

RESOLUTE BIOCENTRISM: MANAGING FOR WILDNESS IN NATIONAL PARKS

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The organizing myth of America's national parks is wilderness. It was forged in the debates between John Muir and Gifford Pinchot as the 19th Century wound down. This myth had little to do with the actual establishment of the first national parks: Yellowstone, Yosemite, and Sequoia. These had more to do with protecting spectacles of nature—geysers, waterfalls, and huge trees—and promoting them as the virtuous attributes of a young nation lacking the constructed marvels of the Old World. This mandate for "object protection" is enshrined in the National Park Service Act of 1916: "To conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." In fact, the wilderness myth so clearly articulated by Muir gestated as policy for the better part of a century before its emergence as the basis upon which national parks (i.e., the large, mostly-western, nature parks) are now managed.

The unifying principal of national park management (of "natural areas") today is the perpetuation of native ecosystem elements and processes. That is, keep all the [native] species; seek the free play of fire, water, wind, predation, decomposition—the verbs in the ecosystem; fend off alien organisms; and then permit the ecosystem to sort itself out. As management policy, it is rarely if ever fully expressed, but it has been a goal at which managers could aim (Graber 1983).

The passage of the first Wilderness Act in 1964 formalized and enshrined the notion of wilderness

into law. In subsequent years, the bulk of the lands in the large western "natural" national parks, much of the unroaded portions of national forests and Bureau of Land Management lands, and some eastern parklands, became legal wildernesses. The law prevents nearly all mechanized use and development of Wilderness, but in most cases permits grazing, hunting, and fishing where these activities were already permitted. Over the years the practice of "wilderness management" has evolved in the federal agencies, occupying itself with such issues as social carrying-capacities, waste-handling techniques, trail design, wilderness fire management, minimum-impact camping, acceptable practices in rock climbing, and the appropriate uses of helicopters over and in wildernesses.

Wilderness has taken on connotations, and mythology, that specifically reflect latter 20th Century values of a distinctive Anglo-American bent. It now functions to provide solitude and counterpoint to technological society in a landscape that is *managed* to reveal as few traces of the passage of other humans as possible. Contemporary wilderness visitors are just that. Unlike the hunters and gatherers who preceded them on the land, moderns who enter wilderness do so not to live on the land, nor to use it, but rather to experience it spiritually. The ecosystem is defined on its own terms, but this wilderness is a social construct.

Protecting the spiritual values of wilderness for its users has been the principal aim of wilderness managers. These are largely "human-on-human" effects: social crowding, conflicts between hikers and stock users, litter, feces, camp fire rings. They

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affect how visitors experience wilderness but have a minimal effect on wild ecosystem functions. For the most part, neither managers nor visitors are aware of the ways in which the Wilderness landscape has been altered by former aboriginal activities (such as hunting, clearing, burning, agriculture), past and present local landscape alterations (game extinctions, logging, alien introductions, riparian destruction by grazing), or system-wide anthropogenic forces (habitat fragmentation, air pollution, suppression of native fire regimes, climate change).

FIRE MANAGEMENT IN SEQUOIA: THE INDIAN DILEMMA

The evolution of fire management in the national parks recapitulates in many ways the evolution of the park wilderness principle. Ecologists recognized early in the century that the establishment and maintenance of some plant species and vegetation types depended upon periodic fire. Among national parks, this is particularly obvious in the Everglades in the Southeast where the pine-sawgrass community requires frequent fire, and the Sierra

Nevada—Sequoia, Kings Canyon, and Yosemite, vegetation from foothill chaparral to subalpine forests show fire dependence. Nonetheless, the larger social assumption that fire, because it destroys life and property, should be suppressed at all costs determined how it would be managed in national forests and parks until the 1960s.

At that time in the Sierra Nevada, scientists and then park managers began to realize that in the mixed conifer forests of the Sierra Nevada, fire suppression had prevented the reproduction of the Giant Sequoia (*Sequoiadendron giganteum*), and gradually led to the dense ingrowth of shade-tolerant species such as White Fir (*Abies concolor*) that ultimately would transform the naturally frequent and thus relatively cool Sierran fires into fearsome crown fires that could destroy the ancient monarch Giant Sequoias themselves. The practice of intentional burning to reduce fuel accumulations—"Prescribed Management Fire"—was born. Ring scars in old Giant Sequoias (Kilgore and Taylor 1979) suggested that, in the most recent millennium at least, the high frequency of fires could not be explained by the contemporary

ignition rate from lightning. They suggested that the extra fire had been produced by aboriginal burning.

During the 1970s and 1980s, Park managers and scientists struggled to define fire management—a combination of Prescribed Management Fire, "Prescribed Natural Fire," (lightning-caused fires allowed to burn under a set of constraints) and the suppression of all other ignitions, natural or anthropogenic, that failed to occur "under prescription" (Graber 1985). There were several difficulties: In the beginning (Leopold et al. 1963), the purpose of the program was to restore a more open forest structure and stimulate reproduction of the Giant Sequoia, both of which were presumed to have suffered severely during a century of fire suppression, while at the same time reducing dangerous levels of fuels (i.e. living and dead wood) that had accumulated during a century of fire suppression. These goals were largely concerned with forest structure and aesthetics, and may reflect an instinctive human preference for "open and park-like" forests over "dog-hair thickets of White Fir (Leopold et al. 1963), as well as for the heroic Giant Sequoia—after which the park had been named—over the "piss-fir" despised by foresters for its inferior wood. The work of Kilgore and Taylor (1979), Lewis (1973), and others suggested that this "desired" forest state would require supplemental ignitions to substitute for the centuries of aboriginal forest burning.

An early challenge to straightforward prescribed burning was presented by Bonnicksen and Stone (1982), who argued that burning a forest that possessed a greatly-altered structure on account of a century of fire suppression would lead to new artifices of both structure and fire regime. Their basis of their objection was that fire should be viewed as a tool to create a structural result—in their case, the forest that would have been present had not a century of fire suppression intervened. A second objection was introduced by Barnes (National Park Service files), who objected to the aesthetic changes in Giant Sequoia stands, especially blackened bark, produced by prescribed fire. His position was based on visitor perceptions of the park's "prime resource," the monarch bigtrees.

More fundamental than these objections, however, were conceptual weaknesses in the prescribed fire dual objectives of fuel reduction (i.e. safety) and improved forest structure. These became apparent as the technology of prescribed burning improved and

the paleoecology of the Sierra Nevada became better understood (Anderson 1990, Graumlich 1993, Swetnam 1993). Mimicking aboriginal/lightning fire patterns presented two apparent dilemmas: Indians had been present in the Sierra for less than 20,000 years, a far shorter period than the present array of species; moreover, as cultural creatures, the Sierran Indians and their landscape-altering practices no doubt were in a flux of substantially greater rapidity than ecological time. Had they remained undisturbed by Europeans, it was unlikely that they would have continued pursuing deer, collecting acorns, and lighting fires for millennia to come.

The second problem was climate change. Revealed indirectly through tree-rings (Graumlich 1993) and pollen cores (Anderson 1990), it had been expressed at the millennial scale as dramatic variations in the dominance of species and even physiognomic groups at the present montane sites of mixed-conifer forest, and at the century scale as equally-dramatic differences in fire intensities and frequencies. Given these dynamic forces, what was the objective of administrative burning? The logic of attempting to simulate a fire regime produced by a dynamic aboriginal culture operating in a dynamic climatic regime began to fade by the late 1980s (Parsons et al. 1986).

Nonetheless, some sort of fire management decision was required: The contemporary park forests were changing in ways reflecting the intrusions of industrial culture. Fire-dependent species were declining while the forests as a whole were becoming more flammable and dangerous, and less attractive. The course selected was to use prescribed management fire as a corrective measure only—to reverse the fuel accumulation of the past century, and then to permit natural forces—lightning and climate—to determine fire regime and forest structure henceforward. Thus the hard decisions would be left to nature, and the National Park Service would be managing for wildness, not some anthropogenically-determined desired state. Yet to be resolved are developing conflicts between smoke-producing Sierran fire and regional air quality standards. In addition there is the growing suspicion that the important events in the formation of Sierran vegetation architecture naturally occur not during frequent low-intensity fires, but when the century-scale combinations of weather and vegetation produce large, hot, and dangerous fires that neither fire managers nor society are ready to accept. Most worrisome, is that the parks' fire management

program has yet to re-establish a fire frequency even 10% of the rate recorded in tree rings.

THE BIODIVERSITY PROBLEM

Fundamental to the notion of a wilderness park is that it possesses its aboriginal array of native biota and associated ecosystem processes. American national parks have, in the latter part of this century, come to serve as its pre-eminent nature reserves; most International Biosphere Reserves in this country are also national parks. The nature these reserves are intended to protect is the indigenous biological diversity of the region. Yet increasingly, national park ecosystems are being transformed by the introduction of alien plants and animals, and secondarily from the extinctions of native populations as a result of those alien introductions. As the following several examples illustrate, not only is local biodiversity being swamped, but the management keys to retarding its loss conflict with the park notion of wild nature.

In Shenandoah National Park in the Virginia Appalachian Mountains, pests and pathogens from Eurasia have devastated the populations of American Chestnut (*Castanea dentata*), American Elm (*Ulmus americana*), Eastern Hemlock (*Tsuga canadensis*), and Eastern Dogwood (*Cornus florida*), while the Gypsy Moth (*Lymantria dispar*) continues to weaken and kill a variety of oaks and other hardwood trees. Stresses induced by ozone and acidic pollutants may be potentiating these epibiotics. This loss of a substantial portion of the dominant native flora has reduced the populations of birds and mammals depending upon the fruits and seeds, and cover these trees once produced. And of course the impacts ramify through insect populations, those that depend upon them, and so on. Parallel, although less severe losses are taking place in Great Smoky Mountains National Park, in the southern Appalachians. Although these ecological changes are acknowledged by park management to be a loss of much of the wild character of the areas, no solutions present themselves.

The Sierran national parks, Yosemite, Kings Canyon, and Sequoia, have suffered comparatively little anthropogenically-induced species turnover. (Macdonald et al. 1988). One notable exception is the foothills below about 1,500 m., where—as for most of the rest of California low-elevation wildlands—Eurasian annual grasses and some dicots

have virtually replaced the native herbaceous species. The weedy annuals, (e.g. Wild Oat, *Avena fatua*; Cheatgrass, *Bromus tectorum*; Filaree, *Erodium cicutarium*) were largely introduced and established during the mid-19th Century period of intensive cattle and sheep grazing, including the present parks, that overwhelmed native herbs unadapted to intensive grazing. There is reason to suspect that these introduced annuals have changed fire frequencies, interfere with recruitment of the native woody plants with which they occur, and have had a significant impact on the birds, small mammals, and reptiles indigenous to the foothills. There are no practical means yet known to remove permanently these aggressive weedy aliens over large areas, nor is there good information on what the native herbaceous layer consisted of, should an opportunity arise to restore it.

A similar situation obtains on Channel Islands National Park, where long and continuing grazing has destroyed the native vegetation to the point where many endemic plant species have been reduced to small numbers of individuals. Elimination of grazing might be sufficient to permit re-establishment of some healthy native vegetation, but not without the control of the aliens. Because they are islands, however, the Channel Islands may lend themselves more readily to attempts at extirpating the weedy annuals.

The large Hawaiian national parks, Hawaii Volcanoes and Haleakala, have experienced substantial replacement of the native flora and fauna by introduced species, a process that continues at a rapid pace. Avian malaria carried by accidentally-introduced mosquitoes has eliminated most of the native avifauna except in the mountains, while dozens of alien bird species have been introduced intentionally or escaped from captivity. Alien herbs, shrubs, trees, and vines (e.g. Christmasberry, *Schinus terebinthifolius*; Strawberry guava, *Psidium cattleianum*; Blackberry, *Rubus argutus*.; Banana poka, *Passiflora mollissima*) are now a significant fraction of the parks' biomass, leading to continuing efforts to find pests and diseases that can be introduced to control them (Smith 1989). Introduced bunchgrass (*Andropogon* spp.) on Hawaii has led to a dramatic increase in the frequency and range of lightning-produced fires, further damaging native plant and animal species not adapted to burning. Although goats and sheep that once nearly extirpated the famous native silversword from Haleakala (*Argyroxiphium sandwicense*) have been largely removed, pigs, rats, and mongoose (*Herpestes*

auropunctatus) introduced to kill the rats have decimated ground-nesting birds and, in the case of the pigs, spread the seeds of alien plants while further reducing many of the edible natives (Stone 1989). Fencing combined with aggressive snare-trapping of pigs in both parks has recently led to significant local restoration of native forests, but this controversial practice—strongly opposed by animal-rights groups—will likely have to be sustained indefinitely if it is to maintain the ecological benefits achieved.

Although both Hawaii Volcanoes and Haleakala were established as national parks principally for their physical features—volcanoes—and, in the case of Haleakala, the Silversword as well, their value as wild nature preserves was recognized early on. Yet the rate of anthropogenically-induced biotic change in these parks is so rapid that ecological relationships among natives and recent arrivals have only begun to sort themselves out. In the meantime, "weediness" is a striking feature of many areas as a few new aliens dramatically overwhelm the locals. Ironically, perhaps, this is not entirely a novel process. About 25 species of plants were brought by the original Polynesian settlers over 1000 years ago, as were dogs, pigs, and rats. The large native Hawaiian birds appear to have been hunted to extinction by the new arrivals.

Park management in Hawaii has expended millions of dollars to contain the spread of the most aggressive recent aliens, and to exterminate new arrivals. Both the Brown Tree Snake (*Boiga irregularis*) that devastated Guam's native birds, and the European Hare, famous for its denuding-abilities on tropical islands, have been intercepted in recent years. With the exceptions of goats removed from both parks, and pigs from a portion, however, the ecological turnover in favor of aliens has continued. Up to one-half of all endemic Hawaiian plants are threatened with extinction, representing a vast loss of global biological diversity. Granted, the great infusion of plant and animal species from elsewhere—including most of the ornamental tropics admired by island visitors—has contributed to a high local species diversity on the islands. But as the islands and their national parks lose local species in favor of cosmopolitans, planetary biological diversity is eroded.

In summary, for each of the cases above, human activities have led to losses of native biota and—in most places—their replacement by cosmopolitan and

human-adapted species from elsewhere. This process has eroded the "distinctiveness of place" of each park and diminished its native wildness in favor of a homogeneous greenscape. To most park visitors who have little familiarity with nature, the changes are unobserved and they experience the park as "nature," viz. escape from industrial urban life. To varying degrees the loss of local biodiversity and wildness is reversible, but only by yet another level of aggressive human intervention—this time intentional and often quite visible to park visitors. The alternative, however, is to acquiesce and accept the progressive degeneration of pre-Columbian wild systems in the national parks and their replacement by systems ever more closely resembling what exists outside the parks. As Soulé (1990) observes, the rapid anthropogenic reconstruction of ecological communities is global, and presages a collapse of the existing paradigms of conservation biology upon which modern park management has come to depend.

THE CONUNDRUM OF CLIMATE CHANGE

Bill McKibben, in his book *The End of Nature* (1989), posits that since we humans have altered planetary processes by the additions of greenhouse gases, stratospheric-ozone-depleting gases, and ubiquitous toxins, "nature" no longer exists: All life systems reflect anthropogenic influences. Even if this position is too extreme, it identifies a significant underlying paradox in the future management of national parks as wild systems that also function as preserves of native biological diversity. Changes in climate will lead to changes in the suites of species—especially plants—adapted to a given locale. Parks are increasingly becoming ecological islands as the landscapes that surround them are converted to agriculture or development. Thus while climate change can be expected to lead to the local extirpation of species in parks, the invasions of many native "replacement" species—those adapted to the new climate—will be blocked by isolation. The intentional introduction or maintenance of native species could in some cases be used to facilitate the introduction of organisms that would have arrived on their own before habitat fragmentation, and to preserve the survival of other species that would no longer be sufficiently adapted to persist and reproduce under the new climatic and ecological conditions. Such intensive management is *likely* to be necessary to preserve species of plants and animals that already are local in distribution.

To manage national parks in this way emphatically abandons the contemporary ecologically-based notion of wildness. We indeed become trapped into caring for the rest of life in a transformed world. The alternative is to permit life forms to sort themselves out on their own. We could then expect rapid climatic change to lead to a significant loss of biological diversity through extinction and the advantaging of cosmopolitan species, *taking place under conditions created by humans—McKibben's end of nature*. Anthropogenically-induced global change (not simply climate, but also such changes as habitat fragmentation and introduction of weeds and pathogens) has eliminated the possibility of treating national parks as wilderness reserves that can sustain themselves as islands in time. So the dilemma is this: Park ecosystems are changing on account of global-scale anthropogenic forces. That acknowledged, there is no longer a protected wild reserve to impede local-scale management of nature. But what shall be the intent of such management? The most obvious would be to attempt to reverse or mitigate human-caused perturbations: Light fires where the native fire regime has been disrupted; reintroduce extirpated species; eliminate alien species. In practice, however, these levels of biotic management are frequently too expensive, impractical, or introduce yet more artifice. Ecological engineering, however benign, deprives park visitors (and distant supporters) of the subjective experience of "nature on its own terms." So what, then, is a national park?

NATURAL VERSUS CULTURAL LANDSCAPES

National parks are established not only for natural features, but for cultural ones as well. For many decades, the National Park Service presumed a relatively straightforward dichotomy between "natural" parks—generally the big wildernesses, and smaller "cultural parks" that featured an historic battlefield or old, historically-significant buildings in the East, or aboriginal archaeological artifacts in the West. The increasing sophistication of park managers and changes in the law have gradually led to management for both natural and cultural resources in many national parks.

A relatively new concept in cultural resources management is the "cultural landscape." For example, the large grassy clearing known as Cade's Cove in Great Smoky Mountains National Park is not

self-sustaining. It is maintained by burning, clearing, and grazing to maintain and illustrate the conditions created by early settlers in the area. Of course, most of the Great Smoky Mountains was logged and farmed until the Chestnut Blight and subsequent establishment of the park forced its inhabitants to relocate and most clearings were invaded by trees. There is presently a tacit understanding in the park that most of it will be permitted to return to forest—although not the forest that preceded either aboriginal or European settlement—while small areas will be artificially maintained in a condition simulating white settlement of the 18th and 19th Centuries.

As research continues to reveal the many ways in which "wild" park landscapes were transformed, and may continue to be, by activities of aboriginal or European people, there arises a conflict about the most appropriate management scheme for landscapes: Are they to be quasi-natural landscapes absent humans, in which as many of the original ecological pieces and processes as possible will be preserved or restored, or will they reflect some moment in their cultural history: Indians, cowboys, hippie commune? Among recent and serious proposals by government and academic cultural resource specialists has been a recommendation to preserve traditional campsites in park wilderness, in direct opposition to attempts in recent decades to "naturalize" wilderness by eliminating as many traces as possible of human passage and occupation. Another proposal has been to preserve as a cultural landscape some of the vast, denuded stretches produced by many years of cattle-grazing on one of the Channel Islands, as well as the cattle themselves, instead of eventually eliminating grazing and attempting to restore, to the extent possible, the pre-Columbian vegetation presently confined to small refugia.

This expanded vision of cultural resources overlaid on an otherwise (human)-unoccupied landscape represents an unresolved clash of visions that plays itself out daily among the resource managers of the National Park Service and other wildland management agencies. While the culturalists have effectively dispelled the myth that park lands are unaffected by the past affairs of humankind, they raise the possibility—fearsome possibility—that there then is no wild nature in parks: Parks are constructions. This doesn't prevent a kind of park that joins the preservation of biological diversity with the preservation of cultural artifacts: Compromise is

possible. But such a place recedes ever further from wilderness.

WHAT ARE PARKS FOR?

In North America, the wilderness parks and other designated wildernesses are the closest thing we have to markers against which we can judge the world we have invented nearly everywhere else. They represent places where our species has exercised restraint, where we have resisted the wholesale conversion of material and energy to our own purposes. Whatever the "rightness" or "wrongness" of the civilization we continue to invent, wild nature and national parks represent—however imperfectly and however dependent upon our continued care—ecological anchors to our own and the planet's past.

Managing national parks from "nature out" instead from "humankind in" may well be a fiction. The trouble with managing biocentrically is that we don't know yet what really constitutes ecosystem management, although we now are striving to achieve it (Agee and Johnson 1988). But it is nonetheless the most conservative approach during a period of great uncertainty. If we strive to preserve all the parts, the native ecosystem elements and processes, society has the opportunity for choices in the future. With wisdom and improving scientific understanding, we may well be able to use parks to preserve most of the parts, while they continue to provide spiritual solace for as long as our society finds value in wild nature.

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