Managing the wild: should stewards be pilots?

Peter Alpert
University of Massachusetts, Amherst, MA

Aldo Leopold (1949) once described shooting a wolf and watching "a fierce green fire dying" in its eyes. As this fire went out, it lit Leopold's own passion for conservation. Nevertheless, as more humans settled, the wolves disappeared. In 1995, wildlife biologists restored wolves to the American Rockies, where Leopold had worked, capturing them in Canada and releasing them in Yellowstone National Park. In a world increasingly dominated by humans, the killers have become the keepers of the green fire, the managers of the wild.

Managing the wild is a paradox. If wildness is "freedom from control" (Whitesell 2001), then managing the wild means controlling the uncontrolled. There are two ways to resolve this contradiction. One is to leave things unmanaged, the other is to accept the contradiction as a necessary and tolerable evil.

There are practical arguments for leaving wild places unmanaged. First, people may not know how to manage natural systems effectively. For instance, to increase the elk population, managers at Yellowstone fed them and killed their predators (Wright 1999). Because this resulted in more elk than the range could support, the managers began to kill elk. Finally, a policy of "natural regulation" was adopted, leaving the elk to live and die in the renewed company of the wolves. In 1988, the largest fires in the history of any national park burned through Yellowstone. Their size and intensity were unexpected, but so was the swift recovery of plants afterwards. Artificial attempts to restore the forests were "generally unnecessary and possibly even counterproductive" (Turner *et al.* 2003).

Another argument for not managing the wild is that people need to use wild places as references, to see how the world works and how it is being changed. For example, research in a natural reserve in the desert of New Mexico revealed how El Niño events can increase the risk of outbreaks of hantavirus. Measurements in uncut forest in New Hampshire documented the problem of acid precipitation in the US (Pringle and Collins 2004). It is often more difficult to tease out ecological relationships in managed places.

On the other hand, there is a belief that the wild is no longer in a position to manage itself (Sanderson *et al.* 2002); since no place is free from human interference, human counter-interference is essential. For example, only about 14 populations of large ungulates in 10 parks in the US may have enough freedom of dispersal and presence of predators to maintain themselves (Wright 1999). Although the elk in Yellowstone may survive well without intervention, they are probably a rare case.

Even the biggest and wildest areas are now subject to the spread of species introduced by humans. Uncontrolled, these species can crowd out native species and alter ecological functions. In a Costa Rican preserve, fencing out cattle favored the growth of introduced grasses, leading to fires, which had not been known to occur there naturally (Ramirez 2004). Should the cows be welcomed back?

Human-caused climate change may also commit us to managing the wild. Early in the 1900s, moose crossed the winter ice on Lake Superior to Isle Royale (Peterson 1999). By the 1930s, the moose numbered in the thousands, browsed faster than their food plants could grow, and began to starve. In the late 1940s, wolves followed the moose across the ice, controlling their numbers and thereby probably saving the rest from starvation. However, the small population of wolves may go extinct, and rising lake temperatures make it unlikely that wolves will ever cross the ice again (Wright 1999). Would shipping in the next pack of wolves be interfering with nature or compensation for interfering?

Ecological restoration typically aims to recreate a previous, more natural state (Hobbs *et al.* 2004). Does it matter how much artifice is used to restore nature? To study local adaptation in wild strawberries, I went to collect plants from dunes in the Golden Gate National Recreation Area in San Francisco. Although the place had never been developed, something seemed odd about the lay of the vegetation. It turned out that a restoration project had planted wild species there, including the strawberry. There was no way to know which plants were natural and so they could not be used to study past adaptation. Are these once wild dunes now forever restored?

The paradox of managing the wild is politically urgent in the US. This country still holds substantial wilderness areas, but has new policies to intensify their management and use. Roadless areas of the Tongass National Forest, home to a major portion of the world's uncut temperate rainforest, may be opened to logging. A federal "Healthy Forests Initiative" has funded the thinning of other old-growth forests in the name of fire prevention. Year after year, exploration for oil in the Arctic National Wildlife Refuge, considered one of the wildest large ecological systems in the world, hangs on a few votes in the US Senate. The paradox has a different urgency in developing countries, where people rely heavily on local natural resources. If wild places are best left to manage themselves, and if human use of these places is essential, then people need to both use them and leave them wild. Can

© The Ecological Society of America

humans be part of wild places, as long as their impacts remain just one factor among many?

This forum does not intend to debate the value of having wild things, though this is an important question (eg Balmford *et al.* 2002), nor whether there is such a thing as pristine wilderness. The purpose here is to discuss how what remains of the wild can best be conserved.

The US has begun to temper its national philosophy of the role of humans in nature from dominion to stewardship (Alpert 2000). The National Park Service's website speaks of its "stewardship of park natural resources". The "Guiding Principles" of the National Wildlife Refuge System begin, "We are land stewards". For its reserves, The Nature Conservancy hires stewards. But so do ships and planes, and we don't expect or trust the stewards to steer them. When they manage the wild, should stewards be pilots?

References

Alpert P. 2000. The concept of stewardship. In: Levin S (Ed). Encyclopedia of biodiversity, Vol 5. New York: Academic Press.

Balmford A, Bruner A, Cooper P, *et al.* 2002. Economic reasons for conserving wild nature. *Science* **297**: 950–53.

Hobbs RJ, Davis MA, Slobodkin LB, *et al.* 2004. Restoration ecology: the challenge of social values and expectations. *Front Ecol Environ* **2**: 43–48.

Leopold A. 1949. A Sand County almanac and sketches here and there. New York: Oxford University Press.

Peterson RO. 1999. Wolf–moose interaction on Isle Royale: the end of natural regulation? *Ecol Appl* **9**: 10–16.

Pringle CM and Collins SL. 2004. Needed: a united infrastructure to support long-term scientific research on public lands. *Ecol Appl* **14**: 18–21.

Ramirez A. 2004. Ecological research and the Costa Rican park system. *Ecol Appl* **14**: 25–27.

Sanderson EW, Jaiteh M, Levy MA, *et al.* 2002. The human footprint and the last of the wild. *BioScience* **52**: 891–904.

Turner MG, Romme WH, and Tinker DB. 2003. Surprises and lessons from the 1988 Yellowstone fires. *Front Ecol Environ* **1**: 351–358.

Whitesell EA. 2001. Mapping the wild. In: Rothenberg D and Ulvaeus M (Eds). The world and the wild. Tucson, AZ: University of Arizona Press.

Wright RG 1999. Wildlife management in the national parks: questions in search of answers. *Ecol Appl* **9**: 30–36.

David Western
African Conservation Centre, Nairobi, Kenya

The paradox of managing the wilds hinges on one word – "wild". In North America, as Alpert points out, wild means unmanaged. However, unmanaged is not the same as unused or the absence of human impact. Humans influence even the remotest North American landscapes, whether by the reverberations of Pleistocene extinctions, the demise of Native Americans, the suppression of fire, or climate change.

Africa bears an even heavier imprint, despite its teeming wildlife. The savannas are everywhere used, if not managed, by people. Their fires, wells, livestock, and settlements have shaped the savannas we see today. Ironically, wildlife and livestock intermingle and their distributions shadow each other through the seasons. Areas like Amboseli National Park and Mara Game Reserve, both in Kenya, were preserved for their spectacular wildlife concentrations, despite having far more livestock. To the tourist, these newly created sanctuaries are the African wilds. To the Maasai people, they are ancestral cattle lands, where wild means the presence of dangerous animals rather than the absence of people.

Clear goals, scientific understanding, and measurements of human impact are far better guides for protecting and managing biodiversity than our feelings of what constitute the wilds. Take Alpert's question of whether cows should be welcomed in a conservation area or not. If our goal is to conserve a refuge with minimum human presence, cows should be banished. But what if our goal is conserving biodiversity in the savannas? Traditional nomadic herds often increase the savanna diversity, in contrast to the more familiar depletion caused by sedentary fenced herds. In conserving savanna biodiversity we should judge the cow by its impact on other species, not by our feelings.

The clearer the goal, the easier it is to decide conservation priorities. Fortunately, most conservation areas are categorized as national park, wilderness area, wildlife refuge, biosphere reserve, or some other designation defined by national or international conventions. Clarifying goals makes conservation decisions easier. If our aim is to preserve areas with minimum human presence, we should save the remote but biologically poor boreal forests. If our aim is to conserve biological richness, we should conserve tropical ecosystems despite (and sometimes because of) human impact.

We move closer to judging when to intervene by defining goals and measuring impacts, but how should we do this? Guidelines are only as good as the science they rest on. We also need robust theories to explain the processes underlying species viability and biological diversity. Verifiable theories help us draw up criteria for defining the minimum viable areas and the critical processes for maintaining biota. Theory and criteria in turn help us devise methods and tools such as Population and Ecosystem Viability Analyses used to guide management action (Western 1992).

Our goals may shift with our lifestyle, values, and knowledge. The eastern deciduous woodlands in the US were Indian homelands a few centuries ago, then at various times lumbered, farmed, and preserved as wilderness. Our goals are fluid and the very concept of wilderness is a product of North American history (Nash 1967). So does the unmanaged have any place at all in this shifting landscape?

If our world is gardenized and pristine nature is illusory (Janzen 1998), this is good reason to study human influence as a dominant ecological force (Vitousek *et al.* 1997) rather than an ecological aberration (Western 2002). Conservation is about managing human impact, not the wilds. Places little affected by people can serve as barometers of our excesses and help us figure out how to throttle back.

© The Ecological Society of America

Much as I've tried to dispel the paradox of managing the unmanaged, I have to admit that it transforms into another expression. The more we change the world, the more we govern evolution (Palumbi 2001). The distinction between intentional and unintentional human impact is shrinking (Western 2002). Just like the Red Queen, running in place, we are destined to manage ever harder to save any semblance of the natural until Alpert's paradox emerges in another form; the unmanaged will be more managed than the managed to preserve the illusion of the natural.

References

Nash R. 1967. Wilderness and the American mind. New Haven: Yale University Press.

Palumbi SR. 2001. The evolution explosion: how humans cause evolutionary change. New York: Norton.

Janzen D. 1998. Gardenification of wildland nature and the human footprint. Science 279: 1312–13.

Vitousek PM, Mooney HA, Lubchenco H, and Melillo JM. 1997. Human domination of earth's ecosystems. *Science* **277**: 494–99.

Western D. 1992. The biodiversity crisis: a challenge for biology. *Oikos* **63**: 29–38.

Western D. 2001. Human-dominated ecosystems and future evolution. *P Natl Acad Sci USA* **98(10)**: 5458–65.

Barry R Noon and Brett G Dickson
Department of Fishery and Wildlife Biology, Colorado State University

Currently, all major ecological systems are human-dominated (Sanderson *et al.* 2002; Wackernagel *et al.* 2002; Imhoff *et al.* 2004). That is, the major driver of change in species composition, landscape structure, and ecological processes is human transformation of the landscape. As a consequence, many plants and animals in terrestrial, marine, and freshwater systems are currently in decline or at risk (Pimm 2001). We directly or indirectly expropriate about 40% of all terrestrial primary productivity, over 25% of all marine primary production, and 60% of accessible freshwater (Pimm 2001). Impacts on the ecological systems can be measured by our population size and total consumption. These impacts vary geographically (Imhoff *et al.* 2004); in developing countries, population growth is the dominant factor, but in industrialized countries it is per-capita consumption.

Protected wildlands are not immune from human influence. Even the most isolated areas of the globe are experiencing the effects of our activities. Two examples illustrate the extent of this influence. Coastal areas and the open ocean have experienced a 90% decline in biomass of large predatory fish, in comparison to pre-industrial levels (Myers and Worm 2003), and many seabird populations in the Antarctic are in decline due to the combined effects of fisheries exploitation and climate change (Croxall *et al.* 2002). Ironically, some wildlands may be more at risk than areas open to human use. In many protected forest lands in the western US, for example, modern fire suppression efforts have led to the accumulation of fuels and disruption of natural fire regimes, thus increasing the risk of large, catastrophic fires (Cole 2000).

Given an uncertain future, it is important to recognize that wildlands provide two critical resources that enhance our quality of life. First, they provide environmental goods and services essential to human welfare that are rapidly being lost from lands extensively transformed for human commerce. Because loss is generally more marked outside of wildlands, our reliance on these lands will become more pronounced over time. Second, they provide an emotional refuge; few places remain where we can experience the unique spiritual renewal that is provided by nature in a relatively wild state.

When prized resources are in short supply relative to demand, they increase in value. Such is the case for both the spiritual and physical resources provided by wildlands. Admittedly, their value for environmental services is poorly appreciated, but nonetheless these values are tangible and measurable. For example, the increasing value of high-elevation wildlands for maintaining watershed integrity is measured by water quality, quantity, and seasonal delivery (Baron *et al.* 2002). The increasing demand and decreasing supply suggests a simple solution – set aside more wildlands. Even in the absence of political resistance, however, this solution is untenable over the long-term, because even our most remote wildlands will be increasingly affected by the human footprint (Sanderson *et al.* 2002; Imhoff *et al.* 2004).

Although wildlands, by definition, have experienced limited direct transformation, they are not immune to indirect human degradation. Examples of current threats with increasing trends include atmospheric deposition, changes in UVB radiation, and climate change. As a result, it would be naïve to put a fence around existing wildlands and expect them to continue to compensate for losses in environmental services and emotional benefits that are occurring external to their boundaries.

Simultaneously acknowledging the futility of a laissez-faire approach to management and the increasing value of these lands for emotional refuge defines the conundrum. Inescapable environmental degradation will require intrusion into wildlands to restore ecosystem processes and elements that are being lost. Unfortunately, to the extent that wildlands will need to be entered for active management, their value as a spiritual refuge will be compromised. The reality is that wildlands as a source of refuge and as a source of services cannot be maximized simultaneously. Sustaining ecological integrity will require novel approaches to management, so as to minimize adverse effects on spiritual and aesthetic values. For example, we know the benefits of cutting down trees and turning them into products for human consumption, but the benefits of keeping them standing may be even greater (see Balmford *et al.* 2002). Because of the extent of the human footprint, we agree with Janzen (1998) that we will need to practice management and restoration as a form of sustainable gardening.

Traditional approaches to wildland management and

 © The Ecological Society of America

restoration will be inappropriate if spiritual and aesthetic values are to be maintained. As a result, managing the wild to offset indirect human impacts will be more expensive. As locations for emotional refuge and environmental services become increasingly rare, however, the benefits will progressively outweigh the costs. Given current trends, accepting large costs to sustain these areas is already justified and now is the time to act.

References

Balmford A, Bruner A, Cooper P, *et al.* 2002. Economic reasons for conserving wild nature. *Science* **297**: 950–53.

Baron JS, Poff NL, Angermeier PL, *et al.* 2002. Meeting ecological and societal needs for freshwater. *Ecol Apps* **12**: 1247–60.

Cole DN. 2000. Paradox of the primeval: ecological restoration in wilderness. *Ecological Restoration* **18**: 77–86.

Croxall JP, Trathan PN, and Murphy EJ. 2002. Environmental change and Antarctic seabird populations. *Science* **297**: 1510–14.

Imhoff ML, Bounoua L, Ricketts T, *et al.* 2004. Global patterns in human consumption of net primary production. *Nature* **429**: 870–73.

Janzen D. 1998. Gardenification of wildland nature and the human footprint. *Science* **279**: 1312–13.

Myers RA and Worm B. 2003. Rapid worldwide depletion of predatory fish communities. *Nature* **423**: 280–83.

Pimm SL. 2001. The world according to Pimm. New York: McGraw-Hill.

Sanderson EW, Jaiteh M, Levy MA, *et al.* 2002. The human footprint and the last of the wild. *Bioscience* **52**: 891–904.

Wackernagel M, Schulz NB, Deumling D, *et al.* 2002. Tracking the ecological overshoot of the human economy. *P Natl Acad Sci USA* **99**: 9266–71.

Andrzej Bobiec
Bialowieza Forest Institute, Narewka, Poland

Wildness is not about whether we influence forests, but how we influence them, and the magnitude of that influence. Humans have long utilized forests without concern for their development, letting nature manage the effects of our actions. This has often caused substantial changes in the composition and structure of the residual forest and, on occasion, actually contributed to the loss of forest. Application of forest management techniques and silvicultural knowledge was a critical point in the history of forests. Aimed at sustaining timber supply from a limited land base, foresters now control managed forests to deliberately alter the flow of energy through ecosystems. Thus, the minimum criterion necessary to discern natural from non-natural forests is whether or not there is intentional control over forest development.

We cannot truly protect or conserve nature in its various stages of development, nor can we compensate for that development to recreate the past. Instead, we can either attempt to control and manage what exists or let nature follow its own course.

Some claim that, in view of the present state of the environmental transformation, forests will die without our thoughtful help. However, doesn't the mass die-back of spruce monocultures in southwestern Poland, the Czech Republic, and southern Germany, and their spontaneous replacement by more diverse vegetation, show that forests are highly adaptive and resilient? Nature is capable of sustaining wilderness in the 21st century. But are we willing to permit that and to accept forests that meet nature's objectives rather than our own?

The objectives of modern European forestry are to improve the ecological resilience and aesthetics of highly fragmented, even-aged monocultures. A fine-scale, individual approach is considered far more ecological than the vast clearcuts of traditional management. Such "forest art" is thought of as sustainable management, but is based on the physiology and individual relationships of target species and confined to tiny administrative units. Objectives for a forest as a whole, and inherent processes in an ecosystem are often eclipsed by traditional thinking and myths. The deep-rooted belief in the necessity of removing trees "infested" by spruce bark beetle, or the reduction in numbers of ungulates causing browsing damage, are examples of this sort of thinking.

For Europeans, who have hardly any memory of forested wilderness, the "new forestry" is often identified with the protection of nature. The model of a clearcut-less silviculture is widely perceived as sustainable. This is because sustainability has been commonly interpreted as a fair partition of land for conflicting interests, rather than as sustaining natural ecosystems. At the same time, preservation of portions of the landscape is often considered obsolete, ignoring the social and environmental challenges of the present. Active remodeling of even-aged monocultures meets the environmental expectations of European societies. But is this example of forest art equally appropriate when applied to the scarce and highly dispersed remnants of ancient, natural forests?

Conservationists fear that the annual extraction of 2.3 million m^3 of wood may seriously damage the ecosystem of Mt Hood National Forest in Oregon, a total area of about 2.7 million ha (Keating 2004). Even a higher average extraction rate might be comparatively less harmful than the harvest planned in the Polish part of Bialowieza Primeval Forest (BPF). About 150 000 m^3 of lumber is to be collected (RDLP Bialystok 2003) from the 49 500 ha managed forest. Such a harvest encompasses more than 80% of the total forest area, measuring 60 000 ha (Bobiec 2002), and is three times more intense than in Mt. Hood. Most of the BPF yield is considered a byproduct of management, intended to "re-establish the primeval character of stands" and eradicate the spruce bark beetle (RDLP Bialystok 2003). With no large-scale clearcuts, exotic species, or pesticides, the management is perceived as pro-ecological and sustainable. Also, to the European and international authorities, "The volume of trees to be felled [in the BPF] will depend on the use of these techniques and on timber-yield forecast by the management plan itself" (Council of Europe 2002). Similarly, the Polish Committee of UNESCO MAB (UN Educational, Scientific, and Cultural Organization, The Man and the Biosphere Programme) seems to disregard the controversy between preservation of natural processes and

© The Ecological Society of America

forestry intervention. The Committee reassures us that there is no need for any improvement or adjustment to achieve Biosphere Reserve status for the entire forest. The BPF is also a candidate for the European Union (EU) network of natural areas, NATURA 2000; however, this program does not have an independent preservation agenda or functional institutional instruments.

Although a wilderness act would seem redundant in Western Europe, where no true wilderness remains, EU conservation practices are at an insufficient scale to address processes such as natural disturbances and migration of large animals at the ecosystem level. As extended to the former communist countries, where relatively large remnants of natural ecosystems still exist, the EU needs a wilderness act to preserve these landscapes and to perpetuate and restore the scarcest European natural resource: the wilderness.

References

Bobiec A. 2002. Bialowieza Primeval Forest the largest area of natural deciduous lowland forest in Europe. *Int J Wilderness* **8**: 33–37.

Council of Europe Committee of Ministers. 2002. Resolution ResDip(2002)3 on the renewal of the European Diploma for Protected Areas awarded to Bialowieza National Park (Poland) (Adopted by the Committee of Ministers on 11 September 2002 at the 807th meeting of the Ministers' Deputies). www.topb.most.org.pl/hand/ce1.doc. Viewed 8 September 2004.

Keating J. 2004. Wyden's Mt. Hood Wilderness Plan in perspective. www.theportlandalliance.org/2004/may/mthoodplan.htm. Viewed 8 September 2004.

RDLP Bialystok (Regionalna Dyrekcja Lasów Panstwowych Bialystok) (Regional Directorate of the State Forests Bialystok). 2003. Management plan for the Bialowieza Forest Promotional Complex for the period 01.01.2002–12.31.2011. www.bialystok.lasy.gov.pl. [In Polish] Viewed 8 September 2004.

Peter Landres
Aldo Leopold Wilderness Research Institute, Rocky Mountain Research Station, USDA Forest Service, Missoula, MT

In his introduction, Peter Alpert sets out the problem facing many areas that are protected for their natural values: ecological conditions and processes may be so compromised that sustaining "natural conditions" is no longer possible without human intervention. This problem poses a critical dilemma for managing areas formally designated as "wilderness" by the US Congress.

In the US, designated wilderness is both an ideal and a place. As an ideal, wilderness is "an area where the earth and its community of life are untrammeled by man" (Section 2[c], 1964 Wilderness Act). "Untrammeled" means uncontrolled, unmanipulated, self-willed, or, in common terms, wild. It was chosen as the best word to convey the intention that modern people approach wilderness with humility, restraint, and respect (Scott 2001). Wildness is an important symbol of willful restraint, setting the highest ethical standard for the relationship we have with the land, where "we deliberately withhold our power to change the landscape" (Nash 2004).

Wilderness is also a place where "natural conditions are influenced by the primeval forces of nature" that is "managed so as to preserve its natural conditions" (Section 2[c], 1964 Wilderness Act). When the Wilderness Act was written it was probably assumed that simply not taking direct actions within wilderness would protect natural conditions. We know the impacts inside wilderness from actions such as fire exclusion and stocking lakes with fish. We also now know the impacts from outside threats such as global climate change, non-native species, and a context of development. Clearly, wilderness is no longer influenced by only the primeval forces of nature.

While the legislated goal for wilderness is to be both wild and natural, in some situations implementing these goals creates a unique and central dilemma for wilderness managers: not restoring wilderness may allow natural conditions to further degrade, but taking action destroys the symbolic value of restraint and may influence natural conditions in unknown ways. The question is not whether we can take action, it is whether we should. Should we spray herbicides to control non-native invasive plants? Should we provide water to bighorn sheep that are now cut off from their seasonal sources? How about felling trees that have grown because of fire exclusion and are now ladder fuels threatening old-growth trees? Or periodically dumping lime in a stream to buffer acid deposition? Or removing landslide debris from a stream that now blocks spawning of listed fish? These and other challenges currently confront wilderness managers. Cole (2001) described this dilemma as one of two major issues that will shape US wilderness in the coming century (see also Cole 2000; Landres *et al.* 2001).

Some conservationists argue that our current biological diversity crisis demands that we manipulate wilderness to restore natural conditions. In my view, wildness is even more rare and threatened than naturalness in our increasingly developed world. In addition, the unique legislated goal of wildness means that the burden of proof for taking restoration action in wilderness is higher than for any other land. This does not mean that no action should be taken; it means that because wildness and naturalness are both important, certain actions may be justified after carefully considering the full range of technical questions raised, including: Is there sufficient understanding about reference conditions and processes, as well as the long-term effects of restoration actions? Is restoration even possible, given the context of the area and the pervasiveness of ecological change? How long will the restoration actions take, and how long will the effects of these actions last? How large an area will be affected? What are the local, regional, and national perceptions about wildness, naturalness, and the proposed actions? How will the public be involved in substantive discussion and does the public sufficiently trust the agencies to do this fairly?

Manipulating wilderness, even for the positive purposes of restoring natural conditions, also raises ethical questions, including: Is there a moral obligation to mitigate the impacts of prior manipulation? Are short-term restoration

 © The Ecological Society of America

actions justified to restore natural processes that operate over the long-term? Are actions justified in wilderness when restoring a legally threatened or endangered species? Do the symbolic value of wildness and the ecological value of naturalness have equal importance? Is it even appropriate to define a target for natural conditions in wilderness?

Only after answering such questions and making all value judgments and assumptions explicit can we evaluate the relative risks and benefits of taking action in each situation and reach a decision on whether to do so. This decision may be to take action and accept, albeit reluctantly, the "gardenification" of wilderness (Janzen 1998). In other situations the decision may be to not take action and accept the degradation of naturalness. Deciding whether to manage the wild in wilderness – whether to be guardians or gardeners – should be difficult because the consequences are large, demanding that we fully understand what we gain and lose by our actions.

References

Cole DN. 2000. Paradox of the primeval: ecological restoration in wilderness. *Ecol Restor* **18**: 77–86.

Cole DN. 2001. Management dilemmas that will shape wilderness in the 21st century. *J Forest* **99**: 4–8.

Janzen D. 1998. Gardenification of wildland nature and the human footprint. *Science* **279**: 1312–13.

Landres P, Brunson MW, and Merigliano L. 2001. Naturalness and wildness: the dilemma and irony of ecological restoration in wilderness. *Wild Earth* **10**: 77–82.

Nash RF. 1980. The value of wildness. *Am Wild* **Spring**: 7–10.

Nash RF. 2004. Celebrating wilderness in 2004. [unpublished essay]. Located at: Aldo Leopold Wilderness Research Institute, Missoula, MT.

Scott DW. 2001. "Untrammeled", "wilderness character", and the challenges of wilderness preservation. *Wild Earth* **11**: 72–79.

George Nickas
Executive Director, Wilderness Watch, Missoula, MT

Peter Alpert describes one of the great challenges facing land stewards today. Across much of our nation's wildlands – indeed, around the world – the challenge of restoring damage caused by past land-use practices is a formidable task. There is plenty of ground on which to engage in the experiment called "management", to make mistakes and to learn how to undo much of what we humans have wrought. In short, there is no limit to the opportunities where, to continue Alpert's metaphor, the stewards might try their hands at the controls; where a few miscalculations will be relatively harmless, will serve to inform future efforts, and are unlikely to steer society's goals for restoration off course.

Not so for wilderness. By "wilderness", I mean the roughly 4% of US lands that have been set aside by Congress as part of the National Wilderness Preservation System. By and large these areas are where humans have least worked their will, and by law should not try. In the words of Howard Zahniser, author of the 1964 Wilderness Act, these lands should be "managed as to be left unmanaged" (Zahniser 1956).

Wilderness serves many purposes. It provides important habitat for wildlife sensitive to human disturbance. It provides clean air and clean water in a world where both are increasingly rare. It affords humans a necessary respite from our increasingly harried, commercialized, and mechanized lives. Wilderness also offers incalculable scientific benefits, an opportunity to study and learn how uncontrolled nature responds to ever-changing conditions and natural forces.

Yet it is wildness that truly sets wilderness apart. Wilderness serves as a check on our hubris and on our innate human desire to manipulate the environment to our liking. In wilderness, humans are the stewards, not the pilots. Our participation with wilderness is a journey, not a destination; meddling can only serve to steer us off course. Robert Lucas, a pioneer wilderness researcher, put it this way: "If ecological processes operate essentially uncontrolled within the wilderness frame of reference, the results, whatever they might be, are desirable by definition. The object is not to stop change, nor to recreate conditions as of some arbitrary historical date. The object is to let nature 'roll the dice' and accept what results with interest and scientific curiosity" (Lucas 1973).

Some would argue that humans must be both pilot and steward, that the Wilderness Act requires wilderness be managed to preserve a natural state. Even if we could agree that this is an acceptable approach to wilderness stewardship, the effort would be fraught with problems. For starters, it is exceedingly difficult, if not impossible, to establish a natural reference point at which to aim restoration efforts. Second, nothing in nature ever stays the same. In light of ubiquitous changes caused by global warming, acid deposition, and the increasingly rapid transfer of exotic species, the desired conditions will be constantly shifting, precipitating the need for yet another set of manipulative management efforts. Third, decision-making within the federal land management agencies is spread through hundreds of individual local managers. As a result, hundreds, if not thousands, of manipulative restoration projects will be implemented, each reflecting the personal bias of the individual manager. This ensures that wilderness will be neither natural nor wild.

In wilderness, stewards must be humble and above all guided by restraint. Having places where humans are not at the controls keeps the wilderness dream alive, both in our minds and on the land. We would do well to be guided in our stewardship by the words of the Wilderness Act's author and greatest champion: "We must remember always that the essential quality of the wilderness is wildness" (Zahniser 1992).

References

Lucas RC. 1973. Wilderness: a management framework. *J Soil Water Conserv* **28**: 150–154.

Zahniser E. 1992. Where wilderness preservation began: Adirondack writings of Howard Zahniser. Utica, NY: North Country Books, Inc.

Zahniser H. 1956. The need for wilderness areas. *The Living Wilderness* **Winter–Spring 1956–57**: 37–43

© The Ecological Society of America