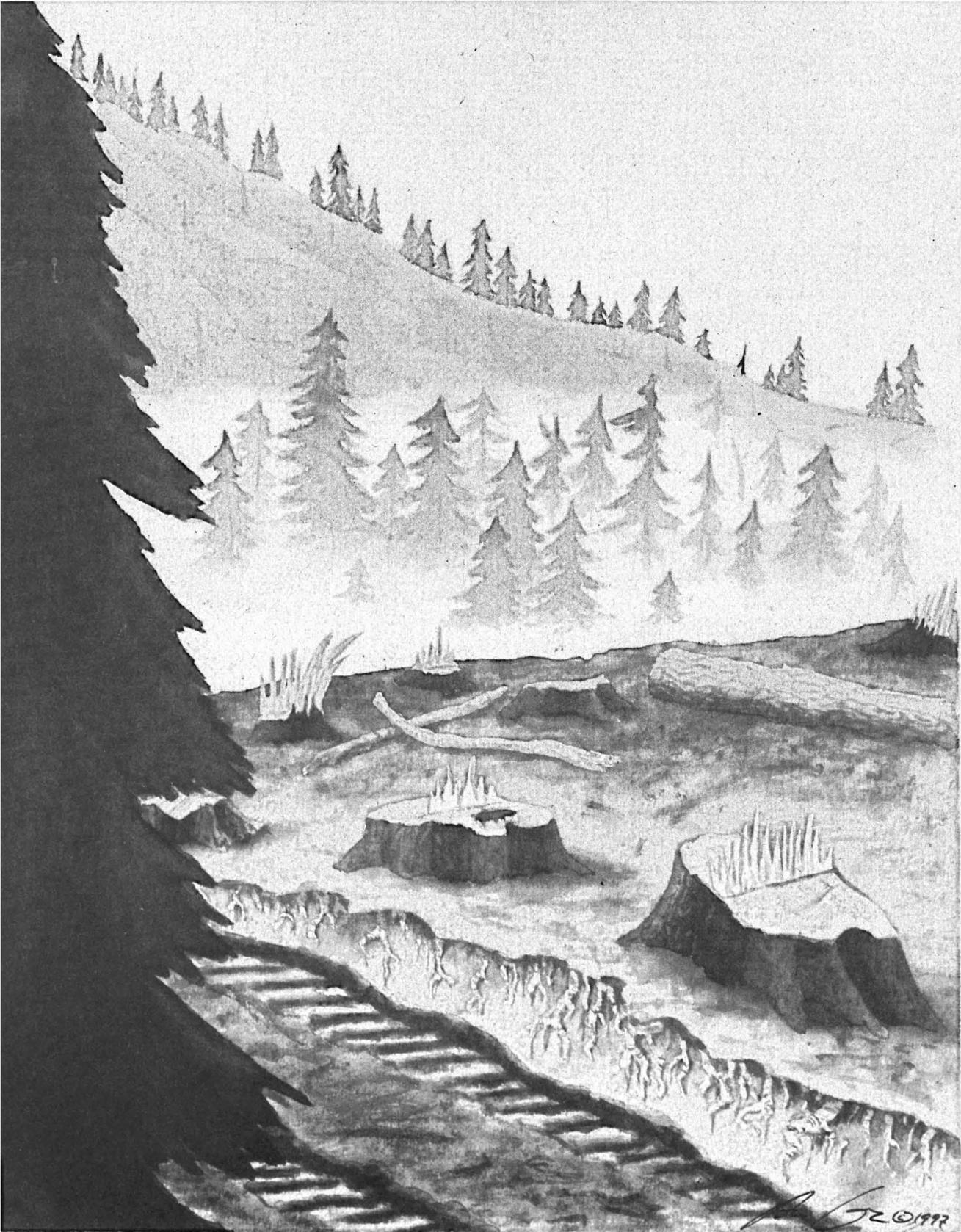


illustration by Audra Loyal

THE ROAD CLIMBS in a spiral around a bare mountain and finally ends at the top of the hill in a broad expanse of gravel. I get out of my truck to look around. I'm guessing that a high-line used to work about where I am standing. Although the hill has grown up in brambles, the earth still bears the marks of skid trails where cables pulled logs up the hill to the yard. This high up, I can see all the way to the afternoon sun and the golden line that marks the ocean. From the top of the range to the edge of the sea, the landscape is a patchwork of clearcuts, replants, landings, bare earth, and a few reserves of old-growth cedar and hemlock along the coast.

When I walk to the far edge of the hill, I learn that I am not alone up here. A man sits in the cab of an old pickup truck, staring out over the fading hills, never looking my way. The hair on the back of his neck is grey and curling, the skin moist and brown from the sun. He wears a plaid shirt covered with a quilted vest and his hands, still gripping the steering wheel, are enormous.

What does he hear, listening so intently? Faint on an old wind, the creak of cables maybe, the shriek of the whistle-pig, shouted commands, men calling out, chainsaws shaking with power, spraying woodchips from a cut in the log, the roar building and fading as the blade moves into the log and out the other side. Trucks gearing up, logs thudding onto huge log-decks, and the cracking, cracking, cracking as a tree falls through the forest, breaking off limbs, rending the long fibers of its trunk, then silence—a long, terrible silence—and a great thud as the tree drives its limbs into the earth, rises once, settles. Faint on an old wind, the smells of lubricating oil, diesel exhaust, coffee, dust, and the sweetness of new-cut cedar, as beautiful as Christmas.

Both he and I can see clear to the sea. The view from the end of the road is a landscape of irretrievable loss. A few patches of forest are left on old homesteads and in locked-up forest reserves on federal land. A few more plots to cut, a couple of lawsuits pending that may release some logs, some salvage logging after burns in the Siskiyous and Cascades. Three years maybe. Maybe four. Then the logging companies will pull up stakes and look for somewhere else to cut. His children will leave then, too; there's no work for timber workers where there's no timber. One son off to the fish-packing plants in Alaska maybe. Another to California. Once the daughter with the new baby leaves—for Portland? Spokane?—what will he hold in those great rough hands?

I listen. I think I can hear the ocean, but maybe it's the wind down in the valley or chip trucks on the Alsea Road past Tidewater. ■

Kathleen Dean Moore is Chair of the Philosophy Department at Oregon State University, Corvallis. Her essays are collected in Riverwalking, recently selected for a 1996 Pacific Northwest Bookseller's Association Award. She is currently at work on a book of essays about quiet water.

Tree Planting

—Astoria, Oregon 1979

*Each morning before first pink light
we climbed into battered vans, young
broken men with debt, rain ponchos,
baskets of trees crossing the Columbia
into Washington to plant our nation's forests.*

*No one awake in the rain, in the slick silt
erosion of another logging mayhem
we stooped, dug, and dropped skinny
nursery hemlock plugs into cold mud
guaranteed to harvest in twenty years.*

*In front of us the rise and fall echo of chainsaws,
sawyers clearcutting, pushing back wildness
over the next ridge into oblivion, opening up
the heart of the old growth all the way to the sea.
There would never be enough trees.*

*From where we stood in the slag and slash,
the silent moonscape of no memory,
we knew it could never be finished.
This frantic rush to take apart
the green world limb by limb.*

—Stephen J. Lyons

The American Sycamore

Platanus occidentalis

by Robert Leverett

GIANTS IN THE EARTH

In preparing to write a tree article, I begin by searching my memory for early encounters with the species. In the case of *Platanus occidentalis*, I have a childhood memory of watching a grove of sycamores from the window of a train, during late fall or early winter. The trees were growing near a river in Tennessee and I dimly remember their whitish bark and leafless crowns. My father identified the trees for me. Identification at a distance was his forte. The memory may be my earliest of the American Sycamore. Unfortunately, I recall little else about those river bottom dwellers, but the image they presented was indelibly etched into my young mind.

A more prominent sycamore memory involves a small tree that grew on a bank behind our house in the little community of Blue Ridge, Georgia, appropriately nestled in the Blue Ridge mountains. On occasion, I climbed the tree, but it leaned out precariously from the bank and I usually lost my nerve about halfway up the trunk. A void loomed ominously beneath. Little did I realize then that this struggling little tree was a member of a species of giants, perhaps the most massive of our Eastern plants. The backyard sycamore experience was but one of many that stimulated a primal tree consciousness in me, with origins buried in the genetic code of unknown ancestors.

Growing up in the mountain South, the American Sycamore did not play a large role in my daily tree observations. In most places I lived, there weren't many, but what there were stood out in bold relief, clearly distinguishing themselves from other species. Their blotchy brown outer bark, pale green to ivory white inner bark, and ghostly winter forms were filed as imprints in my growing bank of tree images. Nothing else quite resembled them. So let us begin our exploration of the species by examining its unique physical characteristics.

PHYSICAL CHARACTERISTICS OF THE AMERICAN SYCAMORE

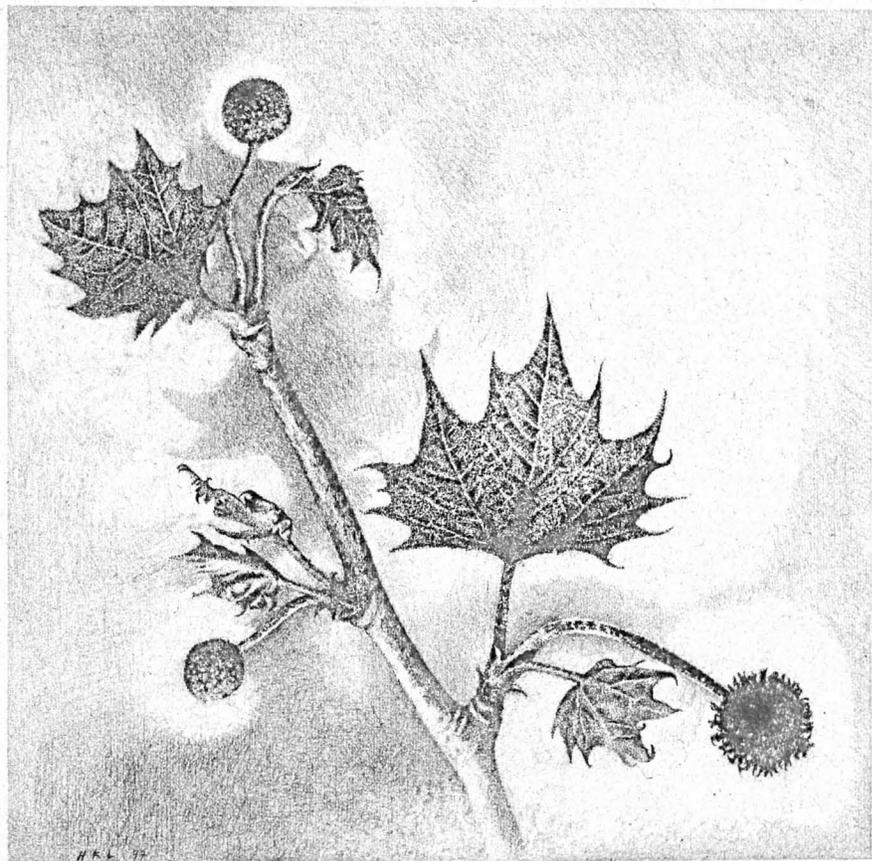
The American Sycamore carries several common names. Buttonwood and buttonball describe its fruits. The species is also known under the names plane tree, American plane tree, whitewood, water beech, and Virginia maple. Except for buttonwood and buttonball, these common names communicate little, except to emphasize our lack of sycamore imagination.

Physical descriptions of trees by authors often reflect personal preferences. How does the bark appear (I'm a bark man, myself), the flowers and fruit, the leaf shape, the tree's autumn color, its overall shape? Authors inclined to wax poetic are challenged to coin inventive words and phrases they hope will capture the more illusive qualities of a species—features that the eyes see, but words fail to easily describe. If terms like "sweeping and graceful" convey the forms of the ash and elm, stout or strong the impression left by the oak, what words describe the absolutely unique physical characteristics of the sycamore? Perhaps more than any other species, the American Sycamore lays down the challenge, "describe me, if you can."

If terms like "sweeping and graceful" convey the forms of the ash and elm, stout or strong the impression left by the oak, what words describe the absolutely unique physical characteristics of the sycamore?

Leaf

The leaf shape of this deciduous tree is somewhat maple-like, palmately lobed. Main nerves start at the point of leaf attachment and run individually to the ends of the lobes. The leaves are alternate at the end of leafstalks that vary from 2 to 4 inches in length. Sycamore leaves are large, 4 to 9 inches across and about the same in length, sometimes larger. There are 3 to 5 discernible lobes to a sycamore leaf, with coarse teeth filling in between. If one were to connect the outer points of the lobes with a smooth curve, that curve would be close to circular. Sycamore leaves are pale green above and woolly beneath. The leaves are indistinguished in the fall, turning pale yellow and sometimes just brown. The base of the leaf stalk is swollen. It houses or hides the winter bud. This is a distinguishing feature of the American Sycamore.



Flower

The flowers of the sycamore are tiny. Both male and female flowers are produced in dense heads. Color of the female flowers is greenish-red; male flowers, yellow to red. The sycamore flowers in spring.

Fruit

The seeds of the sycamore are housed in buttonballs which are ball-like fruits about 2/3 to 1 inch in diameter. The seeds are so small that it takes 200,000 of them to make a pound. They are dispersed both by water and by wind. Water often carries sycamore seeds to mud flats where they germinate. Wind sends them to distant locations when the buttonball opens. The fruits mature in early fall.

Bark

The sycamore's bark is its most distinguishing feature. *The Tree Book* (1914) by Julia Ellen Rogers describes it thus: "dark reddish brown on trunk, breaking into small scaly plates; smooth and thin on branches, olive green, flaking off in irregular plates, exposing whitish inner bark."

One impression left by the bark of the sycamore is that of camouflage. The mottled patches seem to mirror the light and dark reflections of water over which the sycamore often leans. The bark on the upper branches of the sycamore presents patterns of exquisite artistic beauty.

Wood

The sycamore's wood is often described as light to ruddy brown, hard, coarse grain, not very strong and very difficult to

split. Its dry weight is about 35 lb/cubic foot. It is said to be subject to large shrinkage and warps when dried. Sycamore wood decays rapidly when in contact with soil.

THE RANGE AND NICHE OF THE SYCAMORE

The American Sycamore once enjoyed a much broader range than today. According to *The Tree Book*, the fossil record shows that the "Arctic regions from Greenland west bore forests of these trees." In *The Great American Forest* (1965), Rutherford Platt recounts his discovery of the records of the Arctic explorer Admiral Donald Macmillan whose adventures at Aternakerdluk, Greenland turned up evidence of a past hardwood forest that contained the American Sycamore. Today, the range of the sycamore extends from southern Maine in the valley of the Merrimac and in some of the river valleys of New Hampshire and Vermont, across New York state, through Michigan, southern Wisconsin, down through Iowa and across to extreme eastern Nebraska, then southward through eastern Kansas, Oklahoma, and Texas and finally snaking eastward across the deep South to northern Florida. The sycamore prefers river bottoms and flood plains, and can be found in association with Red and Silver Maple, cottonwood, Box Elder, willows and Sweetgum. But the sycamore can grow in somewhat dryer areas and on occasion recolonizes old fields. Once established inside the forest, it persists, though not in large numbers. Dr. David Stahle, director of the University of Arkansas's Tree-Ring Laboratory, provides an interesting view of sycamore habitat (e-mail to me, 11-96):

Flowers and New Leaves—American Sycamore, by Heather K. Lenz

"The sycamores at the Frank Tract of Cross Timbers near Tulsa, Oklahoma, were a great surprise. I've heard so much about the dry, sterile soils of the Cross Timbers, and the resultant monotony of post oak-blackjack oak woodlands, with few other tree species to relieve the boredom. So, the Frank Tract is an education in reality. We were hiking through these dissected woodlands, falling into a north-facing ravine and finding centuries-old post oak, along with younger but undisturbed blackjack, black, shumard oak. Centuries-old red cedar were also growing within this hardwood canopy wherever big rocks or short blufflines allowed sufficient sunlight for these shade-intolerant cedar to put together a life. A nice long life in many cases. Then we hit the bottom of the draw and followed the presently dry streambed down to where it cut over a sandstone ledge into a deeper and more confined ravine. And there we found the lovely white and well-formed stems of American sycamore... The sycamores are the tallest trees I've seen in the stunted woodlands of the Frank Tract. They didn't look exceptionally fat or old, but that little draw is within 10 miles of the absolute western limit of upland deciduous forest in this portion of Oklahoma, and the presence of sycamore in this very xeric woodland is a testimony to its incredibly wide distribution and adaptability. Its presence adds to the diversity of the Frank Tract, and helps underscore the importance of the Frank Tract as well."

Dr. Charles Cogbill reminds us of the sycamore's quirky behavior in the northern part of its range. The Stockbridge sycamore of Vermont grows about 25 miles north of White River Junction, the northern limit of the sycamore in the Connecticut River Valley. The Stockbridge sycamore is a disjunct individual. Its size, according to Charlie, is substantial, over 4 feet through. In contrast to the Connecticut River Valley, in the Champlain Lake Valley to the west, the sycamore's range extends north to Quebec. The tallest hardwood in Vermont is said to grow in the Champlain Valley. The species? Yes, the sycamore. These examples indicate that the American Sycamore is able to give a good account of itself up to the very limits of its range, north, south, east, or west.

PHYSICAL SIZE

The American Sycamore is often described as the largest eastern hardwood or the largest eastern tree. Sycamores are said to have exceeded diameters of 10 feet more often than any other eastern species. Historically, at least a few sycamores exceeded 15 feet in diameter. Consider some of the greatest sycamores for which we have data. A base diameter of 21 feet was documented for an American Sycamore at Mt. Carmel, Illinois! At 20 feet up the trunk, it was still 19.7 feet thick. A tree at Brownstown, Indiana measured 20.3 feet in diameter at the base. A sycamore at Kokomo, IN measured 17.8 feet at the base and 16.2 feet thick at 12 feet up the trunk. A famous and well-documented sycamore at Worthington, IN had a girth of 42 feet 4 inches, translating to a diameter of 13.4 feet. The tree's height was listed as approximately 150 feet. The tree was docu-

mented by the American Genetic Society. The great 18th century French botanist Andre Michaux reported a tree on a small island in the Ohio River that was 40.3 feet around at 5 feet off the ground. This represents a thickness of 12.8 feet. The same tree had been measured by George Washington twenty years before with nearly the same results. However, in 1802, Andre Michaux's son, Francois, topped his father's find, when he discovered in Ohio a great American Sycamore that measured 47 feet in girth at 4 feet off the ground. One of the great sycamores that naturalist Robert Ridgeway documented in his famous study of the Wabash River flood plain forest was 15 feet in diameter. Photographs exist for this tree. Using the American Forests big tree formula and the tree's other dimensions, Dr. Charles Cogbill has calculated that the tree would have earned 760 points on the size scale.

Other great sycamores have been described without accompanying dimensions. One intriguing example: the Pringle tree of West Virginia, an American Sycamore, was so large that the Pringle Brothers made their home in it. They were deserters in the Revolutionary War.

American Sycamores are known to have reached great heights as well as girths. When growing in competition with other species, the American Sycamore is capable of reaching heights comparable to those of the Tuliptree, Pecan, and Black Walnut. Robert Ridgeway described sycamores on the Wabash River flood plain as having reached heights well above 150 feet. The maximum height of the species has been placed at between 175 and 200 feet. This is probably excessive. A more likely height limit of the species is 150 to 175 feet. Heights of 150 feet for past giants may have been fairly common in the best growing conditions.

Today the sycamore stands out as the largest species in many eastern states. Ohio is home to the national champion sycamore. The reported dimensions of the Ohio tree are circumference 48.5 feet, height 129 feet, crown spread 105 feet. This earns the tree 737 points! If this sycamore is a single tree, then it stands alongside some of the great sycamores of the past. If it is multi-stemmed, then it is but another misleading submission to *American Forests*. I have been told that the tree is, in fact, a composite of 5 stems. I have no personal knowledge of the tree and would appreciate hearing from those who have. However, the sycamore's good reputation does not depend on the Ohio tree. A past national champion sycamore in Kentucky is reported as being 39 feet in girth, 96 feet tall, and having a 100 foot average crown spread. Does anyone know if this tree is single-stemmed and still standing?

The species even stands proud in the cool climate of New England. Sycamores represent the largest trees of Connecticut and Massachusetts. Where the sycamore isn't the largest tree in the state, it is often a contender for second or third place. The champion sycamore of North Carolina is a respectable 21 feet 1 inch in girth, 128 feet tall, and sports a crown spread of 95 feet, earning 405 points on the big tree formula. The champion sycamore of West Virginia is 23 feet 3 inches in girth,



He has measured other sycamores to near 140 feet. The tallest I have personally measured in New England is a Connecticut sycamore 121.5 feet in height.

In November 1996 Will Blozan made a trip to Illinois to collect data on the famous Beall Woods trees of the Wabash River flood plain, the stamping grounds of famous naturalist Robert Ridgeway. Will searched and searched for remnants of that great flood-plain forest, yet the biggest of the sycamores Will measured is only about 127 feet tall and 11 feet in girth. As a maximum, the 127 foot figure is surprisingly low given the historic heights of sycamores in the region. It is even more remarkable when one considers that Vermont's tallest hardwood is supposed to be a sycamore growing in the Champlain Valley that is a little over 130 feet tall. It would appear that the giant sycamores of the Wabash River flood plain are only memories.

showing that the tree is still formidable, though the largest sycamores in that state are long gone. The champion sycamore of South Carolina has a reported height of 142 feet, and earns 465 points. The Virginia champion is not far behind with 455.

American Sycamores with dimensions that produce 400 point totals on the big tree formula are common over a wide geographical range. However, I suspect that the Mecca for sycamores, the Mississippi and Ohio River Valleys, have a few unpublicized ones that approach 500 points.

As for sycamores of great height, in the April 1978 edition of *American Forests*, a tree growing in South Carolina's Congaree Swamp was reported to be 166 feet tall. Is this a credible height? Maybe, but without laser equipment, accurate measurements of in-forest sycamores present real technical challenges. Using a laser, Will Blozan has accurately measured one in the Great Smoky Mountains National Park to 153 feet.

AGE OF THE SPECIES

In addition to large size, the sycamore can be counted into that group of extraordinarily fast growers, as opposed to, say, the White Oak. Both reach great size, but at vastly different rates. Rates of growth of 70 feet in 17 years have been cited for the sycamore. In his scholarly 1846 work *Trees and Shrubs of Massachusetts*, Dr. George Emerson describes a sycamore that reached a girth of 8 feet and a height of 80 in only 20 years. In marginal conditions, the American Sycamore grows slowly, but apparently sycamores that are either fast-grown or slow-grown can live a long life. The sycamore's absolute longevity will likely remain in doubt because the oldest trees are almost always hollow. There is ample evidence to support ages of 200 to 300 years for old sycamores, but a few historic sycamores are known to be far older.

Bark, Leaves, and Fruit—American Sycamore, by Heather K. Lenz

USES OF THE AMERICAN SYCAMORE

Human

Despite the reputed lower quality of sycamore wood, the species has seen a wide range of uses. Furniture, boxes, and interior trim are routinely cited as uses. When quarter-sawed, sycamore wood takes a beautiful finish. Other uses to which the sycamore has been put include railroad ties, fence posts, veneers for decorative purposes, fuel, and ox yokes.

Wildlife

When it comes to understanding about the ranges, sizes, and ages of individual tree species, I count myself in the contest. When it comes to understanding the value of each species as wildlife habitat, I must hang my head. I'm a babe in the woods, so I turn to my friend John Foster, a naturalist from Northfield, Massachusetts. I posed the following question: "John, what is your understanding of the value (role) of the American sycamore to wildlife? My reading is that it is given low marks by many wildlife biologists as a food source for birds and other animals."

John received a flood of information across the Internet in response to his request for input. Part of John's analysis (which includes the observations of Julie Bell, Philadelphia PA, Jim Greaves, Santa Barbara CA, Joe Jordan, Rock Island IL, Kimberly G. Smith, Univ. of Arkansas Fayetteville, and Troy Gordon of Missouri) is reproduced below.

At the invitation of Bob Leverett, I decided to look at the new tree friend that he had found. Preliminary investigation had revealed that the Sycamore tree was "of low wildlife and habitat use." I was highly doubtful of that. My own experience indicated that the sycamore is a complex form, dominating in an extremely rich habitat, that of a low river plain.

*The picture before us is one of habitat utilization by a myriad of animals. The sycamore, known for its huge crown spread and massive limbs, is also known for its many form cavities. Cavities, in any habitat, are very important for make shift shelter; any port in a storm. But there is a large and diverse group of animals that take advantage of cavities more for primary use than the occasional event. These animals range from birds to mammals. In Indiana in 1992, a large colony of the federally endangered Indian Bat (*Myotis sodalis*) was discovered in a dead sycamore trunk cavity (Kurta, Allen, et al. 1993). This roost, which was maternal in nature, had approximately 95 bats. Other reports indicate that the smaller cavities are used by a wide range of woodpeckers. The Red-Headed, Pileated, Red-bellied Woodpecker and Common Flicker have all been noted using the cavities as nests. The flamboyant and cavity loving Wood Duck, as well as the Hooded Merganser, nests in the trees' many smaller cavities. Incidentally, these two birds have been known to share nests, going so far as to share incubation duties!! (who gets the kids on the holidays?) Lest we forget the four legged, Arkansas Raccoon hunters were sur-*

prised one day in February to find a Black Bear sow with cubs hibernating in the trunk cavity of a venerable sycamore. And if you can picture 'coon hunters at the tree, then surely it doesn't seem hard to imagine Raccoons using it as an important source for dens, as has been reported by Roger Tory Peterson in Arizona [in a Western species of sycamore, presumably—ed.].

*The tree's many form cavities is only one of the several habitat features of the sycamore. Because of the open crown structure of larger or mature trees, the sycamore is favored by species who need a view, whether for hunting or security/nesting activities. It has been reported that the pterodactyl like Great Blue Heron favors the large open crowned tree for nesting colonies or rookeries, in the midwest. From California comes a report that Yellow-billed Magpies nest & roost actively in *Plantanus racemosa*, close cousin of *P. occidentalis*. And what riverine habitat would be complete without the rattle of the Kingfisher while perched above the water on the many out-stretched limbs of *Plantanus occidentalis*?*

Most of the avian action described occurs in the summer months, but from across the country have come reports from birders who attest to the trees' importance as winter food for several different species of birds; Goldfinches and Purple Finches are the most commonly reported. In addition to the many roosting, feeding and nesting opportunities that this tree offers during its life, there are just as many uses for it once it is dead. The river habitat of the tree makes it vulnerable to bank erosion and channel movements. As a result, the sycamore frequently finds itself submerged or partly submerged in water. This provides hunting, nesting and roosting opportunities for turtles, snakes, and fish.

In summary, the sycamore has an important combination of features usable as habitat; abundant, variable cavities, a complex open crown structure, etc. Because of this the American Sycamore is an important habitat tree, contributing greatly to its environment. It is my hope that current dogma about the sycamore as poor wildlife habitat will end.

THE PSYCHOLOGICAL IMPACT OF THE SYCAMORE

I am thankful to all, past and present, who can focus on trees without succumbing to the belief in the necessity of utilitarian value. I am thankful for the artist who paints the White Birch, "candle of the forest," into scenes of the North Woods and traditional New England landscapes that celebrate the autumnal glory of the Sugar Maple. To capture with pen and brush, or with camera lens, "birchness" and "mapleness" will always be, in my humble opinion, a pursuit of the highest order.

To this end, I'm sure the American Sycamore has a guaranteed place in tree art. For the psychological impact of this species goes deep. Mike Bagdon, son of my friend Bob Bagdon, chronicler of environmental causes through music, observed an old sycamore at the historic Wayside Inn grist mill near

Marlboro, Massachusetts. When asked to say the first thing that popped into his mind, Mike proclaimed the sycamore as reptilian looking. I admit that its contorted branches reminded me of the head of Medusa. Julia Ellen Rogers gives us a clue to this psychological impact. "Except in young trees, the limbs are tortuous, reaching out in many directions (*like writhing serpents?*) without much regard for symmetry."

As tree consciousness develops in our species (or is rediscovered), our awareness of trees as possessing psychological structures, or at least inducing them in ourselves, will blossom. Michael Perlman has taken this line of investigation to great depth. Michael summarized his thoughts on a particular sycamore as follows.

After the hardwoods have bared their branches in autumn, you will see, if you cross the bridge over the Connecticut River that brings you into Sunderland, Massachusetts and look ahead to your left, a singular sycamore, a tree as amazing as any mountain, its bright branches jutting above all the other Main Street trees.

The Sunderland Sycamore is the sort of tree you believe until you see it. Its five massive limbs, arching out and up, are each as large as a good-sized tree. Because its bark is fragile, its outer layers easily crack and peel away in response to the powerful pressures of expanding growth rings. The tree, which is the only sycamore on that stretch of the street, offers a distinctive array of colors, ranging from the quiet, dappled browns of the trunk and lower limbs to the birch-white higher branches. Looking straight up into the tree's crown is like looking up into a whole forest, a kaleidoscope of branches that seem to resolve into shapes of individual trees that have taken root on the larger, darker limbs. If you approach the tree on Main Street, the multi-colored limbs, so different from those of the surrounding sugar maples, will give you the unmistakable impression that the tree is standing there watching and waiting for you; its personality shapes the neighborhood and reaches out for relationships.

As with Michael, the species will remain an enigma to me. Its great size cannot go unnoticed. Its indistinguished autumnal color is offset by a compelling, almost mesmerizing, ivory-looking bark on its upper limbs, which twist and turn, continually searching for new directions. No discernible pattern. No recognizable plan, just primal energy affirming the efficacy of random growth in producing unimaginable living organisms. Maybe the sycamore is a bleed-through from a more primitive world to invoke memories in us of a time when our Earth connections were firmer, more sensual. A time when we stood in awe of the forces of creation.

A TALE OF TWO TREES

Several years ago, I had learned, from information generously passed to me by a Connecticut big tree enthusiast, of Connecticut's largest tree, the magnificent Pinchot sycamore of Weatogue, Connecticut. A 1984 measurement lists the dimensions of the tree as 25 feet 8 inches in girth, 93 feet in height, and 138 foot average crown spread. This earned the great tree 435 points on the big tree formula. Since then, it has grown. Today the girth is 26 feet 8 inches, the height is 97 feet and the average crown spread 140 feet.

Almost as large is the Sunderland sycamore described above by Michael. State forester Anne Marie Kittredge and I determined the dimensions of the Sunderland giant to be 24 feet 6 inches in girth, 108 feet in height, and 137 feet average crown spread. This gave the Sunderland tree a whopping 436 points.

These two giants are most likely the largest living things in New England. But how does one determine which tree is truly the largest of its species? American Forest's simple formula is not up to the job. Logically, total volume would be the best measure, but how does one go about determining volumes for irregular forms with complex branching patterns? A lot of higher mathematics and computer simulations would be needed. Methods that approximate volume by using simple geometrical solids like cylinders, cones, paraboloids, hyperboloids, etc. are useless. The great Sunderland sycamore branches higher up the trunk than does the Pinchot sycamore—15 feet versus no more than 7. The Sunderland tree is taller. The branch spread of the two trees is virtually identical. The short spread for both trees is 122 feet. The long spread is 152 for the Sunderland tree and 154 feet for the Pinchot. Both have massive twisting limbs. The contest between the giants will continue and should logically be expanded to include the largest of the White Pines, Tuliptrees, and American Elms. The columnar forms of the biggest of those species may contain the most wood. However, until proven otherwise, the two sycamores can be celebrated as the largest living single-stemmed trees in New England.

IN SUMMARY

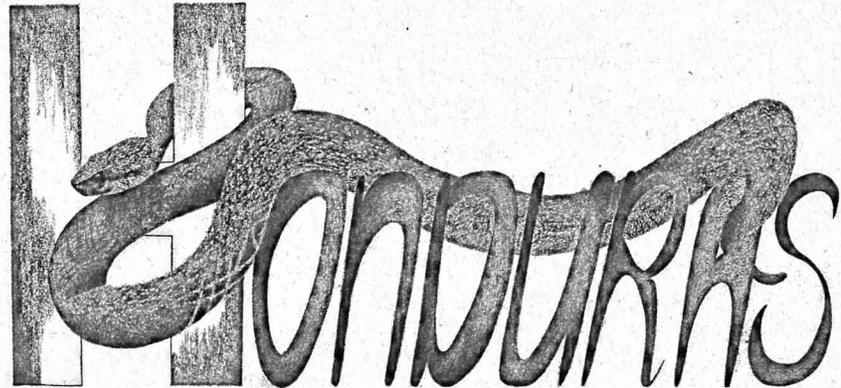
The American Sycamore is a tree that challenges the imagination as few others can. A great flood plain tree. A good shade tree for city streets. The largest of all eastern species. A good tree for wildlife. The primal source of Cherokee existence. Describe it if you can. It is the American Sycamore. It is rooted in the distant past. It allows us to get close, but never too close, never close enough to completely unravel its mystery. ■



Robert Leverett (52 Fairfield Ave., Holyoke, MA 01040), the East's most indefatigable arboreal afficiando, regularly writes for Wild Earth and irregularly leads expeditions in search of the remaining giants.

EXPLORATION

of the Montana de Susmay Olancho,



by Bruce J. Sleazeweazel Morgan

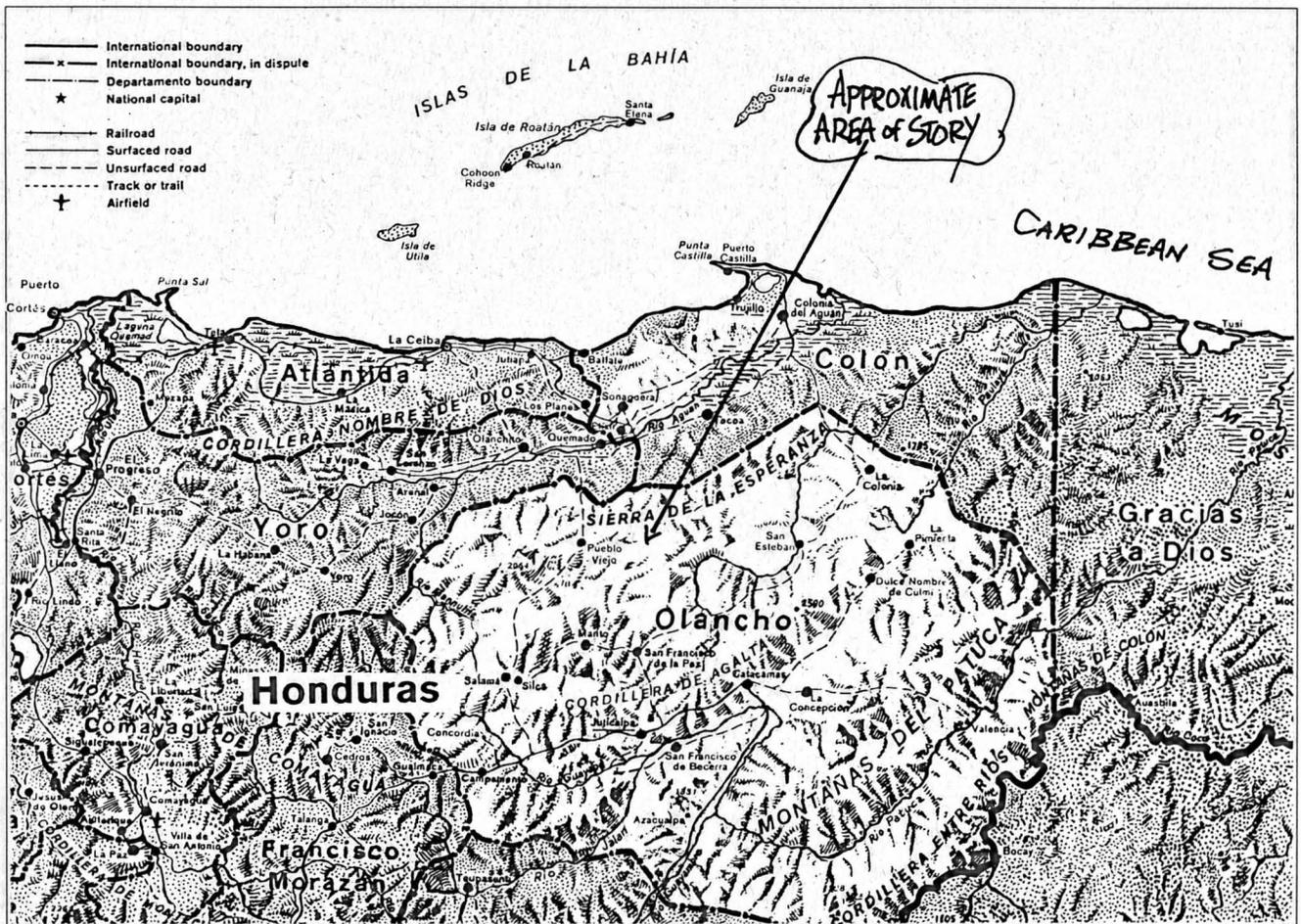
(Part 1)

A quick glance at the geological map of Honduras revealed several significant tracts of unexplored karst wilderness. I had tired somewhat of the incessant bugs and bogeymen of Belize, despite having made numerous wonderful discoveries there, and had recently returned from visiting “the cave” of Panama (as in “the cave” of Delaware). A malarial hell filled with savage Indians, Panama has very few caves, and snakes are hard to find, so what use is the place? At least in Belize one can reasonably expect to be snakebitten. In search of a new venue for adventure, I set my sights on Honduras.

Honduras is often touted as the new yuppie-free Costa Rica, a cool green destination where tourists who visit “la selva” don’t have to stay in expensive lodges with interpretive Nature trails. Instead, the intrepid few stay in flea bag hotels, in village huts, or on the ground in the jungle as I do. All of this will soon change as hordes of ecotourists from Europe and America descend upon the beaches, mountains, and rainforests to get their fill of biophilia. Rather than suffer the condescension of the avant guard Euro-weenie travelers, I decided to get there first; so in February of 1995, Ann Harman and I, with fellow lunatic adventurers Chris Augusta, Barbara Boardman, and Alycin Hayes, set out for Honduras.

Olancho is a large, sparsely settled province in the middle of Honduras, known as the “wild west” even by Hondurans. The average guy rides a horse, wears a cowboy hat and carries a gun, just like he should. When the police in Honduras were recently disbanded due to incorrigible corruption, leaving the honest citizens to the tender mercies of the army, a few traffic cops in Tegucigalpa, and some jack-booted narco-thugs funded by the United States government, some people panicked, but not the folks in Olancho. They settle things themselves in the old-fashioned way; so the murder rate is high, but the crime rate is low. I, for one, despite the occasional frito bandito, feel much safer in such a place than at home under the protection of the police. It sounded like a safe fun place to visit.

Throughout Central America are rare populations of beautiful green and blue arboreal vipers living on remote mountain peaks. I prefer to call them “nose biters.” I wanted to be the first to find one, perhaps a new species, while poking my nose into the nethermost bush.



Other cavers, but damned few, have explored parts of Honduras. The indefatigable Steve Knutson has made major discoveries in the vicinity of towering Cerro Santa Barbara and in Yoro. The geologist Rick Finch, who lived there for some years and probably knows the Honduran karst better than anyone else, has visited the Montanas de Colon. These jagged limestone pinnacles, lost in the uninhabited jungles of La Mosquitia, are arguably the most significant unexplored karst wilderness left on the planet. I had intended to get there by river, down the Pataca in a dugout canoe; but a nasty little war flared up at the confluence of the Pataca and the Wampu between cowboys (land hungry peasants) and the resident Indians. An excess of left over AK-47s and M-16s from the Contra wars in nearby Nicaragua made the river a bit too hot for travel. Gringos in canoes would be sitting ducks, rather like being the guests of honor at a pinata party, so we resolved to go elsewhere.

The British Tea Cavers, Tom Hawkins and Andrew McKenzie, have written a book (actually a list) on the caves of Honduras, and have visited Olancho, but didn't penetrate far into the wilderness. More recent was the much hyped but nonetheless wonderful discovery of a funerary cave near Catacamas, dubiously dubbed "The Cave of the Glowing Skulls," which was investigated by archaeologist Jim Brady.

Despite the best efforts of these individuals and others, underground Honduras has been slow to reveal its secrets. Most expeditions have been thwarted by almost impenetrable jungle and plugged sinkholes, no matter where they went.

Honduras is a geologically complex country, dominated by many rugged mountain ranges. As they say of West Virginia, if Honduras were ironed out flat, it would be the size of Texas. Unlike nearby parts of Guatemala and Belize, Honduras has relatively little limestone, and none of it lies flat. The northern ranges are predominantly composed of intrusive igneous rocks, and the south of volcanics. Limestone outcroppings are scattered in between.

The geological map of Honduras shows a large block of limestone occupying most of the Sierra de Agalta, a massive mountain range running southwest to northeast in the middle of Olancho. The map turned out to be almost completely wrong, but it was a good lead.

The valley at the base of the Sierra de Agalta is semi-desert. Farther up are extensive pine forests which become magnificent temperate rainforests at elevations above 3500 feet. Above 5500 feet the slopes are bathed in mist, the trees diminish in size, and the rainforest becomes cloud forest laden with orchids and other epiphytes. The crest of the Sierra rises above 7500 feet, and is cloaked in a windswept elfin heath. All of this I had to discover for myself, as no literature is available on the area, and all those who claimed to know the area contradicted each other.

There was one more reason to visit the Sierra de Agalta. As we all know, isolation leads to speciation. Throughout Central America are rare populations of beautiful green and blue arboreal vipers living on remote mountain peaks. I prefer to

call them "nose biters." They hang at face level in the vegetation. The only recorded death by Honduran vipers was of a person bitten on the tip of his tongue. None have ever been found in this part of Honduras, but it was reasonable to suppose they existed up there somewhere in the mountain mists. I wanted to be the first to find one, perhaps a new species, while poking my nose into the nethermost bush. This snake hunting technique, the use of one's enlarged bright red nose as a target for the fangs of vipers, is known as rhinal luring.

The topographical maps showed no karst features anywhere on the main flank of Agalta, but the newly explored cave of the Rio Talgua with its "glowing skulls" lies at the base of the mountain. Just to the west of Agalta, and contiguous with it, is the Montana de Susmay, the topography of which is radically different from that of Agalta. Huge sinkholes and disappearing streams dot the landscape. The entire area appeared to be uninhabited except for the village of Susmay, which is located in the bottom of an enormous *dolina*, as closed karst valleys and large sinkholes are often called. The Susmay dolina is almost three miles across. The British Tea Cavers and Rick Finch had previously visited the village of Susmay, but had explored only the extensive cave at the upper end of the dolina. More important, Finch had found an enormous resurgence at the bottom of the mountain near Gualaco, which appeared to drain the entire area. This spring is the source of the Rio Grande, and ultimately the Rio Sico. There appeared to be 3480 vertical feet of limestone from the peak to the resurgence. No other outsiders had ever visited, so the area was ripe for discovery.

A dirt road leads from the funky little cow town of San Francisco de la Paz across the mountain to Gualaco. About halfway to Gualaco, the bus dropped us off at the tiny settlement of Magua. From there we planned to walk to the village of Susmay in the bottom of the sink. Our packs were terrible heavy, mine intolerable, so the first thing I did was to commandeer a horse for my pack. I'm too old and wise to suffer for fun unless it is unavoidable. Most of the weight was food and carbide for an extended stay. Caving gear consisted of a carbide lamp, headlamp, and Bic lighter. No one in their right mind carries a helmet in the tropics while backpacking through the jungle.

The scenery was superb. Magua is located at the point of transition from pines to broadleaf forest. A given ridge would be either pine or jungle depending on the prevailing winds, history of fires, and other ecological factors. Most of the jungle between Magua and Susmay has been cleared for coffee fincas (farms)—a disappointment to be sure, but of all forms of agriculture practiced in the tropics, coffee growing is the most ecologically benign and aesthetically pleasing. The dark green glossy leaves and scarlet berries of the coffee bush make it a most ornamental plant. The bushes live for many years, and require little care other than occasional trimming and the laborious picking of the beans. Fruit trees are planted above the

coffee to provide shade.* A tile-roofed farmer's hut with children, dogs, and horses gamboling about, surrounded by such a verdant finca, makes for a most idyllic scene. The cool mountain air feels like perpetual springtime. The rich soils and perennial streams of the Susmay dolina have made it a veritable eden for the lucky inhabitants.

While on the bus to Magua, we had asked a grizzled old cowboy, "Who is the best hunter and woodsman in the sierra?" He replied, "it must surely be my cousin (everybody here is related) Chico Acosta, the head man of the village of Susmay." This was the perfect introduction. When we arrived in Susmay and asked for the famous hunter Chico Acosta, he received us like visiting royalty, and agreed to be our guide through the high jungles to the east. We set up camp in front of his house, while everyone gazed in amazement at our multicolored tents and modern gear. Such cultural contrast is always an embarrassment. Though the people here know little of the outside world, they are of European descent, not Indian, so the gulf is not so great. We were greeted with curiosity, not fear.

The next morning we decided to take it easy and explore the cave at the head of the dolina described by Hawkins and McKenzie. A pleasant stroll up the valley brought us to the resurgence of the Rio Susmay Cave. The way in was blocked with boulders, so we searched the nearby jungle for another entrance, but found none. As is often the case in tropical karst areas, the jungle was especially beautiful around the entrance. Butterflies filled the air, and the enormous corrugated leaves of Anthuriums grew from every crevice in the exposed rock.

We returned to the stream, then noticed a tricky climb, up and over the boulder pile, which led to the main trunk passage. Within a short distance we were forced to wade, and then to swim. The water was cold, which I considered to be a gross insult in a tropical cave. I have been spoiled by low elevation caving in the tropics, where one can wade and swim for hours without getting chilled. The passage narrowed and the water got deeper as we pressed onward. None of us were equipped for wet caving, so the others remained behind while I foolishly swam ahead. The weight of my day pack almost pulled me under, so I left it behind, thereby violating the most fundamental of safety rules. After the third long swim I wisely turned back at a nasty duck-under. When I turned around I discovered that Ann had followed me with nothing but a carbide lamp and a waterproof flashlight clenched between her teeth. My sweetie had no intention of letting me drown alone in the dark! She must have wanted to drown too.

As we swam back, my one good supposedly waterproof light began to fail. With flotation gear and waterproof lights the cave would be easy, but without the right equipment it could be a deathtrap. We found Chris and Barbara huddled on a rock in the stream, then further back found Alycin, who was remarkably composed given that this was her very first cave and she had been left alone in the dark with no idea of when we might

*Science Editor's note: New varieties of coffee that do not require shade trees are being promoted in many parts of the neotropics, leading to coffee monocultures with far fewer native species of animals using them.

return. Though she was not frightened, the experience confirmed what she already suspected: that only madmen would leave the beautiful warm green jungle for a voluntary visit to hell. Equally certain is that much more remains to be discovered in the Rio Susmay Cave.

The stream flowing through the cave is the main branch of the Rio Susmay. The ultimate headwaters of the system lie beneath Monkey Fucker Mountain (Cerro Mico Chingo), which is reported to have several caves. I inquired as to the meaning of the curious name. While Ann and Alycin stood nearby, the local men insisted that it didn't mean anything, but as soon as the ladies left they cracked up and assured me that of course it meant Monkey Fucker. Sometimes it gets lonely up there.

After issuing from the resurgence, the cave stream is joined by several other small streams which pour in from other arms of the enormous dolina. These converge to form the Rio Susmay, which then disappears into a clogged swallet at the lowermost point of the sink. I did not visit the (re)sumidero, as the submergence is called, but it has been described as a chaotic jumble of huge logs "tumbled like match sticks." During times of flood the sink must gulp enormous quantities of water. How could such a dynamic system be plugged? No doubt erosion from recent agricultural activities is partly to blame, but subsequent investigation of virgin sinkholes revealed a similar condition. It is noteworthy that very little bare limestone is exposed anywhere, either in the sinkhole or elsewhere in the vicinity. It is hard to imagine that the five linear kilometers from the sink to the resurgence at the bottom of the mountain does not contain an open cave system waiting to be discovered.

Much confusion arose because the locals properly refer to the cave stream as the Rio Susmay, whereas the map refers to it as the Quebrada Susmay (Susmay Creek). The map identifies a completely different drainage to the east as the Rio Susmay. When I inquired about this river, I was told that it did not exist. How could such a large topographic feature not exist? Simply because it is bone dry all the time, so they don't recognize it as a river. It has no local name, so I will henceforth call it the Nameless Valley. The mouth of the Nameless Valley canyon opens directly above the resurgence of the real Rio Susmay. No wonder the map makers were confused. To compound the confusion, further to the east of the Nameless Valley is a large stream known as Quebrada Seca (Dry Creek), which is in fact the only wet stream in the entire area.

We decided that an enormous cave system probably lies beneath the dry bed of the Nameless Valley. To understand the geology and hydrology of this drainage thus became the focus of the expedition.

The next day we packed all our food and gear on three horses and two mules, then set out to the east. The crew consisted of the aforementioned lunatic adventurers, Chico, a wonderful old geezer named Santos, and three interchangeable young men, all inbred Acostas. The entire village gave us a

sendoff. We passed through the pleasant little settlement of La Pimienta. From the pass above the village we beheld a bucolic tableau of field and forest in the dolina below. Beyond the hidden valley of Susmay, mountain ranges rose, one after another, to the horizon.

The topo map shows an extensive flat along the upper reaches of the Nameless Valley. I had hoped that it would be virgin jungle, and a great place to camp. As we descended from the pass into the Nameless Valley we were stunned to see nothing before us but devastated forest. Thousands of large valuable hardwood trees had recently been cut down, and were waiting to be burned. Many of the trees were huge oaks, walnuts, and mahogany, any one of which was worth a fortune. I was aghast at the waste, and began ranting and raving about the idiocy of anyone who would do such a thing just to grow a little corn. Our hosts, of course, had done the work, and were proud of it. They were not happy to be called idiots. The ugly American strikes again. I would not relent, and said that they must be very rich to consign such wealth to the flames. I was about to burn up a 100 Lempira note to prove the point, but my friends stopped me for fear that the cost of our guide services might dramatically rise. The truth of the matter is that to them the trees are numberless and worthless, a mere impediment in the path of progress. These people are squatters, or pioneers if you insist, and it is only by the act of "taming the jungle" that the land becomes "theirs."

I then railed on about the excessive number of children in the village, and the fact that the valleys of Comayagua and Tegucigalpa, which are now desert, were once lush forest; and that their green Eden would soon be an impoverished dustbowl like most of the rest of Central America. The people of Susmay may be ignorant hicks, but they are far from stupid. They didn't like what I had to say, but they did listen. These were the opening salvos in my campaign to inculcate the principles of conservation into their thick skulls. It was a novel concept, the likes of which they had never heard before.

We continued north through the ruined flat, then east again up a narrow valley. Finally the forest closed in and we were in virgin jungle. The mule trail was the only sign of disturbance, and the trail led to only one place, Chico's hunting camp. The farther up we went the more magnificent the forest became. This was jungle unlike any I had ever seen before. Temperate rainforest is a better name. Dull scientists would refer to it as moist pre-montane forest. The trees were mostly oaks, hickories, and sweetgums, with the odd mahogany, sapodilla, or fig thrown in to remind me that this really was the jungle. The forest was similar in both aspect and species composition (except for the missing conifers) to the cove forests of the Great Smoky Mountains of North Carolina. Anyone who has ever been to the Joyce Kilmer Memorial Forest in the Great Smokies can imagine this magnificent forest.

I ranged ahead of the others, pausing frequently to try to get my bearings. We had continued east for several miles, al-

ways gaining in elevation, but it was impossible to see any landmarks. The forest canopy, which was over one hundred feet above me, obscured all view of the sky and surrounding mountains. There was very little evidence of large animals, other than the fresh tracks of *el tigre* [Jaguar] and a troop of monkeys far overhead. I was out of shape, and eventually became exhausted from the climb, so I rested and pondered where on earth I might be, but could come to no conclusion. The others finally caught up, the ladies on horseback, then passed me by so that I was the last to reach camp. The men were much chagrined at having to surrender their mounts to the women. All true cowboys hate to walk. Ever try climbing a mountain in pointy-toed cowboy boots? But they were gallant gentlemen, as all true cowboys are, so they suffered the indignity in silence.

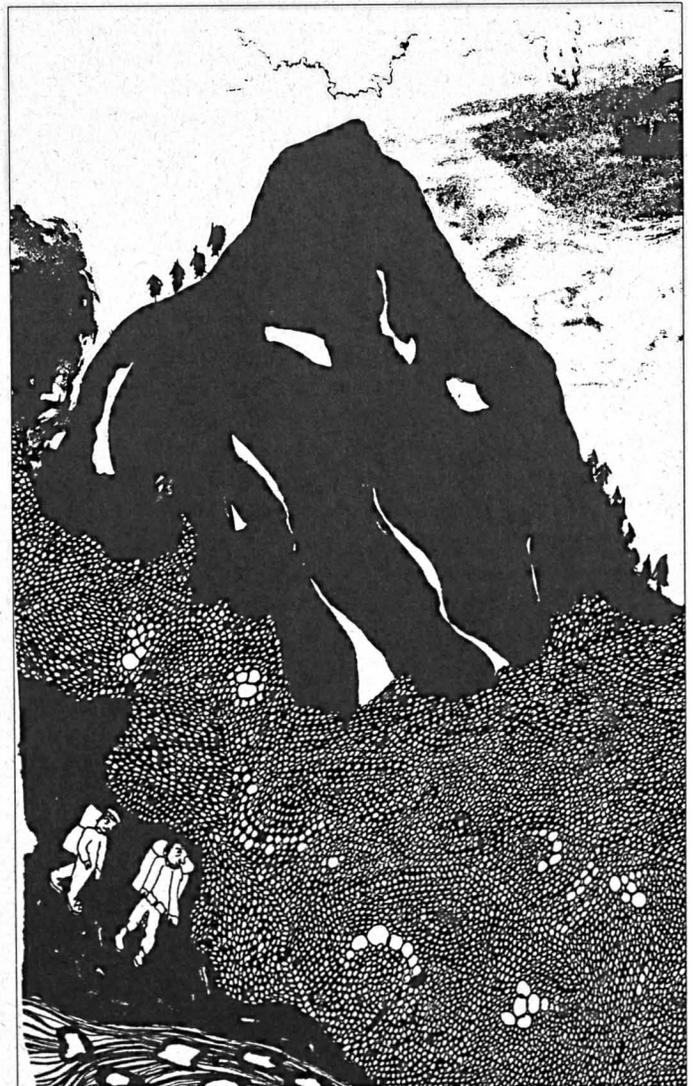
Chico's reputation as a woodsman was based entirely on his incredibly remote little farm/hunting camp. It was a great place to get away from the wife, kids, and everybody else. It consisted of two huts and a corn crib in the middle of about ten acres of overgrown clearing, with a small pasture for the horses. There were oranges, bananas, and sugar cane. Most importantly, there was a little trickling creek, the first we had seen, which disappeared into a sinkhole. The entire finca was located in a sinkhole, but which one? The map showed numerous sinkholes.

One of the goals of the expedition was to reach an incredibly remote giant sinkhole, a dolina over a mile across, which is shown on the map east of the Nameless Valley and west of the rim of the 1500 foot deep gorge of Quebrada Seca. It might seem difficult to miss such an enormous karst feature, but not in the high jungles of Honduras. Before you begin to look for anything, you have to know where you are; so locating our camp on the map became the first order of business, but we didn't have a clue.

Everyone had warned us that the nights were cold in the high sierra, so Ann and I came prepared with foam pads, a light-weight sleeping bag, a fleece blanket, a tent, heavy sweatshirts, and each other. Nevertheless, we froze our asses off. The poor campesinos had to make do with thin blankets and banana leaves, barely enough cover to pass a comfortable night in the valley of Susmay, not nearly enough for the high sierra. For them, this wasn't a fun trip.

The best coffee in the world grows in Susmay, and Chico is justly proud of his product. He handed us a jug of java fit to jolt the dead back to life. He and the men had arisen before dawn, too cold to sleep. We surveyed the gray sky with some apprehension. It was obvious that the sun had no intention of appearing, so we huddled around the cooking fire in the kitchen of our hut, waiting for it to warm up. It didn't. The others decided to huddle and rest for the day. I explained to Chico that I needed a "buena vista," preferably from the top of a cliff, so that I could see the surrounding countryside, and thereby attempt to locate our camp. His only suggestion was to head north.

The farther up we went the more magnificent the forest became. This was jungle unlike any I had ever seen before. Dull scientists would refer to it as moist pre-montane forest.





The tiny trail to the north was overgrown but still discernible. It skirted the upper edge of a big sinkhole that Chico had cleared for a milpa (corn field) years ago. No terrain is more treacherous than an abandoned milpa. Huge burned logs lay crisscrossed everywhere, all tied together by an impenetrable mass of vining, prickly, urticacious plants such as the wretched Chichicaste plant, one touch of which leaves angry, burning welts on the skin. Oftentimes the only way to cross such a field is by walking on the trunks of fallen trees, or by slashing a tunnel through the tangled mess. Watch out for the dread *Terciopelo* (Fer-de-Lance snake) in such a place. It is often stated that slash and burn farmers abandon their fields after only a few years because of soil depletion, but I believe it is primarily because of the insurmountable task of fighting the second growth vegetation. As a result of this phenomenon, whenever a farmer needs to get across an abandoned field, he makes a trail around it through the relatively open jungle rather than attempting to go straight across.

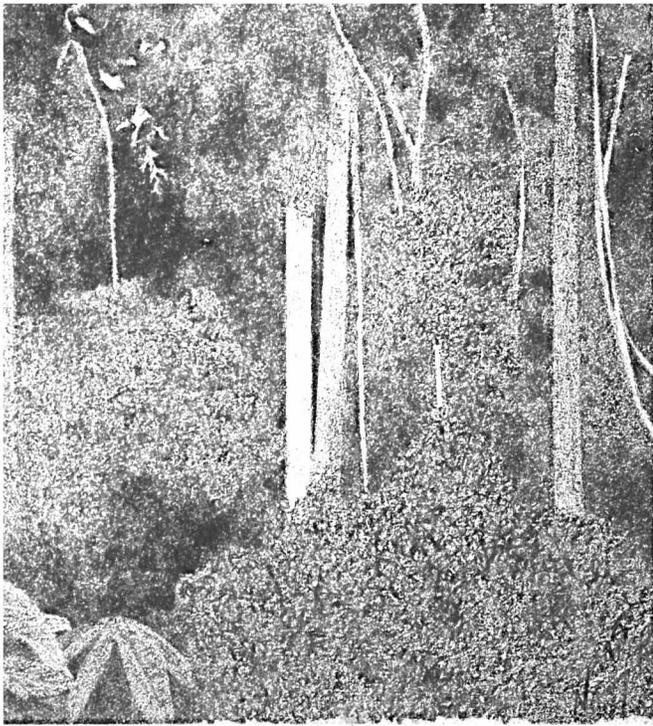
The trail continued up the mountain through beautiful open forest to the ruins of a hunting shelter at the base of an enormous Sapodilla tree. Hunters wait all night at the base of such a tree for game to come to feed on the fallen fruit. The delicious fruits hadn't fallen yet, so I looked up in the tree. As I did, I was greeted with a horrific roar. A band of howler monkeys occupied the uppermost branches. The females with young retreated to leafy coverts; the old male, swollen with indignation, climbed down to a lower branch, and blasted me with every nasty epithet in his limited vocabulary. I howled back, and soon the air was filled with our raucous cries. The people back in camp could clearly hear the noise over half a mile away. I made reference to his ancestors, his color, his nappy hair, the length of his tail, his personal hygiene, and every other insult I could think to offer; but in the end he won. I was outcursed. I could yell no more.

Near the top of the mountain I was confronted with an almost impenetrable Bracken bald. Windstorms and lightning-induced fires often conspire to blast the tops of mountains. The jungle doesn't normally burn; but under such conditions of ecological disturbance, a ten-foot-tall mass of Bracken Fern quickly grows to smother out all other vegetation. The result is similar to an abandoned field, vegetable hell, but nothing a sharp machete can't cure. After hacking through a hundred yards of this I suddenly emerged onto an open ridge overlooking the deep gorge of Quebrada Seca.

The view was sublime. I stood among ancient pines, each of which was hung with a garden of red and purple bromeliads. Repeated fires had burned away the understory vegetation, creating an open park-like expanse on the narrow ridge. To the north the pine clad slopes fell away to the barren valley below. Tiny settlements could be seen in the valley, then beyond these, more mountains. From fifteen hundred feet below me came the roar of waterfalls tumbling down the gorge of Quebrada Seca. Across the gorge, to the east, rose the main mass of the Sierra de Agalta, known locally as the Sierra de Babilonia. To the southeast lay the headwaters of Quebrada Seca, and the unexplored cloud forests of Cerro los Volcanes and the Montana de Susmay.

Only one thing marred the perfect solitude of this exquisite place: the fresh pile of mule shit and a recently chopped trail running along the ridge. Why would anyone bother to chop a trail to such a remote place? The trail came from the direction of Gualaco.

Later, when I returned to camp, Chico had an unsettling answer: outlaws. The people of Susmay live in fear of the people from Gualaco, and consider them all to be thieves and murderers. Is it a fact, or just a feud? I don't know. Chico assumed that banditos had set up a camp somewhere near the headwaters of Quebrada Seca to escape from the law. What other explanation could there be for such an obscure hideout?



Back in the clearing Chico entertained us with tales of how terrible the people from Gualaco were, all thieves; meanwhile, we stole all the squashes, chayotes, and melons we could carry.

Before leaving the beautiful ridge I paused to pick a bundle of fresh young fiddlehead ferns. To these I added the asparagus-like shoots of a giant species of jungle *Smilax*, or green-brier as it is known back home. While passing through the abandoned milpa I searched for tender young poke weed leaves, but the plants were all too old and the leaves toxic. Upon arriving back at camp I proudly presented my bounty to the hungry men. They would have none of it. Chico said, "around here we eat beans and meat, not weeds." Only old Santos took an interest. He remembered the old days when a man had to live off the jungle to survive and Indian lore was considered useful knowledge. He knew the names of various plants and animals. Chico and the younger men knew nothing. To them a snake was a snake, a bird was a bird, and a tree was a tree. If it had no obvious economic value, it had no name.

Despite their rejection of my proffered veggies, we still had a feast. Ann had managed to scrounge some mustard greens from around camp, and these they recognized as food. More important, the men had managed to shoot two *tepesquintle*. These big fat guinea-pig-like rodents are the very tastiest animal in the jungle. Anyone who has ever eaten one proclaims it to be the finest meat in the world, though it is nothing but a tailless rat. Even the skin and gelatinous fat are delicious!

Our pathetic little stream did not invite bathing, so in the morning Chico offered to lead us across the mountain to the swimming hole at Quebrada Seca. We followed a faint trail up and over the mountain to the east, then began a long steep descent into the gorge. About halfway down Chico suddenly froze. In the clearing far below us, we could see the thatch roof of a newly constructed hut. Chico was convinced that this was the bandits' hideout. He was obviously afraid, and such fear is contagious. I was determined to keep going, so he reluctantly agreed, provided that we left no trail and approached the hut from a different direction. He was greatly concerned that they

would find our trail and follow it back to his hunting camp. We crept down the hill until we intersected their trail, the same trail I had encountered on top of the ridge. We cautiously approached the hut. No one was home. Fresh tracks showed that they had just left for Gualaco.

Below the clearing ran the beautiful Quebrada Seca. The crystalline waters slid between huge polished boulders of colorful metamorphic rock. Tree ferns overhung the stream, casting a perpetual emerald gloom on the mossy rocks below. The air was cool and still. Each of us chose our own private pool to bathe in, but not for long; the water was much too cold. Alycin, who is from Canada, thought the water was just dandy, so she stayed in long enough to discover that the stream was full of leeches.

Back in the clearing Chico entertained us with tales of how terrible the people from Gualaco were, all thieves; meanwhile, we stole all the squashes, chayotes, and melons we could carry. I wonder what the people of Gualaco must think of the people from Susmay? Bloodthirsty bandits all!

Our little dip so invigorated me that, upon returning to camp, I resolved to rebuild our water supply infrastructure. The pool that we used to drink and bathe from was little more than three inches deep. Horses and mules routinely fouled the water, and it was a perilous descent down a slick mud slope to get to the stream. Chico accepted this as a normal state of affairs—he had been drinking mule shit and falling into mud all his life—but I was determined to show him how a real gringo does things. Plumbing is the prerogative of civilized man. The first I whacked down all the surrounding small spindly trees to make a bridge. The wood from these second-growth weed trees was softer than balsa. When I tried to use it for lumber, it simply smooched into vegetable goo which became one with the bog. Then I tried to dig out the pool using a rusty tin pan. This caused the mud to slowly avalanche in from above. Nothing I could

The forest grew even taller. There we beheld the most magnificent tree we had yet seen, a sweetgum with a trunk at least seven feet in diameter.

do seemed to change the equilibrium of mud and water. I abandoned these futile attempts, then directed my attention to cutting steps with my machete into the slick mud bank. That night it rained, the horses came back, and entropy won. In the morning nothing had changed.

Chico had assured me that the little stream did not disappear into a cave. I found this hard to believe, so I followed it down into a steep sink not far from camp. The water gurgled into a tiny swallet at the bottom, and was gone. There was no way for anything bigger than a salamander to enter. I supposed that erosion from the nearby milpa had plugged the cave, but then I observed that the roots of the giant trees had not been covered with silt, but ran along the surface as they should, nor had logs piled up against the entrance due to raging floods exacerbated by agriculture. The sinkhole was almost pristine, and the fault for the plugged cave could not be laid at the hand of man. This sink was at the bottom of a complex of huge dolinas, all of which together must collect a Noachian deluge of runoff during the rainy season. How could all that water fit down this tiny hole? Why was there no evidence of catastrophic flooding?

I have emphasized the omnipresent mud, but the mud here is no worse than in other jungles, certainly nothing like the knee deep quagmires of Panama. Unlike most of the larger dolinas in the area, this little sink even had a limestone cliff towering above it, proof that there was solid rock at the core of the mountain, not just dirt. If indeed this little sink was an adequate conduit for the waters, how could such a system remain in equilibrium over geological time? Why would the choked cave system not fill with mud and logs, causing the sinkhole to become a lake, then blow its plug occasionally with a catastrophic gulp, as do lakes in Florida with a similar hydrological regime? Damned if I know.

From camp we could see clouds gather every afternoon around the highest peaks to the south. This was the cloud forest. The mountains seemed close enough to touch, but Chico insisted that they were many hours of hard climbing away. He reluctantly agreed to accompany Barbara and me on an attempt to reach the peaks.

A tiny trail skirted the finca, then ascended steeply along a ridge to the south. After a hard climb, the ridge opened up into a beautiful park-like expanse of dwarf

parlor palms, *Chamaedorea* sp., like the palms in a hotel lobby. From the grove of palms, the trunks of towering trees rose like colossal columns to the canopy far above. We enjoyed an easy stroll through the beautiful palm grove until we approached the base of the main mountain. The forest grew even taller. There we beheld the most magnificent tree we had yet seen, a sweetgum with a trunk at least seven feet in diameter. We could not see the top, but it appeared that there were no branches for at least 120 feet. The fruits were identical to those of the puny sweetgum trees back home. Chico called it a "liquidambos," which is amazingly close to the correct scientific name for the tree, *Liquidambar*. This tree had indeed been tapped for its liquid amber. Someone had cut notches in the base of the tree to collect the sticky sap. Who would bother to tap a tree here? A short way farther on we found the answer, a well-used trail running along the base of the mountain, presumably from the tiny village of El Gorrion on the other side of the mountain. Chico couldn't imagine why anyone would do such a thing. As far as he knew, this was all uninhabited wilderness.

Just beyond the trail we were confronted with an almost vertical wall of jagged limestone, the first large expanse of bare rock we had seen on the trip. Chico assumed we would turn back there, and was much dismayed when I sharpened my machete, then started whacking my way up the cliff, employing vines and saplings for hand and foot holds. As we ascended from an elevation of about 4800 feet, the character of the forest changed. The trees became shorter and more gnarled, with heavy loads of epiphytes and moss. The air became chilled and wet. We were fortunate that it was a fine clear day, for we had reached the cloud forest where the sun rarely shines. We hacked our way up at least a thousand feet, until the ground began to level out near the summit. This would have been a wonderful place to rest for hours, explore, and perhaps see a Resplendent Quetzal, but we had to return to camp before dark. All of the wondrous rare undiscovered species of plants and animals would have to remain undiscovered. We slid down the mountain in one long, controlled fall, being careful not to be skewered by the stumps of saplings cut along the way, then raced back to camp just in time for dinner. ■ *end, part 1*

Naturalist and spelunker Bruce Morgan (the Southeast's answer to Ed Abbey)
will conclude his exploration account in our next issue.

Wolf Re-story-ation

The Importance of Myth and Values in Ecological Restoration Efforts

by Mollie Yoneko Matteson

A dream for the near future:

The first time I saw a wolf at my family's country homestead in southwestern Vermont, it was the kind of monochromatic November day when the dimly lit sky hangs palpably close, and bony fingers of wind pry under your collar. I was walking with my daughter in a stand of hundred-year-old Sugar Maples, and through the tangle of naked limbs stretching above our heads, I glimpsed the steep, bulging slope of the Taconic Range looming like the breast of a giant roosting bird. We were talking quietly but not intently, paying as much attention to the way the faded leaves crisply disintegrated under our feet as we did to our muted dialogue. Our orange vests and caps seemed an insult to the subdued purity of the afternoon, but one trades aesthetic sensibility for sensibleness during hunting season in Vermont. Still, though we heard occasional muffled booms across the valley, there seemed to be no hunters that day on our property.

I'm amazed now that our clothes didn't warn it away immediately. Surely, a wolf would learn quickly to stay away from humans wearing such outrageous apparel. Yet, suddenly there it was. Soft and precise as a snowflake, the wolf stood crosswise to us about thirty feet away. Across its pale, grizzled flank a dark mantle swooped from its shoulders. Each lean leg was neatly silhouetted, and the wolf's gaze was fixed firmly in our direction. It was as if each of us, my daughter and I and the wolf, had been minding our own business, keeping our shoulders hunched against the cold breeze, when we stepped across some invisible threshold and found ourselves thrust into the same space, staring into each other's eyes.

I looked for a collar or a tag that would give some clue of the wolf's origins. I was pleased that nothing was visible, though it is possible that under its flesh some scientist had inserted a tiny computer to track its movements and the rhythms and chemistry of its breath and blood. I could only wish that this animal had escaped such treatment, and its identity, travels, and ambitions were known only to itself, its lupine compatriots, and the trees, stones, and rivers that witnessed its passing.

Several generations of wolves, descendants of the original animals reintroduced into the Adirondacks and Maine, had been slowly reclaiming territory in the northern forests. Now, like the Moose, Lynx, Fisher and other species before it, the wolf was appearing in places wholly unexpected just a decade ago. Wolf prints on the muddy running track of a college campus in western Massachusetts. A wolf sighted thirty miles outside of Boston. A pair that attempted to den on a farm fifteen miles from Syracuse. It made some people a little crazy, to think about wolves skirting the edges of their towns, yellow eyes staring out at passing cars from behind roadside shrubbery. Yet, though a few livestock and pets succumbed each year, making headlines in the local papers, wolves were no longer a novelty in northern New England and northeastern New York. They were becoming part of the landscape, welcomed by some, resented by others but mostly—and to me this was the most remarkable aspect—they were nothing terribly extraordinary.

Except, of course, wolves are extraordinary.

I stole a look at my daughter's face, and startled the wolf into flight. A few muffled creaks and swishes accompanied its disappearance into the leafless underbrush, and then I could not hear or see it. It had stepped backed into whatever realm it had inhabited before our planes of existence had briefly intersected. My daughter continued to stare into the forest, not because she was unsure what she had seen—she'd seen dozens of wolves in the Rockies, Minnesota, Alaska, and Canada. Rather, I think she gazed, as I did, at a moment of absolute certitude that both she and the wolf belonged in this world. It was a feeling she refused to let fade. I understood then that all my lectures to her on the struggles of activists to restore wolves to their former ranges, my recounting of what it was like to live in a wolf-less West, and grow up in a wolf-less East, had lodged somewhere in her mind as a vague myth of the past. Yet this wolf, crossing our old New England farm, the land my father's family cleared, planted, built upon and today painfully scrapped to hold on to, made the passage of time suddenly vivid as the sinuous shimmer of a river under a bright full moon. The stories wound back from the wolf we had glimpsed to the wolves that walked this ground 250 years ago. I knew it was unlikely the wolf would stay, and that a million factors conspired against the establishment of a pack in this area. Still, as I walked back to the house I held possibility in my heart like one cups a perfectly round, smooth pebble brought back from a wild lakeshore. Close to my skin, hope warmed like a living thing and kept the chill of the oncoming darkness at bay. ○



I BEGIN WITH A STORY—my own close-to-the-skin hope, fashioned into images, emotions, the flutter of living things. This is my dream of the future. Yet when many of us speak of the land and our place in it to a public audience, we use words of reason, practicality, quantity. I could relay my ideas as a logical proposal—a plan for wolf recovery in the Northeast—with numbers and maps, with substantiating scientific evidence, opinion surveys, economic studies; but would that move people?

We must not forget the stories, least of all our own. Ecological restoration of any sort, be it of wild wolves, or free-flowing rivers, or lush, uncut forests, is *re-story-ation*. It is the re-making of the narratives that inform our individual lives, our communities, our culture. The creative imagination has great power which those advocating for wild things and places should not overlook. For too long, too many stories have portrayed wild things as objects for manipulation and subjugation, and by so doing, enslaved our own spirits. In contrast, the stories we craft from our own experiences, and from the wisdom of our mentors and heroes, guide environmental advocates in their work. I share my story because it is my own, and because I believe I have a better chance of truly imparting to my readers the urgency of my vision than I could with any litany of statistics or tired reprise of reassurances.

Wolves will return to the Northeast in the wake of new narratives of landscape and place and relationship to community. It would behoove us as advocates for such a future to help initiate and propel this tide of the imagination, rather than simply hope it develops as a side effect of our painstaking and sometimes passionately labor.

When I consider the likelihood of success of a campaign to restore the Eastern Timber Wolf (*Canis lupus lycaon*) in the Adirondacks and northern New England, I see more reasons for optimism than I've seen in the West. Livestock are scarce to nonexistent in potential reintroduction sites. Further, the cult of the cowboy and the political entrenchment of the livestock industry, which so dominates the western US, is not operative in the East. Of course, many farmers and hunters, and a considerable segment of the general rural population, will treat wolf recovery proposals with ridicule or outrage. Nevertheless, such people are considerably outnumbered by the urban population of the greater Northeast region—and the region's residents know this. Seventy million people live within a day's drive of northern New England and New York (Harper, Falk, and Rankin 1990): some of them hostile, many of them indifferent, but quite a few who agree the return of native species, at least where habitat is still suitable, is a terrific idea. Biologically speaking, there ap-

pears to be a great deal of suitable habitat (US Fish and Wildlife Service 1992). The primary prey species for wolves—White-tailed Deer (*Odocoileus virginianus*), Moose (*Alces alces*) and Beaver (*Castor canadensis*)—are either relatively abundant or in the process of expanding their ranges throughout and beyond potential recovery areas.

Still, I am concerned that a revitalized interest in wolf recovery in the region not be treated or portrayed as a simple business of making sensible-enough biological or economic arguments. I am worried that wolf advocates will aim too low, or make their case too narrowly. If a wolf restoration campaign is to succeed in bringing wolves back as something other than highly manipulated and restricted objects, serving as magnets for tourist dollars or tools of prey regulation, then the values of Nature—in the broadest sense—to which human residents of the region adhere must be understood and respected. Advocates for wolf recovery must offer a vision that is not just scientific or based on the opportunities wolves may offer local economies. Conservation must be about articulating a new mythical understanding of Nature and community, so that restoration, be it of wolves or of the land and its inhabitants more generally, is seen to be as much about *re-storying* place as it is about achieving technical goals or political victories.

Many people working on wolf recovery issues today do see that they are immersed in a process of cultural and personal change, as much as their daily work may be concerned with matters of biology, economics, and natural resource management. Yet from my own past experiences in wolf advocacy, I find few individuals or organizations willing to publicly admit or openly employ the truly mythic aspects of wolves. It's true that environmental groups recognize the powerful symbolism of the species. Wolf imagery sells memberships and trinkets. Wolves draw in activists and supporters to be educated about and primed for related causes such as wilderness preservation. If wolves were not such potent

figures in the collective imagination, they probably would not have been exterminated in this country in the first place, nor would so many people devote their time to wolf restoration today. Nevertheless, biologists, professional land managers, and even wildlife advocates usually seem to shy away from that fuzzy ground where personal and spiritual beliefs and the sense of a societal imperative or ethic converge with science and politics.

A few years ago, a leading federal official in the northern Rockies wolf recovery program stated that he did not understand why people—both pro and con—got so emotional about wolves. After all, he remarked, "They're just another animal."

I think the remark was well-intentioned. The man was simply attempting to diffuse the intense passion that continually swirls around wolf issues—a maelstrom that continually buffeted him and hurt a great many others. But his words revealed either an inability to understand the nature of this very, very deep cultural struggle, or a wistful hope that people would just drop their silly belief systems and get the facts, so he could go on with the business of being a scientist, rather than a mediator and public punching bag. Alas, as research by environmental sociologist Stephen Kellert and others has shown, the presentation of new information very often has little effect on people's attitudes, especially if the beliefs are strongly held (Kellert et al. 1996; Reading and Kellert 1993; Primm and Clark 1996). Instead, "facts" are often interpreted and employed in very different ways by different individuals and interest groups, strengthening existing perspectives, rather than modifying them. Thus, the innocuous-sounding strategy of so many agencies and organizations, that of conducting public education campaigns, is simply not enough. Ambitious, even frightening or offensive as it may sound, what genuine wolf restoration, or any large-scale, long-term ecological recovery project requires is the reshaping of our culture's narrative lore, our folk beliefs, our cultural subconsciousness.

Much good work has been done in the "human dimensions" field of wildlife and natural resource management over the last couple of decades (e.g. Gray 1993, and any of dozens of articles by S.R. Kellert), and a good many scientists—particularly those labeling themselves conservation biologists—understand the primacy of values and ethics in their professions (e.g., Barry and Oelschlagel 1996, and other articles in the special section on conservation and advocacy, *Conservation Biology* 10(3)). Yet, most people involved in the biological or social sciences (including myself) have very little understanding of how individuals, groups, and societies really come to their views on profound matters directly impinging on conservation. These perhaps sound trite when listed so prosaically, but I have yet to hear definitive answers to such questions as, "What is Nature? What is it for? Is there good and evil in the world? If so, how does one recognize it? What is the individual's or the community's obligation to other humans, to non-humans, to the land, to God or gods?"

I began with a story, and place my faith, hazardous though the placement may be, in the revival and re-creation of myth. If ecological restoration is the goal, then *re-story-ation* is the necessary task. In his book, *Hole in the Sky*, author William Kittredge (1992) recounts the saga of his family's ranch in eastern Oregon, and talks about his slow realization that "the world was made of stories, which in turn were an ultimate principle of order...stories were the little motors that ran our actual lives." Our job, he says, must be to "define a story which encourages us to make use of the place where we live without killing it, and we must understand that the living world cannot be replicated...Ruin it and we will have lost ourselves."

My husband recently led a photography workshop that included a woman who counseled battered women, abused children, and other severely traumatized clients. In her counseling sessions, she sometimes assigned her patients to write stories. She saw this exercise as a way

Could the possibility of wolves roaming in the hinterlands of the great cities of the eastern seaboard reawaken the imaginations and aspirations of urban children...

of allowing her clients to ease themselves into their own truths, to make whole objects out of what seemed shattered and fragmented. She also believed that stories allow the narrator to communicate without seeming to attack the values and beliefs of the listener. If it's "only a story," the listener may enter into it more willingly, may allow the message to penetrate more deeply. This is quite different from being the recipient of a sermon on the ills of one's ways, or a lecture dense with statistics, which can be deemed unreliable and therefore dismissed.

Here, then, are a few tentative guidelines for incorporating myth and story into ecological restoration efforts. First, anyone who hopes to help redirect some aspect of the human relationship with the environment must be willing to be honest about his or her own deeply held values, even and especially with those people perceived as hostile. If you are part of the conservation community, whether as an unpaid advocate, professional activist, or agency official, share your own personal stories—the anecdotes, histories, and memories that tell you who you are and help you believe in what you are doing. Perhaps you will still be judged crazy, but it will be harder to label you insincere.

Second, agencies and advocacy organizations need to give more conscious consideration to all the social values of wildlife and wild ecosystems, not just narrow consumptive, economic, or utilitarian values (Kellert 1995, Kellert et al. 1996). Do not assume that those who respond "no" to survey questions on wolf restoration, for example, represent blocks of unmoving antagonism to campaigns to protect Nature. What is understood as "nature" or "protection" may vary widely. Between those gaps in definitions, the soft little lessons and powerful symbols that are communicated in stories may be able to slip in and pull the sides together.

Third, people are already available to aid, or even lead ecological *re-story-ation*. It is time that wolf and wildlands advocates turned very seriously to the professional storytellers and the soul healers—those who make it their business to persuade and communicate via emotions, traditions and symbols. Such people have long occupied the margins of environmental movements, and indeed, their words and images often become the slogans and banners of environmental campaigns. If we are to understand ecological restoration as not merely biological recovery to which political support must be given, but human/social restoration that will be accompanied by ecological revival, then artists, poets, spiritual and religious leaders, counselors, and other visionaries must be integral.

It is important that the social diversity of the region be recognized as valuable, and as critical to the resurgence of ecological health. This may mean listening very humbly to those whose experiences, needs, and perceptions are quite different from ours. Still, I believe we may find allies for restoration in the inner city neighborhoods, the Downeast fishing villages, the upstate mountain hamlets, as well as the college towns, suburbs, resort centers, and the like. Are there cultural traditions among some of the many ethnic groups in the Northeast that allow for more generous relationships with Nature? Could the possibility of wolves roaming in the hinterlands of the great cities of the eastern seaboard reawaken the imaginations and aspirations of urban children who otherwise might believe Nature is only about pigeons, weedy lots, and what they've seen in zoos? And though they are few in number compared with the American Indian tribes of the West, the Indian people of the Northeast would have some powerful things to say to the rest of us about the manner in which this land ought to be inhabited.

Finally, those who advocate for wolves, and the renewal of more complete, self-maintaining, wild ecosystems, must speak passionately for their vision. To think of wild wolves roaming free in the northeastern US is an astonishing act, given the history and dominant cultural attitudes of the last three centuries. Such a project is eminently possible, but not through arid logic, guarded testimony, or curbed ambitions. Though the steps may be incremental, restoration advocates must continue to strive for a re-created, re-formed myth—the story of what our culture is about and how it properly exists in the universe. A small way to begin is to imagine our own private stories, the ones we hope to inhabit some day. ■

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A Homecoming for Wolves in the Northern Forest

by Kathleen H. Fitzgerald

Five hundred people convened in Albany, NY from 14-16 November 1996 for the Wolves of America conference sponsored by Defenders of Wildlife. Participants heard detailed presentations from biologists involved in reintroducing wolves in Yellowstone and Idaho, passionate pleas from activists lobbying for wolf reintroduction in Colorado, debates on removing the wolf from the Endangered Species list, and success stories of natural recolonization in Michigan and Wisconsin. The underlying theme of the entire gathering was the proposed reintroduction of wolves into New York's Adirondack State Park, and support for the idea was overwhelming.

The Eastern Timber Wolf, a Gray Wolf subspecies, *Canis lupus lycaon*, once roamed the entire Northern Forest, from the banks of the Great Lakes, east through New York and southeastern Canada and New England, and north to Hudson Bay. The first New World bounty, set by the Massachusetts Bay Colony in 1630, initiated a devastating slaughter of wolves. For the next two and a half centuries wolves were shot, trapped, poisoned, blown up and burned. The last known wolf in New York was killed in 1897, and they disappeared from Maine by 1909. Today, *Canis lupus lycaon* survives in only three percent of its historic range in the United States, in northern Minnesota, northern Wisconsin, and Michigan's Upper Peninsula.

Most presenters at the conference agreed that wolves probably could not return to the Adirondacks on their own; a lone wolf might find its way across the St. Lawrence River, but the probability of a wolf pack doing so is slim. Moreover, wolf populations in Canada are being depleted through habitat destruction and shooting, thus making natural recolonization of the Adirondacks even less probable.

The 1992 Recovery Plan for the Eastern Timber Wolf identified a few of the prerequisites to bringing wolves back to the Northeast region and maintaining a viable population:

- Large tracts of wild land with low human population density, minimal accessibility and low road density;
- Abundant wild prey;
- Public support.

Presenters at the conference were confident that the Adirondacks provided enough wild land and prey for wolves. They stressed the need for education and outreach in order to increase awareness and acceptance of wolves.



Dennis Hosack of Defenders of Wildlife conducted a preliminary biological assessment of the Adirondacks and found that the road density within the park is approximately .45 km/km² and the area supports approximately 5.5 humans/km². It has been suggested that to maintain a viable population of wolves, an area needs to have less than .58 km/km² of maintained roads and fewer than 8 humans/km². Hosack argued that with a density of 3.25 White-tailed Deer/km² and a Beaver population that has increased sharply in recent decades, there is a sufficient prey base for wolves. Using a known relationship between wolf density and prey biomass availability, Hosack predicted that the Adirondack Park could support approximately 155 wolves.

Alan Hicks of the New York Department of Environmental Conservation disagreed with Hosack's conclusion that there is enough prey available in the Park. Hicks recalled numerous deer camps in the Park where hunters have been unsuccessful in killing any deer for years and said the DEC is not taking a position on the reintroduction proposal. An Environmental Impact Statement would resolve these questions.

Biologists from the West clearly described the reintroduction procedures employed in Yellowstone and Idaho. For those conference participants who thought wolves were merely caught and let loose, this was quite a learning experience. Participants learned that wolves are heavily managed and that the entire process is "hands-on." After being darted, injected with sedatives, relocated, implanted with computer chips, and held captive for significant periods of time, the wolves we introduce today are a far cry from the wolves we recklessly obliterated years ago. Dr. John Theberge, a biologist studying Ontario's Algonquin Park wolves, challenged attendees to recognize the difference between a wild pack of wolves and a pack merely surviving:

Wolves currently are reinhabiting various human settled places in the US and Europe. They may persist numerically, but if heavily persecuted may be forced to adapt both behaviorally and genetically. Maintaining them represents a lower level of conservation success than the persistence and expansion of a truly wild population, where natural selection continues to shape gene pools and behavior. Do people want a made-by-humans wolf, just hanging on in the Adirondacks, or one made by natural selection?

Yellowstone and Idaho were referred to as successful restoration projects. This begs the question: how do we judge success, by quantity or quality of wolves? Because Yellowstone was a "success," we have reason to believe that reintroduction in the Adirondacks could be a success. Defenders of Wildlife's Hank Fisher said Yellowstone should not be used as a model because it cost too much, took too much time, and today there are still people with great antipathy for the wolf. We should learn from the mistakes made in Yellowstone.

Mike DiNunzio of the Adirondack Council said, "Wolf reintroduction is right for the wolf, it's right for the Park, and

it's right for the people." Philip Hamel of the Residents' Committee to Protect the Adirondacks said the RCPA supports a feasibility study.

The 1992 United States Fish and Wildlife Service Recovery Plan for the Eastern Timber Wolf identified the Adirondacks, eastern Maine, northwestern Maine and adjacent New Hampshire as potential sites for wolf recovery. RESTORE: The North Woods, the Greater Laurentian Wildlands Project and other organizations within the region are advocating a FWS Northern Forest wolf restoration EIS.

Wildlands proponents believe we should not study the Adirondacks alone, nor just part of New Hampshire and Maine. Studies should extend through Vermont and southeastern Canada. Wolves will not stop at the Vermont border, nor will they hurl themselves across the state into the study areas of New Hampshire; thus an EIS should be conducted for the entire Northern Forest region.

Wolves may be able to survive within the current landscape, but as RESTORE's Michael Kellett pointed out, humans can survive in slums. Just because a species can survive does not mean it is in the best available conditions. Whether or not the current landscape provides suitable habitat, habitat integrity is not guaranteed. Wildlands in the East are being rapidly lost to development, logging, roading and mining. In order to secure viable populations of wolves and other wide-ranging species and maintain evolutionary processes, large wild areas must be reconnected and permanently protected. When we fail to articulate these long-term priorities, people are given the impression that wolves can co-exist with our gross habits of growth and consumption—over the long term they cannot.

Yellowstone and the Adirondacks share some vulnerabilities—they are both essentially islands of habitat. In fact, the Adirondack Park could be seen as an archipelago holding within its boundaries 16 Wilderness Areas and 16 Wild Forests. Wolves will inevitably leave the political boundaries of the Adirondack Park as they have Yellowstone Park. The short-term solution provided thus far in Yellowstone National Park is darting and drugging wolves and bringing them back into the park, or killing them if they have infringed on people's property. As prominent wolf biologist David Mech said, "We control bears, we control lots of species—we need to control wolves." Western biologists warned conference attendees that wolves would have to be killed, and we need to "toughen up" and accept this reality.

Perhaps this will be the short-term reality, if we reintroduce wolves under the "experimental non-essential" designation—which would compromise the wolves' protection; yet this must not be our perception of long-term reality. Biologists seem confident that wolves could survive within the Adirondack Park; but in order to support a wild, viable population of wolves over the long term, more wild habitat in the Northern Forest will be needed. Again, wild areas must be connected for dispersal routes, migratory paths, genetic ex-

change, and supplemental habitat. Connectivity should be re-established between Five Ponds Wilderness and the High Peaks Wilderness, in particular, and between New York's Adirondack State Park and Ontario's Algonquin Provincial Park.

The need for education was echoed throughout the conference. Since the conference, newspaper pages have been flooded with editorials and news briefs on the possibility of wolves returning to the Northeast. Both support and opposition have been expressed, and conservationists need to be on their toes responding when necessary.

Defenders of Wildlife recently conducted a survey of public opinion on "reintroduction" of the Eastern Timber Wolf to Adirondack Park. Within the Park, 34% strongly supported, 42% moderately supported, 5% neither supported nor opposed or did not know, 8% moderately opposed, and 11% strongly opposed wolf reintroduction. In New York state as a whole, 38% strongly supported, 42% moderately supported, 10% neither supported nor opposed or did not know, 6% moderately opposed, and 4% strongly opposed wolf reintroduction. In New England, support for wolf reintroduction is even stronger.

Although public sentiment toward wolves has changed in the past decade, those impervious to anything wild will still be opposed. The Farm Bureau has already stated its opposition to any study, calling wolves a threat to cows, horses and children. That there has never been a documented case of serious injury to a human by an unprovoked, non-rabid wolf is one of the many facts conservationists need to bring to the fore. Conservationists must illustrate that wolf recovery will produce local economic benefits in the Northeast as it has in Yellowstone, Ontario and Minnesota.

E.O. Wilson, the preeminent conservation biologist at Harvard University, wrote, "Each species in the ecosystem occupies a precise niche and is locked symbiotically with other species. If the basic units of biodiversity are the species, then the Adirondack ecosystem is not complete." Large carnivores, like the wolf, are key indicators of ecosystem function and productivity. The Northern Forest region cannot be restored and maintained as a healthy ecosystem without the return of the wolf. ■

Kathleen H. Fitzgerald is the Coordinator for the Greater Laurentian Wildlands Project, POB 457, Richmond, VT 05477, 802-434-3279. A longer version of this article ran in The Northern Forest Forum (POB 6, Lancaster, NH 03584) Vol. 5 No. 2, winter solstice 1996.

For conference proceedings, contact Defenders of Wildlife, 1101 Fourteenth Street, NW, Suite 1400, Washington, DC 20005.

For more information, contact RESTORE: The North Woods, POB 1099, Concord, MA 01742 or Greater Laurentian Wildlands Project.



Time Series Mapping of Utah's Wild Lands

Documenting the Losses

by Frederick H. Swanson

For all its famous grandeur, Utah's canyon country has an image problem—one as old as the West. It's the image of the wilderness as inexhaustible—the notion that it will always be there, and that humans can hardly scratch the surface of the big open places. This myth has hindered efforts to enact the citizens' proposal to protect "America's Redrock Wilderness"—the 5.7-million-acre proposal so many people fought for in 1995 and 1996.

People in the mainstream of Utah—my friends and neighbors among them—have trouble believing that our wild lands are really in jeopardy. Surely we don't actually need 5.7 million acres?

Of course, wilderness opponents are quick to make this case. One southern Utah county commissioner summed it up: "Look at the land. What do you see? It's pristine. And my family and I have been making our livings off of this land for five generations. Tell me we don't love the land and that we can't be trusted to manage the land."

The region this county commissioner spoke of, the Escalante River and Kaiparowits Plateau country, does contain a great deal of wilderness. But during the last five decades, hundreds of miles of roads have been built here, slicing up what was once a huge roadless tract into many smaller (though still valuable) tracts. The recent designation of the Grand Staircase-Escalante National Monument may put a damper on further road-building in this area, assuming conservationists are successful in warding off efforts to pave low standard roads under the guise of tourist development.

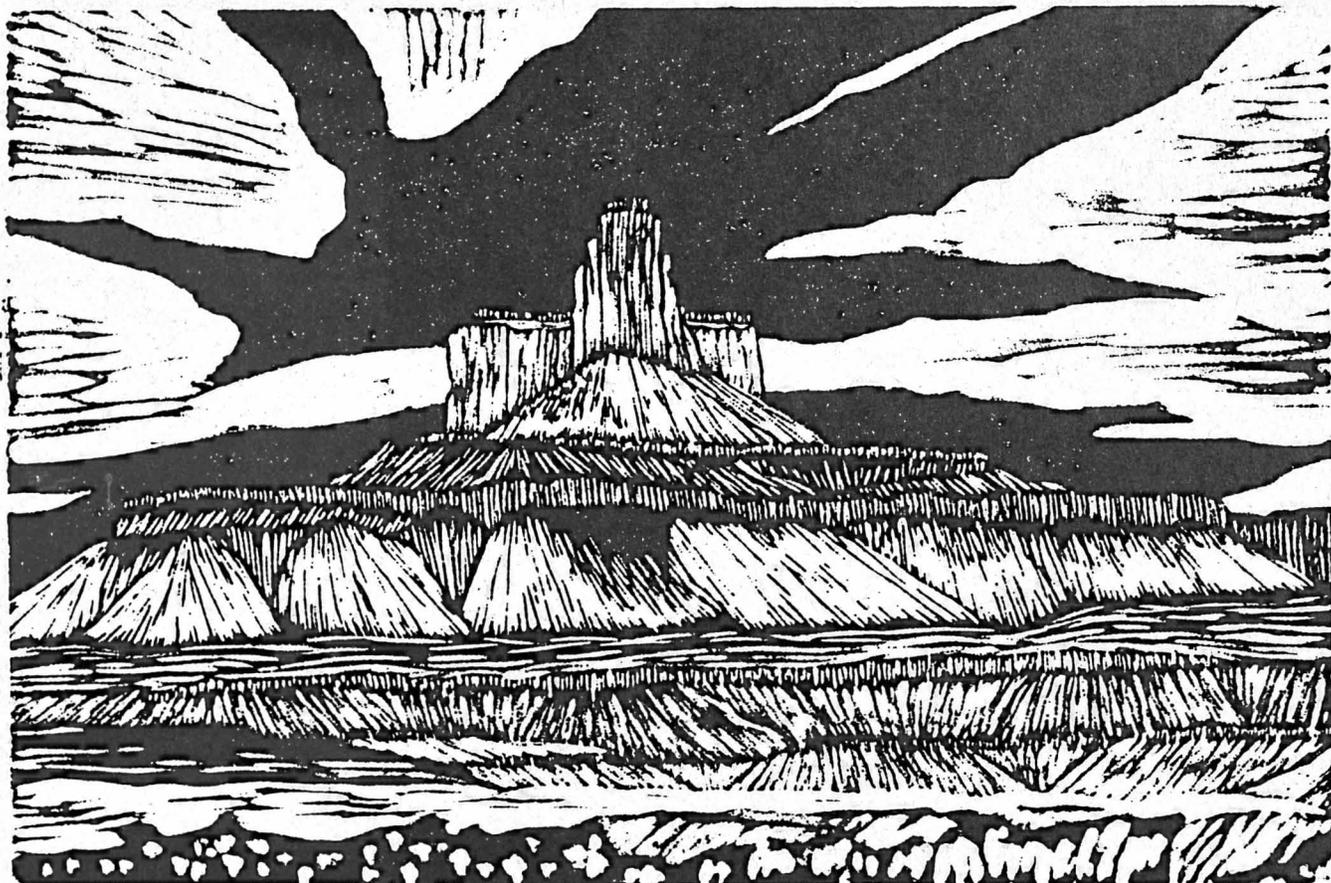
Across most of the rest of southern Utah, however, the threat of wildland development remains. Local county commissioners continue to assert rights-of-way for hundreds of miles of old, disused jeep tracks and vehicle ways under an archaic federal statute known as RS 2477. They've sent out road crews to begin blading these routes in an effort to forestall wilderness designations on BLM lands. Also ominous is the recent increase in the prices of oil and uranium—energy companies hold leases on vast areas of BLM land.

While we may be able to defeat anti-wilderness legislation (such as the Utah congressional delegation's HR1745/S884 in the 104th Congress), it seems unlikely that we will enact good legislation (such as Representative Maurice Hinchey's HR1500) given current public attitudes. Visionary wilderness bills won't pass unless a large segment of the public perceives a real threat to their wild lands.

Therein lies the problem. The loss of Utah's wild lands has been gradual, incremental, and hard to perceive. With the exception of the flooding of Glen Canyon, our wild lands have been lost road by road, mine by mine.

Bob Marshall's comparison of disappearing wildlands to "a snowbank on a south-facing slope on a warm June day" is apt; you can't actually see the snowbank shrink-

The loss of Utah's wild lands has been gradual, incremental, and hard to perceive. With the exception of the flooding of Glen Canyon, our wild lands have been lost road by road, mine by mine.



ing, but it's still going fast. Most people, like our county commissioner, cannot perceive the incremental loss of wild lands any more than a lobster can tell that the water in the pot is getting warmer. Humans, like most animals, are perceptually equipped to notice sudden change—a new dam or a power plant—not the gradual erosion of wildness from hundreds of road segments slowly built over the decades.

MAPS AS A PERCEPTUAL AID

One tool Utah conservationists are using to combat the myth of inexhaustible wilderness is “time-series mapping”—maps that show changes to wilderness lands over time. These maps distill fifty years of landscape change into an easily grasped picture. Time series maps correct our perceptual deficiency by making change visible at a glance.

My interest in time-series mapping began when I found some old highway maps of Utah in library archives. Dating back to 1923, these maps showed an amazing wild region stretching from Moab almost to Kanab. This was the country in which the Interior Department of the 1930s proposed a huge Escalante National Monument, a vision that was sidetracked by local opposition and by World War Two.

Further archive research brought forth a set of more detailed maps prepared by the Department of the Interior's Grazing Service, precursor to the BLM. These maps, prepared from 1939 through 1946, showed primitive tracks into the wilderness that did not appear on the highway maps. Still, a great deal of wilderness existed back then. Clearly, much wild land

had disappeared between 1945 and the present. But how much, where, and when?

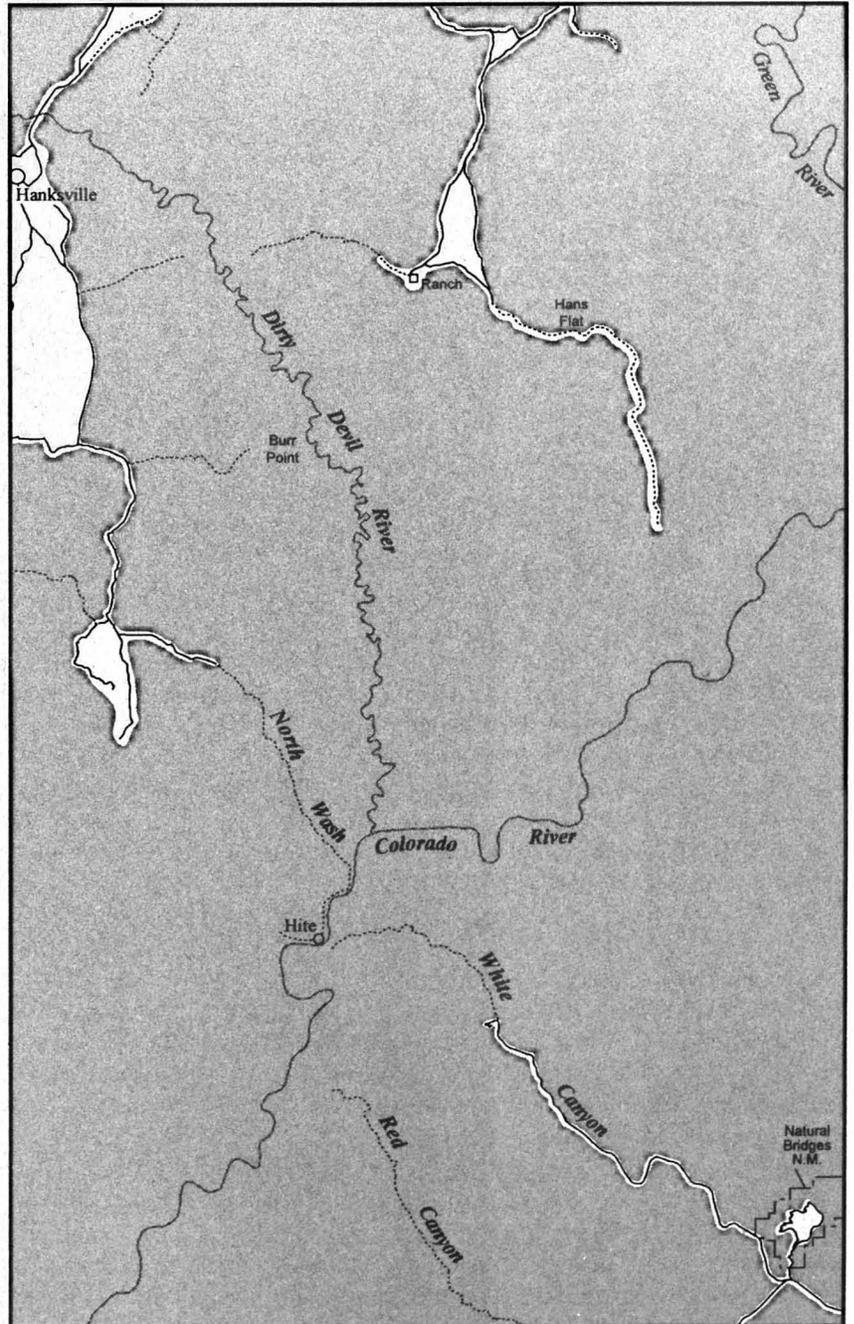
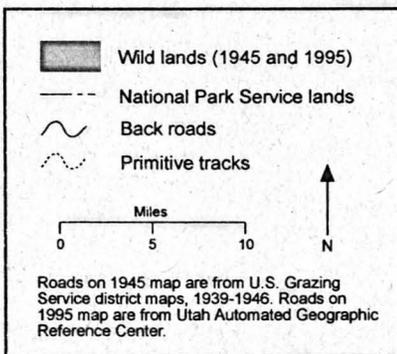
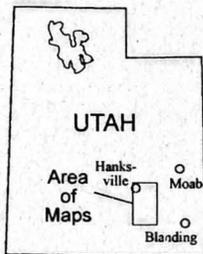
With help from the Maki Foundation, and with computer wizardry provided by Desktop Assistance, Inc. of Helena, Montana, I began transferring the old maps onto a common base for comparison with current maps.

COMPARING WILDERNESS—THEN AND NOW

Southern Utah was not a pristine wilderness even in 1945. Primitive tracks and cattle trails existed in many canyon bottoms. To make a fair comparison with the wilderness of today, I mapped only those roads that would likely have met current criteria: that is, they must have been physically constructed and maintained, and usable by vehicle. I did not count “wash-bottom” routes that regularly flooded and changed course. I read historical accounts of the region to try to determine where people were actually driving vehicles.

Owing to incomplete map coverage, not all regions of southern Utah could be mapped with the same accuracy. I focused on several areas: the Dirty Devil River country, the White Canyon complex on Cedar Mesa, and the Kaiparowits Plateau. All are areas hotly contested in the current Utah BLM wilderness battle. After I completed my work, President Clinton established the 1.7-million-acre Grand Staircase-Escalante National Monument, which encompasses nearly all of the Kaiparowits Plateau. Although Wilderness designations are still needed to solidify protection for the Kaiparowits, I will focus in this article on the Dirty Devil and White Canyon areas.

Utah's Dirty Devil and White Canyon Areas: Fifty Years of Shrinking Wilderness



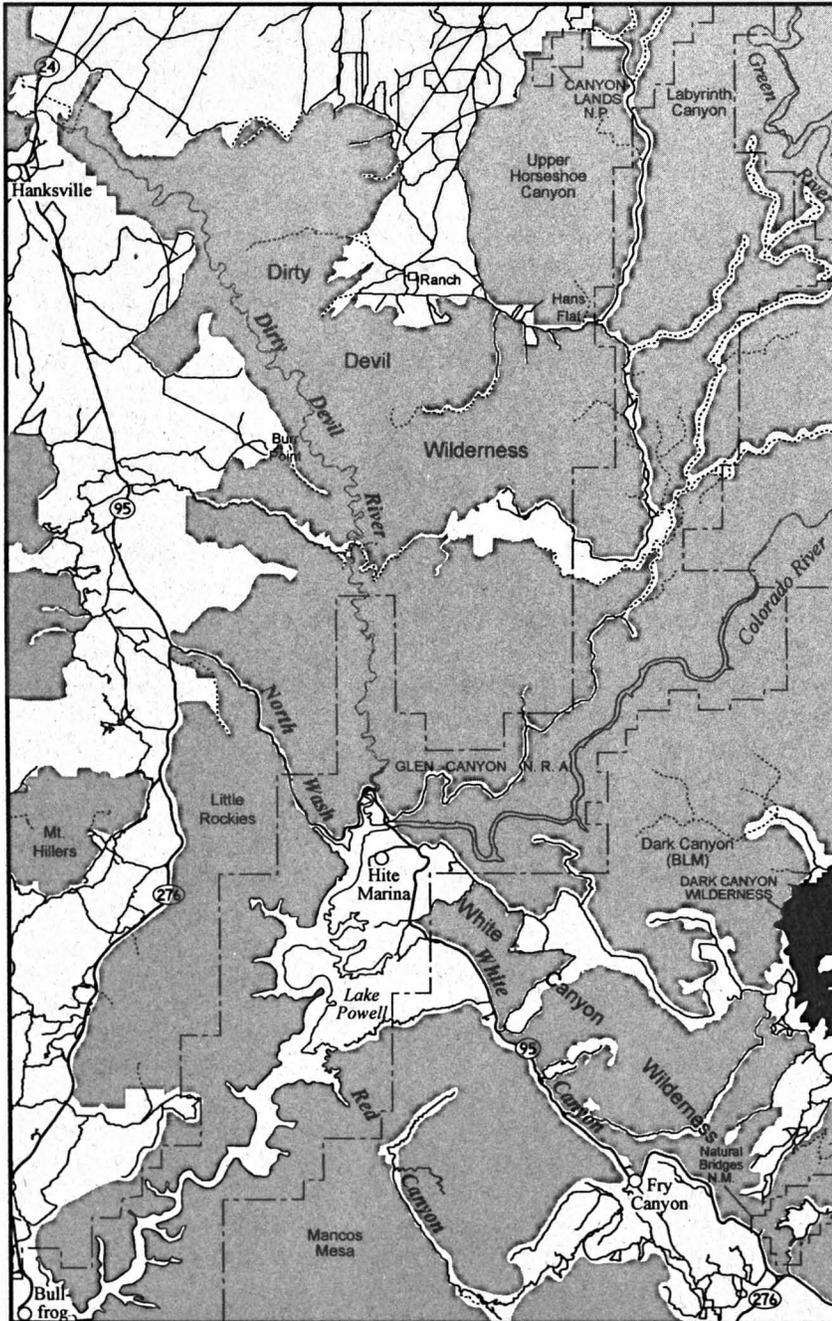
1945—WILDERNESS UNBROKEN

At the close of World War Two, few roads penetrated the great wilderness that lay along the Colorado River in southern Utah. A rough track led down North Wash from Hanksville toward the historic hamlet of Hite. On the other side of the river, a challenging road led west from Blanding to Natural Bridges National Monument and part way down White Canyon, following sandstone benches above the canyon. Automobiles had made it down to the Colorado as early as 1933, but neither route could properly be called a road. Not until 1946 would the routes be completed and joined via a ferry crossing at the river.

Ranchers trailed cattle throughout this region, using routes that later would be upgraded during the mining boom. These included a route leading east and south from the Ekker ranch in Robbers Roost past Hans Flat and into what is now Canyonlands National Park. Red Canyon was also used for this purpose and probably saw occasional vehicle use. The BLM maps also showed a primitive route leading part way to Burr Point. But away from these few roads and tracks lay an unbroken wilderness. What a country it must have been!

The post-war uranium boom changed this wilderness region forever. Government subsidies to uranium prospectors and producers set off a frenzy of exploration throughout the region. The Atomic Energy Commission contracted out a thousand miles of road construction across southern Utah, and any miner with the money to hire a 'dozer could blade in a road anywhere he chose.

Subsequent oil and uranium booms in the 1970s and 80s reopened and extended these old uranium roads. The paving of Utah Route 95, scene of much (fictional) action in Edward Abbey's *The Monkey Wrench Gang*, was completed in 1976. And the filling of Lake Powell from 1963 through 1975 squandered 160,000 acres of the finest wilderness on the planet.



Map prepared by Frederick H. Swanson with technical assistance from Ed Madej of Desktop Assistance, Inc.'s GIS Program, Suite C-2, 324 Fuller Ave., Helena, MT 59601 (Email: info@desktop.org). For more information, write to the Southern Utah Wilderness Alliance, 1471 South 1100 East, Salt Lake City, Utah 84105. ©1996 by Fred Swanson. Map preparation made possible by a grant from the Maki Foundation.

Sources of Information for Utah Time-Series Maps

My best set of old maps were published by the Utah office of the US Grazing Service during the years 1939 through 1946, when the agency became the Bureau of Land Management. The Utah State Office of the BLM no longer keeps copies of these old maps. The BLM published a detailed atlas of "recreation" maps in 1974-1975 which served as the basis for my 1975 benchmark (not shown here).

The US Geological Survey published a wonderful set of topographic maps of southern Utah from 1951 through 1963 at a scale of 1:62,500. The USGS also published many individual maps of the canyon lands region for various geological and mineral studies, but most of these were based on the same 15-minute topographical maps.

The Utah state highway department publishes road maps at a county level going back as far as the 1930s, but these were not detailed enough to show primitive roads.

Several federal agencies (USGS, Soil Conservation Service, BLM, Army Corps of Engineers) contracted out aerial surveys of southern Utah starting in the 1940s. Until the 1970s, however, these surveys were scattered and of uneven quality. Photos are available through the EROS data center in Sioux Falls, SD. These were useful for spot-checking individual areas but did not cover all the ground I wanted to map.

Oil and gas drilling records at the State of Utah's Department of Natural Resources were quite useful. Their records showed individual wells drilled as far back as the turn of the century. Where my maps showed a spur road dead-ending at a well site, I inferred that the road was built about the same time as the well was put in.

The US Environmental Protection Agency has recently been offering sets of matched satellite imagery (from various LANDSAT projects) in triplicate, showing broad landscape changes from about 1975 to the present. The imagery started too late to be of much use in my study, but it could be useful for studies of more recent landscape change such as clearcutting. The images cover a broad area, but are quite expensive.

If you want to do similar time-series mapping in your state, spend some time in the archives section of the nearest federal depository library. The staff at the University of Utah's Marriott Library, especially its Special Collections-Western Americana department, were especially helpful.

1995 — WILDERNESS FRAGMENTED

The 1995 map shows the remaining wild lands in the Dirty Devil, White Canyon and Glen Canyon areas. These lands make up the Utah Wilderness Coalition proposal, part of its 5.7-million-acre statewide proposal for BLM lands.

The story told by the 1995 map is one of fragmentation. More than half of the original wilderness acreage remains, but highways, backcountry roads, and Lake Powell have split what was once a single roadless area into a dozen separate units. The Glen Canyon National Recreation Area, although narrow, knits together many of the BLM units and provides an essential undeveloped core to the region. This core is especially critical as a refuge for Desert Bighorn Sheep, which roam south out of the NRA into the White Canyon benchlands.

This fragmentation has serious implications not only for large mammals, but also for other resources in the region. The outstanding archaeological resources found in the White Canyon area are in peril from pothunters owing to easy road access. Ecologists have documented how exotic weeds such as cheatgrass use road corridors to spread into native grasslands. The road network also is an infrastructure waiting to be used by those expecting another mineral boom. Clearly, we cannot protect the remaining wilderness in this region without addressing how road corridors will be used.

CONCLUSIONS

As I completed these maps, a phrase of Edward Abbey's (the source of which I can't recall) kept running through my mind: "though much has been lost, much remains." Despite five decades of exploitation, there is still a magnificent wilderness in this region. But Abbey's phrase also works in reverse: though much remains, we must never forget what has been lost.

One of the most appealing aspects of The Wildlands Project is its call to begin restoring unity to wild regions. Here, again, time series mapping is of use. Just fifty years ago, the Dirty Devil-White Canyon area was a small part of a vast roadless region. In fighting to protect the remaining chunks of wilderness in this region, we need to remind the public again and again what it looked like just a generation ago.

FURTHER WORK

This project focused on one small part of southern Utah's canyon lands. Given time, I hope to complete a similar set of maps for the entire canyon lands region. The Wildlands Project is undertaking an ambitious mapping project in Utah, and the detailed GIS database they plan to assemble could be used to produce more maps such as these.

I believe that time-series mapping has the potential to arouse support from people who traditionally have stayed on the sidelines of the wilderness debate. Many people outside of our camp have had the experience of losing a favorite hunting ground, fishing spot, or camping area to development. Nostalgia for the lost places of childhood is a powerful human emotion. I hope that my maps will rouse more people to action. Others, too, can adapt this technique to their favorite areas, and add one more tool to the kit we need to save the disappearing wild places. ■

Frederick H. Swanson lives in Salt Lake City, Utah. He was the principal editor of Wilderness at the Edge, published by the Utah Wilderness Coalition. He is often confused with Frederick J. Swanson, a forest geologist who is much taller.

North American Butterfly Association

by Jeffrey Glassberg

A MAJOR PURPOSE of the North American Butterfly Association (NABA) is to encourage people to enjoy butterflies—to have fun. Some people love butterfly gardening, others focus on photography or pursue a big list, while still others relax by observing butterflies at play. NABA tries to help people derive greater pleasure from all of these activities. Obviously, none of this pleasure would be possible without the butterflies themselves. Thus, by necessity, we become butterfly conservationists. We are taking the lead in an effort to ensure the survival of the Monarch overwintering sites in Mexico, and in other efforts to conserve butterflies in North America.

We believe that the most effective way we can contribute to assuring a quality environment for our children's future is by helping to create a large constituency interested in natural history in general, and butterflies in particular. Research has shown that an extremely high percentage of the public has positive feelings about butterflies. Our hope is that once we have shown people how wonderful are the butterflies and plants around them, they will become a force for butterfly and plant conservation. Many of our members become drawn to butterflies through gardening activities, and thus become new converts to the conservation movement.

NABA is a 3 year old, not-for-profit association that now has about 2500 members. NABA is focused on the non-consumptive enjoyment of butterflies and their conservation.

Our quarterly magazine, *American Butterflies*, has color photos and articles by experts that provide information needed for successful butterfly gardening and identification. Recent articles

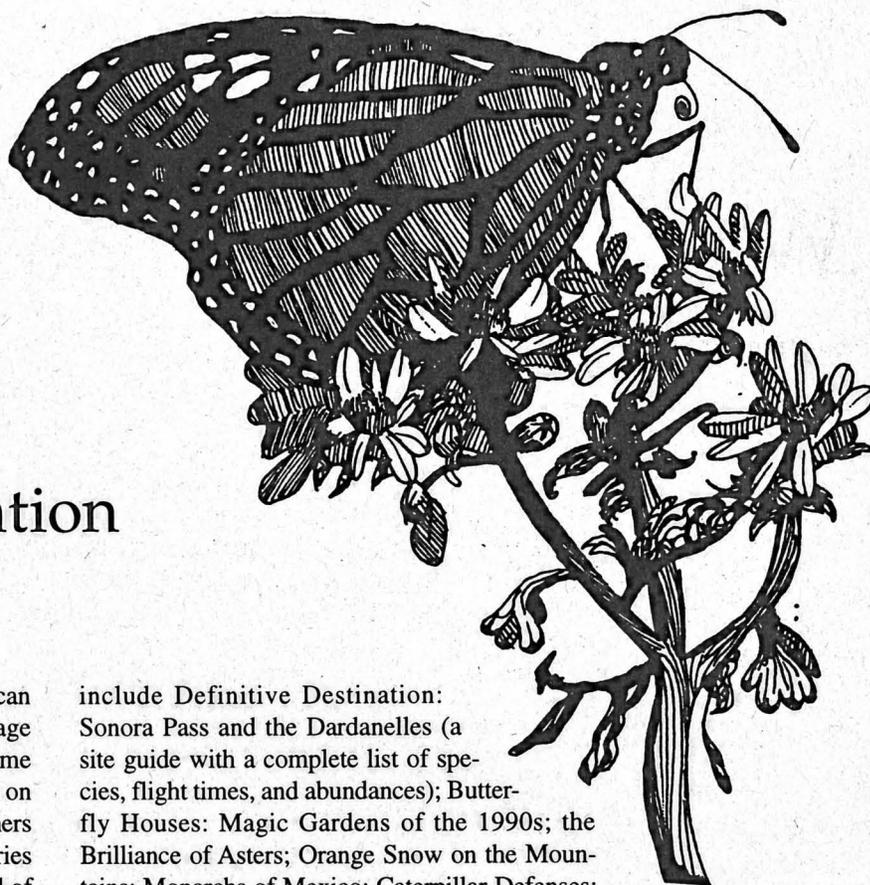
include *Definitive Destination: Sonora Pass and the Dardanelles* (a site guide with a complete list of species, flight times, and abundances); *Butterfly Houses: Magic Gardens of the 1990s*; the *Brilliance of Asters*; *Orange Snow on the Mountains: Monarchs of Mexico*; *Caterpillar Defenses*; *Butterfly Gardening with a Northern Slant*.

Two newsletters (each twice/year), *Butterfly Garden News* and *The Anglewing* (focusing on field notes), keep members apprised of the latest developments in the world of butterflies. The NABA 4th of July Butterfly Counts (held throughout North America), provide a fun way for beginners and experts alike to help measure the health of the environment by taking its butterfly pulse. This year about 400 such counts will be held. Our biennial meetings provide other ways for butterfly watchers to become active in butterfly conservation.

About a year ago, NABA began to charter chapters and there are now 13 local chapters spread across the continent. These local groups are increasing awareness about butterflies and how we can create a more natural environment, even in our suburban and urban areas, that is more butterfly-friendly.

Individual membership in NABA is \$25/year; family membership is \$35/year; and institutional membership (includes the 4th of July Count Report) is \$45. To join, send a check (in US dollars), payable to NABA, 4 Delaware Rd., Morristown, NJ 07960, or write to this address for an information flyer that contains a membership application form. ■

Jeffrey Glassberg is President of the North American Butterfly Association.



Way of Wild Journeying

by Alan Drengson

Since childhood I have been a wild journeyer. Over the years my sense for the wild and wilderness has undergone a number of significant changes. I now realize that these changes represent the four stages of development that have crystallized into the Way of Wild Journeying in the West. These four stages, which can be identified in the literature of wilderness and the wild, are as follows:

1. Becoming aware of our identity as humans, defined by our separateness from the wild and wilderness (we define our human ego-selves);
2. Becoming aware that our identity defined by separateness alienates us from wild Nature, which is both within us and without;
3. Awareness that this alienation is intensified by being placeless (EuroAmericans, especially), leading us to seek reunion with the wild through journeying in the wilderness;
4. The realization that wild journeying is a practice through which to maintain unity so that our will flourishes in harmony with other beings. (We realize our ecological Self.)

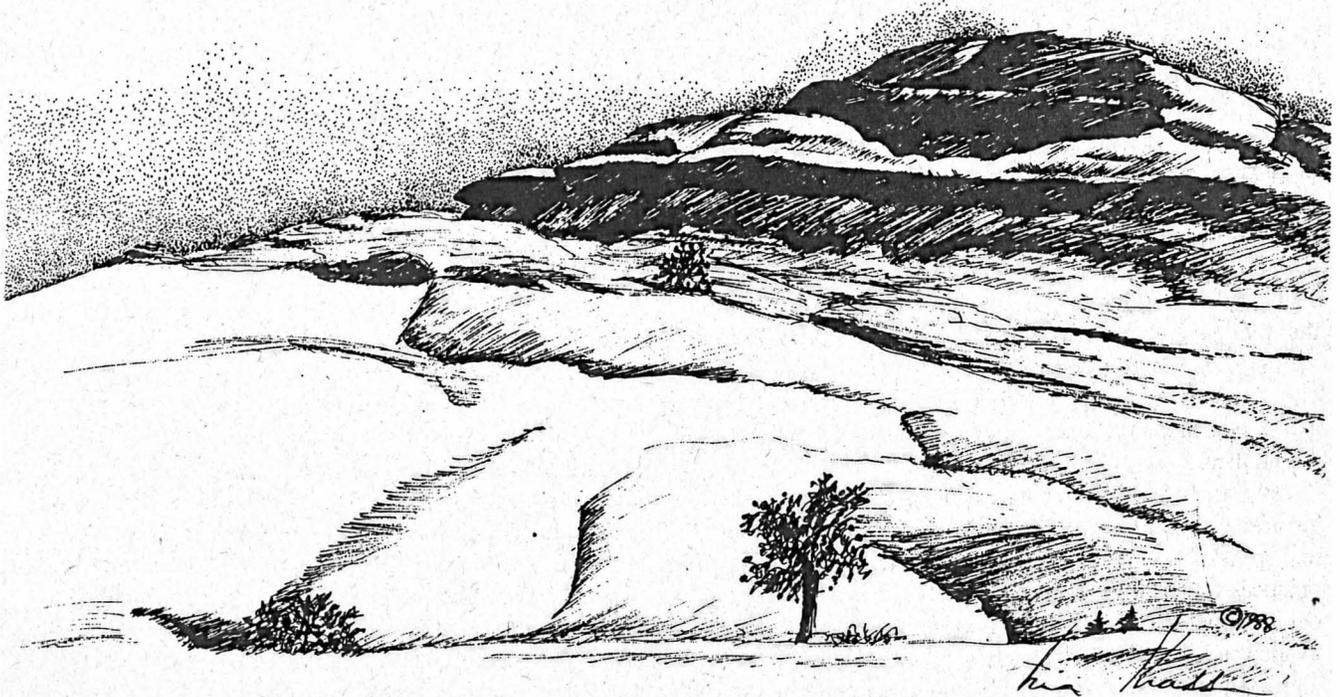
I will discuss the historical narrative development of each of these. For purposes of this essay, I take "wilderness" to refer to a place or an area, whereas by the "wild" I mean the powers and energies found in places, other beings, and ourselves. Wild energies are spontaneous, open and creative. A domestic animal has wild energy, but rarely shows it, since it lives most of the time conditioned and controlled. Urban humans also live under confined conditions, and so find it difficult to realize their wild nature and larger ecological Self, unless they journey to the wilderness to rediscover the wild outside and then inside. Let us now consider the four stages.

The first, becoming aware of our identity as humans defined by our differences from the wild, is represented in Emerson's essay "Nature." Emerson recognizes the degree to which spirit (wild power) infuses Nature. For him this reflects the spirit that is in humans. This, in turn, is projected by a spirit that transcends Nature. Emerson's transcendentalist perspective, then, emphasizes our difference from Nature; for transcendentalists, if at times we feel one with Nature, this is because our body is of Nature, but dependent on the greater spiritual reality beyond (God or the Absolute).

Historically, this estrangement led to deeper unity for many, for it set in motion a dialectical process in which the individual moves to conscious reconciliation and reconnection with Nature. In earlier times Christian metaphysics as a universal European doctrine separated humans from Nature. Modernism retains this dichotomy in its reaction against Christianity, for it holds onto the separation of soul from the world and makes soul merely a ghost in the machine. Late Medieval Christianity is otherworldly; for it, the sacred lies outside of Earth. Modernism is this-worldly; for it, there is no sacred.

The second stage of the wild way is expressed in Thoreau's essay "Walking." Thoreau appreciates Emerson's work, but recognizes that its spiritual culture is European. The sense of division from Nature, and hence nostalgic longing for a beyond, in Emerson's transcendentalism arises from his lack of literary and experiential grounding in the wilderness of North America. His spiritual forebears are mostly Western European. Thoreau sees that

The self purification of wild journeying enables us to come home to live with deepening roots in our places without destroying the habitats of other beings.



modern European literature, and especially English literature, does not know or reflect the way wild Nature is in itself. This is partly because most of Europe has been controlled, mapped, and managed. Our ability to see Nature clearly as it is depends on our access to wilderness and to our own inner wild nature. When we are ecologically aware, we know that we need wild Nature to help us realize our own wholeness.

Sometimes we must leave a place and return in order to know it fully. Thoreau's way to wholeness (his prescription) is to walk every day for at least four hours. He says that his fortune was to be in Concord, where he could just "head West" into the wild. In the wild he awakens to an aesthetic ethic. The spiritual power of places is expressed in their aesthetic wholeness—all beautiful, no weeds, no ugliness.

Thoreau notes the importance of myths and stories for giving us a deep sense of Nature and the Cosmos as an encompassing order and beauty. Myths are created where Cosmos and cultures meet in specific places. He appreciates the metaphoric importance of words like "saunter." He says "to saunter" (in Middle English) originally meant to go in search of the holy (whole) land. A saunterer is like a knight (which implies chivalry—a code of respect and honor) and a pilgrim (which implies religious aspiration) seeking the holy land (wellness and completeness). Thoreau assures us that sauntering does not require going to the old world, for knights of walking can find the holy land, the sacred places, in North America.

The third stage in the way of wild journeying is evident in John Muir's life and writings. While Thoreau describes the spiritual aspects of sauntering, Muir realizes them by being wholly awake in the sacred land. What this means can be explained by further considering the etymology of "to saunter." Its root means

to muse or meditate. Thoreau saw wilderness sauntering as a meditation or musing through which we can realize our own wild nature. Muir's wild meditations revealed that to practice wild journeying means just being in the holy land; wilderness is the sacred manifested here and now.

As civilized, domesticated people, we are like cattle to Thoreau, and machines to Muir. We act out the modern metaphor of the world and body as machines. To embrace a metaphor only half consciously embeds us in other analogies and their forms of action. We begin to get machine-like ourselves, hiding our original wild vitality. We create artificial machine-city environments, which conceal wildness. The more hidden the wild is from and in us, the more numb and dead we become.

Persons who have civilized "knowledge" from dusty books and newspapers, Thoreau says, do not know the world, even though they believe that reading gives them some special knowledge. What they know in this way is mostly second hand. Knowledge must be grounded in experience.

Muir saw that as we recover our wild self by sauntering in the sacred present, we become deeply identified with the places we are coming to know. We become lovers and defenders of them.

The fourth stage in the development of the way of wild journeying as a sacred art draws together when Arne Naess, Willi Unsoeld, and others articulate the Gandhian dimensions of modesty and nonviolence in climbing mountains and defending wilderness. This connects with Thoreau, for Gandhi learned from Thoreau's writings on civil disobedience. The fourth stage also crystallizes the lessons learned from comparative philosophy and Buddhist and Taoist practices which Gary Snyder, Dolores LaChapelle, and others have articulated in English. Hence, we realize that our own original discovery of the way

of wild journeying resonates with Taoism, Zen, the Laung Gompā walking of Tibet, the marathon walking of Japan's Mt. Hiei monks, and the vision quests and walkabouts of aboriginal peoples. Wild journeying is akin to the spiritual journeying of shamanism, which is the source of primal narratives, the ground from which deep meanings arise.

When we walk in the sacred space of wildness, we journey into primal spiritual practices that predate agriculture. The earliest wanderers found when rhythmically walking that they could harmonize themselves through breathing and thereby unify themselves with the spiritual powers of Nature. Out of this harmony, spontaneous visions and stories emerge as the pilgrims respond creatively to the world around and within them.

We are here describing the maturing in North America of a spiritual discipline (a Way) indigenously rooted in the primal spirit of its wild places. It has thematic resonances with practices found in Europe and Asia, but many of these died out in Europe because land and mind were brought under cultivation and control, except for some high mountain areas. Wild journeying reemerges from time to time, as in pilgrimages, a-viking,* and mountain climbing in the Alps; but, for people of European stock, such journeying first flowers fully in the wilds of the new world.

By journeying through all four stages, we come to consciously realize that the flourishing of each being enlarges and enlightens us. Humans are not alone in conferring value on the world. We are of value ourselves, but we also are part of everything else and each wild being has intrinsic self value. In contrast, manufactured things have mostly instrumental and ego value. We realize that the self (ego) does not confirm other beings; they confirm it through the larger ecological Self. Our whole self is the ecological Self. The circle is completed when we take this realization into daily life in everything we do, even in the city, usually seen as opposite to the wild but now seen as a complement to it.

The self-purification of wild journeying enables us to come home to live with deepening roots in our places without destroying the habitats of other beings. From this rootedness, diverse cultures emerge, reflecting the diversity of nature's creativeness. The Art or Way of Wild Journeying, then, is both practice and end. Knowing this, we teach it to our children: how to practice it in daily life, how to keep the wild free and alive, and how to live so that wilderness flourishes.

PRACTICING WILD JOURNEYING

If we want to keep the wild alive within and around us, we should practice wild journeying. To learn this art, focus on basics: walking, breathing, and harmonizing with the aesthetics of the wild. The most direct means to this harmony is through unifying our striding and breathing.

The breathing of beginners is not harmonized. They walk erratically, talk a lot, breathe in a shallow, ragged way, stop often. This is not wild meditational walking. There must be focus and concentration for sustained periods. Many forms of spiritual practice, such as Yoga, Taoism, Tantra, and Zen, use both sound and breathing as means of unification.

The easiest approach in learning or recalling is to breathe in a fully conscious way while walking at a set pace. The aim is to regularize and deepen our breathing until it is in tune with our body movements. This can be taught effectively by focusing on exhaling.

Most of us breathe shallowly and do not fully exhale. If we focus on exhaling completely with each step (or with each two, or three, depending on our speed and the slope), we can bring our movements into harmony with the lay of the land. We breathe in whole wilderness air, and exhale our mental and physical impurities with each rhythmic step. This breathing and rhythmic movement attune us to be more open and receptive. We relax into our deeper selves as awareness expands; we become transparent to the wild.

Practice full breathing out with audible exhalation through the mouth, followed by relaxed deep inhalation through the nose. Vocalization can help set a regular pace. Each exhalation can be vocalized as "HO," making our breathing like a chant. Sustained practice for hours at a time is best. Prolonged practice of harmonious breathing richly oxygenates the body and is physically and psychologically healing.

CONCLUSION

Practicing wild journeying we unify ourselves by movement and breathing. We no longer search for paradise outside this world, but find it in our daily lives. We appreciate core spiritual disciplines not as theories but as concrete realizations of the ecological Self. Thus, wild journeying is religious in the original sense of the term, which means binding back to the source. To be separated from this in urban life is to suffer discord, conflict, and sorrow. Wilderness preservation is critical to the preservation and realization of whole humans. ■

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*which in Old Norse means to go journeying to find the spiritual power of nature

Addressing Population and Immigration Bioregionally

by David Wheeler

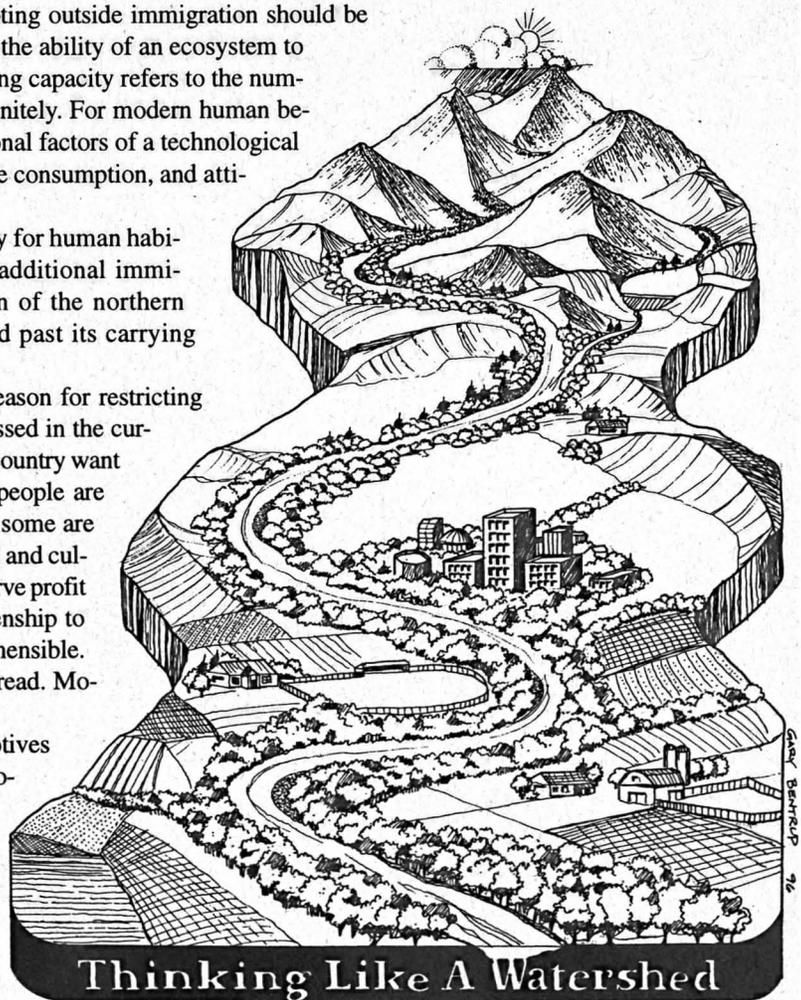
Restriction of outside immigration into the ecosystems of Turtle Island (North America) is clearly necessary. Our ecosystems (or "bioregions") are already overtaxed by too many people, overuse of resources, and industrial pollution. It is true that conditions in many poorer countries are far worse than here, but emigration is no longer a solution to these problems. Mass emigration merely puts off the need for a solution, while degrading conditions in the receiving country.

The key criterion in making decisions about accepting outside immigration should be the concept of "carrying capacity." This is a measure of the ability of an ecosystem to support a given species. For most animal species, carrying capacity refers to the number of individuals a given ecosystem can support indefinitely. For modern human beings, carrying capacity must also incorporate the additional factors of a technological culture, including modes of production utilized, resource consumption, and attitudes toward the land.

If an ecosystem is already past its carrying capacity for human habitation, then it should not be called upon to receive additional immigrants from other areas. With the *possible* exception of the northern tundras, every ecosystem in North America is loaded past its carrying capacity for human beings.

Recognizing carrying capacity limits is the best reason for restricting immigration and underlies many of the concerns expressed in the current political debate. However, the reasons people in this country want to restrict immigration are many and complex. Some people are concerned about social conditions in the biggest cities; some are worried about wage levels. Others aim to preserve racial and cultural purity in this country, while still others want to preserve profit advantage or privilege. The reasons for opposing citizenship to outsiders are not always admirable, and are often reprehensible. This makes immigration reform dangerous ground to tread. Motive is very important in this debate.

One way to winnow out true concern from baser motives would be to speak of immigration control in terms of ecosystems or bioregions rather than in terms of national boundaries. Carrying capacity is first and foremost a biological measure. Bioregions are defined natural ecosystems within which carrying capacity can be determined.



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A good example is the Florida peninsula. Florida is overpopulated and over-developed, and is rapidly becoming more so. Therefore, inhabitants have become alarmed about the influx of refugees from Haiti and Cuba. However, the greatest influx of immigrants is coming into the Florida bioregion from New York. It would be perfectly legitimate for Florida to close its southern border to stem the overcrowding of the peninsula, but only when it closes its northern border, too.

Using national borders for immigration control obscures motives and muddies the debate. Perhaps it would help for committed activists to renounce political boundaries altogether and recognize only natural bioregion boundaries. This would make it clear that our commitment is to the sustainability of ecosystems rather than to national interests.

Right now our national borders are selective filters. Our leaders want to bring the wealth and the resources of the world in and keep the trouble of the world out. But people in other countries know where the fruits of their labor are going—and the most adventurous, most enterprising, and the most desperate of them want to follow.

Throughout the immigration debate there runs an assumption that national boundaries delineate responsibility for problems—"theirs" and "ours." But history proves otherwise. The effects of colonialization and imperialism by the industrialized countries have been felt the world over. We, the privileged, have had a hand in creating the problems the people of the poor countries are trying to flee. Their problems are largely a result of our accumulation of wealth.

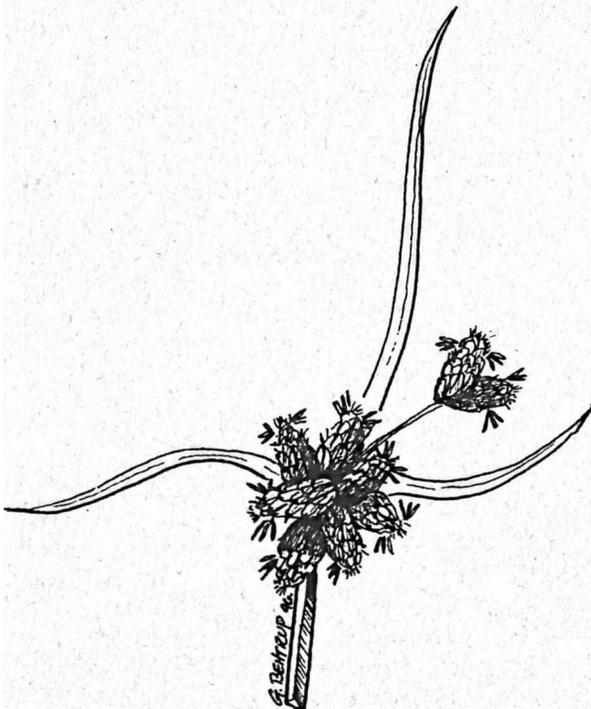
We are also still helping to *maintain* those problems. We support dictators and unprincipled elites in poor countries because of short-term business or military considerations. We drain those countries of resources and exploit their people to maintain our own living standards.

The infamous *maquiladoras*, the foreign-owned factories clustered along the US border in Mexico, are a case in point. The *maquiladoras* depend on the border for their existence. The enforced border allows the companies to realize huge profits by producing goods at low Mexican wages on one side and selling them for big US dollars on the other.

It is unconscionable for us to refuse passage to the people of other countries without accepting our share of the responsibility in creating and maintaining the problems that overwhelm them in their own bioregions. To justifiably refuse people entrance into our bioregions, we must be involved in helping them find viable solutions at home.

This is *realpolitik* as much as it is a question of morality. It is in our own interest to help bring poor countries to sustainability: to dispense birth control tools and information; to promote local food production, rather than food export; to encourage education; to empower women; to redistribute land and power. The world is small today. There are no more frontiers. The only way to stop the immigration flood is to ensure sustainability at home.

We also need to take responsibility for our own house. While people in poorer regions try to emigrate to escape the problems overshooting carrying capacity brings, our strategy is to import resources and labor from other regions while we continue to overburden our own. In this way we maintain an artificially high standard of living in the face of global environmental and social deterioration.



In terms of energy and resource consumption, the United States is a "Land of the Giants." The best thing we can do to restore sustainability to the world is to lower the populations of our own regions, reduce our consumption, and simplify our production methods to stay within limits of our own bioregions.

We must be willing to limit our own ecological impacts if we are going to require that others do so. As well as helping conditions in our own bioregions, this would free up resources so other people can use them locally to attain sustainability for themselves.

At present we offer the world a shining example of unbridled consumption. Seeing our beacon, people of poorer countries follow it here to get their share. If we begin trying to reform our own habits, we could become a powerful force encouraging other people toward sustainability, rather than tempting them toward the American shopping spree.

Saying that immigration restriction is necessary is saying that the problems of poor third world nations are no longer isolated, local problems. We are saying that we, too, are feeling the effects of those problems. This should lead us to work together, cooperatively, to find solutions to these problems. It is true that solutions to regional carrying capacity problems can only be found in the regions in which they originate; but when we turn people away from our borders, we should be willing to take responsibility for our own regions and to help those people find solutions in theirs.

Immigration reform has become a hot political issue within the past year, largely as a result of Pat Buchanan's campaign for the Republican presidential nomination. Previously, decisions about immigration were kept out of the public eye and were the domain of a small coterie of powerful people in Washington, insulated and subject to the whim of any special interest with the money to attract their attention. The situation was such that even some supposedly "liberal" politicians had hired illegal aliens as nannies or domestic help in their homes.

However despicable his motivations, Pat Buchanan has been a great one for blowing the lid off Washington's dirty little secrets. He has helped make immigration reform a public issue—but for all the wrong reasons. He has played upon justifiable fears about economic security held by lower class white people to awaken their latent racism. He has portrayed poor people from other countries, victims themselves, as the cause of problems in this country. And he has ridiculed concern for wild species or the land as inconsequential and irrelevant.

With the likes of Buchanan leading the debate on "immigration reform" in Washington, the air is full of rhetoric about "the national interest" and "economic well-being of Americans." Little is said about ways to decrease human impacts on the land; the debate is about differing strategies to maintain privilege. Even some environmental groups urging population control have been caught in this immigration mind trap.

The sequence goes something like this: Seeing that overpopulation is a major environmental problem, even in the industrialized United States, some environmental groups have cast around for solutions. Seeing that a large part of the United States' population growth is a result of immigration, the groups have called for cuts in immigration to this country—cutting immigration becomes, to their minds, a goal in itself. They look about for allies to help achieve this goal and for policy experts who can communicate the importance of immigration reform to the general public. On the theory that "an opponent of unlimited immigration is a friend of mine," these groups join in coalitions with questionable organizations. They begin to associate with "experts" who are well-known or who have academic credentials, but who also have questionable motives.

This process yields two results, neither of them beneficial. Some environmental groups may begin to be associated with racist, cultural purity elements of the political right. They may adopt some of the same attitudes and rhetoric or they may, simply because of their association, be "tarred with the same brush." Other environmental groups, seeing this take place, decide immigration reduction—and perhaps population reduction as well—are right-wing issues not worthy of support.

Two criteria can help draw a distinction between responsible opponents of unlimited immigration and those interested in social and economic manipulation. First, *why* is a group advocating limits on immigration? Is it for the sake of the land? Probing through a group's rhetoric reveals their driving motivations. Second, *who* would carry out and benefit from their policies? Would their suggested policies be hierarchical, imposed by the governing elites upon the "masses"? Do their policies offer solutions to problems of poverty and overcrowding, or do they work to prevent such solutions? Are they designed to change power relationships, or to protect the *status quo*?

But the most important factor right now is the context of the debate. Influencing the numbers of national immigration quotas is far less important than establishing *why* limiting immigration is important to the future of this land. It is not time to argue over numbers; it is time to establish clearly that the needs of the Earth are what should determine regional populations. If we get caught up in the debate as it is currently defined, we will lose. We can do the most good by focusing our energies on redefining the *terms* of the debate—bringing it back to the land. To make any lasting gains, we must remember that we are not just out to change national policies; we are out to change ways of thinking—a far more complex and difficult task. ■

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A Politically Pragmatic Counterpoint

by Ed Lytwak

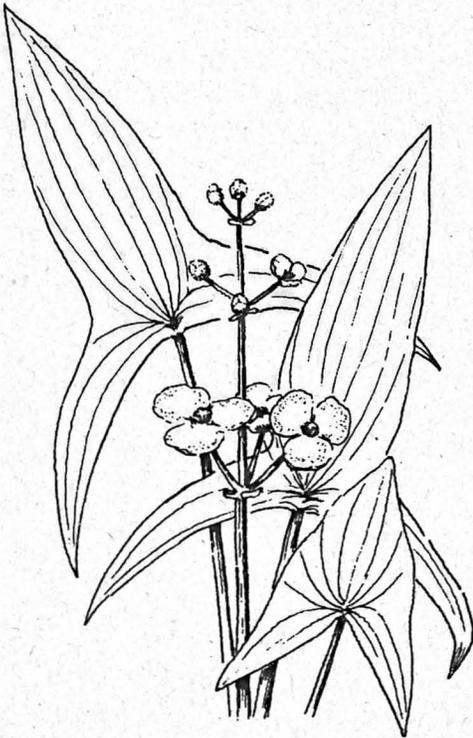
THE INITIAL PARAGRAPHS of David Wheeler's "Addressing Population and Immigration Bioregionally" succinctly outline the ethical and ecological context of population growth in and immigration to Turtle Island (North America). The necessity for limiting human migration into North America is based on the fact that it, like virtually every continent, nation, and bioregion, is already overpopulated. In already overpopulated regions, additional immigration-driven population growth will not help solve ecological or social problems of either sending or receiving bioregions or nations.

Given the need to restrict immigration, Wheeler advocates an ecological perspective for answering the two key questions in determining an equitable immigration policy: "how many?" and "who?" Although using the ecological criterion of bioregional carrying capacity is fundamentally sound, Wheeler acknowledges that determining *human* carrying capacity entails introducing the complications inherent in the human economy.

The dilemma at the heart of determining *human* carrying capacity involves the unsustainable "modes of production utilized" by the current human economy (global capitalism), which is organized in a fundamentally anti-ecological manner; i.e., it treats the larger (supporting) natural economy (the environment) as subordinate to itself. This creates a number of problems—overconsumption, depletion of natural resources, environmental degradation—that both drive global migration and make some restriction of immigration necessary.

Another set of problems associated with determining bioregional carrying capacity for humans is related to the expropriation of carrying capacity. The concept of an "ecological footprint" (as developed by Rees and Wackernagel) makes it clear that humans, unlike other animals, attain their carrying capacity from ecosystems far removed (in both space and time) from where they live. Although "bioregions are defined natural ecosystems within which carrying capacity can be determined," under current conditions of an increasingly integrated global economy and expanding trade, specifically determining bioregional or even national carrying capacity for humans is highly problematic, if not impossible.

A third set of problems, identified by Wheeler, is related to political motivations behind and practical means of restricting immigration. Ultimately, restrictions on immigration rest on political decisions and currently occur within the context of nation states or their agents, the United Nations. Even if bioregional carrying capacity were the primary criterion for restricting immigration, national governments would still be necessary in the absence of a bioregional political system for regulating and enforcing restrictions. Ecologically, stopping population growth, including where necessary restricting immigration, is a practical problem whose solution cannot wait for an indefinite future. That is, we must not wait until we have reorganized our governments along bioregional lines before taking the steps necessary to stop human population growth.



Arrowhead (*Sagittaria latifolia*) by Gary Bentrup

In the US, it is important to not equate present political leaders (and their motives) with the political institutions of American democracy. Moreover, current immigration policies in the US, far from substantially restricting the influx, promote historically high levels of immigration. The root of the immigration problem is not national boundaries, but the agendas of the particular groups of humans in power, including the promotion of globalism (the free movement of people, commodities, and capital) and unsustainable growth of the human economic enterprise. Nevertheless, the stability and democracy of the US national political system offers the chance for equitably restricting human migration both inter- and intra-nationally, as well as implementing the long-term changes necessary to move toward an ecological human economy.

Further complications revolve around what it means for a bioregion or nation to be overpopulated. A bioregion or nation is overpopulated if it must import carrying capacity from other regions or deplete its own natural capital, including past (fossil) and future, to support its human population. Thus, when a bioregion or nation is overpopulated, it is also in the long run reducing the carrying capacity of other regions. With virtually every bioregion and nation already overpopulated, consequent migration pressures raise the thorny "follow the wealth" question: if a nation uses, imports, or trades for the carrying capacity of another nation or region and thus reduces the carrying capacity of that region, do the humans from that region then have the "right" to move to (take advantage of the added carrying capacity of) the exploiting nation?

Ideally, trade relationships would occur only under conditions where the carrying capacity of both regions is thereby enhanced. Unfortunately, modern global trade generally gives unfair advantage to the more powerful trading partner(s), mainly to the benefit of property and capital owning elites (especially corporations), and is based on unsustainably increasing gross throughput—a zero-sum game where additions to the carrying capacity of one nation come largely at

the expense of another's. Determining criteria for immigration restriction requires recognizing how consumption drives global migration pressures.

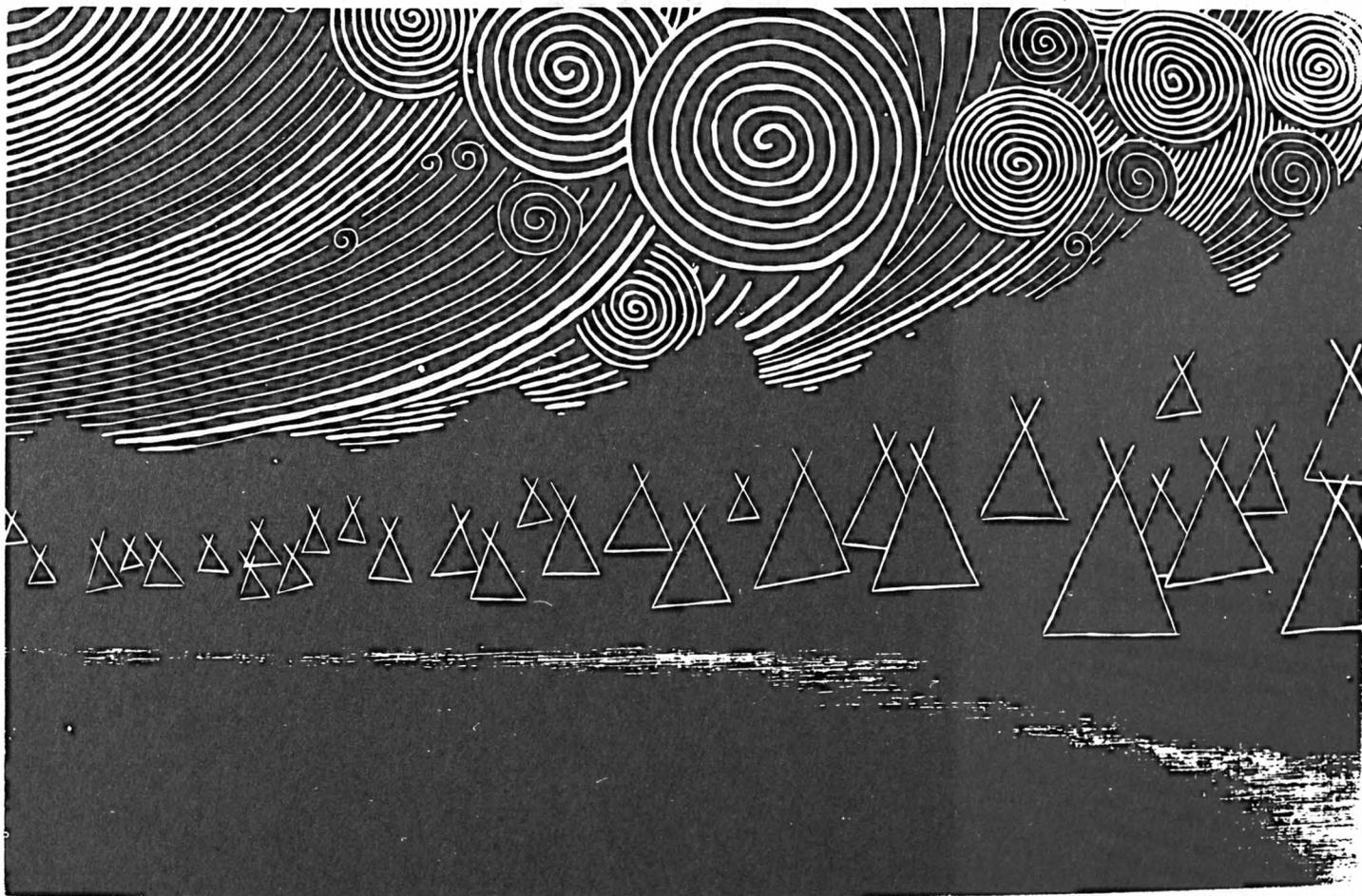
In the short term, "replacement level" immigration limits are ecologically justified, or as Wheeler states, "If an ecosystem is already past its carrying capacity for human habitation, then it should not be called on to receive additional immigrants from other areas." This brings up, however, another aspect of the follow the wealth question, that of lifeboat ethics: if one bioregion or nation has a higher carrying capacity, does it have an obligation to accept immigrants from bioregions or nations whose carrying capacity has been diminished (particularly when a poor nation's loss was partly the result of unequal trade relationships)?

The conflicts between immigration restriction and lifeboat ethics are further complicated by asking, does emigration reduce pressures on the sending countries or, as Virginia Abernethy contends, actually promote added population growth, by allowing those nations to deny limits and avoid addressing their problems? Does it drain away some of the most talented and motivated people from the sending country? There are also the ethical questions about large numbers of people moving from relatively low-consumption countries to the highest consumption country on the planet, and about the right and responsibility of a nation or bioregion's people to protect the environment (all other species) in that bioregion or nation (an ecological territorial imperative?).

One reason that the immigration issue is so difficult to address from a human political or ethical perspective is that it involves often conflicting principles. Wheeler acknowledges this when he questions the political motives of those who would restrict immigration and suggests the consequent advantages of using an ecological perspective. As Maurice King* would say, "ecological constraints take no account of human ethics," or political motives for that matter.

The root of the immigration problem is not national boundaries, but the agendas of the particular groups of humans in power, including the promotion of globalism and unsustainable growth of the human economic enterprise.

*Dr. King, a former fellow at the Institute of Epidemiology and Health Services Research, University of Leeds (UK), is an authority on health problems of the developing world including those related to overpopulation and rapid population growth.



Relying on purely ecological criteria would simplify things if it weren't for the ecological principle that says all things are connected, and the inherent difficulties in separating human ethical questions from ecological ones. While Wheeler cannot entirely avoid the conflicts of human political motivations solely by adopting ecological criteria for immigration restriction, he does identify a valuable connection between ecological and political perspectives: that of inseparably linking "rights" and "responsibilities."

One of the most powerful of these linkages combines the "right" of restricting immigration with the "responsibility" for reducing consumption. Such a linkage would help reduce the reluctance of certain environmental groups to realistically address the need for immigration restriction. One of the greatest advantages of an ecological perspective is an emphasis on linkages rather than the tendency on both sides of the current immigration debate to treat the various aspects of the issue as unrelated. Maintaining such linkages would also put the political motivations of both the "restrictionist" and "open border" factions in a context where constructive dialogue could better take place—something very much needed in the current US immigration debate.

In the current context, determining bioregional carrying capacity is part of a vision, along with ecologically sustainable human economies. An integrated global capitalist economy and national restriction of immigration are realities. The immedi-

ate problem is one of transitions within an ecologically realistic time frame. Equitably restricting human migration by nations is part of the transition, involving existing political systems.

The practical reality of national governments restricting immigration is widely acknowledged as a "right." Wheeler is correct in maintaining that despite the difficulties, a primarily ecological perspective is essential to successfully and equitably implement that right in terms of specific immigration policies on the national level; not just in terms of motives or determining specific levels of immigration, but more importantly in terms of building the widespread and diverse support necessary for agreement on specific restrictions.

Wheeler is also correct in maintaining the crucial importance of linking the short-term right to restrict immigration with the long-term responsibility for also addressing the underlying causes of global migration by significantly reducing consumption—primarily in the developed nations—minimizing the inequalities and volume of global trade, and vigorously pursuing national policies of stopping population growth. Only by tying the various pieces of the global migration dilemma to the larger ecological context can we hope to achieve lasting solutions to the problems of human overpopulation. ■

Ed Lytwak is an American for an ecologically sustainable population, currently focusing on human ecology and the development of an ecological human economy.

illustration by Patrick Dengate

Perceptions

by P.J. Ryan



PERCEPTIONS of an event, a country, a person, or even an organization can vary from one individual to another. Such is the case in how two Englishmen perceive the US National Park Service.

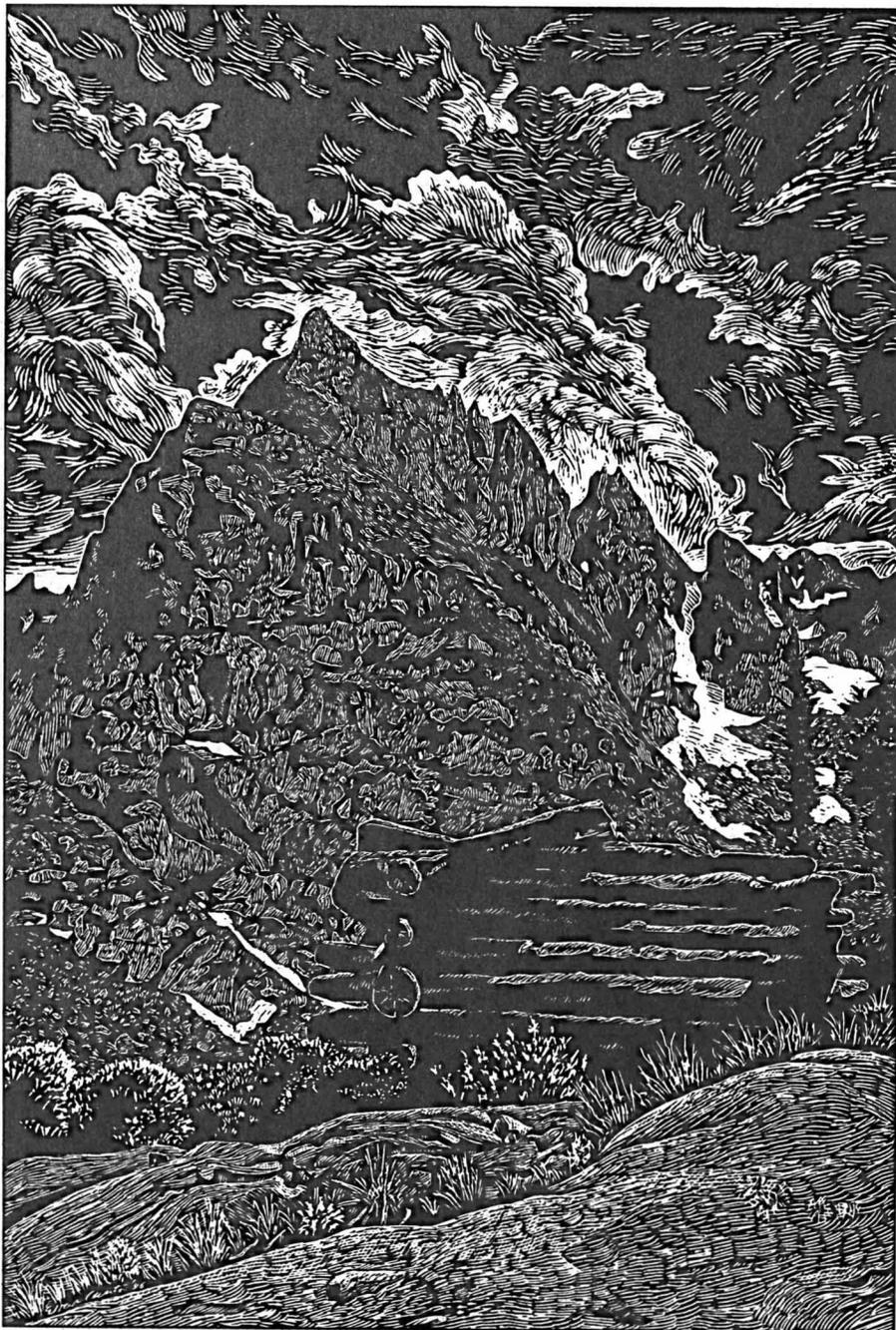
John Keegan, a premier British military historian, author of the magisterial *Fields of Battle: The Wars for North America*, has this admiring, albeit quirky take on the NPS:

What a magnificent institution it is, unequalled in the world. I have talked to its young officers—those who meet visitors seem always to be young college graduates—at dozens of places across the United States, from the battleship graveyard at Pearl Harbor to restored Fort Sumter, target of the first bombardment of the Civil War, in the harbour at Charleston. I invariably experience the oddest sensation when I do; that here are the representatives of an organization most closely akin to one of the colonial services of the vanished British or French empire. That has something to do with their crisp khaki drill uniforms, the faint snap of military discipline about their manner and movements, but more with the sense conveyed of their membership in a body with a continental mission, dedicated to the conservation of a cultural empire's history, human and natural. They might indeed be seen as the Federal Government's district commissioners, for they work often in the country's wildest places, and as ethnographers, forest officers, archaeologists, geologists, cartographers; exactly as colonial services were in the fields of field research and conservation, however, those of the Park Service are far greater in scale and quality.

Well now, buckaroos, wasn't that inspiring? However, lest we become too cocky, we must now turn to the works of William Bryson, perhaps England's most beloved and witty travel writer. *The Lost Continent*, his 1989 book of travels in the US, takes a decidedly unflattering tack on the National Park Service:

Yosemite is a mess. The National Parks (sic) Service in America—let's be candid here—does a pretty half-assed job of running many of the national parks. This is surprising because in America most leisure-time activities are about a million times better than anywhere else, but not national parks. The visitors' centres are usually dull, the catering is always crappy and expensive, and you generally come away having learned almost nothing about the wildlife, geology, and history of the places you have driven hundreds of miles to see. The national parks are supposed to be there to preserve a chunk of America's wilderness, but in many of them, the numbers have actually fallen. Yellowstone has lost all its wolves, mountain lions and white-tailed deer, and the numbers of beaver and bighorn sheep are greatly depleted. These animals are thriving outside Yellowstone, but as far as the Parks Service itself is concerned, they are extinct.

Any park spokesperson who says, "We are Loving Our Parks to Death" should be immediately seized and committed to the William Ridenaur Center for Cliché Eradication.



I don't know why it should be, but the National Parks Service has a long history of incompetence. In the 1960s if you can believe it, the Park Service invited the Walt Disney Corporation to build a development in Sequoia National Park. Mercifully, that a plan was quashed, but others have succeeded, most notably in 1923 when, after a long fight between conservationists and businessmen, the Hetch Hetchy Valley in the northern part of Yosemite—which was said to be even more spectacularly beautiful than Yosemite Valley itself—was flooded to create a reservoir to provide drinking water for San Francisco, 150 miles to the west. So for the last sixty years one of the half dozen or so most breathtaking stretches of landscape on the planet has lain under water for commercial reasons. God help us if they ever find oil there. And everything is just hopelessly, depressingly crowded—the cafeterias, the post office, the stores. This was in April; what it must be like in August doesn't bear guessing at. I have never been anywhere that was simultaneously so beautiful and so awful. In the end, I had a nice long walk and a look at the waterfalls and the scenery and it was outstanding. But I cannot believe that it can't be better run.

Well, shucks! buckaroos! Who are we to believe! Professor Keegan or Mr. Bryson?

In the case of Professor Keegan, we can only murmur a shy “Thank you” and bow or curtsy. Mr. Bryson is a different matter. First of all, we can mount an ad hominem attack on him by noting that he is not a native Brit, but rather an Iowa turncoat who defected from Des Moines to the United Kingdom some 20 years ago, and became one of Britain's favorite humor writers. (Aside from his mean-spirited and somewhat unfair attack on the NPS, Mr. Bryson's books are undeniably funny, and I do recommend that you read Bryson's *Lost Continent*, *Neither Here Nor There* and others, being an expatriate Iowan's take on America, Europe, and the UK.)

Mr. Bryson's attack seems based partly on uncritical digesting of the works of Alston Chase (may his pen lie fallow!) and other half truths. The Hetch Hetchy controversy was irretrievably finished before the formation of the NPS in 1916;

the NPS has successfully resisted even near-boundary oil and gas exploration (the most recent instance being Lechiguilla Cave at Carlsbad National Park, as well as the NPS stand on pipeline safety).

The Disney people, rightly or wrongly, were not operating "in" Sequoia National Park, but rather in their private in-holding, Mineral King, which was partially surrounded by the park. The problem was resolved in an environmental victory entirely satisfactory to the conservation community, if not to the Disney organization.

Visitor centers range from "good" to "superlative" depending not on the alleged stupidity and incompetence of the naturalists or historians, but rather upon either the parsimony or largess of Congress. Rare or non-existent is the park manager or division chief who says "That never occurred to me!" when deficiencies are pointed out by journalists or environmentalists. If they are willing to listen, the patient superintendent can go to files and drag out "wish lists," some yellow and crumbly with age, that politely request funding to remedy the aforesaid deficiencies.

As for education, park shareholders can learn as little or as much as they like, which is the way it is supposed to be in a democracy. The rangers and displays are backed up with more visuals and books than most shareholders care to read, and the internet has recently dissolved the intellectual boundaries of a specific park, so that the taxpayer could, if he/she desired, learn more about the park, from budget to microfauna, than any other person on Earth.

Mr. Bryson is somewhat more on the money when he complains about "the catering being always crappy and expensive." "Always" is getting on dangerous statistical ground, but Bryson has a point here. Exactly why the NPS has chosen to regard Midwestern Dorm Food as some sort of American cultural icon that must be preserved and presented to travelers from all over the world, is beyond me. We are a diverse nation and some of that diversity should show up in the menus of NPS restaurants (and I don't just mean Tex-Mex).

Now, we come to Yosemite Valley, where Bryson again has a point. Yosemite Valley, for all its beauty, has been an image-lessening millstone around the neck of the NPS for decades, starting when we decided we needed a city devoted to industrial tourism on the Valley Floor (sort of like the Pope authorizing a skate board concession in the Sistine Chapel!).

Bryson is no snob. Despite his overall condemnation of the NPS, he was delighted with Mount Rushmore, Yellowstone, Little Bighorn Battlefield, and, of course, Grand Canyon. It seems that Yosemite Valley set him on edge, as it does others, by the perversity of such incredible natural beauty combined with so much man-made schlock and lower middle class "Beach Area Rec" attitude.

It was perhaps best that Bryson not see Yosemite Valley in July and August when it begins to take on that Reservoir Recreation aura that makes it famous in park law enforcement circles. Indeed, for the ranger who wishes to specialize in heavy

duty law enforcement, the three top assignments are Lake Mead National Recreation Area, Glen Canyon National Recreation Area, and the Valley District of Yosemite National Park.

Why this "Rec Area" mentality became so much a part of the Yosemite Valley experience is a mystery, but some clues may be found in cars, alcohol, and a park concession with the resiliency of Kudzu. All three have proved difficult to control.

Any park spokesperson who says, "We are Loving Our Parks to Death" should be immediately seized and committed to the William Ridenaur Center for Cliché Eradication. It is impossible to "Love Our Parks to Death," as it is impossible for an automobile to love anything. Yosemite Valley is seven miles long; you could put the population of San Francisco in it and still have room to amble as long as you didn't allow them to bring their damn cars. Fortunately, Congress, after years of polite pleading from the NPS, is allowing money to seep into the solution by providing funds for "innovative" public transport into the Valley which may alleviate this problem. (I suspect that if we could only build a bridge to Isle Royale National Park, we could democratically provide the Isle Royale Ranger with the same law enforcement opportunities as are available for the Valley District Ranger.)

Ethyl alcohol easily beats marijuana and heroin as a mind replacement device for those "visitors" who wish to feel ten feet tall and bullet proof, and it is available in every supermarket. It is also available at approximately 19 outlets in Yosemite Valley. Now, buckaroos, many federal and state recreational areas, tiring of the nightly donnybrook and tense confrontation, have rather primly designated some or all of their beaches as "family" areas, politely detaining any alcoholic beverage containers until the owners pick them up on their way out of the park. If Indiana Dunes National Lake Shore can have a "family" beach, Yosemite could have a "family" valley. I suspect that if the park concession were to reduce alcohol outlets and other "attractions" within the park until Yosemite Valley reaches the level of that legendary touristic complaint "What do they expect us to do: look at the scenery?," then (with the absence of cars) the famous "overcrowding" of Yosemite would begin to fade away and with less demand, we could begin removing the concession and NPS infrastructure from the valley (maybe even our prison!).

Anyway, Professor Keegan is welcome anytime; Mr. Bryson is encouraged to do his homework a bit more carefully, and, hey! come back and see Yosemite Valley. Perhaps you'll find some slow but incremental improvements as the NPS tires of being beaten with the Yosemite Valley stick. ■

PJ Ryan works for the National Park Service and publishes "the oldest alternative newsletter in the federal government," Thunderbear (POB 2341, Silverspring, MD 20915, \$13.50 per year). The article above is from the August 1996 issue (#190).

A WildWaters Project

Rethinking the South Florida Watershed

by Peter Taylor

We are all aquatic in origin. Whether propelled by fins, feathers or four legs, all life shares the ancestral womb of the planet's oceans. Perhaps this is what drives *Homo sapiens'* obsessive migrations to the beach, what sustains mammalian body water content in almost identical proportions to the land: sea ratio of the Earth itself, and why many of the most biodiverse ecosystems on the planet are within shouting distance of the coast. Marine ecosystems are the cradle of evolution. Most have not changed significantly in over 50 million years, and many individual species glide through the water column with the same predatory certainty as their first ancestors. As magma and water have sculpted global landscapes in a scant few billion years, coral reefs, kelp forests, sea grass meadows, deep sea sulfur vents, intertidal zones, and myriad other marine communities have continued to stitch together the planetary balance between earth and water that supports us all.

Why, then, is the present state of the Earth's marine ecosystems so woefully neglected, and why do we continue to manage land and sea as if they were products of two entirely different evolutions? Many of us lie awake at night haunted by the footsteps of a terrestrial Armageddon—topsoil loss, mineral and fuel exhaustion, desertification and deforestation—while miles away offshore another depleted fishery echoes in lifeless blues and another million gallons of untreated sewage mixes into quiet tidal pools. When we see a crackling moonscape of charcoal where a cathedral of virgin Mahogany once stood, we grieve at the horrors of our own consumption. But when we hear of a distant reef tract ten fathoms down decimated by military ammunitions testing, we merely cock an ear of curiosity. The French are doing what again? We have all been raised with an essential dualism between land and sea—it is taught in our biology, our history, and has been institutionalized in our society. The resolution of this dichotomy both intellectually and tangibly will be a barometer of our progress in our quest to live within the bounds of the biosphere. The oceans may be timeless and eternal, but the health of biodiversity within them has become a negotiable commodity perishable within the span of one human generation.

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POLAROID PRESERVATION

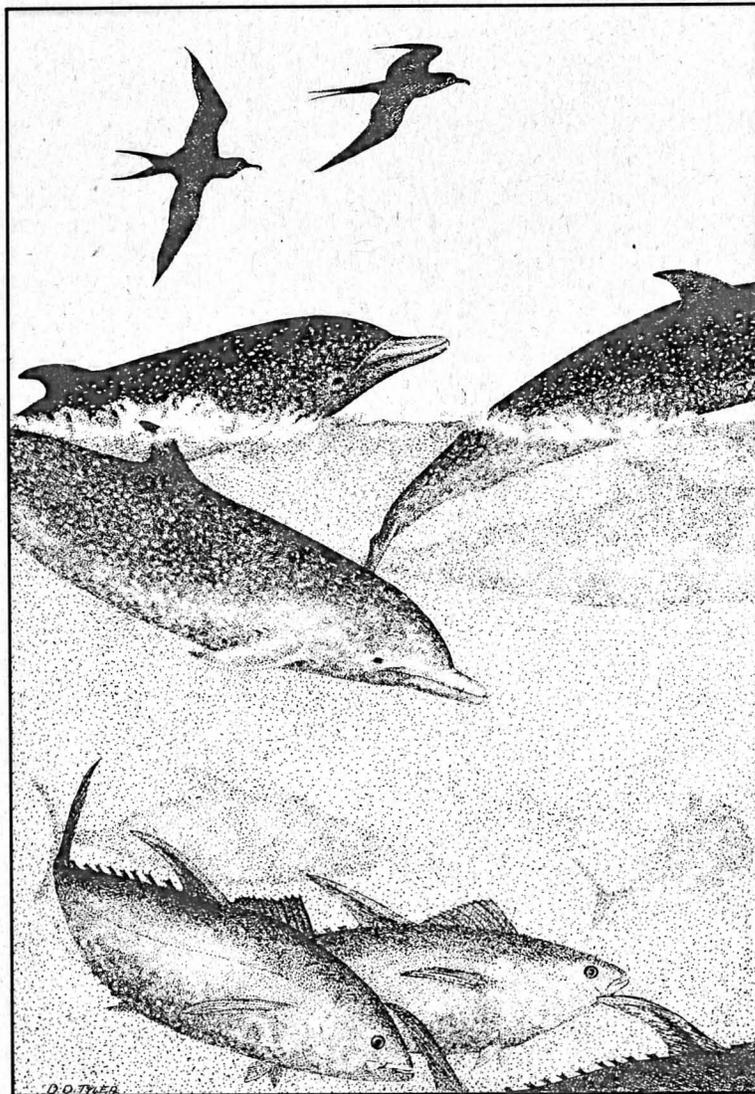
Exhaustive trial and error has shown that no symbiotic relationship can be isolated into its parts without disturbing its internal harmony; and nowhere is this understanding more critical than with respect to the synergistic links between land and sea. Traveling throughout the Caribbean, I have explored countless "marine parks" and "coral reef preserves" that island governments have hastily designated in a cavalier attempt to protect a tourist hotspot. In their defense, they have identified a crisis and acted, but they have neglected to address the *reciprocity and dynamism* inherent in ecological processes. What long-term benefit will marine park designation bring when "black water" sewage pipes, officially

“on land,” continue to pump tons of raw human waste into nearshore waters? Or when fish and other reef creatures migrate to an adjacent reef formation to feed or breed only to find that the assurances there are not the same as in their cozy preserve?

For almost a century now, we have tried to protect many terrestrial and aquatic ecosystems with this type of Polaroid preservation. We find a habitat that inspires us, delineate it like a postcard, and strive to preserve it as a static image while business as usual continues outside its boundaries. This strategy, however effective it may be for urban parks and Zen gardens, simply cannot adequately protect interdependent coastal ecosystems. Modern ecology has taught us that global habitats, flora, and fauna are infinitely interconnected—united into a self-sustaining, self-regulating super organism: Gaia. Most environmental protection efforts thus far have succeeded only in protecting selected places, not the living processes that empower them. Many ecologists are now talking about ecosystem or “wholistic” management, a strategy that echoes Aldo Leopold’s resonant claim that the first rule of intelligent tinkering is preserving all the parts. Such macromanagement would be based on an understanding of interrelationships, from benthic bacteria to atmospheric links in water cycles, and would use this information to help restore the dynamic balance *between* habitats, ecosystems, and their members, rather than *within* isolated examples of them.

THE EMERGING PICTURE

One recent discovery illustrates particularly well how the consequences of coastal mismanagement are dangerously amphibious—adversely affecting both marine *and* terrestrial communities. The Red-legged Kittiwake is a small gull that makes its home along the coast of the Alaskan panhandle and the Aleutian Islands in nests built on the edges of sea cliffs. Fully legal ‘buffalo-hunt’ fishing practices have caused offshore pollock populations—the kittiwake’s primary food source—to plummet over the past two decades. The diminishment of the region’s marine food base has directly paralleled a 50% decline in the resident kittiwake populations over the same two decades. Some Alaskan politicians say the declines are unrelated; biologists studying the matter think differently. And what about the chain-reaction consequences of declining kittiwake numbers which no one is studying yet? It is impossible to say how far these links can fire, and what will be the synergistic effects with other types of distur-



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bances such as coastal deforestation and habitat fragmentation. An afternoon among the periodicals of any library will confirm that the story is much the same with puffins, auklets, and many shorebird species throughout the world.

Thanks to the pioneering work of Jacques Cousteau, Rachael Carson, and many others, reciprocal links such as these between land and sea have been greatly demystified. However, we have yet to translate these discoveries into a tangible, alternative future, and we continue to ground our practices in comfortable commercial paradigms. We base our management strategies on biases rooted in our predilection for landscapes and a fearful ignorance of the sea. In almost every area of global environmental protection, efforts are still limited to *terra firma* with rewards we can walk on, in places humans can call home.

Allow me to elaborate using an example right out my backdoor—the Florida Keys, as seen from a 30 foot cruising sloop.

THE BIG PICTURE IN THE FLORIDA KEYS

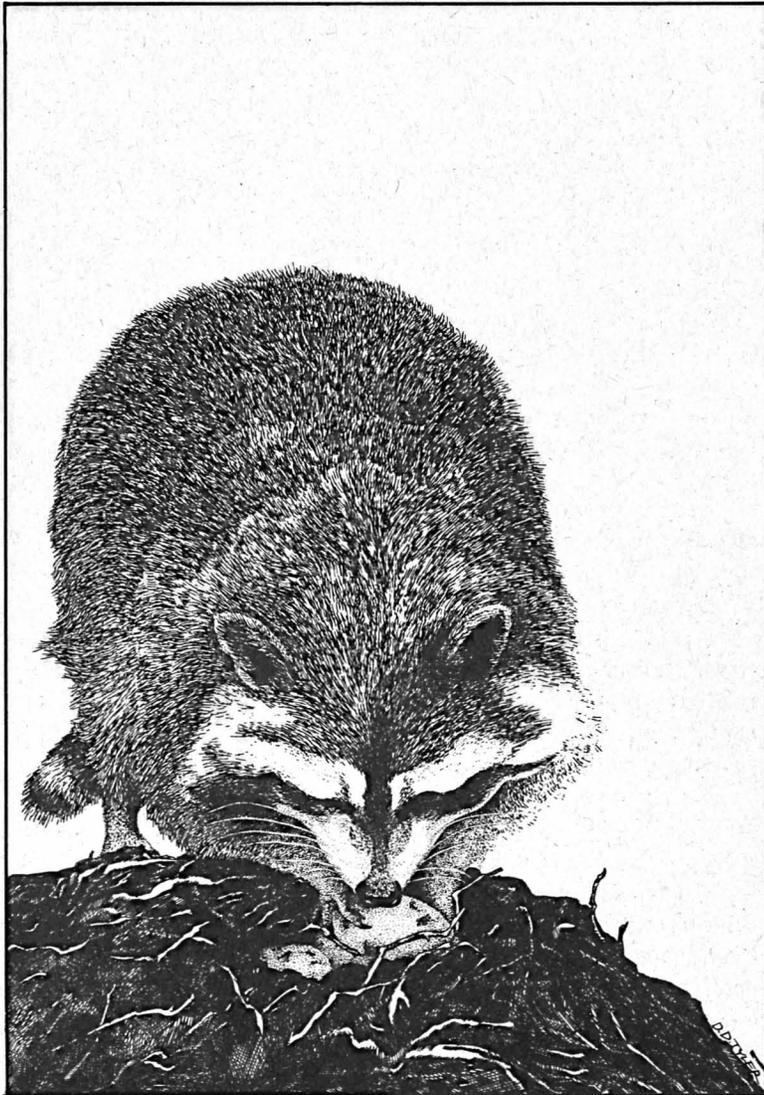
Florida's coral barrier reef ecosystem is the only one of its kind in the United States, and the third largest in the world. Stretching 165 miles southwest from Miami parallel to the Florida Keys, the reef is home to 50 species of coral, over 150 species of tropical fish, rare marine mammals, and inestimable invertebrates we have yet to even look for. The reef also is an ecological parapet, sheltering near-shore seagrass meadows, sand flats, mangrove forests, and hardwood hammocks, providing a home and vital nursery for countless shellfish, permanent and migrant bird species, fin fish, and one-third of Florida's threatened and endangered species. The coral reef ecosystem is a center of biological richness in itself, but it is also the backbone of the Florida Keys bioregion.

Nature's smallest architects, corals are minuscule, filtering-feeding invertebrates which can survive only within the narrowest latitudes of salinity, temperature, light, and nutrient

concentrations. When these conditions prevail, they cluster in artful colonies, configuring themselves into "brains," "golf-balls," and "fans" by secreting a limestone exoskeleton which collectively aggregated is the reef itself. Lying on the periphery of the Northern Hemisphere's subtropical region, the Keys barrier reef is an anomaly, like coral communities in Bermuda and the northern Bahamas, sustained by the warm, clear, nutrient-poor water from the Gulf Stream. It has evolved with a level of fringe disturbance that most other Caribbean reefs have never experienced, and has endured everything from glacial flooding to European colonization. In addition to being the only major barrier reef in such close proximity to a burgeoning human population, the Keys reef is the only in the world that shares evolution with a diverse temperate fauna—including the Key Deer (an Endangered subspecies of the White-tailed Deer), raccoons, and Opossums.

Unfortunately, Florida's reef ecosystem is dying. Most species of coral grow on a glacial timetable—some only a quarter of an inch annually—and decades of accumulated physical damage from anchors, boat groundings, propellers, commercial fishing and lobstering, explosives testing, dredging, and human contact has superseded the living coral polyps' ability to accrete. The Florida Keys is the most heavily visited dive destination in the world, attracting 6 million visitors annually, ten times more than Australia's Great Barrier Reef, an area of coral ten times as large and visible from space. Added to this pressure are millions of gallons of poorly treated sewage discharged daily, stormwater drainage, oil and gasoline leakage, agrochemical runoff, and sedimentation from dredging and road widening and building. Scientists have documented that some hard corals are no longer sexually reproducing and that coral cover has declined so drastically in some areas that recovery may be impossible. At Looe Key reef, one of the most popular dive spots in the country, scientists documented a 40% loss of coral cover between 1984 and 1989. At reefs throughout the Keys, nuisance "sewage" algae have begun to out-compete the hard "reef building" corals for substrate and have covered once colorful coral canyons in an algal haze as thick as the Los Angeles skyline in August.

Each summer for the past three years, Florida Keys newspapers have shouted out with front page articles on a newly discovered coral disease—in 1993, blackband; in 1994, yellowband; and in 1995, whiteband, a coral eating virus that can consume a 400 year old coral head in three days. Aerial photographs of algae blooms the size of a tropical depression are glanced over regularly like Macy's Sunday lingerie ads; and me-



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dia blips about mercury-induced fatalities in Spotted Sea Trout, sponge die-offs over hundreds of square kilometers, selenium concentrations in shellfish, a mysterious internal "wasting" disease in cormorants, and charterboats nabbed by a Florida marine patrol sewage sting are commonplace. This past summer, I saw a water-sports charter advertisement that touted its unparalleled ability to whisk you away to the "Emerald Green Waters of the Florida Keys"—waters that only ten years ago were cerulean gin, like deep space at dawn. At 1995's REEF RELIEF membership meeting, Dr. Brian Lapointe, of Harbour Branch Oceanographic Institute and an expert on sewage and water quality, wondered aloud whether we had actually altered the very ecological structure of Florida's coral reef with such long-term, widespread abuse—resulting in a reef ecosystem dominated by opportunistic algae, jellyfish, and Crown-of-Thorns Starfish, instead of Mountainous Star Coral, Midnight Parrotfish, and Moray Eels. This spring, reports of a mysterious "brownout," which has caused sea fans to wither and die like decayed winter leaves, sent scientists scurrying for their lab books again.

INSIDE THE REAL PICTURE

Faced with such obvious physical decline and mountains of steadily accumulating data, the Bush Administration designated the waters around the Florida Keys a 2800-square nautical mile National Marine Sanctuary (FKNMS) in November 1990. Conservationists and citizens breathed a hard won sigh of relief and began planning for a brighter environmental future in which federal protected status for the reef would be a long-term, preventive asset rather than the domineering superstructure some feared. Since then, however, people have seen little reward for their faith, and to everyone's chagrin, the reef is still dying—in some places even faster. For all its benefits, the FKNMS has been unable to address the most virulent causes of reef decline in the Keys. Officials have pinned responsibility on the obvious culprits—jet-skiers, reckless divers, novice boaters and yacht owners without holding tanks for their sewage—but have neglected the connections that unite the south Florida bioregion into a living web. FKNMS administrators have staked off their specific 2800 sq. mi. plot and set to managing it like a greenhouse, while practices and laws that degrade the reef continue unabated in "other" congressional districts.

Among those who have studied the changes that have occurred over the past decade, it has become common knowledge that not one of the major threats to the Florida Keys reef is aquagenic—that is, none of them have their source underwater. They are all terrestrial-based sources of pollution and commercial exploitation, and none are "natural," despite the claims of some that blackband disease, epidemics of coral bleaching, and 152 Manatee fatalities within eight weeks earlier this year are par for the evolutionary course. The connections between the Keys barrier reef and the entire south Florida watershed can be traced like veins in a bioregional hand. Far

away sources of impact include agricultural run-off from Mississippi and Alabama and chemical discharges from Florida phosphorus mines. Closer to home, "water management" between Orlando and Miami, sugar plantations just beyond the Everglades National Park boundary, agro-leviathans sprawled across the headwaters of Florida Bay, the sewage of six million annual visitors to the Keys, and "managed" increases in nutrient-rich fresh water through the entire system have increased regional levels of nitrogen and phosphorous four-fold in less than a decade.

Craig Quirolo, founder and marine projects director for REEF RELIEF, a Key West based coral reef preservation group, has been "photomonitoring" changes at the reef for over five years. His images and recent video footage are clear, indisputable evidence that accelerated degradation of the reef ecosystem and a scourge of unexplained diseases have occurred in almost direct proportion to the eutrophication of surrounding waters from land-based, locally controlled sources—a long ignored claim Dr. Lapointe has been making since 1991. Again, as with the kittiwake in Alaska, policy makers based management strategies on limited science and commercial standards, precipitating wide-ranging consequences to marine ecosystems that could have been prevented had a more inclusive bioregional model ruled from the outset.

The point here is not to devalue the FKNMS, which has real merit, nor the efforts of private individuals and grassroots organizations, but to point out the continuing consequences of coastal ecosystem management. Florida has more marine and terrestrial protected areas than almost any other coastal state, but the segregational paradigms with which they have been protected are anachronisms. The environmental histories of the Florida Keys barrier reef, the Everglades, and Florida Bay (the latter two, epic tales in themselves) all have one theme in common: they have been "protected" in isolation from the landscapes with which they are inseparably connected and from each other. What are the long-term consequences of fencing off waters like farms while commercial *carte blanche* rules the landscapes that surround them? And what about the links that run in reverse—the imperceptible, *reciprocal* balances that arise in any symbiosis. The collapse of these marine ecosystems very well may bring repercussions on land that no one can yet foresee.

A PRETTIER PICTURE

For those who wonder what a bioregional management strategy for the Florida Keys might look like, I have assembled a list of seven "WildWaters Imperatives" for the Florida Keys compiled from scientific opinions, conversations with environmentalists, and personal observation. If the US Department of Defense can propose to shut down the Keys three days a year to detonate missiles over the Gulf of Mexico for "national security" (which they have), I can at least offer these hopeful alternatives in the interest of ecological security for south Florida:

- 1) Determine a tourism and recreation "carrying capacity" for the Keys bioregion, and use this standard rather than the spreadsheets of the Tourist Development Council for environmental planning.
- 2) Mandate tertiary treatment of all sewage throughout the Keys, with zero discharge at the reef—no exceptions. Surely the combined efforts of over 23 state and federal environmental agencies can do more than simply "remove sludge."
- 3) Enact comprehensive protection of mangroves and wetlands. Increase available habitat for Keys wildlife through the creation of "amphibious corridors." Coordinate the corridors into The Wildlands Project for all of Florida.
- 4) Put certain reefs off-limits to tourists, for regeneration, scientific experimentation, control studies, and photomonitoring. Protect reefs seasonally based on spawning habits and current characteristics. Initiate and *fund* long-term water quality and coral composition studies.
- 5) Stop scientifically unsupported surface and groundwater increases into Florida Bay. The health of the south Florida bioregion and its supporting ecosystems is based on water *quality*, not quantity.
- 6) Establish a coalition including everyone involved in environmental management in south Florida, from Everglades scientists to the National Wildlife Refuge rangers off Key West. The Everglades Forever Act and the Florida Keys National Marine Sanctuary are two of the most ambitious corrective initiatives in American history, yet at present no one can even be sure how often the two mega-managers swap notes.
- 7) Create an environmental educational program for everyone—tourists, locals, kids, veterans, sailors, businesses, etc. Get everyone involved. Promote The Wildlands and WildWaters Project region-wide, and educate people on how and why it would work. Despite what some tourist moguls in the Keys still think, effective environmental preservation is an economic asset, not a liability.

The future of the Florida Keys reef will be a test of our ability to view threatened ecosystems with a totally inclusive sense of bioregionalism, from 110 feet underwater off the Keys to the mangrove and cypress swamps of the Everglades. Elsewhere in the Caribbean, examples of coordinated land and sea management do exist, where coastal watersheds are protected in studied cohesiveness with marine ecosystems, and human activity that affects either is balanced into the equation. The good precedents must be expanded, however, to consistently include whole bioregions, not just isolated watersheds. The consequences of fragmented micro-management are painfully clear in south Florida. Many scientists regard coral reefs as canaries in the planetary coal mine, and after 50 million years of undisturbed melodies, the harmonies seem to be collapsing into a cacophony of crises in the backyard of the most environmentally "advanced" nation in the world.

Peter Taylor is a freelance writer and photographer based in Key West, Florida. He has worked for the volunteer program of the National Marine Sanctuary and for REEF RELIEF, a non-profit organization dedicated to preserving and protecting Florida's coral reef ecosystem.

The Wildlands Project must embrace its aquatic ecosystems, too. The world's "WildWaters," especially in tropical regions, are the backbones of the balance between land and sea. They cannot be managed well in isolation, nor can landscapes be preserved without protecting the waters that unite them. Next time you go to the beach, look at your connection to the water—the instinctive drive to contemplate it, the sweat and salt mixing on your sunsoaked brow, the rivers and swamps emptying into the ocean's eternity. The connections run deep, and it's about time we began preserving the Earth's coastal regions with this in mind, or the belief that the oceans are empty and lifeless may indeed one day come true.

For more information on Florida's coral reef and how to help save it, contact REEF RELIEF in Key West at POB 430, Key West, FL 33041; (305) 294-3100. ■

Epilogue

Last fall, while photomonitoring the spread of blackband, yellowband, and whiteband off Key West, Craig Quirolo unearthed yet another pathogenic contagion ravaging local reefs. First discovered in Key Largo on *Dichocoenia* star corals, and termed "white-plague type 2" by scientists, this new disease is now afflicting Key West's pillar and mountainous star corals, bleaching the exoskeleton a ghostly white at a rate of a centimeter a day. Diving only two months ago in December, he discovered yet a sixth blight—now called, simply, white pox. This still unexplained disease turns the shallow water coral species, *Acropora palmata*, a blotchy white, rapidly creeping across the surface until the entire coral branch is consumed. Dr. James Porter, a University of Georgia marine ecologist who first examined and sampled the disease at Quirolo's urging, suspects that white pox has already killed 50-80% of the *Acropora* in some areas near Key West. Since December, Quirolo has provided still and video photomonitoring images of the diseased coral species to Dr. Debbie Santavy, a marine microbial ecologist at the EPA's Gulf Breeze laboratory, and Dr. Porter has sent core samples for extensive scrutiny.

Despite the rapid response system that may have arrested white pox before it reaches epidemic proportions, its alarming discovery raises some disturbing questions about the limits of ecological tolerance. Not only has the number of identified coral diseases in the Keys doubled in the past few years, but the frequency of appearance has grown almost exponentially. Corollaries with the increasing eutrophication and pollution of Florida Bay and the Everglades seem to be almost too clear, and many feel that Dr. Santavy's analysis will only confirm the obvious. Quirolo has little doubt that the insurgence of blights is directly related to declining water quality, due to everything from illegal septic tanks and cesspools to agricultural run-off. When asked in a recent interview with ABC if we should be alarmed at the rise in diseases, Quirolo answered simply, "If this were an aquarium, I'd say it's time to change the water."

Protected Areas on the High Seas and the Case for Marine Wilderness

by Maxine McCloskey

INTRODUCTION

In order to consider marine environments as potential protected areas, on the high seas and within Exclusive Economic Zones (EEZs) of coastal nations, we must be mindful of the effect of harsh human hands on the land. We must take care in a timely fashion that those same wasteful and destructive practices are not imposed on the oceans.

The ocean differs markedly from the land, especially in that most of the living biomass is concentrated in the relatively narrow euphotic layer at the top and is drifting or swimming about in constant motion. On land most of the biomass is at the bottom of the "ocean of air" and is relatively fixed to the substrate. There are fewer sharp boundaries at sea than on land. The water column is composed of layers that differ in temperature, salinity, oxygen content, and nutrients. These layers are in motion. On the high seas, all but the narrow photic layer are in total and perpetual darkness. Pollutants as well as nutrients and other substances can be carried over vast areas by the drifting and mixing mechanisms.

On land the primary producers are plants. They comprise the bulk of the biomass and constitute the source of food for all other organisms. The plant biomass occurs in species that are fairly large, long lived, and fixed to the substrate in relatively stable communities and associations. This makes suitable boundaries for protected areas relatively easy to determine.

In the oceans, many of the primary producers are small, short lived, and drifting about with the currents; though corals and kelp are important exceptions to this general pattern. Many of the animals are also either drifting or swimming. Many animals depend on drifting plankton for their food.

On considering the potential for marine protected areas and marine wilderness, first thoughts are of extensions from the land; that is, sea level or the wave-filled surface. But how can wilderness values on the ocean surface be defined when the view from sea level, coastal promontories, or from the air shows a flat sameness apparently altered only by weather conditions and light? Storms, of course, add exceptional drama; but except for birds and surface-dwelling marine mammals, sea turtles, and fields of sargassum, the exhilarating variety of sea life forms is masked, for the wonders are below the surface.

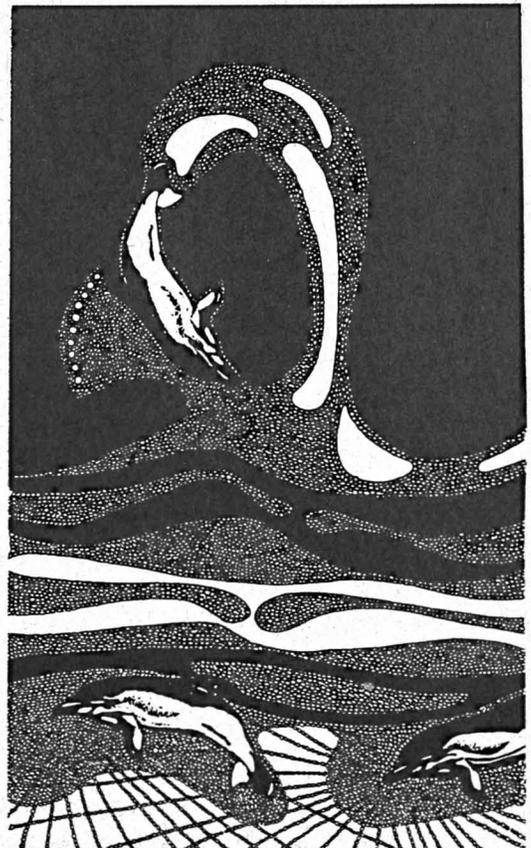


illustration by Jim Nollman

ORIGINS OF THE CONCEPT OF MARINE PROTECTED AREAS

According to the US Wilderness Act of 1964, wilderness is defined thus: "A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammelled by man, where man himself is a visitor who does not remain..." (US Public Law).

The notion of applying the concept of wilderness to coastal and high seas areas appeared shortly after passage of the US Wilderness Act in 1964. The first reference is contained in the recommendations of a special US Panel on Oceanography (President's Science Advisory Committee 1966). The report says in part, "Establishment of a system of marine wilderness preserves (would be) an extension to marine environments of the basic principles established in the Wilderness Act of 1964 that would provide ecological baselines, preservation of unmodified habitats for research and education, and marine wilderness recreation."

Marine wilderness next appeared in 1967 in a paper given by Kenneth Norris at the 10th Biennial Wilderness Conference, sponsored by the Sierra Club. His remarks concerned the nearshore marine environment (Norris 1969).

The Third World National Parks Congress, held in Bali, Indonesia in 1982, sponsored by the IUCN CNPPA (Commission on National Parks and Protected Areas of the International Union for the Conservation of Nature and Natural Resources), devoted considerable time to coastal and marine environments. Discussion of designation of protected areas on the high seas included legal, management, biological, economic, and recreational aspects (Salm 1984).

Another step toward recognizing the concept of marine wilderness was taken at the Fourth World Wilderness Congress, held in Estes Park, Colorado in 1987 and sponsored by the International Wilderness Leadership Foundation. A workshop on ocean conservation recommended that each nation develop a system of marine protected areas that should include wilderness, defined as: "Marine areas where little or no evidence of human intrusion is present or permitted, so that natural processes will take place unaffected by human intervention."

In 1989 I gave an earlier version of this paper before the Thirteenth Northwest Wilderness Conference held in Seattle, Washington.

An international meeting on wild ocean reserves, organized by Dr. Sylvia Earle, Chief Scientist of the US National Oceanic and Atmospheric Administration (NOAA), was held in Honolulu, Hawaii in October 1991. The papers given there and the resulting recommendations provide an excellent source for exploring the concept of protected areas on the high seas (NOAA 1991).

The Commission on National Parks and Protected Areas (CNPPA) of the World Conservation Union (new name of the IUCN) adopted a revised Framework for the Classification of

Terrestrial and Marine Protected Areas following the World Parks Congress in 1992, held in Caracas, Venezuela. The six categories of protected areas now apply to the marine environment as well as to the terrestrial, and wilderness was added to category I, now named "Scientific Reserves and Wilderness Areas." This was another significant step toward marine wilderness in that CNPPA establishes the international standards for protected areas that governments try to institute in their own parks systems.

At the Fifth World Wilderness Congress, held in Tromsø, Norway in 1993, delegates adopted a resolution that "encourages coastal nations to establish under national legislation representative systems of marine protected areas, including areas with wilderness designation," and "recommends that appropriate international agencies establish protected areas in international marine waters including areas designated as wilderness."

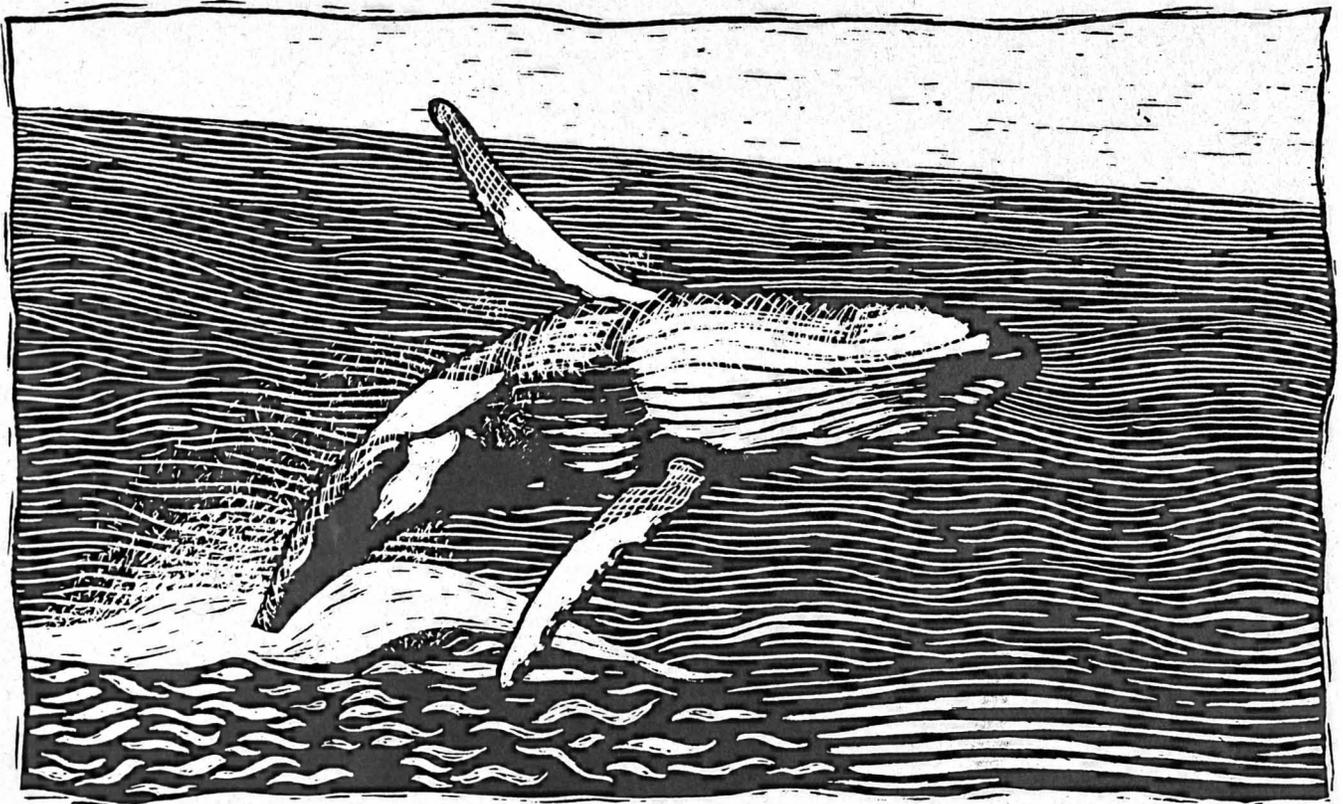
Next, the 19th General Assembly of the IUCN, held in Buenos Aires, Argentina in January 1994, adopted a resolution that encourages protected areas to be established in marine areas beyond the limits of national jurisdictions. At the same meeting, the CNPPA's scope was expanded to include working with the United Nations Convention on the Law of the Sea to advance marine protected areas. Since then, it has established a working group within its Marine Protected Areas Program to ensure that the high seas are given proper consideration in efforts to establish a global system of representative protected areas. I was invited to head this effort.

Slowly but surely, the ideas are advancing that marine protected areas must be established, and that wilderness values can apply to the high seas and EEZs.

WILDERNESS VALUES

Consideration of the familiar values and functions of terrestrial wilderness will help determine whether and how they may apply to marine environments. On land, wilderness areas help to maintain the geophysical equilibrium, water and air quality. They serve as nurseries and refuges for wildlife, maintain biological diversity, and have scientific, moral, historic, aesthetic, spiritual, recreational, educational, social, and personal values. While all of these values can apply to marine environments, those dealing directly with the ecological, physical and biological attributes are the most compelling: as sites for scientific research, refugia for over-fished species, gene banks for diversity, and controls against which to measure what is happening in nonwilderness areas.

The moral arguments are just as compelling for protecting ecosystems in the oceans as for those on land. People don't have the right to manipulate every last acre or resource on the planet for their own desires. Marine ecosystems have the same right to exist as do those on land. Furthermore, we don't know enough to assess what harm may be done by high levels of exploitation.



Those values related to human considerations (aesthetic, spiritual, educational, scientific, recreational, etc.) also apply to at least some marine habitats.

The full range of CNPPA's categories for protection would apply to the seabed: the continuation of the land that becomes deeper as the distance from shore lengthens, finally dropping off the continental shelf. For setting metes and bounds, and limiting or prohibiting certain human activities, the ocean may be more manageable from the standpoint of this extension of land underwater—or submerged land. The healthy seabed, particularly in shallower areas, contains a great mix of plant and animal life that thrives on the nutrient-rich soup of the sea. Of interest also is the palpably three-dimensional nature of the marine environment: animals, including people, and plants can move about horizontally and vertically within it. People are much more aware of the complex biological activity within changing environments when they are moving underwater than they are when moving within air overlying land.

The water column contains numerous species of plants and animals moving about in the currents. Some species are highly migratory, while others depend on more restricted areas with particular food, temperature, salinity, or protection.

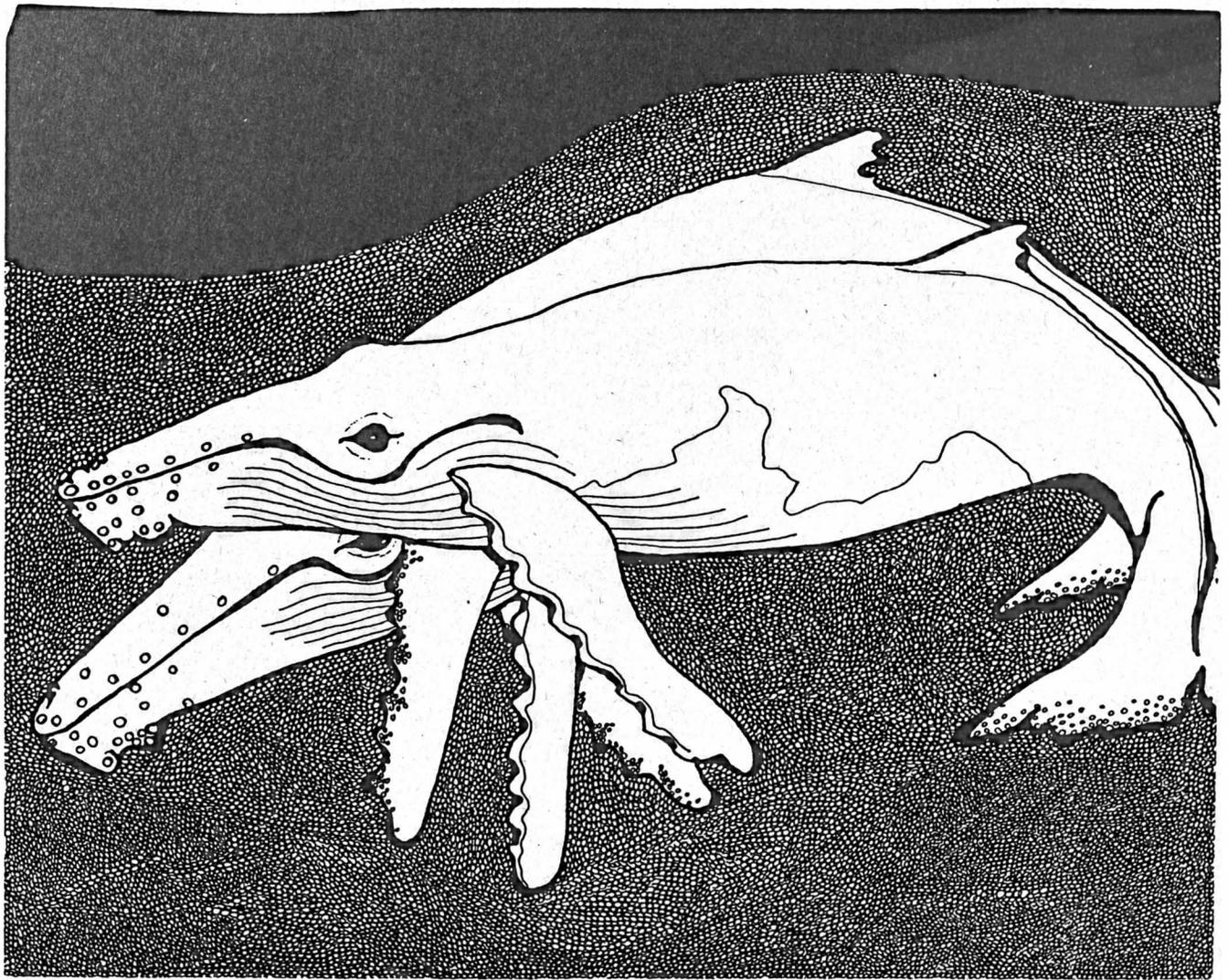
Here are a few examples of the kinds of marine features that merit protected status:

- Places of vast plankton blooms or swarms of krill;
- Rooted sargassum beds and drifting mats;
- Calving, nursing, and feeding grounds of whales and other marine mammals;

- Routes of highly migratory species;
- Seabed areas of unusual scientific interest, such as at current convergences, tectonic rifts, geothermal vents, black smokers, and deep trenches (trenches could be considered the reverse of mountain peaks and ranges on land);
- Seamounts, coral reefs, atolls, guyots (flat-topped submerged seamounts or inactive volcanos);
- Unusual seabed formations, including mounts and canyons;
- Areas of significant endemic populations;
- Essential habitats of threatened and endangered species;
- Nurseries for commercially valuable fish stocks;
- Areas of exceptional biological diversity;
- Areas of exceptional scenic values;
- Representative areas;
- Marine areas adjacent to protected areas on land;
- Submerged aquatic vegetation (seagrass, kelp) beds;
- Ice edges.

WILDERNESS MANAGEMENT

Management of marine wilderness could be through a system similar to that of designated terrestrial wilderness. That is, there would be maximum restrictions on human activity on, above, and under the seabed, within the water column, and on and over the surface. The restrictions should apply to commercial exploitation of living resources as well as exploration or mining for oil or minerals. There should be no dumping, incineration, cable laying, energy development, dredging or any other conceivable human exploitative use.



Appropriate scientific research should be encouraged. There should be a scientific authority that would issue permits and rules, emphasize benign research, and avoid destructive practices or duplication of projects.

Air over designated wilderness should be protected from pollution, just as attempts are made to prevent pollutants from drifting over designated terrestrial wilderness. There is a ready example in Australia's Great Barrier Reef Marine Park, where regulations extend to 1000 meters below seabed and 915 meters above sea level for the most strictly protected parts of the park.

Size, location, and sensitivity of the wilderness units would also dictate the degree of recreation permitted. Regulations consistent with terrestrial wilderness would prohibit the use of mechanized recreation equipment. There should be restrictions on anchoring, especially in biologically rich coastal areas and above seamounts. Nature study and appreciation would be encouraged. High seas recreation would be limited to sailing.

The present internationally accepted right of free passage of merchant and military vessels may have to remain in effect. Australia obtained agreement from the International Maritime Organisation (IMO) to allow it to regulate international shipping in the northern part of the Great Barrier Reef Marine Park

in an area covering about 15,000 square miles designated as a Particularly Sensitive Area. Ship passage in designated wilderness needs thorough analysis and consultation with the IMO.

Wilderness boundaries, as well as boundaries of other categories of protection, would be entered on all marine and air navigation charts. They could actually be marked on the seabed if necessary, although this may be impractical or risky.

A number of nations have already established programs for designation and management of marine protected areas within their territorial seas (up to 12 miles seaward), or within their EEZs. The US has established a very incomplete system of National Marine Sanctuaries, but these sanctuaries are not protected as wilderness.

Australia has many wilderness areas, called marine national park zones, in the Great Barrier Reef Marine Park, which covers 140,000 square miles. All extractive activities and structures (except buoys) are prohibited in these zones. Australia has also established several preservation zones within the four sections of the Great Barrier Reef Marine Park. This is a very strict designation, not even allowing benign recreation; so it is almost more like the Russian category *Zapovednik* than the IUCN category wilderness.

illustration by Jim Nollman

LEGAL QUESTIONS

Adjacent coastal nations could agree by treaty to establish protected areas within their EEZs that contain shared special natural values. Examples would be extensive coral reefs, nurseries for valuable fish, nurseries and breeding grounds for marine mammals and birds, and routes of highly migratory species.

Jurisdictional issues could prove more problematic on the open or high seas than in the exclusive economic zones. The problem is that no nation can regulate the uses of the high seas by others; it can only regulate the activities of its citizens, corporations, and flag vessels.

Two or more nations could, however, agree by treaty to regulate activities of their own nationals, corporations, and flag vessels on the high seas that they have agreed to designate for some protective status. The prohibitions on activities and enforcement would apply only to their own nationals.

The United Nations could assume authority to study, plan, and recommend establishment of a global system of marine protected areas that includes wilderness. Such a program could be adopted by the member nations. Admittedly, this is easier said than done. The UN has already sponsored the Convention on the Law of the Sea (LOS), which contains provisions that would allow the LOS International Seabed Authority to place parts of the high seas floor off-limits for minerals extraction if exploitation would pose an environmental threat. This convention entered into force on 16 November 1994 but without accession by the US. The US is provisionally applying the agreement, which was signed by President Clinton on 29 July 1994. The US Senate has yet to ratify it. If the major powers cannot find their way to ratification, they will be unable to exert their influence on its administration. The close of the Cold War, and the realization that commercial exploitation of deep seabed minerals is many decades away, should influence them to ratify. Its presently limited provisions on protected areas could be amended to provide for a comprehensive program of marine protected areas.

A newer international body has great potential for developing an international program of protected areas on high seas: the Convention on Biological Diversity (CBD), concluded in 1992. The second Conference of Parties, held in Indonesia in November 1995, decided to support recommendations made to it by the Subsidiary Body on Scientific, Technical and Technological Advice that *inter alia*, call for establishment of representative systems of marine and coastal protected areas. CBD also addresses sustainable development of marine genetic resources, providing opportunity for interested persons to help make sure that protective measures are strong enough to effectively balance the exploitive measures. President Clinton signed the Convention, but the US Senate has not ratified it. The US is involved only as a nonparty observer. The CBD may prove to be the best agency for protecting a marine wilderness system. (Cohen and Downes 1995, and MacKay and McAllister 1996).

Four actions by nations illustrate that combined efforts can protect the marine environment. The first was the 1973 conclusion of the International Convention for the Prevention of Pollution from Ships (the London Convention). It aims to eliminate all intentional discharges of pollutants by vessels, and to reduce the risk of accidental discharges. Unfortunately, enforcement provisions are weak, and almost half of the parties fail to comply with reporting requirements (Goriup 1995).

The weakness of this or any treaty is that it only applies to those nations that have ratified it and have taken steps to implement and enforce it. International agreements have no force over nations that are not signatories. Companies that wish to avoid restrictions can just change their ship registrations to nonsignatory countries.

The second international actions benefiting marine areas were the declaration of the Indian Ocean as a whale sanctuary by the International Whaling Commission (IWC) in 1979, and the subsequent decision, in 1994, to declare the circumpolar Southern Ocean south of 40 degrees S as a whale sanctuary for fifty years. Unfortunately, declaration of the Southern Ocean sanctuary has not stopped Japan from killing Minke Whales there under a loophole that allows member nations of the IWC to permit so-called research whaling.

Third was the decision by the eight Arctic nations in 1991 to adopt the Arctic Environmental Protection Strategy. It emphasizes the need to study and monitor the impact of pollution on fragile Arctic ecosystems. While initially its declaration did not include new protected areas, now the Conservation of Arctic Flora and Fauna (CAFF) program proposes 118 new areas. The marine component is extremely limited—representing only about 2.5 percent of the marine part of the Arctic. The CAFF proposal does not include proposals of nongovernmental organizations for three significant marine parks: Barents Sea International Park, Beringia Heritage International Park, and Arctic Ring of Life (Prokosch 1996).

Fourth was the adoption of resolutions by the United Nations General Assembly in 1995 that all nations agree to a moratorium on all large-scale pelagic driftnet fishing on the high seas. Although the driftnet moratorium is now in effect, a number of pirate driftnetters are operating in the Pacific Ocean and the Mediterranean Sea.

Several other existing international programs offer limited opportunity for establishing marine protected areas:

1. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) of 1979 applies to marine animals and refers to the necessity of protecting habitats but does not require establishment of protected areas. Many coastal nations have yet to ratify this convention, including most of the countries of North and South America. (The US has not.)
2. The Regional Seas Program, sponsored by the United Nations Environment Program (UNEP), has officially recognized several regional seas, but all are limited to the nations'

EEZs. Under the program, protocols on environmental protection may be adopted, as by the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region.

3. The UNESCO Man and the Biosphere Program so far applies primarily to land, but could extend to cover marine areas, too. A recently designated biosphere reserve is the first to combine ocean, islands, coast and land areas: the Central California Coast Biosphere Reserve of 850,000 acres. Biosphere reserves are managed by each country using its domestic authorities.
4. The 1980 Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) is a landmark in international conservation law, as it is designed to take an ecosystem approach linking species exploitation to ecosystem conservation. CCAMLR includes a provision for designating special areas for protection and scientific study, even on the high seas. A protocol to the Antarctic Treaty was signed on 4 October 1991 that bans mining activity in the Antarctic region for at least fifty years and designates Antarctica as a "natural reserve, devoted to peace and science." The protocol has been ratified by most of the convention governments, but will not go into effect until all have done so. To date, Russia and Japan have yet to ratify. Although the United States Congress passed the Antarctic Science, Tourism and Conservation Act of 1996 and President Clinton signed it, the US has yet to deposit the instrument of ratification. Since the US is the state of deposit, all that the State Department has to do is to walk across the hall to deposit it. The State Department decided to hold it up until development of regulations by EPA and the US Coast Guard, an action in advance of deposit that it has never required before.
5. The IMO, which regulates many aspects of shipping and dumping from vessels, also has a program of identifying special areas and particularly sensitive areas. It can designate sea areas to be avoided for safety and/or environmental protection (IMO 1991).

CONCLUSION

It is time to press for an international program with authority to establish a system of protected areas on the high seas and on the continental shelves. At the same time that mapping, research, inventorying, exploration, and exploitation of the marine environment go forward, criteria should be developed and planning undertaken for designation and protective regulation of significant ecosystems and critical areas in the oceans. Such a scheme should include wilderness on and under the seabed, in the water column, on the surface, and in the air overhead.

People of the world should not allow the same diminution of viability in the world's oceans, already underway, as continues to occur on land. We must rally international energies to convince nations and international agencies that the mysteries of the seas are worthy of protective programs. ■

Maxine McCloskey is Leader of the High Seas Working Group of World Conservation Union's Commission on Protected Areas.

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Book Reviews

The Song of the Dodo

Shadowbirds: A Quest for Rails

Track of the Coyote

*Mountain Lion: An Unnatural History
of Pumas and People*

THE SONG OF THE DODO: ISLAND BIOGEOGRAPHY IN AN AGE OF EXTINCTIONS

by David Quammen; Scribner (1230 Avenue of the Americas, New York, NY 10020); 1996; \$32.50; 702p.

David Quammen once described the bat as triply-oxymoronic ("a flying mammal that sees in the dark by listening to its own silent screams"). The same could be said of Quammen's staggering new book *The Song of the Dodo*. This is at once a rollicking page-turner about such usually sleepy subjects as evolution, the species-area relationship, and extinction; a book on an obscure topic that couldn't be more far-reaching in its implications; and a vital book that we have badly needed, yet one that nobody could have seen coming.

The umbrella subject of *The Song of the Dodo* is island biogeography—the study of the distribution of species on islands (literal and otherwise). Why islands? Because, as Quammen says, "Many of the world's gaudiest lifeforms, both plant and animal, occur on islands." Like a hermit living without the stabilizing influence of his own kind for too long, evolution on islands can get pretty eccentric. This has attracted collectors and scientists for centuries, most famously Charles Darwin, whose observations in the Galápagos Islands helped him to form his theory of evolution. Darwin does not come off well in Quammen's book; he is set as the foil for Quammen's naturalist hero, Alfred Russel Wallace. While Darwin safely gathered evidence from the comfort of the *Beagle* and mulled it over in England for 20 years, Wallace was living with the natives, enduring insects and monsoons in some of the more remote places on Earth, including eight years in the Malay archipelago. Darwin only found the courage to publish his revolutionary theory under threat of being scooped by Wallace, and which scientist should truly get credit for the basic concept of natural selection is unclear, though Quammen leaves no doubt as to where his loyalties lie.

The efforts of these and other naturalists to make sense of what they were seeing on islands around the world dominates the first half of the book, and the account is riveting. In lesser hands it could have a textbook feel, but Quammen knows how to keep things interesting. He focuses on the personalities, so that we come to feel we know these men, and can share Wallace's excitement as we begin to understand

why the island of Lombok shares more species in common with distant Australia than with Bali, just a few miles away. He also knows when to withhold information and when to clue us in early. *Wild Earth* readers will have an advantage here: by tracing the evolution of the understanding of how species come to be and how they disappear, *The Song of the Dodo* leads naturally to the conclusion that way too many are disappearing way too fast, and something needs to be done. That something, of course, is

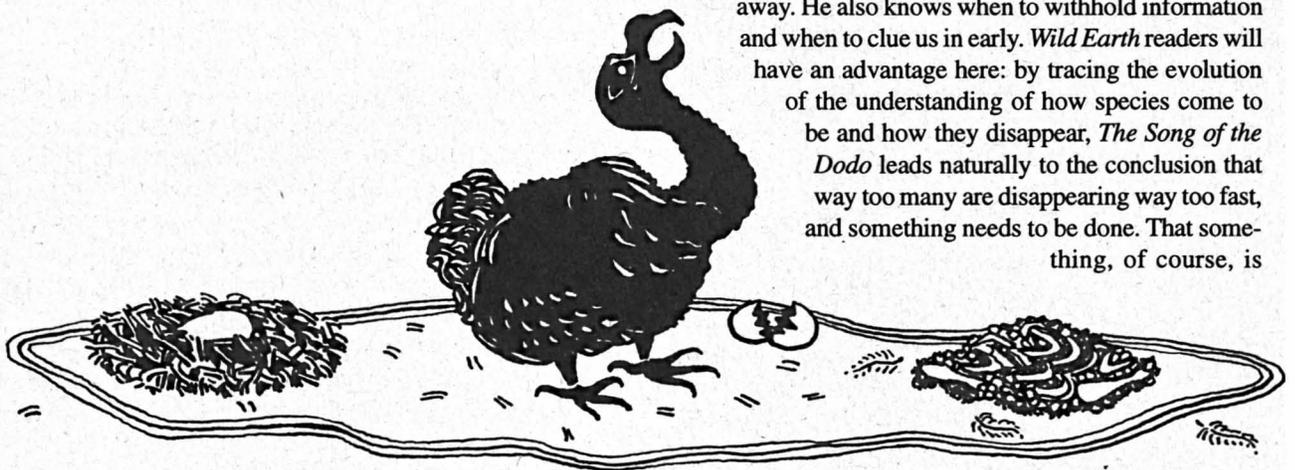
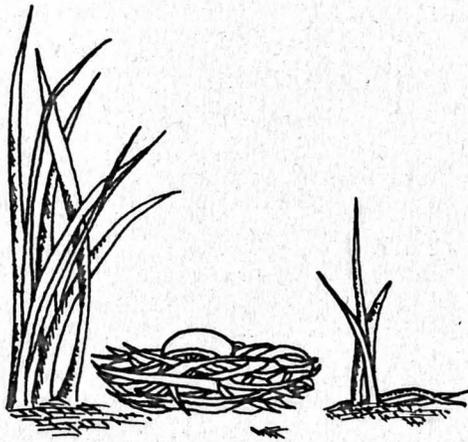


illustration by Mary Elder Jacobsen



The Wildlands Project, which fittingly appears on page 635. It's little more than a footnote, though; I would have liked Quammen to say more about the implications he makes obvious with 600 pages of evidence, but he keeps this a book of "diagnosis, not prescription." He is satisfied just to make the science of conservation biology as difficult to argue against as evolution, and then to point the reader in the right direction.

Another feature that Quammen uses to keep *The Song of the Dodo* rolling is Quammen himself. Readers who remember his *Outside* magazine column will be familiar with his effortless prose and explosive similes. A stocky Brazilian monkey hurls itself between trees "like a badger shot through the forest by catapult." The song of the Indri, the largest surviving lemur, is "a sliding howl, eerie but beautiful, like a cross between the call of a humpback whale and a saxophone riff by Charlie Parker." A pack of Komodo Dragons who are flung a dead goat "pile onto the carcass like NFL linemen attacking a fumble."

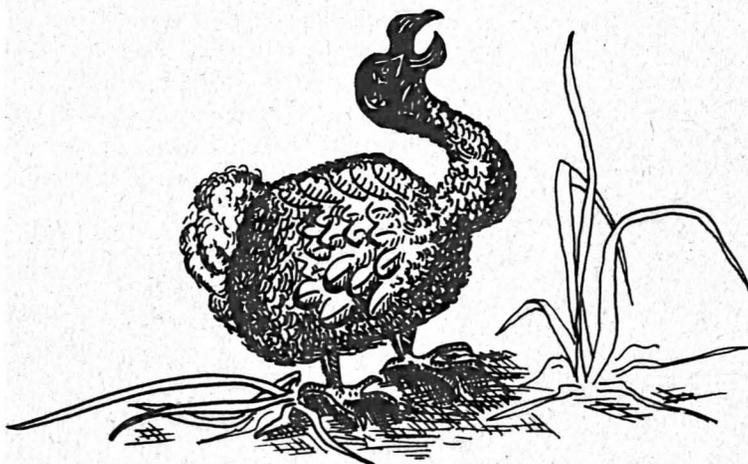
Quammen is able to put these personal observations into the book because this is not simply a linear play-by-play of the birth of two vital fields of science. The story leaps between subjects, loops back on itself, and toggles between the past and present, all held together by Quammen's own curiosity. In *Dodo* and his other works of nonfiction he posits himself as the reader's alter-ego, anticipating questions and reactions with great success. This is a host very concerned with keeping his guests comfortable, well-fed, and entertained.

Quammen's personal journeys to so many of the places discussed in his book allow him to bring to life many of the scientists and species involved in the issues of population viability. E.O. Wilson, Michael Soulé, Dan Simberloff, the Komodo Dragon, the Marine Iguana, and the Golden Bamboo Lemur each get some loving attention, and each is uniquely fascinating. Mauritius, Madagascar, the Galápagos Islands, the Amazon, Tasmania, Guam, the Gulf of California, Komodo, the Aru Islands—Quammen visited them all; indeed, one of the marvels of the book is the dawning realization that this was one heck of an all-expenses-paid trip around the world. Sometimes these visits yield additional information that strengthens the book; other times they serve to make the places more real for the reader, and to allow Quammen to function as a moral compass for the book, as when he spends a night wandering through Tasmania in search of the Tasmanian Wolf (Thylacine), which is believed to be extinct.

Quammen's virtuosity with language also shows itself in his masterful explanations of dense topics. Though he constantly stresses that he is no scientist, he has an immense amount of knowledge and understanding in his head and packs massive amounts of information into this book. Though I've always thought I had a decent grasp of the theory of evolution, somehow the numbers never made sense—a random mutation every 100,000 tries for three and a half billion years still seemed like a hell of a steep climb from *E. coli* to Mozart. But Quammen wields terms like *sympatric speciation*, *adaptive radiation*, and *phyletic evolution* without making them scary, and soon it all seems beautifully simple. ("Speciation is the sharp end of

the wedge, driven between two populations, and phyletic evolution is the wedge's widening butt").

The linchpin upon which Quammen's book turns is the Dodo. This extinct bird native only to the island of Mauritius fits perfectly into the theme of the first half of the book—that weird things happen on islands. The Dodo was indeed a weird thing: a 30-pound pigeon-like bird with tiny, useless wings, a huge naked head, and a big ass (some scholars argue that *dodo* derives from the Dutch *dod-aarsen*, *dod* meaning "round lump" and *aarsen* signifying "rear-end"). Such an animal could have evolved only in an isolated environment devoid of predators and rich in large fruit; such was Mauritius, until *Homo sapiens* hit the beach.



The Dodo serves as the center of Quammen's book because not only is the bird a classic case of evolution gone wild on an island, it's also the classic case of what Quammen calls the "dark double" of island evolution—extinction. Extinction in the last 400 years has largely been a product of human expansion, and has largely occurred on islands. Of 171 species and subspecies of birds gone extinct since 1600, 155 have been confined to islands. "Islands are where species go to die." Why? The answer to that question drives the second half of the book.

But not before Quammen gives the Dodo its long-deserved due. In a perfect example of what makes this book so much more than a purely scientific discussion of island biogeography, he allows himself to picture the end of the last Dodo:



Imagine a single survivor, a lonely fugitive at large on mainland Mauritius at the end of the seventeenth century.... Imagine that she was thirty years old, or thirty-five, an ancient age for most sorts of birds but not impossible for a member of such a large-bodied species. She no longer ran, she waddled. Lately she was going blind. Her digestive system was balky. In the dark of an early morning in 1667, say, during a rain-storm, she took cover beneath a cold stone ledge at the base of one of the Black River cliffs. She drew her head down against her body, fluffed her feathers for warmth, squinted in patient misery. She waited. She didn't know it, nor did anyone else, but she was the only dodo on earth. When the storm passed, she never opened her eyes. This is extinction.

This is not science, but it *is* fine writing. There is something heretical in it, too; I found myself getting nervous as I realized what Quammen was about to do. From the standpoint of the species, one last individual is meaningless, a mere asterisk. This elegy is anthropomorphism, plain and simple, which is discouraged by scientists for being soft-headed, confusing the issues.

But anthropomorphism has been key to Quammen's work since his early *Outside* days, and it is exactly what makes him so good. Quammen's constant similes relating animal behavior to the best and worst in humans are not just funny, they also stress the existence of common ground between the species. They are the sane approach, somewhere between people who dress their dogs in sweaters and Pavlovian scientists who insist that animals are no more than simple programs reacting to stimuli. Without making a point of it, Quammen quietly establishes the idea that, to borrow a phrase from John Donne, no species is an island.

Unfortunately the same cannot be said of the planet's geography. Islands are everywhere, even where there are no islands: as every reader of *Wild Earth* knows, we have carved up the world into fragments of habitat that function as islands because few species can come and go between them. Quammen elegantly traces biogeographers' realization that islands are traps for species, isolating them genetically and making them vulnerable to localized effects. The second half of *The Song of the Dodo* traces the development of this emerging science, sparked by Robert MacArthur, who together with E.O. Wilson wrote *The Theory of Island Biogeography* in 1967. MacArthur died five years later at the age of 42, and because of that Quammen treats him a bit like he does the Dodo—as a figure all the more profound for not being around any longer to get in the way of creative what-ifs; the JFK of island biogeography.

The importance of MacArthur's legacy and the science that has evolved from it is undeniable, and Quammen does a nice job of making it exciting as well. It isn't easy to make dueling papers in *American Naturalist* as compelling as the unintentional race between Wallace and Darwin to transform the scientific world, and occasionally Quammen forces a mythic quality into his prose to make up for what he fears may be his reader's flagging interest; but this is vindicated by the dire urgency obvious in the back of the mind of every scientist we encounter in this book—that we had better do something fast before the titanic crash of biodiversity we are experiencing becomes irreversible. ●

—Reviewed by Rowan Jacobsen, managing editor at *Inner Traditions* in Rochester, VT.

SHADOWBIRDS: A QUEST FOR RAILS

by William Burt; Lyons & Burford (31 West 21 St., New York, NY 10010); 1994, \$25; 172 p., 8 color and 13 B&W photos

There are six kinds of rails in North America, and it is a rare "birder" who has ever seen more than two of them (I've only seen one), much less photographed them. This book is about the Holy Grail quest of trying to find the nests and photograph two of the smallest and rarest of the rare: the Black Rail and the Yellow Rail. Not a single nest of the Black Rail has been found in eastern North America since 1953.

Rails are fleet-footed "shadow birds" that remind one of feathered mice. They inhabit marshes, where they slink through reeds and grass, and rarely take flight. Of all this continent's birds, they are perhaps the most mysterious and magical because they are so elusive and live in such inconvenient places. Not only that, some are nocturnal. Burt writes, "Black Rails are like dreams; in the awake clarity of day you find them gone. Not once in all my slogging daylight hours have I ever glimpsed anything, ever, that could have been a black rail." You know of their presence only by their "song" at night. The little Black Rail, with its beady red eyes, "sings" a froggy perfunctory "de-de-drr" repeated mechanically, with metronomic regularity. The songs of rails are about as unmusical as birds can be. They are all close to "inorganic clicks you can't believe are authored by a bird, or anything else alive—yet, you sense that every caller is obsessed, he is unstoppable..."

Burt, too, is obsessed and unstoppable as he searches for the shadow birds all over North America, mostly at night and with specialized bulky camera gear, in the birds' damp haunts. This makes for humorous encounters with various animals, including birders, landowners and other humans.

Birds hide their nests "with every last evolved instinctual whit of cunning that they have." Burt attempts to find the nests of the two sparrow-sized rails (some rails are the size of chickens, and their nearest relatives are probably cranes) perhaps because "when you have found a bird's nest, you have found him out. You have found the very center of his life, and his dearest secret." And that is what modern exploration is all about: searching for the heart of Nature through a fellow creature that is part of the wild. It is hard for me to conceive of a bird that is more inextricably woven into one of the most evocative types of wild Nature, the marsh.

Marshes are shrinking. We have valued them not enough. Many of our remaining wetlands are being reduced to little more than museum pieces. During his search Burt laments: "There are yellow rails in Michigan, on the Upper Peninsula, but they are within the sacrosanct confines of a National Wildlife Refuge, where the unaffiliated photographer could expect no welcome." Some birders were also not sympathetic to him "meddling" in a marsh at night. Sadly, most of us are unaffiliated, and can't be converted *except* by meddling and muddling through a marsh, *in Nature*. Burt's own quest was started in that way "one day by accident," when he stumbled onto the nest of a King Rail. This was a gift, an opportunity, and he took it.

His search eventually took him to the North Dakota coulees, and he writes:

What havens these coulees are. Where else can you find this intimate adjacency of marsh and prairie birds? At the one hand are the riotous water birds; at the other, the solitary songs of open species: in one ear you have the tomfoolery of squawking, slashing ducks and coots, and in the other the windy songs of sparrows and meadow larks and longspurs.— There is one other beautiful thing about these North Dakota coulees, and that is the unbroken native prairie that lies intact upon their flanks. Seldom anymore do prairie birds still sing in pristine prairie homes, but here they do—.

And there is yet another beautiful thing about these coulees: There are no boundaries, or rules.— They are refuges, to be sure—not Refuges, however. Too small and fragmentary for federal recognition, they are left in the hands of private owners—so you are denied, or rather spared, the amenities of the National Wildlife Refuge visitor centers with flush toilets and interpretive brochures and maps, and staff to answer questions; the observation towers, boardwalks, nature trails, and periodic guided tours, with signs to tell you where to stop, and what to see, and what the annual duck production is in thousands...The feeling that pervades is one of management. It is all planned, you sense, not wild; it is merely delegated space where plants and animals are permitted and provided for, like Indians on a reservation. One more precinct of man, that's all.

Burt admits that it has to be so, "or else small boys would harass the birds, and bigger boys would shoot them!" He wants you to discover, and you can't do that where you are not allowed away from the car or trail. He wants you to explore where "nobody knows which sparrow nests on the grassy hills, which rails or bitterns in the marsh—"

Burt makes no formal appeal for wilderness. He doesn't need to. His simple experiences speak volumes for wild Nature, and they speak for themselves. I have always been rankled by the very idea that you need "permits" to become intimately involved with Nature. The idea that Nature is something "out there" that you regulate and control like a museum exhibit has the effect of associating Nature-loving with timidity and compliancy. Rather it should be opposite, so Nature-lovers would be emulated by common people, not pitied or condescendingly tolerated by them.

The days of fighting Grizzly Bears are long over. However, we need venues for adventure, courage, and perseverance. We need a revival of the ways of the naturalist to which the young can aspire. They will not aspire to emulate those who walk along designated Nature trails and whose exposure of the beauties is that in museum displays. But if there are no great reserves, then where else can we walk?

There are two ways to escape the control mentality, and both suggest themselves in this wonderful book. First, rails are a wonderful metaphor for all of the other wild unseen creatures that will never be on public displays in museum reserves. We can *all* be explorers by pursuing the unknown. Ultimately, the rails need their big reserves, but perhaps more importantly, so do *we*.

Second, Burt's book shows also the value of even *little* private reserves. As we search for the elusive and secretive Black Rail, we can find romance and freedom by protecting a one acre marsh or woodland. It is easy to dismiss such efforts as puny, given the huge need for *large* wilderness; but the love of wilderness can be inspired by finding a "rail's nest" in the back slough. Every acre saved counts.

I digress here, however, from a wonderful adventure story. Burt has the grace not to dwell on the obvious. The most important content of *Shadowbirds* is the unspoken. Along the way he delights us in the simple sensuous pleasures of the marsh. This book is a little gem that should not fall through the cracks. It is in a prominent place on my bookshelf, along with other classics of Nature writing, of both known and unknown authors. ●

—Reviewed by Bernd Heinrich, author of *In a Patch of Fireweed*, *One Man's Owl*, *A Year in the Maine Woods*, numerous scientific papers and books, and, most recently, *Thermal Warriors* (Harvard Press, 1996).

TRACK OF THE COYOTE

by Todd Wilkinson; photography by Michael H. Francis; NorthWord Press, Minocqua, WI; 1995; 138p.

In *Track of the Coyote*, Todd Wilkinson, with the help of photographer Michael Francis and biologist Bob Crabtree, seeks to create a clear image of the Coyote, *Canis latrans*, a creature much maligned by rural Americans and government predator control programs. Together, Wilkinson and Francis recount in words and images the tale of the Bison Pack of the Lamar Valley in Yellowstone National Park, a story uncovered by Crabtree during a five-year study. A year with the Bison Pack and its matriarch, a charismatic alpha female, provides the book with a solid skeleton. The flesh is found throughout, in clear discussions of the life history, clan structure, territoriality, and diet of the Coyote.

The book is brought to life with a bold portrayal of the evolving cultural images of the Coyote—from the trickster of Native American lore, to the object of intense persecution by the livestock industry and Animal Damage Control. Crabtree suggests that years of misdirected and uninformed predator control have only aggravated Coyote problems. Killing Coyotes without regard to their social structure, Wilkinson writes, is a "recipe for chaos." When Coyote pack structure is disrupted, more members breed, and each pair produces more pups. To top it off, Coyote hunters have added selection pressure favoring those Coyotes who can outsmart humans. Says Wilkinson, "The era of the 'Super Coyote' has arrived."

The book suggests alternatives to predator control, such as guard dogs and electric fences. Wilkinson does not pretend to have a panacea for human-Coyote problems, but suggests that we take another look at the "trickster," and, in some places, leave it alone. ●

—Reviewed by Gregory Hanscom, graduate student at the University of Montana



MOUNTAIN LION: AN UNNATURAL HISTORY OF PUMAS AND PEOPLE

by Chris Bolgiano; Stackpole Books, Mechanicsburg, PA; 1995; hardcover \$19.95; 186p.

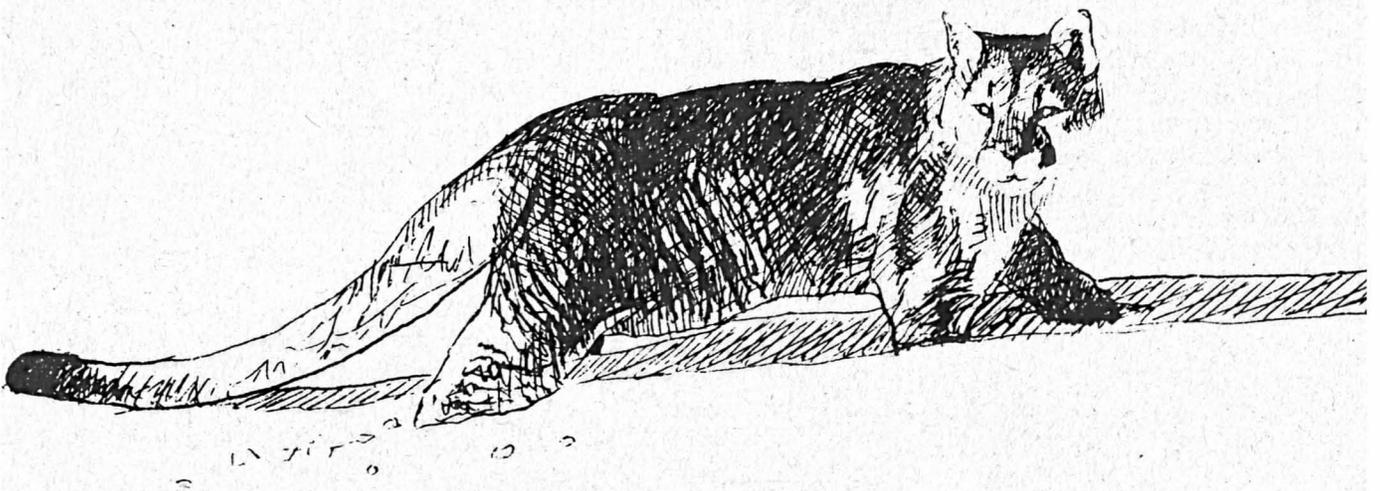
Chris Bolgiano makes no pretense of capturing the elusive creature about which she writes. Her book *Mountain Lion* is dense, eclectic, and tirelessly researched. It is infused with an atmosphere of mystery and reverence toward the big cat and the people who have glimpsed it. The book is as much about humans as it is about lions, for, as biologist Harley Shaw writes in *Soul among Lions*, "In sustaining our image of objectivity, we as biologists pretend that we study wild animals. In reality, we inevitably study an interface between ourselves and other species..." It is precisely such an interface, the one binding *Homo sapiens* to *Felis concolor*, that Bolgiano explores in this book.

When Europeans first reached the Americas, Bolgiano points out, the range of the Mountain Lion encompassed most of the western hemisphere, from the tip of South America to northern Canada. While she travels extensively through the US in search of human-lion interaction, she also draws from Central American traditions, and makes reference to European attitudes toward lions [of the much larger Asian and African species] dating back to cave paintings and ancient stone carvings. Her personal encounters with lion experts, elders, and her home in the Alleghenies provide the anecdotal framework for thorough discussion of cultural attitudes toward lions.

In the first section, the author recounts visits with a Navajo game manager and a medicine man. A walk to the Shrine of the Stone Lions, an ancient Pueblo monument, leads to a discussion of the varied attitudes of native tribes toward the Mountain Lion. The history of European interaction with the cat is interwoven with the story of settler Adam Rudolph and the Panther on Paddy Mountain, a piece of folklore from Bolgiano's native Allegheny Mountains. In order to write about lion hunting, the author joins guides in Utah's Dixie National Forest in a hound-aided chase. Similarly, she travels to the north-west corner of Yellowstone National Park to speak with biologist Kerry Murphy about lion science and its history.

The later chapters of the book focus on current issues of human-lion interaction. Bolgiano looks specifically at the preservation of the Florida Panther and the possible return of the Eastern Panther to New England. Throughout, she acknowledges the complexities of the issues: lion sightings are unreliable and often a product of hopeful imaginations; existing lions may be escapees or abandoned pets; if healthy lion populations are to be restored throughout much of the continent, broad areas of habitat must be set aside and protected. Her book goes a long way in pointing toward a new place in human consciousness for America's Lion. Her final aim: "integration: to balance the extremes without denying the complexities." •

—Reviewed by Gregory Hanscom



SAMPA III Conference

The third international Science and Management of Protected Areas Conference is scheduled for 12-16 May 1997 in Calgary, Alberta. This year's theme is linking protected areas with working landscapes and conserving biodiversity. For information, contact Patricia Benson, SAMPA III Conference Secretariat, #552, 220 4th Avenue SE, Calgary, Alberta, Canada T2G 4X3; 403-292-4519; 403-292-4404 fax; sampa3@pch.gc.ca.

Natural Areas Association Conference

The Natural Areas Association will hold its 24th Annual Conference 27-30 August 1997 in Portland, Oregon at the Red Lion-Lloyd Center. This year's theme, Bridging Natural and Social Landscapes, will focus on finding areas of common ground and forming linkages between the natural and the cultural/socioeconomic values of landscapes. The conference will include symposia, contributed papers and poster sessions, field trips, social events, and business meetings. For information, contact Kathleen Bergquist, Conference Coordinator at 503-579-2920; 503-579-0468 fax; kbconnor@ix.netcom.com.

Liberty Campaign

The World Society for the Protection of Animals (WSPA) is an international animal protection organization striving for the humane treatment and protection of all animals. WSPA's Liberty Campaign is devoted to rescuing and rehabilitating bears who have been abused in captivity. Liberty protects bears throughout the world from poaching, cruelty, and exploitation. Funds raised through WSPA's Friend of Bears program go directly to the Liberty Campaign. To become a Friend of Bears call 1-800-LIB-BEAR or contact WSPA, 29 Perkins St., POB 190, Boston, MA 02130.

Association for the Study of Literature and Environment Conference

The second biennial conference of the Association for the Study of Literature and Environment (ASLE) will take place on 17-19 July 1997 at the University of Montana in Missoula. Gary Snyder, Rick Bass, Pattiann Rogers and David Abram are among the prominent writers and scholars participating in the conference. For more information, contact John Talmage, President-Elect, ASLE, 6538 Teakwood Court, Cincinnati, OH 45224-2112; 513-681-0944; jtall@interramp.com.

Population and Environment

The journal *Population and Environment* covers all aspects of the interface of population with the social and natural environment, both internationally and domestically. Send manuscripts to Virginia Abernethy, editor, Vanderbilt University School of Medicine, Department of Psychiatry, Nashville, TN 37232-2647 and subscription orders to Human Sciences Press, 233 Spring St., New York, NY 10013.

Forest Ecology Network Forms in Maine

The Forest Ecology Network evolved from the group Ban Clearcutting, which was successful in motivating over three-quarters of Maine voters to vote for change in the destructive forestry practices in the North Woods. FEN will work to protect and restore natural forests in Maine through advocacy, citizen activism, and education. People from New England and around the coun-

try who care about the Maine Woods are invited to join. For information, email to fen@envirolink.org; write to POB 2218, Augusta, ME 04338; 207-623-7140.

Whole Terrain

Whole Terrain is the annual publication of the Environmental Studies Department of Antioch New England Graduate School and is dedicated to those who have chosen the environmental field as the basis of their professional lives. It serves as a forum for people who care and work for the environment to share their work experiences, philosophies, and reflections. The journal is available for \$5 from *Whole Terrain*, Antioch New England Graduate School, Department of Environmental Studies, 40 Avon St., Keene, NH 03431; 603-357-3122 ext 272.

Nature Literacy Series

The Orion Society inaugurates its new Nature Literacy Series with the release of *Beyond Ecophobia: Reclaiming the Heart in Nature Education* by David Sobel. The Nature Literacy Series presents instructive essays by visionary environmental thinkers for parents, teachers, and institutions seeking to restructure and revitalize environmental education. *Beyond Ecophobia* is an essential education resource for those who want to nurture a new generation of environmentally sensitive and regionally grounded citizens. *Beyond Ecophobia* is available for \$5 plus \$1 shipping and handling from The Orion Society, 195 Main St., Great Barrington, MA 01230.

New Worldviews

Worldviews: Environment, Culture, Religion is a new international academic journal that explores the environmental understandings, perceptions, and practices of different cultures and religious traditions. *Worldviews* will adopt an interdisciplinary approach, drawing from environmental studies, anthropology, geography, philosophy, religious studies and theology. Individual subscriptions are available for \$50 (3 issues/year) from The White Horse Press, 1 Strond, Isle of Harris, HS5 3UD, UK; fax 0(+44)1859 520 204; aj@erica.demon.co.uk. Submission guidelines can be obtained from Dr. C.A. Palmer, editor, University of Greenwich, School of Environmental Sciences, Creek Road, Deptford, London, England SE8 3BW.

Great Plains Restoration Council

A new organization devoted to ecological restoration of the Great Plains has recently formed. The GPRC will work for establishment of a Buffalo Commons and expanded wildlife habitat in the American heartland. For information or to become involved, contact GPRC, POB 1571, Pueblo, CO 81002; 719-544-2346.

Deep Ecology Workshop, 14-18 July 1997

The Way of the Mountain Learning Center and Faraway Foundation will host a five day wilderness philosophy and experiential ecology workshop at Faraway Ranch near Telluride, Colorado. Workshop presenters include Dolores LaChapelle, George Sessions, David Abram, and Michael P. Cohen. The workshop fee is \$450 (all meals included) or \$350 (lunches only). For information, contact Greg Cumberford at Way of the Mountain, POB 280, Norwood, CO 81423; 888-609-2414 (toll free); wom@frontier.net.

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1 • Spring 1991 Ecological Foundations for Wilderness, The Earth First! Wilderness Preservation System, A Native Ecosystems Act. Proposals for Florida, the Klamath Mountains, and Yellowstone. "Is Population Control Genocide?" by Bill McCormick. Dolores LaChapelle uncovers the wild human. Dave Foreman's "Dreaming Big Wilderness," and Howie Wolke's "The Impoverished Landscape."

2 • Summer 1991 The New Conservation Movement, ancient forests on trial, Grizzly hunting in Montana, killing the coasts, what wilderness can do for biodiversity. Ski development in White Mountain National Forest, an Ancient Forest Reserve proposal for the Mendocino National Forest, and exploring Chile's rainforest. Howie Wolke's Wild Rockies, and Part 2 of "Is Population Control Genocide?"

3 • Fall 1991 SOLD OUT.

4 • Winter 1991/92 Devastation in the North: Canadian deforestation, threatened northern rivers, Hydro-Quebec vs. James Bay, natural gas development.... The BLM in Arizona, the Finger Lakes of New York, and the North American Wilderness Recovery Strategy. Saving Yellowstone, tallgrass prairie, and the White Pine. Roderick Nash's vision of an "Island Civilization," and "Biologists, Biophiles, and Warriors" by Reed Noss.

5 • Spring 1992 SOLD OUT.

6 • Summer 1992 Endangered species crisis, Perdido Key Beach Mouse, speleomanders and trogloderps, Eastern Hemlock, and fungus. Civil obedience, the cost of compromise, "wise use" lies, deep ecological practicality, the language of owning, metaphor in science. Japan's beech forest, Shenandoah National Park, Monongahela wildlands.

7 • Fall 1992 Earth Summit, Endangered Species Act, Grandfather Mountain. Radical environmentalism, a wilderness work ethic, the dignity of wild things. Lynx, Woodland Caribou, tarantula, Sugar Maple, woodpecker wilderness, Adirondack old growth. Southern California biodiversity, Texas's Big Bend Ecosystem. Max Oelschlaeger's "Mountains that Walk."

8 • Winter 1992/93 Patriarchal management, Supreme Court setbacks, "natural law" and human population, planetary oncology, grassroots resistance in developing countries. Coral reefs, jellyfish, wild fossils, the Eastern Indigo Snake, and zoos. A Greater Desert Wildlands Ecosystem proposal, Colorado River delta. Howie Wolke's "Bad Science Lacks the Visceral Connection."

• Special Issue #1: The Wildlands Project: Plotting a North American Wilderness Recovery Strategy. TWP Mission Statement, preliminary proposals for the southern Appalachians, northern Rockies, Adirondacks, and Paseo Pantera. "A Vision for the Meantime" by Michael Soulé, "TWP Land Conservation Strategy" by Reed Noss, "Developing a Regional Wilderness Recovery Plan" by Dave Foreman, "Coming In To The Watershed" by Gary Snyder.

9 • Spring 1993 The power of hope, primitivism, avian activism, mitigation scams. Hydro-Quebec, Pacific Rim forest, tropical biodiversity (Part 1). A proposal for a park without fences: Adirondacks, the Ozarks, and the Oregon Coast Range. "In Defense of Wildlife and Open Expression" by Michael Frome. "The Breadth and Limits of the Deep Ecology Movement" by Arne Naess.

10 • Summer 1993 The Zero-Cut solution, ozone depletion, topophilia, organic archeology, immigration. Wildlife contraceptives, predator eradication, bear wisdom. The Greater Salmon/Selway Project, deep ecology in the Former Soviet Union, tropical biodiversity (Part 2). Threats to Southern Appalachia, Alabama proposal, Eastern forest recovery. "Arizona, The Floating Desert" by Gregory McNamee.

11 • Fall 1993 Biodiversity, caves, ecological economics, land management lingo, legal standing in environmental litigation. Atlantic Salmon, imperiled Gorillas, Kittatinny Raptor Corridor. The Selkirk Mountains, Wild and Scenic Rivers, wildland restoration. "The Rhizome Connection" by Dolores LaChapelle and "Crawling" by Gary Snyder.

12 • Winter 1993/94 Overworking the North Woods, the Tuliptree, Sutter Buttes, freedom of information, consensus vs. independent activism. Bats, endangered invertebrates, exotic pests. The evolving Wilderness Area model, Rocky Mountain National Park reserve system proposal, Yellowstone to Yukon proposal, South African population stresses.

13 • Spring 1994 Wilderness Land Trust, Sea Shepherd, environmental education, bonding with the wild, whole-tree logging, ozone depletion, the anatomy of a burn, Spruce-fir Moss Spider. Mohawk Park, Nova Scotia, southern Utah, nuclear dump in the Mohave Desert, Brookhaven irradiated forest, Southern Appalachian National Forest mismanagement, Vermont wilderness. "Saving Aquatic Biodiversity" by Allen Cooperrider and Reed Noss, and "The Enemy" by Edward Abbey.

14 • Summer 1994 Wilderness Watch, "experimental, non-essential" populations, building a legal file, bioregional mapping, silvicultural fiction, a road-fighting strategy. Hanford's sage-steppe, the impact of logging on songbirds; Bald Eagles, Gila Trout, serpentine rock, hemp. Eastern old growth, butchering the Salmon-Selway, regenerating bush and soul in Australia, Great Plains restoration (Part 1). "A Walk Down Camp Branch" with Wendell Berry; William Catton on carrying capacity.

15 • Fall 1994 Environmental lawyers, biocentric broadcasting, resisting mining, historical records in mapping. Red-cockaded Woodpecker, wombats, seabird restoration, fish stocking. Central Appalachian forests, the Algoma Highlands, old-growth Acadian hardwoods, Pacific Coast wilderness, Thoreau Regional Wilderness Proposal, Great Plains restoration (Part 2). "The Comucopia Scam, Part 1" by Sandy Irvine.

16 • Winter 1994/95 Locking up wildlands, bureaucratic jargon, biophilia vs. technophilia, natural fire, road removal. Urban Peregrine Falcons, snails, cryptogamic soils, the Red Maple. Wisconsin timber law, restoring Lebanon, Great Lakes biodiversity, and "The Comucopia Scam, Part 2." Dave Foreman, Reed Noss, and J. Baird Callicot debate the idea of Wilderness.

17 • **Spring 1995** Grassroots vs. national, Free Market Environmentalism, and community-serving economics. Prairie dog ecosystems, wild to domestic animal ratios, wildlife biologist Susan Morse, India's threatened mangroves, Species Requiem Day proposal, vernal pools. Palouse Prairie, Banff, Hoosier forests (Part 1), Minnesota recovery, and "The Cornucopia Scam, Part 3." J. Baird Callicot's retort, and "Wilderness Does Work" by Michael Frome.

18 • **Summer 1995** Logging and wildfire, great trees of the Great Smokies, wetlands, the environmental consequences of being born in the USA. Gulf Sturgeon, bumblebees, illegal wildlife trade, grazing issues. Utah wilderness, Nevada biodi-

versity, a conservation plan for the Columbia Mountains, and Hoosier forests (Part 2). "Loss of Place" by Howie Wolke, "Health Implications of Global Warming and the Onslaught of Alien Species," by Michael Soulé, and a journey to Bristol Cliffs Wilderness with John Elder.

19 • **Fall 1995** Sustainable silviculture, SLAPPs, conservation easements, global warming and The Wildlands Project. Cow Cops, Spirit Bears, Buffalo Commons, the Black Birch. Eastside forest restoration, old growth in the Adirondacks and Catskills, Hoosier forests (Part 3), Gila River-Sky Island Region proposal. "Private Property and the Common Wealth," by Wendell Berry and "Scenes on a Round River," by Rick Bass.

20 • **Winter 1995/96 The Wildlands Project Special Issue #2** TWP mission statement, preliminary proposals for the Klamath/Siskiyou region, the Northern Forests, Minnesota Biosphere Recovery Strategy. "Wilderness: From Scenery to Nature," by Dave Foreman, "What Should Endangered Ecosystems Mean to The Wildlands Project," by Reed Noss, "Testimony," by Terry Tempest Williams, "Obstacles to Implementing The Wildlands Project Vision," by Steve Trombulak, Reed Noss, and Jim Stritholt.

21 • **Spring 1996** ONRC on Environmental organizing, Biotechnology vs. Biodiversity, Limitations of Conservation Easements, A Deep Photography Ethic. Central Appalachian forest types, the Adirondacks, Tomगत National Park. Special Section: Poems for the Wild Earth. "The Leopold's Shack," by Stephanie Mills, "Are Ecosystem Processes Enough?" by Michael Soulé, "Boat of a Million Years," by Gary Snyder. Bill McKibben's thoughts on finding common ground with conservatives.

22 • **Summer 1996** Grazing and Forest Health, The Fish Wars, Private Lands in Ecological Reserve Systems. Alaska's Honker Divide and Arctic Refuge; Northern Chihuahua; Cromer Ridge, Kentucky. Proposals for a Caribou Commons in Manitoba and an inter-hemisphere conservation corridor. "Text, Civility, Conservation, and Community" by Bill McKibben, "The White Ash," by Bob Leverett.

23 • **Fall 1996** Religion and Biodiversity, Eastern Old Growth: Big Tree Update, Gary Nabham on Pollinators and Predators, South African Biodiversity, NPS Prescribed Fires in the Post-Yellowstone Era, Alaska: The Wildlands Model, Why are Cougars Killing People?, The Adirondack Blowdown, The Yukon Wildlands Project, Mad Cows and Montanans, Humans as Cancer, Wildlands Recovery in Pennsylvania

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

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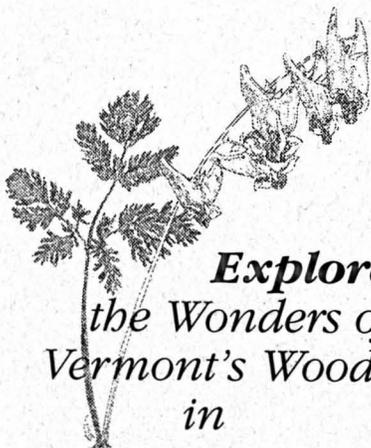
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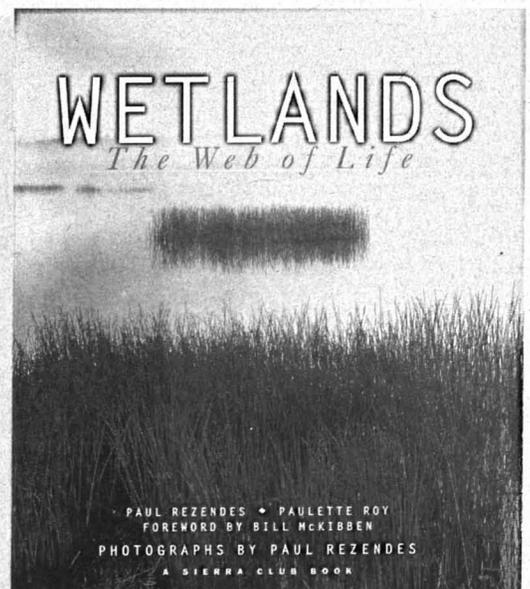
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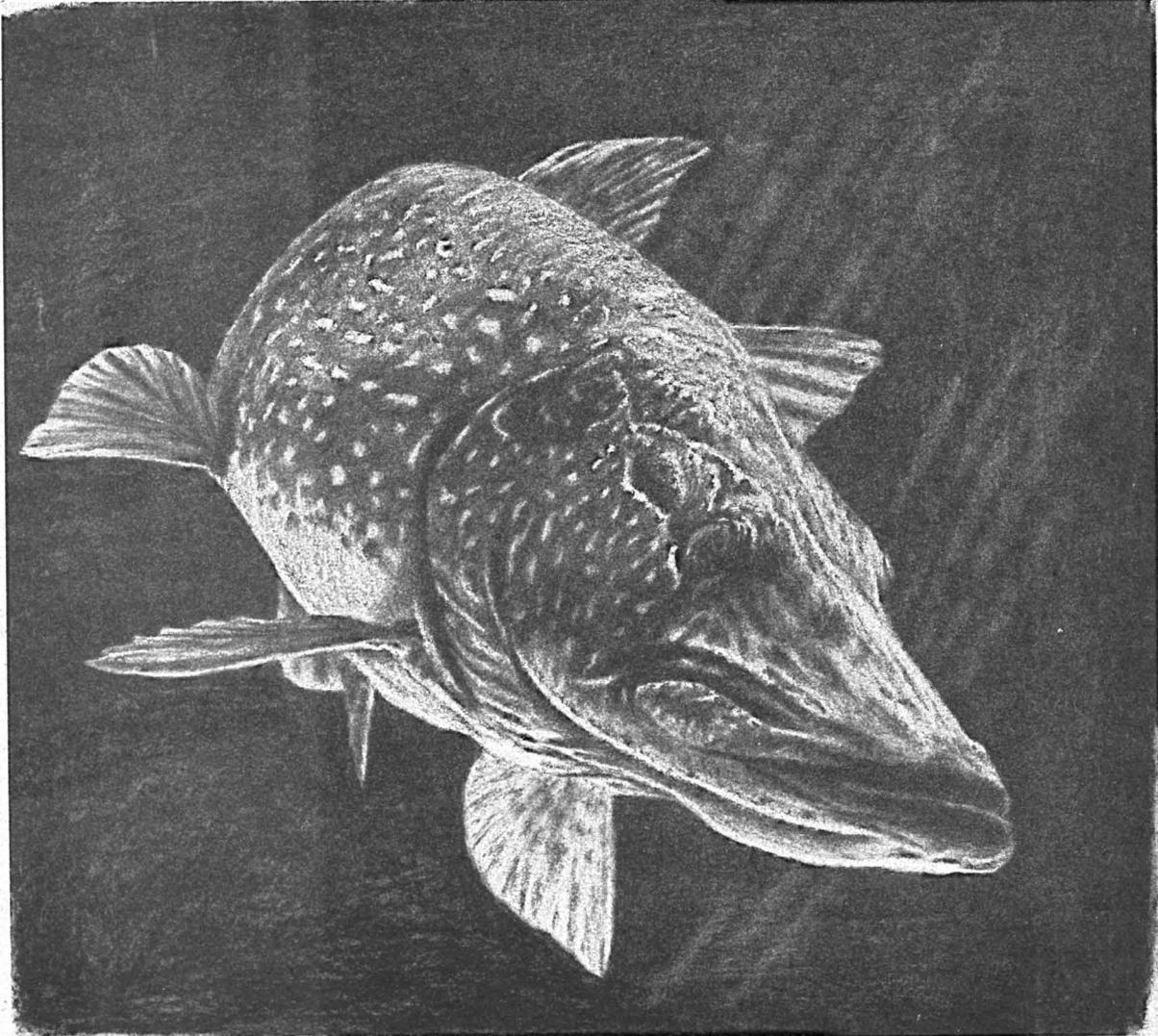
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Northern Pike (*Esox lucius*)

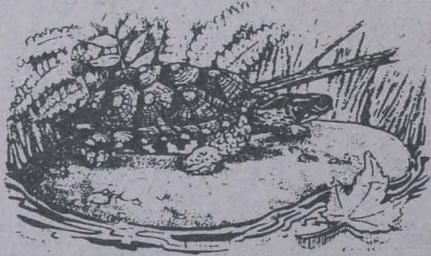


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THOUGH IN A CLASS of many thousands, the Northern Pike stands out (or swims out) among bony fishes for its comeliness, size, and range. Possessed of fine and marbled scales, and weighing up to 45 pounds, *Esox lucius* is reputedly the most widely distributed fresh-water fish in the world, inhabiting lakes and streams across much of North America and Eurasia. Along with its cousin the Muskellunge (*Esox masquinongy*), *lucius* is among the northern fishes most hotly pursued by sport fishers. Northerns and other pike prey upon smaller fish and spawn each spring in tributary streams or shallow lake waters. The Northern is easily distinguished from the Muskie in that *lucius* is dark in color with light marks, whereas *masquinongy* is light with dark marks. The two congeners do occasionally hybridize, however, as if to befuddle fish-watchers.

Dubiously exalted to "game" fish status, the Northern Pike has been heavily managed and manipulated, and has been transplanted into some waters where it does not belong. Still, it remains a symbol of the wild North, having so far been spared most of the insults (hatcheries, dams, clearcuts...) that have reduced many salmon stocks to "oatmeal with gills" (Kahn 1992) or flummery with fins (Davis 1997).

Canadian artist Robert M. Smith (P.O. Box 23003, North Bay, Ont., P1A 3V2), whose artwork also appears on the cover, 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 journal *Wildflower*.



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