

Scaling-up the Minimum Requirements Analysis for Big Wilderness Issues

BY DAVID N. COLE

The concept of applying a “minimum requirements” analysis to decisions about administrative actions in wilderness in the United States has been around for a long time. It comes from Section 4(c) of the Wilderness Act of 1964, which states that “except as necessary to meet minimum requirements for the administration of the area for the purposes 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.” The concept interjects the notions of flexibility and compromise, suggesting that wilderness purposes might on occasion be best served by allowing generally prohibited uses. However, it is clear that such allowances should be the minimum necessary to achieve the purposes of the Wilderness Act.

Recently, the four agencies that manage federally designated wilderness in the United States developed a Minimum Requirements Decision Guide process to assist managers in making wilderness stewardship decisions regarding the appropriateness of administrative actions (<http://www.wilderness.net/mrdg/>). The process guides managers through two steps that lead them to decisions: (1) that an administrative action is necessary (or not); and (2) if it is necessary, that the action is the minimum activity.

Even though the Wilderness Act only uses the minimum requirement terminology in relation to generally prohibited uses in wilderness, the concept has been used to address other issues. Minimum requirement concepts are also applied to special provisions (Sec. 4d) in the Wilderness Act, in that “such measures may be taken as may be necessary in the control of fire, insects, and dis-

eases” and “commercial services may be performed ... to the extent necessary for activities which are proper for realizing the recreational or other wilderness purposes of the areas.” Hende et al. (1978) applied the minimum requirement concept to management of recreation in wilderness. They proposed the principle that only the minimum regulation necessary to achieve wilderness recreation management objectives should be applied. Here, the notion of compromise is even more fundamental. Unconfined recreation (freedom from regulation) is an important aspect of wilderness character, but so are solitude and minimal recreation impacts. Wilderness character can be optimized by crafting a compromise between these conflicting objectives.

The authors of the Minimum Requirements Decision Guide designed it specifically to address the Section 4c prohibited uses. Most often the guide is used for project or site-specific planning—whether or not to restore an administrative cabin or replace a washed-out bridge, whether to use chainsaws or crosscut saws to clear blown-down trees across a trail, whether to use helicopters or mules to move supplies. The authors of the guide note, however, that the process can also be used for programmatic planning and comprehensive land planning. However, where the stewardship issue is something other than a prohibited use, a different type of minimum requirements analysis is needed.

Stewardship issues other than the Section 4c prohibited uses often must be dealt with at larger spatial and temporal scales. They often involve a resource inside and outside a designated wilderness and can require analyses that cross wilderness boundaries. In particular, they

often involve compromising one of the qualities of wilderness character (Landres et al. 2005) in order to avoid compromising another quality of wilderness character or compromising two conflicting qualities simultaneously. Such analyses are much more complex than project-specific analyses, and few precedents exist.

Although it is sometimes assumed that the series of questions in the Minimum Requirements Decision Guide analysis provide a useful guide for all stewardship issues and all levels of planning, some adjustment of procedures is necessary. In particular, the wording and relative importance of questions and how they are addressed may differ. In this article, I propose some ways that the spirit of a minimum requirements analysis could be applied to some of the bigger issues in wilderness stewardship—those that require planning at large spatial and temporal scales, involving multiple resources and jurisdictions.

Big Issues in Wilderness Stewardship

Wilderness character is influenced by the cumulative effect of myriad threats and actions. This is why wilderness managers need to be concerned about the appropriateness of actions that, to some, seem relatively unimportant because they occur infrequently, are short-lived, and are local in effect. Despite the need to be concerned about such small-scale administrative actions as helicopter landings and chainsaw use, managers increasingly need to attend to bigger wilderness issues as well. Near the top of the list must be issues related to maintaining and/or restoring wilderness ecosystems impacted by human influence.

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Ecological manipulation in wilderness is perhaps the most challenging emerging dilemma confronting managers (Cole 1996, 2000). Wilderness character is declining almost everywhere as naturalness wanes in the face of invasive species, fire suppression, air pollution, and a host of other threats (Cole and Landres 1996; Franklin and Aplet 2002). And yet, administrative actions taken to blunt or counteract these assaults also have a detrimental effect on wilderness character. Intentional manipulation of wilderness ecosystems conflicts with the characteristic that most uniquely defines wilderness, its being “untrammeled by man.” The important symbolic value of wilderness as a place of humility and restraint, not controlled by humans (Cole 2005), is adversely affected when intentional manipulation occurs regardless of why such actions are taken or how short-lived such actions are. Moreover, if these issues are dealt with by compromising on a case-by-case, wilderness-by-wilderness basis, our wilderness system will gravitate toward homogeneity and mediocrity (Cole 2003). To maximize the value of the wilderness system, planning and the crafting of compromise needs to occur at large spatial scales.

Applying Minimum Requirement Concepts to Big Wilderness Issues

How can we work through the dilemma of ecological restoration in wilderness to develop compromises between the naturalness and untrammeled qualities of wilderness character at large spatial scales? One

approach is to apply the same concepts that are central to the Minimum Requirements Decision Guide, taking the minimum action necessary to optimize wilderness character. Some subtle adjustments of the process are needed, however. The decision in the first step shifts from “Is any administrative action necessary?” to “What outcome is desirable?” All six questions typically asked in the first step of the analysis are still relevant. However, most attention needs to be devoted to exploring conflict between different components of wilderness character (e.g., untrammeled and natural), deciding how to compromise between components, and codifying the compromise in specific descriptors of desired future conditions. Since these desired outcomes will apply to wilderness, there may be little ability to resolve the situation by taking action outside wilderness.

The second step also shifts, primarily due to the expansion of spatial scale. Instead of determining the minimum activity, the goal is to decide which activities conducted in which places are the minimum necessary to achieve the desired outcome. A more obtrusive action conducted in fewer places in wilderness might be considered the minimum when compared to a less obtrusive action conducted in more places.

Protecting Hemlocks in the Southeastern United States

An excellent example is provided by planning efforts of the national forests in North Carolina devoted to preservation of hemlocks (USDA



Figure 1—Landscape view from Clingmans Dome, Great Smoky Mountains National Park. Photo courtesy of the National Park Service.

Forest Service 2005). Two species of hemlock (eastern and Carolina) are experiencing high rates of mortality due to a small aphidlike insect, the hemlock woolly adelgid, native to Asia and first detected in the eastern United States in 1951. Eastern hemlock is the second most common conifer in these forests, is a significant component of old growth forests, notably in some wilderness areas, is often important in riparian communities, and often lends a distinctive, scenic component to landscapes (see figure 1).

By 2001 the adelgid had spread to the forests of North Carolina and, by 2004, mortality of hemlocks was occurring. Research conducted elsewhere suggests that tree mortality can occur in as few as three years and that more than 90% mortality of hemlocks can be expected within 10 to 12 years of a stand becoming heavily infested (Mayer et al. 2002). Without intervention, it is likely that most hemlocks—among the oldest-lived trees (600-plus years) in the East—would be lost from eastern forests. Carolina hemlock might go extinct,

since its range is primarily in western North Carolina. Extinction of the more widely distributed eastern hemlock is also possible. Even with intervention, the result of the adelgid infestation will be a loss of biodiversity, degradation of aquatic habitat and scenic values, and a reduction in wilderness character, through a loss of naturalness. Many of the finest hemlock stands, in terms of condition, age, and character, are in wilderness. Moreover, many of the most intact ecosystems in the East are in wilderness.

Intervention options exist that appear capable of protecting hemlocks. Injection of the insecticide imidacloprid into the soil close to trees kills the adelgid, resulting in dramatic recovery (Steward and Horner 1994). In close proximity to water and where soil is highly permeable, tree stems must be injected, a technique that can damage trees and is less long lasting. In addition, introduction of nonnative beetles (from China, Japan, and the northwestern United States) can reduce adelgid populations sufficiently to allow

infested trees to recover (Cheah and McClure 2002).

The choice facing the Forest Service, both inside and outside wilderness, was whether to let hemlocks disappear from these forests or to use insecticides and introduction of another nonnative species to protect these trees. Wilderness character was doomed to decline as soon as the first adelgid arrived in the United States. The choice facing planners was which aspects of wilderness character to protect, where, and how. As noted before, wilderness system values are optimized when different compromises are reached in different places because outstanding examples of all components of wilderness character are preserved at least somewhere in the system.

The Decision

In this case, the Forest Service decided to compromise both the untrammelled and naturalness components of wilderness character, by intervening in some but not all stands. They adopted an objective of maintaining reproducing populations of eastern and Carolina hemlock throughout their historical and elevational range. This objective is quite different from such possible objectives as protecting all hemlock stands or protecting stands wherever resources can be mustered to protect them. Their decision for the first step of a minimum requirements analysis was that administrative action is necessary because the desired outcome in wilderness is maintenance of some hemlock stands in wilderness. This decision could not have been made without a decision about desired outcomes in wilderness.

The planners used the concepts of the metapopulation and minimum viable population size to decide how

many trees and conservation areas to protect, as well as the minimum intervention needed to protect the trees in each conservation area. The outcome of the second step in the minimum requirements analysis, then, was a decision about which specific actions in which specific places collectively constitute the minimum necessary. Ultimately, from nearly 400 hemlock stands, they decided to release predatory beetles in 159 hemlock areas (typically 125 acres [50.6 ha] in size) across the forests. To ensure maintenance of an adequate gene pool until effective biocontrol is established, trees will be treated with insecticide in as many as half of these areas. The minimum activity is not the least obtrusive single action. Rather it is the combination of actions, varying in obtrusiveness and applied in the minimum number of stands, that minimizes loss of the untrammelled quality of wilderness character while meeting the desired outcome.

Since the objective of maintaining hemlock in some of these forests applies equally inside wilderness and outside wilderness, many of the treated stands will be in wilderness. It might have been possible to meet the overall objective of maintaining reproducing populations of eastern and Carolina hemlock throughout their historical and elevational range by only intervening in stands outside wilderness, but this would have impacted wilderness character unacceptably. The keys to deciding what to do in wilderness, then, came from deciding about desired future conditions and how to compromise between the components of wilderness character, not from attempting to apply interventions outside wilderness.

Although one might disagree with this decision, the process is true

to the spirit of the minimum requirements analysis. Primary attention was given to optimizing wilderness character, in this case crafting a desired future condition that represented a compromise between the conflicting components of naturalness and untrammelled (Landres et al. 2005). This compromise was codified in a management objective that defined the desired future condition. A management prescription was developed that was a combination of different treatments being conducted in a carefully specified number of stands. The “minimum” activity designation comes as much from intervening in the minimum number of places as from the minimum obtrusiveness of the intervention.

Whitebark Pine

In the western United States, populations of whitebark pine are being decimated by the nonnative pathogen that causes whitepine blister rust. Whitebark pine loss is aggravated by fire management policies, particularly by suppression of fires. This tree species grows at timberline, and much of its range is in wilderness, from Washington south to southern California and east to Idaho, Montana, and Wyoming. Severe whitebark pine mortality is deleterious to grizzly bear populations (see figure 2), because bears depend on whitebark seeds for a significant portion of their diet (Mattson et al. 1991). Clearly, extensive loss of this



Figure 2—Grizzly bears are a wilderness-dependent species of wildlife. Photo by George Wuerthner.

species adversely affects wilderness character, through loss of naturalness as well as scenic values.

As is the case with the adelgid, intervention to protect and restore whitebark pine trees is possible. In particular, some whitebark pines are naturally resistant to blister rust. Such trees can be protected in the wild. Their seeds can be collected and used to restore decimated whitebark populations (Tomback et al. 2001). Such manipulations clearly represent a significant trammeling of wilderness. But, as with hemlocks and adelgids, perhaps the best compromise for wilderness—the way to minimize the aggregate loss of wilderness character at large spatial scales—is to restore some, but not all whitebark pine stands. If so, it is important to use the best available science to prioritize restoration efforts across the high mountains of the western United States, both inside and outside wilderness. Similar

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analyses might be useful for other large-scale manipulations, such as management-ignited fires.

Conclusions

Big wilderness issues are complex and need to be solved at large spatial and temporal scales. Traditional approaches, such as case-by-case decision making and trying to take action outside wilderness, may do more harm than good. The concept of the minimum requirement still provides an appropriate “way of thinking” about these big issues. However, the procedures in the Minimum Requirements Decision Guide need to be modified in order to deal effectively with big wilderness stewardship issues. In particular, more attention needs to be given to describing desired future conditions in as much specificity as possible. This will often require decision makers to make controversial decisions about how to compromise between competing objectives, each of which is championed by a different stakeholder group.

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In addition, implementation plans need to be highly place-specific. The most appropriate and minimum activity has as much to do with where action is taken as it does with what actions are taken. This can also be more controversial, because specific places have varied meanings for different stakeholders, and these meanings may translate into opposing positions regarding how those places ought to be managed, even in wilderness.

Last, but not least, dealing with big issues challenges both our scientific and our institutional capacities. Scientific uncertainty increases as scale increases. Although scientists may know how to save an individual hemlock tree or stand from the adelgid, their knowledge about how many trees to protect and how to distribute protected stands across landscapes is more rudimentary. Similarly, the capacity of our institutions to plan decreases as scale increases. Institutions, such as the Forest Service, are highly decentralized. This makes it challenging to develop a large-scale regional plan, in which different values are maximized in different places. The future value of our wilderness system will largely turn on our ability to devise innovative compromises between competing objectives, in a world with fewer win-win solutions. This, in turn, will depend on the ability of science and institutions to plan and optimize value at large spatial scales. **IJW**

REFERENCES

- Cheah, C.A.S., and M. S. McClure. 2002. *Pseudotsugus tsugae* in Connecticut forests: The first five years. In *Proc., Hemlock Woolly Adelgid in the Eastern United States Symposium*, ed. B. Onken, R. Readeon, and J. Lashomb (pp. 150–65). East Brunswick, NJ.: Rutgers University.
- Cole, David N. 1996. Ecological manipulation in wilderness: An emerging management dilemma. *International Journal of Wilderness* 2(1): 15–19.
- . 2000. Paradox of the primeval: Ecological restoration in wilderness. *Ecological Restoration* 18(2): 77–86.
- . 2003. Agency policy and the resolution of wilderness stewardship dilemmas. *The George Wright Forum* 20(3): 26–33.
- . 2005. Symbolic values: The overlooked values that make wilderness unique. *International Journal of Wilderness* 11(2): 23–27.
- Cole, David N., and Peter B. Landres. 1996. Threats to wilderness ecosystems: Impacts and research needs. *Ecological Applications* 6: 168–84.
- Franklin, J. F., and G. H. Aplet. 2002. Wilderness ecosystems. In *Wilderness Management: Stewardship and Protection of Resources and Values*, ed. J. C. Hendee and C. P. Dawson (pp. 263–285). Golden, CO: Fulcrum Publishing.
- Hendee, J. C., G. H. Stankey, and R. C. Lucas. 1978. *Wilderness Management*. USDA Forest Service Miscellaneous Publ. No.1365.
- Landres, P., S. Boutcher, et al. 2005. Monitoring selected conditions related to wilderness character: A national framework. Fort Collins, CO: USDA Forest Service Rocky Mountain Research Station General Technical Report RMRS-GTR-151.
- Mattson, D. J., B. M. Blanchard, and R. R. Knight. 1991. Food habits of Yellowstone grizzly bears. *Canadian Journal of Zoology* 9: 1619–29.
- Mayer, M., R. Chianese, T. Scudder, J. White, K. Vongpaseuth, and R. Ward. 2002. Thirteen years of monitoring hemlock woolly adelgid in New Jersey forests. In *Proc., Hemlock Woolly Adelgid in the Eastern United States Symposium*, ed. B. Onken, R. Readeon, and J. Lashomb (pp. 50–60). East Brunswick, NJ: Rutgers University.
- Steward, V. B., and T. A. Horner. 1994. Control of hemlock woolly adelgid using soil injections of systemic insecticides. *Journal of Arboriculture* 20: 287–88.
- Tomback, D. F., S. F. Arno, and R. E. Keane, eds. 2001. *Whitebark Pine Communities: Ecology and Restoration*. Washington, DC: Island Press.
- USDA Forest Service. 2005. *Environmental Assessment: Suppression of Hemlock Woolly Adelgid Infestations*. Asheville, NC: National Forests in North Carolina.

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