THE GEORGE WRIGHT

# FORUM

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Dedicated to the Protection, Preservation and Management
of Cultural and Natural Parks and Reserves
Through Research and Education

# The George Wright Society




## Executive Office

*P. O. Box 65, Hancock, Michigan 49930-0065 USA*
☎ *1-906-487-9722; fax 1-906-487-9405*
*info@georgewright.org* ■ *http://www.georgewright.org*
David Harmon ■ Executive Director
Robert M. Linn ■ Membership Coordinator


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**On the Cover:** The Taking of the Gettysburg Tower. See the article by John Latschar on page 24.

# Society News, Notes & Mail

## GWS and the Future of the BRD

The advent of a new Administration in Washington is bringing questions about the future of the U.S. Geological Survey's Biological Resources Division. There have been persistent rumblings that the BRD will be dismantled and its scientists returned to their original agencies. As of this writing (early February), nothing concrete has materialized, and in fact there have been denials from various quarters that any such dismantling is being contemplated. Nonetheless, the perception remains. So, on January 18 the GWS sent a letter to the transition team to express our support for the continuation of the BRD. Our support for the BRD goes back to 1993 when its predecessor, the National Biological Survey, was created. Our position then was that the concept of NBS was good, but we had grave reservations about taking scientists out of the National Park Service to help stock the new agency. Once NBS became a *fait accompli,* however, the GWS took the position that we would fully support it and urge it to supply the best science possible to the national parks and other protected areas.

That remains our position today. In our January letter, we stated that "the bottom line is getting the best science, and the best scientists, delivered to the parks, no matter which organization delivers them. The parks need access to scientific research to guide and support management decisions on facilities, use, and long-term planning." Our main concern with any attempt to abolish the BRD is this: it would disrupt personnel so much that it "would effectively bring much-needed, timely scientific work to a grinding halt while the transition takes place—a process that could easily take many, many months." That, we feel, is too high a price to pay. And, in addition, there is the uncertainty of how the scientists would be merged back into their original agencies. We asked: "Would the budgets of the receiving agencies be boosted enough so that the incoming scientific programs are preserved intact, or would the receiving agencies only get enough money to cover salaries? If the latter, then the effect of abolishing BRD would be to abolish the vital scientific work it is carrying out. Would existing National Park Service science and resource management projects be raided to pay for new returnees? There are just too many uncertainties and too much potential disruption."

Instead, we urged the Administration to "fully fund BRD, to direct it to work closely with the client agencies in Interior, and to greatly increase the funding of all scientific programs affecting our nation's public lands. In particular, we urge the Administration to support the Park Service's Natural Resource Challenge. We believe that the BRD can play a key role in ensuring the success of this vital scientific and resource management initiative."

We realize that there is a significant division of opinion on this issue among the GWS membership. We have received impassioned letters pro and con: some feel that the BRD is the worst thing that has ever happened to science in the NPS, while others see it as the best. This disagreement is not new; we received similar letters from both sides back in 1993. If you feel strongly about this issue one way or the other, please let us hear from you—we want to be as responsive as possible to our membership and welcome your input. We will continue to monitor the issue closely. And, should the BRD in fact be dismantled, we will work to try to make the transition as smooth as possible and to ensure that the interests of science in the national parks are not short-changed in any way.

## Nominations Open for Board Election, 2001

The 2001 Board election, which will take place this September, is for the seats of two incumbents, Gary Larson and Rick Smith. Both incumbents are eligible for re-election to a second three-year term on the Board, and both have indicated that they will run for re-election. We are accepting nominations from those who wish to challenge them for these seats. The term of office runs from 1 January 2002 through 31 December 2004. Nominations are open through 1 July 2001. To be eligible, the nominator and nominee must both be GWS members in good standing (it's permissible to nominate one's self). The nominee must be willing to travel to Board meetings, which usually occur once a year; help prepare for and carry out the biennial conferences; and serve on Board committees and do other work associated with the Society. Travel costs and per diem for the Board meetings are paid for by the Society; otherwise there is no remuneration. Federal government employees who wish to serve on the Board must be prepared to comply with all applicable ethics requirements and laws; this may include, for example, obtaining permission from one's supervisor and/or obtaining a conflict of interest waiver. The Society can provide prospective candidates with a summary of the requirements. The nomination procedure is: members make nominations for possible inclusion on the ballot to the Board's nominating committee. The committee then, in its discretion, determines the ballot. Among the criteria the nominating committee considers when determining the ballot are the skills and experience of the potential nominees (and how those might complement the skills and experience of current Board members), the goal of adding and/or maintaining diverse viewpoints on the Board, and the goal of maintaining a balance between natural- and cultural-resource perspectives on the Board. (It is possible for members to place candidates directly on the ballot through petition; for details, contact the GWS office.) To propose someone for possible candidacy, send his or her name and complete contact details to:

Nominating Committee, The George Wright Society, P.O. Box 65, Hancock, MI 49930-0065 USA. All nominees will be contacted by the nominating committee to get background information before the final ballot is determined. Again, the deadline for nominations is 1 July 2001.

**John Donahue**

# Box 65: *Commentary from the GWS office and our members*

# A Second Century Of Stewardship: Mission 2016

This year the National Park Service (NPS) will mark its eighty-fifth anniversary as the nation's premier preservation agency. As we continue our stewardship of natural and cultural wonders on behalf of the people of the United States, we need to pause occasionally and determine if we are true to our mission. In these past nine decades the mission of this agency has grown and evolved into areas never envisioned by the founders. The American people now expect much more from the stewards of parks and historic sites than could ever have been imagined in the nineteenth century.

Having now left the twentieth century behind, many of the future dilemmas and mandates the NPS will face in the century ahead are still difficult for us to foresee. However, others are clearly evident and will require resolution before the new challenges can be faced. The aim of this paper is to challenge the employees of NPS, our partners, and the public to set a course for moving the agency forward in planning, preparation, and scientific knowledge for preservation in perpetuity. The purpose of the goals that follow is to provide a coherent context for NPS to present issues and solutions to the American people and their representatives in a manner that will allow for successful disposition of those issues. This agenda will focus the talent and energy of NPS professionals on the tasks most urgently requiring completion to prepare for the impending "Second Century of Stewardship." My fervent hope is that all concerned individuals and groups will suggest additional goals to be considered and implemented by the agency.

In order to meet the ever-more-difficult feat of providing visitation opportunities while preserving resources in an unimpaired state, we must first complete the tasks begun in the twentieth century. We must establish a far-reaching strategy for managing wildlife, wilderness, and historic structures and districts. We must integrate every programmatic mandate into the consciousness of every unit manager. Whether it is the River and Trails program or the National Register, every superintendent must feel a sense of ownership of these outreach activities. We must provide our workforce with the tools and the knowledge to meet visitors, partners, and antagonists on an equal footing.

The agency needs to focus for the next fifteen years on preparing for those tasks and completing the agenda of this rapidly closing first century of NPS existence. The following broad objectives could provide a cohesive context for the NPS family of employees, partners, and friends to cooperate over the next two decades while building a consensus with the public and their elected officials. We must finally answer definitively the question "What are national parks?" if we are to proceed boldly and successfully into the realm of twenty-first century challenges. We must solve the dilemmas that have plagued our past if we are to face the as-yet unimagined land management conundrums of the future.

The next NPS director should declare that it is our intention to mark the first century of preservation stewardship in America, not by self-congratulatory recognition of past achievements, but by building the workforce, the tools, and the constituency in this nation to surpass those achievements in our "Second Century of Stewardship."

### Mission 2016 Goals for the National Park Service

1. Assist the president and Congress in disposing of the twentieth-century wilderness proposals, dating back to 1970. The agency cannot continue to manage large portions of the land within its purview without final direction from Congress. Many of these areas have already been held in temporary status for thirty years.
2. Prepare a programmatic and systematic policy implementation for wildlife issues in all NPS units. The various populations are extremely distinct, but the problems and solutions are limited in number and in type. This issue requires a stronger centralized role.
3. Develop a critical review process for determining the appropriateness of inclusion of new sites within the National Park System. The process must be as objective as possible and be approved by Congress and the president, allowing decisions to be determined without political interference. An independent board composed of experts would apply the criteria submitted by the agency. These individuals should be drawn from diverse backgrounds and locations to ensure that the voice of the people is heard.
4. Establish a method of supplying scientific research for natural and cultural issues and applying objective academic peer review in a manner that is not impaired by the necessities of other management priorities. The NPS has experimented with numerous ways to investigate scientific dilemmas, but has yet to find one that is accepted by a majority of the academic and scientific community.

5. Integrate all of the legal mandates of the agency into the daily operational activities of every park, regional office, and the Washington office. The complex mission of NPS, as established by the Organic Act, has been enhanced and further complicated by the subsequent passage of numerous important laws, all of which need to be recognized and understood in an operational context by every employee.
6. Develop the strategic planning aspects of the agency to project future roles for NPS and to embrace areas of preservation that the public foresees as critical elements of the NPS role in the future. We have not, as an agency, always accurately judged the best interests of the public. We have been led into historic preservation, wilderness management, and partnership activities by some visionary leaders within NPS and by many members of the public outside the government. These important elements of today's NPS often were initiated against our will, but today we all see the value of them.
7. Create a workforce that represents a true picture of the American population. Diversity will include the full spectrum of racial, ethnic, and religious groups that make up the American population, but will also mean more. A diverse work force for NPS in the next century will include individuals with urban, suburban, and rural backgrounds. We will need academics and tradespeople, historians and biologists, not just by grade and series but by vocation and avocation. We need to have members of the NPS family who understand the psyche of visitors from metropolitan areas and foreign nations as well as from rural American areas. We have begun to make excellent progress in this area, but much remains to be done before the "face of America" greets us in every NPS unit.
8. Ensure that the NPS workforce has the basic necessities, amenities, and tools so that their private lives enhance their workplace effectiveness. Isolated parks need to have appropriate housing. Parks with local communities need to ensure that their employees are part of the local housing market and community life. People need to have their basic needs met in order to function efficiently in the workplace. We can no longer expect employees to function like a military force occupying some foreign land. While it is a valid goal to limit our housing liabilities, it is more important to supply the basic living needs to our staff in remote locations.
9. Maintain, as a basic element of the NPS mission, a sufficient level of technology to accomplish that mission. Technology will be at the core of our ability to pro-

tect the visitors and park resources in the coming years. Communications and computer technology will support every operational activity, from search and rescue to resource management.

10. Continue to provide technical assistance. The NPS is a force for leadership in park management around the world. Many of the areas of expertise within the agency, however, should also be developed for use by other sectors of the government and the public. For example, cultural centers that specialize in archeology, museum services, and cultural landscapes should be developed to assist other agencies and non-profit groups, and, in some cases, provide services for a fee. These centers, already in existence, should be nurtured and encouraged in their mission.
11. Provide specific and career-long developmental opportunities for employees. Career ladders must be established that allow individuals to find personal fulfillment from disciplines and management positions. Flexible competencies should be established that encourage employees, but also allow for individual initiative and career development within the civil service system.
12. Promote the heritage assets of the people of the United States in a manner that allows for increasing visitation without compromising the quality of a national park visit. The agency agenda for the future needs to be transparently non-partisan. It should be made as easy for a political representative to support parks as it is for their constituents to do so. An agency whose mandate is to protect in perpetuity should have broad plans for decades ahead that are not influenced by topical political activity. This goal may seem naïve, but it is in fact critical. The public supports parks regardless of political affiliation, and it is our burden to develop a way for the NPS's goals to become pervasive throughout the political system.
13. Develop transportation alternatives to allow for maximum visitation without degrading the resources. In some ways, railroads created the parks and automobiles peopled them. In the future, public transportation and reservation systems will keep them open to the largest number of visitors. Areas which allow special uses, such as the operation of off-road vehicles, should develop sustainable management systems for those high-impact recreational activities and limit them to the extent required for resource preservation.
14. Find a way to ameliorate the impacts of commercial consumptive uses and develop sustainable management practices for those uses. Some examples of consumptive uses that cause conflicts with preservation of re-

sources include grazing, mining, oil and gas development, and commercial fishing. NPS also must acquire, to the greatest extent practicable, all non-federal lands and interests within NPS units.

15. Participate in the larger land-use planning exercises that are taking place all over the country. We must work closely with other land managers and the public to find ways for state, federal, and private lands to manage visitation and recreation, and to sustain the larger ecosystems and wildlife corridors.
16. Maintain purity of purpose in the protection of parks. While we anticipate continued evolution of our mandates and the kind of sites we may manage in the future, the original mandate of preservation in perpetuity must be ingrained in every employee at every level. New directions the agency may take must grow from its core values and mission—not be incompatible and alien to them.
17. Continue and increase the relevance of the national parks to the population of the United States. This is the single most important goal for the management of NPS. The changing demographics of the nation and the varied cultural backgrounds of the people will demand a constant education effort. NPS must reach out to the inner cities, the suburbs, and the rural areas, and especially to new immigrant populations, through traditional outreach activities, the educational system, and telecommunications. The values that are the foundation of preservation efforts must continue to be taught to all of the people, if those values are to continue to be relevant.

If we celebrate our hundredth anniversary by preparing for a second century of stewardship, we will have demonstrated that we are indeed worthy of the trust that the likes of John Muir, Theodore Roosevelt, and Bob Marshall placed in us. More importantly, we will also have earned the trust and gratitude of future generations for our ability to think of their needs and to place those needs first. This great legacy we care for is ours to hold and to enhance, but never to diminish.

***John Donahue*** *is superintendent of Big Cypress National Preserve in Florida, and was formerly vice president of the GWS. Reminder: this column is open to all GWS members. We welcome lively, provocative, informed opinion on anything in the world of parks and protected areas. The submission guidelines are the same as for other GEORGE WRIGHT FORUM articles—please refer to the inside back cover of any issue. The views in "Box 65" are those of the author(s) and do not necessarily reflect the official position of The George Wright Society.*

**Bob Krumenaker**

# Wilderness and Natural Resource Management in the NPS: Another View

*[Ed. note: This comment on wilderness management from GWS president Bob Krumenaker continues the dialogue begun in the last issue by outgoing GWS president and National Park Service historian Richard West Sellars in his Box 65 article "The Path Not Taken: National Park Service Wilderness Management." The Society invites further discussion on the topic of wilderness management in the national parks, or of other topics of interest to the readers of THE GEORGE WRIGHT FORUM. There will be a plenary session on the new interagency report on wilderness at the upcoming GWS conference in April.]*

My friend and colleague Dick Sellars quite rightly points out in the last issue of the FORUM that many in the NPS natural resource management community are reluctant to take on wilderness management responsibilities. It may be indifference towards, or even outright distaste for, the restrictions placed on management activities within designated and proposed wilderness areas. I suspect, however, that it involves something more. In fact, in my own experience I would say that NPS natural resource managers are generally among the strongest supporters of wilderness values on the park staff.

Supporting wilderness values and taking on the organizational responsibility for wilderness management are, however, different (although related) things. What do we mean by "wilderness management," anyway? Some, of course, think it is an oxymoron—that wilderness, by definition, should not need to be managed. While that may be an ideal, if we didn't need to manage wilderness we would also not be lamenting that wilderness values are eroding. For wilderness management, in reality, is about (as the 1964 Wilderness Act says) the "preservation of outstanding opportunities for solitude or a primitive and unconfined type of recreation" on lands that retain their "primeval character."

Preservation of wilderness, then, is really about minimizing human influences on wilderness lands and on the wilderness experience of those who venture forth into these places. In that regard, I believe that our mandates for preserving natural resources within wilderness are no

more and no less than they are for other natural areas within the National Park System. And, as natural resource managers within NPS are already responsible for providing park superintendents with technical support and programmatic advice on how to preserve, restore, or maintain natural values in parks, organizational changes would make little difference in this regard. Hence, natural resource managers already have the *natural resources* responsibility within designated and proposed wilderness—but to preserve wilderness values, we have to manage more than resources.

Managing wilderness users and managing administrative intrusions are the real challenges of wilderness management, and it is in these areas that the legal and policy constraints of wilderness designation differ from other backcountry. The on-the-ground truth is that, in most parks with wilderness, users move from non-wilderness to wilderness and back in the course of their use of the park. We should make it clearer than we do when they are in wilderness and when they are not, but the key point is that a visitor-use permit system cannot and should not be separate and distinct for wilderness and non-wilderness. Use restrictions ought to be different in each area, and we can and must make that clear before visitors start their off-road trips.

I believe the reluctance of park natural resource staff to take on wilderness management stems more from the circumstance that backcountry permitting and use regulation, as well as decisions on administrative facilities, generally do not fall within the organizational purview of most natural resource managers, rather than from a lack of interest in seeing wilderness managed in accordance with legal intent. Few resource managers are eager to take on new responsibilities when they lack sufficient staff, and in most cases organizational power, to do their current jobs, let alone the new ones. That's true of everyone—so Dick and I certainly agree that to do wilderness "right" in the national parks, regardless of where it falls in the organization, we need to make sure there are people dedicated (in every sense) to the task and accountable for their performance.

Do resource managers have the expertise to take on wilderness management? Certainly they can develop it, just as good park rangers do. Interpreting the Wilderness Act on the ground is not a technical proposition, but one of managerial direction and the will and skills to implement it. I think the real problem is that in too many parks we still think of natural (and cultural, for that matter) resource management as separate from park operations. Where we have integrated resource management effectively with other operations, wilderness responsibilities make tremendous sense within the natural resource management program. At Isle Royale, for example, where 98% of the land area of the park is desig-

nated wilderness, the natural resource management staff led the design and implementation of the backcountry and wilderness permitting system in the 1980s, and are still today part of an interdisciplinary team that decides on use limits and site-specific design issues for trails and campsites. At Shenandoah, where 40% of the park is wilderness and the park organization has more depth, backcountry and wilderness management is a branch of the park's natural and cultural resource management division. The park's wilderness coordinator is the branch chief and oversees trail maintenance as well as the permit system. It works quite well, and the real opportunity that an integrated program encourages is that the expertise the park already has in natural resource inventory and monitoring can be applied to evaluation of wilderness conditions—which means measuring the impact of people on soils, vegetation, and other people's perceptions of solitude and enjoyment.

So, in sum, Dick Sellars and I agree that many in the NPS do not take our wilderness mandates seriously, and we need to change that. I don't care where wilderness management resides in a park, however, as long as our legal mandates for wilderness are taken seriously and field staff are provided the fiscal, personnel, and leadership support to do the job. I believe that in many parks, the wilderness role fits well into the natural resource management program, but the real need is to integrate resource management fully into park operations. If we accomplish that, wilderness can work well anywhere.

***Bob Krumenaker***, Valley Forge National Historical Park, P.O. Box 953, Valley Forge, Pennsylvania 19482-0953; bob_krumenaker@nps.gov

**Martine Landry**
**Vernon G. Thomas**
**Thomas D. Nudds**

# Sizes of Canadian National Parks and the Viability of Large Mammal Populations: Policy Implications

## Introduction

Canada's 39 national parks are intended to form a system of representative natural regions across the country. These parks are dedicated to the public for their benefit and education, while being maintained in an unimpaired state for future generations (Parks Canada 2000). However, the size and boundaries of the parks reflect competition from logging, mining, agriculture, and urban development occurring around them (Parks Canada 2000). There is renewed public and governmental concern about maintaining and restoring the ecological integrity of Canadian national parks. Most northern parks are still surrounded by wilderness, but southern parks are challenged from within and without by stresses that reduce ecosystem viability (Parks Canada 2000). Parks Canada has identified significant threats to all but one of the parks (Canadian Heritage 1998). The current zoning system for national parks is more reflective of historical land uses and facilities rather than designating lands within parks according to criteria for ecological integrity, and especially the temporal and spatial dynamics of wildlife populations (Parks Canada 2000).

Recent research (Newmark 1987, 1995; Glenn and Nudds 1989; Grumbine 1990; Gurd and Nudds 1999; Nudds et al. 1998a; Parks Canada 2000) has shown that North American parks do not protect many of the wild species that depend on them. Parks Canada is aware that managing parks as isolated areas is no longer appropriate, and that the parks' resources and value to visitors are being compromised by external land-use factors under provincial control as well as internal factors related to public use (Green 1984). Under the existing park zoning system, there is provision for legal protection of wilderness areas to prevent activities that could impair the ecological integrity of the parks (Canadian Heritage 1999; Parks Canada 2000). However, estimates of the minimum necessary size of parks

vary considerably (Gurd et al. in press), leading to different policy implications for management.

Most parks may not include large areas of pristine wilderness for their flora and fauna, and the status of such species may depend upon what happens outside of park boundaries. We examined whether Canadian national parks, as isolated areas, could sustain indefinitely their populations of wolves *(Canis lupus)*, black bears *(Ursus americanus)*, and grizzly bears *(Ursus horribilis)*. These species were selected because the minimum area requirement for mammals is usually larger than for other taxa, and because they are most sensitive to isolation and reduced habitat area (Schmiegelow and Nudds 1987). Mammalian carnivores also have larger home ranges than omnivores or herbivores of similar body size (Harestad and Bunnell 1979).

If the populations of these carnivores are deemed to be viable within the actual wilderness areas of the national parks, there is potential for these species to be managed sustainably within the parks. However, if the minimum critical area (MCA; Nudds et al. 1998b: 356) required for these three species exceeds the total useable area of habitat inside the parks, then provision to create legally protected areas of wilderness elsewhere must be made.

## Methods

The MCA for each species was calculated from the equation MCA = MVP/MVPD, where MVP is the minimum viable population size and MVPD is the minimum viable population size density. The MVP is that population size large enough to allow long-term persistence despite unpredictable genetic, demographic, and environmental changes (Shaffer 1981; Fritts and Carbyn 1995). The MVP can be affected by these parameters: sex ratio, age at first breeding (L), litter size, survival rate to age of first breeding (l), probability of breeding (b), and age distribution in the population (Table 1). The model of Reed et al. (1986) used to calculate the MVP is based on these parameters. This model applies to species with overlapping generations, and may be adjusted for monogamous species, such as wolves, or polygamous species, such as black bears and grizzly bears.

An effective population size of 500 individuals was used for both the monogamous and polygamous species. This effective population size is that which has been hypothesized to be sufficient to avoid the loss of genetic variability due to inbreeding and to minimize the effects of genetic drift over a long period of time (Reed et al. 1986). Estimates for demographic parameters used to calculate the MVP were derived from published studies (Table 1). A sex ratio of 1M:1F for adults was assumed for all species, even though such a ratio could be confirmed from the literature for only cubs and yearlings. Because direct information on the breeding sex ratio was lacking for black bears and grizzly bears, different MVP sizes (and an average MVP size) for these species were calculated using different sex ratios (Table 1).

**Table 1. Different MVPs with derived MCAs for wolves, grizzly bears, and black bears using the model developed by Reed et al. (1986) with different parameters.**

| *Species* | *Parameters* | *MVP* | *MCA (sq km)* |
|---|---|---|---|
| Wolves[1] | Largest L ; sex*, breeding 1:1 | 530 | 768[4] |
| | Smallest L ; sex 1:1, breeding 1:3 | 1,178 | 1,707[5] |
| | | | |
| Grizzly bears[2] | Largest L, l, b; sex, breeding 1:1 | 388 | 1,911[4] |
| | Largest L, l, b; sex 1:1, breeding 1:3 | 488 | 2,404 |
| | Largest L, smallest l, b; sex, breeding 1:1 | 1,198 | 5,901 |
| | Largest L, smallest l, b; sex 1:1, breeding 1:3 | 1,108 | 5,458 |
| | Smallest L, l, b; sex, breeding 1:1 | 2,222 | 10,946[5] |
| | Smallest L, l, b; sex 1:1, breeding 1:3 | 1,900 | 9,360 |
| | Smallest L, largest l, b; sex, breeding 1:1 | 710 | 3,498 |
| | Smallest L, largest l, b; sex 1:1, breeding 1:3 | 776 | 3,823 |
| | Averages; sex, breeding 1:1 | 656 | 3,429 |
| | | | |
| Black bears[3] | Largest L, l, b; sex, breeding 1:1 | 462 | 1,717[4] |
| | Smallest L, l, b; sex, breeding 1:1 | 4,296 | 15,970[5] |
| | Averages; sex, breeding 1:1 | 982 | 3,651 |
| | Averages; sex 1:1, breeding 1:3 | 1,336 | 4,967 |

* Sex ratio and breeding ratio in f

1. Carbyn (1981), Soper (1973), Burt and Grossenheider (1976), Gonzalez and Quintin (1993), Carbyn et al. (1993), Weber (1977), Mech (1977).
2. van Tighem (1967), Burt and Grossenheider (1976), Soper (1973), Reynolds (1993), Pearson (1975), Mundy and Flook (1973), Wielgus et al. (1994), Knight and Eberhardt (1985), Mattson (1990a, 1990b).
3. van Tighem (1967), Gonzalez and Quintin (1993), Burt and Grossenheider (1976), Soper (1973), Yodzis and Kolenosky (1986), Schwartz and Franzmann (1991), Kemp (1985), Hastcheff et al. (1986), Stone and Wendell (1986).
4. Best-case (optimistic) scenario.
5. Worst-case (pessimistic) scenario.

Best- and worst-case scenarios were calculated for each species. The best-case scenario determined the smallest viable population size, whereas the worst-case scenario determined the largest viable population size. This was accomplished by using different values for different parameters and breeding

ratios of 1M:1F or 1M:3F (Table 1). Once the best- and worst-case scenarios had been determined for grizzly bears, the same array of values was used for black bears. Cubs, yearlings, adult non-breeders, and adult failed-breeders were excluded from the calculations; therefore, estimates of MVP size are very conservative, referring only to the numbers of breeding animals.

The MVPD of each species was estimated from the species' body mass (Silva and Downing 1994). Published values of the body mass of adult males and females of each of the three species from different regions of North America were combined into a single body mass estimate for each species. Finally, the best-case and other derived MCAs for each species were compared with the sizes of those national parks where the species is, or was historically, present (Banfield 1974).

## Results

The sizes of most Canadian national parks are similar to the sum of their designated preservation and wilderness areas (i.e., Zones 1 and 2 in the Parks Canada terminology; Table 2). Therefore, we compared the total area of parks with the calculated MCAs. The estimated minimum viable population densities were 0.69 wolves /sq km, 0.27 black bears/sq km, and 0.20 grizzly bears/sq km. The smallest MCA calculated for the three species was 768 sq km for wolves; the largest, 15,970 sq km for black bears (Table 1).

Eighteen of Canada's 39 parks are less than 1,000 sq km in area, and 14 of those 18 are smaller than 500 sq km (Figure 1). Of the 36 national parks that either presently contain or historically contained at least one of the three species under study, 14 appear unlikely to be able to sustain any of the three species, under even the best-case scenario (Figure1a). Only 6 of the 36 parks are larger than 15,970 sq km and thus might be able to sustain all three species under the worst-case scenario. In the best-case scenario for grizzly bears, 42% of the national parks that either presently contain or historically contained this species are too small to sustain the MVP, and only 17% could sustain the worst-case MVP (Figure 1b). Similar results pertain to black bears: 63% of the parks are too small to sustain a population under the best-case scenario, and only 7% could do so under the worst-case scenario (Figure 1c).

Figure 1 also reveals differences in the MCAs among species. The MCA for wolves is less than that for both black bears and grizzly bears, as is to be expected from the wolf's smaller body mass. However, the worst-case scenario for black bears predicts the need for a greater area of habitat than that predicted by the worst-case scenario for grizzly bears, a result inconsistent with what would be expected from a comparison of the body mass of these two species.

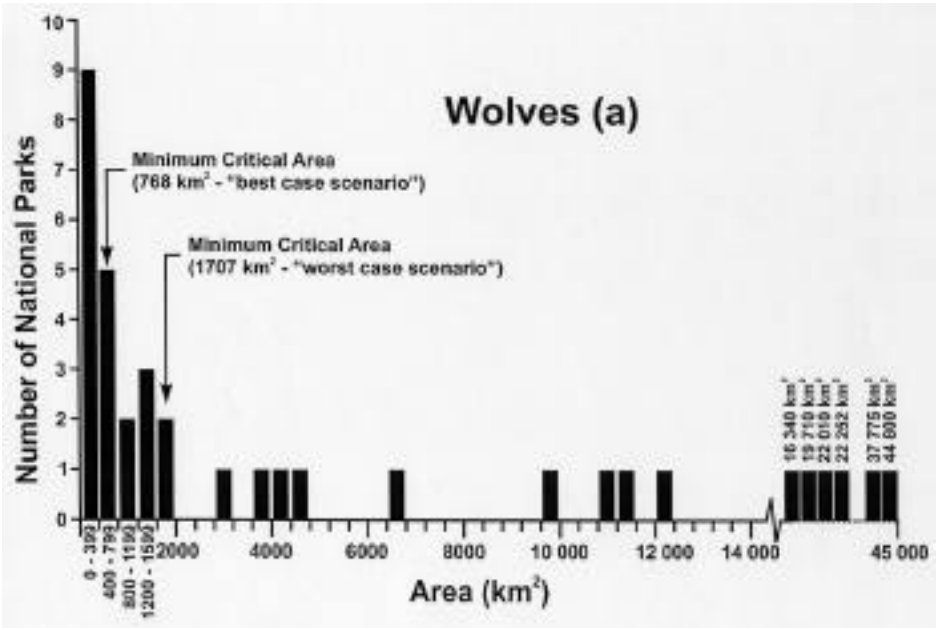
## Discussion

On an individual basis, national parks are representative of the larger Canadian ecozones in which they are

**Table 2.** *Total area for Canadian national parks and their special preservation areas (Zone 1) and wilderness areas (Zone 2). In the park zoning system, Zone 1 does not permit public access, and Zone 2 allows activities with minimal human interference (Canadian Heritage 1995).*

| National Park / Species | Total Area | Zone 1 | Zone 2 |
|---|---|---|---|
| | | (area in sq km) | |
| Saint Lawrence Islands | 8.7 | 3 | 2 |
| Point Pelee (w, bb) | 15 | 11 | 0 |
| Prince Edward Island | 21.5 | 5 | 0 |
| Georgian Bay Islands (w, bb) | 25.6 | 4 | 0 |
| Mingan Archipelago (w, bb) | 151 | 15 | 134 |
| Bruce Peninsula (w, bb) | 154 | 75 | 0 |
| Elk Island (w, bb) | 194 | 0 | 177 |
| Fundy (w, bb) | 206 | 2 | 183 |
| Kouchibouguac (w, bb) | 239 | 10 | 129 |
| Forillon (w, bb) | 240 | 3 | 231 |
| Mount Revelstoke (w, gb, bb) | 256 | 97 | 62 |
| Terra Nova (w, bb) | 400 | 4 | 296 |
| Kejimkujik (w, bb) | 404 | 16 | 311 |
| Pacific Rim (w, bb) | 500 | 6 | 295 |
| Waterton Lakes (w, gb, bb) | 505 | 10 | 399 |
| La Mauricie (w, bb) | 536 | 11 | 498 |
| Grasslands (w, bb) | 906 | 18 | 0 |
| Cape Breton Highlands (w, bb) | 948 | 142 | 683 |
| Yoho (w, gb, bb) | 1,313 | 26 | 1,116 |
| Glacier (w, gb, bb) | 1,349 | 0 | 1,093 |
| Kootenay (w, gb, bb) | 1,406 | 84 | 1,294 |
| Gwaii Haanas | 1,495 | 75 | 1,420 |
| Gros Morne (w, bb) | 1,805 | 126 | 1,101 |
| Pukaskwa (w, bb) | 1,878 | 3 | 1,863 |
| Riding Mountain (w, bb) | 2,973 | 15 | 2,914 |
| Prince Albert (w, bb) | 3,874 | 4 | 3,853 |
| Nahanni (w, gb, bb) | 4,765 | 14 | 4,741 |
| Banff (w, gb, bb) | 6,641 | 266 | 6,176 |
| Jasper (w, gb, bb) | 10,878 | 54 | 10,660 |
| Auyuittuq (w) | 19,469 | 215 | 21,254 |
| Kluane (w, gb, bb) | 22,013 | 132 | 21,793 |
| Quttinirpaaq (w) | 37,775 | 189 | 37,397 |
| Wood Buffalo (w, bb) | 44,802 | 4,480 | 38,530 |
| Tuktut Nogait (w, gb) | 16,340 | – | – |
| Sirmilik (w) | 22,252 | – | – |
| Wapusk (w, bb) | 11,475 | – | – |
| Aulavik (w) | 12,200 | – | – |
| Ivvavik (w, gb) | 9,750 | – | – |
| Vuntut (w, gb, bb) | 4,345 | – | – |

*Species currently or historically present: w = wolf, bb = black bear, gb = grizzly bear.*
*Source: Roy B. Rivard, Parks Canada, Natural Resources Branch, Parks Canada, Hull, Quebec (personal communication, February 2000).*



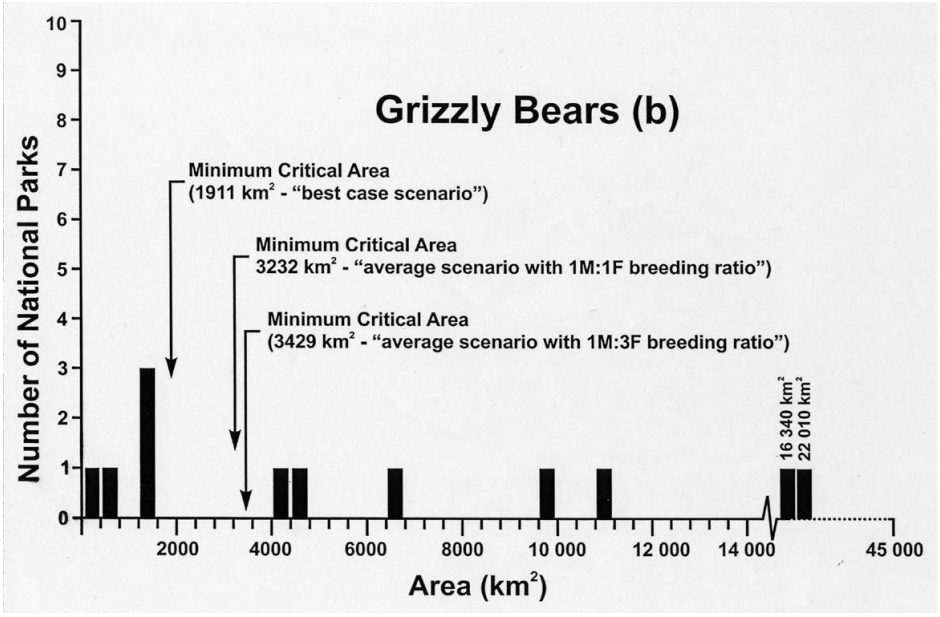
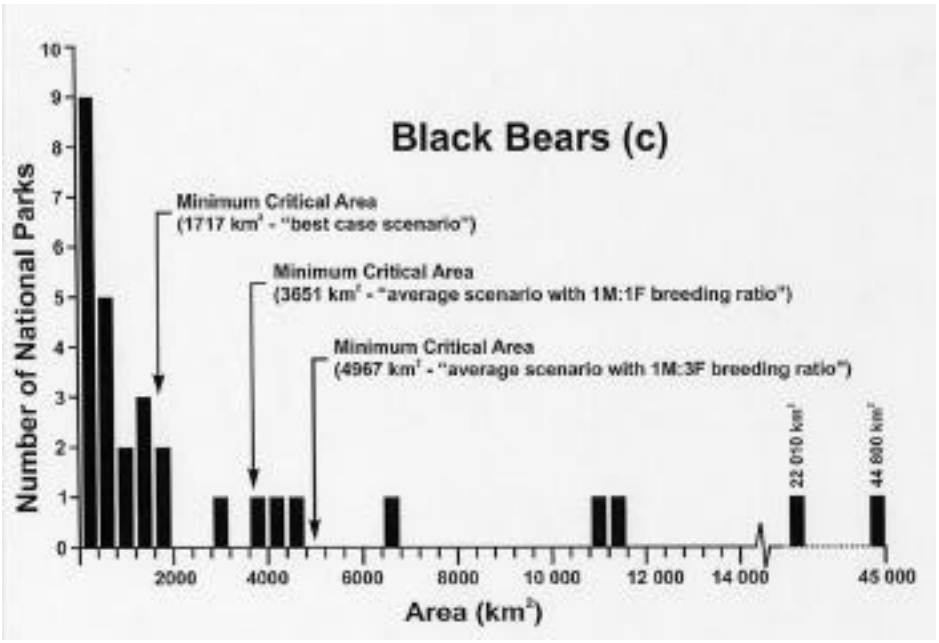




Figure 1. The number of national parks that are smaller or greater than the ranges of minimum critical areas of wolves (a), grizzly bears (b), and black bears (c). Only Canadian national parks in which the species under study were currently or historically present are included.

**Figure 1 (cont'd)**




located (Parks Canada 1999). Only the most northerly parks are still surrounded by wilderness, are not yet subject to over-use, and have few land-use conflicts outside their boundaries. The small size, high visitation rates, and ecological isolation of southern parks militate against MVPs of wolves, black bears, and grizzly bears being maintained there. Even within protected areas, conflicts with humans are usually the major cause of adult mortality in these species (Woodroffe and Ginsberg 1998).

This study shows that most of Canada's national parks cannot indefinitely sustain MVPs of these large carnivorous mammals. The number of parks whose areas are smaller than the required MCA increases from 14 of the 36 parks in the best-case scenario to 30 of the 36 parks in the worst-case scenario. Therefore, priority should be given to those preservation measures that maximize reserve size or mitigate carnivore persecution along park borders and in buffer zones (Woodroffe and Ginsberg 1998). Parks Canada has recently, and correctly, moved to designate wilderness protection through zoning in national parks. However, because most parks are already too small to adequately protect large mammals, it follows that existing wilderness zones within parks will be too small, regardless of the zoning schemes used.

There are sources of error in the determination of the MCA for each of these species. The total areas of the

parks include unusable habitat features such as lakes, steep mountain faces, glaciers, and human developments. There are several major assumptions of the Reed et al. (1986) model that can be violated in real, wild, populations. We included only adult male and adult females in the determination of each species' MVP. It is not realistic to have only breeders in the defined population, especially for wolves that live in a highly-structured social pack system (Mech 1966). Violation of any of the assumptions results in underestimation of the number of breeders required to maintain the effective population size of 500 individuals. The conventional use of 500 as an effective population size has also been questioned. An overview analysis such as this cannot account for environmental stochasticity or variations in the local richness of habitats. Together, these sources of error may explain discrepancies between the calculated MCAs and observed populations that survive in small areas or which are extirpated from larger areas, or the discrepancy between the MCAs for two bear species in this study.

Because most national parks are smaller than the MCAs required by their large carnivores, Parks Canada should work to ensure that wilderness areas both outside and inside the parks are preserved. In many cases, large mammals are currently in national parks only because there is wilderness surrounding the park boundaries. The ability of large carnivore populations to use wild habitats adjacent to parks and their probability of survival within the parks are highly correlated (Newmark 1995). This situation is evident in the case of black bears inhabiting Atlantic Canada's national parks. The normal movements of foraging black bears are so extensive that they and their habitats should be managed on a landscape scale exceeding park boundaries (Forbes et al. 1999). Reducing the losses of large mammals in the future will require that the total area of species habitats in parks be augmented either through the acquisition or the cooperative management of non-federal lands adjacent to parks (Newmark 1987).

The size and location of many protected areas have been based on convenience or compromise with competing land uses (Nudds et al. 1998b). Most boundaries are artificial and do not reflect the biotic boundaries of the local ecosystem. The results of this study allow us to concur with the recommendations of the Panel on the Ecological Integrity of Canada's National Parks (Parks Canada 2000) that urge a review of the park zoning system and consideration of parks as multi-scaled ecosystems. Functional habitat connections between parks and adjacent protected areas should be created, maintained, or restored to allow movements of wild species (Parks Canada 2000). This would permit populations to be managed at sizes that might more likely persist.

Attempts are already occurring to introduce park perimeter protection under Parks Canada directive, as in the case of Georgian Bay Islands National

Park and the Greater Georgian Bay Ecosystem Initiative (Wiersma 1996), the Foothills Model Forest near Jasper National Park (Parks Canada 2000), and the Greater Fundy Ecosystem project (Woodley and Freedman 1995). These initiatives are positive steps toward a more multi-level-oriented collaboration among different agencies. However, the criteria for zoning within parks need to be reviewed. Zoning categories are weakly defined in terms of the preservation of ecological values (Parks Canada 2000). New zoning criteria, if they are to benefit wildlife, should reflect the range and habitat requirements of species of concern and be based on their ecological needs, rather than on the placement of proposed developments and user facilities.

The provinces, territories, and private land owners will play a key role in the future of Canadian national parks, especially in southern Canada, where agreements to decrease outside land-use stresses might contribute to preserving large-animal populations. In the creation of new parks, Parks Canada and the provinces should use their legal powers to protect against development adjacent to boundaries. These, too, would serve to effectively enhance the size of parks and promote the persistence of large-animal populations. Management arrangements with neighboring jurisdictions can have a profound effect upon the sustainability of large species and the ecological integrity of parks (Parks Canada 2000).

## Acknowledgments

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***Martine Landry, Vernon G. Thomas,*** and ***Thomas D. Nudds,*** Department of Zoology, College of Biological Science, University of Guelph, Guelph, Ontario N1G 2W1, Canada; vthomas@uoguelph.ca

**John Latschar**

# The Taking of the Gettysburg Tower

A little after 5:00 PM on July 3, 2000, at a signal from Secretary of the Interior Bruce Babbitt, explosive charges were ignited at the base of the National Gettysburg Battlefield Tower. As thousands of cheering observers watched, in less than ten seconds the tower shivered, leaned slightly, and then collapsed into a pile of ignobly twisted steel and rubble. Suddenly, what had dominated the skyline of Gettysburg National Military Park for over 26 years, was gone. As Barbara Finfrock, president of the Friends of the National Parks at Gettysburg, aptly summed it up: "Now, when we look at the battlefield, we will see nothing … which means we will be able to see everything." Thus ended the relatively short but undeniably controversial life of the infamous tower, which *USA Today* labeled "the ugliest commercial structure to ever intrude on the sanctity of a national park."

## Construction of the Tower: 1970-1974

In February 1970, Thomas R. Ottenstein, of Silver Spring, Maryland, became an investor in (and soon president of) Gettysburg Battlefield Tower, Inc. Plans were announced to build a 300-foot observation tower on a site immediately adjacent to the park boundary, on the edge of the field of Pickett's Charge. As soon as the plans became public, controversy erupted. Opposition was immediately announced by the Pennsylvania Historical and Museum Commission, Gettysburg Battlefield Preservation Association, Gettysburg Battlefield Guides Association, and many other individuals and groups. George Hartzog, director of the National Park Service (NPS), called the tower proposal "monstrous," and "an environmental insult." *The New York Times* labeled it "a new low in historical tastelessness" and historian Bruce Catton stated that the tower would be another "step in the process of cheapening and commercializing the battlefield area."

By March of 1971, permits had been secured, and construction started on the foundations for the tower. Construction operations galvanized opposition to the tower. On June 14, 1971, Secretary of the Interior Rogers C. B. Morton wrote Pennsylvania Governor Milton Shapp stating his intention to prevent completion of the tower, which he described as "the most damaging single intrusion ever visited upon a comparable site of American history." Thus encouraged, on July 8 the Pennsylvania General Assembly passed a resolution stating that the necessary steps should be taken to stop the tower.

In the meantime, however, what one historian has called "an astounding bureaucratic blunder" was taking place. On June 4, apparently without Morton's knowledge, Assistant Secretary of the Interior Nathaniel Reed gave a 29-year-old political assistant the mission of negotiating with Ottenstein to find a more desirable location for the tower. On July 2, 1971, less than two weeks after Secretary Morton assured Governor Shapp that he intended to prevent the completion of the tower, the acting director of NPS signed an agreement with Ottenstein whereby the site for the tower was moved away from the field of Pickett's Charge to a location east of Taneytown Road. In order to provide access to the new site, Ottenstein was provided a 22-foot right-of-way across NPS land. In turn, Ottenstein agreed to donate five percent of the tower's net taxable income to a nonprofit corporation or foundation for the benefit of the park (in a 1973 amendment to this agreement, the National Park Foundation was named as the recipient of funds).

The sudden announcement by the Department of the Interior on July 11 that it had bargained secretly with the developer whom it had bitterly opposed in public astounded, confused, and bewildered both supporters and opponents of the tower. No one at the park, including the superintendent, was even aware that negotiations had been taking place. Worse, Secretary Rogers later told Governor Shapp that he was not aware of the negotiations or the agreement until after it was announced. To this day, who made the decision to negotiate with Ottenstein, and where the authority to conduct and conclude such negotiations came from (since it apparently did not come from Secretary Morton) remains a mystery.

Opponents of the tower were highly critical of the deal. Many pointed out (correctly) that the agreement violated the provisions of both the National Environmental Policy Act and the National Historic Preservation Act, since the Department had neither prepared an environmental assessment nor consulted with the Advisory Council on Historic Preservation before providing Ottenstein with a right-of-way across NPS-owned land. Surprised by the backlash of outrage after the announcement of the deal, Interior spokesmen tried to point out that the agreement itself did not constitute departmental or NPS approval of the tower, but that it was negotiated in order to minimize the tower's adverse impacts upon historical viewscapes. Nobody was fooled.

Even though abandoned by the Department of Interior, in late July the Commonwealth of Pennsylvania filed suit in Adams County Court to block construction of the tower, citing its aesthetic impacts upon the historic scene. In October 1971, however, the case was dismissed. Citing the extensive and uncontrolled commercial development already surrounding the park, the

judge wryly noted that "the historical Gettysburg area has already been raped." The judge also specifically referred to the July agreement. "For whatever reason," he wrote, "the National Park system [sic] has implied by this agreement that the historical values of Gettysburg will not be damaged by the erection of this tower at this site."

The governor appealed this verdict to Commonwealth Court, but the case was referred back to the County Court, which reaffirmed its original position on July 27, 1972. With court victory confirmed, construction on the tower (at the new site) started that November. Pennsylvania wasn't done yet, however, and appealed again to Commonwealth Court. That appeal was rejected in April 1973, and the commonwealth appealed again to the Pennsylvania Supreme Court, which ruled in October 1973 to permit completion of the tower.

Finally, in December 1973 the commonwealth filed suit in U.S. District Court in Washington, D.C., against the Department of the Interior, the National Park Service, and Ottenstein, charging that the right-of-way agreement was granted illegally and obtained through "coercive political influence." The federal court dismissed the complaint in October 1974. While Pennsylvania's final lawsuit was still in court, construction on the tower was completed, and it opened for operation on July 29, 1974.

## Setting the Stage: 1974-1997

For many years following the opening of the tower, not much happened. Although none of the groups that had opposed the tower were happy with its looming presence over the battlefield, not much could be done. Pennsylvania had exhausted its legal appeals, and since the tower was outside the park's boundary there was nothing NPS could do. In 1982, NPS completed a general management plan for the park (which had been in progress since 1969). The new plan was completely silent on the issue of the tower.

Not until 1987, thirteen years after the tower had opened, did circumstances begin to change. That year, President Reagan signed Public Law 100-132, directing NPS to conduct a boundary study of the park, and to submit a report to Congress with recommendations for expansion of the boundary. Following considerable public involvement, NPS submitted the boundary study to Congress in August 1988. Among the areas recommended for addition to the park's boundary was 55 acres along Baltimore Pike, including the tower property. The study reported that "the 300 foot high, private observation tower sited here visually intrudes upon both this area and the entire park. Removal of the tower is the only option for restoring this part of the battlefield's integrity."

In August 1990, President Bush signed Public Law 101-377, "An Act to Revise the Boundary of Gettysburg National Military Park." The

tower property was included within the new park boundary. NPS then prepared a land protection plan for implementation of the boundary expansion. After extensive public involvement and review, NPS published the land protection plan in November 1993. The plan listed the tower as a high priority for fee-simple acquisition, with the objective being to "remove modern development (National Gettysburg Battlefield Tower) and restore site."

Following the completion of the land protection plan, there was a short-lived interest in the acquisition of the tower. Anticipating this, NPS initiated an appraisal in order to determine the value of the tower property. Unfortunately, the tower owner would not allow the NPS appraiser to review financial documents, thereby eliminating the benefit of the "income approach" for the appraisal. This made it necessary to rely upon either the market (comparable sales) approach or the cost approach. It goes without saying that comparable sales for the tower would have been very difficult to find. Consequently, the cost approach, which attempts to determine the value on a replacement basis, was used even though it is generally recognized as the least reliable method of valuation. The appraisal report, completed in September 1993 and released in November 1994, utilized the cost basis and estimated the (replacement) value of the property at $6.6 million.

Ottenstein, naturally, liked this appraisal very much, and indicated to NPS (primarily through the media) that for $6.6 million he was a very willing seller. But both the Administration and Congress quickly lost all interest in acquisition of the tower at that price. As one congressional appropriations staffer remarked: "There's no way Mr. Ottenstein is going to get that kind of 'wind-fall' profit from that damned tower."

The park also considered the feasibility of a fund-raising effort. However, all of the major non-profit land conservation entities had attitudes similar to that of the Congress: they didn't feel that it was feasible to approach either their members or their major supporters to seek funds for the acquisition of the tower at what they considered to be a wind-fall profit price. A private citizen volunteered to lead a fund-raising campaign to acquire the tower. However, he quickly proved unwilling to follow NPS procedures, or even to coordinate his quickly-changing plans with NPS before he announced them to the media, so he was quietly asked to desist.

Renewed interest in the tower, however, did cause a few people to wonder why Ottenstein had never provided the National Park Foundation with payments of 5% of the tower's taxable income in accordance with the 1971 agreement. In 1996, the National Park Foundation and NPS asked Ottenstein for an accounting "to explain the absence of donations" as required by the agreement. After several exchanges

of letters, accountants for the National Tower provided the National Park Foundation with summary sheets of income and expenses for the years of 1974 through 1995. According to their summary, the tower had experienced a net loss of $224,000 (after amortization and depreciation) over its twenty-one years of operation.

If the accounting was correct, it can only be concluded that the tower was a complete failure as a business venture. It is certain that paid visitation to the tower had never come close to Ottenstein's original projections. In his 1971 "National Gettysburg Battlefield Tower" promotional brochure, Ottenstein had predicted that he would capture 18% to 20% of the park's visitors during the first year of operation, and 30% by 1980. Similarly, he predicted that by 1980, tower operations would result in local tax revenues of $500,000 per year. He never came close to either projection. Visitation to the tower barely rose above 10% of park visitors, gross revenues for tower operations were less than $400,000 in 1980, and were only $559,000 in 1995. In 1995, the accountants reported that the tower paid a mere $65,000 in local taxes, a far cry from the $500,000 predicted.

Although there were a few questions concerning the completeness of the accounting, the National Park Foundation attorneys advised that there didn't seem to be enough taxable profits from the first twenty-one years of the tower's operation to make it worth the legal fees involved in pursuing the matter any further.

### The Beginning of the End: 1998-1999

In the summer of 1998, NPS provided a briefing for the Office of Management and Budget (OMB) on Gettysburg's draft general management plan. At the end of the briefing, OMB staff commented that it looked like the proposed plan would solve all the long-term issues confronting the park except for the tower, and that "perhaps we should do something about that." They did. In the fall of 1998, as part of OMB's "passback" of the proposed Fiscal Year 2000 budget for NPS, OMB directed the secretary of the interior to include funds in his final budget request for the acquisition of the tower. Consequently, the president's proposed budget request for 2000 for NPS included $5.7 million for the acquisition of three tracts of land, "including the six-acre tract containing the Gettysburg tower." The budget justification for the funding request was to "eliminate adverse development" from the battlefield and to restore the "historic integrity" of the park.

Excited by the new initiative, the National Trust for Historic Preservation, National Parks and Conservation Association, the Civil War Trust, and the Friends of the National Parks at Gettysburg all contacted the House and Senate appropriations committees, asking for their support in approving the funds for

acquisition of the tower. In the meantime, given new Administration interest, NPS once again started the appraisal process for the tower property in August 1998. Negotiations were also reopened with the property owners, to see if they would be willing sellers.

By the spring of 1999, events at Gettysburg were attracting departmental attention, particularly the park's draft general management plan and proposal for a partnership for a new visitor center and museum complex. Primarily for that purpose, Secretary of the Interior Babbitt scheduled an Earth Day visit to Gettysburg that April. In a short speech to assembled park staff, guests, and media, Babbitt stood next to the statue of General Meade on Cemetery Ridge and announced his support for the general management plan. Then, dramatically, he turned around, pointed at the tower looming over himself and General Meade, and announced that he intended to "take that tower down, on my watch."

In October 1999, Congress passed the FY2000 budget for NPS. Included was $1.6 million in new land acquisition money for Gettysburg, appropriated with the note that "this amount together with the $4,500,000 unobligated balances from prior fiscal years will … provide for the acquisition of the Tower" as well as another parcel of land. The appropriations report also noted that Congress understood that "the Tower was appraised at $3,000,000." The report was correct, for the appraisal started in the fall of 1998 was now complete.

## The End: 1999-2000

Being the beneficiary of a secretarial initiative can make life rather interesting. As of the turn of the fiscal year in October 1999, NPS had the legal authority to acquire the tower property (the 1990 boundary expansion legislation), a plan was in place (the 1993 land protection plan), and appropriations were in hand. All that was left were acquisition and demolition of the tower. Unfortunately, there was only one year left on Secretary Babbitt's "watch," considerably less than a normal acquisition process would take, and considerably less than the normal cycle for obtaining funds from Congress for the tower's demolition.

The NPS lands staff, in conjunction with the Department of the Interior solicitor's office and the Department of Justice, were already working on the first task. After a year of negotiation with the tower owners, it was clear that acquisition on a willing-seller basis was a rather dim prospect. Ottenstein was willing to sell, but for no less than $6 million. Consequently, a "complaint in condemnation" package was put together. On December 9, 1999, the secretary's office approved the condemnation of the tower, and the U.S. Attorney for the Middle District of Pennsylvania filed the complaint in condemnation in U.S. District Court in Harrisburg, Pennsylvania.

In the meantime, NPS prepared

and submitted to the secretary's office an estimate of the funds required to demolish the tower, for potential insertion into NPS's FY2001 budget request. Based upon the normal demolition procedures (i.e., cranes and men working on a piece-by-piece dismantling of the tower), with normal markups for design services, preparation of construction drawings and specifications, construction bidding and award, and construction administration and supervision, the NPS estimate for the dismantling package was $1,030,473.

Those funds, however, would not be available until FY2001 (if approved by Congress). In the meantime, no one familiar with a normal condemnation process was willing to assure Secretary Babbitt that NPS would gain title to the tower property before the end of his tenure in December 2000. Consequently, NPS was directed on December 9, 1999—the same day that condemnation was approved—to prepare a report describing what it would take to allow the secretary to demolish the tower—not only "on his watch," but preferably on July 3, 2000 (in just seven months!).

The report was submitted on January 10, 2000. The answer to the first question was obvious. In order to guarantee that NPS obtained title to the tower during the secretary's tenure, the complaint in condemnation would have to be amended into a declaration of taking. Although not unprecedented, a declaration of taking posed a financial risk to NPS. Under a complaint in condemnation, property owners retain ownership and control of their property until the court determines the amount of compensation. Although this sometimes takes a year or more, if the number is too high (for example, $6.6 million), NPS has the opportunity to withdraw the complaint action and not acquire the property. In a declaration of taking scenario, however, NPS would be asking for immediate possession of the property before the court established the amount of compensation due. Having already taken the property, NPS would have no choice but to pay whatever amount the court determined as just compensation. For this reason, longstanding agreements required that NPS notify Congress before filing a declaration of taking.

The second part of the report was more promising. NPS had contacted a private firm, Controlled Demolition, Inc., which specialized in the "implosion" of buildings and structures. Controlled Demolition offered to donate their services for the "implosion" of the tower, as well as the cleanup of the tower debris, at no cost to NPS. With this offer in hand, the $1 million for demolition of the tower was removed from the FY2001 budget request, and on February 24, 2000, NPS formally accepted Controlled Demolition's offer of donated services. The donation agreement required NPS to make the tower property available to Controlled Demolition no later than June 2, in order to give them sufficient time to

prepare the tower for demolition on July 3.

On March 15, the Department of the Interior notified the four House and Senate appropriations and authorizing committees of its intent to file a declaration of taking of the tower property, and asked for their concurrence. Two precious months slipped away before written concurrence was received from the last of the four committees on May 17. The NPS lands staff and the departmental solicitor's office had been working closely with the U.S. attorney's office in the meantime, preparing the necessary legal paperwork, so the declaration of taking was filed in court on the afternoon of May 17. Simultaneously, a motion for possession was filed, asking that possession of the property be given to the United States on or before June 2, 2000.

Strangely enough, Ottenstein's attorneys did not file any objections in court either to the complaint in condemnation, the declaration of taking, or the motion for possession. Perhaps this was because the tower continued to fail to make much profit; perhaps because Ottenstein's health was relatively poor. However, attorneys representing two cellular phone companies that had antennas on the tower filed motions opposing possession, citing disruption of service to the public.

In order to justify immediate possession, the burden was upon the government to demonstrate the urgency of acquiring the property. The court was informed that Controlled Demolition's offer to remove the tower at no cost was based upon the NPS commitment to provide access to the property in time for them to prepare for a July 3 demolition, which was the "only date CDI is available to undertake the felling of the National Tower." Since Controlled Demolition's donated services would save NPS (and taxpayers) over $1 million, failure to obtain access to the property in time to take advantage of that offer would cost NPS and taxpayers the like amount.

After several telephone conferences, the court ruled on June 5, granting possession of the tower property to the United States on or before June 15. On June 14, the tower operators vacated the property, and physical possession passed quietly and without incident to NPS.

With possession of the property secured, attention turned towards both the physical demolition of the tower, and the accompanying public ceremony and celebrations befitting such an occasion. Even though NPS had not been able to provide Controlled Demolition with access to the property by June 2 in accordance with the original donation agreement, the company graciously overlooked that detail and went to work on the structural examination and preparation of the tower structure for demolition.

In the meantime, the park brought in NPS's type 1 incident management team, to plan and coordinate the public ceremonies surrounding the demolition of the tower. The

team worked closely with Controlled Demolition, which retained control of the actual demolition site, with the team in charge of site security, public access and safety. The team also coordinated with the secretary of interior's advance staff, as well as with the White House liaison staff (up until 48 hours prior to the demolition, there was a possibility that the president might attend the demolition ceremonies).

On July 3, the ceremonies went off without a hitch. After short speeches by Barbara Finfrock, president of the Friends of the National Parks at Gettysburg; Richard Moe, president of the National Trust for Historic Preservation; Robert Stanton, director of NPS; and Secretary Babbitt, the secretary led the assembled crowd and dignitaries in a countdown leading up to the ceremonial firing of two Civil War cannons (one Union and one Confederate) at the tower. After a three-second pause, to simulate the flight of the shells from the cannons, Controlled Demolition fired 12 pounds of explosive charges fixed to the lower support structures of the 2-million pound structure. The tower shuddered slightly and slipped to the ground, accompanied by the cheers of the estimated 10,000 visitors scattered around the battlefield to view the sight (Figure 1).

Figure 1. The tower moments after the charges were exploded.

### Lessons Learned?

When reviewing the short and lurid career of the National Tower at Gettysburg, at least two "lessons learned" seem to be worth noting. The first is rather simple: with the impetus and sanction of a secretarial initiative, and enough smart people willing to work hard enough, anything is possible. Although this "lesson" may seem patently obvious, it bears repeating for it should strengthen the hearts and heighten the resolve of everyone engaged in the never-ending struggle for the preservation of our nation's precious resources. As Richard Moe remarked on that momentous day, "Sometimes we *can* correct the mistakes of the past."

The second lesson, although equally obvious, may be more difficult to apply. Simply put, it's worth the time and effort to do things right the first time—even though the cost or the effort "doing right" may often seem daunting. If NPS and the Department of the Interior had stood more strongly against the building of the tower in the early days, it might not have happened. However, instead of standing on our collective principles, we opted for "compromise," with disastrous results. In trying to explain to Governor Shapp why NPS had abandoned the fight against the tower, the agency explained that its agreement with Ottenstein was based upon the belief that it could do nothing to stop the tower. The Pennsylvania attorney general tried to sell this point of view to the court, stating that the agreement "can only be viewed as a decision on the part of the federal government to make the best of a bad situation, not as an explicit or even implicit sanction of the tower." The judge, like most others following the case, was not persuaded. In his final ruling, he wrote that "the plain language of the [NPS-Ottenstein] agreement does sanction the erection of the tower proposed in these proceedings at the site specified...." Indeed, how could he have reasoned otherwise, since that agreement gave Ottenstein a right-of-way across NPS lands into the proposed tower site?

Of course, we'll never know if the opponents of the construction of the tower would have prevailed, had NPS and the Department of the Interior remained steadfast in opposition instead of compromising. But in retrospect, it certainly seems like a battle worth fighting. At the very least, we would have been as proud of the role of our agency in opposition to the construction of the tower as we are in its ultimate destruction.

***John Latschar,*** Gettysburg National Military Park, 97 Taneytown Road, Gettysburg, Pennsylvania 17325-1080; john_latschar@nps.gov

**Hal K. Rothman**

# The War for the Future:
## Mountain Bikes and Golden Gate National Recreation Area

If there is one genuine contribution that the USA has made to the application of the principles of democracy, the most likely candidate is the national park. Prior to the Age of Enlightenment, the eighteenth-century intellectual (and ultimately social) revolution that insisted individuals possessed natural rights and added the relationship between the governors and the governed to human affairs, the idea of a park owned and used by the people was unknown. In most cultures, especially monarchies and other hereditary governments, parks belonged to nobility and the wealthy, and were kept and maintained for their use alone. Common people were excluded from designated lands, often on the penalty of death. Many stood outside the boundaries of such areas and looked in with envy, conscious of the wealth of natural resources and aesthetic pleasures within and equally aware of the huge price to be paid for violating the liege's prerogative. Such parks, like the forests set aside for royal hunts, served as manifestations of power, markers of different standing in a society riven by social distinctions. They were also the flashpoints of class-based tension. The story of Robert of Locksley, the twelfth-century English gentleman who, as Robin Hood, took to the woods after defending a man who killed a deer on restricted land to feed his starving family, illustrated the tension inherent in traditional private parklands (Gilbert 1912, 11-23).

In American ideology, the crucial feature of national parks was the principle of their openness to all. In the eyes of supporters, national parks were testimony to the patrimony and heritage of a country that intended to reinvent the relationships between government and its people. During the late nineteenth century and the early twentieth, people who professed goals of community saw in the national parks not only affirmation of their nation, but a clear and distinct way to articulate the prime assumption of their time: that a society's institutions should serve the economic, social, spiritual, and cultural needs of its people. This principle, deeply ingrained in the concept of national parks—if not always in the motives behind their creation—became an underlying premise in the evolution of American conservation.

Democracy connotes the concur-

rence of the majority in decision-making, but historically national parks have served a much smaller constituency: the privileged classes of the middle and upper-middle class who accepted the idea of conservation and enjoyed the wealth and leisure to enjoy the parks. By the 1960s, the USA had begun a transformation that asked its national parks to meet new psychic and cultural needs. People who were not far from poverty could regard national parks as trophies for the class of people who got all the perquisites American society offers. The response to that sentiment created the latest in a series of reshapings of the intellectual boundaries of inclusion in the National Park System. One dimension of this became the concept of "parks for the people, where the people are"—an idea attributed to Richard Nixon, but which had its genesis in Lyndon B. Johnson's Great Society programs (Rothman 2000, 33-64; Foresta 1984, 169-180). From this came urban national recreation areas, which gave recreation a pre-eminence in the park system that it had not earlier achieved.

In this respect, Golden Gate National Recreation Area became the first national park of the 21st century. Its mission, no less than to be all things to all people all of the time, reflected the changing demands of the American public and left the Park Service with the inherent dilemma of determining boundaries for types of use within the park. The park was created atop prior public and private patterns of use that gave users proprietary feelings about the land in question. Very often vocal representatives of communities in the area, these citizens and taxpayers had to be part of the management equation. Such situations offered a different picture of national parks, as places that combined a sense of national destiny with the needs of local users—people who hang-glide among them—while simultaneously protecting traditional park values.

Golden Gate became the scene of a cultural struggle that articulated the fundamental difficulty of melding these complicated roles. Despite the heavy weight of preservationism in the scholarship about the Park Service, one crucial dimension of agency strategy has always been constituency building. Until the advent of that cultural fault line in American society which was inaugurated by a combination of the Microchip Revolution and MTV, the Park Service relied on a supportive public with whom it shared general goals. The changes in world culture in the past twenty-five years have made that older constituency a demographic relic, valuable support that is dwindling in number and indeed in cultural significance. In a "Nobrow society," as the writer John Seabrook calls it, where everything is equal in its claim to be unique, the idea of specialness of experience sounds hollow (Seabrook 2000, 210-212). In the new America, people define their own values. For the Park Service, this resulted in conflict with

groups who logically fit under the agency tent, but for reasons of class, cultural position, and other complications, have become adversarial.

One of the best examples of this conflict occurred at Golden Gate and the nearby San Francisco Bay Area (Figure 1). There, mountain bikers, a constituency that the national parks will need in the future, grappled with the agency over the use of trails. When the national recreation area was established in 1972, bicyclists made up only a small percentage of park users. Bicycling was then considered mainly a child's activity. Among adults, only the unusual, adult commuters, and enthusiasts rode bicycles. As Americans aged, bicycles fell by the wayside. Between 1975 and 1985, Judith Crown and Glenn Coleman observed, "many aging buyers of ten-speeds hung up their road bikes in garages, not far from the fondue pots and Pocket Fishermen." American bicycles were largely made by Schwinn and Huffy, suitable for youngsters but hardly the raw material of adventure. Even the famous Raleigh ten-speed was little more than a basic transportation device. The advent of mountain biking in the early 1980s revolutionized bicycling and created a new sport with much symbolic cachet. Mountain bike races became cultural events that expressed a heightened individualism, and the races helped build constituency. Mountain bikes were carefree and even anarchic, and they allowed baby boomers a taste of the freedom of their youth, symbolically

Figure 1. The Marin Headlands and the Golden Gate, looking south towards San Francisco.

located in the anti-authoritarian 1960s. To the generation raised on environmentalism, mountain bikes offered another advantage: they gave riders a claim to environmental responsibility as well (Crown and Coleman 1996, 114-115).

Mountain biking had its genesis in the Bay Area, which Gary Fisher, Joe Breeze, Charlie Kelly, Michael Sinyard, and Tom Ritchey, who together founded the sport, called home. Mount Tamalpais was the center of the universe to mountain bikers, the place from which their cultural ethos sprang. Converting bicycles to hard, off-road work meant going back a generation to the sturdy, thicker bikes of the 1950s with their balloon tires. Known affectionately as "clunkers," these became the progenitors of mountain bikes. By 1977, Joe Breeze had already built a frame tailored to mountain riding; within one year, Fisher and Kelly were selling items called "mountainbikes" for $1,300 apiece. By 1982, Michael Sinyard and his Specialized Bicycle Components had produced the Stumpjumper, and sold 500 of them at a New York trade show in February 1982. The "Rockhopper," an inexpensive version of the Stumpjumper at $399, quickly became the most popular of the new bicycles. By the middle of the 1980s, mountain biking had become a fad with particular attraction for disaffected youth (Crown and Coleman 1996, 116-130; Berto 1998, 21-27).

At Golden Gate, mountain bikes presented a new dimension to the on-going questions of park and constituency management. Adjacent to Mount Tamalpais State Park (and, indeed, with the state park inside its legislative boundaries; Figure 2), the national recreation area was close to the center of the mountain-biking universe. Bikers quickly discovered the park, and their presence challenged other users. Their new technology visibly redefined the outdoor experience and etiquette. Instead of being green, brown, and understated, mountain bikers seemed loud and brash, adorned in their bright blues, reds, and yellows. Mountain bikes freed cyclists from the roads, allowing them to ride the same trails where people rode horses or hiked. To those who had long enjoyed the trails, mountain bikers seemed to crash through the woods without respect for others. This led to the inevitable: a series of on-going conflicts between users with equally valid claims to park trails, but little tolerance for one another. Another clash of cultures in which the Park Service was to serve as referee began.

The hikers and horse riders quickly gained the upper hand in the hiker–biker wars, as they came to be called. Hikers and equestrians were a constituency familiar to the Park Service, and they tended to be far more sedate than bikers (Figure 3). They dressed in earth tones, were

quiet, and moved at a pace to which the Park Service was accustomed.


**Figure 2. Location of Golden Gate National Recreation Area and Mount Tamalpais State Park.**

Hikers and equestrians seemed to be of the age and class of the people who set park policy, who served on the Golden Gate National Recreation Area Citizens' Advisory Commission, and who attended public hearings. Mountain bikers, by contrast, seemed out of control. They were young, wore bright colors, and raced around with abandon. The parallel between mountain bikers and skateboarders, with their plaintive "skateboarding is not a crime" slogan, was clear. The difference between constituencies was age and inclination. If hikers in their lightweight garb represented the back-to-nature ethos of appropriate technology that stemmed from the 1960s, best exemplified by Stewart Brand and the *Whole Earth Catalogue*, mountain bikers represented a new future, the embrace of technology to free the self in nature (Chan 1986, A3; Danz 1999, 26-35; Kirk, n.d.).

It was little surprise that the Park Service found affinity with the hikers and equestrians. A little staid by the

Figure 3. Horseback riding: A traditionally popular activity at Golden Gate National Recreation Area.

1980s, and unsure of itself during the Reagan-era assault on the federal bureaucracy, the Park Service held close to its oldest friends, those who fashioned the park system and who prized it for its democratic purposes—which they casually translated as being aligned with their own perspective. In a social and technological climate that tilted toward new values, the Park Service possessed few of the intellectual and cultural tools to sort out the new terrain. Despite its efforts to shape a future in urban parks, much of agency policy still focused on the crown jewels, the expansive national parks of lore. When faced with new and adamant constituencies, the Park Service relied on its past. This decision may have been a tactical reflection of the agency's fears instead of its hopes, for by the middle of the 1980s, the Park Service was in chaos. The Reagan years were hard for all federal agencies. Without adequate resources or the chance for the new parks that remained the lifeblood of agency constituency, and under the leadership of new director William Penn Mott, who had been a potent adversary as head of the California state park department, the Park Service felt exposed and vulnerable. Only its old friends, the ones who had always saved it, seemed able to bring the agency back from the morass into which it appeared to slide (Rothman 1998, 58-63; Foresta 1984, 68-73; Godino 1988, 59-66).

Organized and influential equestrians and similar users seemed far more dependable allies than anarchic young mountain bikers.

Golden Gate was a test case for the development of a new park ideal, and the existing formulas for management did not always meet the needs of the three million people in the Bay Area. The tensions that the hiker–biker conflict created illustrated one of the primary issues that constantly haunted park managers: at Golden Gate, the Park Service continually faced the uncomfortable situation of having to divide up different kinds of uses on essentially qualitative, that is to say value-based, terms. As long as American society accepted specific ideas about the hierarchy of values—when common culture asserted that a certain kind of experience was expected from national parks areas—these distinctions were easily made and upheld. As cultural relativism—the idea that values are all the same—became one of the byproducts of the upheavals of the 1960s and their aftermath, the certainty of earlier definitions became harder to sustain. A national recreation area had many of the same features as a national park, but its purpose was different. Technologies changed the nature of possible experience, and sorting those differences became the Park Service's nightmare.

Public response revealed this fundamental difference in perception. By 1985, Mount Tamalpais had become a battleground between mountain bikers, the state park system, and other park users. The conflict spilled over into Golden Gate. Harold Gilliam, a Bay Area columnist, agreed that bicycles should be allowed in the national recreation area, but advocated restricting mountain bikes in the designated wilderness in Point Reyes National Seashore. The Wilderness Act of 1964 banned mechanical traffic in wilderness areas, but the original 1965 U.S. Forest Service regulations defined "mechanical" as "not powered by a living source." As a result, bicycling was permitted in wilderness areas and bicycles did travel wilderness trails in Point Reyes National Seashore until 1985. That year, the Park Service followed a Forest Service revision of the rules that banned all "mechanical transport" from designated wilderness. The ruling set off a storm. Administrative discretion ruled out an activity with twenty years of legal sanction, biking advocates averred, precisely because the activity became more popular. The number of off-road bikes, as mountain bicycles were then called, changed the terrain, Gilliam believed, and bikers needed to abide by the rules and restrictions that governed public conduct (Frost 1985; Dickerson 1985; Gilliam 1985b; Sprung 2000; Boxer 1984; 36 CFR 4.2c, 4.3; 16 USC 1133c).

Gilliam's columns brought the battle to Golden Gate. Although Gilliam's perspective reflected a legitimate interpretation of statute, biking enthusiasts responded as if their very sport was under attack. Despite the

official designation, "Point Reyes and Golden Gate National Recreation Area are not wilderness areas in any sense," observed June L. Legler of Oakland in a response. "You have mountain bikes confused with motorcycles," Bob Shenker pointed out in a sentiment typical of biking advocates. "We are not a group of oil drillers," another insisted, linking the mountain bikers to the environmentalist ethic of the park (Gilliam 1985a; Parks 1985). The lines were clearly drawn. Despite support for the bikers in the newspaper, the Park Service had uneasy relations with a constituency that was crucial, in its demography and future voting patterns, to the future of open space in the USA.

The transformation was driven by changes in mountain bike technology. While racing initiated the development of the new bicycles, the aging of the people who might ride them contributed greatly to their popularity. Mountain bikes had larger gear ratios and more gears than the conventional three- or ten-speed machines, making it easier to climb hills and removing just enough of the physical difficulty from the activity to convert it to a recreational pastime. In essence, mountain bikes did what mass technologies had always done for the recreation user: they made an activity easier to enjoy by making it less physically demanding. For the Baby Boomers who seemed to want their youth to continue forever, the mountain bike answered a deep need. It contributed to a sense of undiminished vigor, the illusion that age did not need to slow anyone even a little bit.

Most mountain bikers were law-abiding adults who enjoyed the sport as recreation, but like any technology that promotes speed and daring, the new bikes appealed to youth, especially young males. They could be found careening down the roads of Marin County at breakneck speeds and soon were riding "single-track" trails and paths in Golden Gate as well as Mount Tamalpais. Their etiquette and culture were different than those of the Baby Boomers, and they became a source of contention that illustrated the difficulties of managing a national park area in an urban setting. To many of the park's conventional users, mountain bikers did not respect nature or other users of the resource. Despite organizations such as the Bicycle Trails Council of Marin, a mainstream group devoted to bridging the gaps between mountain bikers, hikers, and other constituencies, the tension in the Bay Area about the appropriate use of open spaces mounted.

The Park Service generally sided with traditional users. Mountain bikes had become popular with far more people than the brightly colored racers who defined the sport to the public and shaped park opinion about mountain biking in general. By the mid-1980s, bicycling had been reinvented as a widespread pastime. As cyclists spread through the population, a series of decisions cast their activity out of one of the pri-

mary open spaces in the Bay Area. In 1987, the National Park Service ruled that all trails in national park areas were closed to bicycles unless park officials designated them as open. This ruling gave park administrators considerably greater leeway than before on an important policy issue, allowing managers to respond to local needs but simultaneously creating inconsistency in the National Park System. It left Golden Gate with a severe problem: two active and vital constituencies disagreed and resource management and other guidelines did not offer a clear solution.

At Golden Gate, in the middle of the heart of mountain biking country, park staff made a concerted effort to fairly assess the impacts of different kinds of use. In a series of meetings and memos in early 1988, the natural resources staff assessed the impacts they believed they could attribute to different kinds of use. Dogs chased and killed wildlife, marked territory and possibly affected wildlife behavior, bothered people, and left waste. Horses started new trails, left manure on trails and in other use areas, accelerated erosion on and off trails, and deteriorated riparian areas. Bicycles and their riders widened and deepened minor social trails, made their own trails, caused ruts and water channeling in tire tracks, rode through endangered and rare plant habitats, scarred areas too steep for other users, and caused severe loss of topsoil. Hikers and other pedestrians also created social trails, disturbed sensitive flora, initiated erosion, poached, and left garbage (National Park Service 1988a, 1988b). Assessing the collective impacts from a resource management perspective and regulating use presented an enormous challenge (Figure 4).

Local discretion forced the Park Service's hand. Despite the effort to broadly assess impact, the park remained captive of its most powerful constituencies, the environmental groups that had been its mainstay since they helped found the park in 1972. These were the single most consistent supporters of the park. After three years of assessing possible programs, the park followed NPS history and the tacit inclinations of park personnel. On October 24, 1990, Golden Gate banned bicycles from all but designated trails in the Marin Headlands and Point Reyes National Seashore. The response was entirely predictable. Protests abounded. Bikers and their friends howled at the ruling, seeing it as class and cultural warfare. "Dog owners: the GGNRA staff plans to restrict you next! Help us stop them!" read one mountain biker broadside that sought to identify other constituencies threatened by the ruling. Mountain bikers thought that they were persecuted by a confederation of older, wealthier users. "Some hikers and equestrians can't get used to a new user group," observed Tim Blumenthal of the International Mountain Bicycling Association (IMBA), a group formed in 1988 in Bishop, California, to promote re-

Figure 4. Multiple trails and trail erosion.

sponsible riding. "Bikes go faster and are more colorful, so it's easy to see how they can be unsettling." Statistics failed to demonstrate to Blumenthal's satisfaction that mountain bikes were hazards on the trails andhe could not accept the restrictions. The lines were drawn, as clearly as ever (National Park Service 1990a; Beyeler 1991, 37-44; Anonymous 1991; Sprung 2000).

The resolution of this issue became a question of politics. Again the letters poured in; again a combination of self-interest (enlightened and otherwise) and concern for the condition of the resource dominated the perspectives. Hikers felt threatened

by mountain bikers, and many of those who sought limits on bicycle use were people of power and influence. Their complaints addressed to the park usually were forwarded to U.S. representatives, senators, and other political leaders. Hikers also used bicycles in the park. Many of their letters supported the new policies but asked for specific exceptions for the writer's favorite biking trail. Equally as many angry letters from bike advocates reached the agency, and the ban put the Park Service in the position of siding with one constituency against another—anathema in the complicated politics of the Bay Area (Malcolm 1990; Howell 1991a, 1991b; Galland 1990).

The sheer volume of concern forced Golden Gate officials to re-evaluate their policy. After long and tortured deliberations, in December 1992 the final mountain bike policy at the national recreation area was announced. The policy kept much of the park closed to mountain bikes. In the view of Jim Hasenauer, IMBA president, the final policy was "virtually unchanged" from the original proposal. "It cuts existing riding opportunities by half," Hasenauer observed. The Park Service offered its decision as a compromise, but many among the mountain bikers regarded the policy as victory of privilege over ordinary people. While the Park Service showed that 64% of the 72.6 miles of trails in Golden Gate were open to biking, mountain bikers pointed out that every single-track trail in the park, the narrow tracks mountain-bikers favored, was closed to them. Mountain bikers thought that the rules discriminated against them. They were even excluded from some fire roads that NPS trucks traveled, eliminating even the widest trails within the park. The Park Service countered by pointing to erosion that bikes caused on fire roads. "There's no good reason to ban bikes in the GGNRA," Hasenauer exclaimed, rallying the mountain biking constituency (Hasenauer 1993a, 1993b).

The different sides had become polarized during the fray and the final policy, an attempt at compromise, satisfied no one. Golden Gate and Mount Tamalpais evolved into the "most extreme mountain biking conflict ever," Gary Sprung, IMBA communications director, recalled a decade after the scrape. "It was ironic that it happened in the birthplace of mountain biking." The Bicycle Trails Council of Marin (BTCM), which in 1989 organized volunteer mountain bicycle patrols to help educate bikers in Mount Tamalpais State Park and also developed a "Trips for Kids" program to take inner-city children on bicycle trips, took the lead in battling the new policy. Working with IMBA, the Bicycle Trails Council of the East Bay, and other bicycling organizations, BTCM spearheaded a lawsuit that charged that the "Designated Bicycles Routes Plan" violated the National Environmental Policy Act and the Golden Gate National Recreation Area authorizing act. The

suit charged that the decision was reached without sufficient public involvement and did not meet the terms of statute, and the supplicants requested an injunction to prevent implementation of the plan Sprung 2000; National Park Service 1990b; Hasenauer 1993a).

The mountain biking community was split into three broad categories: radical riders who flouted the system, mainstream riders who sought to work within the system, and bikers who engaged in other activities and sought to bridge gaps between the different groups. Responses to the park policy varied according to the groups' political stance. Angry cyclists cut "guerrilla trails," unauthorized paths through areas that the park designated as off-limits to cyclists. The pinnacle of this was the "New Paradigm Trail," a trail initiated in 1994 that was an overtly political statement. The trail was built in secret without government authorization and kept hidden from all but those in the mountain biking community. Cyclists used the trail for two or three years until it was discovered and destroyed. The trail became a cause célèbre for Bay Area cyclists, who regarded its development as civil disobedience and its destruction as perfidy. Wilderness Trail Bikes, which built its own bicycles, had been involved in bicycle advocacy since the beginning of fat-tire bicycling. The company issued a widely reproduced broadside that championed the cyclists' cause, arguing for a strong relationship between cycling and environmental ethics (Cunningham et al, n.d.).

The New Paradigm Trial was guerilla theater as well as a bike trail: the energy, enthusiasm, and clearly articulated perspective of its advocates signaled a constituency that the Park Service could and likely should have cultivated. The link between cyclists and environmentalism offered a new and potentially powerful constituency for NPS, but the agency and its friends rejected the concept. In response, the Sierra Club joined the agency against the mountain bikers, furthering polarizing the situation and alienating mountain bikers. Although the bicycling groups lost their lawsuit against the park, the implications for park management were clear (Meyer 1993; Thurman 1989; Anonymous 1993; Wayburn and Meyer 1991). At Golden Gate, the Park Service could expect challenges from activity constituencies it chose not to accommodate. Anywhere in the park system such a situation presented a political risk, but in the politics of the Bay Area, its dimensions were accentuated.

The mountain biking fiasco represented the limits of policy. In part because the park's general management plan did not address bicycling and in part because mountain bikers did not form the kinds of groups that other constituencies did, the agency could not bring enough mountain bikers into the process to achieve the kind of buy-in that made planning a success at Golden Gate. Unlike conservation and environmental groups

and even kennel clubs, mountain bikers did not respond to the invitations to participate that the agency offered. Their reticence and the close ties between the Park Service and mountain-biking opponents left the cyclists outside the loop. Some mountain bikers were happy there; they could engage in Edward Abbey-like anarchism without any responsibility for the results. But the disintegration of relationships meant that the issue continued in an adversarial fashion—a less-than-optimal result.

The story of mountain biking at Golden Gate speaks volumes about future management of national parks. As the common values of American society are less widely shared, and as new constituencies who represent a large share of voters in the future, but seem problematic in the present, become more common, the Park Service must find ways to include such people and their uses in support of national parks. The changing demography of the USA requires an agency that is flexible to the needs of broader public groups in certain kinds of areas, such as national recreation areas that are designated for use. Without that flexibility, the Park Service runs the risk of appeasing the privileged of the present at the expense of the vast majority of the future. Clashes of cultural values, such as the mountain-biking wars at Golden Gate National Recreation Area, pose serious questions about the nature of Park Service policy-making.

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***Hal K. Rothman,*** Box 5020, University of Nevada–Las Vegas, Las Vegas, Nevada 89154-5020; rothman@nevada.edu

**Natalia Danilina**

# The Zapovedniks of Russia

*"Occupying a huge territory spreading out into two continents of the world, we in Russia are the possessors of unique natural treasures. They are as unique as, say, the paintings of Raphael—and they are as easy to be destroyed, but it is not possible to recreate them."*

*— Ivan G. Borodin, Russian academician, 1914*

About 1.5% of the land area of Russia, or 33.2 million ha, consists of zapovedniks—strict nature preserves, comparable to designated wilderness areas. There are currently 99 zapovedniks. They are the most traditional and, arguably, the most important form of natural protected area in Russia. Thanks to zapovedniks, many species of animals and plants, such as sable, European bison, or Siberian crane, as well as the last little islands of virgin steppe and the most valuable forest massifs, have been conserved. There are more than 5,000 people staffing zapovedniks; they not only protect and study these islands, but conduct extensive environmental education among the population, especially schoolchildren.

## The History of Zapovedniks

On 29 December 1916, the document "On Establishing a Hunting Zapovednik in Zabaikalsky Region" was presented by Russia's minister of agriculture to the governing Senate. That date can be considered the beginning of the state-run system of zapovedniks. Now, at the turn of the new millennium, when one's thoughts naturally turn both to looking back and looking forward, the need to summarize the achievements of zapovedniks has arisen. We are recalling all those who pioneered the cause of nature conservation in Russia at the end of the 19th and the beginning of the 20th century: professors and academicians such as V.V. Dokuchaev, Grigori A. Kozhevnikov, Ivan G. Borodin, Andrej P. Semyonov-Tyan-Shansky, V.I. Taliev, G.F. Morozov, and others. Unexpectedly, their ideas and words appear to be quite in tune with our time. Listen to Dokuchaev in 1895: "We are sorry to say that our virgin black-earth steppes with their original charm, boundless expanses, feather grass, unique dwellers like babacs, great bustards, wolfberry, etc., are surprisingly quickly disappearing from the face of the Russian land." Today, virgin steppes are, alas, virtually non-existent.

Russia's first scientific zapovednik was founded by Dokuchaev in the Luganskie steppes in 1892. Scientists had raised the alarm: forests

were being cut down, steppes were in danger, populations of the most valuable fur-bearing animals were catastrophically decreasing — the natural resources of Russia were, it was realized, not infinite. Semyonov-Tyan-Shansky's papers and talks developed an understanding of these problems among the enlightened part of the Russian society. He wrote: "Large areas of undamaged forest must be transformed, as has been done in many places in North America, into zapovednik areas to conserve the taiga intact forever." In a 1908 paper (which has come to be regarded as a classic), Kozhevnikov enunciated the principles of establishing natural areas as zapovedniks: "These areas must be 'zapovedniks' in the full sense of the word.... Here, any actions violating the natural conditions of the struggle for existence are not permissible and nothing should be eliminated, nothing should be added or improved, nature should be left as it is and we shall watch the results. The areas within zapovedniks are of enormous significance, so their establishment must be primarily the concern of the state; though it can, of course, be a matter of a public and private initiative, the state must be ahead here." How up-to-date these words sound now.

Morozov, a well-known specialist in forestry, said in 1910 that the selection of areas for zapovedniks should be carried out according to a plan so that each botanical-geographical region had wild protected natural areas which, taken as a whole, would represent a number of the most characteristic and the scientifically valuable types of vegetation. It was this principle that was employed in the Soviet Union, and continues to be today in post-Soviet Russia, when forming the network of zapovedniks.

In a 1913 article titled "Protect Nature!," Taliev wrote that "the beauty of nature is the highest value of its own, and it must be protected irrespective of narrow practical tasks—a beautiful landscape, a scenic road, a precipice associated with recollections, etc., are the national heritage in the spiritual area just the same as minerals and so forth are our heritage in the area of material culture." These ideas did not become popular in Soviet Russia; the rational and utilitarian attitudes toward nature, including its protection, took the upper hand. Today, the nature-conserving community begins to return to those remarkable ideas.

In 1914, the first proposals for founding zapovedniks in the Baikal area were put forward by Franz F. Shillinger. This passionate traveler, an enthusiastic and gifted man, was directly involved in the establishment of almost twenty zapovedniks, among them Altaisky, Pechoro-Ilychsky, and Kondo-Sosvinsky, both in Russia and in other parts of the Soviet Union. In 1929, Shillinger conducted investigations in the area between the Pechora and the Ilych rivers. He wrote then that "the beauty of the park we are working at does not yield in many ways to the

renowned Yellowstone Park in the North American United States; as for its economic aspect and its contribution to the growth of well-being of the local people, it will exceed that park in many ways." In 1930, Pechoro-Ilychsky Zapovednik was founded; it has since been added to the list of World Heritage Sites. However, few people, whether in Russia or beyond, know about the beauty of Pechoro-Ilychsky, and it should be noted that its contribution to the growth of the well-being of the region has been very insignificant so far. The ideas and plans developed by Shillinger have not yet been put into practice. The history of establishing zapovedniks in Russia, as exemplified by Pechoro-Ilychsky, has been contradictory and far from easy.

Approaches to the purposes and objectives of zapovedniks have changed many times over the decades. During the formative years discussed above, three main competing ideas were put forward:

- Some felt that a network of zapovedniks patterned upon North American national parks should be created in order to conserve wild nature and to show its beauty to people.
- Others believed that a network of zapovedniks must serve scientific investigations exclusively.
- Still others promoted a strictly practical approach: zapovedniks must become hunting reserves in order to conserve and increase populations of valuable commercial species.

All three approaches were employed during the creation of the first zapovedniks. But subsequently Russian society's attitude toward living nature started changing, and the attitude toward zapovedniks changed as well. In the 1930s, zapovedniks were influenced by activities aimed at "improving" nature. Authorities promoted the introduction and acclimatization of species of plants and animals alien to the country; for example, raccoon-like dogs and skunks, which are now ubiquitous. Such predators as wolves, lynx, birds of prey, and so on were considered harmful and were destroyed.

The rise to power in the 1930s and 1940s of the heterodox geneticist and agronomist Trofim D. Lysenko proved disastrous to the zapovednik movement. Lysenko's views—he believed that ecology and genetics were hostile to the Soviet regime—received enthusiastic official support. Unfortunately, Lysenko's beliefs were based upon the supposed necessity of radically altering nature in favor of the material interests of human beings. The impact on the zapovednik system was tragic: in the 1950s and early 1960s according to the "highest" verdicts, zapovedniks and the science dealing with them were branded as useless. Many zapovedniks were liquidated, and the area of surviving ones was considerably cut down. Beginning in 1951, 21 of the 37 zapovedniks in Russia proper were liquidated; in the Soviet Union as a whole the number was 88. The area of the remaining ones

was reduced catastrophically. For example, Pechoro-Ilychsky Zapovednik was cut to just 7% of its former area, while that of Sikhote-Alinsky Zapovednik went from 1.8 million ha to 100,000 ha.

In the 1970s, the network of zapovedniks began to be restored, and good progress was made in developing new ones. One might say that the scientists "took revenge" for the persecution of zapovedniks during the previous period! In 1981, the General Statute of National Zapovedniks was approved. It established a strict nature conservation regime for the entire area of zapovedniks, prohibited any interference in natural processes, and stated the priority of scientific activities. The statute reflected the interests of nature conservation in detail and rather completely, and has undoubtedly played a very constructive role. Nevertheless, many of its aspects were idealistic. Unfortunately, it did not take into account the interests of people living within zapovedniks or nearby, nor did it account for the peculiarities of each protected area, local traditions, and the variety of purposes and objectives that arose during different periods of the zapovedniks' history.

At the end of the 1980s and the beginning of the 1990s, the changes in the society led many activists to go to work for the nature conservation organizations that were then being formed. Thanks to their efforts, the network of zapovedniks began to grow very rapidly. In the 1990s alone, 31 new zapovedniks were established. At the same time, up-to-date legislation was passed. In 1991, a new Statute of State Nature Zapovedniks in Russia was approved in which attempts were made to take into consideration the interests of nature protection and people as well as to phrase the rights and duties of the zapovedniks' law enforcement (ranger) service. In 1995, a federal law on protected areas, including zapovedniks, entered into force. One provision was the creation of a conservation, research, and environmental education body to serve zapovedniks. Zapovedniks are now federal properties, and are completely exempt from any economic use. Today, when Russian protected areas are mentioned, it is the state nature zapovedniks that are mostly meant. Zapovedniks comprise the foundation of the Russian network of protected natural areas.

## Zapovedniks and Local Communities

Up to the beginning of the 1990s, villages and other settlements were often included in the areas of designated zapovedniks. Sometimes the central office of a zapovednik was located directly in such a settlement. As in most remote places in Russia, people continue to live in some isolation from the rest of the world and mostly earn their living directly from the natural economy. They cultivate the earth, keep cattle, and use wood to fire stoves, and it is often only within the zapovednik's forest that it

is possible to gather sufficient stocks of that firewood, collect berries and mushrooms, etc. Other zapovedniks are in the immediate vicinity of towns and villages, which causes certain inconveniences for the people living there. For years the question of relations between local people and zapovedniks was not dealt with properly. Zapovedniks, separated from the outside world, lived according to their own laws. The hard period that Voroninsky Zapovednik in Tambovsky Region went through illustrates the problem. Founded in 1994 to save the last surviving islands of forests, the zapovednik is almost completely surrounded by numerous settlements. Most of the local people, who had watched with a heavy heart the contamination of the rivers and lakes, mass poaching, and the destruction of forests, at first enthusiastically supported the establishment of the zapovednik. Then questions began to arise. Where to take firewood from? How about gathering berries and mushrooms? What about fishing? Can all the problems connected with the traditional use of natural resources by local people be solved in the areas adjacent to the zapovednik? The administration of the zapovednik carried out numerous negotiations, clarified the boundaries of the protected area, tried to take into account local peculiarities when preparing the "particular statute," the main legal document governing each individual zapovednik. An uneasy process it was. Antagonists of the zapovednik tried to use these facts in their favor. Among them there were notorious poachers, but they were poachers invested with power. They launched a massive anti-zapovednik campaign, demanding that it should be closed down. They involved some representatives of the federal authorities in the conflict. Sustained efforts were required of the zapovednik's managers, its staff, and the Board of Zapovedniks to stop illegal actions associated with the campaign. It became obvious that zapovedniks will not be able to conserve nature if they do not bear in mind the interests of local people and do not win their understanding and support. The problem is, of course, not exclusively Russian. In many countries of the world, protected area specialists try to find like-minded people in local communities—representatives of the public who unite in supportive non-governmental organizations (NGOs). They help national parks and other protected areas conduct a dialogue with people, carry out environmental education work with children, and draw extra funding for nature conservation projects.

### Public Movement in Support of Zapovedniks

Until 1994, NGOs dedicated to promoting protected areas and ensuring their public support were virtually non-existent in Russia, though some nature conservation organizations included protected areas in the sphere of their interests.

That December, a seminar held at the Caucasian Zapovednik became a landmark in Russian protected area management. It was devoted to the problems of environmental education activities of zapovedniks and national parks. The question of making the work more active, as well as the importance of winning nationwide support, were discussed for the first time at the seminar. It gave an impulse to the formation of a public movement in support of protected areas, and the process of organizing associations began. For the last several years, associations of zapovedniks and national parks in northwestern Russia, along the Middle Volga, and in the Far East (among others) have been actively working. A number of zapovedniks began to issue their own newspapers, and many have been intensively cooperating with mass media. Since 1994, the professional newspaper *Zapovedy Vestnik* has been issued to conduct an exchange of information between specialists of protected areas. In 1997, the first national monthly popular newspaper on zapovedniks and national parks, called *Zapovednye Ostrova* ("Protected Islands") appeared in Russia. The newspaper is being published by the EcoCenter "Zapovedniks."

Specialists working in zapovedniks have realized that only by working in contact with local people, informing the public of the activities of zapovedniks, and helping to resolve the nature conservation problems of the surrounding region, can they enlist true public support. Here is a graphic example. In 1993, two years after the founding of Katunsky Zapovednik, an opinion poll was conducted to find out the attitude of people living in the adjacent Ust-Koksinsky Region. The region is in the mountains, far away from any large settlements. The immediate interests of the people would not seem to have been infringed upon. Nevertheless, 19% of those questioned expressed a negative attitude toward the existence of the zapovednik, and a further 22% had heard nothing about it. Intensive work, first of all with schoolchildren, teachers, and the mass media, has led to a change of opinion. According to a new poll taken in 1995, more than 94% of the people now knew about the zapovednik, and 81% found its activities useful. Today, Katunsky Zapovednik has firm support in the region and the wider republic, and has acquired additional financial possibilities.

In the 1990s, the attention of foreign charitable foundations and other organizations, such as the MacArthur Foundation, the Eurasia Foundation, the World Wide Fund for Nature (WWF), and the U.S. Agency for International Development, was drawn to the system of zapovedniks as a whole. Of great importance was the development of *The Portfolio of Investment Proposals for Conserving Biodiversity in Russia,* a publication supported by WWF, which then set up a Russian program office. Further drawing the public's attention to

Russian zapovedniks and other protected areas was the formation of the EcoCenter "Zapovedniks," established by WWF in 1996.

The EcoCenter "Zapovedniks" created a network of 40 small NGOs aimed at ensuring public support for particular zapovedniks (much like Friends' Groups). The main members of such groups are teachers in local schools. The director of Bureinsky Zapovednik, Albert Dumikyan (who was drawn away from sunny Armenia to Khabarovsky Territory to manage the zapovednik), spearheaded a Bureia Center, which is actively working with schoolchildren and the mass media of the region. The EcoFund "Chazy," established under the initiative of Khakassky Zapovednik, issues the *Zapovedano* newspaper, and works with libraries of the republic getting readers (especially children) acquainted with the work of the zapovednik. The EcoCenter of Voroninsky Zapovednik, created by the talented and enthusiastic Alexander Yegorov, who heads the zapovednik's department of environmental education, conducts interesting regional studies and arranges for children's Olympiads related to the zapovednik.

### Historical Monuments and Zapovedniks

Traditionally, zapovedniks were intended only to conserve wild nature. At any rate, neither in the theoretical statements nor in the law is the protection of monuments of history and culture mentioned. But the history and culture of Russia are closely connected with natural features. A striking example is the relationship between the Raifsky Monastery of the Holy Lady and Volzhsko-Kamsky State Zapovednik. For many years, the monastery protected the beautiful forest massif that was in its possession. Then the 1917 revolution broke out and the monastery was closed down. Many years later, the zapovednik was founded and has been conserving the valuable forests ever since. The monastery has now been renewed and its architectural ensemble reconstructed. The zapovednik and the monastery combine their efforts to conserve the beautiful natural environment. Mutual understanding and friendly relations unite Archimandrite Vsevolod and Yuri Gorshkov, director of the zapovednik. Many other zapovedniks incidentally conserve cultural and historical sites and monuments, but do not have the means to give them proper attention. A preliminary investigation carried out by the EcoCenter "Zapovedniks" has shown that Russian zapovedniks contain over 6,000 historical and cultural sites. They include the famous Kapova Cave with prehistoric petroglyphs (Shulgan-Tash Zapovednik, South Urals), 18th-century hermitages (Visimsky Zapovednik, North Urals), medieval settlements (Sikhote-Alinsky Zapovednik, Far East), churches of the 11th-13th centuries (Severo-Osetinsky Zapovednik, Caucasus), ancient burial grounds, monuments of the Second

World War era, and on and on. These monuments and sites need legislative protection and special studies.

### Tourism and Zapovedniks

Can tourism be developed in zapovedniks? The issue has been discussed for many years. In the beginning of the century, "nature zapovedniks" and "national parks" were taken as synonyms. After the issuance of the statute of 1981, the point of view implying the impossibility of tourism in zapovedniks predominated. But a number of zapovedniks were established in places that traditionally have attracted many tourists. These zapovedniks conserve unique nature features that arouse great interest in many people, such as the valley of geysers in Kronotsky Zapovednik (Kamchatka); Kivach, the biggest waterfall in Europe; and other unique or beautiful landscapes. There are also traditional tourist spots such as the Dombai within Teberdinsky Zapovednik (Caucasus), Krasnoyarsk *stolby* (peculiarly shaped rocks—a Mecca for climbers) in Stolby Zapovednik (Siberia), and others.

Today's legislation allows zapovedniks to develop tourism facilities in specially assigned areas, and to create trails. At the same time, zapovedniks remain nature reserves—strictly protected areas. The tourist routes and areas assigned to traditional uses by local people account for only 0.3 to 5% of the zapovedniks' total area. On the rest, nature proceeds according to its own laws. In most areas of zapovedniks, hunting, the felling of trees, the collection of windfallen trees and branches, or any other interference in natural processes are prohibited.

### Conclusion

Thanks to the unique historical conditions of Russia, a geographical network of zapovedniks has been created which represents virtually all the diversity of nature throughout the country: the northern tundra, the mountains of the Caucasus, the Urals and the Altai, the black-earth steppes and Siberian taiga, the Far East and Kolsky Peninsula. The potentialities are unique, and today it is necessary to continue strengthening the network that has resulted from almost a century of zapovedniks.

***Natalia Danilina,*** EcoCenter "Zapovedniks," Institute of Economics, 15th Floor, Nakhimovsky Pr. 32, Moscow 117218, Russia; chipmunk@online.ru

**John Shultis**

# Consuming Nature: The Uneasy Relationship Between Technology, Outdoor Recreation and Protected Areas

*Our culture has seldom been inclined to confront the profound changes that accompany technological innovation. Like a carrot prompting a cart horse, technology entices us forward in a way that keeps us from noticing much about the road ahead, each offering results in such a slight movement that by the time we realize we are far from home, no serious re-examination of our fate seems possible.*

— Attributed to J. Robert Oppenheimer, *Ethics for New Life Forms*

## Introduction

Humans have always displayed contradictory attitudes towards technology. For over a century, our literature and films have contained dire warnings about the power of our technological creations. From Shelley's Frankenstein to Orwell's Big Brother and Kubrick's HAL in "2001: A Space Odyssey," artists of all persuasions have used the potentially macabre consequences of technology to titillate and terrify their audiences.

Similar conflicting attitudes between humans and technology can be found in the parks, outdoor recreation and tourism field. Indeed, it could not be otherwise: these recreational experiences, activities and institutions cannot escape the cultural milieu from which they emanate (Foresta 1984). This is a critical point: the uneasy alliance between technology, outdoor recreation, and protected areas outlined in this paper is a reflection of a far deeper and complex relationship between humans and their technology. As such, there are no easy answers, and it appears that the issue of technology will act as a magnet of contention for recreation managers. That is, recreationists and recreation managers will be both attracted and repelled by the recreation technology that affects the outdoor recreation experience and recreation management in both a positive and negative manner.

The purpose of this paper is to outline past and present relationships between technology, outdoor recreation, and protected areas, highlight the potential impacts of technology on the outdoor recreation experience and park management, and suggest future trends in this Byzantine relationship. The link be-

tween technology and consumerism in outdoor recreation and parks is outlined.

## Historical Relationships between Technology, Outdoor Recreation and Protected Areas

Despite the continued (and flawed) conception of parks as primordial landscapes relatively untouched by human activity, there is a strong, often-forgotten relationship between protected areas and human technology. The rise of Romanticism and Transcendentalism—generated in large part from the widespread social and environmental impacts of the technology which created the Industrial Revolution—laid the foundations for the creation of first urban, then national parks. More specifically, without the technological innovation of the railroad, and the critical support of railroad barons, it is unlikely that early North American national parks such as Yellowstone and Yosemite in the USA and Banff and Glacier in Canada would have been legislated (Nash 1982; Shultis 1995; Runte 1997).

The ability of Henry Ford's assembly line to create affordable automobiles had even greater implications for parks (Quin 1997). Even John Muir, the most strident supporter of wilderness and national parks, grudgingly agreed that keeping the newfangled automobile out of the parks would be counterproductive. In retrospect, Muir and other supporters of the automobile were correct: allowing automobiles into parks directly led to increased public support for parks, a boom in outdoor recreation, and the creation of additional parks and park systems (e.g., state and provincial parks). The downside—and there are almost always unintended, negative consequences of new technology (Tenner 1996)—was increased congestion, conflicts, environmental impacts, and commercialization in the parks.

The degree to which outdoor recreation and protected areas have become commercialized is demonstrated by the now ubiquitous use of natural images and outdoor recreation activities to sell everything from cars to calendars and the related "corporatization" of municipal and public recreation agencies (Crompton 1998; Helmuth 1999; Juniu 2000; Schwartz 1998; Searle 2000; Stormann 2000). The use of outdoor recreation and wilderness images in marketing has proven to be problematic, in that the messages contained within advertisements, both explicit and subliminal, are often antithetical to the low-impact practices espoused by park managers (Huffman 2000). Even more disturbing, there is empirical evidence that the commercial media's representation of nature leads to a devalued emotional attachment to the land, particularly in local settings (Levi and Kocher 1999). This finding supports McKibben's warning that, through the hubris of advanced technology,

> we have killed off nature—that world entirely independent of us which was

> here before we arrived and which encircled and sup ported our human society.... Instead of being a ca tegory like God—something beyond our control—it is now a category like the defense budget or the mini mum wage, a problem we must work out. This in itself changes its meaning completely, and changes our reaction to it (McKibben 1989, 96, 210; see also Sack 1992).

A closely related economic and social force of the twentieth century, consumerism, has also had indelible impacts on the outdoor recreation experience, and thus park management. Falk (1994, 94) identifies three related characteristics of the consumer society: "(a) the *constitution of desire* exceeding the "necessary," (b) the *limitlessness* of the desire and (c) the endless longing for the *new*" (italics in original). Our consumption patterns now directly relate to the way in which we measure our happiness and quality of life. In addition, our economy has become largely dependent upon this upwardly spiraling consumption of material goods. Perhaps most importantly for park managers, consumerism has led to the creation of politically active consumer groups, many of which now wield considerable economic and political power. For example, in the field of outdoor recreation, groups supporting the increased presence of ATVs (all-terrain vehicles) and other motorized vehicles in wilderness and parklands have become an increasingly powerful force in legislation and policy development. In response, The Wilderness Society (2000) recently listed unregulated ATV use as the most important issues facing parks and wilderness in the year 2000.

Consumerism has become rampant among many recreationists. A recent newspaper article suggests that "money, leisure time, and an appreciation for the finer things in life have turned the Great Outdoors into just one more place to enjoy a latte" (Florio 2000, 1): rather than "communing" with nature, people are now "consuming" with nature (see also Hasselstrom 1994). Ewert and Shultis (1999) essentially make the same point, suggesting that while most recreationists use technology to visit the backcountry, an increasing number visit the backcountry to use their technology (cf. Hill and McLean 1999). Again, the key point here is that outdoor recreation and parks are culturally defined, and thus cannot escape the so-called tyranny of consumerism that either curses or blesses contemporary society, depending on one's perspective.

## Contemporary Issues and Attitudes

While park and outdoor recreation managers have been reacting to an influx of technology since the birth of the national park systems in the mid-to-late nineteenth century, the battle lines seem to be drawing ever closer at the dawn of the twenty-first century (Petersen and Harmon 1993; Shultis 2000). This increasing concern over technology among outdoor recreationists seems related to:

(a) the accelerating rate of technological innovations affecting outdoor recreation and the speed at which they enter the mass market; (b) the increasing amount and level of social (e.g., conflict, crowding, and displacement) and environmental (e.g., increased erosion and disturbance of wildlife) impacts created by these accumulating technologies; and (c) the impact that this synergy of new technologies may be having on the outdoor recreation experience and thus (d) the very structure and cultural roles of parks and nature itself. Some of the major impacts of technology and the implications of these impacts are reviewed in Table 1.

For example, new forms of transportation—e.g., personal watercraft (jet skis), snowmobiles, and mountain bikes—have greatly increased the number of distinct types of recreationists who must share outdoor recreation areas with growing numbers of visitors. Recreation managers are forced to deal with the disparate requirements and demands of specialized user groups, as each new technology-based activity creates a clientele with distinct motivations, attitudes, values, and desired setting and management attributes (Bryan 1977; Bryan 2000). As a result:

> The number and diversity of visitors to natural areas are increasing. Conflict is an inevitable result of these pressures: not all desired experiences are possible, not every stakeholder [i.e., consumer] will be satisfied, and some will certainly lose out. Issues of social equity, power, and politics will increasingly dominate recreation (Hull 2000, 58).

Hull's warning about the social and political ramifications of technology is echoed by Volti (1995, 22), who notes that "technologies do not stand or fall on their intrinsic merits. The decision to develop and deploy a new technology is often shaped by the distribution of power in society." The proliferation of user groups, often enabled and defined by technology, has helped propel recreation managers into the age of the special-interest group, a pluralistic and postmodern world in which a multitude of consumer-based groups actively lobby governments to enact legislation and policy that reflect their collective point of view. Managers are thus forced to adjudicate between competing special-interest groups wielding considerable, though differing levels of economic and political power. This is an excellent example of what Weil and Rosen (1997) term "techno*Stress*": the individual and societal costs of dealing with the consequences of technology.

The impact of "techno*Stress*" on park management and the outdoor recreationist is hard to underestimate. The (good?) old days, where canvas tents and tinned goods were considered lightweight, where wool and cotton were the only available fabrics, now seem like ancient history. Innovations only a few decades old, such as nylon, fiberglass, freeze-dried foods, and plastic are now considered "traditional" camping

equipment (see Anonymous 2000b). The impact of these synthetic fabrics and materials was particularly revolutionary, and, like the automobile before it, propelled outdoor recrea-

Table 1. Categories of technological impacts: Impacts and implications for park managers. Source: Adapted from Ewert and Shultis (1999).

| *Category* | *Examples* | *Impacts* | *Major Implications / Issues* |
|---|---|---|---|
| ***Access / Transportation*** | Automobiles, airplanes, ATVs, snowmobiles, jet skis, mountain bikes, helicopters, BASE jumping | Increased use and type of users, recreation conflicts, human–natural environment interactions (e.g., wildlife) | Managers need to deal with increasing conflicts, carrying capacity issues, environmental impacts, infrastructure development, and a more diverse set of recreationists (e.g., experience levels) |
| ***Comfort*** | Synthetic fabrics, plastics, internal-frame packs, light-weight tents | Longer visits, increased use, expanded use (e.g., by families, the less fit, the elderly), increased desire for facilities | Increased attention to carrying capacity, environmental impacts, search and rescue, visitor demands for amenities (e.g., showers, etc.) |
| ***Safety*** | Synthetic fabrics, stronger materials, more effective means of protection (e.g., climbing aids, non-collapsible kayaks) | Longer and more remote visitation, recreation during the "shoulder periods" (e.g., winter); a general "pushing back" of the perceived margin of safety, more risk-taking activities | Incongruence between the type of situation (i.e., level of danger) and the skills and experience of the individual; expectation that "experiences" will be low risk |
| ***Communication*** | Radio, cellular and digital phones, GIS, GPS, datalink watches, "Palm" computers | More rapid linkages to other groups; expectation that remote backcountry tripping can stay "connected" to outside world | Increased safety and planning capability; expectations that information and ability to "connect in" will be available (e.g., park radio frequencies, avalanche warnings at the site, etc.); more demand for search and rescue |
| ***Information*** | Television, satellite TV, Internet | Increased awareness, use and appreciation, more informed public, increased options and opportunities | Primarily external-driven messages: managers will be forced to respond to images portrayed by commercial interests and provide their own |

| | | | |
|---|---|---|---|
| | | | information in a variety of formats |

tion activities and areas into the mass market. In addition, they had (and continue to have) enormous implications for recreational use patterns (e.g., frequency and length of trips, distance traveled per trip) and, perhaps most importantly, for the experiential component of outdoor recreation activities (e.g., safety, comfort) and their social and environmental impacts (Ewert and Shultis 1999). Among the many new technologies that may challenge park managers in the near future include folding mountain bikes and "all-terrain" in-line skates and skateboards (Anonymous 1999). The Internet and virtual reality programs will also change the way in which we perceive, visit, and experience protected areas.

Declining budgets have wreaked havoc on the ability of land management agencies to deal with the potential impact of new technologies. For example, the director of the U.S. Bureau of Land Management (BLM) noted that "improved technologies mean people can now travel into areas that were once inaccessible" and admitted that "BLM planning, staffing and budgets have not kept pace with the need to manage these activities and reduce the impacts to the natural systems" (Bureau of Land Management 2000a, unpaginated; see also Wilkinson 1999a). In addition, our inability to predict future technological innovations or their impacts make these decisions even more problematic for outdoor recreation managers (Wilkinson 1999b). To this end, Section 4.1.4 of Parks Canada policy maintains:

> As new or modified forms of out door recreation emerge, each will be assessed for its appropriateness nationally before consideration in the park management planning process. Individual park man agement plans will then specify the types and ranges of both new and existing appropriate outdoor recreation activities and their supporting facilities. Parks Can ada will also periodically review its national directives to ensure that new forms of outdoor recrea tion are adequately considered.

While this proactive stance is laudable, and often lacking in other agencies, the current lack of appropriate levels of funding, personnel, and research capacity in Parks Canada (Searle 2000), which prevents them from dealing with these issues, makes the assurances ring a little hollow.

The aforementioned societal ambivalence towards technology is easily found among park and other outdoor recreation managers. At one end of the spectrum are those who wholeheartedly embrace all forms of new technology in outdoor recreation areas. Douglass comes out firmly on this side in his discussion of cellular phones in the backcountry:

> New technologies are here and they should be welcomed by managers instead of being viewed as annoyances. Those areas, such as Baxter State Park in Maine, that have responded to the new tech nology by banning it are wrong-minded. Certainly, there is some slight annoyance from hearing people talk on the telephone in what some might consider to be an inappropriate setting. Much of the anti-cellular phone arguments reflects resistance to change and even envy of new concepts of open space enjoyment. The tech nology ... presents great opportu nities for peo ple to visit and enjoy outdoor settings more safely (Douglass 2000, 348).

It is interesting that Douglass' rationale for supporting cellular phones in backcountry location are equivalent to those used on behalf of automobiles in the early 1900s. It appears that for many recreation professionals (and recreationists), public use is still the highest function of protected areas. Searle (2000) suggests that this is the primary position and argument in Parks Canada, despite legislation that clearly recognizes the supremacy of the preservation (as opposed to use) function. Similar concerns have been expressed about the U.S. National Park Service (NPS) (Wilkinson 1999a).

At the other end of the technology spectrum are those like Baxter State Park Director Buzz Caverly, who, despite opposition from a variety of pro-and anti-development groups, has created strict regulations in the park. Not only are cellular phones restricted, but radios, televisions, portable tape decks, outboard motors, and pets are also prohibited in this park (Austin 1996).

But Caverly is by no means alone. Restrictions on recreation technology have been increasing throughout protected areas, with NPS recently banning snowmobiles and jet skis in many, though not all, national park units (National Park Service 2000a; National Park Service 2000b). Many other parks disallow specific activities such as BASE jumping (parachuting off cliffs), slack lining (a combination of rock climbing and bungee jumping) and mountain biking either throughout parks or in specific areas of a park. BLM, typically seen as the USA's most pro-ATV federal land-managing agency, has recently agreed to review its policies on ATVs (Bureau of Land Management 2000); previously, it had ignored presidential directives from the 1970s to better study and regulate the impact of these technologies in their jurisdictions.

These conflicting attitudes towards technology are also found among recreationists. Perhaps the most revealing place to examine recreationists' attitudes to technology is within the many popular magazines dedicated to this user group. Magazines such as *Backpacker* and *Sierra* clearly display paradoxical attitudes towards technology. On one hand, the newest recreation- related technologies are extolled by the numerous companies advertising throughout these magazines, and the maga-

zines have come to rely upon advertising revenues. Regular editorial columns display the newest "gear," normally in a non-critical manner which ignores their potential social or environmental impacts. On the other hand, occasional articles bemoan the current state of the "technological wilderness," profile anti-technology recreationists, or romanticize about the wilderness experience in the "good old days" before zippers, chain saws, Gore-Tex, and satellite phones (e.g., McGivney 1996; McGivney 1999; Anonymous 2000c; Greenwald 2000; Tilton 2000).

Despite these inconsistencies among both recreationists and managers, however, the overall trend seems clear. While there are powerful opponents, outdoor recreation agencies have become increasingly willing (or, more correctly, willing to be convinced by external lobby groups) to alter policy to limit the use or impact of technology. Consumer-group opponents will likely continue to focus their arguments on the need to increase the public's use and support of parks and the importance of increased visitor safety, while supporters of restrictions will point to the social and environmental impacts of unregulated technologies in the backcountry. It seems likely, given (1) the related trend of agencies to emphasize preservation rather than use functions of parks, (2) the increasing social and environmental impacts within parks, and (3) the increasing rarity of relatively unmodified landscapes outside of park systems, that these restrictions will continue to escalate in the near future.

These restrictions will be welcomed by environmental and anti-technology groups such as the Les Miserables Primitives and the Society of Primitive Technology in the USA. These groups are the vanguard of a growing "Neo-Luddite" movement (named after a nineteenth-century group who eschewed the technology that forced them from their jobs during the Industrial Revolution) centered in the USA (Hill and McLean 1999). These and like-minded groups will be pitted against pro-technology groups who rely upon consumerism and groups who believe in the primacy of use in the ever-present preservation-versus-use debate.

A contemporary example of this debate can be seen in the current battle over the continuation of the Recreation Fee Demonstration Program. Originally embraced by a wide range of interest groups, proponents (largely representing pro-ATV interests and so-called wise use groups) are now battling with environmental and non-mechanized recreation groups to dismantle this program. It has become a controversial, divisive issue among park and wilderness agencies (McManus 1999; Paige 1999; Watson and Herath 1999; Collins 2000; Woodside 2000). Perhaps the final winner of this battle will serve as an indicator of the speed at which technology will be restricted

in the near future, in that it will demonstrate the current power of commercial/consumerism and preservation/environmental interests within land agencies and the wider society.

## Discussion and Conclusion

Technology has proven to be a double-edged sword for outdoor recreation and protected area managers. Technological advances have greatly facilitated public recreation in protected areas by improving access, transportation, safety, comfort and information on parks. The resulting increases in park use have heightened social concern and appreciation for the natural environment and protected areas (or vice versa). However, technology also has changed how individuals perceive nature and pursue outdoor recreation. Increased participation rates have not only served to generate additional technological innovations, but may also have led to increased consumerism in protected areas. For many recreationists, the "psychological focus of the leisure activity actually becomes the technology itself (particularly its acquisition and use) rather than the activity" (Hill and McLean 1999, 16).

The limited empirical evidence available suggests that the increasing use of technology in outdoor recreation will have fundamental effects on the emotional relationship between humans and the natural environment, resulting in a lessened emotional attachment to the land, especially in local areas. This may be critical to our future relationship to the land: Aldo Leopold strongly argued that local attachment to landscape is the most critical need for the long-term conservation of healthy ecosystems (1999).

This paper has emphasized that recreationists, managers, and the general public will continue to have conflicting attitudes towards the use of technology in outdoor recreation areas. In the short term, until social attitudes and values towards consumerism and commercialization in protected areas change, managers will find it difficult to place restrictions on technology in protected areas: in their own best interests, pro-technology consumer groups and their industry backers will attempt to block such efforts.

Managers must do a better job at firing the hearts of recreationists to participate in a debate over the purpose of protected areas and the appropriateness of specific technologies within these areas. Organizations supporting parks must also help generate and contribute to these difficult discussions. The battle for high-quality recreational experiences and protected areas may rely on these groups' ability to prove Oppenheimer wrong: while humans have been loathe to reflect upon the impacts of technology in the past, perhaps a better understanding of the severity of technology's ramifications in protected areas will convince us to initiate such a process.

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***John Shultis,*** Resource Recreation and Tourism Program, University of Northern British Columbia, 3333 University Way, Prince George, British Columbia, Canada V2N 4Z9; shultis@unbc.ca

**Peter J. P. Gogan**
**John A. Mack**
**Wayne G. Brewster**
**Edward M. Olexa**
**Wendy E. Clark**

# Ecological Studies of Bison in the Greater Yellowstone Area: Development and Implementation

## Introduction

Bison *(Bison bison)* of the Greater Yellowstone Area (GYA) are perhaps best known to the scientific community from the classic study of Meagher (1973) that reviewed their ecological status and management from the time of establishment of Yellowstone National Park in 1872 through the last National Park Service (NPS) removals of bison within the park in 1966. Since cessation of herd reductions in the park, bison numbers within Yellowstone increased (Dobson and Meagher 1996), as did range use (Meagher 1989b), including increased frequency and magnitude of movements beyond the park boundaries in winter (Meagher 1989a; Pac and Frey 1991; Cheville et al. 1998).

A free-ranging bison herd, distinct from the Yellowstone park herd, was established through the release of a captive group in the southern end of the GYA in 1969. This herd utilizes portions of Grand Teton National Park and the adjacent National Elk Refuge (National Park Service 1996).

Bison of both the northern and southern GYA harbor the exotic bacterial organism *Brucella abortus* (Mohler 1917; Thorne et al. 1978), the causative agent of brucellosis. Brucellosis can cause abortion in domestic and wild ungulates and undulant fever in humans. Concerns over the potential transmission of brucellosis from bison to domestic cattle in Montana, as bison move beyond the northern and western boundaries of Yellowstone in winter, has prompted the state of Montana to kill bison leaving the park since 1984-85 (Dobson and Meagher 1996).

Through the spring of 1996, almost 2,000 bison were killed beyond the park boundaries (Meyer and Meagher 1995; National Park Service 1998). These management ac-

tions have been and remain controversial (Peacock 1997). In 1996, NPS and the state of Montana developed and implemented a new interim program to control the number of bison moving beyond the park boundaries (National Park Service and State of Montana 1996). An estimated 1,100 bison were removed from the Yellowstone park population in the winter of 1996-97 alone (P. Gogan, unpublished data).

A number of ecological factors and park management practices have been suggested as contributing to bison movements. These include upward trends in bison numbers coincident with a series of mild winters in the 1980s. Some hypothesize that the increased size of the bison population impacts the forage resources available in winter. The interaction between bison movements and available forage may be compounded in some winters by snow conditions, which may render forage unavailable to bison. Furthermore, it has been suggested that bison use of plowed and groomed portions of Yellowstone's road system in winter: (1) provides access to forage resources not otherwise available; (2) results in an energy savings to bison, which facilitates over-winter survival; and (3) results in elevated numbers of bison in the park when these two factors are combined (Meagher 1993).

The authors worked cooperatively to identify many data gaps in bison ecology and to develop and implement a multi-faceted research program to secure the required information. We describe the status of the research program, the coordination between studies, the inclusion of additional studies of the ecology of bison in the GYA, and the realized and intended end products of these studies.

## Program Development

The bison research program began in the fall of 1995 when biologists from the park's Yellowstone Center for Resources contacted their counterparts in the National Biological Service (NBS, subsequently reorganized as the U. S. Geological Survey Biological Resources Division, or USGS-BRD, in 1996) to discuss information needs relative to the ecology of bison in Yellowstone. Two preliminary studies were implemented in the park in 1996 (Dawes 1998; Ferrari 1999). The identified information needs quickly expanded to a comprehensive list of research projects relative to the northern GYA. Inclusion in these discussions of biologists from Grand Teton and the National Elk Refuge resulted in identifying and adding research projects for the southern GYA to the list. Identified research projects included:

- A synthesis of trends in bison numbers and habitat use between 1968 and 1998;
- Statistically reliable estimates of the number of bison in Yellowstone;
- Bison seasonal movement patterns and habitat use;
- The role of extrinsic factors

(such as snow conditions and forage availability) in seasonal distribution;

- Effects on bison of winter grooming of portions of the road system within Yellowstone;
- Impacts of bison on the vegetative communities within Grand Teton and Yellowstone;
- Impacts of killing or removing bison on bison population dynamics;
- An ecosystem-level model to calculate bison ecological carrying capacity within Yellowstone; and
- An ecosystem model-based analyses of bison and elk population dynamics and habitat-use relationships in the southern GYA.

These studies were designed to integrate fully with the pilot studies then under way (Dawes 1998; Ferrari 1999). We determined that all data for the northern GYA should be gathered in a manner compatible with a synthesis of findings within the ecosystem model.

We recognized that the most desirable approach was to conduct a comprehensive research effort to address information needs simultaneously. Our next step was to identify potential principal investigators among USGS-BRD and university researchers. Researchers were selected on the basis of their demonstrated ability to conduct comparable studies of bison or other ungulate species in the GYA or elsewhere. Principal investigators were charged with developing pre-proposals for a package of studies designed to be coordinated and conducted simultaneously so as to realize the maximum synergistic benefit of interactions between researchers. Conducting the studies simultaneously would also result in sharing of resources between both the ecological studies (Table 1) and on-going investigations of the epidemiology of brucellosis in bison. This package of pre-proposals was submitted to the office of the director, USGS-BRD, for funding.

## Program Implementation

We required principal investigators to develop full proposals and secure two written peer reviews of each proposal. A separate independent panel was assembled to review each proposal and accompanying written peer reviews. Members of the panel were selected on the basis of their knowledge of the GYA or bison ecology. Two individuals were selected to serve as co-chairs of the review panel and were charged with submitting a written report of the panel's evaluations to USGS-BRD. The panel met in early June 1997. Each principal investigator made a verbal presentation of the proposed study to the panel. The panel's written evaluation was received the same week (Gasaway and Messier 1997). Principal investigators were required to submit written responses to the review comments or revise the study plan, or both. Funding was released to principal investigators after each

study proposal had undergone complete peer reviews.

A condition of bison research within Yellowstone was that

Table 1. Ecological studies of bison in the GYA developed jointly by the National Park Service and USGS Biological Resources Division. YNP = Yellowstone National Park, INEEL = Idaho National Engineering and Environmental Laboratory.

| ***Project Title*** | ***Principal Investigator (italics) and Co-Investigators*** | ***Funding Source; Status of Project*** |
|---|---|---|
| Utilization of forage by bison in the Gibbon, Madison, and Firehole areas of YNP | *L.R. Irby*<br>S. Dawes | NPS-NRPP; completed |
| Assessment of the risk of transmission of *B. abortus* from bison to elk in the Madison–Firehole winter range | *R.A. Garrott*<br>M. Ferrari | NPS-NRPP; completed |
| Statistical analysis and synthesis of 30 years of Yellowstone bison data | *M.L. Taper*<br>M. Meagher | USGS-BRD; completed |
| Seasonal habitat selection and movements of bison in YNP | *P.J.P. Gogan*<br>E.M. Olexa, K.A. Keating | USGS-BRD; on-going |
| Development of aerial survey methodology for bison population estimation in YNP | *R.A. Garrott*<br>L.L. Eberhardt, S.C. Hess | USGS-BRD; on-going |
| Determining forage availability and bison use patterns in the Hayden Valley of YNP | *L.R. Irby*<br>T. Olenicki | USGS-BRD; on-going |
| The effects of groomed roads on the behavior and distribution of bison in YNP | *R.A. Garrott*<br>D.D. Bjornlie | USGS-BRD; on-going |
| Population characteristics of YNP bison | *P.J.P. Gogan*<br>K. Podruzny,<br>E.M. Olexa,<br>J.A. Mack | USGS-BRD; on-going |
| A model-based synthesis of bison and elk habitat use in the Jackson Valley | *T. Hobbs*<br>F.J. Singer | USGS-BRD / NPS-NRPP; on-going |
| Spatial ecosystem modeling of Yellowstone bison and their environment | *M.B. Coughenour* | USGS-BRD; on-going |
| Genetic analysis of *Brucella* from bison and the generation of a PCR-based diagnostic system for epidemiological and ecological | *R. Rodriguez*<br>F. Roberto | USGS-BRD INEEL; on-going |

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| studies | | |

the park's resource council, an interdivisional operations coordination group, had to review and approve the study plans. Further conditions of the package of bison ecological studies within Yellowstone were that progress reports be filed with the director of the Yellowstone Center for Resources and that all researchers attend biannual coordination meetings with park biologists and other principal investigators. One USGS-BRD requirement for the studies was that all data files generated during the research activities be provided to USGS-BRD and NPS no later than two years after the completion of each study. Each file must have an associated metadata file that is compliant with Federal Geographic Data Committee and National Biological Information Infrastructure standards.

All studies are either completed or under way, and to date principal investigators have complied with all conditions (Table 1, Table 2).

## Discussion

One of the mandates in the 1998 National Parks Omnibus Management Act is that "the Secretary [of the Interior] is authorized and directed to assure that management of units of the National Park System is enhanced by the availability and utilization of a broad program of the highest quality science and information." This mandate highlights the importance of science in management of park resources. Accordingly, the GYA bison ecology research program is planned and integrated so as to provide the "highest quality science" for management purposes. It was conceived and has progressed as a joint cooperative effort between management and research biologists. The program is intended to greatly enhance the understanding of bison ecology in the broad sense and integrate past research and the results of new research into a predictive model of the role of bison in the GYA.

The importance and value of data on bison population ecology is underscored by the extensive treatment given to the available data in a recent National Academy of Sciences review of the status of brucellosis in the GYA (Cheville et al. 1998). The report repeatedly stresses the need for more and better information of the types being gathered by these studies. Furthermore, data from these ongoing studies have direct and immediate application to the "stream" of decisions on bison management represented by the interim bison management plan (1996) and other ongoing planning documents in Yellowstone and Grand Teton and future management actions. The data generated thus far have been used in the final environmental impact statement (EIS) for the interagency bison management plan for the state of Montana and Yellowstone Na-

tional Park (2000), including responses to public comments. Park managers and management biologists relied on these data throughout the bison management EIS process and, more importantly, used them to re-

Table 2. Additional research associated with the cooperative initiative on ecological studies of bison in the GYA. YNP = Yellowstone National Park.

| ***Project Title*** | ***Principal Investigator (italics); Co-Investigators*** | ***Funding Source; Status of Project*** |
|---|---|---|
| Snowpack distribution in Grand Teton National Park, Wyoming | *K. Hansen*<br>P. Farnes, C. Heydon | NPS-NRPP; completed |
| Snowpack distribution across Yellowstone National Park, Wyoming | *K. Hansen*<br>P. Farnes, C. Heydon | NPS-NRPP; completed |
| Evaluation of management alternatives in the *Draft Environmental Impact Statement of the Interagency Bison Management Plan* | *M. Boyce*<br>R. Angliss, J. Mack | NPS-NRPP; completed |
| Winter bison monitoring in the Hayden Valley and Gibbon to Golden Gate sections of YNP | *G.L. Kurz*<br>D.A. Reinhart | NPS Fee Demonstration Program; completed |
| Assessing impacts of winter recreation on wildlife in YNP | *S. Creel*<br>R. Garrott, A. Hardy | NPS Fee Demonstration Program; on-going |
| The application of conservation genetics to the long-term management of bison in five national parks | *J. Derr*<br>J. Templeton | USGS-BRD / NPS-NRPP; on-going |
| Applying dynamic modeling and adaptive management to brucellosis control in the Yellowstone area | *J.E. Gross*<br>B.C. Lubow, M.W. Miller, T.J. Kreeger | U.S. Department of Agriculture / USGS-BRD / State Partnership Program; on-going |
| Reproduction and demography of brucellosis infected bison in the southern Greater Yellowstone Area | *J. Berger*<br>S. Cain, T. Roffe | NPS-NRPP, USGS-BRD; on-going |

evaluate and adjust the preferred management alternative identified in the final EIS. Preliminary findings from some studies have been presented to the Greater Yellowstone Interagency Brucellosis Committee, an interagency group addressing the control of brucellosis in the GYA, and at regional (Bjornlie and Garrott 2000a; Gogan et al. 1998a; Gogan et al. 2000; Hess et al. 2000a; Olenicki 2000) and national (Bjornlie and Garrott 2000b; Gogan et al. 1998b; Hess et al. 2000b) scientific meetings.

The integration of studies and intended synergistic effects of concurrent studies of bison ecology throughout the GYA have worked well to date. The biannual meetings between principal investigators and park biologists have been very productive, with a great deal of exchange and discussion of preliminary findings and refinements in collaboration and research methodology. Data have been gathered at a lower cost and the results have been more informative than would be expected from a sequential series of individual studies. However, the final test will be the extent to which the gathered data are appropriate for setting values for parameters in the spatial ecosystem model (Table 1).

The core group of ecological studies has become a nucleus attracting funding from other sources and generating additional interest from researchers investigating other facets of bison ecology and management in the GYA such as the studies "Assessing Impacts of Winter Recreation on Wildlife in YNP" and "Applying Dynamic Modeling and Adaptive Management to Brucellosis Control in the Yellowstone Area" (Table 2).

We suggest that the model developed here for studies of bison in the GYA provides a framework for the development of interdisciplinary studies of landscape-level issues in other national parks and protected areas. Key elements of our approach are extensive and continuous communication between management biologists and research biologists, and extensive planning and review of study designs to maximize the effectiveness of the research. However, this program was developed in a state of management crisis, with tremendous disagreement over the state of knowledge of bison ecology, and, consequently, over the wisest management alternative. A far more desirable approach is to provide the levels of funding and staffing to both management and research organizations to enable collaborative program development that anticipates research and management needs five to ten years into the future so that the frequency of management crises may be minimized.

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***Peter J. P. Gogan,*** USGS-Northern Rocky Mountain Science Center, Department of Ecology, Montana State University, Bozeman, MT 59717-0001

***John A. Mack,*** Yellowstone Center for Resources, National Park Service, P. O. Box 168, Yellowstone National Park, WY 82190-0168

***Wayne G. Brewster,*** Yellowstone Center for Resources, National Park Service, P. O. Box 168, Yellowstone National Park, WY 82190-0168

***Edward M. Olexa,*** USGS- Northern Rocky Mountain Science Center, Department of Ecology, Montana State University, Bozeman, MT 59717-0001

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