



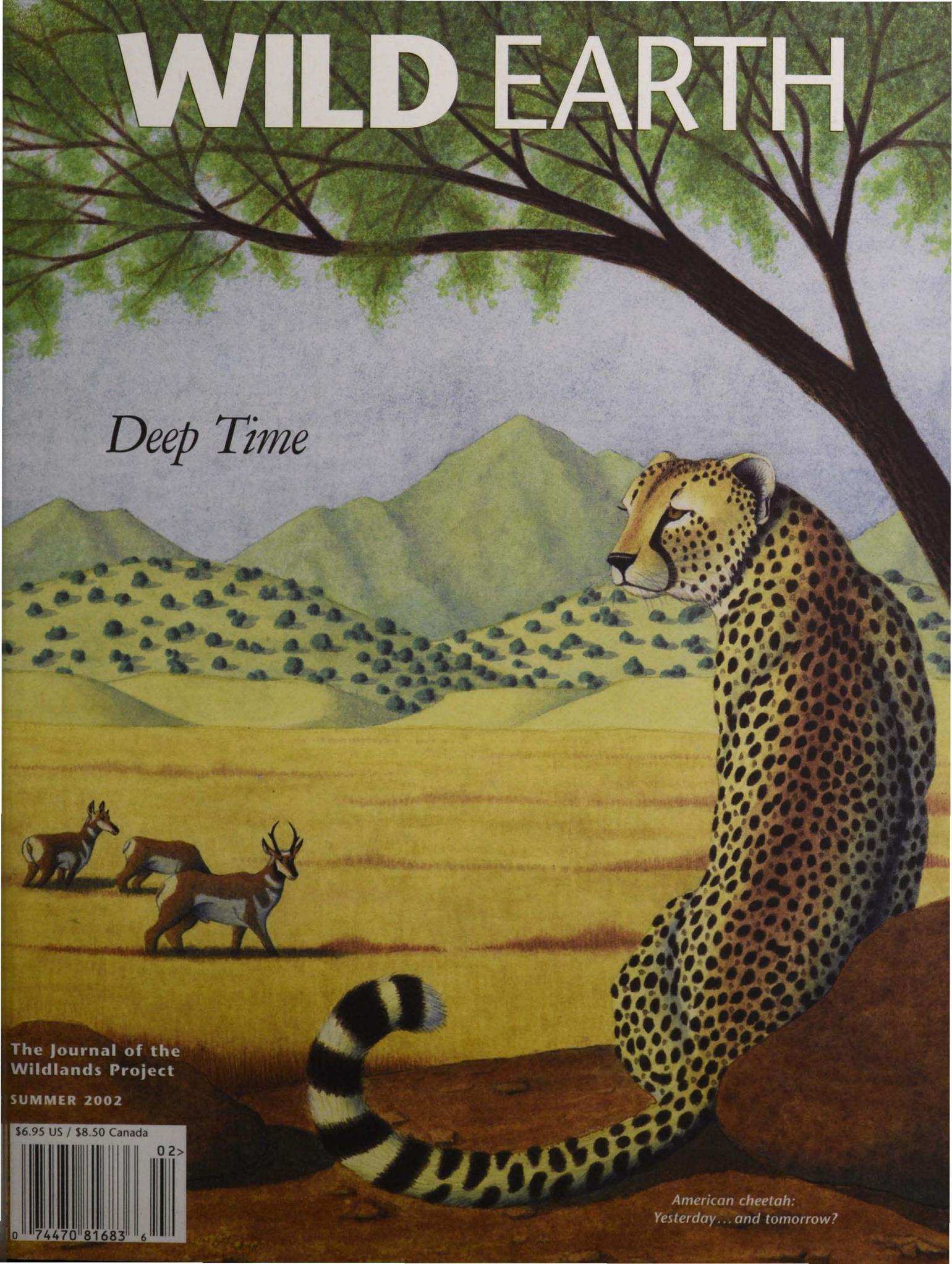
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WILD EARTH



Deep Time

The Journal of the
Wildlands Project

SUMMER 2002

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02>



*American cheetah:
Yesterday... and tomorrow?*

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WILDLANDS PROJECT



reconnect restore rewild

WE ARE AMBITIOUS. We live for the day when grizzlies in Chihuahua have an unbroken connection to grizzlies in Alaska; when wolf populations are restored from Mexico to the Yukon to Maine; when vast forests and flowing prairies again thrive and support their full range of native plants and animals; when humans dwell on the land with respect, humility, and affection.

Toward this end, the Wildlands Project is working to restore and protect the natural heritage of North America. Through advocacy, education, scientific consultation, and cooperation with many partners, we are designing and helping create systems of interconnected wilderness areas that can sustain the diversity of life.

Wild Earth—the quarterly publication of the Wildlands Project—inspires effective action for wild Nature by communicating the latest thinking in conservation science, philosophy, policy, and activism, and serves as a forum for diverse views within the conservation movement.

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ON THE COVER

watercolor with colored pencil by Douglas Moore, ©2002

The American cheetah (Acinonyx trumani) roamed the prairies until 13,000 years ago. The fastest living North American mammal, pronghorns (Antilocapra americana) may reach 60 miles per hour running from the ghosts of cheetahs past. Some evidence suggests that the cheetahs now living in Africa (Acinonyx jubatus) descended from a New World ancestor that moved across the Bering landbridge roughly 3 million years ago. Cheetahs appear to be the only genus of living cats that is North American in origin. Could they, someday, come home?



Paul Shepard: Whistle Blower for Nature

ONE NIGHT IN AFRICA, we came upon a leopard just after she had killed an impala. We watched as she carried her prey up 25 feet to the crook of a tree. Her muzzle was pink from warm blood. She was the most beautiful creature I had ever seen; I was in the most wonderful moment of my life. Paul Shepard would have understood. The leopard was not a figment of my imagination; ah, but the leopard fueled my thoughts. And does to this day.

For 30 years, I have been in the thick of the conservation movement. Through those decades I have been inspired by the genius of Paul Shepard, who is to my mind the most important thinker of our time. I stumbled onto him at the beginning of my con-

servation life in 1971 by reading his anthology with Daniel McKinley, *The Subversive Science: Essays Toward an Ecology of Man*. Paul Shepard's introduction caught my fancy: "The rejection of animality is a rejection of nature as a whole."¹ Aha, thought I, another who understands we are animals! Over the next decade as his books—*The Tender Carnivore and the Sacred Game*, *Thinking Animals*, and *Nature and Madness*—came out, I gobbled them up like sizzling elk steaks.

Paul Shepard's lifelong quest was to answer the thoroughly practical and urgent question, "Why do men persist in destroying their habitat?"² He went deeper than anyone before in seeking an answer: "An uncanny something seems

to block the corrective will, not simply private cupidity or political inertia."³ His answer was that agriculture, pastoralism, and civilization had progressively cut us off from Nature, which led to the failed maturity of individuals and then to the madness of society. He wrote that "we have, in the course of a few thousand years, alienated ourselves from our only home, planet Earth, our only time, the Pleistocene, and our only companions, our fellow creatures."⁴ This answer is deeply radical—in that it goes against the self-love of civilization, the arrogance of humanism, and the idea of progress. Its truth gleams like a cat's tooth.

Shepard's books are demanding. They aren't nature fluff. Ultimately,

This essay is adapted with permission from Dave Foreman's introduction to a new edition of *Man in the Landscape* by Paul Shepard that will be published in fall 2002. The book is the latest in a series of Shepard's works reissued by the University of Georgia Press (800-266-5842).

however, Shepard is challenging to read because most people—nature lovers included—can't handle the truth.

Shepard continued the Darwinian Revolution by creating the discipline of human ecology—looking at human beings and their relationship with the land from an ecological point of view. In doing so, he blew away the Myth of Human Exceptionalism—that humans are not really biological—and offended our humanistic hubris.

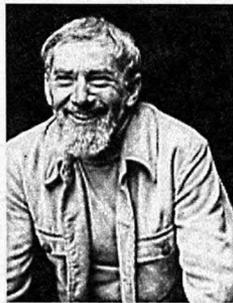
Let's consider my theory of why Paul Shepard was able to see so clearly that our emperor (agriculture-based civilization) wore no clothes. What helped make Paul Shepard the fearless slayer of comforting myths? To be sure, his stabbing intellect and rigorous scholarship were central to that quest, but I believe that three factors in Shepard's early experience helped prepare him to recognize and articulate that our species is fundamentally part of the Pleistocene—to blow the whistle on agriculture and civilization.

First, unlike many academics who have wrestled with the Human/Nature problem, Shepard was an outdoorsman and conservationist before he went to graduate school. In the years immediately following World War II, Shepard did his undergraduate work in wildlife conservation at the University of Missouri—where Aldo Leopold's *Game Management* was the text. Before going to graduate school at Yale in 1950, he worked for the Missouri Conservation Federation for a year. He was a hunter and a fisherman, an egg collector and a butterfly netter. During graduate school and as a young professor, he was conservation chairman of the National Council of Garden Clubs (a major conservation player in those days) and worked as a seasonal natural-

ist for the National Park Service in Glacier, Crater Lake, and Olympic National Parks.

During the 1950s and early 1960s, the modern conservation movement was forged in the fire of successful campaigns against the proposed Echo Park Dam in Dinosaur National Monument and for passage of the Wilderness Act. Tools that conservationists today take for granted—national organizing, publicity, and mass letter-writing campaigns to gain attention from Congress and other policy-makers—were invented during those heady days. Shepard represented the Garden Clubs on the Natural Resources Council of America—a Washington, D.C.-based coalition of national conservation groups.

This grounding in the real world of trout and bears and the other real world of congressional hearings, campaign organizing, and conservation policy development gave Shepard's later work an integrity and authenticity unmatched by most academics. The



Nature about which Shepard wrote was real in his experience. "Nature is real and love of nature is part of its reality," he wrote in the introduction to *Man in the Landscape*. The human destruction of habitat was real in his experience, too. He knew what he was writing about. He was not writing about abstractions.

Second, Shepard had mentors and associates in academia and conservation who were first rank. At Yale, he studied with Paul Sears, one of America's greatest botanists and ecologists. In 1935, at the height of the Dust Bowl, Sears wrote *Deserts on the March*, still a conservation classic.⁵ In *Deserts*, Sears looked at the past wasting of the land by civilizations around the world and throughout history, then turned his wise eye to our own country, where he warned that we might well be digging our grave because of poor land-use practices. Credit Sears for goosing along real soil and water conservation. More deeply, though, in considering our impact on the land, Sears questioned civilization's myth of progress. When Shepard writes in the introduction to *Man in the Landscape* that "catastrophic deforestation and erosion of Mediterranean and Near Eastern soils into the sea... are essential to understanding Western world views," he shows Sears's influence. Sears seems to have long remained a mentor and sup-

Paul Shepard's lifelong quest was to answer the thoroughly practical and urgent question, "Why do men persist in destroying their habitat?" He went deeper than anyone before in seeking an answer.

porter of Shepard. For example, in 1978, Sears wrote of Shepard's *Thinking Animals*, "Weaving experience, wide reading, and reflection together [Shepard] produces an intricate design whose clear message is that man apart from the rest of the animal world is less than human."⁶

Shepard's boss at his early job with the Missouri Conservation Federation was Charlie Callison, who later went on to be conservation director of the National Wildlife Federation and a wise and universally respected conservation leader.⁷ Shepard was part of a pathfinding crew of conservationists, including later-to-be legends David Brower, Howard Zahniser, Olaus Murie, Sigurd Olson, and Rachel Carson.⁸ These mentors and associates in conservation gave him an unmatched background for his scholarly explorations of why we destroy our habitat.

Third was an experience that tested Shepard's courage and integrity. Bear with me a moment while we snuffle under the duff of conservation history. The National Park Service is perhaps America's most revered federal agency.



Had it not been for the seasonal naturalists and for Paul Shepard taking the campaign nationally, who knows how long commercial logging would have continued in Olympic National Park?

The National Park idea is widely considered one of America's greatest gifts to the world. Nevertheless, there have long been maggots beneath the smiling, rosy flesh of the National Park Service's public face.

Today, Olympic National Park in the state of Washington is a flagship of our National Park System and among the most important ecological reserves anywhere in the world. The giant Douglas-firs, western redcedars, and other conifers making up the ancient forests in the Hoh, Quinalt, and Bogachiel River valleys are rightly

seen as the most inspiring feature of this stunning park. This protected ancient forest is what makes Olympic one of our most celebrated ecological treasures. It was not always so. The battle to create Olympic was among the most controversial in National Park history, and the deep, dark rain forest was the crux of the conflict.

For decades, the timber-dominated business and political establishment of Washington fought fiercely against including big trees in the proposed park. They howled that it would be a sin to waste such a wealth of lumber in a National Park lock-up. The Forest Service, too, opposed a park with trees—leave it as a National Forest, they soothingly said, where we can scientifically “manage” it. (Manage meant “clear-cut” in the forester's

quaint tongue.) Surprisingly, the National Park Service (NPS) also stood against including the rain forest in the park. Later-to-be Director of the NPS Conrad Wirth sneered in 1932 that Olympic did not “come up to the standards set for national parks.”⁹ It was not until 1938 that the will of President Franklin Roosevelt and Secretary of the Interior Harold Ickes prevailed and the rain forest valleys were included in the new Olympic National Park. Thus begins one of the darkest chapters in the history of the National Park Service.

Although the Park Service leadership had no choice but to accept the ancient forest, they backed (unsuccessful) legislation to remove forested areas from the park; moreover, throughout the 1940s, secretive logging went on in Olympic National Park with the blessing of the NPS brass. In the 1950s, however, the commercial logging program went big. In 1951, Conrad Wirth, designated to be the new NPS Director, brought in Fred Overly—a professional forester who had worked for lumber companies in Washington and a leading advocate of logging National Parks—to be the Superintendent of Olympic National Park. Overly disguised his commercial logging operation as removing only dangerous trees or those already felled by bugs, winds, and avalanches. Carsten Lien, a leading Northwest conservationist who had been a seasonal naturalist at Olympic in the 1950s, uncovered the truth in his shocking 1991 book, *Olympic Battleground*.¹⁰ Now, I'm a pretty jaded fellow. There's not much anymore that shocks me, but *Olympic Battleground* slapped me across the face. Lien documents that over 100 million board feet of timber were cut in Olympic National Park between 1941 and 1958 in a commercial logging program. The biggest trees in the park were in that haul—giants eight feet in diameter and over 200 feet tall. The scandal and cover-up reached from the superintendent of Olympic to the director of the National Park Service.

Seasonal naturalists working summers at Olympic discovered and began to photographically document the commercial logging despite threats from park management (Overly derided them as “birdwatchers”).¹¹ Among

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the many outrages planned by Overly was a clear-cut swath around the entire border of the National Park—if he had succeeded, the exact boundary of the park would have been visible from space. Overly saw his mission as making the local lumber mills happy.

In 1956, a new head seasonal naturalist arrived in Olympic. Lien reported his name as Paul Shepard. Whoa, I thought as I read, could this be *the* Paul Shepard? It was. Shepard had earned his Ph.D. at Yale in 1954 and had a faculty appointment to Knox College in Illinois—but continued to work summers in National Parks. Lien writes that “Shepard, from the moment of his arrival, was stunned by the ever-present logging occurring everywhere in the park.”¹² Not only did he back the other Olympic naturalists in their opposition to the logging, Shepard took their opposition national. He wrote NPS Director Wirth about the issue, letting him know that the naturalists knew all about the logging plans. Even better, Lien writes, “Shepard had sent forty-eight long telegrams to each of the state presidents of the garden clubs. As a result, Wirth was deluged by letters and telegrams from all over the country and with similar responses from all of the conservation organizations in the country.”¹³

At the fall 1956 Natural Resources Council meeting in Chicago, Shepard drew David Brower of the Sierra Club, Joe Penfold of the Izaak Walton League, Fred Packard of the National Parks Association, and other national leaders into the campaign against Olympic logging. Brower, Penfold, and Packard soon collared Wirth in his D.C. office. *The Living Wilderness*, the magazine of The Wilderness Society, ran photographs

of the logging (blatantly lying, Wirth told Brower that the photos were from outside the park). After being alerted by the park naturalists, local conservation leaders in Washington State organized and began to raise a fuss. Among them was Polly Dyer, still going strong today nearly 50 years later. Due to this intense public outrage, Wirth stopped all commercial logging in Olympic National Park. Overly was transferred to Great Smoky Mountains National Park.¹⁴

Had it not been for the seasonal naturalists and for Paul Shepard taking the campaign nationally, who knows how long commercial logging would have continued in Olympic National Park? What would be left of the rain forest today? Although many people working together stopped the butchery, Paul Shepard clearly played the central role.

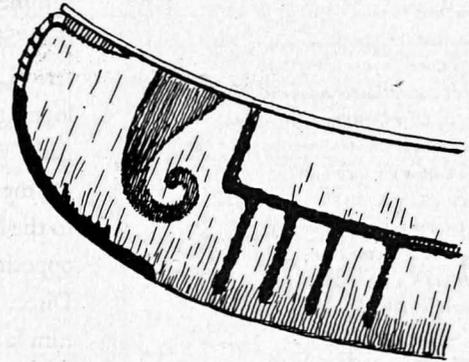
And for this defense of America's natural heritage, he was sacked. Flo Shepard, Paul's widow, writes, “His summer employment in national parks came to a sudden halt, however, when he became a whistle-blower and key figure in uncovering illegal logging operations carried on in one of the parks.”¹⁵ Because of his visible leadership in defending Olympic National Park, he was forever banned from working for the National Park Service. (Unfortunately, Shepard was so shocked by his treatment from the Park Service and by the failure of some national conservationists—especially radical gadfly Rosalie Edge—to fight the logging of Olympic that he resigned as conservation chair of the garden clubs and left the national conservation scene in 1958.)

CONTINUES PAGE 79 ►



People think in five generations—two ahead, two behind—with heavy concentration on the one in the middle. Perhaps that is tragic, and possibly there is no choice. The human mind may not have evolved enough to be able to comprehend deep time.

JOHN MCPHEE



Deep Time

A FEW YEARS AGO, my neighbor found a dugout canoe. A boatbuilder of considerable skill, he was paddling a birchbark canoe of his own making on a small lake owned by the University of Vermont and managed as a natural area. Ironically, he had been thinking that the boat he was using probably wasn't traditional for that water body through its long history of human use. Why would an Abenaki man, hundreds of years ago, bother to carry a bark canoe to an isolated pond far from any water travel route? More likely, a family or kin group that fished there seasonally would have kept a dugout canoe on site, perhaps submerged

along the shore between uses to keep the wood from decaying. Then he noticed a long, rotting wooden plank emerging from a cattail marsh.

The next evening, my neighbor recruited me and another friend to help him consolidate the remnants of the ancient boat and resubmerge them until the state archaeologist could measure and photograph them, and take samples for carbon dating. In a light drizzle, we assisted in the task, then paddled back toward our car. The clouds lifted, an osprey screeched by, and, as if on cue, a rainbow appeared overhead. It was a lovely moment—and for that moment, one could

almost step out of time: I could smell the campfire smoke, hear kids splashing in the water, see two Abenaki men hunched over a massive log, hollowing out its center with stone tools and fire.

The dugout turned out to be relatively young (only around 600 years old). Its builder was the descendant of people who lived in this region for several thousand years before Columbus sailed west. Even that earliest Paleo-Indian culture, though, was a relative newcomer, having arrived after the Laurentide ice sheet receded. Where I sit writing these words on a spring day in Vermont (a hummingbird periodically alights on

flowers nearby) I see a verdant world—but just 12 or 13 thousand years ago this place was starkly white. For thousands of years prior to that, glacial ice blanketed the land.

These scratchings in the sand—a canoe built in the 1400s by a man whose ancestors hunted mammoths, the scraped bedrock appearing after the last ice age—are a fraction of an eye blink ago. Too trivial to even leave a trace in the ponderous layers of geologic time, with its various risings, twistings, foldings, and weatherings of rock over millions and billions of years. Such time scales are, of course, abstractions. Incomprehensible. As John McPhee suggests, that may well be tragic, but also natural. Is there anything in *Homo sapiens'* evolutionary history—which, as Paul Shepard reminds us, was spent almost entirely in a wilderness context—that should prepare us to think about collective consequences of our actions far into the future? And if our biology is against us in this regard, our culture is even more so. Excepting for intellectual contortionists such as geologists and paleontologists, it is generally a professional disadvantage to take a long view of anything. The very foundation of contemporary western culture's economics and politics is short-term thinking. So why should conservationists buck biological and cultural norms to develop a deep time perspective? Let me suggest a couple reasons:

IT STRETCHES THE MIND. As a child, every summer I visited my grandparents' ranch in eastern Wyoming, where pronghorn antelope were my favorite of the rich fauna associated with the rolling shortgrass prairie. (Yes, I know they aren't true

antelope but that's what everyone called them.) It was amazing to see them run. Now I know that the pronghorns' dizzying speed is a Pleistocene relict. As Connie Barlow notes in this issue, it is an ecological anachronism, for there are no current predators (save humans in pickup trucks) that can match their speed. They are running from ghosts—from the cheetahs, long-legged hyenas, and other predators with which they co-evolved in North America.

IT'S NECESSARY. Recognizing how our behavior has affected life's diversity throughout human history is key to understanding the current ecological crisis. Developing the collective capacity to project future consequences of current human behavior is crucial if we are to have any hope of addressing macro-scale problems such as overpopulation, global climate change, and mass extinction.

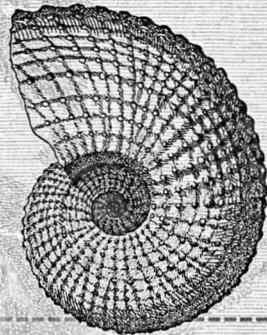
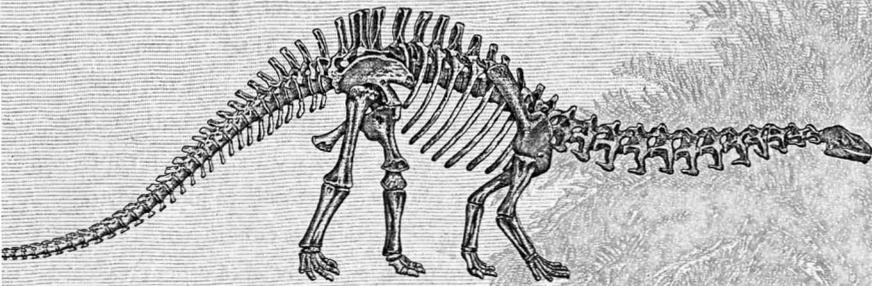
Moreover, an evolutionary time-scale perspective is necessary if ecological restoration—as a scientific discipline and a cultural imperative—is to achieve its potential. Writing in this issue, David Burney and coauthors advance this discussion with their challenge to conservation biologists to consider “restarting evolution” by reintroducing species to suitable habitats outside present ranges but within ranges supported by the late prehistoric fossil record. One such program in the Kingdom of Tonga, where a narrowly endemic Polynesian megapode—the marvelously named *Niufo'u* scrubfowl—is being repatriated to uninhabited islands, already seems successful. Many other similar efforts should likely be attempted where endangered species have been pushed

into marginal habitats and to the brink of extinction by human action.

As the North American conservation community better understands the grand narrative of our continent's ecological history through deep time, we may be better able to judge where human agency has circumvented the evolutionary potential of other creatures. With knowledge comes responsibility, and an ethical challenge is raised: if a past extinction was human-caused, should we attempt to heal that old wound? To be sure, restoring a Pleistocene menagerie of creatures on this continent is a fanciful notion. Considering the controversy over such modest reintroductions as gray wolves to Yellowstone and Mexican wolves to the Southwest, it seems unlikely that any mainstream conservation group will soon advocate for returning cheetahs, lions, and elephants to the Americas.

Such a notion does, however, make the Wildlands Project's position that grizzly bears, wolves, and other large cats should be recovered throughout much of their historical ranges seem tame by comparison. Such efforts by this generation and our immediate successors is a tentative start on rewriting old chapters of the American land-use story that ended badly. When wolves and cougars are again fulfilling their vital ecological role in American ecosystems, perhaps truly bold restorationists with a deep time perspective will take up the charge to “bring back the cheetah.” Until then, there is ample work fending off the clear and present dangers to wild Nature. For many wild places and creatures, there's no time to lose.

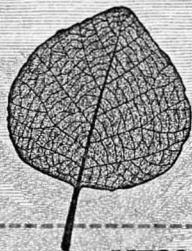
~ Tom Butler



CENOZOIC ERA
(65 million years ago to today)

Quaternary (1.8 mya to today)
 Holocene (11,000 years ago to today)
 Pleistocene (1.8 mya to 11,000 years ago)
 Tertiary (65 to 1.8 mya)
 Pliocene (5 to 1.8 mya)
 Miocene (23 to 5 mya)
 Oligocene (38 to 23 mya)
 Eocene (54 to 38 mya)
 Paleocene (65 to 54 mya)

a



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MESOZOIC ERA
(245 to 65 million years ago)

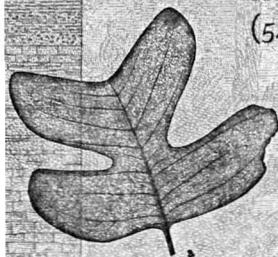
Cretaceous (146 to 65 mya)
 Jurassic (208 to 146 mya)
 Triassic (245 to 208 mya)



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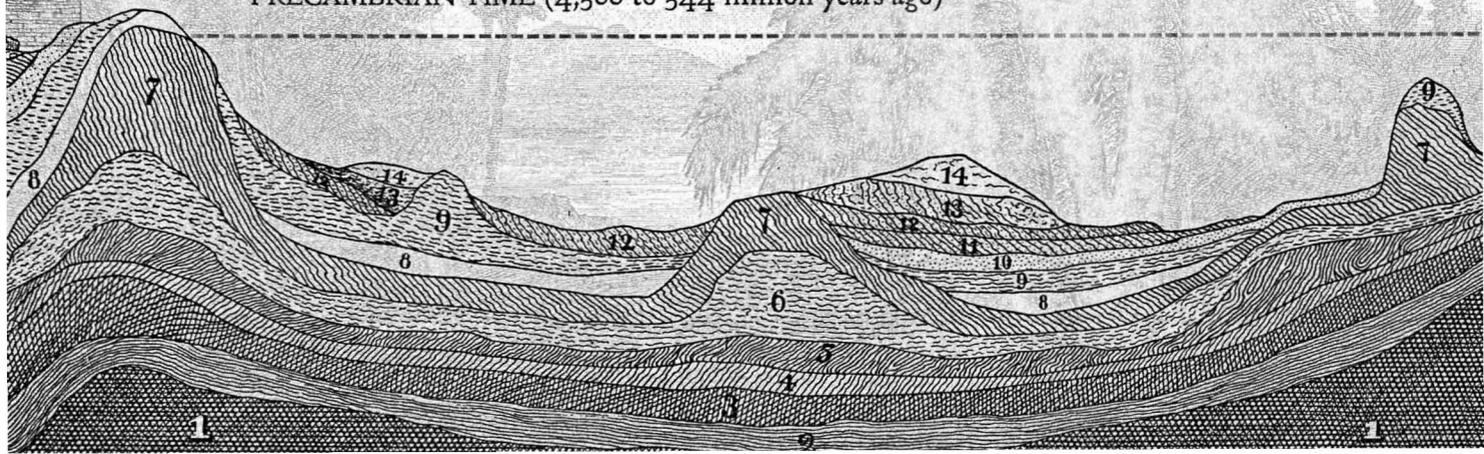
PALEOZOIC ERA
(544 to 245 million years ago)

Permian (286 to 245 mya)
 Carboniferous (360 to 286 mya)
 Pennsylvanian (325 to 286 mya)
 Mississippian (360 to 325 mya)
 Devonian (410 to 360 mya)
 Silurian (440 to 410 mya)
 Ordovician (505 to 440 mya)
 Cambrian (544 to 505 mya)



i

PRECAMBRIAN TIME (4,500 to 544 million years ago)



Finding Our Bearings

by John McPhee

FOR ESTABLISHING OUR BEARINGS through time, we obviously owe an incalculable debt to vanished and endangered species. The opossum may be Cretaceous, certain clams Devonian, and oysters Triassic, but for each and every oyster in the sea, it seems, there is a species gone forever. Be a possum is the message, and you may outlive God. The Cenozoic era—coming just after the Cretaceous Extinction, and extending as it does to the latest tick of time—was subdivided in the 1830s according to percentages of molluscan species that have survived into the present. From the Eocene, for example, which ended some 38 million years ago, roughly three and a half percent have survived. Eocene means “dawn of the recent.” The first horse appeared in the Eocene. Looking something like a toy collie, it stood three hands high. From the Miocene (“moderately recent”), some fifteen percent of molluscan species survive; from the Pliocene (“more recent”), the number approaches half. As creatures go, mollusks have been particularly hardy. Many species of mammals fell in the Pliocene as prairie grassland turned to tundra and ice advanced from the north. From the Pleistocene (“most recent”), more than ninety percent of molluscan species live on. The Pleistocene has also been traditionally defined by four great glacial pulsations, spread across a million years—the Nebraskan ice sheet, the Kansan ice sheet, the Illinoian and Wisconsinan ice sheets. It now appears that these were the last of many glacial pulsations that have occurred in relatively recent epochs, beginning probably in the Miocene and reaching a climax in the ice sheets of Pleistocene time. The names of the Cenozoic epochs were proposed by Charles Lyell, whose *Principles of Geology* was the standard text through much of the nineteenth century. To settle problems here and there, the Oligocene (“but a little recent”) was inserted in the list, and the Paleocene (“old recent”) was sliced off the beginning. Paleocene, Eocene, Oligocene, Miocene, Pliocene, Pleistocene—65 million to 10,000 years before the present. Divisions grew shorter in the Cenozoic—the

This essay is excerpted from *Basin and Range* by John McPhee (©1980, 1981 by John McPhee) and is reprinted by permission of Farrar, Straus and Giroux, LLC. Timeline data source: University of California at Berkeley Museum of Paleontology; visit their Web Geological Time Machine at www.ucmp.berkeley.edu/help/timeform.html

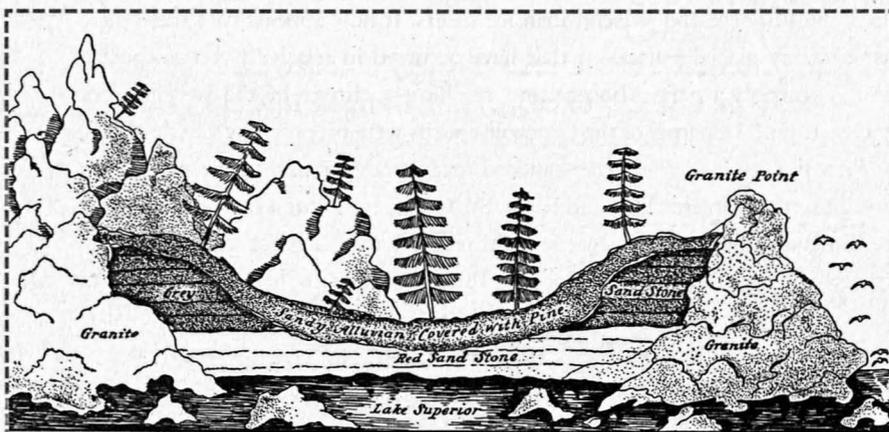
epochs range from 18 million years to less than two million—because so much remains on Earth of Cenozoic worlds.

Ignoring its geology, I guess I don't know a paragraph in literature that I prefer to the one Joseph Conrad begins by saying, "Going up that river was like travelling back to the earliest beginnings of the world, when vegetation rioted on the earth and the big trees were kings." He says, moments later, "This stillness of life did not in the least resemble a peace. It was the stillness of an implacable force brooding over an inscrutable intention. It looked at you with a vengeful aspect. I got used to it afterwards; I did not see it anymore; I had no time. I had to keep guessing at the channel; I had to discern, mostly by inspiration, the signs of hidden banks; I watched for sunken stones." Metaphorically, he travelled back to the Carboniferous, when the vegetal riot occurred, but scarcely was that the beginning of the world. The first plants to appear on land, ever, appeared in the Silurian. Through the Ordovician and the Cambrian, there had been no terrestrial vegetation at all. And in the deep shadow below the Cambrian were seven years for every one in all subsequent time. There were four billion years back there—since the earliest beginnings of the world. There were scant to nonexistent fossils. There were the cores of the cratons, the rock of the continental shields, the rock of the surface of the moon. There were the reefs of the Witwatersrand. There was the rock that would become the Adirondack Mountains, the Wind River summits, the Seward Peninsula, Manhattan Island. But so little is known of this seven-eighths of all history that in a typical two-pound geological textbook there are 14 pages on Precambrian time. The Precambrian has attracted geologists of exceptional imagination, who see families of mountains in folded schists.

Uranium-lead and potassium-argon radiometric dating have helped them to sort out their Kenoran, Hudsonian, Elsonian Orogenies, their Aphebian, Hadrynian, Paleohelikian time. Isolating the first two billion years of the life of the Earth, they called it the Archean Eon. In the Middle Archean, photosynthesis began. Much later in the Precambrian, somewhere in Helikian or Hadrynian time, aerobic life appeared. There is no younger rock in the United States than the travertine that is forming in Thermopolis, Wyoming. A 2.7-billion-year-old outcrop of the core of the continent is at the head of Wind River Canyon, 20 miles away. Precambrian—4,600 to 570 million years before the present.

At the other end of the scale is the Holocene, the past 10,000 years, also called the Recent—Cro-Magnon brooding beside the melting ice. (The Primitive and Secondary eras of eighteenth-century geology are long since gone from the vocabulary, but oddly enough the Tertiary remains. The term, which is in general use, embraces nearly all of the Cenozoic, from the Cretaceous Extinction to the end of the Pliocene, while the relatively short time that follows—the Pleistocene plus the Holocene—has come to be called the Quaternary. The moraines left by ice sheets are Quaternary, as are the uppermost basin fillings in the Basin and Range.) It was at some moment in the Pleistocene that humanity crossed what the geologist-theologian Pierre Teilhard de Chardin called the Threshold of Reflection, when something in people "turned back on itself and so to speak took an infinite leap forward. Outwardly, almost nothing in the organs had changed. But in depth, a great revolution had taken place: consciousness was now leaping and boiling in a space of super-sensory relationships and representations; and simultaneously consciousness

was capable of perceiving itself in the concentrated simplicity of its faculties. And all this happened for the first time." Friars of another sort—evangelists of the so-called Environmental Movement—have often made use of the geologic time scale to place in perspective that great "leap forward" and to suggest what our reflective capacities may have meant to Mother Earth. David Brower, for example, the founder of Friends of the Earth and emeritus hero of the Sierra Club, has



tirelessly travelled the United States for 30 years delivering what he himself refers to as "the sermon," and sooner or later in every talk he invites his listeners to consider the six days of Genesis as a figure of speech for what has in fact been four and a half billion years. In this adjustment, a day equals something like 750 million years, and thus "all day Monday and until Tuesday noon creation was busy getting the earth going." Life began Tuesday noon, and "the beautiful, organic wholeness of it" developed over the next four days. "At 4 P.M. Saturday, the big reptiles came on. Five hours later, when the redwoods appeared, there were no more big reptiles. At three minutes before midnight, man appeared. At one-fourth of a second before midnight, Christ arrived. At one-fortieth of a second before midnight, the Industrial Revolution began. We are surrounded with people who think that what we have been doing for that one-fortieth of a second can go on indefinitely. They are considered normal, but they are stark raving mad." Brower holds up a photograph of the world—blue, green, and swirling white. "This is the sudden insight from Apollo," he says. "There it is. That's all. We see through the eyes of the astronauts how fragile our life really is." Brower has computed that we are driving through the earth's resources at a rate comparable to a man's driving an automobile 128 miles an hour—and he says that we are accelerating.

In like manner, geologists will sometimes use the calendar year as a unit to represent the time scale, and in such terms the Precambrian runs from New Year's Day until well after Halloween. Dinosaurs appear in the middle of December and are gone the day after Christmas. The last ice sheet melts on December 31st at one minute before midnight, and the Roman Empire lasts five seconds. With your arms spread wide again to represent all time on Earth, look at one hand with its line of life. The Cambrian begins in the wrist, and the Permian Extinction is at the outer end of the palm. All of the Cenozoic is in a fingerprint, and in a single stroke with a medium-grained nail file you could eradicate human history. Geologists live with the geologic scale. Individually, they may or may not be alarmed by the rate of exploitation of the things they discover, but, like the environmentalists, they use these repetitive analogies to place the human record in perspective—to see the Age of Reflection, the last few thousand years, as a small bright sparkle at the end of time. They often liken humanity's presence on Earth to a brief visitation from elsewhere in space, its luminous, explosive characteristics consisting not merely of

the burst of population in the twentieth century but of the whole millennial moment of people on Earth—a single detonation, resembling nothing so much as a nuclear implosion with its successive neutron generations, whole generations following one another once every hundred-millionth of a second, temperatures building up into the millions of degrees and stripping atoms until bare nuclei are wandering in electron seas, pressures building up to a hundred million atmospheres, the core expanding at five million miles an hour, expanding in a way that is quite different from all else in the universe, unless there are others who also make bombs.

The human consciousness may have begun to leap and boil some sunny day in the Pleistocene, but the race by and large has retained the essence of its animal sense of time. People think in five generations—two ahead, two behind—with heavy concentration on the one in the middle. Possibly that is tragic, and possibly there is no choice. The human mind may not have evolved enough to be able to comprehend deep time. It may only be able to measure it. At least, that is what geologists wonder sometimes, and they have imparted the questions to me. They wonder to what extent they truly sense the passage of millions of years. They wonder to what extent it is possible to absorb a set of facts and move with them, in a sensory manner, beyond the recording intellect and into the abyssal eons. Primordial inhibition may stand in the way. On the geologic time scale, a human lifetime is reduced to a brevity that is too inhibiting to think about. The mind blocks the information. Geologists, dealing always with deep time, find that it seeps into their beings and affects them in various ways. They see the unbelievable swiftness with which one evolving species on the Earth has learned to reach into the dirt of some tropical island and fling 747s into the sky. They see the thin band in which are the all but indiscernible stratifications of Cro-Magnon, Moses, Leonardo, and now. Seeing a race unaware of its own instantaneousness in time, they can reel off all the species that have come and gone, with emphasis on those that have specialized themselves to death. ☾

Writer John McPhee is the author of 25 books, including Encounters with the Archdruid (1972) and the best-selling Coming into the Country (1977). In 1999, he won the Pulitzer Prize for Annals of the Former World, a study of deep geologic time that gathers in one volume his books Basin and Range, In Suspect Terrain, Rising from the Plains, and Assembling California.



Evolution's Second Chance

Forward-thinking paleoecologists advocate
“jump-starting” diminishing biodiversity

by David A. Burney, David W. Steadman, and Paul S. Martin

PALEOECOLOGISTS ARE PEOPLE who think big when it comes to time. In particular, those who study the late prehistoric fossil record are predisposed to long-range concepts that bridge the gap between deep time and the present. Thinking on long time scales that can even be extrapolated into the future comes fairly naturally for some paleoecologists, it seems—including those participating in an unusual symposium held last year at the University of Hawaii-Hilo, during the annual meeting of the Society for Conservation Biology (SCB).

Entitled “Island Paleoecology: Draining the Past to Irrigate the Future,” the symposium featured speakers whose research into the past points to some possible future directions in conservation biology, particularly in the beleaguered island ecosystems of the world. Like other symposia offered at the SCB meeting that focused on the problems of island ecosystems, much was said regarding the deep damage inflicted by biological invasions and other human-mediated assaults on insular systems.

Reconstructions of ecological changes of recent millennia in the Hawaiian Islands, the South Pacific, and Madagascar,

for instance, disclose lands totally transformed since human arrival. Each of the world's islands can be viewed as a sort of experimental treatment in human ecology, showing with hundreds of replicates that people, even with rudimentary technology, are capable of crushing biodiversity through resource overexploitation in its varied forms and translocation of exotic species to places they would never reach on their own. In this rather sad way, paleoecology provides conservation biologists with powerful parables.

With these same data, however, paleoecology also can point to positive directions for the future. Conservation biology has often been criticized for its siege mentality, as the field is of necessity a crisis discipline, in which rearguard actions and damage control are standard operating procedures. Proactive proposals are relatively rare and likely to be viewed with suspicion. Grand schemes, after all, are more typical of developers. Nevertheless, it was clear in the open discussion following the six symposium speakers that the conservation community is cautiously receptive to advice—even fairly rad-

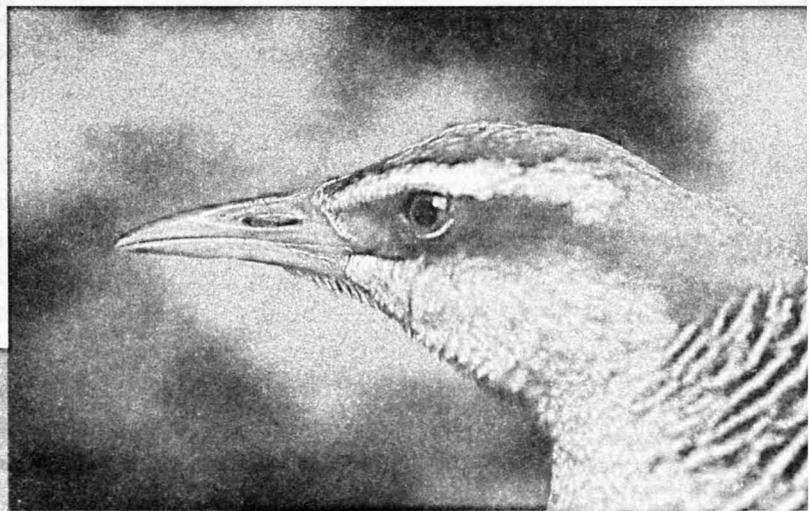
ical-sounding suggestions—from the paleoecological community. Speakers advocated giving species with little apparent chance of survival in their remaining diminished habitat a second chance by restarting populations well outside their present range, but in places roughly corresponding to the greater range that the late prehistoric fossil record shows they occupied when humans first arrived.

The Laysan duck (*Anas laysanensis*) is an often-mentioned example. Less than 500 of these terrestrial, insect-feeding birds lead a precarious existence on tiny (4.1 square kilometers), low (12 meters elevation), uninhabited Laysan Island in the Northwestern Hawaiian Islands chain. The entire wild population could succumb to a single hurricane or tsunami of no greater magnitude than several that have struck elsewhere in the mid-Pacific in historic times. Although earlier studies consider the species to be a single-island endemic, abundant fossil evidence tells a very different story: this little duck was widespread throughout the major Hawaiian Islands when the Polynesians arrived about a millennium ago, and was almost certainly extirpated by prehistoric hunters and their introduced commensals. This endangered bird's eggs may soon be in more than one basket. A study by Michele Reynolds is currently examining the feasibility of reintroductions to national wildlife refuge areas in the Hawaiian Islands that are protected from rats, exotic predators, and ungulates.

Some paleoecologists believe that as many as 2,000 species of flightless rails have disappeared from the myriad islands of the South Pacific in a similar way. These birds could be restarted in the evolutionary sense on a

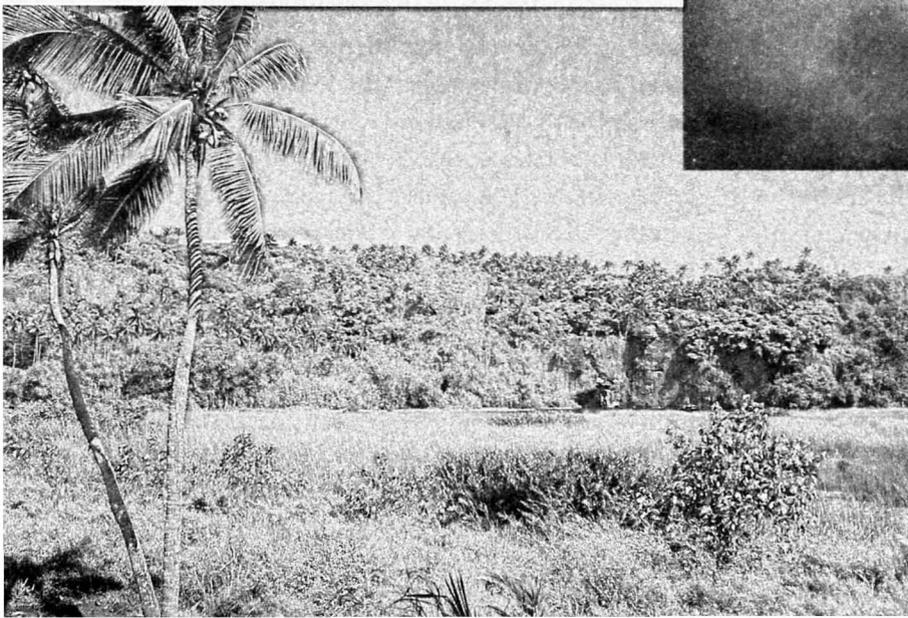
host of suitable small, relatively predator-free islands, using the roughly 20 species that have survived, many of which are endangered. The Guam rail (*Gallirallus owstoni*), for instance, thrives in captivity, but was extirpated in the 1980s on Guam by the introduced brown tree snake (*Boiga irregularis*).

The raised limestone island of Aguiguan (7 square kilometers, 157 meters elevation) in the Mariana Islands is uninhabited, surrounded by cliffs, and mostly forested. Unlike many islands in the region, it lacks a wharf, an anchorage, roads, highways, vehicles, cats, dogs, and black rats (*Rattus rattus*). The only non-native mammal is the small Pacific rat (*R. exulans*). Hundreds of bones of an extinct, flightless species of *Gallirallus*, similar to the Guam rail, have been found at Pisonia Rockshelter, an archaeological site on Aguiguan ranging from 1,800 to 500 years old. Also found were bones of *Ducula oceanica*, a large pigeon that survives in parts of Micronesia today but nowhere in the Marianas. Both of these would be likely to re-establish populations on Aguiguan if restocking took place. Brown tree snakes, which have devastated Guam's birdlife in recent decades, now have been found on the adjacent inhabited



The banded rail (*Gallirallus philippensis*), a prime candidate for restocking certain islands to test whether flightlessness can evolve again in a setting free of mammal predators. JAMES STULL

Mangaia, Cook Islands. Although inhabited by people, this island retains enough forest to be considered as a potential site for translocating populations of endangered birds, especially certain pigeons and doves. DAVID STEADMAN



islands of Rota, Tinian, and Saipan. Aguiquan's inaccessibility means that it likely will remain free of snakes.

The Kingdom of Tonga, a Polynesian archipelago of 170 islands, 40 of which are uninhabited, is a world leader among nations pioneering this approach. A megapode, the Niufo'ou scrubfowl (*Megapodius pritchardii*), is traditionally regarded as endemic to the northern volcanic island of Niufo'ou. Its bones have been found on six islands scattered over the archipelago, suggesting a virtually archipelago-wide distribution when people arrived 2,800 years ago. Over the last decade, biologists have taken eggs of *M. pritchardii* from Niufo'ou to the volcanic islands of Late and Fonualei, where adult birds are now common. Success is also reported with the ground-dove *Gallicolumba stairi*.

The translocation program in Tonga has been low-tech and low budget, but has enjoyed full cooperation from the national government, from aviculturalists at the private Tongan Wildlife Centre, and from visiting ornithologists. The bottom line is that the program is working, with current plans for more reintroductions.

Paleoecological research indicates that plant evolution also may benefit from jump-starting. Work by a multidisciplinary team on a spectacularly rich Holocene fossil site in the Maha'ulepu Caves of Kaua'i has shown clearly something that had been suspected about many currently endangered species of plants, invertebrates, and birds in the Hawaiian Islands, and by extension elsewhere. Many taxa that are rare today and restricted to a few high mountains or steep upper valleys have such restricted and often disjunct ranges only as an artifact of human activities. Trees like *Kokia kauaiensis* and *Zanthoxylum* spp., for instance, are today found in a few spots on rugged mountains in the interior. When Polynesians arrived, these trees and many others, including the attractive endemic palms of the genus *Pritchardia*, were growing at sea level on the dry leeward coast of the island, the Maha'ulepu record shows. The lesson from analyses of fossil pollen and seeds should be clear for conservation biologists: many rare species may be barely surviving today in sub-optimal environments (often very steep) that bear little resemblance to their typical habitat at first human contact. The human onslaughts of deforestation, introduced herbivores, and diseases usually do their work most rapidly and thoroughly in coastal lowlands. With the right kinds of protection, many rare plant species could be reintroduced to converted or degraded lowland habitats of Hawaii

where none are found today—from hotel grounds and golf courses to abandoned cane and pineapple fields.

Forward-thinking students of the past sound some notes of caution in the midst of this otherwise upbeat vision: much has been lost irreversibly. Most island communities that evolved in the absence of ruminant grazers and browsers, from Hawaii to Madagascar, will never again be entirely free of these foreign influences. Rats, pigs, and introduced predators are grave problems, as are diseases such as avian malaria, which has now eliminated nearly all the endemic Drepanidine honeycreepers (Hawaii's spectacular radiation from a single finch ancestor) below 1,200 meters elevation. Work in New Zealand and elsewhere has shown, however, that significant gains can be made on small islands just by attacking one of these problems through rat eradication programs. The U.S. Fish and Wildlife Service and National Park Service have made great strides in the Hawaiian wildlife refuges and national parks controlling feral goats, pigs, cats, and dogs, with a current focus on rats.

The great public-relations obstacles to these eradication programs need to be addressed by the paleoecological community. Numerous fossil studies demonstrate the correlation between the introduction of rats and the decline of native plants, invertebrates, and birds, in some cases beginning more than a millennium ago with the introduction of the small Pacific rat by colonizing Polynesians. Similarly, the fossil record should dispel once and for all the widespread notion among pig-hunters and pig-lovers of Hawaii and other Pacific islands that pigs are native and therefore no threat to island ecosystems. Instead, there is a hint in some fossil evidence that the small pigs first introduced by prehistoric Polynesians were not very successful feral invaders, and that the wholesale proliferation of "wild" pigs on many tropical islands may have come with the introduction of large European varieties in recent centuries.

Human-induced biological invasions are a fundamental problem in nearly all natural communities, insular and otherwise. One ironic effect of the exotics problem is the fear of any talk of reintroducing species. This reluctance includes species or genera that were present in evolutionarily recent time but are now lacking. Professional guidelines for reintroductions emphasize justification from a historical presence, neglecting the late prehistoric fossil record. The long debate over controlling wild horses and burros in North America (missing from the fauna for eleven millennia but present for millions of years

prior to that) is a good example. Perhaps we lack not the ecological and technical know-how, but the appropriate philosophical underpinnings to evaluate future proposals. The recent fossil record provides appropriate models and justifications.

These and other ideas emerging from students of the past are frightening to some conservationists but healthy for the discipline. The Society for Conservation Biology, the Society for Ecological Restoration, and other science-based conservation organizations must advance the discussion, fostering new opportunities by developing not just the techniques, but the attitude and philosophy necessary to accommodate possible breakthroughs suggested by fossil evidence. This is a powerful idea with global implications for saving species and restoring ecological processes.

Try to imagine an Atlantic Ocean that once again has gray whales and monk seals, Madagascar with giant tortoises, ratites, and hippos—maybe even North America with elephants and lions. The late Quaternary fossil record supports all of these as proposals worth considering, from ecological and evolutionary perspectives. Appropriate candidates for reintroduction are available, despite potential logistical and political obstacles. Each new jump-started population would represent another independent evolutionary track into the future, where there would have been few (if any) otherwise. Of course not every attempt will succeed, but those that did would represent genuine progress, not only in ensuring long-term survival of evolutionary lineages, but also in providing collaborative opportunities for a wide range of scientists to make important discoveries. A multiplicity of data on the individuals translocated, for instance, could provide fascinating baseline information for studies of genotypic, phenotypic, and ecological changes over subsequent decades.

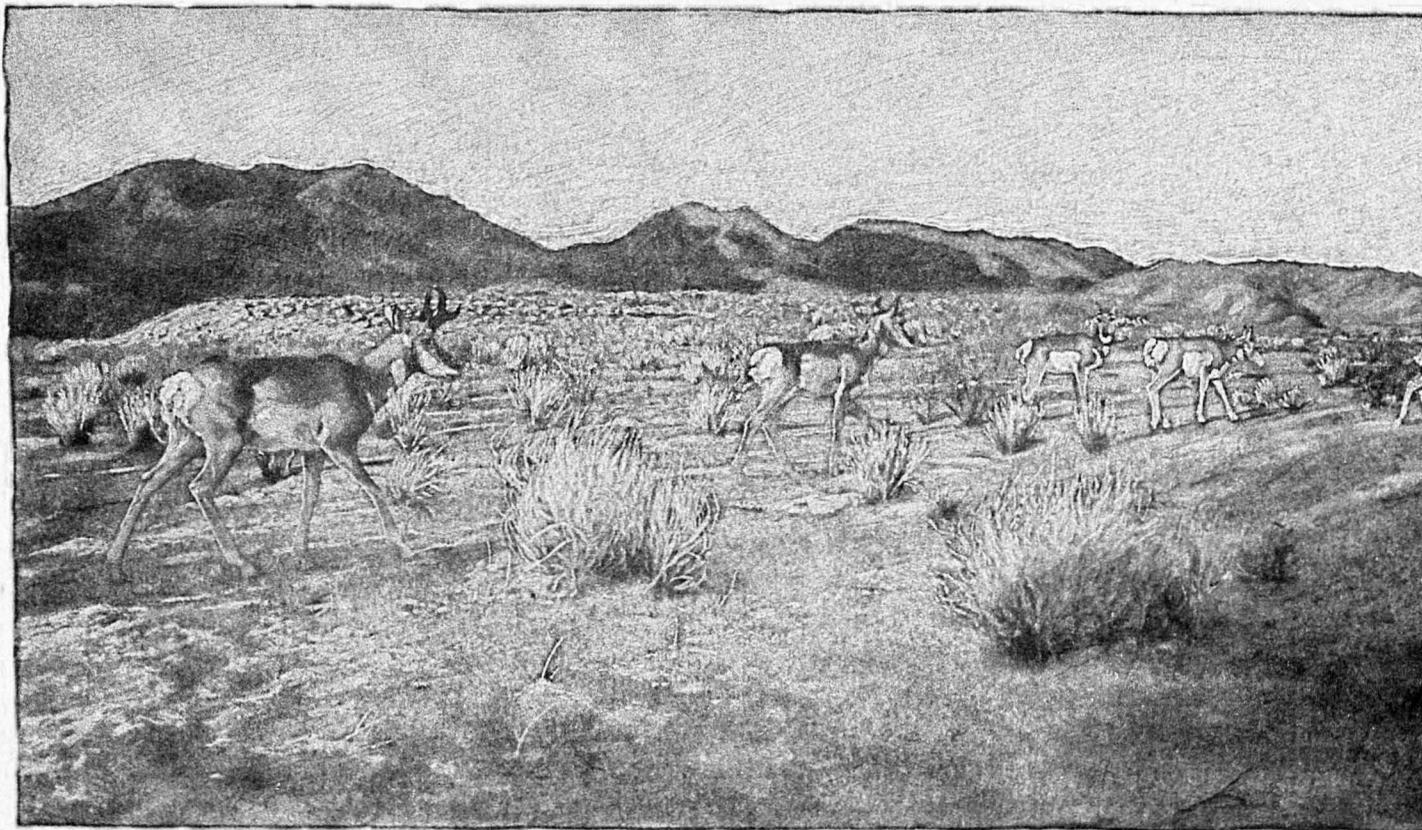
Some critics will suggest that addressing human-mediated losses of biodiversity through bold reintroductions is “playing God.” This notion ignores the fact that we have been playing the Devil with other species for millennia, punishing many and condemning some to oblivion, usually inadvertently. Humans have seldom redeemed these lost species through reintroduction—even when it would have been a simple job. Already we have altered forever the course of evolution through a host of human-caused extinctions and exotic introductions, but we have the capability to undo part of the damage by setting some of the derailed evolutionary lineages back on the track. Where the train will go is for Nature to decide. ☺

David Burney is an associate professor in the Department of Biological Sciences at Fordham University in New York. He studies the paleoecology of Hawaii and Madagascar. **David Steadman** is a professor at the University of Florida and a curator at the Florida Museum of Natural History in Gainesville. He has studied bird extinctions in many regions, including the South Pacific and West Indies. **Paul Martin** first proposed the “Blitzkrieg Hypothesis” to explain the global pattern of late prehistoric extinctions. He is a professor emeritus in the Department of Geosciences at the University of Arizona in Tucson.

RECOMMENDED READING AND SOURCES

For background on the extent of prehistoric transformation of islands, see Steadman (1995) for the South Pacific; Burney (1999) for Madagascar; and Burney et al. (2001) for Hawaii. The books edited by Martin and Klein (1984) and MacPhee (1999) draw together many viewpoints and examples from throughout the world on the subject of late prehistoric extinctions. For reviews of the historical background to the current biological invasion crisis and its role in the future of evolution, see Atkinson (1989) and Burney (1996). For recent arguments in favor of megafaunal restoration in North America, see Martin and Burney (1999) and Flannery (2001).

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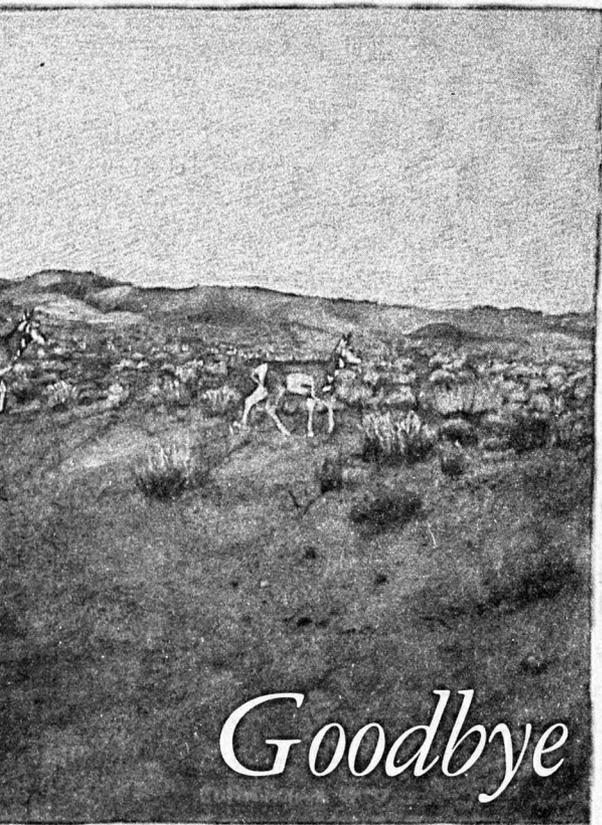


NATIVE OR ALIEN? The distinction is crucial for conservation. An understanding of deep time, however, can scramble the categories. For example, most of us are aware that the “Old West” image of a Lakota warrior riding bare-back on a horse is a blend of native and alien. The Lakota traveled afoot until horses sailed across the Atlantic with the Spanish and went feral in the New World. The deep time twist is that it is the *horse* that is native, the man a recent immigrant to the Americas.

Tim Flannery, in his book *The Eternal Frontier*, explains that horse ancestors originated in North America 45 or 50 million years ago; humans have been here a mere 13,000 years. Horses spent their first 30 million years evolving on this continent and nowhere else. Only during the Miocene, when North America sprouted a dozen kinds of three-toed horses (some grazers, some browsers), did equids begin to colonize the eastern hemisphere. Those early emigrants did not persist in the East, however. The

Asian and African horses alive today (including the zebras) all came from ancestors who were confined to North America until just three million years ago. Were it not for those persistent descendants of vagrant North American stock, horses would have gone globally extinct when they vanished from North America 13,000 years ago—at the same moment that the Lakota warrior’s ancestors arrived from Asia.

This is deep time history, deep ecology history. This kind of education not only alters one’s outlook, but invites a new relationship to the land. The EuroAmerican culture that dominates North America today still treats the continent as a frontier—a collection of resources to be exploited by an ever-expanding population. Can Americans learn a key lesson from the roll-call of lost life forms over the long span of ecological time? Might we begin to understand that no creature, including the human, can persist within a landscape that is treated as a limitless frontier—only on one that is experienced as home?



Goodbye *Eternal Frontier*

by Connie Barlow

Taking the long view

Tim Flannery, director of the South Australia Museum, is officially a vertebrate paleontologist. Yet *Eternal Frontier* is a cross-disciplinary opus that draws from botany, geology, ecology, geography, archaeology, anthropology, and American history as well as paleontology and zoology in constructing the first deeply ecological story of this continent grounded in deep time.

Flannery begins his tale with the asteroid impact off the coast of Mexico that ended the Mesozoic era 65 million years ago by extinguishing the ammonite mollusks, the great marine reptiles, and the dinosaurs, while severely diminishing the diversity of animal taxa from foraminifera to mammals. Plants took a hit, too, but mostly here in North America and eastern Asia, where the shock and firestorms of the impact were most intense. (Plants can wait out horrific conditions as root, seed, or spore.) The end-Cretaceous impact event is described by Flannery in gruesome detail, leaving the reader

The roots of causality in North America are profound, and to address these questions we must go far back in time, to when modern North America came into being. That continent-defining moment occurred one balmy day 65 million years ago, give or take 120,000 years, when a great fiery ball appeared in the sky and came crashing to Earth. The rock had been travelling through space at 90,000 kilometres an hour since time immemorial. Then the statistically improbable happened. It began approaching our planet on a collision course, but where would it hit? Ground Zero, as it happened, was to be North America. This fact, this utterly random event, would change world history.

TIM FLANNERY, *The Eternal Frontier*

aghast at how truly empty of life this charred continent had become in the aftermath, and how open it was, therefore, to the extravagances of “ecological release” and “evolutionary radiation” for those lucky lineages who first wafted in by spore or seed, or emerged from the mud after a long, impact-winter sleep. In short, North America was an ecological vacuum, a frontier available for easy colonization.

Flannery thus introduces the North American story with the violent birth of the Cenozoic and, coincidentally, the birth of the North American continent itself. During the Mesozoic, the eastern and western halves of what would become North America had been separated by shallow water, the Bearpaw Sea, which flooded the continental mid-section all the way from the Arctic Ocean to the Gulf of Mexico. Within five million years following the asteroid impact, tectonic uplift associated with the rise of the Laramide Mountains in the West had displaced the sea. One grand continent was born.

Toward a mythic story of North America

Zoologist David Burney, ecologist Stuart Pimm, conservation biologist John Terborgh, and Pleistocene ecologist Paul Martin have all written laudatory reviews of *The Eternal Frontier*, published in major journals.¹ The science is top-notch, they agree, and the style of delivery is engaging.

I'd like to suggest that this book gives us far more than excellent and readable science. It gave me the idea that, by golly, there *is* a unified story of the North American continent. There are mythic themes that connect the abundant bare facts, and there are lessons to be learned from 65 million years of continental experience.

Oh, what a mythic story it is! Before reading Flannery's book, I assumed that a common Native American name for this continent—Turtle Island—had no basis in fact. Now I know that soon after it was born (upon the retreat of the Bearpaw Sea), this continent hosted the Golden Age of Turtles. Never before and never since, and never anywhere else, has the turtle been such a prominent and speciose member of animal guilds. Pond turtles, soft-shelled turtles, river turtles, and snapping turtles all survived the meteor impact. When the firestorm had passed, and the turtles could safely poke their heads out of the mud, the landscape and pondscape they looked out on was nearly barren of vertebrate life. Crocodylians and (now extinct) champsosaurs also survived in the sediments, and offered the turtles just enough predatory challenge to keep them from reproducing their way to oblivion.

Turtles are more the exception than the rule. This continent has, for 65 million years, mostly been a land of immigrants. "No other continent," writes Flannery, "exhibits such different origins for the constituent parts of its fauna." North America has been a magnet for newcomers, who may overeat or outcompete the natives when they first arrive. If they are to persist, however, they do eventually settle into adaptive harmony as natives themselves—with whatever life community remains. A deep time perspective teaches that, on the one hand, North America will surely be rich in naturalized and endemic diversity within five or ten million years after humans are gone. On the other hand, deep time teaches that the scale of ecological disruption caused by human hegemony over habitat, our unloosing of myriad exotics, our tampering with the very chemistry of the biosphere, as well as our long-standing role in overkill, is unmatched in 65 million years. Is that the legacy we wish to leave in the geological record?

It seems that whenever climate and sea level conspired to give four-leggeds the opportunity to move around, the vast continent of Eurasia sent us proficient beasts, via Greenland and the Canadian Archipelago or by way of Beringia, the now-submerged continental shelf that, when sea level is lower, connects Alaska with Siberia. Elephants (mastodons) found their way into the New World perhaps 17 million years ago, beavers less than ten million. Much earlier, rhinolike brontotheres arrived, radiated into multiple species, and vanished. True rhinos, too, ventured into North America early in the Eocene, and they thrived here until just three million years ago.

Global trade has been much less successful in the opposite direction. There are, however, four big success stories among the mammals. North America gave birth to the dog family (Canidae), the camel family (Camelidae), the horse family (Equidae), and the tree squirrel family (Sciuridae), all of which now have a presence in much of the world. The squirrel story begins in the Oligocene some 30 million years ago, when angiosperm plants in North America had to cope with extreme seasonality for the first time: hot summers, frigid winters. North American nut trees appeared at this time too, suggesting a coevolutionary dance of seed and seed disperser.

The only truly and completely American large mammal alive today is the pronghorn. Not a deer, not an antelope, not a goat, the pronghorn family Antilocapridae originated right here and stayed put for 19 million years. All sorts of pronghorns, some sprouting four, even six antler-like horns, thrived during the Miocene, Pliocene, and Pleistocene. The only one that survived the end-Pleistocene extinctions 13,000 years ago still retains a vestige of a by-gone era. *Antilocapra americana* is ready should a long-legged hyena, a swift *Arctodus* bear, or a cheetah be lurking over the grassy horizon: pronghorns can sprint five miles per hour faster than cars are supposed to travel on the Pennsylvania turnpike. The animal is thus way overbuilt for its current predators, coyote and the all-too-rare gray wolf. Pronghorns are running from the ghosts of predators past. Their speed is an ecological anachronism.

To keep the pronghorn fit and facile, perhaps cheetah restoration efforts should be considered. Flannery's research suggests that the cheetah (*Acinonyx*) is possibly the only genus of living cat that originated in North America. The particular species that chased pronghorn until 13,000 years ago was the spitting image of the one that is now having such troubles with humans, lions, and hyenas in Africa. Bring back the cheetah!

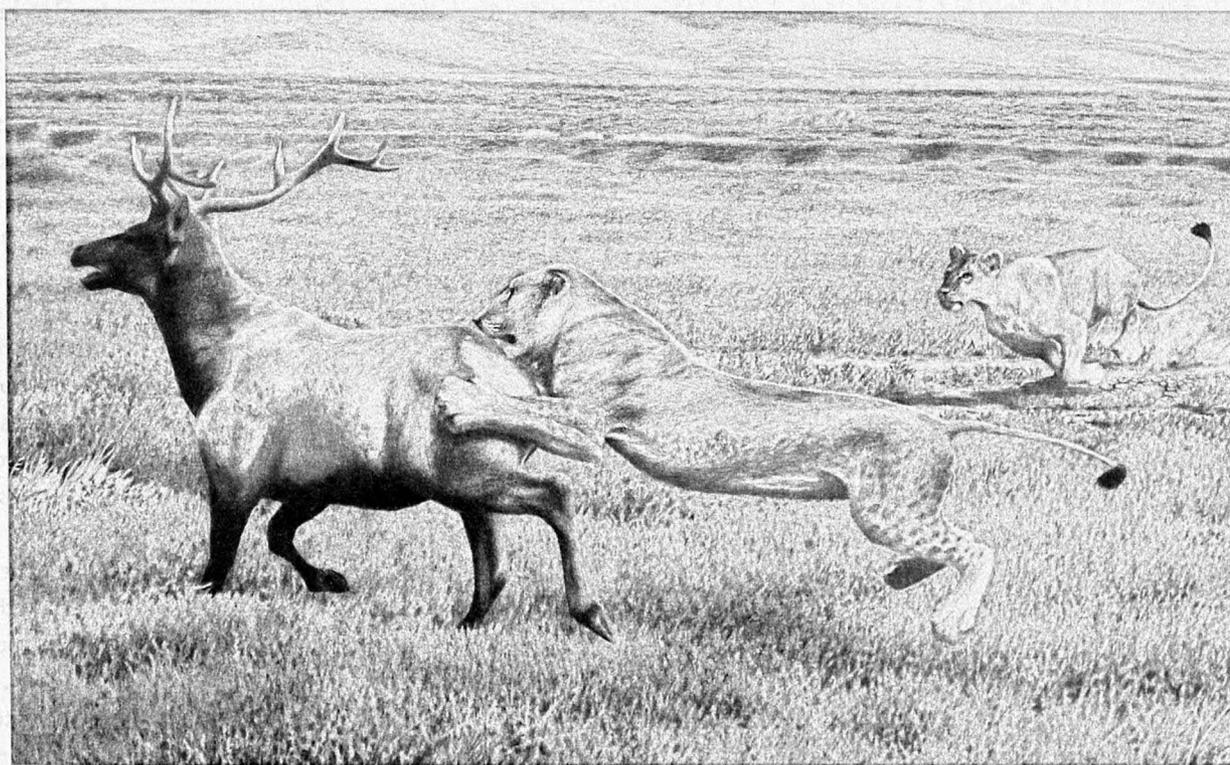
Unaware that Paul Martin and David Burney had published a “bring back” manifesto in *Wild Earth* a year before his own book was published,² Tim Flannery independently and forcefully argues that Americans should repatriate not only the cheetah but also the lion. America’s Pleistocene lion was nearly identical to the living African lion, although it was probably maneless and certainly bigger, with footprints the size of dinner plates. Flannery also joins Martin and Burney in proposing repatriation of the biggest land mammal alive today: the elephant. This convergence of ideas suggests that perhaps the time has come to seriously consider repatriation of extirpated megafauna as part of rewilding North America.³

Convergence (or “parallel evolution”) is indeed another theme that stands out in the Cenozoic story of 65 million years. It seems that there are forms and lifeways that time and time again are called forth by ecological opportunities, and in more than one place. Descended from rails, the six-foot-tall terror bird (*Diatryma*) stalked North America like a miniature *Tyrannosaurus rex* in the early Cenozoic. In South America, independently evolved bird lineages held onto the niche of top carnivore for 50 million years. The last of the breed was

the ten-foot-tall *Titanis*, who survived until late in the Pliocene, after it had ventured into North America.

Similarly, true cats (family Felidae) originated in the eastern hemisphere and then spread to Turtle Island, but not until an older and unrelated form of “cat”—the nimravid—went extinct 23 million years ago. Even canids have periodically generated catlike forms (our living gray fox, a nimble tree climber, is arguably as much catlike as doglike). And, of course, there were the remarkable saber-toothed “cats” of South America. These were pouched marsupials, yet their body and teeth look uncannily like the placental *Smilodon* (a true cat) of the north. The closest common ancestor of *Smilodon* and its South American equivalent was far more like a shrew than a cat, and that ancestor coexisted with the dinosaurs.

An important chapter in the story of the North American continent recounts the amazing exchange of life forms between North and South America. For tens of millions of years, the only terrestrial vertebrates that came into or left South America were those that could fly (bats and birds), float (turtles and tortoises), or hunker down on storm-launched plant debris for a long sea voyage (frogs, lizards, snakes, and toads).



For example, Turtle Island welcomed tree frogs (*Hyla*) into its life community some 35 million years ago. These frogs all came from South America. Toads journeyed north a few million years later. Since then, both kinds of amphibians have speciated grandly, becoming North American natives. Whiptail and race runner lizards (family Teiidae) lived in both of the Americas during the Cretaceous. The asteroid extirpated all of those native to the north. Teiids of Turtle Island today thus hail from South American ancestors who rafted north during the Cenozoic. But South American mammals other than bats came north only when the continents drifted close enough to one another for an extended swim (about five million years ago for the smaller ground sloths) or a dryland

What will make us willing to say goodbye to the convenience of a frontier relationship with the land and reinhabit North America as *home*?

odyssey after the Isthmus of Panama emerged about three million years ago. South American ground sloths, glyptodonts, and toxodons did well in the north until humans arrived 13,000 years ago. Only the small ambassadors from the south—opossums, porcupines, and armadillos—remain.

Meanwhile, Turtle Island sent southward its vertebrates in droves. There is no wild dog, cat, deer, mouse, rat, coati, skunk, squirrel, rabbit, tapir, peccary, camel (llama), bear, or weasel native to South America whose ancestors have been there for more than five million years—and most scampered or slunk across the isthmus only two or three million years ago.

A golden age ends

Following this “Great American Interchange,” the story of the North American continent shifts from deep time to deep history. And this is where the bad news begins. The overkill theory for why the horses, camels, elephants, sloths, glyptodonts, tapirs, peccaries, long-horned bison, and giant tortoises disappeared at the end of the Pleistocene is now widely accepted. The ripple effects of overkill—extinction by starvation, exacerbated by hunting—is the majority explanation for the simultaneous or somewhat later extinctions of the continent’s great native carnivores: dire wolf, sabertooth cats, American lion, cheetah, and the biggest mammalian land carnivore of all time, *Arctodus*, the short-faced bear [see “Species Spotlight,” inside back cover]. Overkill theory is bad news because overkill is us. We did it. Thirteen thousand years ago

is the time we may come to look upon as the beginning of the end of the Cenozoic era⁴—when spear-wielding humans entered North America and overhunted to extinction most of the continent’s large mammals, which had evolved without predation from intelligent, socially organized hominids.

Within the past five years, discoveries in New Zealand, Australia, Madagascar, Hawaii, and Polynesian islands all validate overkill theory. Everywhere, it seems, the last appearances of Pleistocene mammals, reptiles, and flightless birds correlate astonishingly well with first appearances of artifacts and charcoal attributable to *Homo sapiens*.

Correlation is not, of course, proof of cause, but correlation *en masse* is persuasive. Proponents of the theory that climate change caused the disappearances have struggled to explain why continental ice waxed and waned sixteen times in the past

two million years, yet only on the seventeenth melt-back did the change force North America into an “extinction of the massive.” Now, with fine-tuned dating of extinction events in hand, a dwindling team of climate proponents is pressed to explain the non-simultaneity of extinctions around the world. How was climate shifting 50,000 years ago in Australia—and only in Australia? Why did that shift take place before the putative change in North America 13,000 years ago? And how did Cuba manage to avoid the zoological effects of North American climate change until 6,000 years ago, when its six species of ground sloth suddenly vanished? Even more astonishing, one island a dozen miles off the coast of Siberia held onto its mammoths for 8,000 years longer than mammoths survived anywhere else in the world.

And then there are the more recent extinctions on islands distant from any mainland (and more difficult to colonize by raft or canoe). Hawaii began to lose its flightless and other vulnerable birds around 1,500 years ago. Madagascar lost its gorilla-size lemurs, its elephant birds, and its giant tortoises just 1,200 years ago. Even more isolated, New Zealand lost its moa birds just 600 years ago.

It seems that westernized industrial peoples are not the only ones to wreak havoc on lands newly colonized. Perhaps no human culture can be expected to walk lightly upon an unfamiliar landscape—not because we are inherently evil, but because our technology, even at the level of chipped stone, turns us into formidable predators of wildlife that did not co-

evolve with us. Animals too big to hide, too naive to run, and unable to give birth to replacements as quickly as we can slaughter them are the most vulnerable. In the lean times of winter or extended droughts, even bioregionally attuned humans may be driven to kill and kill again, harvesting fatty tongues, while leaving behind the kidney-straining excesses of bare protein, starved flesh. Only after the plundering by the pioneers is complete do the peoples begin a new dance with the landscape. Limits of the land may then shape humans into indigenes who live more or less sustainably with the community of life that remains.

It is surprising to realize, too, that within the context of the 65-million-year Cenozoic era, our symbol of the western wilderness, the grizzly bear, is a recent arrival. The bear who crossed Beringia after the first humans led the way was a human-savvy species that could find a niche in the New World only when a far heftier, faster, and indigenous “short-faced” bear (*Arctodus*) lost its prey base to overkill, and perhaps

made the mistake of assuming that it need not run from anything. Our griz, *Ursus arctos*, is so recent an arrival that it has not yet had time to speciate from the ancestral Eurasian populations of brown bear. The same is true of the animal we call elk and that Europeans call red deer (*Cervus elephas*). Ditto the moose: *Alces alces*. The gray wolf, too, is a recent arrival. Although the dog family, Canidae, originated right here, the gray wolf took form in Eurasia, returning home maybe 100,000 years ago, but only becoming prolific on this continent after the native dire wolf disappeared.

Deep time awareness compels us to accept, as well, that the symbol of the Great Plains is a newcomer to North America. Bison entered this continent 400,000 years ago. The long-horned behemoths then evolved several distinctive species native to place. But those first American bison all vanished with the mammoths and sloths—presumably because they were not only naive of projectiles but hadn’t evolved a strong herding instinct. Into the empty niche came the smaller, short-horned



bison that still survives in Europe. *Bison bison*, commonly known as buffalo here, goes by the name *wisent* in its land of origin. These bison didn't need horns to convince would-be predators to stay away from their young. They ran. The females and young kept to open grasslands, where predators were easily detected at a distance, running was unimpeded, and many muzzles could work together to detect the approach of danger. Alas, even these bison nearly succumbed in North America to guns and railroads.

Frontier or home?

Tim Flannery makes clear that humans per se are not lethal to megafauna (witness precolonial Africa). Rather, the problem is with humans who find themselves in an Edenic frontier of easily killed large animals. It is the way our species invades exploitable habitat—the purple loosestrife phenomenon—that makes a continent quake.

Even after humans adapt to place as indigenes, the danger to wildlife is not over. Native cultures may effectively revert to an alien relationship with their habitat if the technology available to them suddenly changes—notably, if a new technology enters the landscape from abroad and the local peoples indiscriminately make it their own. The sign of an alien is that it is too successful. The body carrying the gun may be native, but the human-gun amalgam is a novelty in the land community.

In the case of North America, the newest waves of human colonists haven't given themselves a fair chance to become indigenous. Technological ingenuity keeps breaching natural limits. For example, Flannery recounts how EuroAmericans passed right by the deserts of the Great Basin on their first westward drive. The limits of the land bested the available technology. But once deep drilling and pumping became possible, the frontier re-opened; lands that had been "wastes" became wheat fields.

Each time that technological innovation gets us out of a resource-limit pickle, there are populations, species, and even whole biomes that suffer. Cornucopians are dangerous not because they are wrong. The real danger for the community of life is that the cornucopians may be right for some time to come. Perhaps technological advances *will* continue to save us from materials shortages, energy shortages, maybe even water shortages for some time, especially now that globalization has effectively made a frontier of the entire globe. At some point,

of course, one limit or another will prove unbreachable (perhaps the limit of human sanity in an increasingly crowded and artificial world), but by then we may have wiped out more forms of life than a Manhattan-size meteor was able to accomplish 65 million years ago.

Coming home

The good news is that we can wake up. *The Eternal Frontier* offers, in breathtakingly beautiful prose, a bracing dose of deep time perspective. Now it is up to us to *choose* a new relationship to North America, to Earth. The landscape cannot be counted on to force the choice upon us, at least not anytime soon. So how will we, of all humans—this prideful, frontier-addicted culture—be motivated to go native, and with all the skill and grace that our sciences and technologies (appropriate technologies) might afford us? What will make us willing to say goodbye to the convenience of a frontier relationship with the land and reinhabit North America as *home*?

One tool in the necessary transformation of spirit will surely be the teaching and preaching of the mythic story of the North American continent. Tim Flannery has given us the storyline, the themes, and a wealth of stunning examples. It is now up to the educators and dramatists and firebrands within the conservation movement to communicate the rich and engaging history of this place: its geological and ecological diversity, its beauty and integrity. Knowing this story, telling and retelling it, is one step on the ethical journey to becoming truly, fully indigenous. ☺

Science writer and editor **Connie Barlow's** most recent books are *Green Space, Green Time: The Way of Science (Copernicus, 1997)* and *The Ghosts of Evolution (Basic Books, 2001)*. She is now traveling throughout North America with her husband, telling the continent's deep time evolutionary story wherever there is interest (www.thegreatstory.org).

NOTES

1. The major reviews of *The Eternal Frontier: An Ecological History of North America and Its Peoples* are: David A. Burney, 2001, "A Down-Under Look at North America," *Natural History* 71/01-8/01: 76-78; Paul Martin, 2001, "Paleobiogeographer from Down Under," *Bioscience* 51: 687-688; Stuart Pimm, 2001, "Cenozoic Dramas," *Science* 292: 1841-42; John Terborgh, 2001, "The Age of Giants," *New York Review of Books*, September 20.
2. Paul S. Martin and David A. Burney, 1999, "Bring Back the Elephants!" *Wild Earth* 9(1): 57-64.
3. Connie Barlow, 1999, "Rewilding for Evolution" *Wild Earth* 9(1): 53-56.
4. Christopher Manes, 1991, "Whatever Happened to the Cenozoic?" *Wild Earth* 1(2): 73-74.

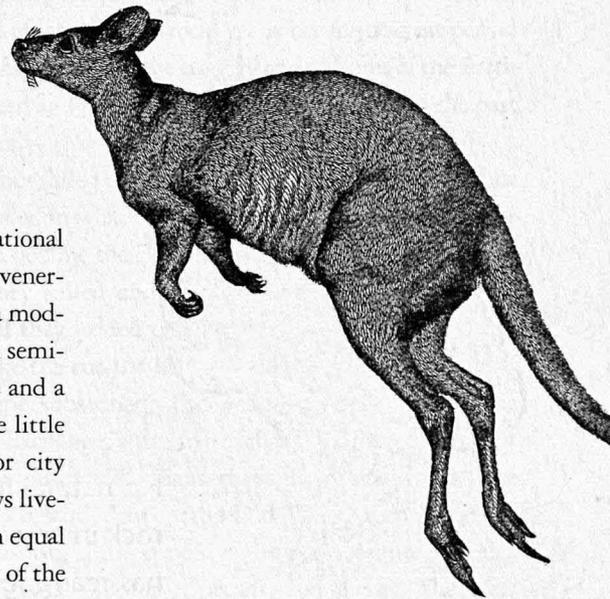
Reuniting Pangaea



a crowded world
connected not by geology
but by human commerce

by Yvonne Baskin

IN THE LATIN QUARTER of Paris, on the grounds of the Muséum National d'Histoire Naturelle, you will find the small, old-fashioned Ménagerie in the venerable Jardin des Plantes. It is not the best zoo in Paris. That distinction goes to a modern zoo on the city's eastern outskirts, where lions and mountain goats roam in semi-natural enclosures. Here in the Ménagerie, Nubian ibex graze in small corrals and a snow leopard stares through the ornate bars of a circular cat house, a structure little changed in 200 years. The Ménagerie remains an attractive destination for city dwellers, though. On a cool afternoon in late April, I found the shaded walkways lively with mothers and young children ogling chickens and African ostriches with equal fascination. I had made my way to this place to try to recapture an obscure bit of the



This essay is adapted from Chapter 2 of A Plague of Rats and Rubbervines: The Growing Threat of Species Invasions by Yvonne Baskin (©2002 The Scientific Committee on Problems of the Environment (SCOPE)) and is reprinted by permission of the publisher, Island Press/Shearwater Books (Washington, D.C. and Covelo, CA). To review the sources for this excerpt, please see the book.

past that nevertheless haunts us still. Wandering by half a dozen llamas, I paused finally to watch a pair of Tibetan yaks munching hay in a small pen. No one else seemed particularly drawn to these massive, placid oxen, and I tried to conjure a sense of the excitement that reportedly ran through the crowds here in 1854 when the first dozen yaks ever to reach France were placed on display. Those beasts became instant celebrities, not just for their novelty but also for their imagined future in the reinvention of French rural life and industry. Yaks, so the vision went, would one day replace mules, donkeys, and oxen, providing wretched peasants in the Alps with a hardy, multipurpose draft animal.

Such was the bizarre and fleeting dream of the Société Zoologique d'Acclimatation, the French acclimatization society, created only a few weeks before the yaks' debut. News of the animals' imminent arrival after a three-year journey from Tibet had stirred the spirits of 130 naturalists, agronomists, scientists, diplomats, industrialists, and landed gentlemen who had gathered under the leadership of zoologist and Ménagerie director Isidore Geoffroy Saint-Hilaire to found the Société. These gentlemen hoped that with the proper

application of science, yaks, as well as llamas, ostriches, kangaroos, and a world of other exotic beasts and plants, could be adapted to a new climate and then turned out to "populate our fields, our forests and our streams with new inhabitants," improving the lot of peasant farmers and launching an agricultural and dietary renaissance in France.

It was the grand opening act in an "acclimatization" movement whose ferment and folly quickly spread throughout Europe and the colonial world. The dozens of societies that formed to further the movement provided ordinary citizens, civil servants, diplomats, and even missionaries an opportunity to join in the importation and exchange of exotic birds, beasts, trees, flowers, and vegetables from across the oceans, an indulgence that from ancient times had been the province of royalty and, later, scientists. For the acclimatizers, the stated goal was not simply to create public spectacles or collect fascinating novelties, but, in Geoffroy Saint-Hilaire's words, to "endow our agriculture, which has languished so long, our industry, our commerce and [our] entire society with blessings which have been neglected or unknown until now." Along with the growing ranks of botanical gardens,



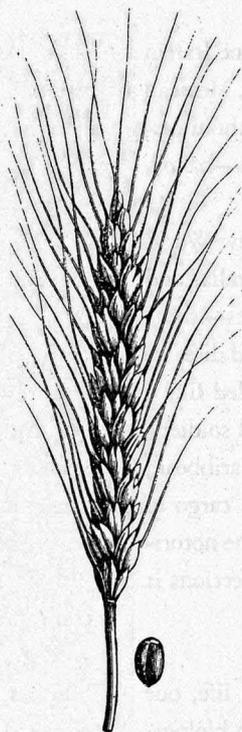
No natural force, no upheaval of ice or fire or rock in any other 500-year period in history, has rearranged the biology and cultures of the Earth with the speed and scope with which humans have in the past five centuries.

zoological societies, and seed merchants, the nineteenth-century acclimatization movement helped fuel an unprecedented rearrangement of the Earth's living heritage.

As they reordered the biological world, they refashioned the human sphere as well. The character of the places we cherish today, their peoples, cultures, foods, and landscapes, strongly reflects choices made 150 to 500 years ago, when Christopher Columbus and the explorers who followed opened up new worlds to exploration and exploitation. So, alas, do the diseases, weeds, and pests that plague us and threaten to displace already beleaguered native plants and animals. The spirit of Geoffroy Saint-Hilaire and his followers is still very much with us, and the consequences are increasingly troublesome. The desire to "enrich" or "improve" upon locally available resources—often with ludicrously little knowledge or forethought—set a tone for agriculture, forestry, fisheries, wildlife biology, and species movers in the plant and pet trades that persisted almost unquestioned until very recent decades. We cannot undo history, but there are good reasons to break with some of its traditions.

IN THE JURASSIC, all the dry lands of the Earth were huddled together on a single continent known as Pangaea. Then forces within the Earth began to drag the great plates of crust apart at the speed our fingernails grow. Slowly, oceans spilled into the widening gaps between landmasses, stranding populations of plants and animals on isolated chunks of island and continent. Left to go their own ways, organisms diverged, evolving into myriad new life-forms and species. When Columbus and other Europeans first ventured across the oceans that now separate the fragments of Pangaea, they encountered the rich array of plant and animal forms that had been forged by millions of years of geologic isolation. At the same time, they opened an era of exploration and commerce that would forever end that isolation.

Even the geologic isolation had never been complete, of course. Occasionally, plant or animal colonists had drifted between chunks of land on flotsam or blown in on the wind. Geologic forces had rejoined bits of land now and again, sail-



ing Central America into place between North and South America 10 million years ago, for instance. The rise and fall of sea levels during past ice ages opened and closed land bridges, allowing humans to walk into Australia about 40,000 years ago and to cross the Bering Strait from Siberia to Alaska a few tens of millennia later. When rising seas subsequently drowned these connections, human groups, such as Native Americans and Australian Aborigines, developed in isolation from Old World peoples until Columbus and those who followed reestablished contact.

With every breach of isolation by geologic forces or *Homo sapiens*, species were lost, including giant marsupials, birds, and reptiles in Australia and mammoths, mastodons, and a host of other megafauna in North America, probably felled both by spears and by diseases carried by arriving humans. Yet no past breach of isolation matches that begun in the fifteenth century. The traffic Columbus and other early European explorers initiated across these ancient gaps reestablished the biological connections between the scattered remnants of Pangaea, and the interchange has been accelerating ever since. No natural force, no upheaval of ice or fire or rock in any other 500-year period in history, has rearranged the biology and cultures of the Earth with the speed and scope with which humans have in the past five centuries.

Columbus failed to find the spices of the East Indies, but when he landed in what came to be called the West Indies, he and his men became the first Europeans to taste corn and chili peppers. They killed and ate a "serpent"—most likely an iguana. And they loaded up goodies to take home. (Iguanas did not make the cut.) What they and other explorers transported in the subsequent 100 years has been dubbed the Columbian Exchange, a massive exchange of ingredients that eventually transformed menus throughout the world. The New World bestowed upon the Old World corn, potatoes, tomatoes, cassava, chili peppers, sweet potatoes, green beans, chocolate, vanilla, pineapple, pecans, and turkey. The New World, in turn, received wheat, wine grapes, sugarcane, onions, lettuce, walnuts, olives, apples, dates, and domesticated livestock—sheep, goats, chickens, pigs, horses, and cattle,

and thus, meat, milk, cheese, and lard. Try to imagine Italian food before tomatoes, French without haricots verts, Mexican without cheese, Thai without hot chilies, African without cassava or corn, and menus anywhere without potatoes—baked, boiled, mashed, or fried.

Unfortunately, a better cuisine is not all the New World got. Long-isolated peoples in the Americas, Australia, and New Zealand succumbed in uncensused multitudes—some put the number as high as 56 million—to Old World diseases such as smallpox, measles, and influenza that traveled like a wave front ahead of the explorers, missionaries, and soldiers. The ships that brought slaves from Africa to the Caribbean, starting in 1648, delivered more than the obvious cargo of misery—they transported to the New World both the notorious mosquito *Aedes aegypti* and two serious viral infections it transmits, yellow fever and dengue fever.

DESPITE THE VAUNTED complexity of modern life, our world is much simpler in many places, more uniform biologically and culturally, than the one Columbus beheld, and the processes that drive the proliferation of cosmopolitan species the world over are accelerating. In Australia, one ecologist noted: “Man through modern agriculture has managed to achieve in 50 years what has taken over 2,000 years in the Mediterranean Basin. Little remains in its original form, having been replaced largely by fields of wheat and grazing land in all but the driest zones.” Much of the credit or blame for this homogenization, of course, goes to plows, axes, livestock, and bulldozers. Yet the global mixing of plants, animals, and microbes, both deliberate and accidental, has teamed with our direct alteration of habitats and landscapes to make any given temperate or tropical place look increasingly like any other. You can now find brown trout and eucalyptus everywhere from New Zealand to Tierra del Fuego, Zimbabwe to California.

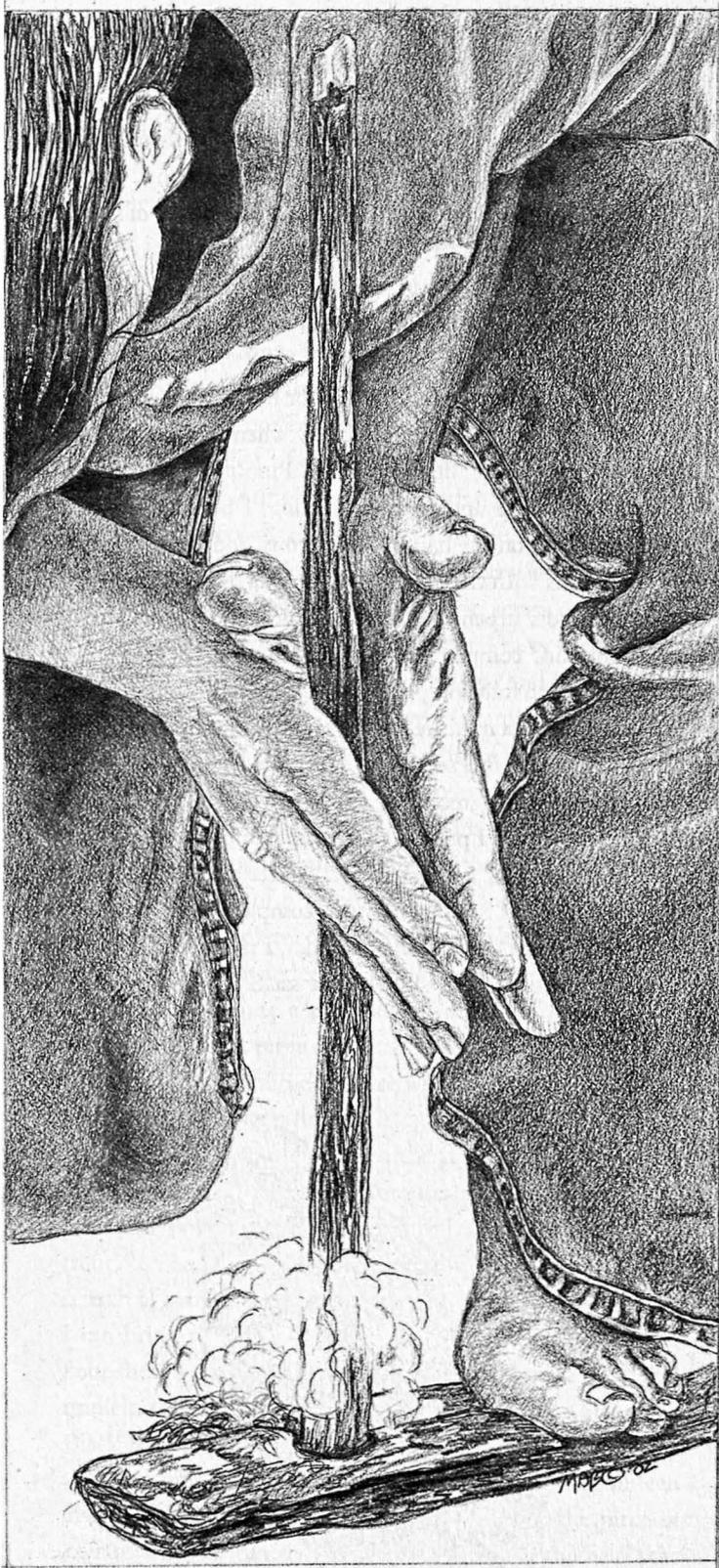
This shake-up hasn't been all bad by any means. We have acquired some lovely things, many of which are mainstays of modern economies and cultures. Who would consign potatoes, rice, wheat, tomatoes, corn, sugar, coffee, or chocolate to be grown and eaten only in the regions where they originated? Our most valuable commodities today are grown far beyond their origins—Eurasian wheat in the North American heartland, South American rubber in Malaysia, African coffee in Brazil, sugar and bananas from Southeast Asia in the Caribbean, and Andean potatoes and Eurasian sheep and cat-

tle worldwide. In the United States, 98% of food production, valued at \$800 billion per year, comes from imported non-native species such as wheat, corn, and cattle. Indeed, these and other widely introduced crop and livestock species provide more than 98% of the world food supply.

Yet there are those gaping wounds we created, the vast movement of weeds, pests, and pathogens that interfere with our health, our livelihoods, and the unique diversity of our native plant and animal communities. Public health and agriculture began to tackle this problem early in the twentieth century, and any border controls and import quarantines we encounter around the world today were erected to protect these sectors. Only recently have we begun to realize, however, the burden this biological roulette has placed on the wild places beyond our farms and homes. In some regions, native communities have been overwhelmed. Nearly half of the wild-growing plants on Hawaii have been introduced by humans, as have at least one-quarter of those in Florida. Half of the plants and all the terrestrial mammals living wild in New Zealand today were introduced by people, and four new exotic plants escape gardens and fields and establish themselves there every month. Likewise, on islands from Mauritius to the Galápagos, at least half of the plant life is non-native and was carried there by humans.

Most acclimatizers and like-minded species movers truly believed they were simply enriching, not replacing, the life of their new homes. In many cases, they were. Most exotic species do not survive in new territories without tending, and among those that do, most slip unobtrusively into their new communities. A small but significant number of these imports, however, turn aggressive. They invade, disrupt, and displace, often marginalizing or replacing local species. A region may end up with the same or even higher head count of organisms, but the new cast is likely to include a striking array of starlings, pigs, thistles, and other creatures that can be found anywhere. This is the new Pangaea, crowded, competitive, a shrinking world connected not by geology but by human commerce. Many unique, rare, or undefended creatures, well suited to isolated realms, will not survive it without our help. ☾

Yvonne Baskin is a Montana-based science writer and the author of *The Work of Nature* (1997). Her articles have appeared in *Natural History*, *Science*, *Discover*, and *The Atlantic Monthly*.



Reclamation

by Jeff Bickart

BETWEEN MY PALMS I spin a slender stalk of mullein, two feet long. Its lower end burns a hole into a length of thick cottonwood root. I have cut a notch into the deepening hole from the flattened front edge of the root. Black dust ground from the tip of the mullein drill and from the cottonwood hearth collects in the notch, above a tinder ball of finely shredded cedar bark. Seven runs of my hands down the drill, and my breaths become more rapid, my heartbeat rises, and acidic exhaustion creeps into my arms. I stop.

A thin trail of smoke rises steadily from the clump of dust. I nudge it with a dry stem of grass into the tinder, cup it, surround it with the bark, and blow strongly and steadily. The red ember eye of the coal glows; I blow harder, cupping it further, nourishing it...smoke pours out, encircling my head. The cedar bark bursts into flame. I place it carefully into my pile of twigs, and build my fire.

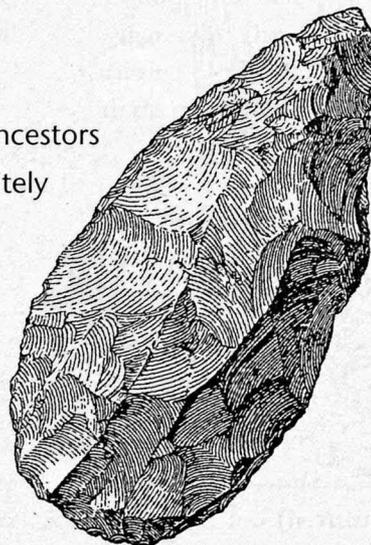
My eyes continually scan my surroundings, searching and scrutinizing, looking for the materials necessary to make the items of a hunter-gatherer's life. I prize straight stalks and stems: elderberry, horseweed, mullein for fire drills; ash-leaf maple, chokecherry, dogwood for arrows. I covet one- or two-year-old willow shoots for baskets, and I wonder whether the stand of paper birch I see in the distance has good bark. Driving past a river that has an exposed bed of cobbles, I must stop to examine the stones: perhaps I will find the treasure of conchoidal fracturing, and the potential of the sharp cutting edge.

"What does it mean to be human?" is surely a fundamental question. To come to an answer we must realize that 95% of our species' history, and 99.5% of the history of the genus *Homo*, was spent exclusively as hunter-gatherers (or scavenger-gatherers), deriving every single thing for life directly and personally from wild Nature. I agree with Paul Shepard that our essential humanness was formed during our evolution in this way of life, that it is still who we are, and that we must bring into our lives now some of that heritage

if we are to truly reconnect with Nature. In *Coming Home to the Pleistocene*, Shepard lists seventy-one "aspects of a Pleistocene paradigm"—his prescription for this reconnection—but with the exception of two aspects listed ("handmade tools and other objects," and "participation in hunting and gathering," which receive no further explication), he ignores the power of studying what may be called aboriginal skills, or primitive technology. We should not, perhaps, go for our first lessons to the garden, with its steel hoes and straight rows.

THE DEERSKIN has been soaking for five days in a solution of wood ashes. It is sodden and heavy when I pull it out and drape it over the log "fleshing beam." Pinning it between my abdomen and the upper end of the log, I bend over it and begin scraping off the hair, the epidermis, and the outer layer of the dermis with the cannon bone from a deer's leg, which I modified and sharpened with a flint flake. Three hours later, I put the skin, completely scraped, into the river to rinse overnight. The following day, I wring it out, and then steep it for an hour in a mixture of deer brains and water, heated by rocks from a fire, in a section of log charred and chopped and scraped out with a greenstone celt. Wringing the skin again, for six more hours I pull it, stretch it, manipulate it in every way I can think of while it dries...whiter and whiter, softer and softer, until it is completely dry, completely soft, and I am completely worn out. On the third day, I use hide glue along the edges to form the skin into a sack, suspend it open-

Each one of us, every single person on this earth, has ancestors who knew how rock breaks, and how to control exquisitely the size, shape, and direction of fracturing to make an edge that could slice effortlessly the hide and muscle and sinew of a wild animal.



mouthed over a smoldering fire of punky wood on coals, and smoke it inside and out until it is a rich brown. The deer and I are transformed.

Each one of us, every single person on this earth, has ancestors who knew how rock breaks, and how to control exquisitely the size, shape, and direction of fracturing to make an edge that could slice effortlessly the hide and muscle and sinew of a wild animal; each of us has ancestors who could turn the skins of deer, the pelts of beavers, foxes, and other creatures into coverings for the body that kept out the coldest weather. Each of us is the descendant of consummate basket-makers; of skilled builders in bark, grass, mud, snow, stones, skins, leaves, poles; of men and women for whom rolling plant fiber on their thighs into thousands of feet of cordage for fish nets was second nature. Each of us can look back to hunters who could follow the faintest impressions of animals through forests and grasslands, over rock, across deserts, and then face them down with atlatls or bows. I carry the blood of a man who killed a mammoth with a spear and butchered it with a chert knife when the ice covered Europe.

Begin compiling in your mind a list of the materials and hand-manufactured items needed to survive as a hunter-gatherer wherever it is that you live. This would mean nothing less than knowing all the plants, the animals, and the mineral resources of a place. To build a culture from the beginning in any place, or, now, to undertake the acquisition of some of the knowledge and skills that would be needed to do so, is to cultivate a profound intimacy with its nature. Begin: you need a piece of string. You have your hands and whatever is in your head. Where will you go, and what will you do with what you find?

The hunter or angler maps the haunts of his prey: the deer's winter yards, the ruffed grouses' favorite thickets, the particular pools and riffles and shoreline stretches that the trout, the bass, the bluegills especially favor. I know every stretch of roadside near my home where dogbane grows, and I can bring to mind all the wet seepy ground where nettle flourishes; I can recall every spot where I have gathered mullein stalks, and I know where the best clay is along the Black River.

The bird-watcher may know the woods where he can always hear the first winter wren in spring, or the piece of marsh where he can reliably find a bittern, or the field that always has nesting grasshopper sparrows. Understanding

gathered solely for pleasure, perhaps, but also, in an older context, the mapping of important resources. All of us who are naturalists have already, although probably not for this purpose, created, in our minds, maps that locate those useful materials (or animals) that would be necessary for us to actually make our lives in a particular place. Those who travel on foot in mountains, forests, and deserts, or in canoes and kayaks down rivers and across lakes and along ocean coasts, catalogue the sheltered locations for camps, the sources of water, the places with good firewood—making critical observations as they have been made for hundreds of thousands of years by human travelers in the wild.

A person who makes baskets for a hobby, even if living in the city, may move from an initial dependence on store-bought supplies to an incorporation of, or even complete use of, materials from Nature, as I did when living in Baltimore 20 years ago: I started to notice twining vines and slender withes during daily runs which often took me on a narrowly wooded trail along a stream that had survived far into the city. Collecting my own materials transformed basket-making into a means of genuine, personal connection. Although we no longer are compelled to live by our knowledge of a chosen place's resources, we still need to know what they are, where they are, and how to use them, if we wish to have a whole relationship to Nature. And although many Americans will never set foot in a national park, and even fewer will enter a designated wilderness area, there remains the opportunity to reconnect with our Pleistocene ancestry even in the midst of urban and suburban life.

I have taken many students out to weedy places and field edges in the fall to gather milkweed and dogbane. None has failed to be gripped by learning the process of properly stripping the long fibers from the dead stalks, softening and cleaning them, and reverse-wrapping them into unbreakable cordage; all bend their heads intently to the simple making of string. I have helped three dozen students, as young as 15 years old, to learn the art of tanning hides with brains. For 12 hours, but sometimes as long as 16 to 18 hours, over two and a half days, they have worked, in some cases struggled, to turn smelly, sloppy deer hides, otherwise discarded by hunters, into beautiful brown tanned skins—and then perhaps made into footwear, or useful bags, and a potential, with more skins, to clothe themselves by their own efforts from some of the raw stuff

of the world. Sometimes, for any of several possible reasons, hides do not soften on the first attempt. When this has happened, my students, who work in pairs on a hide, have always been determined to go through the arduous softening again—the process and the anticipated result are utterly compelling to them. And when, a couple times, re-softening has not much improved the product, although disappointed, they have not complained; I believe that some deep need has been satisfied nevertheless.

In passing on this knowledge, I participate in the ancient heritage of oral teaching, of book-less instruction in skills essential to life—at one time essential to physical survival, and now, I believe, essential to spiritual survival. I learned to tan hides in 1997 at Rabbitstick, a week-long gathering of aboriginal skills devotees held each September on the Henry's Fork of the Snake River in Idaho. My teacher learned from one of the very few who helped recover this skill (among whites—it has never been lost among natives of the Canadian North). Thus I bind myself by oral tradition to ancestors of countless generations ago—reclaiming knowledge which my students, in turn, may continue.

JUST ABOUT ALL modern technology is inscrutable. We are surrounded by boxes. Things happen inside of those boxes. We are the recipients of certain desired results, with practically no understanding of how those results came about. Can you explain why the arrow on your computer screen moves when you push the mouse around? I have no idea how an electronic replica of my father's voice speaks out from the receiver of my telephone as he's driving an automobile in Colorado. And even if I can, more or less, explain how iron ore became the steel of the very useful saw blade of the multi-tool on my belt, I have no genuine connection to that process, and the things that have intervened—great diggers and movers of earth, enormous ships, fiery furnaces, rollers and stampers and sharpeners and polishers of steel—have removed me from the origin, have made the original nature of my tool distant.

The old ways make sense intuitively. You find some fine-grained sediment in a stream bank, and dig it out with a stick. You try to mold it. It holds together. You make a ball, and push down in the center. You thin out the sides and set it to dry in the sun. It cracks a bit, perhaps, but it is usable. It's not much, maybe, compared to the computer on your desk. Low

technology. Elementary school. But you made it, out of the skin of the earth, with your own hands. From the near sense-lessness, the near unknowableness, of the box, you have gone back to literal sensation, to the perceiving of the material, the apprehension of the nature of the clay, directly through the skin of your fingers. I believe that the erosion of our ability to, literally, make sense of what we use and do leads to feelings of helplessness, powerlessness, and even despair.

My students take up in one hand a flattish quartzite cobble gathered from the bed of the White River. Holding in the other hand a round hammerstone, they strike off four flakes alternately from the two sides of their cobbles. They have just reproduced the earliest hominid stone tool, the Oldowan chopper, known from sites dated to 2.5 million years ago. Thus fortified, we go into the woods. A few hours later, having used no other tools and no materials besides what they have gathered, except for a length of deer rawhide, several have started fires with the bow drill sets they have made. They know ancient minds, ancient bodies, ancient hearts, and they have started to know Nature in the most direct and primordial way. Not all succeed in getting fire so quickly, of course. A certain unfamiliar coordination of the body must be learned, the ability to apply directed force in a sort of stationary motion, with control and with calm. But a few of my students have made fire on their first try with a hand drill, a mullein stalk spun on a flattened piece of a cottonwood root or a cedar branch. And as smoke wreaths their heads, their pleasure and satisfaction and pride are clear.

"Take only pictures, leave only footprints" is the right idea for the many over-used places that too many people go to, and for those places that would show, to their detriment, the effects of careless taking and leaving. But to eliminate taking and leaving from our relationship with Nature is to eliminate an essential part of our human nature, and to deny the possibility of the genuine human occupancy of places. Our presence on the land requires taking, modifying, using, and discarding (but human continuance requires doing so well)—and there are plenty of places to collect without harm what one needs to begin in a small way the reacquaintance with the knowledge and skills that made us.

Manipulation of Nature—shaping it with our hands—is a fundamental part of who we are. Can we clearly recognize the magnitude of our current manipulations of Nature (which

may reach their most terrifying in genetic engineering and nanotechnology) without the perspective afforded by familiarity with the skills that sustained us for almost all of our existence? I watch our “progress,” and hear the breathless and earnest declarations of faith in technology’s ability to deliver us from whatever it is that is unsatisfying about our lives, to save us from the problems that we have created for ourselves. I am skeptical.

The study of ancient life-ways common to all people deserves attention as we struggle to understand our place in the natural world. The skills that human beings have used to sustain themselves for nearly all of the existence of the species bring a deep understanding of connectedness and interdependence. Making, using, and living with tools and other products fashioned from the materials at hand in the wild brings insight that is obtainable in no other way, and also offers an indefinable satisfaction that seems to reach something deep inside. Aboriginal humans, by necessity skilled craftspeople, were naturalists of the highest order—observant, to a degree few of us now reach, of the world: the patterns of weather; the signs and habits of animals; the plants useful for food, medicine, clothing, shelter, and weapons; the rocks from which their most basic tools were made.

Let us turn off the Weather Channel and look at the clouds. Let us gnaw the young green flower spikes of cattails, and dig their roots in the fall with pointy sticks. Let us stand in the milkweed by the side of the road, and strip the fiber from the stalks and right then and there make two feet of cord, and thread it through a hole in an acorn cap and call it a necklace. Let us find honeysuckle in a wild tangle in a vacant lot, and weave it over and under and round and round into a basket, and fill it with wild blackberries gathered from next to the train tracks. Let us even go to a patch of woods, and take up a knife, or a sharp flake of flint, and sticks, and stones, and handmade string, and rediscover, if not use, the subtle snares and deadfalls of our predecessors in cunning. Let us go back, and go forward. ☾

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[POETRY]

Tent Dwellers

OKAK, LABRADOR

Inside this licheny ring of stones
that once held down a sealskin
tent, I pitch my own domed
aquamarine tent and then quickly
crawl inside to escape an ice pellet
shower, whereupon I see a couple
of my predecessors squatting dim
and hazy, Dorset People with
cuprous, epicanthic faces, scrapers
of skin, tellers of tales, diviners
of the weather, who stare at this
pallid specimen from a distant
age in his nylon-lined apparel,
astonished that he somehow
survived and they did not.

≈ Lawrence Millman

Wilderness



Is Where My Genome Lives

by Paul Shepard

GENETICAL BIOLOGY AND MEDICINE are widely heralded as the “physics” of the twenty-first century. We are told that “genetic engineering” will become the next equivalent of the twentieth century’s sub-atomic physics. This notion takes its recent thrust from molecular biology and centers on the decoding of the human genome. Progress in mapping genes on the chromosomes is presented in almost daily communiques from medical research, specifying the location and identity of deleterious genes in both humans and other animals. The prospect being offered by medicine is, of course, that invasive techniques will enable us to replace deleterious genes with preferred alternatives early in the life of the individual—the better genes, grown in bacteria or other organisms, transferred to egg or sperm cells by a tiny vaccination. Attention to this new phase of eugenics is focused on the more sensational aspects of the “war” against disease and heritable disability. It is also expected that the perfect tomato and ultimate cow will become realities.

Pursuit of total health and perfect crops may drive this research machine and its publicity, but at a less conspicuous level, what is happening is that the genetic basis and reality of the normal or optimal human individual is being recognized. In the process of decoding the chromosomes we are finding that what was thought to be “cultural,” “environmental,” and “learned” has a genetic basis and that education is mostly a kind of facilitation. We are learning finally that being human is heritable rather than attitudinal (witness the failed attempts to make chimpanzees human by rearing them in human homes or foisting speech on them) and that the

vaunted human diversity is a large window on rather narrow variations. That all human traits are ultimately genetic (just as all are dependent on appropriate circumstances for their expression) is becoming evident. The century-old debate concerning nature and nurture is not dead, but its formulation is no longer one of alternatives so much as reciprocity.

The human genome is many hundreds of thousands of years old and is layered, so to speak, like diamonds in clusters of apish pearls which themselves have older genetic settings, antecedents from primate ancestors and others from still more archaic forebears—mammalian, reptilian, ichthyian, invertebrate, and bacterial. As a species we are Pleistocene, owing little or nothing to the millennia of urban life, or of rustication with cereals and goats, except perhaps some local shifts in gene frequency associated with resistance to epidemic disease and food allergies, along with a widened flow of genes between physical types or races that were more or less isolated earlier.¹

While it is clearly demonstrable that genetic change can be extremely rapid in a small, intensely selected population, such as the remnants of a decimated or island group, or among the human-manipulated domestic plants and animals, the evidence of Homonid paleontology is that the typical rate of genetic change in human evolution is consistent with that of other wild animals—that is, relatively slow. Whether humans are “domesticated” has been debated for decades, but if we follow the definition of “domestic” as a type created by controlled breeding with conscious objectives by humans, then we ourselves are genetically wild. The argument that we

are domesticated because of our high degree of neoteny or infantilization would require that we regard most species of anthropoid primates as domestic also, and the usefulness of the word begins to drain away.

Domestication typically produces rapid change, hypertrophy, and homozygous recessive traits—which is to say, anomalies, diminished intelligence, and specialized features, at the expense of overall adaptability. It is typical of domesticated forms that they cannot survive except with human care, usually in gardens, farmyards, households, laboratories, or greenhouses.

The implications of this have interesting environmental aspects, since the habitat of domestic animals tends to be architectural habitations combined with other domestic forms—complexes of unstable, disclimaxed landscapes under human dominion. While we, like many other genetically wild animals (such as foxes, crows, and langurs) can live in such places, we and they are not bound by nor necessarily at our best in them. Neither we nor crows are limited to a complex of engineered landscapes or domestic plants and animals to survive, because we and crows have not had our genes muddled by breeders. The radical implication of this is that we, like other wild forms, may actually be less healthy in the domesticated landscapes than in those places to which our DNA remains more closely tuned.

The home of our wildness is both etymologically and biologically wilderness. Although we may define ourselves in terms of culture, language, and so on, it is evident that the context of our being now, as in the past, is wilderness—an environment lacking domestic organisms entirely and to which, one might say, our genes look expectantly for those circumstances which are their optimal ambience. Domesticated forms are inventions, the products of empirical genetic engineering in the past. Immersed though we may be in built and altered surroundings, we are not confined to them and our human potential may be fulfilled less in such invented landscapes and the behaviors which they entail than in those cultures and places that are shaped more directly by the terms of our evolutionary genesis.

Like crows and foxes, we are omnivorous, edge forms. Unlike them, our swift mobility through places tends to delude our self-appraisal when it comes to obligatory, ecological constraints. (At least I presume that foxes and crows are subjectively realistic about limitations.) Civilization

conceals our innermost need for those complex communities which characterize wilderness, but does not alter that need. Denying the effects of deviating from the world to which we are adapted is part of modern ideology. As Rene Dubos pointed out more than two decades ago, our adaptability and accommodation to deleterious environments hides our vulnerability to their effects. It is a masking in which we boastfully perceive ourselves as elevated above our progenitors and cousins.

We have become expert at interpreting a wide range of physical and social disorders—everything from war to allergies—as weaknesses (usually temporary) of the social, political, or technological systems, rather than as evidence of ecological dissonance. That we, like bears and cockroaches, can endure deficient environments has been interpreted as evidence of our transcendence of biological specialization, that widely repudiated condition of dinosaurs and all other extinct forms. Social scientists have insisted for three generations that ours is a “generalized” species, while all around us other animals made the mistake of becoming “over specialized.” This fable was so patent that, for a century, paleontologists were unable to recognize our ancestors among any of the dozens of hominid/pongid fossils, seeing them as all being irreversibly overdone.² The culminating expression of this self-deception was the announcement that the human brain, the means of our superior intelligence, was the instrument of our exception from those narrow commitments that burdened other life forms.

We are not the generalized species we were said to be. This is the same brain and nervous system whose dysfunction now produces epidemic levels of psychopathology in cities. What was a good (and very highly specialized) brain for positioning a terrestrial primate in the Pleistocene is evidently maladapted for life in the throes of its own success. Our whole ontogeny or individual development, like the nervous system itself, may be among the most highly specialized biological complexes in existence. The paradox of an apparently unlimited adaptability and extreme specialization will probably untangle its own contradictions in the twenty-first century, as we discover that cultural choices do not exhibit but hide common, underlying, physical limitations and requirements.

Such constraints are part of a universal biological heritage, honed to a Pleistocene reality—that is, to the way of

life—for the three million years commonly said to have ended about ten thousand years ago. In the twentieth century a renewed sense of limitation, necessity of compliance, and of human nature has begun to emerge and to reverse an era of bizarre, cultural hallucinations of “no limits,” and human domination over or exemption from the “laws of nature.” This shift away from the illusion that we can be anything we want to be was foreshadowed by the work of such people as Nico Tinbergen, Konrad Lorenz, Desmond Morris, Lionel Tiger, Robin Fox, S. Boyd Eaton, Marjorie Shostak, Melvin Konner, E. O. Wilson, and Robert Ardrey, all of whom were vilified for “biologizing” the human species and sullyng our self-proclaimed superiority to evolution.

Until recently we have portrayed wilderness in our past in one of two contrasting fictions: the noble savage, such as Adam and Eve and the Greek gods, living in a golden age; or as the Wild Man, a debased figure lurking at the fringes of



The time is coming to understand the significance of wilderness, not as an adjunct to the affluent traveler, as leisure for an educated, esthetic, appreciative class, or as a Noah's ark, but as the psychological and ecological mold of humanity, which continues to be fundamental to our species and ourselves.

civilization, destined to consort with the beasts as one of them, an aspect of ourselves which we have repudiated as a grunting cave man. This Wild Man is the grotesque monster of civilized hubris, the embodiment of 3,000 years of our fear of the wilderness.

Our “wild” state corresponded to what we wrongly thought to be characteristic of wild animals, mistakenly deduced from watching the demented and stupid beasts of the barnyard. The only hope for human beastliness—our rage, terror, lust, gluttony, and murder—was either religious salvation or a “social contract” which would block all those destructive instincts. This ugly vision of wildness as the dark side of our heritage inclines us to shy away from wilderness as the ground of our being. Wilderness has been valued as the place we test our civilized (i.e., urbanized) selfhood against raw Nature, as a landscape esthetic, as an ethical enclave of biodiversity, or as that refuge in which we hope to have a spiritual experience. But a better idea of people in wild places emerges, in which its practical and sensory terms model the optimum qualities of life in many respects, not only of philosophy, preservation biology, and High Culture, but of food, exercise, and social structure. The time is coming to understand the significance of wilderness, not as an adjunct to the affluent traveler, as leisure for an educated, esthetic, appreciative class, or as a Noah's ark, but as the psychological and ecological mold of humanity, which continues to be fundamental to our species and ourselves.

Twenty years ago, Hugh Iltis wrote, “Man's love for natural colours, patterns, and harmonies, his preference for forest-grassland ecotones which he recreates wherever he settles, even in drastically different landscapes, must be the result (at least to a very large degree) of Darwinian natural selection through eons of mammalian and anthropoid evolutionary time....Our eyes and ears, noses, brain, and bodies have all been shaped by nature. Would it not then be incredible indeed, if savannas and forest groves, flowers and animals, the multiplicity of environmental components to which our bodies were originally shaped, were not, at the very least, still important to us? Would not such a concept of ‘nature’ be a major part of what might be called a *basic optimum human environment?*”³

This new perspective comes in part from a better understanding of our primate cousins and ancestors, of hunting-gathering societies present and past, and of the conditions of

life prior to the first cities and the earliest domestications. Thus have archaeology and anthropology served to revolutionize recent thought. Even so, radical rethinking about *Homo sapiens* from the social sciences is an exception to the twentieth-century mainstream with its commitment to cultural relativism. As Kroeber said, "It is differences that we are interested in." And most academic anthropology and its educated public continue to assume that civilization is some kind of orthogenic, progressive panacea.

The social bias against species-specific traits and all other naturalisms was a continuation of the dogma of human uniqueness espoused by Western world religions. For centuries the naturalists merely broke their heads against this insular conceit, Darwin's theory of biological evolution being the principal case in point, still "debated" by those who want

none of an organic essence, or who want to see it dressed out only as compassion.

The surprise that this is changing is not because of new respect for the work of naturalists or because official anthropology has turned about, but through the doors of medicine itself. It is all the more surprising because of the essentially unecological stance of modern medicine's adherence to the ideal of the preservation of life at any cost, its official blindness to catastrophic human overpopulation and loss of other species, and its fanatic devotion to antibiotics and expensive technology. Yet, we will be inadvertently convinced of the value of our wildness because our health in the broadest sense depends on it. As we begin to see organic dysfunction and disease as the misfitting of our genome and the environments we have created, we move away from the notion of a "war"



against natural process. Acknowledgement that we are indeed Pleistocene hominids keyed with infinite exactitude to small group, omnivorous life in semi-forested habitats may not be immediately forthcoming, even from those with the immunological intolerances for milk and cereals, those whose vascular systems are clogged with domestic fats and cholesterol, whose bodies creak with arthritic sedentism, in the midst of epidemic psychoses of overdense populations whose cosmologies yield havoc because they demand control over rather than compliance with the natural world, cosmologies based on the centralized model of the barnyard. We have begun to move toward better diet and exercise because of immediate necessity, but in the long run its measure is life in the lost world of the ice ages, from which such symptoms mark our alienation. The seemingly remote world of the "ice age" and the savannas which preceded it is where the criteria were established that will decide finally whether our medical therapies and "life style" are successful and whether we truly understand what recovery means.

No one, it is said, can go back to the Pleistocene. We will not, in some magic time-warp that denies duration, join those prehistoric dead in their well-honed ecology. But that is irrelevant. Having never left our genome and its authority, we have never left the past which is part of ourselves, and have only to bring the Pleistocene to us. Regardless of the lines drawn to end that period by geologists and archaeologists, we remain "in" it. Fortunately, it is not only a Thing or a Place or a Time, but a mosaic life way, a living embroidery. The Pleistocene is accessible in its astonishing intimacy and perennial presence. We continue to share the world with most of the families of plants and animals who were also part of it.

A culture is an assemblage, not a monolith. The Pleistocene is constructible in terms of its ontogenetic, economic, social, ecological, and cosmological characteristics. The omnivorous mode and small-scale community of human life is not a mono anything—monolatry, monogamy, monopoly, or monotony.

Perhaps the time has come to dispose of the notion of wilderness as a zoo, an exalted esthetic, a captive, exotic landscape, or a storehouse of tomorrow's resources. Wildness is the state against which we assess the "virtues" of civilization and its correlates—mass society, the use of fossil fuels, growth-oriented economics, and the technologies of disjunction and pseudo-mastery that temporarily conceal our limi-

tations and lead us to play in a world of virtual reality rather than live in actual places.

Our hearts are touched by those who seek to create a therapy in the wilderness. But the effort to recreate, to study, or to appreciate the balm of wilderness, to compose a literature of self-discovery and solitude and new awareness are, culturally speaking, merely first efforts, only palliative. Our concern over the increasing rate of extinctions and the worldwide diminishing of biodiversity is, in the end, not altruism, nor ethics, nor charity. Wild species are true others, the components of wilderness and at the same time the external correlates of our inmost selves. Together with their abiotic world, their interactive dynamic is so complex that, when a small part of it—fluid mechanics—was discovered to be vastly complicated, the dismayed physicists cried, "Chaos!" But the naturalists have suspected right along that the world was not chaotic nor that our brains are nearly as complicated as a swamp whose vapors alone throw physicists into a tizzy. As the new genetic mapping inches forward in the next century, the resonance of the two ecologies—the biome and the genome—will be perceived as the way to human health. ☾

Paul Shepard (1925–1996) was a pioneering thinker in human ecology. He is the author of over a dozen books including *Nature and Madness*, *The Tender Carnivore and the Sacred Game*, and *The Others: How Animals Made Us Human*. This essay was originally presented in 1993 as a paper at the Fifth International Wilderness Conference in Norway. It later became the basis for a much expanded discussion of "Wildness and Wilderness" (chapter 8) in Shepard's book *Coming Home to the Pleistocene* (Island Press 1998). It is used by permission of Florence Shepard.

NOTES

1. That is, emergents of the last three million years, rather than as the humans would have it, creations of the Holocene or last ten thousand years.
2. That is, the argument that none of those heavy-browed, big-jawed, hairy anthropoids could be ancestral because our species could not "evolve" from creatures with all those specialized traits. No relict of *Oreopithecus*, *Ramapithecus*, *Australopithecus*, *Homo habilis*, or *Homo erectus* could be anything but "cousins" of our mysterious forebears. This eternal missing link mythology vanished, however, when we understood that adaptive neoteny (retarded development) could do just what was required, and voila! there in our hands were the bones of our kin.
3. Hugh Iltis, 1974, "Flowers and Human Ecology," in *New Movements in the Study and Teaching of Biology*, ed. Cyril Selmes (London: Maurice Temple Smith).

Ecopsychology Since 1992

As long as there is Prozac, who needs environmental sanity?

AS FAR AS I AM AWARE, the term “ecopsychology” was coined in the pages of my book *The Voice of the Earth* in 1992. That was the year of the Earth Summit in Rio when the air was filled with debate about the future of the environmental movement. *The Voice of the Earth* offered the concept of ecopsychology as an appeal to environmentalists and psychologists for a dialogue that would enrich both fields and play a significant role in public policy. The catch phrase that encapsulated the proposal was “ecology needs psychology, psychology needs ecology.” At the time, there were various efforts around the fringes of professional psychotherapy to achieve that goal. They bore names like “green psychology,” “nature-based therapy,” or “ecotherapy.” Each was some one therapist’s idea about how to include the more-than-human world in their work with clients whose problems seemed to transcend the social context that delimits conventional psychology. There was also the well-developed field called “environmental psychology,” but that has to do with the harmonious design of rooms, buildings, and landscape—the architectural environment of urban life, which is more the problem than the solution when it comes to our alienation from Nature.

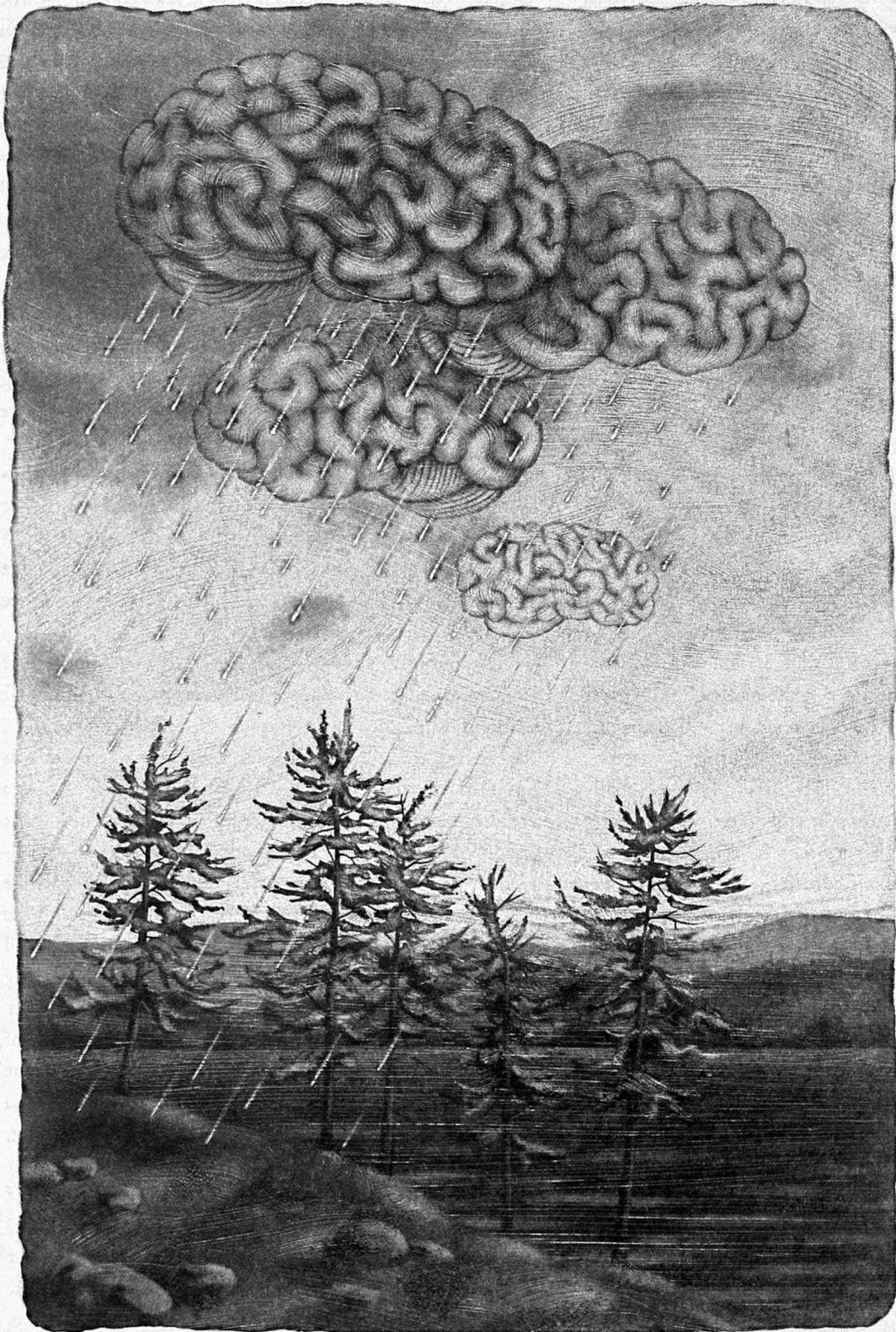
It is hardly unusual for fields of study to work out the sort of alliance ecopsychology seeks. All interdisciplinary efforts arise from the fact that the demarcations dividing specialists are wholly artificial and may at some point limit our understanding. For example, where does one sensibly draw a hard and fast line between economics and political science, or between geography and geology? Or consider sociobiology, a much-publicized effort to bring sociology, evolutionary biology, and psychology together in support of some highly controversial conclusions about human nature. In much the same spirit of intellectual adventure, ecopsychology suggests that what psychologists have learned about human behavior may have much to tell us about our bad habits toward the Earth. Since conservationists seek to change those habits, would it not be helpful for them to draw on what psychologists can tell them? This would seem to be especially important where the human behavior in question is wholly irrational, even to the point of self-destruction.

I began to wonder about this possibility several years before I wrote *The Voice of the Earth*. I was struck by how often people characterize the behavior of our species as “crazy.” It is “crazy” to destroy the ozone layer in order to enjoy the convenience of spray cans. It is “crazy” to wipe out magnificent wilderness areas to build shopping malls and parking lots. It is “crazy” to keep filling the atmosphere with automobile exhaust in order to drive around in sport utility vehicles. In all these cases, people have been given the facts of the matter, but most of them continue doing irreparable damage to the planetary ecology as if they cannot help themselves. Environmentalists scold them, but that does no more good than scolding a pyromaniac for setting fires.

Nature is not scenery or the zoo in which the affluent part of the world seems to bask as though at the circus. It is the genesis of mind. The genesis of the mind, its dynamic, was a community of life that provided the cognitive terms out of which human identity arose, in which our sense of self continues to live.

PAUL SHEPARD,
Encounters with Nature

by THEODORE ROSZAK



This essay is adapted from the new afterword to The Voice of the Earth: An Exploration of Ecopsychology by Theodore Roszak (©1992 and 2001) and is reprinted by permission of the author and the publisher, Phanes Press, Inc. (www.phanes.com).

Many environmentalists believe they have an adequate answer to the question of irrational environmental conduct. They believe there are profiteers at work acting against the public interest. There are real estate interests out to make money at the expense of polluting rivers; there are conscienceless marketers whose bottom line depends on selling things that waste resources. True enough. But that only removes the problem by another step. At some point activists have to recognize that the relentless pursuit of money is among the most widespread kinds of craziness in our world. There are fabulously wealthy CEOs who are literally killing themselves on the job to make another million—and taking down whole rainforests with them. Had there been some greater ecological awareness in their time, would Freud or Jung, Sullivan or Horney agree that behavior like this is “sane” because it leads to greater profits for Exxon or Monsanto?

I found myself asking how many of our ecologically destructive habits stem from compulsive behavior that people do not understand and cannot stop. In short, crazy behavior, but crazy behavior by now so well rationalized that it passes for realistic public policy and practical economics.

Like everybody who speaks to the world about the environmental crisis, I was once in the habit of scolding people about the stupidly destructive things we do to the planetary ecology. I would, for example, show them a plastic six-pack holder and tell them with blood in my eye how these silly objects find their way out of the landfill where we bury them into the lakes and oceans where they have been known to strangle waterfowl. Or I would call attention to the styrofoam cups they had brought to the lecture, then bawl them out for adding to the CFCs that are eating away the ozone. I was good at that kind of tongue-lashing. I had a hundred examples of thoughtlessly harmful behavior to unload on my audience. It made me feel virtuous to stand before them predicting the cataclysm our way of life would soon bring down on us. But I also recognized that presentations like this were making less and less of a difference, and indeed I was growing weary with spreading gloom. The public that responded to scare tactics and guilt trips had been used up, and it was not the vast majority. Too many others were either not paying attention or just did not care.

And then I began doing something unusual for anybody in the environmental movement. I stopped scolding and

began listening. I asked people why they did the ecologically destructive things they did and gave them a chance to talk. The answers were jarring. They had nothing to do with ignorance, greed, or indifference. There were few people I met who were not aware of our troubled relations with the planet. Some confessed to having dreams about the failing state of the world, dreams about forests and rivers and animals that made them sad. They spoke of times and places, a favorite tree or a lovely landscape they recalled from their childhood that was now gone. Deep inside some were grieving about the natural beauties they had seen vanish in their lifetime. No psychologist had ever asked them about those dreams, but they were having them just the same. I was reminded of the opening scene in the movie *sex, lies, and videotape*. The woman tells her shrink that she is seriously anxious about all the garbage that is piling up in the world. She wishes she could do something about it. Her therapist responds, “Tell me more about your marriage.”

I discovered that, far from being underinformed, people are often overwhelmed by the magnitude of the environmental crisis. The situation seems so far gone that they assume there is nothing they can do. Every day they see reports of disaster in the news; every day they receive mail from groups announcing the imminent death of another species, another dire prediction of global famine or draught. Which are they to save first, the whale or the tiger, the rivers or the valleys? What can they do to stop the devastation of an old-growth forest they were told ten years ago could not survive another decade? Hasn't time run out? At last they withdraw with a sense of helplessness. But ironically, their despair is the direct result of bad psychology on the part of the very people who want to enlist them in the cause of protecting Nature. The environmental movement would seem to have invented a problem so big that there is no way to solve it.

Another common response I elicited was the sense of being trapped. People inherit a way of life; everything about that way of life is interconnected. Tell them that they have to throw out the whole social order by next Monday morning, and they cannot help but be stunned. If they stop using their automobile, they will lose their jobs...and their homes. If everything on sale in the supermarket is toxic or environmentally incorrect, what will they eat? Even if the situation is that bad, it is fruitless to ask people to change too much too fast, and worse than useless to blame them for global catastrophe.

In some cases I discovered such accusations make people both angry and stubborn. They respond by reviling the grieving greenies and stop listening.

I learned that people are especially interested in talking about their consumption habits—as good a place as any to begin. At the 1992 Rio Earth Summit, President George Bush, attending with great reluctance, made a speech in which he announced that he had not come to Rio to undermine the American way of life—by which he meant getting and spending without limit. So I asked people to tell me about how and why they consume. I don't know if I expected them to confess to swinish greed, but what they did tell me was as pathetic as it was illuminating. "When I feel really depressed, I go shopping." Scores of people gave me that answer. "I like to be where there are lots of happy people. So I go to the mall...and I end up buying something I don't need." "Every time I break up with a guy, I throw out all my clothes and jewelry and use up my credit card buying a new wardrobe." Several women admitted to that. Other people said they enjoyed the experience of power they gained by deciding which product to buy; it made them feel they had some control over their lives.

Or consider another remarkable finding. When asked why they continued to commute one-to-a-car when they knew that car pooling makes more sense, some people confessed that the hour or two they spent in their car was the only chance they found in the course of the day to be on their own and reflect on their lives. So here we have two bad environmental habits, one that turns out to be a flight from depression, the other a search for solitude. At least to me, it made a difference to see those habits as something more than blind ignorance or selfish acquisitiveness.

And finally, most revealing of all, there were many who admitted that they experienced shopping as a form of "addiction." They felt ashamed to admit it, but they simply could not control themselves. Going out and buying something—*anything*—relieved some terrible agony within.

That became a major insight for me. Addiction is, after all, an irresistible compulsion to do something that one knows is harmful, demeaning, or destructive. I talked that over with some psychologist friends who were quick to tell me that the worst thing to do with addicts is to shame them. Shame is what brought them into therapy in the first place; they don't need more of it. Making them feel guiltier may

only make things worse. As one therapist put it, "If you shame them more, you lose them."

I found myself asking how many of our ecologically destructive habits stem from compulsive behavior that people do not understand and cannot stop. In short, crazy behavior, but crazy behavior by now so well rationalized that it passes for realistic public policy and practical economics. If that is so, then reason and logic on their own cannot solve our dilemma. Some greater force within us, some instinctive loyalty to the living planet, will have to be invoked.

Thinking along these lines, I soon found myself dealing with deeper and darker questions than the shopping habits of the modern world. I eventually had to agree with the environmental philosopher Paul Shepard that our total orientation toward Nature in the modern world is a form of madness. Shepard was the first ecopsychologist, the first thinker in the conservation movement to apply psychological categories to our treatment of the planet. "Why do men persist in destroying their environment?" he asked at the beginning of his classic work *Nature and Madness*. And he did mean "men," for his answer was that men are "ontogenetically crippled" by childish fantasies of power. "The West," he believed, "is a vast testimony to childhood botched to serve its own purposes, where history, masquerading as myth, authorizes men of action to alter the world to match their regressive moods of omnipotence and insecurity." Working along much the same lines, I have also come to believe that, at its deepest level, the environmental crisis traces to the twisted dynamics of male gender identity.*

When we speak of costs and benefits, we are using an economic category; when we speak of resource depletion, we invoke an ecological category. But "crazy" is a psychological category. Ecologists and economists are not at home dealing with craziness. Psychologists are. They try to understand the crazy things people do. They have developed a rich fund of ideas about irrational conduct. I began *The Voice of the Earth* with a question. If abusing the living Earth has become the psychopathology of everyday life in our time, might psychologists not have something of value to offer environmentalists who are seeking to change people's behavior? I naively assumed that both psychologists and environmentalists would find such a dialogue worthwhile.

I was wrong.

I discovered that few psychologists have any interest in relationships that reach beyond couples, families, and maybe

* *The Voice of the Earth* touches on this, and even more so my novel *The Memoirs of Elizabeth Frankenstein* and *The Gendered Atom*, an essay on the sexual psychology of science.

the workplace. The fact that all these relationships are contained and sustained by the natural environment goes totally unrecognized, something not worth mentioning. The guiding light of the profession, the *Diagnostic and Statistical Manual*, mentions Nature in only one respect: seasonal major depressive episodes, feeling blue when the weather turns rainy. The *DSM* offers scores of refined categories for sexual disorders, substance abuse, and antisocial behavior. It never asks about the quality of people's relationship with the natural world in which our species spent 99% of its evolutionary history.

Ecopsychology could go a long way toward correcting the self-defeating public relations of the conservation movement. But there is a great deal more the field has to offer. Indeed, in the century ahead as the science of ecology matures, psychologists may come to see that our sympathetic bond with the natural world—the “ecological unconscious,” as I call it—is a defining feature of human nature, the one aspect of the psyche that has been most cruelly repressed by urban industrial culture. It may assume the place that sexuality holds in Freudian psychology, religious archetypes hold in Jung's psychology, and family relations hold in several more recent schools.

At a conference dealing with ecopsychology in 1994, I was approached by the psychology editor of the *New York Times*, a reasonably well-informed authority. He had heard about ecopsychology, but he was skeptical. (After all, I was from California.) He was curious about this idea that human beings have some kind of emotional rapport with Nature that might be worth serious psychological attention. Were there any “hard data” for that?

Hard data? What could he possibly mean? Might Wordsworth and Shelley qualify as hard data? Would generations of landscape painting qualify? Would Taoism and other forms of Nature mysticism qualify? What about the myth, folklore, and fairy tales of countless centuries past to which every child still seems to respond with spontaneous fascination? My principal interest in *The Voice of the Earth* had been material of that kind. Would that qualify? No. The editor wanted quantification. After all, psychology is a science. And science assumes that numbers are more real than experience. I did find numbers for him, and he then did a report on this odd new direction in psychology.

I found the numbers by logging on to *Psychological Abstracts* and searching for descriptors like “nature,” “wilderness,” “mental health,” “trees,” “animals,” “therapy,” “experience,” etc. I stopped when I had printed out 80 single-spaced pages of titles and abstracts. The titles were all rather like this:

“The Effects of a Wilderness Therapy Program on Changes in Self-Esteem and Teacher-Rated Behavior of Youth at Risk,” “The Effects of Wilderness Camping and Hiking on the Self-Concept and Environmental Attitudes and Knowledge of Twelfth Graders,” “The Impact of a Wilderness Experience on the Social Interactions and Social Expectations of Behaviorally Disordered Adolescents.”

As for the abstracts, they read something like this: “This study provides empirical confirmation of the limited research that reports positive effects of wilderness therapy on changes in self and behavior of youth at risk.” “Results indicated that participating adolescents showed a significant increase in cooperative behaviors and that direct observation procedures were more sensitive to behavior changes than were standardized measures.” It was only after I submitted the results of my search that the *Times* editor felt secure enough to run a story on ecopsychology.

I remain bewildered that so large a body of research has had so little influence among professional psychologists. I am just as bewildered that conservationists have made nothing of this evidence for the healing value of wilderness. I assume this body of work has simply been ignored in favor of more important matters. Almost everything psychologists say about money, sex, or eating gets attention. If a therapist delivers a paper at a professional conference dealing with the anxieties that result from making a killing on the stock market or ending a love affair, it is almost certain to be reported in the media.



It was not only the quantity of published research on the psychological benefits of Nature I found impressive, but even more so the uniformity of the findings. Take a group of battered wives, abused kids, cocaine addicts, terminal cancer patients, convicts, depressed junior executives, or suicidal adolescents for a walk in the woods, a canoeing trip, a seashore retreat, a hike in the desert...and they feel better. As every Romantic poet once knew, viewed against the background of an alpine landscape, a stormy sea, or a lovely sunset, personal problems take on a distinctly lesser scale. When it comes to getting out of one's own, self-obsessed world of money worries, broken love affairs, or office politics, there is no tranquilizer more effective than standing under a starry sky at night and breathing in the wonder. There were even hard data on these matters, statistics that read something like: "After climbing a mountain, alcoholic housewives achieved an 87% improvement in self-image as measured by the XYZ index; this effect degraded by 15% over the next twenty-two weeks." As far as I could tell by reviewing all the testing and all the numbers, nobody came back from any kind of exposure to open space and grand vistas feeling worse. Some felt they had come close to God.

And yet, the environmental crisis remains of little interest to practicing psychologists. I suspect things will remain that way until ecological craziness is given a numbered heading in the *Diagnostic and Statistical Manual*. Until that happens, no therapist will be able to bill for his or her services. A major barrier. Even more threatening may be the fact that resorting to the healing powers of Nature—getting away from it all as we often seek to do when we take a vacation, going into deep retreat, standing in the presence of natural magnificence—requires little intervention from professionals. Again, a financial loss to the profession.

Beyond these purely mercenary considerations, there is a more formidable problem. If our culture is profoundly invested in an anti-environmental ethos, then psychologists may find challenging that ethos is simply too much to take on. After all, they too are residents of our urban industrial society, well-embedded in its values and assumptions. They earn from urban angst. Most therapists I know are content to tinker, adjust, and above all prescribe; it is all their clients seem to expect. Going deeper takes longer and hurts more. As long as there is Prozac, who needs environmental sanity? The courage with which Freud faced the radical madness of modern life in *Civilization and its Discontents* is rare. He was prepared to psychoanalyze our entire culture. Few have followed in his footsteps.

Nevertheless, it is my conviction that ecopsychology has a promising role to play in public policy. One of its more well-defined initiatives impinges upon environmental law. Suppose the *Diagnostic and Statistical Manual* contained an ecologically oriented definition of mental health, something with an impressively clinical name like "dysfunctional environmental relations syndrome." It might then be possible for lawyers to bring cases based on the damage done to the mental health of a community by destruction to the natural world. That would be even more feasible if the Wilderness Act were amended to more directly include the psychological benefits people gain from untamed Nature.

The environmental lawyer Christopher Stone has written a classic essay on environmental law titled "Should Trees Have Standing?" by which he means should a forest, a pristine wilderness area, or a species have rights at law? Stone believes they should. But he admits this would require a "shift of consciousness." It would require people to overcome the "sense of separateness" that makes them believe Nature is the "dominion" of humankind. Obviously few people, especially in government and business, are ready for such a change. For better or worse, in the modern world, transformations of consciousness have been staked out by professional psychologists as their province. What, then, does ecopsychology ask of them? That they offer us an environmentally based criterion of mental health that reconnects us with the living planet that mothered the troubled human psyche into existence. ☾

Theodore Roszak is author of *The Making of a Counterculture*, *Where the Wasteland Ends*, and other works of nonfiction and fiction. He lives in Berkeley, California, and is professor of history at California State University, Hayward. He has twice been nominated for the National Book Award.

RECOMMENDED READING

Ecopsychology On-Line, the website for the Ecopsychology Institute at California State University, Hayward, is now dormant and does not receive communications, but it remains accessible at ecopsychology.athabascau.ca. Among the articles archived in issue #3 is a discussion of how ecopsychology might help lawyers protect the environment. Christopher Stone's "Should Trees Have Standing?" (first published in 1974) was reissued in 1996 by Oceana Publications. A new edition of Paul Shepard's landmark book *Nature and Madness* is available from the University of Georgia Press.

MOST OF US THINK OF SNAILS and slugs only as slimy garden pests. These “pests” are almost always non-natives, often from Europe. Native land mollusks, which include shelled snails and partly or wholly shell-less slugs, are not found in flower beds. They stick to wild habitats and are not very tolerant of disturbance. In fact, they and their freshwater counterparts (aquatic snails and clams) are among the most sensitive indicators of disturbance in many western ecosystems. While there are numerous threats to the habitat of native western mollusks, livestock production is a primary factor in the more arid regions of the American West.

Grasping the scope of the problem, and the reasons why snails are vulnerable to the impacts of livestock, requires an understanding of the diversity of native snails and their particular ecological requirements. Snail endangerment in the West is significant not only because of the potential loss of many mollusk species, but also because it signals a general dismantling of key habitats (such as springs and riparian areas) and because terrestrial and freshwater mollusks are often important, if usually hidden, players in the ecosystems they occupy.

Diversity of western mollusks

Veteran hikers in the mountainous West commonly come across “bones”—dead shells, bleached white from exposure—of large (1–3 inch) land snails. In particular, *Oreobelix* shells are found over most of the western U.S. east of the Coast Range, especially in the Rocky Mountains. *Oreobelix* means “mountain-snail”; not surprisingly, the 120 named forms are most often seen in alpine locales. But snails are equally at home in near-deserts, in open rock talus or outcrops (Arizona–New Mexico talussnails), among grasses, or even in true deserts, such as in Baja California Sur. Others live only in moist mountain forests; a few range right up to the edges of Montana glaciers.

The soft, exposed body, even of shelled forms, makes it easy to see why mollusks might be sensitive to disturbance. So, it is remarkable that mollusks can successfully exploit such a wide range of habitats. Still, each species generally has narrow habitat tolerances and many are found only in small areas. Each is wonderfully adapted to local conditions, even those as harsh as a lava rock talus in eastern Oregon, for example. But all native mollusks can quickly die if their natural

NATIVE SNAILS

INDICATORS OF ECOSYSTEM HEALTH

by Terrence J. Frest

*Each shell, each crawling insect holds a rank
Important in the plan of Him who framed
This scale of beings; holds a rank, which lost
Would break the chain and leave behind a gap
Which Nature's self would rue.*

BENJAMIN STILLINGFLEET (1702–1771), British poet

This article is adapted from the author's chapter in Welfare Ranching: The Subsidized Destruction of the American West edited by George Wuerthner and Mollie Matteson (©2002 by the Foundation for Deep Ecology), and is reprinted by permission of the Foundation for Deep Ecology. For citations and the full source list, please see the book. To order, call Island Press at 800-828-1302 or visit www.islandpress.org.



habitat changes significantly or they are removed from it. Western Washington fir forest snails cannot live in eastern Washington, and it is very easy to drown a desert land snail. Likewise, native freshwater snails of the western U.S. are quite well adapted to and dependent on presettlement, regionally prevalent, pristine water conditions. For example, the Laniidae, a family of large freshwater limpets, lack the lungs and gills typical of other freshwater snail groups. They respire only through their skin and thrive exclusively in very cold, clear, fast-moving, oxygen-saturated waters. Laniidae are found in the American West, where such habitat was once common, and now at merely a few sites in a few river systems.

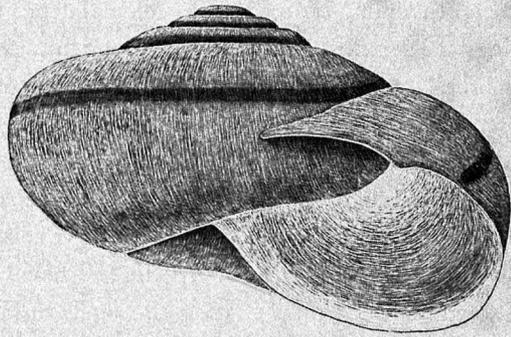
Characteristic of western fresh waters are the hydrobiids, or springsnails, once common from Mexico to Canada and California to the Great Plains. Over 100 species of springsnails in the genus *Pyrgulopsis* are scattered over most of the West, but are especially prevalent in the Great Basin. These creatures are small, under ½ inch long, and respire with gills. A few live in warm springs, lakes, or streams, but most only in cold springs, which must be permanent, quite chilly (fed by ground water), and clear. Springsnail sites generally have excellent water quality, free of pollution and major disturbance. Such habitats are of great importance all over the West, but especially in relatively dry regions. Western freshwater habitats differ from those of eastern North America in that larger streams in arid areas such as the Great Basin may dry seasonally. Hence, year-round springs are of paramount importance to native animals and plants, as well as to humans looking for dependable water supplies for their own use or for crops or livestock. Springs are major foci for biodiversity generally.

The western U.S. displays a nearly endless variety of landforms, and the snail biota reflects this in its own diversity. A fellow malacologist (mollusk specialist) and I recently determined that the northwestern U.S. has about 30–40 native genera of land snails and slugs and about an equal number of freshwater types. We recognized about 225 land snail species, perhaps 36 slugs, and about 150 freshwater snail species. For the whole western U.S., the figures would at least double. Many of the mollusks are undescribed (known but not yet scientifically named or studied). We projected a total of 450 Northwest land snails, 72 slugs, and perhaps 300 freshwater snails still “out there.” This counts only described and undescribed species from already studied areas. There could be many more, perhaps double the figure just given. But currently, at least 50% of western mollusk species are not

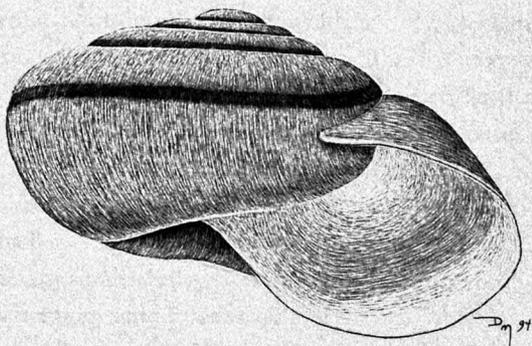
even named, though mollusks are among the best known invertebrates. This situation is unlike that in the East, where most taxa are known and new ones fairly unusual. In the West, even in comparatively well-studied groups like mollusks, we face the real and tragic problem of centinelan species—that is, species unknown to science before their extinction and hence never recorded. Currently there is little support or funding for finding and describing new species and there are few taxonomists who can do so. Hence, we may lose a sizable part of our own native biodiversity with very little trace. Scientists are involved in a race against time to find and describe the diversity of life.

One example: after long neglect, the western U.S. spring biota has begun to attract scientific attention. In 1982, about 400 freshwater snail species were reported from the whole United States. As of 1999, the number had reached about 700. Most new ones are western. Smithsonian malacologist Bob Hershler has visited some 2,000 sites in his Great Basin springsnail project. In the genus *Pyrgulopsis* alone, 58 new species were discovered and described. However, by the time these findings were reported, two had already become extinct. At that rate of loss (two species in 3–4 years), less than a century would be required to extinguish all of his discoveries and most Great Basin springsnails. No new species will arise during the same period, and one can only wonder how many have already disappeared in the 150 years of western settlement and development preceding his study.

Should one be concerned about the extinction of springsnails? Basically, animals like mollusks represent what E. O. Wilson has termed the “hidden 99.5%” of the diversity of life and “the little things that run the world.” Aside from the fact that they are fascinating animals (as every malacologist knows), doesn't every species have an inherent right to exist and live out its evolutionary life span unmolested? More practically, mollusks are a major basal food chain member, usually at the herbivore (plant-eating) level, in much of the West. While not as species-rich as some groups, notably insects, they make up in mass what they lack in diversity. In western forest habitats, they are major consumers of forest floor detritus and recyclers of animal and plant wastes. In stream environments, they are often the major basal food chain herbivore (major aquatic plant consumer and recycler) and serve as an important food resource for fish, amphibians and reptiles, and water-loving birds and mammals. On land, they are a food item for amphibians, reptiles, some birds, and many small to medium-sized mammals.



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COURTESY U.S. FISH & WILDLIFE

Ecosystem health indicators

Snails are exceptional indicators of forest and freshwater ecosystem health on two levels. A typical mollusk fauna has about equal numbers of widely distributed and very local (endemic) species; the more cosmopolitan forms are useful for regional assessments, while the endemics are useful at a local scale. Most snails are easy to see and find and have easily preserved shells that provide a record of occurrence even after severe disturbance. Unlike insects, the number of taxa at a site is usually small, so that identification is comparatively simple. Habitat specificity of many snails means that very fine microhabitats can be detected and monitored. Mollusks are also effectively sessile; that is, they don't easily move far. This makes them more vulnerable to local disturbance and also more useful in assessing local habitat stability. Part of a region's mollusk fauna is often a relict of prior environmental conditions, reflecting climates and microhabitats that may be limited today but were widespread in the past. Snail colonies can survive on very tiny patches of ground or in single springs, as long as basic habitat remains unchanged. Thus, endemics often reflect an area's geologic history and past climates on a scale of hundreds or millions of years, while generalists reflect today's ecology. This unique historical perspective cannot be gained from migratory groups, such as birds or mammals. And snails or clams make just as good or even better fossil indicators: for one thing, fossil mollusks are much more abundant and likely to be preserved than plants, insects, or vertebrate animals.

Western U.S. mollusks often have little relationship with those of the rest of the country. The mountainsnails, for example, date back at least to the time of the dinosaurs; but despite (or maybe because of!) their humble status, they have survived essentially unchanged while the larger flora and fauna around them have vanished. Fossil land snails look much like living representatives, and occur in about the same regions. Likewise for such western endemic freshwater groups as the freshwater limpet family Lancidae and the western springsnails (*Pyrgulopsis*). These, too, date back at least 65 million years and lived in much the same areas as now. The farthest eastern migration of *Oreobelix* was to the Mississippi River in one short-lived ice-age incursion, and Hershler recently proved that western springsnails are substantially different from all of their eastern and central U.S. relatives.

Once established, mollusks are often persistent. Land snail colonies, for example, are known to inhabit the same site for 10,000 years or more. Upper Klamath Lake (Oregon)

snail fossils indicate that several freshwater forms have lived in the same area for at least five million years. These small animals may thus reflect aspects of the climate and ecology of a region and its history on a geologic scale not possible for many other groups.

Native snails may be able to survive natural catastrophes, even on the tremendous scale of volcanic eruptions and Bretz floods (the repeated catastrophic Late Pleistocene–Holocene Lake Missoula floods, which affected the entire Columbia Basin and were named after their discoverer, J. Harlan Bretz). Yet, some features of their biology make them vulnerable to extirpation by human-mediated causes. Partly, this reflects the scale, pace of change, and repetitive nature of human activities. Livestock grazing, for example, affects 70–75% of the total acreage in the American West. Among other causes of snail and slug extirpation, two related ones—livestock grazing and spring modification—are preeminent.

There is a relative dearth of objective, quantitative scientific studies on the impacts of livestock production on native mollusks. Many federal land managers have little interest in knowing how activities such as livestock grazing affect freshwater snails and other species, so there has been slight incentive for investigation. Careful analysis of the existing literature, however, does lead to some fairly well-established conclusions. Moreover, increased public interest in public lands management has recently led to more objective studies. For specifics on snails, I draw especially on the results of my own examination of over 6,000 sites in the western U.S. since 1988.

Livestock grazing impacts

Livestock grazing is a major factor causing regional extinction or reduction of both land and freshwater mollusks. With up to 90% of all western federal lands allotted to use by livestock producers, this is an extremely severe problem, especially in sensitive habitats. Heavily grazed areas often lack land snails altogether or have only introduced, pest taxa. Even moderately grazed sites typically have a depauperate fauna of a few generalist species. I know of no instances in which moderate to heavy grazing improved native terrestrial or freshwater mollusk diversity or abundance, but examples of reduction or extirpation are easy to find. Direct trampling, soil compaction, and colony fragmentation are major problems, but resulting vegetation changes and the usual reduction in plant biomass, and thus in effective cover and shelter, are also significant. So are concomitant changes in moisture and insolation (i.e., penetration of sunlight to the ground). Worldwide,

perhaps the single most important factor causing land snail death is desiccation, which grazing exacerbates. Soil compaction and trampling extirpates snail colonies, tends to dry up springs and seeps, and induces plant community change, such as simplification, diversity loss, or introduction of non-native taxa.

The physical consumption of plants by livestock can result in elimination of some plant species (and the smaller animals that consume them) and give competitive advantage to other plants, particularly weedy species and heavily protected, tough, or toxic taxa. Grazing also tends to increase insolation, which warms and dries soil seasonally. Livestock trample and break up large woody debris and other shelter sites used by mollusks for winter hibernation and summer aestivation, seasonal protection from dryness, and egg-laying. Locally, manure and urine deposits can change soil conditions and degrade water quality. Changes to soil pH (domestic animal wastes are rich in ammonia and ureic acids) can affect the land community dramatically. Also, soil erosion is generally increased in grazed areas. Litter or duff, a major source of food and shelter for mollusks, is often largely or totally absent in heavily used sites. Moreover, associated activities, such as rangeland “improvements” to springs, seeps, bogs, riparian areas, or other unique and uncommon microhabitats, have major deleterious effects. Even light grazing by domestic species seems to have substantial negative effects on land snail diversity and abundance.

Together with my colleagues, I have documented specific instances of land snail colony reduction or extirpation. Some of the most egregious involve seven Idaho land snails recommended for federal Endangered Species Act listing as threatened or endangered at the inception of the law in 1973. The two localities of a new species described in 1975 had both been either greatly damaged or destroyed by 1995—one largely by cattle grazing and the other by domestic sheep grazing. Fortunately, we were able to locate additional inhabited sites. This species is still not listed and its present condition is unknown. We also noted instances in which a colony bisected by a fence either died out completely or had only dead shells on the grazed side. Even if areas have been fenced off from livestock, fencing is rarely adequate and long-term usefulness is questionable. It seems likely that native taxa are well adapted to light grazing by native herbivores. Indeed, many taxa have evidently survived such levels of herbivory for substantial time periods. Greater intensity grazing, however, particularly by introduced herbivores, seems to present severe problems. For

increased stock visits, with accompanying trampling effects and accumulation of acidic manure and urine. Unless the source area is left intact and carefully protected, development can completely extirpate the native freshwater mollusks, as well as reduce diversity in other animal and plant groups. At least 3,500 springs have been "developed"—often at public expense—in Idaho and Montana alone. Their biota is forever lost. Ironically, such development often fails in its primary function—to make water more available to stock. Piping, channeling, and similar activities may disturb the groundwater source or be so inexpertly done as to dry up the spring. Moreover, this type of modification tends to concentrate stock in an extremely limited area, thereby exaggerating the damaging effects of livestock.

In the drier parts of the West, springs are major focal points for plant and animal biodiversity. Spring development thus tends to selectively eliminate the relatively few rich islands of plant and animal diversity in arid regions. Even in better-watered locales, springs, seeps, and spring-fed small streams are high diversity areas and seasonal and moisture refuges for much of the biota. Numerous plant taxa are restricted largely or completely to such areas, and they are sites of concentration and breeding for many insects, amphibians, and reptiles. Many of the more sensitive land mollusk species are restricted wholly or in part to springs and seeps or their borders. Spring development is one of the most common "range improvements" done on the western public lands. Yet, for native flora and fauna, these actions are anything but improvements.

In upland areas, even where forests and permanent streams are present, springs may be the most dependable water

sources and thus are subject to conversion. Another use of upland springs is the "pump chance," which are dug-out areas modified to provide permanent ponds—ostensibly as sources of water to fight forest fires. However, since many pump chances are virtually inaccessible, their value for fire suppression is nil. Instead, these often function as de facto livestock ponds in poorly watered areas. As with other types of spring development, the result is almost always destruction of the native biota, especially rare and strongly endemic forms.

Summary

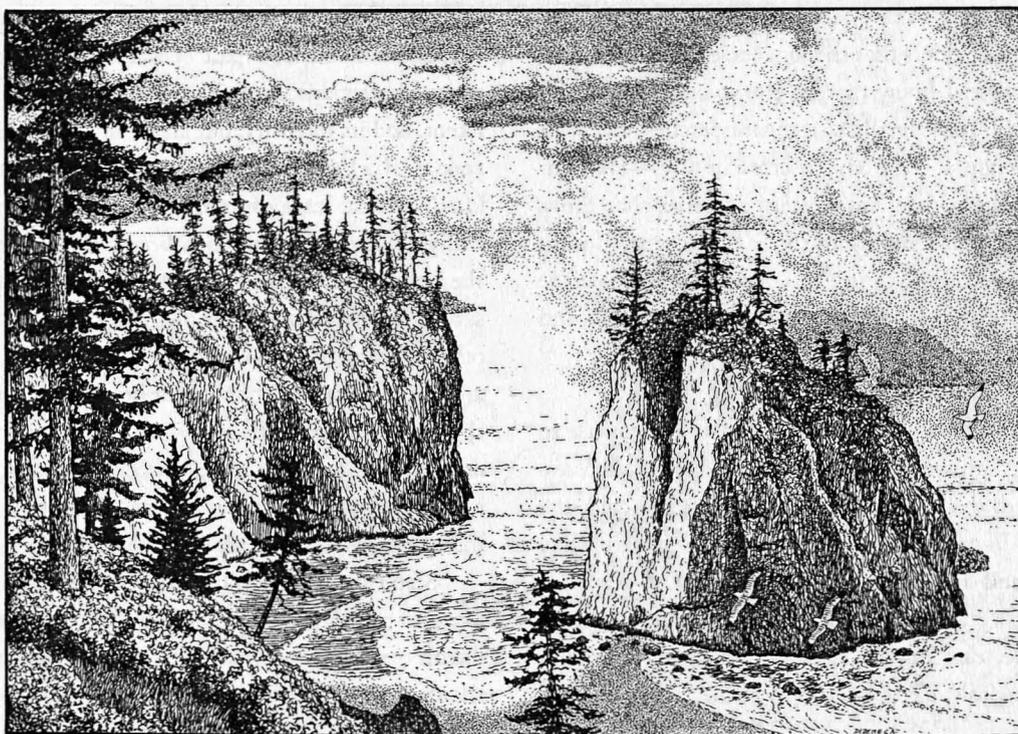
Livestock production has negative repercussions for nearly all native species. Activities ancillary to livestock grazing, such as spring development and road-building, tie directly into the negative aspects of livestock grazing but are not universally recognized as detrimental themselves, even when their impacts are equally or more significant than that of direct grazing pressures.

It would tax even the most dedicated biophile to be personally concerned with every species assemblage that makes up the planet's biosphere. Yet, more detailed consideration of even one such group—the native snails of the western U.S.—can give a sense of our impacts upon the many more, effectively anonymous taxa that comprise most of Earth's biodiversity. ☾

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Wilderness as Witness (Cape Perpetua)

by KATHLEEN DEAN MOORE

IT TAKES A STRONG STOMACH to drive over the Coast Range from my house to the Pacific Ocean. The road goes the way of the rivers, following tight curves between the hills. Logging trucks crowd the turns, going the other way. They downshift to hold heavy loads against the grade. Over the crest of the range, in the green tumble of hills that form the headwaters for the coastal salmon streams, each curve uncovers another square of bare-ass mountainside, clear-cut to the mud. There's hardly a green leaf left in the cut—only grey dirt, shattered tree trunks lying every which way, and rootwads bulldozed into muddy piles. Even the rivers are grey, muddied by rain that erodes the raw draglines.

I drive as fast as I can through this part, keeping my eyes on the single row of alders that the loggers left along the road to hide the carnage. I know that on the coast, just south of Cape Perpetua, I'll come finally to remnant patches of ancient rain forest, somehow saved from the crosscut saws—six-hundred-year-old Sitka spruce and western redcedar that grow, dark and mossy, down the slope to the edge of the sea. I push through the scarred hills, trying to concentrate on how the ancient forest will smell—all damp earth and cedar—and how surf sounds, far away through deep ferns.

SOUTH OF THE CAPE, I walk a trail under Sitka spruce to the edge of the cliff, where the forest cracks off into the sea. On the headland, the air is suddenly salt-thick and cold, the wind ferocious. In wild surf, scuds of sea-foam spring up like startled birds, and logs shoot ten feet in the air. A few children run shouting along the cliff edge, holding their hats against the gale, ducking under sheets of spray, changing course simultaneously, like sanderlings. I pull my windbreaker tight around me and sit on a bench overlooking the sea.

The place I sit is a memorial bench. Someone who deeply loves the coast must have chosen the site, just above the wild collision of coastal stream and cobbles. I read the inscription on the brass plaque: *Mother, when you hear a song or see a bird, please do not let the thought of me be sad, for I am loving you just as I always have. It was heaven here with you.*

The note confuses me. At first, I think it's the mother who has died. And then the unthinkable works its way into my mind. A living, grieving mother must have written this note, as if her child were not dead, but was speaking to her through the sea of her pain. And the heaven they shared? I'm thinking it must be here, in this exact spot, where the sea surges into the river at high tide, and gulls stand hip-deep shouldering fresh water across their backs, as they must have done for centuries.

I imagine a mother pulling rainpants on a child already dancing to go. A last pat on his wool hat, and he runs across the grass in too-big boots. She pulls on her own raincoat and follows him down the trail. At the cliff edge, she stands beside him in the wind, looking out to sea.

How can she live with the sorrow?

We're told by psychologists that there is a pattern to grief: everyone must make the same terrible five-stage journey, putting one foot in front of the other, step by step in air suddenly gone cold and thick. My friend Katherine, who knows many kinds of sorrow, thinks that people experience

the same five stages of grief, no matter whether it's a person who is mourned, or a part of the world—a forest, a salmon run, a species, a stream. The quality of the pain may be different, and its intensity, but all the stages of grief are there, in people who loved the devastated land.

The first stage of grief is denial. Maybe the forest isn't really dead. All those seeds hiding in the bulldozed ground—they might grow into a forest some day. And if it's too late to save this forest, isn't there still time to save the forests on the other side of the mountains? And maybe the salmon runs aren't extinct; the salmon might be waiting in the ocean until the rivers clear and silt washes off the spawning beds. "Look around," my neighbor says, trying to lift my spirits. "It's still a beautiful world. The environmental crisis is just a protest-industry fundraising scam."

Step two. Anger. What kind of person can cut an ancient forest to bloody stumps, bulldoze the meadows to mud, spray dioxin over the mess that's left, and then set smudge fires in the slash? And when the wounded mountainside slumps into the river, floods tear apart the waterfalls and scour the spawning beds, and no salmon return, what kind of person can blame it on an act of God—and then wave the bulldozers through the stream and into the next forest, and the next? I hope there's a cave in hell for timber industry executives like this, where an insane little demon hops around shouting, "jobs or trees, jobs or trees," and buries an axe-blade in their knees every time they struggle to their feet.

Step three. Bargaining. Look, we're rational people. Let's work this out. Destroy this forest if you have to, but plant new seedlings in the slash. Drain this wetland and build your stupid Kmart, but dig a new swamp next to the highway. Let cattle trample this riverbank and crap in this headwater, but fence them from this spawning bed. Kill the smolts in your turbines, but buy new fish for another stream. Then let's try to create some community. Let's study the issue again in five years.

Step four. Depression. Hopelessness deep and dark enough to drown in.

And gradually, disastrously, grief's final step: acceptance.

On the Oregon coast, the children know mostly fish-poor, flood-stripped streams. Here, estuaries are fouled, and no river water is safe to drink. That's the way it is. Why should they think it could be any different? Children who have never seen an ancient forest climb the huge, crumbling, blood-red stumps, as they might climb onto the lap of a vacant-faced grandfather. They look out over the ferns and hemlock seedlings, unable to imagine what used to be: They

don't remember waking up to birdsong. How can they miss a murrelet if they've never seen one? It's not just their landscape that has been clear-cut, but their imaginations, the wide expanse of their hope.

And when their grandparents' memories of unbroken forests fade, and the old stories get tedious—the streams of red salmon pushing upriver—and the photograph albums hold only dry images of some other place, some other time, then another opening in the universe shuts, a set of possibilities disappears forever.

This is what we must resist: gradually coming to accept that a stripped down, hacked up, reamed out, dammed up, paved over, poisoned, bulldozed, impoverished landscape is the norm—the way it's supposed to be, the way it's always been, the way it must always be. This is the result we should fear the most.

I TURN AWAY from the ocean and hike up the creek into a forest that's never been logged. It's dark here, and noisy with wind and distant surf. Shadows sink into the whorls of maidenhair ferns and shaggy trunks of cedars centuries old. The decaying earth is a black granite wall bearing the names of all that has been lost and forgotten on the far side of the mountain: the footprints of cougar and elk, yellow-bellied salamanders pacing across dark duff, swordferns unfurling, the sweet flute of the varied thrush, the smell of cedar and soil; the wild coastal river, its headwaters buried in mossy logs, its waters leaping with salmon, its beaches dangerous with surf and swaying bears. Kneeling, I trace a heron's tracks engraved in black soil at the edge of the stream.

Into the shadows, light falls like soft rain. It shines on every hemlock needle and huckleberry, each lifted leaf of sorrel. There's a winter wren singing somewhere in the salal, and a raven calling from far away. I lean against an ancient Douglas-fir that soars to great height and disappears into the overcast.

The wild forest is a witness, standing tall and terrible in the storm at the edge of the sea. It reminds us of what we have lost. And it gives us a vision of what—in some way—might live again. ☾

Kathleen Dean Moore is the author of two acclaimed books of essays set in the forests and rivers of the Pacific Northwest, *Riverwalking: Reflections on Moving Water* and *Holdfast: At Home in the Natural World*. She is a professor of philosophy at Oregon State University in Corvallis.

Losing the Lines

At the summit of the coast range the fog stops. We go on.

Out of Mad River drainage. Down into Redwood Creek.
Up & then down along Willow Creek to the Trinity.

We cross over into another country. So long salt.
Hello mountain air.

At Burnt Ranch we drop down. Cross to the north bank.
Head upriver.

Good-by redwood. Hello mixed conifer & serpentine.
We can't get enough of the difference.

At 6000 feet it is spring a month ago. At the top of the
Pacific Crest Trail: tiny heathers & violets.

Ah, but then look around. North of us the green of
Scott Valley borrowed from rivers gone dry this year.

Off to the east massive clearcuts in the public forest.

Down in the Trinity steelhead can't get past the dam.
In the riverbed rusting iron and mine tailings of a
century ago.

This country as damaged as the one we have left.
We are still in the beautiful land of the resource extractors.
We can't go anywhere anymore.

And we can't remain in place. Even the trees. The very
rocks can't stay home.

Refugees everywhere line up to cross borders.

Not river and ridge. Not watershed. Not nature's lines
between us. New demarcations of plenty and famine.

Nothing goes anywhere unless it follows money.

Drugs. Guns. Viruses. Global accountants.

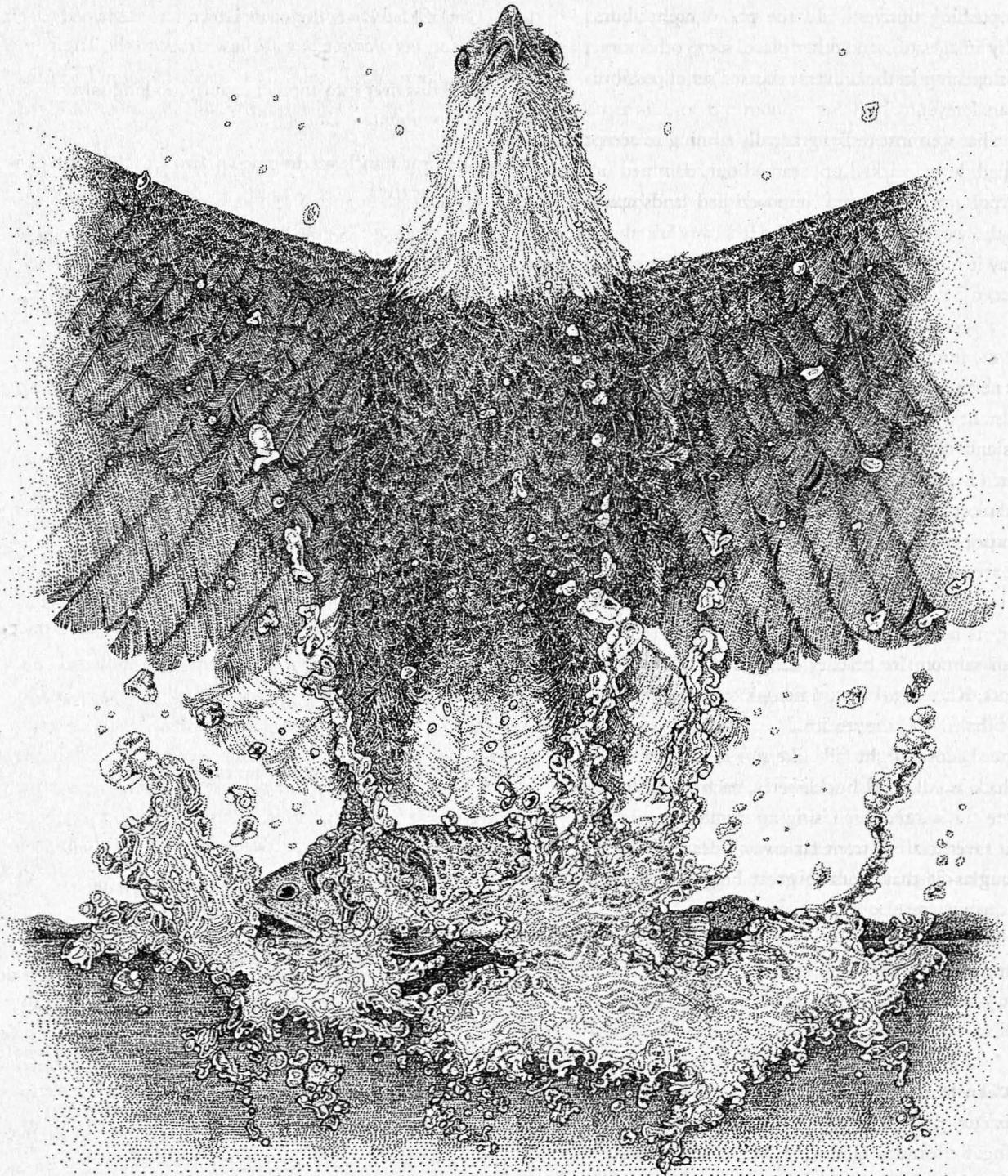
There is no more away. No place is here. We flee the ruin.
Arrive at ruin.

We have crossed over into an earth without borders.

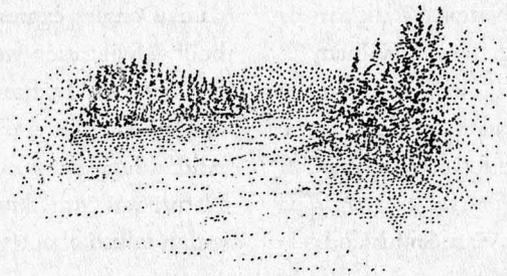
I have made you this posy to remember where we are.
Hold onto those little violets.

≈ Jerry Martien

A Struggle for Wildness



Dean Bennett



*the story of Maine's
Allagash Wilderness Waterway*

by Dean Bennett

THE STRUGGLE WAS INTENSE, its lessons significant, and in the end the nation had preserved one of its premiere wild river areas—northern Maine's Allagash Wilderness Waterway. "There are no hundred miles in America quite their equal. Certainly none has their distinctive quality," wrote U.S. Supreme Court Justice William O. Douglas after seeing the Allagash in 1960.¹ A decade later the area had been protected by state statute and had been designated by the U.S. Department of the Interior as the first state-administered river in the National Wild and Scenic Rivers System.

The story of these events reflects changing cultural values toward Nature and wildland in America. But the narrative of the Allagash's protection is not contained in the river's watershed, the Maine woods, or even the greater northern forest. It flows out into the corridors of power in Augusta, Maine, and Washington, D.C. The conservationists who worked to save the Allagash were part of a burgeoning wilderness preservation movement during the era of its greatest advancement, when the National Wilderness Preservation System, the National Wild and Scenic Rivers System, and the National Trails System were created.

The struggle over Allagash country began in earnest in 1955 when a federal report suggested the "establishment of a river wilderness area featuring the Allagash River and its immediate surroundings" and noted that "there are few sizeable rivers within the entire New England–New York region that now remain in a natural state."² But the report also outlined the idea for a hydroelectric dam to be constructed at Rankin Rapids, a few miles below the mouth of the Allagash River—a dam that would flood most of the river. The project would supplement a tidal power project proposed for Passamaquoddy Bay in eastern Maine. For the next decade, the resolution of these conflicting proposals would be played out in the context of a growing national environmental awareness and concern for wild places.

The following year, Gene Letourneau, a popular outdoor writer in Maine, reported that four representatives of the National Park Service were "looking over this vast [Allagash] wilderness area primarily to appraise its potential as a national park." Letourneau noted that many changes had come to the Allagash during the past 30 years, among them "the bulldozing and graveling of numerous private hauling roads."³ Again in 1959, Letourneau interviewed park service planners in the waterway.⁴

In the spring of 1960, while the National Park Service was preparing its report, Supreme Court Justice William O. Douglas was working on his book *My Wilderness: East to Katahdin* and planning to visit the Allagash country. On the morning of September 22, Douglas and his party pushed off from the shore of fog-bound Telos Lake for a ten-day trip. The group of ten included writer Edmund Ware Smith and 73-year-old trip leader Willard Jalbert, Sr., known affectionately as "the Old Guide."

Leaving the shadow of the Katahdin range, they headed north more than a hundred miles across a chain of headwater lakes, down the Allagash River, and into the St. John River to Fort Kent on the Maine-Canada border. Their campfires were occasions of hearty, imaginative discussion; Douglas, notebook in hand, probed endlessly about the river's natural and cultural history. But hanging over their trip was the realization that log-hauling roads were rapidly penetrating the Allagash corridor. As they sat around their last campfire on the St. John River at the site of the proposed Rankin Rapids

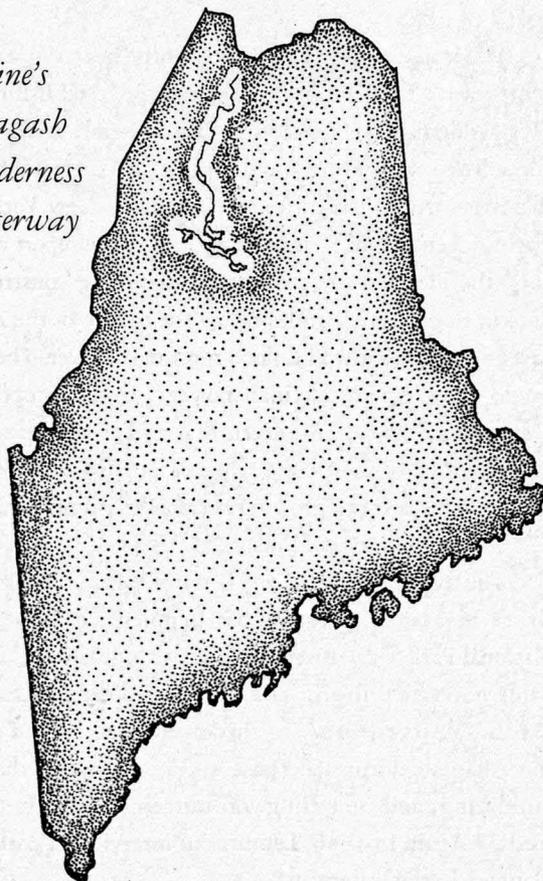
dam, Douglas expressed the thought that if the dam were built, "civilization would condemn for all time a wilderness area fashioned by time and Nature, nourished by sweet water, and filled with more wonders than man could ever catalog." After a long silence the Old Guide spoke: "Men think that Nature was created just for them, for their exploitation." The group talked about these things around the campfire "until every star was out."⁵ The trip had a profound influence on Douglas. Although he had seen wilderness areas all across the United States, the Allagash deeply impressed him, and after the trip, he advocated actively for its preservation.

Two months before Douglas's passage through the Allagash, Maine architect and outdoorsman Robert Patterson and his wife, Barbara, had been on what had become almost an annual Allagash pilgrimage for them since 1936. Over the years, Patterson's concern about the loss of the Allagash's wild qualities had grown. This, accompanied by the realization that Maine needed a voice for conservation-minded people, had motivated him to help found the Natural Resources Council of Maine (known as the NRCM) in 1959. For the next six years, as its first president, he would work tirelessly to save the Allagash.⁶ And he would need to, for opposition had already begun to surface. On May 5, 1960, a newspaper article reported that a petition bearing more than 7,000 names, representing a "goodly number of people of northern Maine," opposed the "unproposed proposal for a national park."⁷ And before the end of the year, the large industrial forest owners of the Allagash region went on the offensive, suggesting that proper management was all that was needed to preserve the beauty of the waterside area.⁸

Early in 1961, the federal government's role in shaping the future of the Allagash began to take form when the newly elected President of the United States, John F. Kennedy, appointed Stewart Lee Udall as secretary of the Department of the Interior. Udall had earned a reputation as a conservationist in the 1950s as a member of the U.S. House of Representatives from Arizona. As head of the Interior Department, Udall grew in stature as a champion of conservation. In 1963, two years after he took office, his book *The Quiet Crisis* was published, dedicated to the idea that we "must grasp completely the relationship between human stewardship and the fullness of the American earth."⁹

Soon after his appointment, Udall was drawn into the growing Allagash controversy. Should the area be used for park, power, or paper? Udall recalled that, while facing this dilemma, Senator Edmund S. Muskie arranged to meet him

Maine's
Allagash
Wilderness
Waterway



THERE ARE SEVERAL starting points for the Allagash. One that Thoreau took starts at Moosehead Lake, passes through Chesuncook Lake and Umbazooksus Lake to a portage or carry into Mud Pond. This portage marks the divide between Penobscot waters, which run south, and Allagash waters, which run north. Mud Pond is indeed one of the headwater lakes of the Allagash which flows into Chamberlain Lake. Another starting point is Allagash Pond, which connects by a winding outlet with Allagash Lake, which in turn flows into Chamberlain. The one we took starts at Telos Lake, thence through Chamberlain and on north.

Telos Lake, part of the Allagash waters, lies close to the watershed of the East Fork of the Penobscot. It lies so close that an enterprising man in the 1850s dug an outlet which makes Telos water run into the East Fork. The excuse, related by Thoreau in *The Maine Woods*, was that Canada asserted the right to tax all timber running down the St. John, of which the Allagash is a tributary. To avoid this controversy, Allagash water was made to run south rather than north. Whatever the reason, the Telos Cut was long used to run logs down the East Fork. In time logging operations changed; bulldozers, trucks, and roads replaced handsaws, sleds, and water transport. The Telos Cut, however, remains. It was acquired by a power company for storage of water; and it is so used today. Precious water, sorely needed if the Allagash is to be restored as the most wondrous canoe stream in the nation, runs needlessly into the East Fork today.

Thoreau never traveled the main Allagash. Coming in through Mud Pond, he crossed Chamberlain and Telos and portaged around the Telos Cut to put his birchbark canoe—18¼ feet long, 2 feet, 6½ inches wide, and sewed with thread from the roots of the black spruce—into the East Fork and went south, coming out at Oldtown. Our journey, which began at the Telos Cut, went north.

The distance by water from Telos to Fort Kent is approximately 140 miles. From Telos to the junction of the Allagash and the St. John it is a bit over a hundred miles. There are no hundred miles in America quite their equal. Certainly none has their distinctive quality. They will, I pray, be preserved for all time as a roadless primitive waterway.

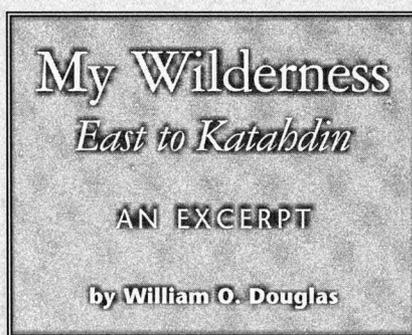
PADDLING THESE Maine lakes shows few distant views. The hills surrounding the lakes are round and low, never more than a few hundred feet high. No towering mountain breaks the rhythm of this rolling country. Occasionally a faraway ridge sits against the horizon. They are never more than 2000 feet high—pieces of ancient ranges that have been largely leveled. The waters abound with game—herons, gulls, snipes and ducks, common loons, bald eagles, muskrats, otter, mink, beaver, deer, and, if one is lucky, a moose swimming a lake. Once we nearly caught up with an otter that obviously was leading us away from her young ones. At another time a mink kept ahead of the canoe by a few yards for nearly a quarter of a mile.

Wherever we camped I scouted the woods behind us and usually found marks of early logging operations. With a little imagination one can see where tote roads once ran. Marks of old camps or depots are still evident. Most of the majestic white pines that once made Maine famous are gone. Second growth,

now about fifty years old, marks most of the corridors through which the Allagash flows.

After a burn or after clear cutting, raspberries and blueberries come in. So does the fireweed. The hardwoods soon take over. Willow flourishes. These rather open woods, filled with browse and other feed, cause the deer population to rise. With the deer come the bobcat and the lynx. With the berries come the bears. The frisky, talkative red-pine squirrel arrives. Spruce grouse and ruffed grouse multiply.

There are a few coyote in this area. There may be cougar, though the fact is not established. The Old Guide does not remember any wolves along the Allagash. Others say that wolves were present when the first settlers arrived and that they then moved north. Some think the wolves are returning. Though that is unconfirmed, I think of wolves when I hike the corridors of the Allagash. They seem to fit the environment. I have seen them in Alaska, loping gracefully across open basins. I had always associated wolves with the northlands of the East. One time I met two wolves along a trail. As I turned a bend they were coming my way, no farther off than I can cast a dry fly. I stopped and they stopped. We stood staring at each other for perhaps a minute. They were energy personified—alert, poised, unafraid. I was, as usual, unarmed. My thoughts were torn between fear and a strange intuitive



This excerpt from My Wilderness: East to Katahdin by William O. Douglas (1961, New York: Doubleday & Company, Inc.) is used with permission of the William O. Douglas Estate.

CONTINUES PAGE 59

and President Kennedy in the Oval Office of the White House. Muskie, who supported the tidal power project, wanted to preserve the Allagash River and argued that any major dam on the St. John River should be above the mouth of the Allagash. Muskie invited Udall on an unpublicized trip by floatplane into the Allagash region, which was taken in June of that year. It was the beginning of a relationship in which both would work to preserve the Allagash.¹⁰

The Allagash captivated Muskie. He had spent time there while governor of Maine. In 1971, after gaining the label "Mr. Clean" of the environmental crusade for his many legislative accomplishments in Congress, Muskie explained his feelings for the Allagash region, referring to it as "that wooded corner of Maine...where...we can find peace in the woods and on the lakes and streams, collect our thoughts, and ready ourselves for whatever challenges the world brings."¹¹

In June of 1961, Maine's legislature entered the picture, officially recognizing that "the Allagash River Valley is the last major waterway in the east still a wilderness area" and directing the Legislative Research Committee to "study steps to secure these assets for the benefit of the people of the State."¹² The following month the U.S. Park Service released its report on the Allagash country, proposing a national recreation area that would cover 246,500 acres of the watershed. An article in the *Portland Evening Express* noted that Udall "hasn't yet made up his mind about the proposal."¹³

In the fall, the paper companies continued their public opposition. International Paper stated that should any proposed park plan materialize, the company "would have to look immediately for a new source of raw wood to keep its two mills operating."¹⁴ And the Associated Industries of Maine came out in direct opposition, saying the forest products industry would be injured by "locking up the Allagash for recreation."¹⁵

Early in 1962, Patterson and the NRCM began developing a set of broad objectives for the waterway's preservation, seeking the advice of Sigurd Olson, author, wilderness advocate, and a leader in the protection of the Quetico-Superior wilderness along the boundary between Minnesota and Ontario, Canada.¹⁶ As planning progressed, another major threat appeared. It came in the form of another proposed major hydroelectric dam, called Cross Rock, near Rankin Rapids, a private initiative that would create a 200,000-acre lake and obliterate the entire Allagash River to Chamberlain Lake.¹⁷

During 1963, Maine's governor signed into law an act creating the Maine Allagash River Authority, consisting of

five state officials charged with finding a way to preserve the Allagash River.¹⁸ The law also established an advisory committee to which Patterson was appointed. Regarding the authority's charge, Senator Muskie commented that "presumably, the establishment of such a wilderness area, if it is to be meaningful, should include the Allagash River and adjacent land areas as a contiguous and well defined entity irrevocably dedicated to its maintenance in a wilderness state."¹⁹ Udall reportedly said that "if the State did something on its own and would insure State ownership, he would refrain from pushing federal ownership."²⁰

In June, Justice Douglas spoke at the annual meeting of the Natural Resources Council of Maine, calling the Allagash country "a sleeping giant among the few remaining potential park and recreation areas in the northeast" and urging that it be saved.²¹ Two weeks later, Udall recommended early authorization of the Passamaquoddy Tidal Power Project, with a dam on the St. John River above the mouth of the Allagash to "preserve in its entirety the free flowing Nature of the Allagash River and its superb values." And shortly afterwards, Udall's Bureau of Outdoor Recreation proposed the creation of the Allagash National Riverway, about 100,000 acres smaller than that originally put forward by the National Park Service.²²

These events provoked the large landowners to apply more pressure. In September of 1963, three representatives of a major paper company met with Muskie to threaten that unless their concerns regarding the proposed Allagash National Riverway could be resolved, the company's plans to locate a new \$50 million paper mill in Maine would probably have to be dropped.²³ Muskie and Udall both communicated they were flexible but committed to preserving the Allagash River.²⁴

Through 1963 and 1964, the Maine Allagash River Authority and its advisory committee worked to draft state legislation, and in February 1965, a bill was advanced in the Maine legislature to create the Allagash Wilderness Waterway—along with a bill authorizing the potentially devastating Cross Rock dam. An alliance of conservationists, landowners, fish and game interests, and others formed to oppose the dam.²⁵ Patterson and other conservationists also opposed the Allagash legislation because it was essentially a landowner bill with inadequate protections for the river's wilderness character. Opposition to both bills succeeded.

Unexpectedly, on May 30, 1965, just prior to the failure of the Allagash bill, another avenue of hope had appeared. A newspaper editorial announced that Senator Muskie had

feeling that if there were time, even man and wolf might come to terms of coexistence. A strange power pulled me toward these magnificent specimens of wildness. I took one step and they left the trail, but not in fright. They loped a few rods, then stopped to eye me again. This happened several times before they were lost in the thick forest. One need have no fear, walking these Maine woods today. We Americans walk so noisily that, unless stalking is undertaken, all the game goes out ahead of the hiker.

IN THE SPRING and early Summer the Allagash is a roaring cascade. There are whirlpools that would break a canoe as easily as man breaks a match. The Old Guide recited many tales of narrow escapes from them. He held forth at length on how to negotiate with safety the edge of a whirlpool. Currents that are easy and gentle in late Summer are raging sluiceways in May and June.

We had no such problems on our run of the Allagash. We had plenty of water most of the time. But below Churchill Lake we were a bit short. Once in the ten-mile stretch below Churchill we came to a beaver dam across the Allagash. How many beavers had built it I do not know. But it was freshly completed. Rocks as big as a man's hand had been carried or pushed by the beavers into the dam. Logs and branches had been cleverly interlaced. At places mud had been packed down. This was an engineering achievement of distinction.

The Old Guide stopped the canoe by the beaver dam and talked at length about these animals. Beavers are abundant along the Allagash. On a few of the tributaries there may be a thousand or more.

The lazy beaver—the drone—is expelled from the family. He lives the lonely life of a bank beaver. He collects branches and logs on the riverbank above a house where he lives.

"He's too lazy to build a dam," the Old Guide said. "The bank beaver does the minimum work necessary to live."

The beavers who built the dam across the Allagash were far from being drones. They were experts indeed.

"I hate to take down their dam," the Old Guide said. "But we can use two inches more of water."

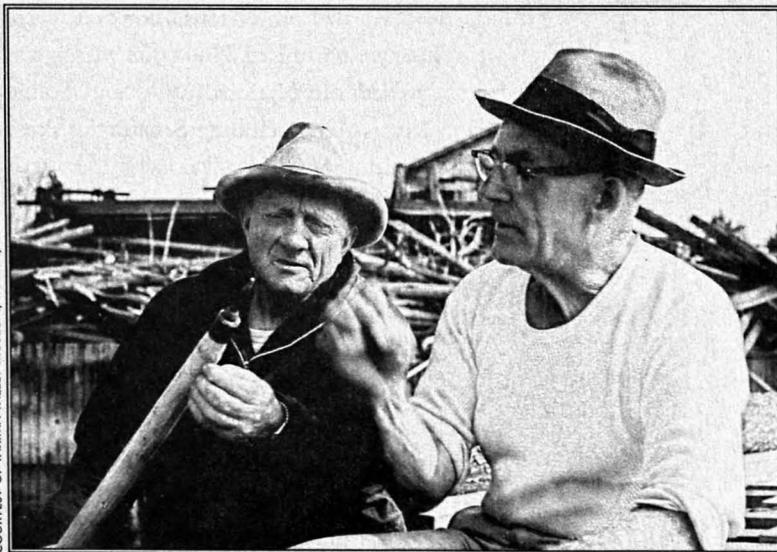
And so we tore a hole in it, creating in a half-hour a large sluiceway through which the water poured.

"By morning the beavers will have repaired the damage," he added as our canoe shot through the new passageway. And before two hours had passed, I realized that, but for the water we had "borrowed" from the beavers, we might not have floated this shallow stretch.

That night we talked about the water "borrowed" from the beavers. A guide spoke up to say, "It should have come from the power company." There is the feeling up and down the Allagash that the water diverted at Telos to the Penobscot rightfully belongs to the Allagash. That night there was emphatic talk in favor of the beavers and against those who, by diverting Allagash water, rob the river of water during the Fall.

RED SQUIRRELS were chattering overhead. A beaver who had helped build an excellent dam across the brook slapped his tail to sound the alarm. A muskrat ran along the edge of the brook. A squaretail jumped over and again in a pool shaded by an ash tree that Fall had turned bright yellow. I could see the river for a half-mile or so when I looked upstream and a quarter-mile when I looked downstream. Its music is soft. The life it nourishes is endless. One can drink its water safely at any point. Many can camp here and come to know some of the mysteries of a river that never sleeps, and of the chain of life dependent on it. Youth can test their strength against these currents and come to worship the sanctuaries through which it flows. Hundreds of

CONTINUES PAGE 61



COURTESY OF YAKIMA VALLEY MUSEUM, YAKIMA, WA

Justice William O. Douglas, at left, and Willard Jalbert, "the Old Guide," examine a setting pole at the ruins of Churchill Dam, below which the Allagash River's first set of rapids begins. Douglas made the Allagash trip while working on his book *My Wilderness: East to Katahdin*.

introduced a measure that would permit states to administer wild river areas like the Allagash waterway within the proposed national wild rivers system.²⁶ Muskie saw an opportunity to resolve the federal and state differences over the Allagash by amending a national wild rivers bill making its way through Congress.

Meanwhile, on June 2, the prospects for state preservation were revived by the creation of a special legislative Allagash study committee to be chaired by Senator Elmer H. Violette, a respected and experienced legislator from northern Maine. And on January 17, 1966, as a result of Senator Violette's leadership, a new bill was printed for the creation of the Allagash Wilderness Waterway. It provided for inclusion of all the Allagash's headwater lakes; state purchase of a restricted zone 400 to 800 feet wide to "preserve, protect and develop the maximum wilderness character of

the watercourse"; and a mile-wide buffer with state controls. In February, the state legislature enacted the bill and authorized a \$1.5 million bond issue "to develop the maximum wilderness character of the Allagash Waterway," a sum to be matched by the Bureau of Outdoor Recreation. The wording was significant, for the framers of the act recognized that, because the Allagash was no longer purely wild, its wilderness character needed to be restored, or "developed." In November, Maine voters overwhelmingly approved the bond issue, inaugurating, in the words of Udall, "a new concept, a new national era, of creative Federal-State conservation partnership."²⁷

With passage of the act authorizing a bond issue for the purchase of land, the Allagash River escaped the fate of so many other rivers—development and obliteration by dams. Just as the Allagash battle was heating up, this cruel fate

had befallen the beautiful and wild Glen Canyon of the Colorado River just above the famous Grand Canyon when the Glen Canyon Dam was constructed.²⁸ But through tenacious advocacy, the Allagash had been saved, and the victory would be a landmark moment in conservation history as wilderness advocates focused attention on the heavily used but recovering forests of the East.²⁹

All the protections, however, were not yet in place. In 1968, Congress passed the National Wild and Scenic Rivers Act, including Senator Muskie's amendment. Moreover, the Allagash Wilderness Waterway was named in the act for inclusion in the National Wild and Scenic Rivers System pending application of the governor.³⁰ This was done by Governor Kenneth M. Curtis in the spring of 1970. On July 17, a notice in the *Federal Register* announced approval of the Allagash Wilderness Waterway as the first state-administered river in the system. The waterway had met the criteria for classification as a wild river, the most stringent designation in the act.³¹



Dean Bennett

The dedication of the waterway on July 19, 1970, only a few months after the first Earth Day, came at a time of considerable change in our nation's view of environmental protection and the responsibility to protect the American wild. The Allagash Wilderness Waterway was a symbol of this change and provided hope for wild rivers everywhere. Maintaining that symbol, however, would require no less an effort than had been exerted in its preservation.

Today, the Allagash Wilderness Waterway is under siege by those who want to open it up for easy access by motorized vehicles. During the past 30 years, the state has approved ten vehicular access sites directly to the water where only two or possibly three were intended in its policies issued in 1970. A new management plan completed in 1999 failed to adequately reflect the waterway's wild river designation under the Wild and Scenic Rivers Act. And in the late 1990s, the state constructed a modern concrete and steel dam and truck crossing at the head of the Allagash River without receiving a federal permit from the Army Corps of Engineers, the application for which would have triggered a review by the National Park Service. At this writing, the Maine Department of Conservation has signed an agreement with the National Park Service to mitigate the Park Service's finding that the dam has a direct and adverse effect on the values for which the river was designated. The agreement has the potential to correct some of the management failings of the past and to incorporate the intent of the federal "wild" river designation into the 1999 management plan. While undoing past mistakes will not be easy, public support appears to be strong for managing the Allagash as a wild river. In early April of this year, American Rivers chose the Allagash as one of our nation's most endangered rivers, bringing national attention to Maine's mismanagement of America's most famous wilderness canoeing river east of the Mississippi.

The Allagash runs through the heart of the northern forest. Its millions of acres are still relatively undeveloped and principally managed for wood, although recent changes in ownership have been accompanied by increased liquidation-style logging and ominous signs of impending large-scale real estate development. For decades, this region has been seen as the Northeast's remaining opportunity for wilderness protection and recovery. If there is anything that today's wilderness preservation efforts can learn from the Allagash experience, it is this: We must seize the moment or opportunities will be lost; we must be persistent, for such efforts are

years from now, if we are faithful life tenants, the Allagash can serve man by renewing his strength, by broadening his horizons, by teaching him that he is only a part of life far greater and richer than his own.

It was here on Whittaker Brook that my idea of the urgency of saving the Allagash crystallized. That morning I had heard saws screeching in the distance, and a far-off rumble of logging trucks. Upstream from Whittaker Brook, I had seen the site of a proposed highway extending from Ashland, Maine, on the east to Dauquam, Canada, on the west—a road that would traverse the Allagash corridors. These operations would mean the end of the Allagash. We must move fast, if the whole chain of lakes and streams that make up the Allagash is to be preserved. Relics of old dams must be removed. The natural flow of Allagash waters must be restored. The tributaries of the Allagash must be protected by acquiring a wide corridor on each side of the waterway. This corridor must be free of roads, free of resorts, free of all marks of civilization. The Allagash must become and remain a roadless wilderness waterway. No more cutting of trees. No invasions of any kind.

I talked to the Old Guide about it.

"Excellent" was his only comment.

We have a chance to redeem in the Allagash some of the values we have lost. If we have the courage to act swiftly, if we have the vision to see the enduring values in wilderness, we can make a permanent treasure out of the Allagash. If we drift with the easy tides of popular pressures, the Allagash will become "civilized." Once that happens, it will join the mass recreational areas where the quiet and peace of the wilderness are gone forever. ☾

William O. Douglas (1898–1980) was the longest-serving Supreme Court justice in American history. A noted legal scholar, champion of civil liberties, and conservationist, he was also a prolific writer about his wilderness travels. Two of his books, *My Wilderness: The Pacific West* and *My Wilderness: East to Katahdin*, were published during the long legislative struggle to pass the Wilderness Act. Among many other conservation battles to which Douglas lent support, he helped defeat highway proposals for the C&O Canal lands (setting the stage for creation of a national historic park), and along a wild shoreline of the Olympic Peninsula. His behind-the-scenes advocacy for the Allagash River's wild nature helped it become designated a national wild and scenic river.

difficult, costly, and time-consuming; and we must be vigilant because, as Stewart Udall points out, "there are people who will push and push to undermine the protections we have given...and who will succeed in gradually whittling away gains thought to be permanent and lasting."³²

If we are tenacious and vigilant in our work to conserve wild places, our descendents may enjoy the wonders of an Allagash Wilderness Waterway flowing through a great Maine woods landscape recovering its primeval wilderness character. ☺

Dean Bennett is professor emeritus at the University of Maine at Farmington. A long-time student of the northern forest's natural and cultural history, his books include *Allagash: Maine's Wild and Scenic River* and *The Forgotten Nature of New England*. This article is adapted from his most recent book, *The Wilderness from Chamberlain Farm: A Story of Hope for the American Wild* (Island Press 2001).

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RESOURCES

The Allagash Wilderness Waterway—intended to protect wild and scenic values and for quiet, remote recreation—is threatened by increased development including parking lots, more snowmobile trails, and especially more roads and motor vehicle access. Many individuals, groups, and a coalition of conservation and sporting organizations, businesses, and citizens are working to restore and defend the wild character of the Allagash Wilderness Waterway.

Citizens to Protect the Allagash 3 Wade St., Augusta, ME 04330; 800-287-2345 or 207-430-0196; allagash@allagashonline.org; www.allagashonline.org

The Allagash Alliance 10 Sanctuary Dr., Buxton, ME 04093; 207-929-8245

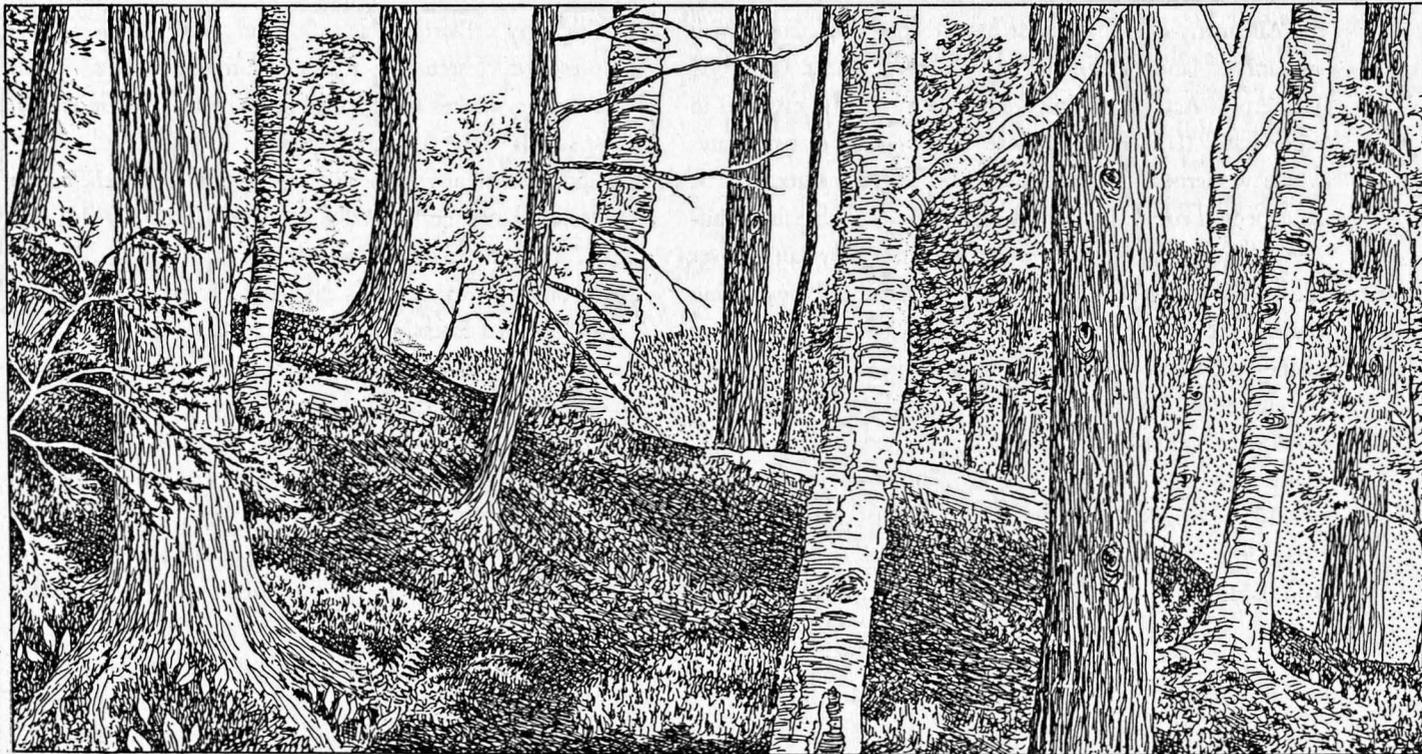
Maine Public Employees for Environmental Responsibility (PEER) 207-723-4656; mepeer@peer.org. For an excellent introduction to the current threats facing the Allagash, read their report "Losing Paradise: The Allagash Wilderness Waterway Under Attack" (download at http://www.peer.org/publications/wp_losing.html or call to request a copy). Tim Caverly, Director of Maine PEER, has also developed a slide show, "The Allagash: A Wilderness at Risk" that highlights these threats.

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HONORING A WILDERNESS VISION

A Proposal for Pennsylvania's Allegheny National Forest

by Newkirk L. Johnson



FROM WETLAND, WOODLAND, WILDLAND

It must be concluded that the demand for wilderness experience on the Allegheny National Forest is very high, given that half the nation's population lies within a day's drive of the Forest.

ALLEGHENY NATIONAL FOREST LAND AND
RESOURCE MANAGEMENT PLAN, 1986

PENNSYLVANIA'S ONLY national forest, the Allegheny, is a significant but often overlooked natural area. Located on the Allegheny Plateau in the northwestern part of the state, the region is home to five threatened and endangered species—the bald eagle, clubshell mussel, Indiana bat, northern riffleshell mussel, and the small-whorled pogonia. Before the arrival of European settlers, Allegheny Plateau forests were sparsely populated by humans and heavily wooded. Old-growth stands of eastern hemlock, American beech, eastern white pine, American chestnut, and other species covered most of the Plateau (Lutz 1930; Whitney 1990).

However, intensive resource extraction has made the Allegheny one of the United States's most heavily exploited forests, both before and after its designation as public land. Less than 5,000 acres of old growth remain here following a period of massive clearcut logging from approximately 1890–1920. In the aftermath of this cutting, the Allegheny National Forest was established in 1923, with the first land purchases made by the Forest Service (under the authority of the 1911 Weeks Act) to promote the reforestation and protection of the Allegheny River watershed (Bishop 1925; Henretta 1929).

Today, despite this origin in forest and water protection, the Allegheny National Forest has a disproportionately small amount of land designated as wilderness under the 1964 Wilderness Act when compared with national forest land in other states (U.S. Forest Service 1998)—even eastern states where wilderness designation is meager (Klyza 2001). The Allegheny is currently the only federal land suitable for significant expanded wilderness protection in Pennsylvania. Over the next several years, Forest Service managers will be revising the Allegheny's Land and Resource Management Plan (known as the Forest Plan), which dictates management direction for the entire forest—just over 513,000 acres (U.S. Forest Service 1998)—making now the most opportune juncture to advocate additional wilderness designation in Pennsylvania.

In the original forests of this region, black cherry comprised less than one percent of all trees (Lutz 1930; Whitney 1990). However, after the clearcutting era, non-climax shade-

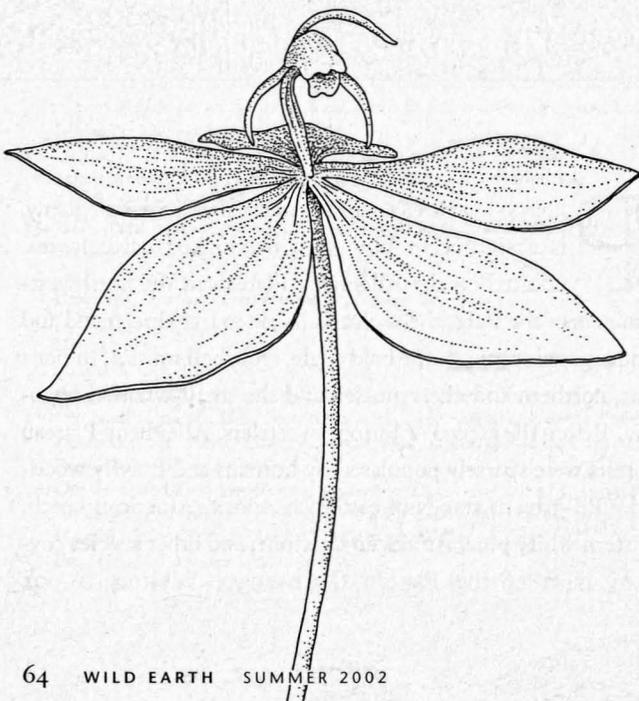
intolerant species such as black cherry increased in frequency during reforestation. As it became clear that this tree was particularly profitable as commercial timber to produce expensive veneer, paneling, furniture, and other luxury items (Marquis 1975; Butt 1984), management practices in the late twentieth century turned deliberately toward retarding natural succession to native forest types in order to maintain the elevated presence of black cherry (Marquis 1975; U.S. Forest Service 1986). As former Allegheny Forest Supervisor John Butt wrote in the *Journal of Forestry* in 1984, "To perpetuate the valuable hardwoods, the USDA Forest Service adopted an even-aged silvicultural system favoring the shade-intolerant black cherry....During the 1960s and '70s...foresters began to prescribe clearcutting to regenerate the stands." Today, black cherry makes up 25% or more of the canopy trees in most stands of the Allegheny.

Some small areas of original forest did survive the turn of the century clearcutting, due largely to property disputes. The Tionesta Scenic and Research Natural Areas, a 4,100-acre parcel of old growth, is one such place; located on the east side of the national forest, it was designated a National Natural Landmark in 1973. The Forest Service has recently characterized the Tionesta Research Natural Area as "one of the most valuable old-growth remnants in the eastern U.S....evidenced by the 10-fold increase in research activity on the area over the past decade" (Nowak and Nelson 1997).

Some areas of the forest have recovered from the clearcutting and even-aged management, albeit with a remarkably different forest structure and composition. Efforts by Pennsylvania's two former Republican Senators, Hugh Scott and Richard Schweiker, to include several of these portions of the Allegheny in the 1975 Eastern Wilderness Areas Act legislation were thwarted in the House by the local Congressman. Eventually, the 8,600-acre Hickory Creek Wilderness, along with seven islands in the Allegheny River known as the Allegheny Islands Wilderness, were designated through the passage of the Pennsylvania Wilderness Act in October of 1984. Other areas of the Allegheny that have been considered for wilderness over the years include the Tracy Ridge (9,000 acres), Allegheny Front (8,000 acres), and Clarion River (3,700 acres) tracts (Shafer 1979).

Pennsylvania's legacy

Howard Zahniser, author of the 1964 Wilderness Act, was from the town of Tionesta (which lies along the Allegheny River on the southwest boundary of the national forest) and



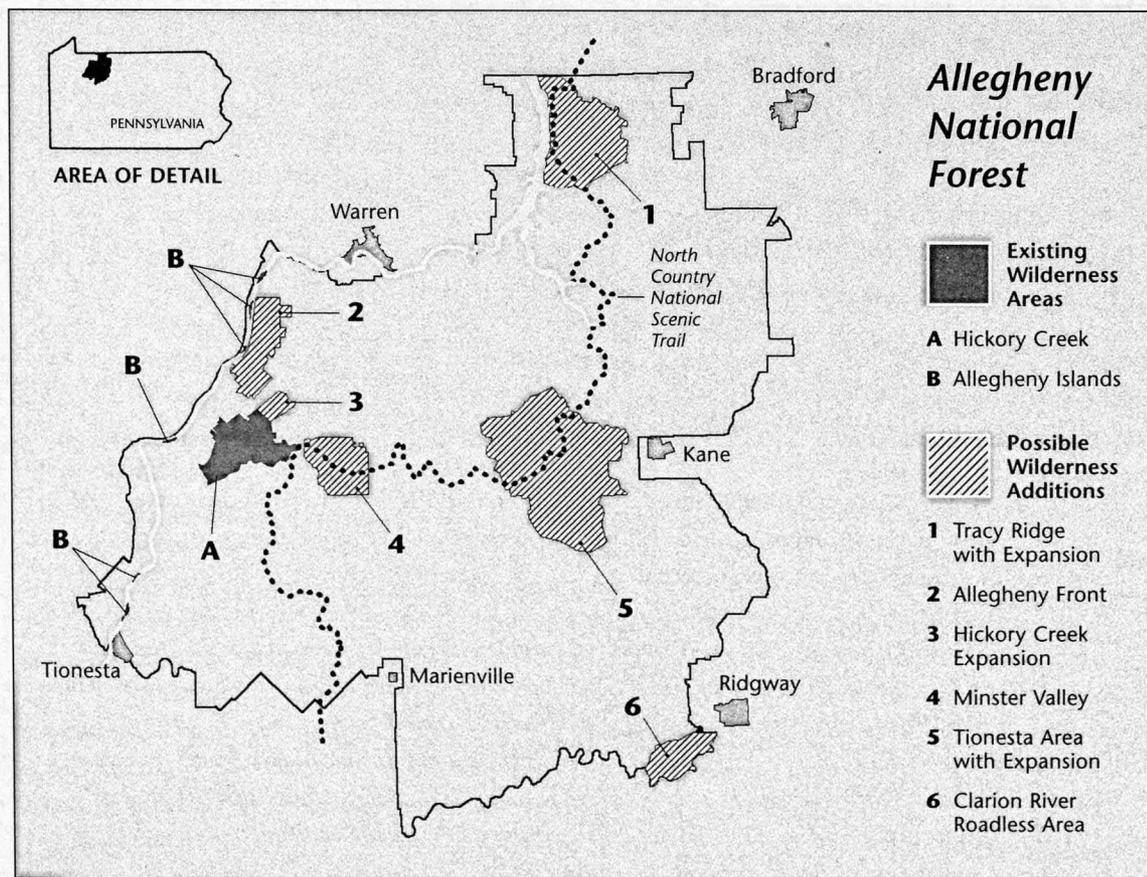
learned to love the Allegheny landscape early in life. Though he moved away as an adult, it was Tionesta that Zahniser considered home. Alice Zahniser, Howard's wife, recently recalled that "When Howard died, we buried him in a spot in the cemetery that is only about thirty feet from the [Allegheny] river bank. We found a natural stone from the forest for his gravestone. It faces the river....I think he would have been pleased" (Zahniser 2000).

With Howard Zahniser's vision of a growing repository of wilderness in mind, Friends of Allegheny Wilderness has proposed the region of the Allegheny demarcated by U.S. highway 6 and state highways 66 and 948, with the 4,100-acre Tionesta old growth as its core (Johnson 1999; Johnson 2001), as a candidate for wilderness designation. The Tionesta tract provides high quality habitat for many native species, including bobcats, black bears, Blackburnian warblers, and the recently reintroduced fisher. It is also one of the few confirmed breeding locations of the yellow-bellied flycatcher in Pennsylvania (Crossley 1999). Nevertheless, timber sales approaching the boundary of this native forest

tract continue to be planned and implemented, and boundary markings have become unclear over the years, resulting in actual timber harvest within the remnant old growth (Nowak and Nelson 1997).

Without additional protection, the forest surrounding the Tionesta old growth may continue to be fragmented by logging, oil and gas drilling, and road-building (U.S. Forest Service 1986). With 95% of subsurface rights privately owned on the Allegheny, oil and gas drilling is still prominent. Even within the Tionesta area (Bjorkbom and Larson 1977; U.S. Forest Service 1980) an estimated 120 wells still exist (Jacobs 2000), though many of these are no longer producing. These activities would be curtailed and eventually eliminated under a Tionesta Wilderness Area designation through the purchase of subsurface mineral rights, as was done with the Hickory Creek Wilderness designation in 1984.

The proposed Tionesta Wilderness Area would designate as much as 20,000 acres as wilderness, thus completely surrounding the 4,100 acres of old growth with a pro-

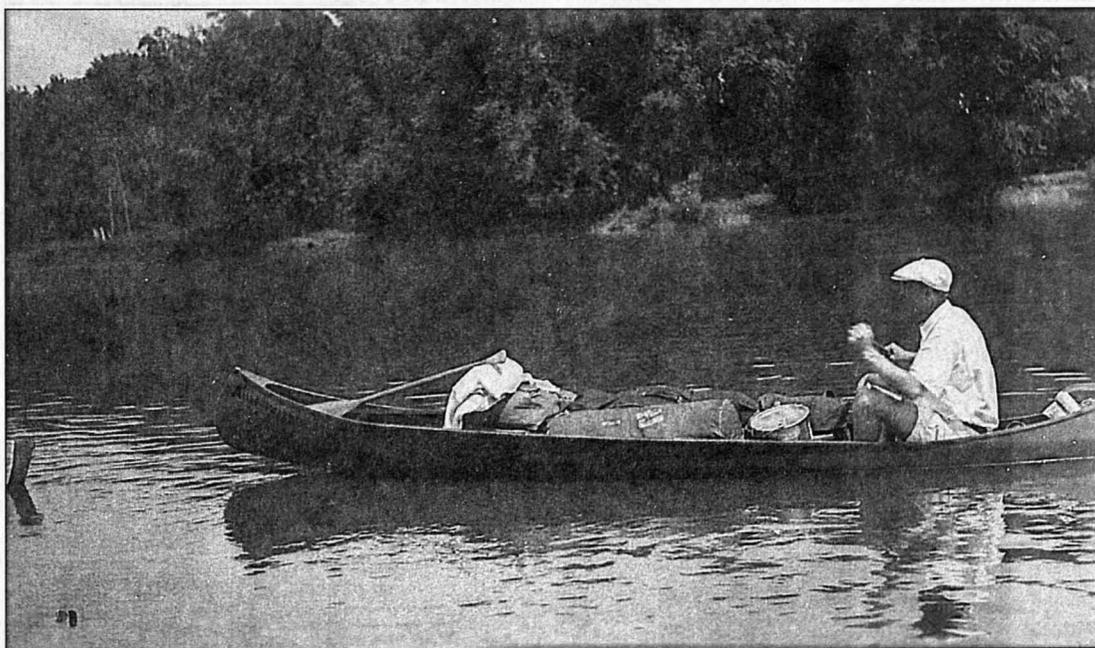


rective wilderness buffer. In time, the entire wilderness area would come to resemble the native forest at its core. Bjorkbom and Larson (1977) describe the likely path to recovery: "Most of the Allegheny Plateau outside the Tionesta Scenic and Natural Areas is now dominated by second-growth stands of intolerant species resulting from the commercial logging operations of the 1890–1930 era. These second-growth stands will eventually revert to hemlock/beech/sugar maple types like those in the Tionesta tract if left undisturbed long enough."

It is an unfortunate legacy to Howard Zahniser, a key architect of our National Wilderness Preservation System, that the land he loved as a youth has a less-than-spectacular record for wilderness designation. This is acutely troubling considering the numerous opportunities for wilderness

throughout the Allegheny National Forest in addition to the Tionesta area. Several roadless areas deserve protection, and the existing Hickory Creek Wilderness Area should be expanded northward to include the headwaters of East Hickory Creek.

Zahniser deserves a greater tribute than just the Hickory Creek and Allegheny Islands Wilderness in his home national forest. While these are wonderful natural areas, they total less than 9,000 acres, or just 1.74% of the Allegheny National Forest (U.S. Forest Service 1998). The continued overwhelming bias for timber, oil, and gas production is a poor legacy to Zahniser's ties to the region and a poor use of our public lands. An additional 30,000 or more acres of wilderness in the Allegheny would not only be a fitting tribute to Howard Zahniser, but would also help ensure the well-



COURTESY OF ALICE ZAHNISER

IN JUNE OF 1937, Mr. and Mrs. Zahniser paddled down the Allegheny River in their canoe, the *Alison*ward. In the second to last entry of the journal that Zahniser kept during their trip, he observed his surroundings as they approached the town of Tionesta:

It was a clear blue June day. The sky was especially beautiful, with cumulus, cirrus, and stratus clouds all day. As we went under a bridge at West Hickory...we saw two eagles flying high over the "narrows."...The canoeing from Hickory on had the added interest of the faint recollection of familiar things. We were much interested in fish jumping and in the green herons, standing on an anchored boat. A duck flew up from the river as we neared Tubbs Run's mouth and circled high in the air in ascending spirals and up Tubbs Run Valley....As we came near Tionesta we followed small currents close to the left bank, despite the shallow water, as we hoped to land at the cemetery....

being of native Allegheny Plateau flora and fauna. Such additions of eastern wilderness, where the majority of the nation's population resides, are sorely needed (U.S. Forest Service 1986; Klyza 2001); current and future generations would surely benefit from the protection of these wild places. If we recognize the opportunity to influence policy during the upcoming Forest Plan revision process, raise public awareness about the need for more wilderness in Pennsylvania, and make the recovery of wildlands in the East a priority, more wilderness on the Allegheny can become a reality. ☾

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Kirk Johnson is the executive director of Friends of Allegheny Wilderness. He has family ties in the Allegheny region dating to the late 1700s. ☽ To support the Friends of Allegheny Wilderness proposal for a Tionesta Wilderness Area, and to advocate that it should be given due consideration during the Forest Plan revision process, write to Kevin Elliott, Forest Supervisor, Allegheny National Forest, P.O. Box 847, Warren, PA 16365. For additional information on the campaign, contact the Friends of Allegheny Wilderness, 220 Center Street, Warren, PA 16365; 814-723-0620; alleghenyfriends@earthlink.net; www.pawild.org.

[POETRY]

The Grandmother Hypothesis

Any day now, when I am an old woman
and my skin drapes closer to bone,
my body will feel her cells opening to sunlight
one by one like tiny flowers in a lush field;
and her spirit streaming full bank through the sunrise and dusk—
the two trapdoors between the worlds;
ah and the antic, enigmatic tinglings of night,
all my liquids rippling toward the moon.

In the spring, snowmelt will seethe and mutter in my veins,
reminding me that I'm not as old as I will be
and coaxing me down to the river.

When I am an old, old woman,
I will pad along the banks with soft eyes;
follow my failing nose and ears toward the must
of seeds, the purling of water; rejoice
with my tongue. When I lie down to sleep
the long grasses will bend over me,
all our breaths spiraling up in a single twist of wind.

☽ Ann Weiler Walka

The Lesser of Evils

by Andy Kerr

SO, YOU DO NOT LIKE to pay a fee to hike on public lands? Who does—besides bureaucrats, so-called free-market libertarians, and those members of Congress who would like to tap the Forest Service budget to find money for another cruise missile or inch of flight deck on the next aircraft carrier?

Though tax revenues have gone up, domestic government spending has gone down. Overall, the Forest Service gets less tax dollars than it used to—and that is generally a good thing because the agency spends most of it subsidizing roads, timber sales, livestock grazing, and mining. In the horrible old days (today they are just terrible), when a million log trucks a year were coming off Pacific Northwest federal forests (it is today perhaps 100,000 year, or one every five minutes, all day, every day of the year), trail maintenance, campground, and other recreation costs were taken out of general funds—sort of as small mitigation for all those stumps.

If you are opposed to national forest recreation fees, first ask yourself: Are you opposed as a *recreationist* or as a *conservationist*? It makes a difference as to any potential high ground you might occupy on the issue.

AS A RECREATIONIST, you were happy with the free ride of not paying for trails, just like the free ride other recreationists get. But, oh wait,



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Recreation Fees

National *Forests* or Amusement Parks?

by **Bethanie Walder**

LATE LAST OCTOBER, I drove my car to the entrance gate at Yellowstone National Park and paid the \$20 entrance fee so I could speak at a conservation conference being held in the park. Even though I live just a five-hour drive from one of the most beautiful places in North America, I almost never go to Yellowstone anymore—for two reasons. First, it costs 20 bucks to get in whether I plan to spend a day or a week there. Second, it's teeming with snowmobiles in the winter. Not exactly the kind of outdoor experience I'm looking for. But it seems we'd better get ready for the brave new world of public lands recreation because the Forest Service's recreation fee demonstration program is primed to make the national forests just as expensive and commercially developed as many of our national parks.

Initially implemented by Congress in 1996, "fee demo" was touted as a way to raise the site-specific funds to fix the crumbling recreation infrastructure in the national forests. But why was it crumbling? Because Congress had systematically cut direct recreation appropriations to the agency, even while the economy was booming. Fee demo is a pre-determined solution to a manufactured crisis, a solution that ultimately benefits private industry at the expense of public lands. The Forest Service has long maintained a close relationship with the timber industry. With reduced logging levels, that relationship has cooled, and the agency has jumped into bed with the recreation industry. It is looking for new revenue sources and finding them in industrial recreation and commercial partnerships. But rec fees are primed to take the Forest Service down the wrong ecological and economic path.

More fees, more infrastructure, more damage

The Forest Service is likely to promote those forms of recreation that justify the highest user fees. From trail widening to high-end campgrounds, recreation fees encourage high-intensity uses that in turn create high-intensity infrastructures. To date, limited recreation funding has been used to mitigate or restore the ecological damage caused by recreation; instead, it is used to increase recreational developments.

It is no surprise that intensive recreational use and its attendant infrastructure fragment habitat; harass and displace wildlife; increase noise, water, and air pollution; spread invasive weeds; and compact and erode soil. Compounding these problems, high-intensity recreation displaces "human-powered" activities, forcing hikers and wildlife watchers into smaller and smaller areas (mostly roadless and wilderness areas), because motorized uses tend to be incompatible with low-intensity uses. Tried taking a quiet cross-country ski trip in Yellowstone lately?

As both wild animals and human-powered recreationists are displaced into smaller areas, the impacts of quiet recreation become more significant on wildlife, because neither group has anywhere left to go. While all recreational decisions should be based on maintaining the ecological vitality and resiliency of the land, recreation fees force the agency to manage for short-term revenues. Yet nowhere is revenue generation listed as one of the agency's mandates.

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► The Lesser of Evils

campers have long paid to use campgrounds, as have off-road motorists paid for their facilities (but not the damage they do to the land and water) through the tax on the gas they waste. Downhill skiers pay through a portion of their lift ticket.

Have you wondered why federal land agencies are so accommodating of late to off-road vehicle constituencies? As that great conservationist Deep Throat noted, "follow the money." Several years ago, Congress allocated that portion of gas tax funds paid by off-highway gasoline consumption to the development of trails and staging facilities. Bureaucrats do not have a similar source of funds to tap from a tax on hiking boots, cross-county skis, backpacks, binoculars, and related outdoor gear. Public agencies have long tapped such tax revenues on hunting and fishing equipment to the benefit of hunters and fishers.

Rec fee opponents will say...

But, I am just walking on public lands, I am not using a developed facility like a campground! Trails are development and do cost money to build and maintain. There is also the cost of law enforcement to reduce the risk of your car getting clouted at the trailhead.

But dammit, the public lands belong to all of us and ought to be free to use! You are not paying to use the public lands; you are paying for use of the developed facilities on public lands. If you do not want to pay, then the next time you visit the national forests, park more than one-quarter mile from the trailhead and do not use any trails. When you come to a trail while walking through the woods, jump over it.

But the poor cannot afford it! True, but if you subscribe to this journal, you can. If you were truly concerned about the poor, they would be better served if you were advocating progressive taxation, income redistribution, or at least a "trail stamps" equivalent to the food stamps program.

But we pay taxes and it ought to go to trails on public lands that are available to everyone! While available to all, not all use them. With a specific fee, you know exactly what you are paying for; with a general tax, you do not.

But the bureaucracy is using most of the money on overhead! Agreed. But that's a reason to reform—not abolish—the fee system.

But the system is confusing—with different fees and different

permits for different places! The bureaucracy is slowing improving the trail fee system to make it more user friendly. With pressure, they will eventually get it right.

AS A CONSERVATIONIST, you should be more concerned. The perverted elegance of the federal timber sale program is that up to two-thirds of all timber revenues are kicked back directly to the bureaucrats who put up the sales. Bureaucrats are rewarded—in terms of bigger budgets, more staff, nicer offices, newer trucks—for making stumps. While not as elegant or efficient, the same can be said for the federal livestock grazing program.

Is it a good idea to move the Forest Service budget from one addiction to another? As timber revenues decline, would not the Forest Service seek to supplant them with recreation revenues? And not just the paltry trail fee, but bigger cuts off bigger campgrounds and ski areas? Quite likely they will try; they are bureaucrats after all.

As conservationists, we have gotten ourselves in a political trap; we have whined for years about taxpayer-subsidized logging, grazing, and mining and called for an end to such giveaways. Taking such a position rather assumes that it is okay to do these

things on the public lands if they are not subsidized and/or that all (ab)users of public lands ought to pay their way. Are conservationists now going to openly support taxpayer subsidies of human-powered recreation, but continue to oppose them for logging, grazing, mining, and off-road vehicles?

As the Forest Service switches from the timber tit to the amusement mammary, conservationists must now work to prevent the agency from going for ski areas, water slides, full-service resorts, and hotels. It is a serious problem, but a manageable one and not nearly the problem that massive timber sales, grazing permits, and mining projects are.

Paying a user fee need not be the beginning of an irrevocable slide down the slippery slope to industrial recreation, especially if conservationists tenaciously oppose the Disneyfication of public lands. The price of wilderness—is liberty—is eternal vigilance. So as a recreationist, pay your fee and quit whining! If you are a conservationist, pay your trail fee and never quit watching the agency. ☺

Conservation strategist and gadfly **Andy Kerr** (www.andykerr.net) writes from Oregon's Rogue Valley. The title of his next book is Oregon Wild: Threatened Forest Wilderness.

► National *Forests* or Amusement Parks?

Bad economics

Recreation fees create perverse incentives, generate less funds than direct appropriations, and result in disparate funding across the national forest system. The fees are paying for the infrastructure, not the forests. While some might argue that user fees make sense, the logical outcome is that the people paying for infrastructure will demand highly developed public lands, from RV campgrounds with sewage dumping stations, showers, and electricity hookups, to high-speed highways on which to access those campgrounds. Those facilities have long been provided outside of the national forests, and that is where they should stay. It is a sign of things to come that the Forest Service is already promoting a plan to upgrade more than 60,000 miles of roads to highway status for improved recreational access.

While the Forest Service has not yet proposed impact-based fees, some economic analysts are already promoting (to Congress) that the fee program be restructured. Although it may seem reasonable to pay based on the impacts of the recreation—if you are a hiker you pay a small amount, and if you are an off-road vehicle driver you pay a larger amount—this will only result in promoting higher-impact recreation. The greater the infrastructure needed, the greater the cost, the greater the damage, the greater the loss of wild, natural forests, deserts, grasslands, and wetlands.

And fee demo doesn't even solve the problem of declining funding—appropriations have been cut in direct correlation with fee revenues. In some instances the fees themselves are keeping people out of the forests, thus exacerbating the funding problem. At Lava Lands Visitor Center in Bend, Oregon, visitation dropped 45% in the two years after fees started. Congress also cut appropriations by the amount that the fees did generate, leaving the visitor center with no extra money to fix their leaking roof and forcing them to cut services. And all this because Congress apparently decided the direct appropriations were too high. Is it true? Currently, an American citizen earning an annual salary of \$40,000 pays a whopping three cents per year in taxes to recreate on national forest lands. If that were doubled, it would likely generate far more revenue than fee demo.

Fee demo is a pre-determined solution to a manufactured crisis, a solution that ultimately benefits private industry at the expense of public lands.

Fee demo also forces imbalanced recreational funding. Because most of the fees remain where they are spent (except for the approximately 19% that it costs to enforce fee collection), only “destination” areas will have adequate funding. Unprofitable forests could be subject to intense commercial development to increase revenues. The Forest Service will be pressured to sell itself to the highest recreational bidder. At Lava Lands, fee demo did not fix the funding problem, so the agency began discussions to develop a public-private partnership to maintain the center. Such partnerships result in private profit from public lands and a loss of authority over an area's management.

The implementation of the fee program seems to be a calculated effort to turn the forests into privatized, commercialized, motorized playgrounds. Where is the sense in a policy that will mostly benefit private, industrial manufacturers of recreational toys like off-road vehicles, while damaging the very heart of the public lands in the process?

FOREST FEES will bring larger, fancier, more “convenient” facilities. They will bring entrance gates and toll booths to the forests. They will accelerate the privatization, commercialization, and motorization of Nature. They will bring an end to the national forests as most of us still know them. Ironically, they will not bring enough money to fix what's wrong with recreation on the national forests, from maintenance backlogs to enforcing the law against motorized trespass (though plenty of money is going to enforce fee demo itself). From an ecological and economic perspective, recreational fees are a backwards and damaging approach to recreational management on public lands. Now is the time to end recreation fees and promote necessary and ecologically sensitive federal recreation appropriations. The future of publicly accessible, ecologically vital national forests depends on it. ☹

Bethanie Walder is the director of the Wildlands Center for Preventing Roads (www.wildlandscpr.org), an organization that protects and revives wild places by promoting road removal, preventing new road construction, and limiting motorized recreation. She lives in Missoula, Montana and backpacks on free and wild public lands throughout the country.

Fire

A Brief History

by Stephen J. Pyne

University of Washington Press, 2001

224 pages, \$18.95

THE YEAR 2001 is estimated to be the second warmest in 140 years of recorded weather, adding to the fodder of global warming theories.

IN CALIFORNIA, a pathogenic spore is killing oaks; a researcher at U.C. Berkeley hypothesizes Sudden Oak Death has spread in part because of fire exclusion, which may also be linked to oak die-offs in the Ozarks.

FOR MOST OF August, I worked as a fire monitor assigned to Yellowstone National Park, managing a series of lightning-caused fires that burned a few thousand acres amid a facsimile of natural conditions. The Hayden Valley tourists marveled at bison and the afternoon column of smoke.

THEN CAME September, when four airliners loaded with passengers and jet fuel were used as manned missiles.

THIS IS OUR CONTRADICTION, combustibility world. Our most essential tool is also our fiercest destroyer. Fire is a catalyst that has shaped the evolution of species and ecosystems, a tool with which we've shaped our landscape, agriculture, industry, and climate.

In *Fire: A Brief History*, prolific author Stephen Pyne notes that "in *The Republic*, the philosopher Plato likened the human condition to life in a cave, illuminated by flames." Yet this allegory, according to Pyne's history of our fiery world, is also archaeology. In a South African cave,

the oldest deposits hold caches of bones, the prey of local carnivores. Those gnawed bones contain the abundant remains of ancient hominids. Above that record rests, like a crack of doom, a stratum of charcoal...and atop that burned break, the prey have become predators. Hominids have claimed the cave, remade it with fire, and now rule.

Pyne takes Plato's illuminating flicker out of the cave and into the world. "Only humanity has become, for the biosphere, the keeper of the vital flame," writes Pyne. "Fire's story is a story of the Earth and, as myths emphatically insist, a story of ourselves." And Pyne, who began his career as a Park Service firefighter at the Grand Canyon and now teaches at Arizona State University, is fire's storyteller. He has become the pre-eminent historian of fire in part because so few had looked at fire as a focus for history. Yet fire is entwined with history. Where once we only hunted and herded and gardened with fire, we now propel transportation, business, industrial agriculture, and war, all with the fire triangle—the available fuel, oxygen, and heat of our carbonized planet.

Fire: A Brief History, the latest

installment in his six-book Cycle of Fire, collects Pyne's research into a unified theory that locates fire into three eras: First Fire, where fuels accumulated and ecosystems evolved as a result of natural ignitions; Second Fire, the last 100,000 years, when people learned to apply fire to

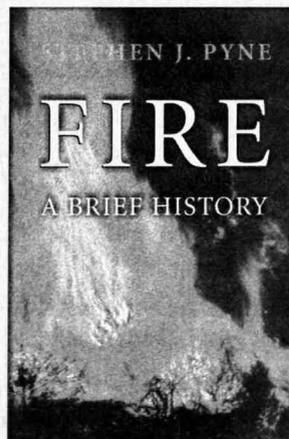
the landscape; and Third Fire, when our technological command of flames focused fire within industrial controls, even as we attempted to exclude fire from the landscape.

We may dream of a pristine world in which the land was wild because it was free from people, and thereby protected from human conflagration. But Pyne notes that nearly all landscapes experience natural fire; often these wild places were populated with humans who worked fire into the landscape with a gardener's selectivity, enriching the soil while weeding for preferred foods. It was European colonization that helped launch the land-control policies that either evacuated native peoples from the land (e.g., the American West) or sought to control aboriginal burning by creating forest preserves mostly off-limits to native use (e.g., colonial India). As anthropogenic fire was withdrawn from the land, the fire

regime often changed from high-frequency, low-intensity fires to less frequent but stand-replacing conflagrations.

In the transition from Second Fire to Third Fire, the colonizers often condemned and suppressed all fires in the landscape, whether ignited by humans or lightning.

More recently, awareness of natural fire regimes (i.e., a recognition of First Fire) has helped drive landscape-scale conservation efforts. Yet these management policies often overlook the impact from human ignitions during the era of Second Fire. In many climates, humans benefited



from burning off the fuels early in the season—before the fuels could be burned *en masse* by lightning fires. With these pre-industrial fires, people were merely reshaping processes that existed in Nature.

The igniters of Second Fire competed with First Fire for the fuels, and mostly we won. The controlled ignition of industry often seeks to suppress all fire in the landscape. As a result of this suppression, wildland fire roars through the unburnt fuels (including suburbs). Emissions from burning fossil fuels are accepted, but ecosystem burning is still mostly taboo. In the logic of Third Fire, it is better to expel hydrocarbons while commuting to work than to burn off the growing fuel bed that connects one house to the next.

Early agricultural peoples often tell a story of first inhabitation, a time when the Earth was remade with their fires. Now we remake this Earth with fire exclusion in our colonized nature reserves and an over-clocked burning of fossil fuels. Yet whatever technology we choose, Pyne believes we will remain creatures of fire:

Beyond the next epoch of geologic time, well after this species has expired and another must examine its record, we may come to be seen as we have often seen ourselves, as a flame—destroying, renewing, transmuting.... The flame—tended, suppressed, abandoned—will speak uniquely to our identity as creatures of the Earth.

As it should. ☾

Reviewed by Ron Steffens, who teaches journalism and writing at Southwestern Oregon Community College and works as a seasonal fire monitor in the Greater Yellowstone area.

Return of the Wild The Future of Our Natural Lands

edited by Ted Kerasote

Island Press, 2001

260 pages, \$25

GET INTO YOUR CAR and start driving. Set the cruise control at 50 miles per hour. Do not stop for food or bathroom breaks, do not stop for gas, do not stop for any reason. Drive 24 hours per day without rest until you have covered every official mile of road in the United States. You'll be done in 16 years with your odometer reading roughly 7,000,000.

A pullout map of these roads in *Return of the Wild: The Future of Our Natural Lands* shows an undulating mesh of grey so pervasive and fine that the whole nation appears paved: not just on the two urban coasts but across the Midwest and Plains—and in most every cranny of the public land that covers the West. Charts that accompany the map explain that this net of roads (excluding the uncounted miles of jeep tracks and such) breaks 82% of the U.S. into fragments of less than 1000 acres.

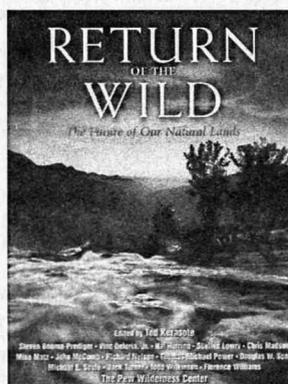
The fate of the remaining roadless tracts is the fate of the wild and shapes our own fate—argue the 15 contributors to this new anthology sponsored by the Pew Wilderness Center. Editor Ted Kerasote notes that not only does civilization depend on the ecosystem services that wild places provide (if you live in New York City, be grateful for the vast water purification system that is the Adirondacks), but that

without wild Nature, people will be “like potted trees in the foyers of great skyscrapers,” alive but alone.

It may be that Christians and hunters form a political fulcrum on which the future of these natural lands teeters. Suellen Lowry reports that more than 40% of Americans attend houses of worship each week; Kerasote tallies the rifle and rod ranks at 77 million (17 million hunters, 60 million anglers). These groups have enough clout and conviction to form a bulwark for protecting wilderness—or to trample the conservation movement on the march to a post-natural world.

Which way will hunters go? Some are the descendents of the ecologically astute founders of the wilderness movement (as Chris Madson notes in “The First Conservationists”); some are lazy consumers, willing to have whole populations of wildlife killed to protect farm-raised elk for spineless trophy shooting (as Hal Herring describes in “Marketing the Image of the Wild”). If the concluding narrative by Alaskan deer hunter and anthropologist Richard Nelson provides a clue, the return of the wild might come from those who humbly stalk—and gratefully eat—wildlife.

Hunting is one thing, extinction is another. To allow “wildlife to be lost is the ultimate irony for those who worship...the wildest being in existence,” Steven Bouma-Prediger asserts in “Christianity and Wild Places.” The growing strength of coalitions like the National Religious Partnership on the Environment may signal that ecologi-



cal indifference is giving way to a green reading of the Bible—not just on college campuses but among the expanding evangelical denominations. What would happen if more churches stopped worrying about carpeting and took an interest in the forest floor? With the civil rights movement and the televangelists as competing examples, it is clear that the cultural sway of religious organizations in America could, as Lowry reports, “galvanize millions...about caring for creation”—and make conservation a holy giant.

This book doesn't systematically address its subtitle, “the future of our natural lands.” Instead it presents a grab-bag of conservation subjects: a sketch by Douglas Scott of historical landmarks in American wilderness protection (followed, oddly, by Vine Deloria's claim that wilderness doesn't exist for American Indians); a “how to” by Thomas Michael Power for countering the economic hooey of wilderness opponents; an ominous treatise by Jack Turner on the ways “genetically modified biological artifacts” might replace natural systems; a description by Todd Wilkinson of a coalition of conservationists and loggers who support grizzly bear recovery in the Bitterroots; Michael Soule's intelligent distinction between three archetypes of people (managerial, ecological, heroic) in exploring the question, “Should wilderness be managed?”

Return of the Wild, like many anthologies, reminds me of the top drawer of my file cabinet. It is full of useful stuff, but I'm not sure how it all got there. ☺

Reviewed by **Joshua Brown**, Wild Earth's assistant editor.

CONSERVATIONISTS' *Bookshelf*

Yearning Wild: Exploring the Last Frontier and the Landscape of the Heart

by R. Glendon Brunk, 2002, *Invisible Cities Press*, 316 pages, \$16.95 paper

When Glendon Brunk moved to Alaska in 1968, he wished to live in the wilds of the Last Frontier. He succeeded: building his own log cabin, hunting big game, becoming a world-class dogsledder and staunch defender of the Arctic National Wildlife Refuge. In a culture of conquest, he came to value wildness both in the world and within himself. This coming-of-age-after-40 memoir captures the painful contradictions that are Alaska today.

Red: Passion and Patience in the Desert

by Terry Tempest Williams, 2001, *Pantheon Books*, 258 pages, \$23 hardcover

“It is a simple equation: place + people = politics,” begins these five compact essays on the desert of southern Utah. Exploring why the redrock wilderness matters to the soul of America takes Williams to realms of poetry, policy, and natural history in her hunt for “wild mercy.”

African Rain Forest Ecology and Conservation: An Interdisciplinary Perspective

edited by William Weber, Lee J. T. White, Amy Vedder, and Lisa Naughton-Treves, 2001, *Yale University Press*, 588 pages, \$65 hardcover

From the vast lowland Congo Basin to the archipelago of forest islands on its eastern rim, the African rain forest

faces a host of conservation threats. Thirty-three essays by scientists and on-the-ground practitioners provide extensive information on the paleoecology, species diversity, human cultures, and research needs in this region.

A Naturalist's Years in the Rocky Mountains

by Howard Ensign Evans, 2001, *Johnson Books*, 137 pages, \$14 paper

From his home at 7,800 feet on the edge of a granite cliff, entomologist Evans presents sharply etched portraits of thatcher ants, hummingbirds, bumblebees, woodrats, Clark's nutcrackers, pollen wasps, marmots, and other mountain wildlife. Read one chapter a night around the campfire on your next hike through the Rockies.

Extinct Birds

by Errol Fuller, (1987) 2001, *Cornell University Press*, 398 pages, illustrations, \$45.95 hardcover

Unlike the birds themselves, *Extinct Birds* has been brought back in a revised edition. A beautiful, mournful chronicle of the natural history and demise of hundreds of avian species, including a few new additions since 1987. Happily, a small group of rediscovered birds has been removed.

Fascinating Mammals: Conservation and Ecology in the Mid-Eastern States

by Richard H. Yahner, 2001, *University of Pittsburgh Press*, 333 pages, \$19.95 paper

Fifty brief essays, organized by animal families, explore how beavers adapt to winter, why skunks stink, the conservation needs of bobcats and flying

squirrels, how bats fly, and many other questions about the mammals that live from New York to Maryland. A good companion to field guides.

**Eugene Odum:
Ecosystem Ecologist and
Environmentalist** by Betty Jean

*Craige, 2001, University of Georgia
Press, 226 pages, \$34.95 hardcover*

The holistic view of Nature presented in the now-classic *Fundamentals of Ecology* is perhaps the most important work of Eugene Odum, the founder of ecosystem ecology. This biography illuminates the intellectual explorations of this scientist, activist, and educator.

**The Philosophy of Ecology:
From Science to Synthesis**

*edited by David R. Keller and Frank B.
Golley, 2000, University of Georgia Press,
366 pages, \$30 paper, \$55 hardcover*

Is Nature the sum of its parts? Since Ernst Haeckel coined the term in 1866, philosophical debates over the meaning of "ecology" have emerged like spring growth. This anthology of source materials and current articles provides an introduction to what some call the synthetic science.

**Common Lands, Common
People: The Origins of
Conservation in Northern
New England** by Richard W. Judd,

*1997, Harvard University Press, 335
pages, \$19.95 paper*

Countrypeople—rather than urban intellectuals and politicians—were the source of a conservation ethic in northern New England, Judd argues, drawing on a vast wealth of primary sources. A vivid study, now available in paperback.

PUBLICATIONS

Wilderness Report Card The American Wilderness Coalition has released its first "Wild Card," a 48-page report that ranks members of Congress based on their conservation voting record. To view the report online, visit www.americanwilderness.org, or call 202-266-0455 for a copy.

Yukon Conservation Atlas "About 22% of the Earth's remaining wilderness is in Canada and most of this is in the north," reports the Canadian Parks and Wilderness Society in *Yukon Wild: Natural Regions of the Yukon*. This updated edition provides status reports on 22 ecoregions. Contact cpaws@cpawsyukon.org, 867-393-8080.

Border Species Report The Canadian Wildlife Service and the U.S. Fish and Wildlife Service have released "Conserving Borderline Species: A Partnership between the United States and Canada." The 28-page report features 10 at-risk species that range across the border: the black-footed ferret, swift fox, woodland caribou, grizzly bear, whooping crane, piping plover, marbled murrelet, Lake Erie water snake, Karner blue butterfly, and western prairie fringed orchid. For copies, call 703-358-2390.

GATHERINGS

Globalization Teach-In This summer, the United Nations will gather in Johannesburg, South Africa, for the 10-year anniversary of the Rio Earth Summit. Immediately prior to this meeting, on August 24–25, the International Forum on Globalization's teach-in will draw attention to why the agreements from Rio are failing—and to the institutions and multinational corporations that keep globalization off the current UN agenda. For information, visit www.ifg.org.

Journalists Conference The Society of Environmental Journalists 12th annual conference will be held in Baltimore, Maryland, on October 9–13, 2002. The conference encourages journalists to explore "why so little ink or airtime is devoted to complicated, controversial topics like population growth, immigration, and consumption." For conference details and registration, contact www.sej.org, 215-884-8174.

Sky Islands Conference Sponsors of the Sky Islands Wildlands Network, including the Wildlands Project, Sky Island Alliance, New Mexico Wilderness Alliance, and The Wilderness Society, will host a "State of the Sky Islands" conference in Tucson, Arizona, October 18–19. For more information, visit www.wildlandsproject.org or call our Southwest Field Office, 520-884-0875.

15th Land Trust Rally More than 1500 people are expected to attend the premier gathering of land trust professionals and volunteers—the annual Land Trust Alliance Rally. This year's rally is in Austin, Texas, on October 26–29. Visit www.lta.org or call 202-638-4725.

Invasive Plants Symposium The Chicago Botanic Garden presents an international research symposium, "Invasive Plants—Global Issues, Local Challenges," October 27–30, 2002, at the Congress Plaza Hotel, Chicago. Information is available at www.chicagobotanic.org/symposia or 847-835-8261.

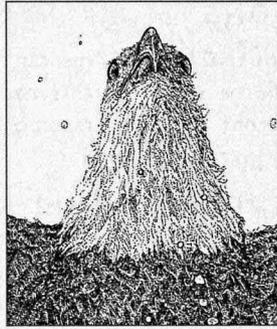
Sharpening our Claws American Wildlands will host its 5th annual Natural Resources Laws Conference on November 14–15, 2002, at Chico Hot Springs Lodge in Paradise Valley, Montana. Topics covered will include federal land planning, forest roads, the Endangered Species Act, and water issues. Visit www.wildlands.org.

Carnivores 2002 Defenders of Wildlife's 4th national conference on carnivore conservation will be held in Monterey, California, on November 17–20, 2002. Carnivores 2002 will focus on both marine and terrestrial predators. Contact Defenders of Wildlife at 202-789-2844 ext. 315, carnivores2002@defenders.org or visit www.defenders.org/carnivores2002.

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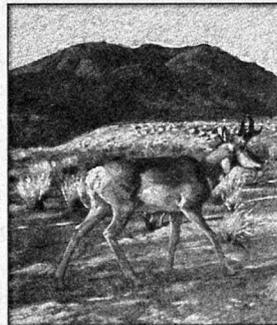


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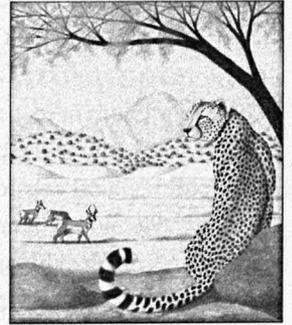
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Thirty-two back issues are available, beginning with our spring 1991 edition. For a more complete listing, visit www.wildlandsproject.org. Order online or use the reply form insert in this issue. See form for additional publications.

Summer 2000 • American Parks and Protected Areas

Foreman on resourcism vs. will-of-the-land, historical perspectives from John Muir & Gifford Pinchot, Richard West Sellars on the history of national park management, American environmentalism 1890–1920, David Carle calls for expanding national parks by shrinking national forests, Andy Kerr & Mark Salvo critique livestock grazing in parks and wilderness, Sonoran Desert National Park proposal, David Rothenberg and Michael Kellett debate on Maine Woods National Park, wildlands proposals for Maine and connectivity between Algonquin and Adirondack parks, Brad Meiklejohn retires cows from Great Basin, southwest New Hampshire wildlands, a Maine land trust, viewpoints on biodiversity conservation and “nature as amusement park,” Thomas Berry interview

Fall 2000 • Little Things Resurrection Ecology by Robert Michael Pyle, Tom Eisner interview, Microcosmos, Return of the American Burying Beetle, Forgotten Pollinators, Laurie Garrett on the Coming Plague, Tom Watkins tribute by Terry Tempest Williams, Hunting & Nature Conservation in the Neotropics, Rockefeller’s Philanthropy and the Struggle for Jackson Hole, critique of land exchanges, A Wilder Vision for the Texas Hill Country, Central Texas Forest Restoration, Fiction Folio: Dave Foreman’s Lobo Outback Funeral Home

Winter 2000/2001 • 10th Anniversary Edition

Exceptional excerpts from *Wild Earth*’s first decade, the wilderness legacy of Robert Marshall, philanthropy aids rewilding in Florida, Michael Soulé asks if sustainable development helps Nature, Dave Foreman & Kathy Daly’s ecological approach to wilderness area design, Connie Barlow sees ghosts of evolution, the dilemma of ecological restoration in wilderness, Sprawl vs. Nature by Mike Matz

Spring 2001 • Wild, Wild East Dave Foreman on “Pristine Myths,” an Eastern turn for wilderness, Eastern Wilderness Areas Act legislative history, Doug Scott reviews Congress’s criteria for wilderness, David Foster interview, biotic homogenization in the Northwoods, eastern cougar recovery, David Carroll on turtles and trout, Tom Wessels on beaver recovery, lichens and ancient forests, biodiversity on the Appalachian Trail, wildlands philanthropy in Maine

Summer 2001 • Dave Foreman on cornucopianism, Tom Butler on smart growth and sapsuckers, David Olson calls for conservationists to speak with one voice, long-nosed bats and white-winged doves, saving the sagebrush sea, Lyanda Haupt delights in the winter wren, Cascades Conservation Partnership, battling invasive fungi and insects, genetically engineered trees, farming with the wild, ecolabeling, wilderness restoration forum, US population stabilization

Fall/Winter 2001–2002 (combined issue) • **Citizen Science** Thomas Fleischner on natural history, Reed Noss considers whether citizen scientists are amateur naturalists, Rick Bonney suggests citizens collecting data help science, profiles of projects that monitor birds, mammals, fish, butterflies and more; Foreman on Early Awareness of Extinction, Biological Crusts, Sonoran Jaguars, Restoring Scotland’s Caledonian Forest, Doug Scott examines words of the Wilderness Act, a lament for Florida, Pedaling Conservation Biology Across America, Saving School Trust Lands

Spring 2002 • Extinction or Recovery? Causes and Processes of Extinction by Dave Foreman, A Fleet of Arks by Scott Russell Sanders, Quantifying the Biodiversity Crisis, Learning from the Rocky Mountain Locust, Passenger Pigeon Lice Rediscovered, Wolves & the Ecological Recovery of Yellowstone, Canebrakes, Threats to the Black-Tailed Prairie Dog and A Plan for Conservation, California Condors in Arizona, Moral Meaning of & Today’s Fight for the Endangered Species Act, Wildlife Amendment Protects Private Lands

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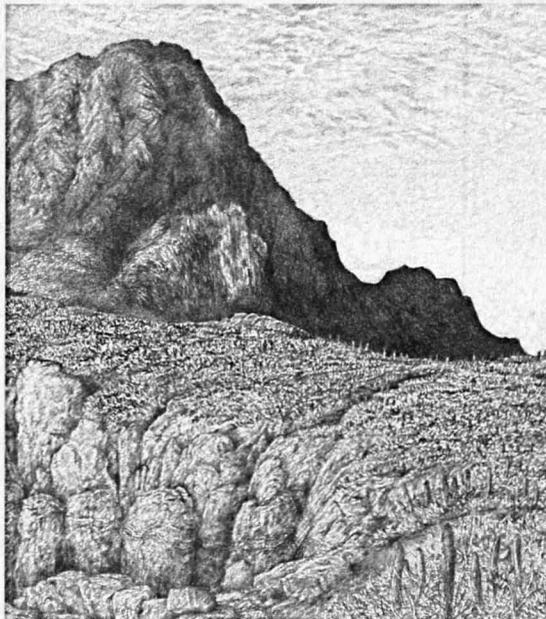


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Davis Te Selle

I find it interesting that this incident is so little known. Lien's account is the only detailed one of which I know. Flo Shepard only briefly alludes to it. And Shepard himself mentions only that he had "twice been a whistle-blower in state and national park services" in his second preface to *Man in the Landscape*. The standard histories of American conservation written before *Olympic Battleground* are silent on the scandal. Carsten Lien scooped everyone to reveal a hypocritical, revolting incident in the history of the National Park System. Without his honest account crediting Paul Shepard's leadership in halting the logging, I—and I assume nearly everyone else—would have remained ignorant of this telling chapter in Shepard's life. Bully for Carsten Lien. Stopping the logging in Olympic National Park was a very big deal. It was a significant national conservation campaign for the 1950s. It was a landmark in defending the integrity of National Parks and in the

transformation of National Parks from protecting monumental scenery to protecting natural ecosystems.

I think we also find in it a big part of the reason why Paul Shepard was able to become a whistle-blower on civilization. After knowing of the Park Service brass's alienation from Nature, after digging into the heart rot of a corrupt federal agency, and after personally suffering retaliation for defending truth, integrity, and beauty, Paul Shepard may have been able to better weather the tempest of criticizing the "agricultural revolution" and civilization. None of this takes away from Paul Shepard's creative brilliance and majestic scholarship. It does, however, give some insight into why Shepard was able to break free from the powerful myth of civilization to see the naked emperor—and to become a whistle blower for Nature.

≈ **Dave Foreman**

*Old Man of Hoy
Orkney Islands, Scotland*

NOTES

1. Paul Shepard, 1969, "Ecology and Man—A Viewpoint," in *The Subversive Science: Essays Toward An Ecology Of Man*, ed. Paul Shepard and Daniel McKinley (Boston: Houghton Mifflin Company), 6.
2. Paul Shepard, 1998, *Nature and Madness* (Athens: University of Georgia Press), 1.
3. Shepard, *Nature and Madness*, 3.
4. Paul Shepard, 1998, *The Tender Carnivore and the Sacred Game* (Athens: University of Georgia Press), xxviii.
5. Paul B. Sears, 1935, *Deserts on the March* (Norman: University of Oklahoma Press).
6. Sears had a major influence on me, as well. *Deserts on the March* was one of the first conservation books I read. Sears retired to Taos, New Mexico, in the 1960s. One of my treasures is a 1972 letter he sent me supporting my lonely (and ultimately unsuccessful) fight against Cochiti Dam on the Rio Grande.
7. I had the honor of working with Callison to defend the public lands against the "Sagebrush Rebellion" in the late 1970s and early 1980s.
8. I draw some of this history from Flo

9. Carsten Lien, 1991, *Olympic Battleground* (San Francisco: Sierra Club Books), 267.
10. Chapter 17, "Timber Flows" (pp. 268–298) in *Olympic Battleground* is the source for this discussion.
11. Seasonal park naturalists are the park rangers with whom most visitors interact. They have no permanent status and can be denied future contracts for almost any reason. Many are college professors, teachers, and graduate students who spend their summers in the parks "interpreting" Nature to visitors.
12. Lien, *Olympic Battleground*, 286.
13. Lien, *Olympic Battleground*, 291.
14. In my view, Wirth was the worst National Park Service Director ever. He was a diehard opponent of the Wilderness Act and was the force behind "Mission 66," a ten-year scheme to pave and develop the National Parks.
15. Florence R. Shepard, "Searching for Place," 100–101.

The opinions expressed in Campfire are my own, and do not necessarily reflect official policy of the Wildlands Project. —DF

hunted—likely due to human causes. Paleo-Indian hunters first reached the Americas, or developed deadly new hunting technologies, at about the time of the mass extinctions. Unlike in Africa, where big game coevolved with humans for millions of years, the American megafauna was not adapted to the appearance of an advanced new predator. We may now only speculate on the appearance and ecology of these massive running bears—arguably North America's greatest mammalian carnivore. ☺

Laura Cunningham describes herself as a "paleoartist"—one who combines research in living natural history with paleontology and fine art. She lives in Nevada near Death Valley National Park. Her short-faced bear illustration was created in colored pencil on paperboard.

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notes from the executive director

LIKE MOST WILDLANDS PROJECT members, my passion for conservation is rooted in personal experiences with the natural world. One such experience that continues to linger in my memory is a canoe trip in Labrador over a decade ago. While camping on Menihek Lake, I heard a lone wolf howl in the distance. That animal's call, long and mournful, seemed to stop time. This was my first encounter with a wolf in the wild, and its haunting song will forever remind me of the power of wild Nature.

Yet only a handful of Americans will ever have this experience because so few wolves live in the United States. Once common from coast to coast, wolves were virtually exterminated in the U.S. over the course of this century. By the time gray wolves received protection under the Endangered Species Act (ESA) in 1974, only about 400 animals remained, inhabiting a tiny portion of northeastern Minnesota and Isle Royale, Michigan. Since then, a combination of natural population growth (thanks in part to ESA protection) and planned reintroduction efforts has allowed wolf populations to recover in a few limited areas.

In spite of these successes, the future of wolf recovery in the United States is in grave danger as the U.S. Fish and Wildlife Service prepares to reclassify gray wolves under the ESA. The current proposal by the Service

would eliminate ESA protections for wolves in all portions of the lower 48 states except in Yellowstone National Park, central Idaho, and the southern Arizona–New Mexico borderlands. The Service justifies this change by saying that wolf recovery actions are neither “necessary nor feasible” for most of the wolf's historical range.

We disagree. If humans will accommodate them, wolves can again survive and thrive in the wilder stretches of the American landscape. The Wildlands Project has been a leader in the Coalition to Restore the Eastern Wolf, working with other groups to generate comments on the proposed rule, host educational seminars, fight state anti-wolf legislation, and petition Interior Secretary Norton not to abandon wolf recovery efforts in the Northeast.

From our field office in Boulder, Colorado, the Wildlands Project is working with our partners in the Southern Rockies Wolf Restoration Project to ensure continued protection for wolves under the ESA, and to bring wolves home to parts of southern Wyoming, Colorado, and northern New Mexico. We cosponsored a public opinion poll that showed strong support for bringing the wolf back to the southern Rockies. Two-thirds of all respondents were in favor of wolf restoration—and support for wolves increased once respondents heard arguments both for and against restoration in their state.

Most conservation biologists believe that wolves have an important

ecological role to play in the southern Rockies. To help bring science into the debate, we collected the signatures of nearly 50 top scientists for a letter to the Fish and Wildlife Service opposing the proposed changes. Our position is that the Service misses the point—simply having a few wolves in a few places is not enough to sustain the full richness of our natural heritage. A growing body of science suggests that populations of wolves and other top predators are vital to healthy ecosystems. It's not just the wolf that's missing from too many landscapes across North America, but fully intact food webs held together by large carnivores, which contribute to the well being of many creatures, big and small.

In short, wolves help put the “wild” in wilderness. Fostering natural recolonization and actively reintroducing wolves to suitable portions of their former range will help restore a balance in Nature that has been missing for almost a century. Reclassifying wolves under the ESA (downlisting to threatened in some regions and delisting entirely in others) will effectively close the door on future restoration efforts, and American wildlands will be much the poorer. The Wildlands Project will continue to oppose agency efforts to abandon the wolf.

~ Leanne Klyza Linck

Take action for the wolf and read more Wildlands Project news on our website www.wildlandsproject.org

Species Spotlight

*Furry, Fierce,
and Fast*

Giant Short-Faced Bear

KINGDOM	Animalia
PHYLUM	Chordata
CLASS	Mammalia
ORDER	Carnivora
FAMILY	Ursidae
GENUS	Arctodus
SPECIES	simus

*text and illustration
by Laura Cunningham*

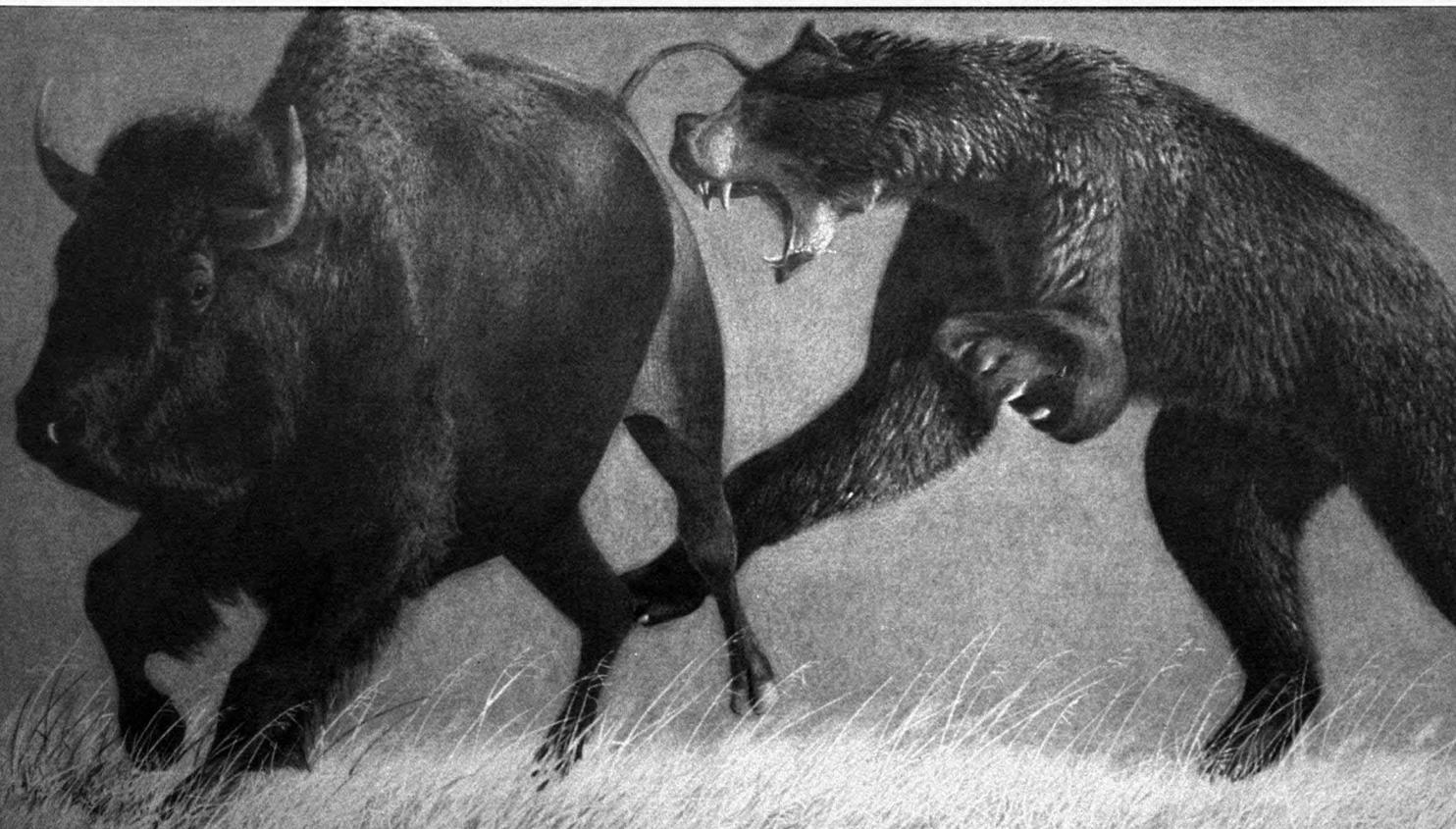
ONE OF THE most fearsome mammalian predators ever, the giant short-faced bear (*Arctodus simus*) was not adapted to rooting about for food like most modern bears, but had long, strong limbs to enable it to run down and knock over the big game animals that existed during the last ice age. Standing over 4 feet tall at the shoulder, this bear was larger than the biggest brown bears now living in Alaska. On hind legs, it towered 10 feet off the ground with a 13-foot vertical reach. Its head was like that of a great cat, designed to grip flesh, and its claws pointed forward to aid in running. Here, a bison cow (*Bison antiquus*) tries to maneuver away from the jaws and limber arms of the predatory bear chasing it.

Bears of the genus *Arctodus* lived in North and South America during the Pleistocene epoch (2 million to 10,000 years ago). Fossils of *A. simus* have been found from Alaska to Missouri to Mexico, and in the famous Rancho La Brea tar pits in Los Angeles, California. Habitats occupied by this bear apparently ranged from savannas and grasslands to semi-desert lake shores in the Southwest; from mountain forests to subarctic tundra-steppe.

Females weighed, on average, 15% less than males, like many modern bear species. But unlike today's omnivorous grizzly and brown bears, *Arctodus* was a highly adapted carnivore: its jaws were fitted with teeth designed to slice meat and crush marrow-rich bones, rather than chew roots and other plant material. Its long legs were designed for cursorial (running) habits, and it probably kept pace with prey species such as giant bison, North American horses and camels, musk oxen, elk, and perhaps baby mammoths.

About 10,000 years ago, the giant short-faced bear suddenly went extinct—along with an array of fellow predators, and most of the big mammals they

◀ CONTINUES PAGE 79



Pennsylvania *Wild*

Less than 2% of Pennsylvania's 500,000-acre Allegheny National Forest is designated wilderness. The Allegheny's current Forest Plan concedes that "it seems obvious that the demand for wilderness designation on the Forest is high, and the available supply in the regional area is low."



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CLARION RIVER ROADLESS AREA, ANF



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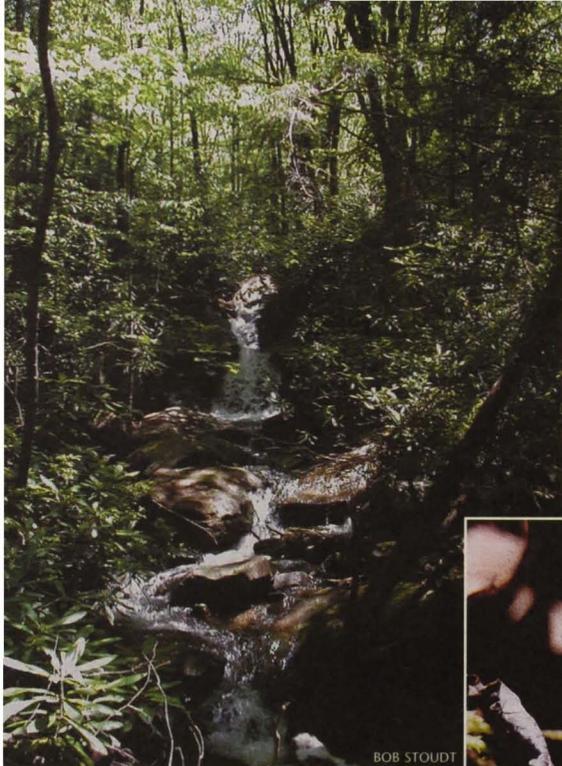
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