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Ecological Restoration in Wilderness: Natural versus Wild in National Park Service Wilderness

Introduction

The Wilderness Act of 1964 (Public Law 88-577) derived substantially from ideas first proposed by Howard Zahniser in the 1940s when he was executive director of the Wilderness Society (Brower 1964). It was a piece of legislation that, by the time of its enactment into law, had been intensely discussed, reviewed, and edited both by the wilderness community and by Congress. Unlike many laws, its final language was carefully crafted, including its ambiguities. However, like many other laws, it is a prisoner of its time: It is limited to an understanding of the world that existed in 1964. Both the degree of our understanding and the world itself have changed substantially since then.

Two key elements of the Wilderness Act are the phrase "wilderness character," and the word "untrammeled." This paper proposes that *ecological restoration*, which is defined here as human activities intended to take landscapes toward a more natural condition, is often both appropriate and legal in designated wilderness within the National Park System. However, the nature of that restoration and the means by which it is achieved are constrained by the Wilderness Act.

Wildernesses are Wild to Varying Degrees

In *The End of Nature*, Bill McKibben demonstrated that no places on Earth are entirely free of anthropogenic influence (McKibben 1989). Industrial gasses, and their effects on climate and radiation, are omnipresent. Transportation systems have transplanted organisms of all kinds to all but the remotest corners of the planet, where they have not infrequently decimated some of the native inhabitants. Nonetheless, McKibben would have been more accurate had he conceded that nature still exists, but that it is, to varying degrees, less wild.

It was an important organizing principle of America's national parks, as well as of the American wilderness system, that they had captured primeval landscapes unaltered by human activities (Leopold et al. 1963). It is now generally accepted among both ecologists and anthropologists that human beings began making wholesale alterations in their new North American home shortly after they arrived more than ten thousand years ago (e.g., Martin 1986; Martin and Klein 1987). These changes

included the extirpation of some large mammal species, and the modification of vegetation over large areas by the use of fire (Stewart 1963).

Moreover, the traditional notion that wild landscapes were stable or homeostatic over millennia, even in the absence of human beings, has been replaced, in ecology, by the paradigm of change, often catastrophic, induced by change in climate or the arrival of new species that change competitive relationships. Fire, or less commonly volcanism or seismic activity, regularly "reset" some wild landscapes.

Wildernesses, like other reserve lands, are parts of larger systems. They lie within a landscape matrix that is, to varying degrees, altered, and which in turn affects the functioning of ecosystems in wilderness. Organisms, chemicals, light, sound, and many ecosystem processes such as fire move into wildernesses from those adjacent landscapes. Many of the smaller wildernesses in the eastern United States are merely ecosystem fragments.

Many wildernesses have lost native species, particularly large carnivores. Non-native plants and animals have become established nearly everywhere except the polar regions. Many wilderness areas contain pre-existing hydrological diversions, or are downstream of them. Fire regimes continue to be altered both by suppression and by anthropogenic ignition from surrounding areas, and often by the political or practical necessity of controlling fire on the wildernesses themselves. The sounds of aircraft and motor vehicles penetrate deeply into many — even large — wildernesses, while the lights of large cities alter the night sky for scores of miles around them. Lastly, wildernesses, like the rest of the planet, are being altered—in some cases radically—by anthropogenic climate change.

Ecological Restoration: An Increasingly Critical Tool for Nature Conservation

At a time when wildlands continue to be converted to human use, and those that remain become progressively more compromised, the restoration of ecosystems has become an important tool in nature conservation. Removing alien elements, reintroducing extirpated species, aiding the recovery of native ecosystem processes (e.g., fire and hydrologic regimes) to more natural parameters, restoring native landforms, and mitigating anthropogenic stressors where possible are all actions that potentially lead to more natural ecosystems and better preservation of native biodiversity. The National Park Service (NPS) has, in recent decades, increasingly turned to taking compromised lands and returning them to more natural and—often more homeostatic—conditions. This is well represented in the alien plant and animal removals from Hawaii Volcanoes and Haleakala national parks to restore native forest systems, and the removal of roads, restoration of landforms, re-vegetation of stream banks, and thinning of recently cut-over redwood forests in Redwood National and State Park. On a broader scale, programs to restore native fire regimes or their surrogates, and teams that identify and remove invasive alien plant species, are now

widespread in the National Park System.

Restoration activities, because of their manipulative nature, have the potential for unintended consequences less desirable than the pre-restoration condition. Some widely accepted attributes of a successful ecological restoration project are that it:

- Is based on accepted scientific principles;
- Utilizes place-based information;
- Selects a clear, rational, and accepted target condition;
- Is attainable and sustainable;
- Acknowledges that it is experimental; and
- Builds in monitoring and adaptive management.

The Wilderness Act

With regard to both the activities of ecological restoration and the long-term outcomes of those actions, the Wilderness Act has a number of relevant passages. Some of its most important language includes the following (emphasis added):

> *Section 2 (c):*
> "A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its *community of life are untrammeled by man....* An area of wilderness is further defined to mean ... land *retaining its primeval character and influence,* without permanent improvements ... which is protected and managed so as to preserve its natural conditions and which ... generally *appears to have been affected primarily by the forces of nature,* with the imprint of man's work substantially *unnoticeable...."*

These words clearly reflect an earlier, romantic notion of scenic primeval landscapes, with the importance of present *appearance* perhaps greater than the reality of past land use and natural history (Franklin and Aplet 2002:272). The Wilderness Act specifically permits hunting and grazing except where otherwise prohibited: The degree of "trammeling" imposed by intense cattle and sheep grazing in many (non-NPS) wildernesses of the Pacific and Intermountain West is profound both ecologically and visually.

> *Section 4 (a)(3):*
> "... the designation of any area of any park, monument, or other unit of the national park system as a wilderness area pursuant to this Act *shall in no manner lower the standards evolved for the use and preservation of such park,* monument, or other unit of the national park system in accordance with the Act of August 25, 1916, the statutory authority under which the area was created, or any other Act of Congress which might pertain to or affect such area...."

This language concedes that wildernesses in the National Park System are nonetheless governed by the same statutory authorities as other NPS lands, and that NPS lands typically benefit from a higher level of preservation than those of the other three wilderness management agencies. The arguable (or litigable) point, however, is whether that higher standard indicated would call for interven-

tion into disturbed wilderness ecosystems, or refraining from such activity.

Section 4 (b):

"Except as otherwise provided in this Act, each agency administering any area designated as wilderness *shall be responsible for preserving the wilderness character of the area* and shall so administer such area for such other purposes for which it may have been established as also to preserve its wilderness character. Except as otherwise provided in this Act, wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, *conservation,* and historical use...."

Here there is an apparent conflict between the agency's responsibility for preserving *wilderness character* (which was defined earlier) and devoting wilderness to conservation as one of its public purposes. Taken as a whole, however, it would appear that wilderness character takes precedence over conservation.

Section 4 (c):

"Except as specifically provided for in this Act ... there shall be no permanent road within any wilderness area designated by this Act and, *except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act ...* there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area."

This section speaks directly to the means by which ecological restoration may or may not be achieved. Yet if the purpose of the act includes conservation and its administration, and if that, in turn, requires otherwise unsanctioned devices or structures, to what extent is such restoration activity permitted? Ultimately, such determinations are made through agency policy, and sometimes litigation.

The National Park Service is guided in this area by Director's Order 41: Wilderness Preservation and Management. The reference manual for DO-41 says the following:

6.3.7 Natural Resources Management:

"The principle of non-degradation will be applied to wilderness management, and each wilderness area's condition will be measured and assessed against its own unimpaired standard. Natural processes will be allowed, in so far as possible, to shape and control wilderness ecosystems. Management should seek to sustain natural distribution, numbers, population composition, and interaction of indigenous species. Management intervention should only be undertaken to the extent necessary to correct past mistakes, the impacts of human use, and the influences originating outside of wilderness boundaries. Management actions, including restoration of extirpated native species, altered natural fire regimes, controlling invasive alien species, endangered species management, and the protection of air and water quality, should be attempted

only when the knowledge and tools exist to accomplish clearly articulated goals."

This policy language very clearly supports ecological restoration. There is no legal nor regulatory barrier to ecological restoration, at least in principle. On the other hand, a reference to appropriate vs. inappropriate tools is not provided.

Can Unnatural be Wild?

It has been popular in recent years to contrast "natural" with "wild." Both Cole (2000) and Landres et al. (2001) find a significant difference between these words, particularly as applied to wilderness, while Turner (1996) unapologetically and passionately argues that "wild" precludes intentional human intervention. On the other hand, the author has argued (Graber 1985, 1995), as did McKibben (1989), that the pervasive and insidious magnitude of human activity has largely rendered the distinction moot. This is particularly true in many of the small, eastern lands that Congress has set aside as designated wilderness. There is, for example, very little that is wild about Cumberland Island Wilderness on Cumberland Island National Seashore, which includes roads, motor vehicles, many introduced species, and several key species extirpated. Yet through time, if this were desired, alien species could be removed, natives species reintroduced, a natural fire regime re-started, and human construction removed. Surely the product would be closer to the wild Cumberland Island that its first European settlers saw. Similarly, other small pockets of nature, albeit wounded nature, are wildernesses in name only. They require urgent intervention and long-term maintenance simply to preserve what remains—and often what remains is quite irreplaceable. To put it another way, their value as managed reserves of biodiversity exceeds their value as "wilderness."

One of the largely unintended flaws in the Wilderness Act is its ecological naiveté from a 21st-century perspective (a naiveté shared by most legislation and even much science of the period viewed with today's hindsight). The *appearance* (Sec. 2[c])of wildness is in the eye of the beholder: An ecologist or scientifically educated naturalist sees anthropogenic alteration where someone not so schooled does not. The reality is that the landscape is compromised. The elegant use of "untrammeled" in the act refers to *intentional* control or manipulation of the "community of life" (Zahniser 1963; Scott 2001). But ecological consequences are the same regardless of the degree or distance of intention. In his passionate polemic, *Guardians not Gardeners*, Zahniser both failed to understand how altered many of his beloved wildernesses already were, and failed to recognize that walling them off with a law would not protect them from further deterioration. In his powerful and beautiful essay, "Thinking Like a Mountain," Aldo Leopold (1949) discussed the loss of wildness on a mountain when the last wolf had been shot. Surely he would have approved of putting it back.

The pace of landscape change in the United States and the rest of the world is accelerating. So is human appropriation and alteration of the

very air and water that is the stuff of life. Yet locally, and perhaps only temporarily, those changes can be largely stopped, even reversed, with sufficient knowledge and effort.

It is likewise important to remember that wilderness landscapes have always been subject to both natural and anthropogenic changes. The disturbances introduced by ecological restoration—the loss of wilderness character—need not represent permanent loss.

A Way to Think About Ecological Restoration in Wilderness

In wilderness, appearances do matter. There are some real trade-offs on NPS lands between the conservation of nature and the intent of the Wilderness Act. Both have value and importance to humanity and the future of planet Earth. Determining how to reconcile the two can be assisted by a cost/benefit analysis. I have attempted to classify common kinds of ecological restoration activities into three groups, representing the degree—in magnitude and longevity—to which wilderness character is compromised. None of these activities, in my opinion, is necessarily precluded by statute, regulation, or policy. However, by the time one is considering the activities listed in Class III, one must carefully weigh the benefits against the significant impacts on wilderness character, and consider whether the proposed restoration activity is sufficiently beneficial to outweigh the impacts on wilderness character. An excellent and far more comprehensive discussion of the management and restoration of wilderness ecosystems is provided by Franklin and Aplet (2002).

Class I: Short-term wilderness disturbance, long-term wilderness character enhancement. This class includes:

- Reintroduction of self-sustaining native species;
- Extirpation of invasive alien species;
- Restoration of natural fire regimes; and
- Restoration of natural hydrologic regimes.

This class of activity entails one-time reversals of anthropogenic changes that, once accomplished, are self-sustaining. Users of wilderness might well encounter restoration activities that would typically result in impacts to wilderness character lasting a season to perhaps several years. Some of this, such as dam removal, might require heavy equipment. Upon completion, however, traces of the restoration activity would be extinguished over a short period of time, while the benefits of "re-wilding" to wilderness character would be long-term.

Class II: Long-duration or recurring entry, with benefits and costs to wilderness character. This class includes:

- Periodic control of persistent introduced species;
- Indefinite extent of planned ignitions;
- Reintroduced species requiring continuing support; and
- Mitigation of acidified waters.

Many ecosystems that include wildernesses suffer anthropogenic disturbances for which we lack the knowledge, the legal authority, or the financial resources to correct permanently

at the present time. For example, introduced weedy plants often invade natural areas from adjacent lands, and require regular removal and frequent monitoring. Periodic liming of some eastern streams mitigates acid precipitation and permits continued survival of native fish and amphibians that otherwise would be entirely eliminated from the ecosystem—at least until the source pollution is eliminated. Pyrophytic ecosystems that lie adjacent to developed lands may no longer receive sufficient natural fire ignitions, or those ignitions are no longer politically acceptable; however, periodic managed ignitions may accomplish most of the objectives of maintaining the natural structure and composition of the native biological community. Small, anthropogenically isolated populations of large mammals, such as mountain sheep, may lack the demographic or genetic size for long-term viability. However, periodic infusions of additional animals can help assure survival. These nature-maintenance activities reflect the sad reality that many designated wildernesses, and other kinds of nature reserves, are simply too small or isolated to sustain their full suite of ecosystem functions without intervention. The National Park Service manager must ultimately weigh the restoration benefits to the ecosystem against the impacts to wilderness character.

Class III: Support of laws or NPS policies; don't directly enhance wilderness character. This class includes:

- Habitat modification for endangered species;
- Regulation of predator or prey numbers when an area is too small for natural regulation or natural controls have been lost;
- Control of native pests or dangerous species to protect life or property outside wilderness; and
- Removal of native organisms in support of restoration elsewhere.

These activities represent severe impacts on wilderness character. They clearly violate the intent of the Wilderness Act. Some of these, such as control of pests, reflect the incapacity of some landscapes designated as wilderness to function as such either ecologically or politically. On the other hand, some severe interventions, such as the removal of native organisms for restoration elsewhere, illuminate the fundamental and unavoidable connectedness between many wildernesses and their surrounding, more modified landscapes. Ultimately, decisions in this category must move to a public forum for their ultimate resolution.

Wilderness is a (profound) social construct. Nature simply *is*. Cultural expectations of wilderness will continue to evolve. A personal interaction with wild nature may or may not continue to be an important component of human life. But for the indefinite future, aggressive actions will be required to preserve even a semblance of the elements that comprise natural ecosystems. Let's not throw away any parts.

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