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I FIRST HIKED the Windsor Trail in Santa Fe National Forest in the early 1970s. Lake Katherine, Santa Fe Baldy, Nambe Lake: Windows onto the world! From 1994 through 1998 I lived in New Mexico and had the opportunity to walk that trail at least monthly, and almost daily at the peak of the aspen colors. I'd hike up the long beginning hill, through the mixed conifers, then down into the large aspen grove. And hide away for a few hours, losing myself in the rustling sounds of the golden leaves, the wonderful smells, and the distant vistas. I always took a single reading with me. Sometimes Psalm 104; on occasion Snyder, or Jeffers, or Emily Dickinson. And sometimes W. S. Merwyn. His poem, "Witness," from the collection *The Rain in the Trees*, became my favorite. It goes like this.

> I want to tell what the forests
> were like.
> I will have to speak
> in a forgotten language.

Sometimes, sitting there with the quakers, I was able to remember fragmentary phrases from that forgotten language—even begin to articulate a strange tongue. I hope the following remarks will not seem too strange. They may make you uncomfortable. I assure you they are forthright and predicated in my growing concern for western forests generally, and especially southwestern ponderosa pine ecosystems.

THE PASSAGE OF THE WILDERNESS ACT (1964) was an event of considerable national—and, I must say, personal—significance. I was born in 1943. My life since the age of twenty-one, my adult life, has been one lived "under its influence." The reinforcement of the objectives of the Wilderness Act by other legislation, particularly the Endangered Species Act, has also had a significant effect on me, partly by making me aware that American citizens believe that the wild earth has some legitimate claim to existence. Whatever the insufficiencies of these laws, whatever the formidable political challenges that rise up now and again, and whatever the challenges of interpretation and implementation, we can take considerable pride as citizens in the now more than 100 million acres of designated wilderness. We can also take pride in the many endangered

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species recovery plans, plans tied intimately if implicitly to conserving core habitats.

It is my hope that in the next decade or so the bigger visions of wilderness preservation and recovery, such as that exemplified by the Wildlands Project or the possibility of national forest restoration policy, can be embraced by the American people. Citizen choices are crucially important because they go beyond our daily private choices exercised through markets to the basic notions of what counts fundamentally for us as a nation. Citizen choices enacted into law, whether civil rights or wilderness legislation, give us dignity as a people, and bring us together as a people sharing collective values. Envision, then, the possibility of vast, wild landscapes with thriving arrays of native species, including carnivores, stretching from the Canadian border through Yellowstone and on down the spine of the Rockies to the Sonoran Desert, sweeping up much of New Mexico and Arizona in its embrace. The prospect is inspiring!

Despite the many achievements since passage of the Wilderness Act, all is not perfect in the Southwest. Many of the larger objectives of "the wilderness movement" are at considerable risk. The rapidly increasing incidence of stand destroying or catastrophic forest fires, particularly in ecosystem types such as ponderosa pine that are evolved adaptations to low intensity ground fires, are a major threat to wildness and wilderness. To doubt the reality of that threat is, I believe, a willful denial. Recall, if you will, that the same government agency, the General Accounting Office (GAO), that issued a widely ignored report on the enormous risk of terrorist attacks on our nation's commercial airlines has also issued repeated reports on the enormous risks and costs—human and otherwise—of catastrophic fire.

Even one stand-destroying fire, such as the 2000 fire that ravaged nearly 16,000 acres of the Kendrick Wilderness outside Flagstaff, Arizona, the so-called Pumpkin fire, is too much. The consequences of that fire will last for centuries. Four spotted owl habitats were destroyed. Subsequent soil erosion has been significant. Yellow bellies became so much kindling. The actual fire fighting cost more than a million dollars a day, and lasted more than two weeks. Luckily no one was killed. Hundreds of respiratory cases, including myself, also followed the fire. I'm disturbed that some local spokespeople for a few wilderness groups welcomed the fire as a natural process, which it patently was not. Even more disturbing: there was no need for the fire. Adjacent and interwoven areas that had been partially restored to a natural condition went almost entirely unscathed.

Some threats to wilderness are more insidious, and far less obvious, than catastrophic fire. For example, fire suppression and grazing, practices that became established during a pre-ecological era when the evolved structures and natural processes of ponderosa forests were poorly understood. These practices continue to the detriment of the health of many

ecosystem types. In ponderosa forests these practices lead to many undesirable outcomes, including runaway increase (irruptions) in the numbers of young trees, and, subsequently, canopy closure; destruction of the forest understory (literally the heart of biodiversity); and premature mortality of old growth, the magnificent yellow bellies, six or seven hundred, even more, years old. And these practices also create the conditions for catastrophic fire.

MY WANDERING AROUND SOUTHWESTERN LANDSCAPES, my day hikes in the Santa Fe, Coconino, and other National Forests, as well as my backpacking trips in the Weminuche and South San Juan wildernesses of Colorado, have always been journeys of renewal. More re-creation than recreation, where for a few hours or days I leave behind the hustle and bustle civilization and my daily life—including politics. Over the last few years, especially since 1994, my frequent trips to these places have brought into focus the necessity of better understanding the politics of wilderness preservation and restoration. I can capture at least part of what wilderness politics is about in terms of three risks. If these risks go ignored, arguably, they will lead to undesirable outcomes for the forested landscapes and biodiversity of the Southwest.

One of those risks is that there is as of now no "wilderness agenda" grounded in scientific research, ethical judgment, and political agreement that is embraced widely across the Southwest for the next 100 years, or even the next five years. I'll come back to this first risk shortly.

A second risk, as Dave Foreman makes clear, is that "the Big Outside" is an endangered species.[1] While I do not want to diminish the significance of what has been achieved, too much of what has been designated as wilderness is *too little, too late,* even if the designations were *better than nothing, never.* Too much of designated wilderness is so-called rocks and ice, the high and steep, often dry, and inaccessible country that did not lend itself well to permanent human settlement. Typically these areas were ripped off for quick cash through grazing, timbering, and mining. (One of my favorite and certainly one of the most beautiful spots on this planet, located in the South San Juan Wilderness, is immediately adjacent to a superfund clean up site.) Most of the bandits quickly got out of Dodge, looking for another resource to plunder. Some few hung around, milking the last vestiges of plunder from the land. And beginning to believe the illusions of their own smoke and mirrors that God had put them there to do this. All of you know the various chapters of this story, especially as it has been recounted by people like William DeBuys, in *Enchantment and Exploitation,* Donald Worster, in *Rivers of Empire,* or Patricia Limerick, in *The Legacy of Conquest.*

The Big Outside is also at risk because, as the science of island biogeography makes clear, when wilderness refuges are cut off, isolated from other refugia, their value for the conservation and restoration of

biodiversity is significantly diminished. Surrounded by landscapes that are increasingly fragmented by roads, clear cuts, pipelines, mines, ski resort condominiums and slopes, and many other forms of human nincompoopery, our designated wildernesses are more and more "islands." I'll also come back to this second risk.

A third risk, one that is under-recognized within the community of wilderness advocates, is that most designated wildernesses are *anthropogenic landscapes*. I'm going to develop this point at length, since understanding "Risk 3" is fundamental to grappling with "Risks 1 and 2." Why? Because Risk 3 is an interrelated part of overcoming Risk 1, the present lack of a politically united wilderness movement with a constructive agenda for restoring forest ecosystems in not only the core areas of designated wilderness but also in the larger areas of the national forests, parks, and other public lands. And understanding Risk 3 is also essential to dealing with Risk 2, the increasing fragmentation and destruction of the Big Outside. If we are to preserve what we have, restore designated wilderness and other public lands, and begin the multigenerational realization of big visions like the Wildlands Project, then prudence alone dictates the necessity of facing up to the challenge of Risk 3.

"ANTHROPOGENIC LANDSCAPE" is a term of art. The Indo-European root word, "gen," as in gene, genetics, generate, and genesis, is one source of the term, and "anthropos," a Greek term meaning human, is the other part of the idea. Anthropogenic landscapes are, most simply stated, human generated. More technically, they are landscapes to which humans are closely coupled, caught up in causal chains, webs of action and reaction. Anthropogenic landscapes are artifactual, rather than natural. Cornfields and city parks are examples. Indeed, cities themselves are anthropogenic landscapes. But cornfields, urban parks, and cities are all "landscapes by design," brought into being through human purpose—clear intent. Our public lands in the Southwest are more often than not anthropogenic landscapes, but they are largely unintentional consequences of human activities. Who would want to create and then perpetuate biologically impoverished forests flirting with the vagaries of the next fire season?

Underlying today's anthropogenic forests lies a larger sweep of history. Consider that until the Neolithic Revolution, some 15,000 years ago, humans were few in number and widely scattered in a social form called "band society." Their global and regional impacts were virtually nil, and local impacts were relatively benign. After the Neolithic Revolution, marked by the cultivation of cereal grasses and the domestication of herbivores, as well as permanent human settlement, everything changes. We are now to the point where, as the pre-eminent conservation biologist Edward O. Wilson argues, the human species has become an "ecological aberration."[2] "An Armageddon," Wilson writes, "is approaching at the

beginning of the third millennium....It is the wreckage of the planet by an exuberantly plentiful and ingenious humanity."[3] Our numbers, technologies, and belief systems, not the least of which is acquisitive materialism, are undercutting the web of life globally. The earth in its entirety, the global biosphere, is the largest scale of study for anthropogenic phenomena, and the depletion of stratospheric ozone and atmospheric warming are among the best known globalized anthropogenic phenomena. These global events can profoundly affect regional landscapes, although the details lie outside my scope here. Believe me, the possibilities of global climate change must concern all who care about wildness, wilderness, and biodiversity in the Southwest.

To restate, anthropogenic landscapes are those to which human beings are closely coupled in a multidimensional causal sense, as distinct from pristine nature, or pure wildernesses, to which humans are only loosely coupled, or not coupled at all. "True wildernesses" are authocthonous landscapes, *self-willing lands* continuing on natural, nonlinear evolutionary trajectories. Self-willing implies what the eminent biologist Ernst Mayr calls "teleonomy," that is, evolutionary trajectories conditioned by the past that continue to unfold or develop in response to changing circumstances, thus producing further evolved orders.[4] Self-willing also connotes what the noted physicist David Bohm calls the "qualitative infinity of nature," the ongoing biophysical processes that regenerate the evolved order and create new biophysical orders.[5]

What we have today in ponderosa pine, mixed conifer, and pinon-juniper ecosystems are more often than not simulacra of natural systems: *they are artifactual ecosystems*, no longer self-willing, but tightly controlled through culturally evolved codes and institutions. One of my Montana friends, Tom Birch, a long time wilderness advocate and environmental philosopher, published a piece several years ago entitled "The Incarceration of Wilderness."[6] He uses the metaphor of the prison to describe what we are doing to the wild earth. Applied to the issues at hand, we are figurative jailers. Through grazing, logging, and fire suppression and exclusion we have effectively locked southwestern forest ecosystems into a human prison.

The path toward decline started in a pre-ecological age—an age of blissful ignorance. We initiated the process by grazing cattle and sheep. By eliminating predators. By building roads. By fire suppression. By building dams and making deserts bloom with golf courses and people. By developing condominium retirement villages. By logging. By all those things that Charles Wilkinson, a strong voice for change, calls "the big buildup."[7] Make no mistake; the present policies for forest management are holding southwestern forests in bondage. Fire suppression and exclusion are prima facie examples of "close coupling," of the human hand weighing heavily on the earth.

ENTER PARADOX. Confronting Risk 3, the pervasive reality of the anthropogenic biosphere generally, and the artifactual nature of southwestern public lands forests specifically, necessitates a critical look at ourselves. Not a look outward, but a look inward, at the human estate. We've learned from a century of ecosystem inquiry that the continued separation of nature and culture, of biophysical ecology from human ecology, is not only conceptually untenable, but also increasingly dangerous, dangerous to the integrity of all types of ecosystems, and dangerous to human culture itself.[8] Such arguments were anticipated by people like Aldo Leopold and Rachel Carson. When Carson argued that we are living in a Neanderthal Age of Science, one that through its blindness to the interconnectedness of living systems endangers all life, she challenges the split of culture and nature. When Leopold argued for the land ethic, for the notion that an action or policy or behavior is right when it preserves the integrity, stability, and beauty of the land community, and for the notion that humans should not think of themselves as the masters and possessors of the land community, but as plain members and citizens, he also challenges the split of culture and nature.

These lessons are easily repeated. And ignored. Coming to grips with the political challenges of anthropogenic landscapes will not be easy. The issues are as much about us, and our self-definitions, as the world beyond our skin, those southwestern landscapes that we call designated wildernesses, national forests, and national parks. If, and perhaps only if, we humans are intellectually strong enough and ethically humble enough to recognize the visible and ongoing consequences of our actions, the unintended consequences of narrowly economic, narrowly political, narrowly managerial, and ecologically ignorant actions, then we might begin to overcome Risk 3 and grapple with Risks 1 and 2.

LET ME ENGAGE THE ISSUE by considering the set of three risks in terms of a single southwestern forest type, the ponderosa pine ecosystem, a type that predominates in several national forests as well as many designated wildernesses, a type whose total extent in the Southwest is six million acres or more—depending on where you draw the lines. Consider how conflicted the political, managerial, and scientific situation has become in regard to the ponderosa system. For example:

> —The Center for Biodiversity brought suit in Federal Court against the Grand Canyon Forest Partnership's treatment plans for the urban-wildland interface where the city of Flagstaff and the Coconino National Forest blend.
>
> —The Southwest Forest Alliance's (SWFA) website offers a lengthy discussion of "Why the Flagstaff Presettlement

> Restoration Model Should Not Be Applied to Public Forest Lands."
>
> —*Canyon Echo*, the newsletter for the Grand Canyon Chapter of the Arizona Sierra Club, headlines "Must We Destroy A Forest in Order to Save It?"
>
> —The Wilderness Society, through its Denver office, argues that *planning*—and I emphasize the word "planning"—for the ecological restoration of the Mt. Trumbull and Mt. Logan designated wildernesses on the Arizona Strip should be stopped.
>
> —To take a final example, the Chair of the Maricopa County Audubon Society argues in an editorial published in the *Arizona Republic* that ecological restoration is a "gimmick" (in effect, a linguistically deceptive practice) that will re-establish the logging of old growth trees.

There are several issues here. One is that the so-called Flagstaff Model, the plan for the urban-wildland interface at the juncture of the community of Flagstaff and the Coconino National Forest, is not what anyone with knowledge of the international community of ecological restorationists, as represented by the several thousand members of the Society of Ecological Restoration, would designate as an ecological restoration in a strict sense. The plan is driven by the primary objectives of fire prevention and fire risk reduction to *the built environment*, that is, to the community of Flagstaff. And the means to these objectives are two: so-called *fuels reduction* by thinning and subsequent *controlled burns* (prescribed fire) that consume the slash and accumulated detritus built up over decades of fire exclusion and suppression. The SWFA claim that the Flagstaff urban-wildland restoration model is not a model for restoration of the larger extent of public lands is correct in some ways. Fuels reduction and a continuing regime of prescribed fire are not what wilderness advocates believe are appropriate goals to be achieved within the bulk of forested public land and designated wilderness. In truth, they are means, at best, and limited means, to other goals. (The dispute over these goals is, of course, the nub of Risk 1.)

Interestingly, the SWFA calls for a *natural processes model* as a desirable model for restoration. If you do a comparison/contrast of that model with the bulk of the ecological restoration literature, published by dozens of restorationists over the last ten years, you will find agreement on the basic meaning of ecological restoration. *Strict ecological restoration*, not something else called by that name, entails multiphase, long-term planning and actions that initiate a transformational process leading toward a pre-

disturbance (reference conditions) composition, structure, and functions of the degraded ecosystem if that ecosystem had remained on a natural evolutionary trajectory.

Such a vision for restoration of ponderosa pine and other southwestern forest ecosystems runs through the 1996 publication *Forests Forever!*. This document reflects the days when the wilderness movement had some semblance of order, when diverse stakeholders agreed on the reality of unhealthy forest conditions, goals to be achieved, and the means to achieve those goals.[9] Ecological restoration was used in the context of taking actions that reduced the risks of crown fire while healing forested landscapes and re-establishing the associated biodiversity, rather than using the term to refer to treatments designed to protect the built environment. At that time wilderness advocates were relatively together on their goals for the public lands and the ponderosa forests of the Southwest. Those were the days when people did not fall prey to the dangers George Orwell captures in his novel, *1984*, that is, the misuse and perversion of language. War is not peace, no matter what Big Brother says. At least in part because of semantics we find ourselves in today's mess.

In some ways, the disagreements over the appropriate policies, over scientific facts, and over managerial practices are understandable. There are issues of uncertainty. Of monitoring. Of slippery slopes that begin with forest thinning and end with the reintroduction of commercial forestry. And issues involving the public land management agencies. For example, take the Forest Service. "Please take the Forest Service," some might be thinking. But clearly, there are intelligent, ethically principled, and caring people within the agency. Almost anyone who has worked with the Forest Service on specific issues has found allies, even friends, therein. Yet the history of the Forest Service, especially as interpreted through the lens of wilderness advocacy, is not a pretty picture. The single best account is Paul Hirt's *A Conspiracy of Optimism*. He argues that over the course of sixty years, since World War II, the so-called iron triangle, the coalition of powerful Western politicians, commercial timber interests, and the agency itself, engaged in policy making and on the ground practices that fundamentally degraded "forest health" (ironically, since the forest health policy was rhetorically rather than ecologically driven) while generating huge profits for private interests, all legitimated in the name of the public good.[10]

So what's the upshot for the politics of wilderness? What might be termed the "warranted suspicion" of the Forest Service. Suspicion that insidiously undercuts the claims made by people like Jack Ward Thomas. During his tenure as Chief of the Forest Service, Thomas argued that dramatic changes were occurring in forest management practice, driven partly by laws such as the Endangered Species Act, partly by the emerging theory and practice of ecosystem management, and partly by public demands. "Much of this revision [in forest management]," Thomas

explains, "seems to be a response to public demands for forestry practices that are...more sensitive (realistically or perceptually) to actual multiple use values...than past practices almost solely directed toward profit and job maximization from timber production, harvesting, processing, and utilization."[11] Which is, in some ways, all well and good. But without some sweeping political mandate, such as a National Forest Ecological Restoration Act, and a plan with a timetable for the reform of the agency itself, Thomas's words are basically a pie in the sky exhortation to virtue rather than a meaningful agenda for overcoming the havoc caused by more than a century of forest abuse.

Similar problems of credibility exist for other land management agencies, especially the National Park Service and the Bureau of Land Management. Alston Chase's *Playing God in Yellowstone* is just one case in point. And suspicion spills over onto any one individual, any environmental non-governmental organization, or any organization, that is perceived as co-operating with the Forest Service, the Park Service, or the Bureau of Land Management. Yet suspicion is not always justified. Too often they are anchored in the past rather than the present. After fighting so many battles for so many years with so many allied groups that wanted to do nothing more than cut down the forests and turn them into tree farms, it is hard for "forest war warriors," much like "cold war warriors after detente," to re-assess the possibilities of the present situation.

But the source of conflict and dispute over policy goes deeper than the agencies themselves. We must also consider forest science (silviculture), which environmental groups often term so-called forest science. Forest science has been grounded in silviculture, in the applied science designed more than anything else to extract every last measure of economic value from the forests, as calculated in board feet of timber. In other words, in getting out the cut and growing a new crop. Forest science is clearly one chapter in the modern story envisioned by Frances Bacon and Rene Descartes, the project to become the master and possessor of nature through science. There are schools of forestry all around the nation that are still held in the thrall of the past.

Until forest science is over-determined by conservation biology and systems ecology, and until forest science becomes multidimensional, that is, until it begins to overcome the divide of human ecology and biophysical ecology, then there will continue to be conflict. When we step back from forest science smoke and mirrors we discover that all scientific inquiry, all processes seeking scientific truth, are grounded in value judgments. And these judgments determine the kind of truth that will be found, although not the substance of the truth itself. Silviculturists have been ingenuous, indeed, I would say willfully blind, masquerading behind the veil of objectivity, a thin disguise for narrowly economic objectives that, ironically, in the long run, *make no economic sense* whatsoever, destroying communities

and forests in their wake. Thomas Powers captures this admirably in his wonderful book, *Lost Landscapes and Failed Economies*. Forest science, to borrow Dave Foreman's metaphor, has been at the point of the army engaging in the War Against Wilderness.

LET ME CONCLUDE. I've argued that recognizing Risk 3 is critical to the politics of wilderness. We must acknowledge the reality of anthropogenic landscapes that have been pushed and held far from a natural evolutionary trajectory, landscapes now at risk, and landscapes from which we should de-couple ourselves if we are to dream that they can again become self-willing, wild lands. Set in the context of altering *the trajectories of decline* so that genuinely wild lands, self-willing landscapes, can re-establish themselves, we can then frame *conservation biology* and *ecological restoration* as the keys to the prison door. That is, as culturally adaptive approaches to problem solving, and as guides for healing, for nudging anthropogenic landscapes onto trajectories of recovery. Even so, I must note, restoring our public lands forests will be a task confronting untold complexities and many uncertainties, requiring large initial expenditures of public funds (continuing until natural processes are re-established) and, no doubt, agency reform.

Enter Risk 2, the continuing war on the Big Outside. Again, conservation biology and ecological restoration offer constructive possibilities, actual means to achieve the end of vast tracts of healthy lands, with interconnected core areas sweeping across tens of millions of acres of North and Latin America, home to a full array of indigenous flora and fauna. And this can be done in ways that allow private lands to be "working wildernesses," as they have been called, interconnected with larger, public lands core habitats.

Enter Risk 1, the lack of a united wilderness movement, that is, a political force with its own political house in order, instead of constant contention and conflict. As Pogo says, we've met the enemy and he is us. Conservation biology and ecological restoration are wake up calls to a species that has practiced terrorism against wild nature for more than 15,000 years. It is time for us to become Friends of the Earth. To do so we will have to break out of the *politics of stalemate* and find our way onto the political paths of discursive democracy, to a politics that matches what Wallace Stegner terms the geography of hope. Not possible you say? Such a claim is a self-fulfilling prophecy. We have to do better among ourselves for the good of the forests. We will have to recover a forgotten language.

Consider the last sentence in Alexandra Murphy's *Graced by Pines: The Ponderosa Pine in the American West*: "By the grace of old pines, we enter into our own history, into an understanding of our place and worth in the landscape of the American West."[12] Murphy offers provocative points germane to the politics of wilderness, especially in light of Aldo Leopold's threefold challenge: first, to become plain members and citizens of the land

community, second, to escape the hold of the A/B cleavage through recognition that only some, not all values are subsumable under economic categories, and third, to evaluate our policies and actions on the basis of a land ethic predicated on the integrity, stability, and beauty of the ecosystem.

What we clearly see, when we follow Murphy and enter into our own history in these southwestern landscapes, is that we have pushed our ponderosa forests far, far off their natural course. These ecosystems are on a trajectory of decline that has fundamentally disturbed and disrupted the composition, structures, and processes of the ecosystem type. We also see that any legitimate claim to being a member of the land community is predicated on nudging these ecosystems off the path of continuing decline, even destruction, onto a multigenerational trajectory of recovery.

We know how, basically, to do this. First, through regeneration of the composition, the indigenous floral and faunal suite of species, including the large carnivores. Second, through recovery of structures, especially the clumpy old growth and the open parks. And, finally, through the re-establishment of processes—all hail natural processes—especially the natural disturbance regime of frequent, low intensity fire. By fleshing out these steps, and coming to agreement on plans as appropriate for ecological restoration in its strict sense, as well as effective policies for agency reform, we can begin the long term process of healing ponderosa forests, nudging them towards increasingly natural, evolutionary trajectories.

Which is to say, then, that *the idea of wilderness*, the idea which has inspired me throughout my adult life, the idea of naturally evolved, self-willing lands, ones from which we humans have de-coupled ourselves, is not an anachronism. The idea of wilderness is a beacon of light at the other end of this century, of new possibilities for life on this planet, and thus a powerful alternative to the Myths of Sustainable Development and the New World Order. May the idea of wilderness sustain us all.

ENDNOTES

1. DAVE FOREMAN & HOWIE WOUK, THE BIG OUTSIDE: A DESCRIPTIVE INVENTORY OF THE BIG WILDERNESS AREAS OF THE UNITED STATES (Harmony Books rev. ed., 1992).

2. EDWARD O. WILSON, THE DIVERSITY OF LIFE (1992).

3. EDWARD O. WILSON, THE FUTURE OF LIFE (2002), xxiii.

4. ERNST MAYR, TOWARDS A NEW PHILOSOPHY OF BIOLOGY: OBSERVATIONS OF AN EVOLUTIONIST (1988).

5. DAVID BOHM, CAUSALITY AND CHANCE IN MODERN PHYSICS (1957).

6. Thomas H. Birch, 12 *The Incarceration of Wildness: Wilderness Areas as Prisons*, ENVIRONMENTAL ETHICS 3 (1990).

7. CHARLES WILKINSON, FIRE ON THE PLATEAU: CONFLICT AND ENDURANCE IN THE AMERICAN SOUTHWEST (1999).

8. FRANK GOLLEY, A HISTORY OF THE ECOSYSTEM CONCEPT IN ECOLOGY: MORE THAN THE SUM OF THE PARTS (1993).

9. SOUTHWEST FOREST ALLIANCE, FORESTS FOREVER! A PLAN TO RESTORE ECOLOGICAL AND ECONOMIC INTEGRITY TO THE SOUTHWEST'S NATIONAL FORESTS AND FOREST DEPENDENT COMMUNITIES (1996). The SWFA advocates four primary goals. These goals (restore southwestern forests to fully functioning ecosystems, provide jobs for local economies, plan for future generations, and diversify and stabilize) are consistent with the SER's expanded notion of ecological restoration. *Forests Forever!* also states strong and largely warranted criticism of U.S. Forest Service policies. *Id.* at 29.

10. PAUL HIRT, A CONSPIRACY OF OPTIMISM: MANAGEMENT OF THE NATIONAL FORESTS SINCE WORLD WAR TWO (1994).

11. Jack Ward Thomas, *Foreword, in* CREATING A FORESTRY FOR THE 21ST CENTURY: THE SCIENCE OF ECOSYSTEM MANAGEMENT xi (Kathryn A. Kohm & Jerry F. Franklin eds., 1997).

12. ALEXANDRA MURPHY, GRACED BY PINES: THE PONDEROSA PINE IN THE AMERICAN WEST 110 (1994).