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Wolf Handling at Isle Royale: Can We Find Another Approach?

Introduction

The Wilderness Act of 1964 lists "scientific use" as one of the public purposes of wilderness, yet it is evident that the recognition and/or acceptance of this wilderness use varies within those federal agencies that administer wilderness lands. Parsons (2000) discussed the legislative history that clearly supports the role of the scientific use of wilderness while at the same time noting the differences in agency philosophies and policies regarding the management of scientific activities within wilderness. In general, there is no common approach for managers to address the typical concerns associated with research activities in wilderness, such as requests to use motorized equipment or to conduct manipulative research. The resulting inconsistent responses by wilderness managers to research requests can lead to frustration for both parties.

Graber (1988) and Parsons (2000) argue for the values of scientific activities within wilderness. In the case of Isle Royale National Park, scientific activities have significantly enhanced the public appreciation of the wilderness character of the park and/or aided park management in managing for wilderness values. Such varied research projects in the park as the long-term study of wolf–moose relationships (Peterson 1977; Peterson et al. 1998), common loon productivity related to recreational use impacts (Kaplan et al., in press), social science research to identify the wilderness values sought by park visitors (Pierskalla et al. 1997), an inland lakes fishery inventory (Kallemeyn 2000), and the presence of contaminants in park wildlife and waters (Kaplan and Tischler 2000; Swackhamer and Hites 1988) are but a few examples of a wide range of important research activities that have contributed to the management of this island wilderness. Each of these research projects, however, involved debate and consideration of how to minimize the operational impacts of the research to wilderness values while still accomplishing the research objectives.

What follows is a case study from Isle Royale that describes the formal thought process that park managers and external researchers went through to address concerns about ecological and social impacts related to continuing the long-term wolf–moose research program in the park.

Particular aspects of this research project provided an opportunity to discuss the values of a specific research program within the broader context of managing the park as wilderness. Although elements of this case study have been described elsewhere (Oelfke and Wright 2000), this paper reports on the continuing evolution of that story.

Background

The wolves of Isle Royale National Park, Michigan, have been the subject of an intensive research and monitoring program since 1958. The benefits of this long-term project have been widespread and enduring, ranging from influencing park management practices and regulations (particularly in relation to visitor use of this island park) to the dissemination of natural history information on the species—information that played an influential role in reversing anti-wolf sentiment in North America beginning in the 1960s. The study has been a model research program within the National Park Service (NPS), highlighting the values of a commitment to long-term research and its value to park management.

On equal footing with the importance of the wolf in this park is the perception of the park as a unique wilderness resource, as a remote island archipelago where many of the direct influences of modern-day civilization are absent. Congressional designation of 99% of the land base of the park as wilderness in 1976 legislated this perception into law and NPS policy, necessitating management of the land base for wilderness values.

However, the needs of these two programs—the highly popular wolf research program and wilderness management of the park—occasionally come into conflict (Oelfke and Wright 2000). The natural tension that can exist between research methods and tools and minimizing their intervention on wildlife populations within wilderness requires thoughtful consideration of alternatives to balance the needs of each program's values.

The Isle Royale Landscape

Although the dual Isle Royale icons of wolves and wilderness are found elsewhere in North America, the setting in which they are found represents a unique wilderness resource. Isle Royale lies a minimum of 25 kilometers from the mainland of Ontario, Canada, across the cold, deep waters of Lake Superior. This separation has protected Isle Royale from excessive development and recreational use, including a lack of roads and hunting, both of which often impact wolf populations. The lack of adjacent land boundaries largely eliminates the issues of habitat fragmentation common to other protected areas and the political issues and ecological influences associated with terrestrial wildlife emigration/immigration, which can often heighten the need for active management of wildlife resources. Although certainly there have been human influences on park wildlife, the relative isolation of these populations permits consideration of managing wildlife for that elusive wilderness characteristic of "wildness," as a baseline of *wilderness* wildlife management at one end of the

wildlife management spectrum. Whereas the "hands-off" approach to wildlife management today has less usefulness in many other parks and wilderness areas, the unique characteristics of this landscape permits the consideration of this approach at Isle Royale primarily because of these values of wildness.

The Wolf Research Program

Now in its 45th year, the wolf and moose research program at Isle Royale has chronicled the rise and fall of these populations, and park management, the public, and the research community have appreciated the on-going reporting of that story (Figure 1). The unique landscape previously described, which has effectively isolated the wolf population, coupled with the "hands-off" research approach employed from the beginning of the research program in 1958, combined to make the wolf population and the research program immensely appealing for both their scientific and aesthetic values. The idea of an "untouched" wolf population became a hallmark feature. Documentation of the status and trends of the wolf population was adequately gathered through aerial surveys in the winter, and for the first 30 years of the program that was enough intrusion into their world. Wilderness management policies direct that the minimum requirement or tool be used when completing any action (including research) within wilderness, but the desire to perpetuate the aura of the untouched wolf population also con-

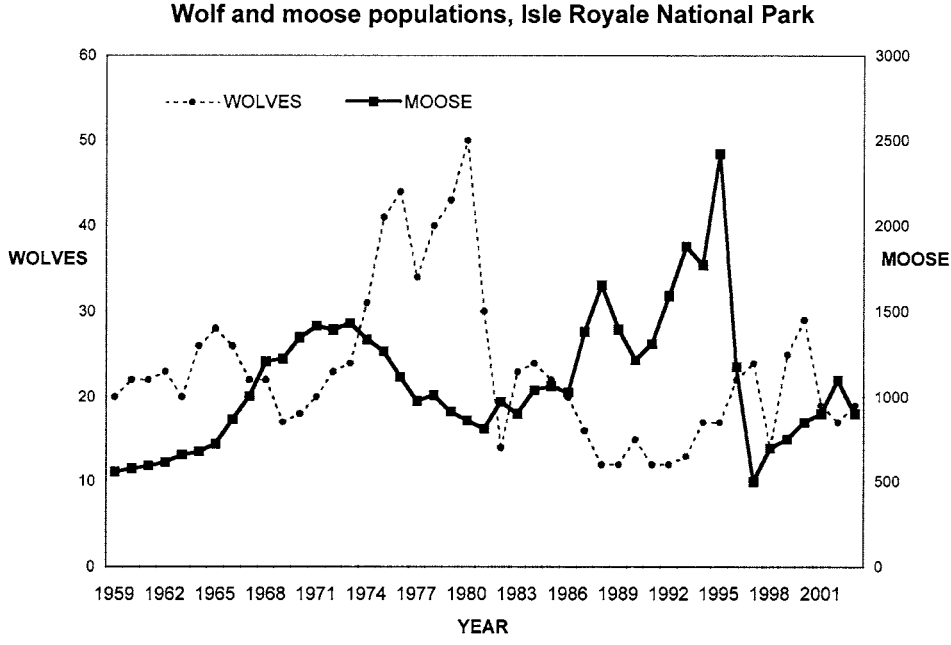

Figure 1. Comparison of wolf and moose population trends, Isle Royale National Park, 1959–2003

Table 1. Wolf and moose populations, Isle Royale National Park, 1959–2003

YEAR	WOLVES	MOOSE (est.)	YEAR	WOLVES	MOOSE (est.)
1959	20	556	1984	24	1,041
1960	22	576	1985	22	1,062
1961	22	591	1986	20	1,025
1962	23	612	1987	16	1,380
1963	20	656	1988	12	1,653
1964	26	675	1989	12	1,397
1965	28	720	1990	15	1,216
1966	26	865	1991	12	1,313
1967	22	1,002	1992	12	1,590
1968	22	1,207	1993	13	1,879
1969	17	1,222	1994	17	1,770
1970	18	1,348	1995	17	2,422
1971	20	1,416	1996	22	1,178
1972	23	1,395	1997	24	500
1973	24	1,430	1998	14	700
1974	31	1,337	1999	25	750
1975	41	1,268	2000	29	850
1976	44	1,117	2001	19	900
1977	34	976	2002	17	1,100
1978	40	1,010	2003	19	900
1979	43	912			
1980	50	862	**Avg.**	**23**	**1,090**
1981	30	811	**Max.**	**50**	**2,422**
1982	14	972	**Min.**	**12**	**500**
1983	23	900			

tributed to this research approach.

By 1980, the island's wolf population stood at 50, a density (one wolf per every four square miles) that was not sustainable. The population crashed, dropping to 14 animals by 1982. Expectations were that the wolf population would rise again to more stable levels. Indeed, the wolf population did rise over the next two years, but a sharp, prolonged decline occurred thereafter. By 1988, when the wolf population remained in the low teens despite an apparently ample food base, it was clear that something was awry in the population. Park management sought advice from both within the NPS and the external research community, and a peer-reviewed proposal in 1988 recommended the need to handle wolves on the island to assess the persistent wolf population decline and the high mortality rate. The practice of handling

wolves continued following a meeting of specialists that reviewed the first-year findings. During that period, no "end-date" for how long the handling was to continue was discussed; rather, most experts involved believed that answers to the questions of the wolf decline would be gained quickly and resolve the issue. Ultimately, disease was implicated as a major factor in the island's persistent wolf decline (Peterson et al. 1998).

Although the key focus of wolf handling was to assess the population decline, the insight gained into the population's genetic decline was quickly recognized for its scientific value on a broader scale (Wayne et al. 1991; Lehman et al. 1991; Peterson et al. 1998). The island's wolf population offered an unprecedented opportunity to examine the significance of genetic losses for long-term viability in a small, isolated population.

Wolf handling has continued to the present, with 20 wolves having been handled from 1988–2002. The wolf population remained low until a significant upturn started in 1994; by 2003 the population was only slightly below the study period's long-term average of 23 animals.

Values of the Wolf Research Program

There have been several substantive decisions made by park management that are the direct result of the wolf research program. Several of these decisions significantly affect visitor use in the park, including (1) a complete park closure to visitor use from November 1 through April 14 of each year, largely to facilitate the research program and prevent harassment of the wildlife through winter recreational activity; (2) prohibition of overnight camping in approximately 50% of the park to protect wolf denning sites and to keep visitors from coming into close contact with wolf pups, thus preventing habituation to humans; and (3) a prohibition of mammalian pets on the island to reduce the potential for disease introductions.

Other recognized values of the research program have included the wide dissemination of natural history information on the wolf and moose populations of the park, particularly as it has described these populations in an environment free of human harassment and interference. The public and scientific communities remain keenly interested in the annual updates of these populations.

Finally, as an example of the value of long-term data that will be sought through the developing NPS Inventory and Monitoring Program, the 30 years of wolf population data provided a compelling argument that significant change had occurred within the population. This change, recognizable in good part because of the length of the population dataset, helped convince park management that more intensive investigation was warranted, ultimately leading to the decision to begin the intensive handling of the wolf population.

Assessing the Issue of Wilderness Values and Wolf Research Program Needs

By the late 1990s, with the wolf population numbers back to the long-

term average and the question of the wolf decline largely settled, it was appropriate to examine the reasons for continued wolf handling in the park. As noted above, information from the wolf research program had enabled park management to make several science-based decisions in support of resource protection, and offered the scientific community and the public a fascinating look into the life history of this wolf population. Some of this insight was possible only through the live-capture and handling of individual wolves. At the same time, as understanding of the specific wolf decline episode became clearer, a timely argument to again examine the rationale for wolf handling was voiced. Admittedly, that voice came largely from park staff (as opposed to the public or external wilderness advocacy community), but it was appropriate that preservation of the wildness of the park's wildlife populations receive full consideration. The suite of characteristics that define the wilderness essence of Isle Royale—the isolated island landscape within the vastness of Lake Superior, a highly charismatic carnivore species with a history of minimal human influence, and the minimal developed nature of the island—all contribute to a unique wilderness personality of the park that established the seriousness of this debate. It was obvious that compelling arguments for and against continued wolf handling could be made; there simply was the need and desire to objectively address the issue.

Thus, park management brought together an independent scientific panel to assess the wolf handling issue and recommend a course of action to the NPS. It was felt an outside panel could provide an objective and scientifically valid opinion on the merits (and impacts) of continued handling. The scientific review followed the suggestions outlined by Meffe et al. (1998). The panel convened in April 1999, and consisted of three experts: two from the U.S. Geological Survey Biological Resources Division (USGS-BRD) and one from the interagency Aldo Leopold Wilderness Research Institute, along with participation from NPS employees and the project's principal investigator, Rolf Peterson. Panel members were selected based on expertise in wolf research and wildlife management and/or familiarity with wilderness and wildlife management in the NPS.

The expert panel reviewed pertinent information on the Isle Royale wolf population and the wilderness values associated with the park. The panel was then asked to provide a recommendation to park management on whether it was necessary to continue to handle wolves in the park or if the research program could return to a "non-handling" approach.

Review Panel Findings

The panel reviewed the relevant information and identified the advantages of handling and not handling wolves as a means to determine a recommendation. That information, with a recommendation, was submitted to park management in a summary report (Isle Royale National Park 1999).

Although there are numerous advantages of handling wolves in terms of the quality and quantity of

information that can be obtained, the most important advantage identified was that handling permitted the ongoing assessment of genetic change within a small population. This assessment is considered to have broad regional or global application and significance for understanding the genetics of isolated populations. The key advantage to not handling wolves, aside from the obvious removal of possible trapping injury or mortality to them, was the value of minimizing human influence on the population.

Ultimately, a consensus was reached that the scientific value to be gained from tracking the loss of genetic diversity of this population warranted the continued handling of the population. The panel recommended that handling should continue for the next five years (2000–2004), which was considered an adequate period to seek other methods for obtaining the genetics information. The park and researchers were also challenged to aggressively pursue other data gathering techniques that would not require handling, with wolf fecal-DNA as a source of genetic material identified as a possible technique to consider.

Both recommendations were followed, and research into the use of wolf fecal-DNA as a source of genetic material was initiated in 2001 through NPS and USGS-BRD funding and effort, with field collection of scat samples occurring in 2001–2002 and analysis continuing in 2003. Researchers were specifically asked to evaluate wolf fecal-DNA as a useful source of genetic material for monitoring genetic diversity within the island's wolf population.

Preliminary Findings of the Wolf Fecal-DNA Work

Seventy-two scat samples from the 2001 winter research program were analyzed for microsatellite DNA. Of these, DNA could be amplified in 38 (53%) of the samples. From these samples, 18 unique genotypes were detected, implying a population of 18 wolves. Aerial surveys conducted during the 2001 winter research program detected 17 wolves. It is not clear which estimate is correct; it is possible to miss a wolf during aerial surveys, but unlikely to overcount the population. It is possible to misidentify a wolf's genotype, and thereby over- or undercount wolves. However, this preliminary analysis indicates that fecal-DNA provides a very useful tool for monitoring the genetic diversity of the island's wolf population. Other estimates from the fecal-DNA, such as the sex ratio within the population, revealed less conclusive results based on the 2001 samples.

What is Next?

Wolf research at Isle Royale is unquestionably a valued activity within the park (to the point of being highlighted in the park's 1998 general management plan), in particular for monitoring and reporting on the genetic diversity within the population (as recommended by the expert review panel in 1999). The ability to return to a research program that does not include wolf handling to track that diversity appears feasible through the non-invasive fecal-DNA method. However, such an approach would come at the cost of readily tracking disease concerns within the popula-

tion, presently only obtainable through blood samples—which requires wolf handling. The advantages of tracking radio-collared wolves in terms of quantity and quality of observational data are also lost if handling is discontinued, but it is worth noting that high-quality observational data were obtained for the first 30 years of the study through purely non-invasive observational means.

Preliminary answers to the specific question asked of the recent wolf fecal-DNA research appear to provide the park with critical information for an important issue: that of balancing research methods with wilderness values. It is not a simple issue to resolve, as is true for many wilderness/minimum requirement issues in a park. Further, this particular issue of wildlife handling is fairly specific to Isle Royale, in the sense that such a restrictive view of wildlife handling is largely available for debate because of the unique landscape characteristics that are rarely found elsewhere.

That said, there are broader implications of this case study that should be of use in other wilderness areas. The specific non-invasive research methods employed in the Isle Royale wolf fecal-DNA project hold great promise for their applicability elsewhere, and complete results of that effort will be reported on following the 2003 analysis period. Perhaps more importantly, we believe the expert panel review approach offers the opportunity for an objective assessment of an issue that can be difficult for the principal parties to sort through (in this case, Isle Royale park management and the principal investigators) due to their long-term connection to the park and project. Although there is significant value in the intimate knowledge that both the researchers and park managers have of the park-specific issues of wolves and wilderness, there is also much to gain from consulting the objective minds of those with no direct or close ties to the issue.

Finally, it is somewhat ironic that the wolf research program, lauded for providing so much information that has aided park management in the past, has been called upon to provide new information that may make the continued *operational aspects* of the program a more difficult task. But resolving that question may ultimately come to this: is the enhancement of the wildness of the island's wolf population, so closely linked to the wilderness character of the island, worth enough to warrant returning primarily to the research methods last employed some 15 years ago?

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