

Wilderness Social Science

Responding to Change in Society, Policy, and the Environment

ALAN E. WATSON AND H. KEN CORDELL

Abstract: Wilderness social science has changed over the 50 years since passage of the Wilderness Act. This research was initially heavily influenced by the need to operationalize definitions contained in the Wilderness Act, the desire to report use levels, and the need for better understanding of the important values American people attached to wilderness. Over the past three decades, however, wilderness science was guided by new questions asked by managers due to changes in society, technology, and use patterns. Scientists have collaborated with managers to provide solutions to changing science needs and changing relationships between the U.S. population and wilderness. This article summarizes these changes and highlights contributions to wilderness and other protected area management solutions.

Introduction

Even before the Wilderness Act passed and provided a “definition” of wilderness, social scientists explored how people defined wilderness and how those perceptions might help managers once Congress legally defined it. At the Boundary Waters Canoe Area in Minnesota, for example, Lucas (1964) initiated research to understand various ways people described the wilderness character of places. He was exploring differences between motor boaters and canoeists in an area where both user types were well established, anticipating the challenges of changing use in areas protected for their wilderness character, and maybe even the possibility of special provisions that enabled some “nonconforming” uses to continue in wilderness (see Figure 1).

For many years after passage of the Wilderness Act, research by Stankey (1973) and others (e.g., Roggenbuck et al. 1993; Williams et al. 1992), was strongly driven by a passage in the Wilderness Act that indicated the visitor should be able to experience solitude or primitive and unconfined recreation opportunities. Early scientists operationalized this legal definition by exploring how numbers of encounters with others in wilderness influenced trip satisfaction. The potential implication was that managers should consider controlling visitor numbers or distribution so that visitors would not feel excessively



Alan E. Watson: Photo courtesy of the ALWRI.



H. Ken Cordell: Photo by Babs McDonald.

crowded in wilderness (a surrogate for solitude). In this approach, other recreation users were initially perceived as a threat (to solitude). The Limits of Acceptable Change (LAC) (Stankey et al. 1985) planning process was introduced by Stankey (1973) as an alternative way to systematically address recreation carrying capacity in wilderness by focusing on how recreation use threatened specific attributes of the wilderness environment (social and biological).

This Limits of Acceptable Change concept greatly influenced research efforts and planning approaches, was

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eventually incorporated into the Forest Service handbook and generated similar National Park Service efforts (see NPS 1997) to implement an indicator-based planning system. With LAC there is less focus on numbers of people (unless numbers are truly the problem) and more emphasis on the levels of impact people have on attributes of the wilderness resource. A great deal of research occurred across wilderness and other wildlands to help managers obtain input from visitors in selecting specific indicators and determining how much change in these indicators (defined by standards) they might allow.

Today, these indicator-based planning systems are widely used in wilderness planning in the United States (McCool and Cole 1998) and in other countries. Just since the turn of the century, however, social scientists (see Glaspell et al. 2003) have invested great effort in developing understanding of wilderness experiences in previously understudied Arctic areas to allow development of indicators and support indicator-based applications that may be distinct from past applications. More than half of our National Wilderness Preservation System (NWPS) is in Alaska, and its distance from population centers, difficult access, challenging conditions, and special provisions for transportation and subsistence use by rural people add dimensions to the wilderness experience. Watson et al. (2007) presented the culmination in an Arctic and sub-Arctic initiative and the most complete exploration of how this type of indicator-based planning system fits into other ecological indicator systems being employed, as well as other human well-being indicator systems around the world. Academics and managers have been able to replicate some of the Arctic studies,

particularly the one at Gates of the Arctic National Park and Preserve (Glaspell et al. 2003), to make good use of this line of research in aiding selection of indicators and proposing standards for a broad range of public uses and both contributing and threatening forces on wilderness character. Benefits extended well beyond Arctic and sub-Arctic applications.

Recreation use monitoring was also an important wilderness social science effort with roots in the 1960s, and it continues to be an important application function of wilderness social science today. Forest Service scientists (see James 1967) initiated efforts to address manager needs to estimate recreation use to all dispersed outdoor recreation sites and eventually with specific applications to wilderness (Lucas et al. 1971). Managers often ask for assistance with sampling issues, deciding on methods of measurement, what to measure, and how often to develop monitoring estimates. A manual was developed to help managers identify their use and user monitoring objectives, the type of system that could provide this information, technology and sampling considerations, and data analysis methods (Watson et al. 2000).

Beyond Solitude, Crowding, and Monitoring – Part 2

Many factors drove change in wilderness social science beyond solitude protection and use monitoring in the 1980s and 1990s. Changes in science personnel in Forest Service Research, political challenges to the integrity of wilderness through introduction of expanded access proposals, and, in general, increased demand on limited outdoor resources saw expansion of the Forest Service wilderness research program to an interagency research



Figure 1 – At the Boundary Waters Canoe Area Wilderness in Minnesota, conflict research between canoeists and motorboats preceded wilderness designation.

unit in 1993. Development of the Aldo Leopold Wilderness Research Institute was a response to rapid expansion of the wilderness research program into new topics and to areas not previously studied.

While conflict between motorboaters and canoeists seemed an important research issue in the 1960s, this particular conflict was not widespread in the NWPS due to normal exclusion of motorized and mechanized transportation in wilderness. In the recreation literature, however, scientists drew on this research and other efforts to understand conflict between recreationists and proposed a model to explain conflict by the early 1980s (Jacob and Schreyer 1980). This model was commonly used in manager training, and it influenced a long line of research in recreation, with various elements of the model actually becoming major research topics themselves. It wasn't until the late 1980s and early 1990s that research had advanced to the point that full applications of the model were possible in developing potential solutions to conflict and propose long-term monitoring of conflict levels.

A rash of conflict research in the early 1990s was precipitated by two events. First, while there was no specific amendment to the Wilderness Act ever developed or submitted to a congressional vote, in subcommittee there was discussion of opening up wilderness to bicycle use. With the advent of mountain bicycle technology, some advocates felt that opening wilderness to bicycle access could increase wilderness use, relevance, and support. This movement never really caught traction, although it did generate lots of questions that research had not addressed up to that point. The wilderness science community responded with some of the first research on conflicts between bicycle use and other uses (Watson et al. 1991), with some speculation about how bicycle use in wilderness might impact other users. This research was never used to help manage bicycle use in wilderness, but it provided a foundation for expanded wilderness conflict research and many manager applications outside of wilderness at outdoor recreation sites popular for mountain biking.

Second, with a limited amount of wilderness attracting increasing use and varied types of users, other conflicts were becoming more common, and managers were strongly motivated to address them. Rather than purposes of “solitude or primitive and unconfined recreation experiences,” there was increasing interest in the Wilderness Act’s stated purpose of “enjoying wilderness as wilderness.” When in conflict with other users or their impacts, it was difficult to enjoy wilderness visits, particularly if some experienced users felt new users were invading their spaces with activities or attitudes not considerate of wilderness purposes.

The most visible conflict in wilderness around 1990 was between hikers and recreational stock users. This precipitated coordinated research on a large scale to understand issues such as (1) what the contributors to conflict are, (2) differences between the eastern and western United States, (3) differences between conflict with outfitted and nonoutfitted stock use, (4) conflicts between hikers and both day stock use and overnight stock use, (5) conflict with stock use in national parks and on national forest wilderness, and (6) conflict with different types of recreational stock (Watson et al. 1993). This research has often been quoted in efforts to solve conflict issues, particularly in the Sierra Nevada Wildernesses of California, where this research reappears periodically and is reexamined to help managers look for new solutions to persistent conflict issues. Recreation stock use is down in these areas, however, and more recent research in this region no longer tends to focus on an issue so important in the 1990s.

Another indication of how societal change can influence wilderness social science was the response of managers and scientists to the Recreation Fee Demonstration Program. When Congress voted to allow federal agencies to collect more user fees for public land access, with the intent of keeping more receipts for local use, there was great uncertainty about where to charge fees, how much to charge, and how to evaluate the effect on visitor experiences. Many felt that wilderness users were possibly the most threatened by new user fees, but they could also benefit substantially from proper use of fees for restoration or information programs. There was a flurry of research at the time of initiation of these

fees that was not focused solely on wilderness but rather on how wilderness use fees might be different from other recreation use fees (Watson and Herath 1999). Research articles were generated to assist all interests in learning about fee issues that could help shape policy, and entire theme issues of journals were produced and opinion pieces generated that shaped academic research programs and manager knowledge and opinion about fee programs in wilderness. This research was important to making decisions about wilderness fee uses (based on public preferences) and whether to charge them at all. Inquiries have found very little recent fee research connected to wilderness.

It was not only changes in society and policy, however, that drove changes in research during this era. Beginning with research by Patterson et al. (1998) and Borrie and Roggenbuck (1998), wilderness social science became more grounded in visitor experiences themselves and less driven by the Wilderness Act. A very small wilderness in Florida became the single area we seemed to know the most about for several years, although Juniper Prairie could hardly be described as the “typical” wilderness. It was small, mostly water-based, and mostly comprised of day use. A hermeneutic approach to data collection and interpretation focused on understanding the experience of visitors as it unfolded, while an in situ study of trip focus identified the ebbs and flows of the experience. These refreshing “open book” approaches provided managers with understanding of how they might define and protect not only solitude or primitive and unconfined recreation experiences but also challenge, way-finding, immersion in nature, and other dimensions of the experience not well-defined in

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the Wilderness Act. They are obviously important aspects of “enjoying the wilderness as wilderness” and are heavily influenced by visitor management, visitor numbers, and visitor behaviors.

More than half of the National Wilderness Preservation System is located in Alaska. Wilderness research, beyond some simple replications of recreation preference studies, was nearly nonexistent in Alaska until after 2000. Building on Juniper Prairie success, studies at Gates of the Arctic National Park and Preserve, Denali National Park and Preserve, and Wrangell–St. Elias National Park and Preserve provided new insights into contributing and threatening influences on visitor experiences. This research approach quickly led to expanded efforts to also apply such methods to understand how experiences among other users of the resource were different from recreation users and how their experiences could be protected, whether directed to do so by the Wilderness Act or not. There are several outstanding examples of expansion of wilderness social science to study Indigenous communities to understand contributions of wilderness to their well-being. Along the Situk River on the Tongass National Forest (Christensen et al. 2007), on the Togiak National Wildlife Refuge (Kluwe and Krumpke 2003), and in the Western Arctic Parklands (Whiting 2004), “enjoyment of wilderness as wilderness” took on new meaning for a local, rural, indigenous user. It wasn’t only about recreation or subsistence, it also included expression of humility, contribution to identity, and protection of traditional skills. New knowledge emerged through changing to a more inclusive research question and applying more

qualitative research methods. This research paradigm still exists and is now applied at a growing number of places with new contributions to solving conflicts. Alaska Native and American Indian perceptions of wilderness meanings are important expansions of the previously narrow social science focus on recreation participation in wilderness (Watson 2011). Expanding our understanding of the trade-offs involved in wilderness designation and stewardship has been an important role of social science.

Society-Level Values

An important line of wilderness social science research to address society-level awareness and values attached to wilderness has also evolved from its start in the 1960s. The U.S. public has been asked what they value about wilderness protection and whether they support designating more federal land as wilderness. The importance of this research is that of informing legislators, land-management agencies, designation advocates, and other interests about public support for wilderness. Until the early 1960s, little research was conducted to evaluate the public sentiment toward protected wilderness. One study, commissioned by the Outdoor Recreation Resources Review Commission (ORRRC 1962) highlighted two broad classes of wilderness values: recreation and indirect. Indirect values were defined to include conservation ethics, scientific uses, and “the wilderness idea.” The wilderness idea established the roots of the concept of existence value—valuable because it is there and has been designated for protection from development and exploitation.

Early economic value studies of recreation benefits were primar-

ily aimed at valuing recreation visits to wilderness. The ORRRC study, and others that followed, often attempted to estimate the per-acre value of wilderness and to provide a framework for considering allocation of additional public land to wilderness status. Behind the ORRRC recreation-demand study was a survey of wilderness users who reported that among the 21 benefits of wilderness visits asked about, the most important values (“appeals”) were to observe natural beauty, get away from sights and sounds, and get away from work pressures.

Throughout the 1970s a variety of studies and articles appeared that further illuminated the range of values attributed to wilderness protection, beyond on-site recreation experiences. In part this advancement sprang from the work of natural resource economists who advanced the notion that on-site recreation visit values captured only a part of the total value. Krutilla and Fisher (1985) were among a number of thought leaders in the concept of total value. Whether seen through the research eyes of economics, or other disciplines, the idea that the societal, total value of wilderness is multidimensional was taking shape.

In 1980, Haas et al. (1986) took the idea of multiple values further by developing and applying a 13-item wilderness values scale. The emphasis was on moving past the idea that the only value of wilderness is its recreational use value. Most highly valued by respondents were protection of water quality, wildlife habitat, and air quality. Next were bequest (future generations) and option (future own use) values. Following these values were those of seeing wilderness as a contemporary recreation opportunity and scenic beauty.



Figure 2 – Americans value wilderness: 90% of Americans indicate protection of both air quality and water quality are extremely important.

Research to broaden understanding of the public's support for wilderness was extended through a set of questions included in the 1995 National Survey on Recreation and the Environment. The survey asked about awareness of the NWPS, whether there is adequate acreage protected, and the importance of various benefits or values. The findings indicated broad public support for wilderness protection, mainly for its ecological and environmental quality and off-site values. This survey was followed in 2000 by a replication of the values scale (Cordell et al. 2003). The findings indicated that while more people in 2000 were aware of the NWPS, increased awareness did not increase support for additional acreages. The public in 2000 placed greatest importance on ecosystem services, existence value, recreation, and future use options. Throughout

this expansion, however, recreation use of wilderness has remained a chief focus of both managers and researchers.

This line of research remains important today. Further study was conducted to identify whether there were detectable trends in how Americans value wilderness (Cordell et al. 2008). Two values stood out: 90% of Americans indicated that protection of air quality and water quality were extremely important (see Figure 2). Four additional values (protecting wildlife habitat, having wilderness for future generations [bequest value], protecting rare plant and animal species, and preserving unique plants and animals) also stood out, as more than 80% indicated very important to extreme importance.

Wilderness Social Science: Full Maturity

Wilderness social science research in 2014 doesn't much resemble wilderness social science research in 1964. Those of us who trained in forestry or recreation management or forest economics were a big part of the transformation, responding to law and policy changes, changing society, changing threats to wilderness, and changes in the research approach. The topics today are mostly different, the methods can be very different, and the quantity has increased substantially. After 50 years of science to support wilderness stewardship, it is clear that the initial decision to focus research on meeting the directly stated intents within the Wilderness

Act was productive and contributed not only to management decisions immediately but also to evolving planning systems that would last up to the present. The Limits of Acceptable Change planning system and other indicator-based approaches are a fine legacy for wilderness research and application. Replication of recreation research accomplishments to address new uses or changing users was productive, has led to refinement of planning systems applications, and continues to contribute to wilderness protection today.

As in a great deal of science today, however, there is extreme interest in how climate change will affect our lives in the future. While at first a great deal of effort was aimed at understanding the role of wilderness protection and possibly new designations in climate change mitigation, today there is no question that a previously underrecognized value of wilderness is as a baseline of relatively low human influence to understand climate change impacts on natural systems. And along with this recognition worldwide comes the realization of a dilemma: there are new demands on wilderness for installation of measurement devices, more traffic to support monitoring in remote locations, and more pressure for decision makers to review proposals for achieving the scientific values of wilderness (Carver, McCool, Krenova, and Woodley 2014). We are constantly engaged in the debate about protecting or restoring nature and the trade-offs encountered from the impact of management actions on wildness. The role of wilderness (and appropriate management intervention) in providing water-based ecosystem services and restoring natural fire processes will take on new challenges

and significance in rural and urban communities in future scenarios.

Tracking changes in priorities for wilderness protection benefits will continue to be of interest to managers, politicians, and the public. As our society changes in its relationship with wilderness, we are anticipating all of society to pay more attention to ecosystem services flowing from wilderness protection and the contribution wilderness has to make to science. Clean water, wildlife migration corridors, airsheds, filtration of groundwater, cultural practices, and recreation will all only become more important to us as a society. But will these issues become less controversial in the political arena? Will the U.S. National Wilderness Preservation System continue to expand? Will new interpretations of the values of wilderness be widely accepted as we continue to move away from a limited perception of the value of wilderness as a playground and more toward recognition of wilderness as part of our identity, part of our necessary lifeline to support human life on Earth, and a demonstration of our ethic toward nature and future generations? These are some of the challenges wilderness social science will face in the coming decades.

References

- Borrie, W. T., and J. W. Roggenbuck, 1998. Describing the wilderness experience at Juniper Prairie Wilderness using experience sampling methods. In *Wilderness and Natural Areas in Eastern North America: Research, Management and Planning*, ed. D. L. Kulhavy and M. H. Legg. (pp. 165-172) Nacogdoches, TX: Stephen F. Austin State University, Arthur Temple College of Forestry, Center for Applied Studies.
- Carver, S., S. McCool, Z. Krenova, M. Fisher, and S. Woodley. 2014. Fifty years of wilderness science: An international perspective. *International Journal of Wilderness* 20(2): this issue.
- Christensen, N., A. Watson, and J. Burchfield. 2007. Relationships to place in wildland resources management: Developing an effective research approach. In *Science and Stewardship to Protect and Sustain Wilderness Values: Eighth World Wilderness Congress Symposium: September 30–October 6, 2005, Anchorage, AK*, comp. A. Watson, J. Sproull, and L. Dean (pp. 470–478). Proceedings RMRS-P-49. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Cordell, H. K., C. J. Betz, and G. T. Green. 2008. Nature-based outdoor recreation trends and wilderness. *International Journal of Wilderness* 14(2): 7–9, 13.
- Cordell, H. K., M. A. Tarrant, and G. T. Green. 2003. Is the public viewpoint on wilderness shifting? *International Journal of Wilderness* 9(2): 27–32.
- Glaspell, B., A. Watson, K. Kneeshaw, and D. Pendergrast. 2003. Selecting indicators and understanding their role in wilderness experience stewardship at Gates of the Arctic National Park and Preserve. *George Wright Forum* 20(3): 59–71.
- Haas, G. E., E. Hermann, and R. Walsh. 1986. Wilderness values. *Natural Areas Journal* 6(2): 37–43.
- Jacob, C. R., and R. Schreyer. 1980. Conflict in outdoor recreation: A theoretical perspective. *Journal of Leisure Research* 12: 368–380.
- James, G. A. 1967. *Recreation Use Estimation of Forest Service Lands in the United States*. Research Note SE-79. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station.
- Kluwe, J., and E. E. Krumpel. 2003. Interpersonal and societal aspects of use conflicts: A case study of wilderness in Alaska and Finland. *International Journal of Wilderness* 9(3): 28–33.
- Krutilla, J. V., and A. C. Fisher. 1985. *The Economics of Natural Environments*. Baltimore: Johns Hopkins University Press.
- Lucas, R. C. 1964. *The Recreation Capacity of the Quetico-Superior Area*. Research Paper LS-15. St. Paul, MN: U.S. Department of Agriculture, Forest Service, Lake States Experiment Station.
- Lucas, R. C., H. T. Schreuder, and G. A. James. 1971. *Wilderness Use Estimation: A Pilot Test of Sampling Procedures on the Mission Mountains Primitive Area*. Research Paper INT-109. Ogden, UT: USDA Forest Service, Intermountain Forest and Range Experiment Station.
- McCool, S. F., and D. N. Cole. 1998. Experiencing Limits of Acceptable Change: Some thoughts after a decade of implementation. In *Proceedings: Limits of Acceptable Change and Related Planning Processes: Progress and Future Directions, 1997, May 20–22, Missoula, MT*, comp. S. F. McCool and D. N. Cole (pp. 72–78). General Technical Report INT-GTR-371. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Outdoor Recreation Resources Review Commission. 1962. *Wilderness and Recreation – A Report on Resources, Values, and Problems*. ORRRC Study Report 3. Washington, DC.
- Patterson, M. E., A. E. Watson, D. R. Williams, and J. R. Roggenbuck. 1998. An hermeneutic approach to studying the nature of wilderness experiences. *Journal of Leisure Research* 30(4): 423–452.
- Roggenbuck, J. W., D. R. Williams, and A. E. Watson. 1993. Defining acceptable conditions in wilderness. *Environmental Management* 17(2): 187–197.
- Stankey, G. H. 1973. *Visitor Perception of Wilderness Recreation Carrying Capacity*. Research Paper INT-142. Ogden, UT: USDA Forest Service, Intermountain Forest and Range Experiment Station.
- Stankey, G. H., D. N. Cole, R. C. Lucas, M. E. Petersen, and S. S. Frissell. 1985. *The Limits of Acceptable Change (LAC) System for Wilderness Planning*. General Technical Report INT-176. Ogden, UT: USDA Forest Service, Intermountain Forest and Range Experiment Station.
- National Park Service. 1997. *VERP: The Visitor Experience and Resource Protection (VERP) Framework*. Denver, CO: U.S. Department of the Interior, National Park Service, Denver Service Center.
- Watson, A. E. 2011. The role of wilderness protection and societal engagement as indicators of well-being: An examination of change at the Boundary Waters Canoe Area Wilderness. *Social Indicators Research*, DOI 10.1007/s11205-011-9947-x.
- Watson, A. E., D. N. Cole, D. L. Turner, and P. S. Reynolds. 2000. *Wilderness Recreation Use Estimation: A Handbook of Methods*

Continued on page 33

- Walsh, R. G., G. L. Peterson, and J. R. McKean. 1989. Distribution and efficiency effects of alternative recreation funding methods. *Journal of Leisure Research* 21(4): 327–347.
- Walsh, R. G., J. B. Loomis, and R. A. Gillman. 1984. Valuing option, existence and bequest demands for wilderness. *Land Economics* 60: 14–29.
- Walsh, R. G., and L. O. Gilliam. 1982. Benefits of wilderness expansion with excess demand for Indian Peaks. *Western Journal of Agricultural Economics* 7(1): 1–12.
- Weber, M. A., P. Mozumder, and R. P. Berrens. 2012. Accounting for unobserved time-varying quality in recreation demand: An application to a Sonoran Desert Wilderness. *Water Resource Research* 48, W05515, doi:10.1029/2010WR010237
- Wilderness.net. 2014. Creation and growth of the National Wilderness Preservation System. Retrieved March 13, 2014, from www.wilderness.net/NWPS/fastfacts.
- Withey, J.C. et al. 2012. Maximising return on conservation investment in the conterminous USA. *Ecology Letters* doi: 10.1111/j.1461-0248.2012.01847.x.
- J. M. BOWKER is a research social scientist, USDA Forest Service, Southern Research Station, Athens, GA, 30602, USA; email: mbowker@fs.fed.us.
- H. KEN CORDELL is an emeritus scientist, USDA Forest Service, Aldo Leopold Wilderness Institute and Southern Research Station, Athens, GA 30602; email: kencordell@gmail.com.
- NEELAM C. POU DYAL is assistant professor at the University of Tennessee, Department of Forestry, Wildlife, and Fisheries, Knoxville, TN, 37996-4563, USA; email: npoudyal@utk.edu.

Continued from WILDERNESS SOCIAL SCIENCE, page 19

- and Systems. General Technical Report RMRS-GTR-56. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
- Watson, A., B. Glaspell, N. Christensen, P. Lachapelle, V. Sahanatien, and F. Gertsch. 2007. Giving voice to wildlands visitors: Selecting indicators to protect and sustain experiences in the eastern Arctic of Nunavut. *Environmental Management* 40: 880–888.
- Watson, A. E., and G. Herath. 1999. Research implications of the theme issues “Recreation fees and pricing issues in the public sector” (*Journal of Park and Recreation Administration*) and “Societal response to recreation fees on public lands” (*Journal of Leisure Research*). *Journal of Leisure Research* 31(3): 325–334.
- Watson, A. E., M. J. Niccolucci, and D. R. Williams. 1993. *Hikers and Recreational Stock Users: Predicting and Managing Recreation Conflicts in Three Wildernesses*. Research Paper INT-468. Ogden, UT: USDA Forest Service, Intermountain Research Station.
- Watson, A. E., M. Roian, K. Knotek, D. R. Williams, and L. Yung. 2011. Traditional wisdom: Protecting relationships with wilderness as a cultural landscape. *Ecology and Society* 16(1): 1–14.
- Watson, A. E., D. R. Williams, and J. J. Daigle. 1991. Sources of conflict between hikers and mountain bike riders in the Rattlesnake NRA. *Journal of Park and Recreation Administration* 9(3): 59–71.
- Whiting, A. 2004. The relationship between Qikiktagrugmiut (Kotzebue tribal members) and the Western Arctic Parklands, Alaska, United States. *International Journal of Wilderness* 10(2): 28–31, 38.
- Williams, D. R., J. W. Roggenbuck, M. E. Patterson, and A. E. Watson. 1992. The variability of user-based social impact standards for wilderness management. *Forest Science* 38(4): 738–756.
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- ALAN E. WATSON is the supervisory research social scientist at the Aldo Leopold Wilderness Research Institute, Missoula, Montana; awatson@fs.fed.us.
- KEN CORDELL is emeritus scientist, Aldo Leopold Wilderness Research Institute and retired pioneering research scientist and project leader, Southern Research Station, Athens, Georgia.