

# Wilderness Biology and Conservation: Future Directions

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**Abstract**—The new conservation movement—uniting scientists and activists—seeks to relook at the role of protected land. The result is a redefining of terms, the encompassing of the concept of ecosystems, incorporating both scientific and nonscientific approaches to conservation, and reconsidering management. This philosophical essay speculates on the future of wilderness and conservation biology.

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The idea of wilderness is on the defensive these days. Under attack from commodity-extraction interests and conservative politicians, the old foes, and now blind-sided by politically-correct humanists and social deconstructionists, wilderness seems to have few friends. Besieged from the right and the left, both in their own ways portraying protection of wilderness as an elitist frill, the wilderness concept might appear to have outlived its usefulness. But this would be a fallacious conclusion. Although ecosystem management, too often proposed as a substitute for protection, is the pre-eminent theme within land-management agencies today, just as sustainable development dominates the international conservation agenda, another theme may become just as powerful. A new movement, representing an alliance of scientists and activists, is taking shape.

This new conservation movement, although young and not yet entirely on its feet, seeks to redefine the role of protected areas in conservation strategy. It seeks to base a greatly expanded network of wilderness and other protected areas on the principles and findings of conservation biology. In some cases, such as the reserve designs associated with The Wildlands Project and cooperating regional groups, the goal is not just to save existing wilderness, but to *re-wild* much of what has been lost. Among other things, this means bringing large carnivores, wildfire and other inconveniences back into landscapes where they have been eliminated or reduced. More modest examples of the new conservation movement can be found in state and federal agencies, land trusts and many other traditionally moderate groups. Yet the conservation proposals coming out of some of these moderate groups—for example, state agencies in Florida—are as radical as any you would have seen in the pages of the *Earth First! Journal* just 10 or 15 years ago.

I have defined conservation biology as science in the service of conservation. But why do we need science for

wilderness? Isn't wilderness preservation more a matter of saving places of grandeur and beauty from ruination in the name of free enterprise? Aldo Leopold, speaking of his field of wildlife conservation, once pointed out that "there seems to be few fields of research where the means are so largely of the brain, but the ends so largely of the heart." Is it not time we brought the heart and the brain together?

It might come as a surprise to some wilderness activists to realize that scientists and managers have hearts, too. Ask yourself: Why do *you* want to preserve wilderness? Is it because wilderness areas rack up lots of recreation visitor days that help justify your agency's existence in these times of declining revenues? Is it because a particular wilderness area might have a 95% probability of maintaining a viable population of species X for 100 years? For most of us, deep down, it's neither of these reasons, both of which are fundamentally rational and quantitative. Rather, it's the qualitative experience that matters. Wilderness is beautiful; it's inspiring, challenging, thrilling, even heartbreaking. Occasionally, tears come to my eyes when I encounter a stunning wilderness scene or a perfect specimen of a wild creature in its native habitat. What strikes me is the beauty of that scene, in that irreplaceable moment, and also the knowledge that so many other, potentially beautiful scenes have been precluded by chainsaws, cows, and bulldozers.

Emotions and the ability to see art in nature are what inspire most of us to be conservationists. There is a problem, however. Saving lovely, primeval wilderness areas does little to confront the extinction crisis. Saving beautiful places has brought us a highly biased, biologically insufficient system of protected areas. Building a better system requires using our brains and applying the best available science. Fortunately, there is a natural connection between heart and head that we can use to our advantage (and I'm not talking about the carotid arteries and jugular veins). It is the emotional contact with nature and the aesthetic experience that perk our intellectual interest. The next, natural step is to use our intellects to figure out better ways of selecting, designing and managing protected areas.

For me, as for many others I know, conservation biology offers a way to unite our emotional and intellectual interests in nature. Our emotional interest and the aesthetic experience itself are mostly selfish, after all. No matter how pure or spiritual it might seem, love of nature, like any other love, is in part self-gratification. The most selfless love still makes us feel righteous for having it. But when we find beauty in living things, as we become intimate with them, we begin to have concern for their welfare. We begin to value each wild species, each wild place, for its own sake. We want to know that they will persist, even if we will never see them. Such are the values upon which the science of conservation biology is based—they are essentially the same values that

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underlie the wilderness movement. These values tell us where to go; the science tells us how we might get there.

I cannot understand people who see little place for science in wilderness preservation, nor do I agree with those who believe that science is the only way to make conservation decisions. Both heart and head are needed. The fact is that nonscientific criteria have dominated decisions throughout conservation history. We have selected areas because they are pretty, they are fun to hike in, and they're not good for much else. This "rock and ice phenomenon" is abundantly documented, although there are many important exceptions. By insisting that we broaden the representation of habitats in protected areas, design networks of reserves to maintain viable populations of sensitive species, and manage wilderness and other protected areas to sustain or simulate natural processes is not to place rationality above emotion and spirituality. Quite the contrary. Basing the design and management of protected areas on biological and ecological criteria is a necessary outgrowth of our emotional attachment to life, our biophilia. It means basing conservation decisions on a concern for the long-term welfare of all living things, not just on our need for aesthetic gratification. It is the most selfless love I can imagine.

If you accept my notion that we need to unite scientific and nonscientific approaches to conservation, what specifically does science suggest that we do differently? First, we need to acknowledge the limitations of our current network of protected areas (reserves) in this country and elsewhere and make a serious attempt to fill the gaps. The national gap analysis program (GAP) of the U.S. Department of Interior provides a wealth of information on habitats and species currently unrepresented or underrepresented in protected areas. More detailed investigations in particular regions provide more information. The picture is basically the same everywhere: The most productive habitats, and often those richest in biodiversity, are the least well-protected. In the West and much of the East, these underrepresented habitats tend to be at low elevations and have the richest soils. Conversely, in Florida and other areas in the southeastern coastal plain, most underrepresented habitats are at the opposite end of the topographic spectrum: The wilderness areas are in the swamps and marshes, and the well-drained uplands are unprotected. Most of the productive, poorly represented habitats nationwide are in private ownership and devoted to agriculture or urban uses. Nevertheless, some significant conservation opportunities remain in these landscapes. We must work quickly.

Improving the representation of habitats and biodiversity in protected areas cannot rely on traditional wilderness preservation campaigns. Whether private or public land, some of the most critical areas are too degraded to meet criteria for wilderness designation. They often need substantial, hands-on restoration to regain their full biological potential. The problem is that there is virtually no type of public-land designation that is appropriate for these areas and would provide sufficient protection from exploitation. For example, the Late-Successional Reserves (LSRs) established under President Clinton's Northwest Forest Plan better represent biodiversity than the system of wilderness areas in the region. Nevertheless, not only are many of the LSRs already heavily roaded and fragmented, they remain open to uses incompatible with conservation objectives.

Old-growth timber sales have been conducted in several designated LSRs since their designation, mostly under the infamous salvage logging rider. (Timber sales for restoration were not prohibited by the Plan, but conservationists did not expect to see old growth logged.) And now—amazingly—the Winema National Forest in Oregon is trying to push through a major ski development in one of its LSRs. And we wonder why activists distrust the agencies and are unwilling to grant them more discretionary power?

Besides using scientific information to better represent our native ecosystems and hotspots of biodiversity in true protected areas, we must use science to design reserve networks that are more likely to retain their biodiversity over time than our current network of mostly small, isolated protected areas. Most designated wilderness areas and national parks are tiny relative to the area required to maintain complete, naturally functioning ecosystems with viable populations of all native species. For example, 55 percent of national park units are smaller than 1000 ha (2500 acres), and only 12 percent of wilderness areas are larger than 100,000 ha (250,000 acres). (See discussion and graphs in chapter 5 of R. F. Noss and A. Y. Cooperrider. 1994. *Saving Nature's Legacy*. Island Press, Washington, DC). We have learned a lot about how to design effective reserves over the last couple decades of research in conservation biology. Sure, there is still much left to learn, but time is running out in many places, and we must start applying what we know without unreasonable delay. Foundations and individual donors must start funding, in a big way, scientifically defensible conservation planning in every region. With adequate dollars, and for less than the U.S. government has spent for management plans in just two regions (the Pacific Northwest and Interior Columbia Basin), we could have a scientifically credible reserve design for the entire continent of North America within, say, three years, a lot faster than it takes conservation legislation to move through Congress.

Among the things we have learned from experiences with our existing protected areas system, and from the theory and empirical results of conservation biology, is that small areas, especially when isolated, tend to lose diversity over time. Bill Newmark's studies of mammals in national parks, for example, showed that mammal species have been lost from all but the largest complexes of parks in North America. The smaller the park, the greater the losses. Many other studies, both theoretical and empirical, have demonstrated the vulnerability of populations to happenstances of demography, genetics and environment, as well as to deterministic processes, such as edge effects and direct exploitation or persecution of wildlife by humans. These findings brought us a series of empirical generalizations or principles of conservation biology, such as: (1) Species well distributed across their native range are less susceptible to extinction than species confined to small portions of their range; (2) large blocks of habitat, containing large populations, are better than small blocks with small populations; (3) blocks of habitat close together are better than blocks far apart; (4) habitat in contiguous blocks is better than fragmented habitat; (5) interconnected blocks of habitat are better than isolated blocks; and (6) blocks of habitat that are roadless or otherwise inaccessible to humans are better than roaded and accessible

blocks. This last principle is especially germane to wilderness conservation, as wilderness is defined by roadlessness.

I worry, however, that some conservationists take these empirical generalizations at face value, without wanting to do the necessary research to determine just how they apply in particular cases. The application of these principles to reserve selection and design is not necessarily straightforward. You have to know quite a bit about the system and the individual species concerned in order to interpret these principles wisely and see the inevitable exceptions. Yes, all else being equal, bigger is better. But how big is big enough? The answer to that question depends on such things as the home range size, demography and life history characteristics (including dispersal capacity) of the species; the quality of the habitat; the nature of surrounding habitat; and how well connected the habitat patch of concern is to other suitable patches. Habitats that seem close together might as well be a thousand miles apart if they are separated by a highway or other barrier insurmountable to the species of interest. Connected is not necessarily better than disconnected if the corridor is unusable or if it increases the risk of mortality. Empirical generalizations can be useful when site-specific information is lacking, but they can only be taken so far.

Yes, we have learned a few things in conservation biology, but a substantial amount of case-specific research is needed to design a reliable reserve network. I emphasize this point because it is here that the new alliance of scientists and activists is possibly most fragile. Activists, and the foundations that fund them, often want quick, easy answers. Rules of thumb and design principles are grabbed at like candy and consumed rapidly, without taking the time to catch the subtleties of flavor. This is a mistake. If we're going to create a conservation network on this continent that has a high assurance of meeting conservation goals, it must be a science-based network, not simply a science-informed network based on a few general principles and the casual advice of a scientist or two. As I opined earlier, putting a basic reserve network in place need not be enormously expensive in time or money. More detailed and extensive research, however, will be needed to learn how to manage these areas competently in the long run.

This brings me to another weak area in the new conservation movement based on an alliance of scientists and activists: the issue of management. Wilderness enthusiasts have traditionally ignored management issues. Even the land-managing agencies, which are generally not adverse to management, have let many wilderness areas go essentially

unmanaged. I have visited many designated wilderness areas containing fire-dependent plant communities, such as grasslands, longleaf pine and ponderosa pine communities, that are terribly degraded by active or passive fire suppression. They now require active, restorative management, which must include maintaining or mimicking ecological processes. It seems, however, that *wilderness* and *management* are seen by many as opposing concepts. They are not. Only the largest wilderness areas are, possibly, self-managing. The others are too small or too degraded by external and internal influences to manage themselves and retain the native species and communities we count on them to retain. The ecological consequences of not managing these areas could be as severe as those that come from poor management. Much of the wilderness science agenda in coming decades should be devoted to testing alternative restoration and management treatments in wilderness and other natural areas. Especially important is learning how to manage ecosystems in the least obtrusive ways that still get the job done. Perhaps designations other than "wilderness" are appropriate for many of these areas, but I would hate to see them become what the agencies now manage as multiple-use or "adaptive management" zones. Can we manage nature and still retain wildness? We're going to have to figure out how. Again, heart and head must be united.

The future of wilderness science, and of wilderness, will parallel the future of the conservation movement generally. Its success will depend on the success of the new alliance of activists and scientists, but it must go a couple important steps farther: It must be generally accepted by society and then implemented by managers. These steps will require significant cultural change. It is clear that an increasing number of people are coming to see that our culture has gone down the wrong track for too long. That's probably unfair. It wasn't really the wrong track, not at first. It was the only track we knew, battling the wilderness, exterminating the dangerous animals, pushing back the frontier until there we were, at the shores of the Pacific with nothing solid left to push. Yet we keep pushing, destroying the last stocks of wild fish in the oceans, along with the last fragments of wilderness on the land. We've gone too far, and some of us are finally seeing that our only salvation, as a culture, is making amends to nature. Not only saving the last vestiges of wilderness, but letting wilderness grow. Biologists and other natural scientists have a key role to play in this movement by defining the biological requirements for success. But it is going to take everyone in the movement, of all stripes and professions, to achieve that success. Let's get back to work.